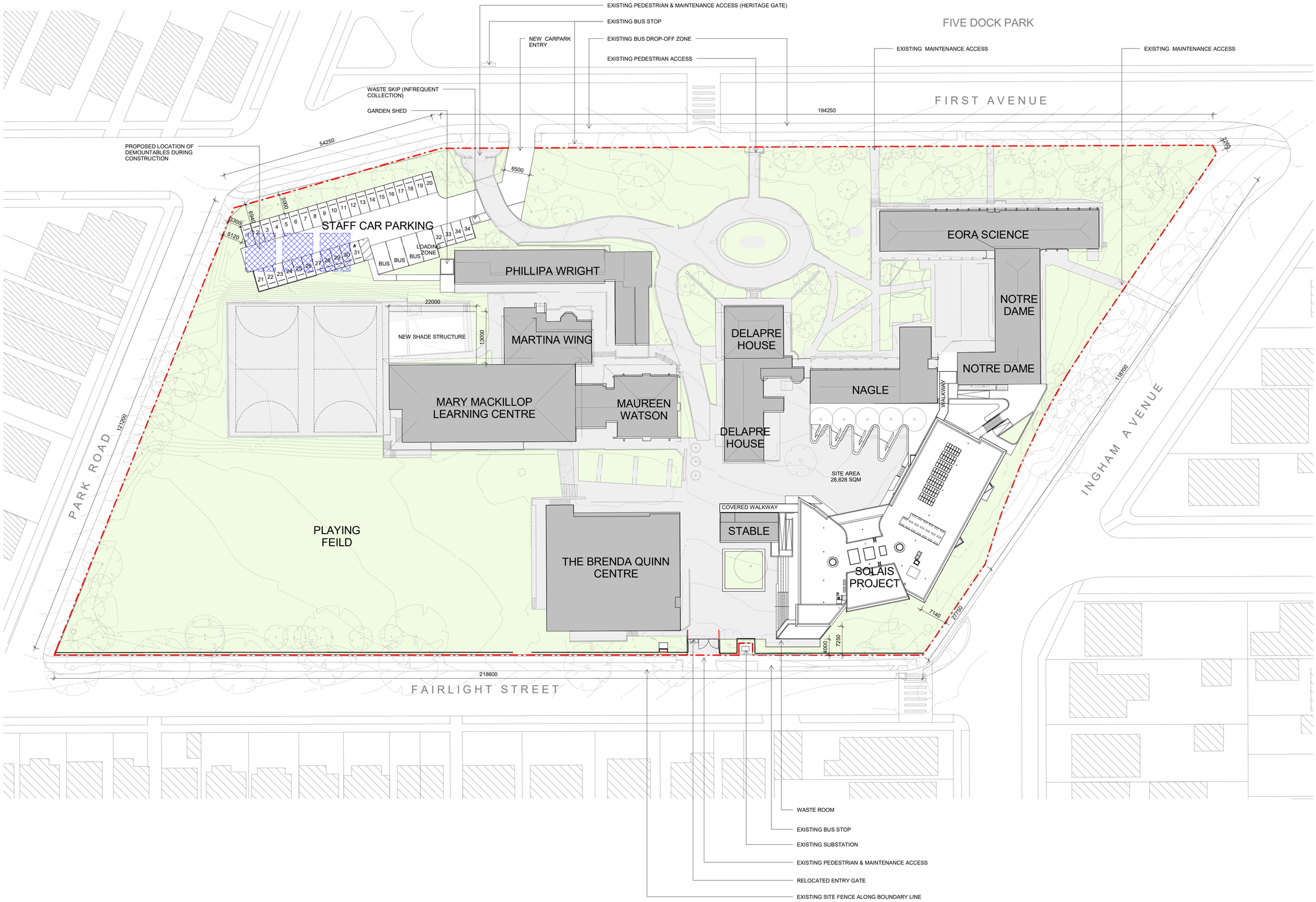

LEGEND

- SITE BOUNDARY
- EXISTING BUILDINGS

REV	DESCRIPTION	DATE
6	Amendment to Development Application	28.06.2018
5	Amendment to Development Application	02.05.2018
4	Issued for Development Application	02.03.2018
3	Issued for Development Application	16.02.2018
2	Issued for Development Application	25.01.2018
1	Consultant Coordination	18.01.2018

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PROJECT TITLE

Domremy College Solais Project

CLIENT TITLE

Sydney Catholic Schools

PROJECT ADDRESS

121 First Avenue Five Dock, Sydney NSW

DRAWING TITLE

PROPOSED SITE PLAN

STATUS

FOR DEVELOPMENT APPLICATION

DRAWN BY	CHECKED BY	DATE PRINTED	SCALE
SQ	JV	3/07/2018 4:31:02 PM	1 : 500

PROJECT NUMBER	DWG NO	REVISION
2128	**DA01.02**	**6**

N

DOMREMY COLLEGE SOLAIS LAB PROJECT

STORMWATER MANAGMENT CONCEPT PLAN – CIVIL ENGINEERING

Prepared for: Sydney Catholic Schools
By: **en**struct group pty ltd
Revision: C
February 2018

DOMREMY COLLEGE SOLAIS LAB PROJECT

WATER MANAGEMENT CONCEPT PLAN - CIVIL

ISSUE AUTHORISATION

Document Title:	Domremy College Solais Lab Project
Document Number:	5503-CIV-RP-001
Project Reference:	5503
Prepared For:	Sydney Catholic Schools
Date:	June 2018
Author:	Miqueas Moreno
Reviewer:	Qusai El-Jurf

Rev	Date	Purpose of Issue / Nature of Revision	Prepared by	Reviewed by	Issue Authorised by
A	09/02/18	Issued for DA	MM	QEJ	QEJ
B	13/02/18	Issued for DA	MM	QEJ	QEJ
C	19/06/18	65% Design Development Updated	MM	QEJ	QEJ

Contents

1 Introduction

enstruct group have been engaged by Sydney Catholic Schools as civil and structural engineering consultants on the Domremy College Solais Project.

This report:

- Outlines and assesses the condition of existing civil assets on site and provides outline civil engineering guidance to meet the requirements of any future works on the site.
- Establishes the design concept for the civil engineering components of the project including stormwater drainage, Sediment and Erosion Control Plan and Water Sensitive Urban Design.
- Defines the performance requirements for a stormwater management plan, considering the respective components of the stormwater drainage system, on-site stormwater detention (OSD) and water quality target parameters within the proposed development to suit anticipated and applicable local authority requirements.

2 Existing Site Conditions

2.1 Site Description

The existing site is located in the Domremy College campus at 121 First Avenue in Five Dock, NSW. The site, depicted on Figure 1, is bounded by First Avenue to the north, Ingham Avenue to the east, Fairlight Street to the south and Park Road to the west. Domremy College is situated in a suburban residential area and adjoins Five Dock Park at its northern boundary.

The site is occupied by a number of educational buildings, a carpark and sport facilities. The application site has an approximately area of 28.900 m^2.

Figure 1: Site Location Plan

2.2 Existing Site Drainage

The site generally falls from a highest point located on First Avenue towards the south-east and south-west corners. Most of the existing development's stormwater runoff is intercepted and diverted to a number of kerb outlets located along Fairlight Street, which fall toward west, and Ingham Avenue

which drains towards Fairlight Street. There is not exists stormwater network surrounded the site, therefore the public drainage is limited to street drainage.

Survey plans only show pits and grated drains with their respective invert levels; however, the existing internal stormwater pipe network information was not indicated on plans.

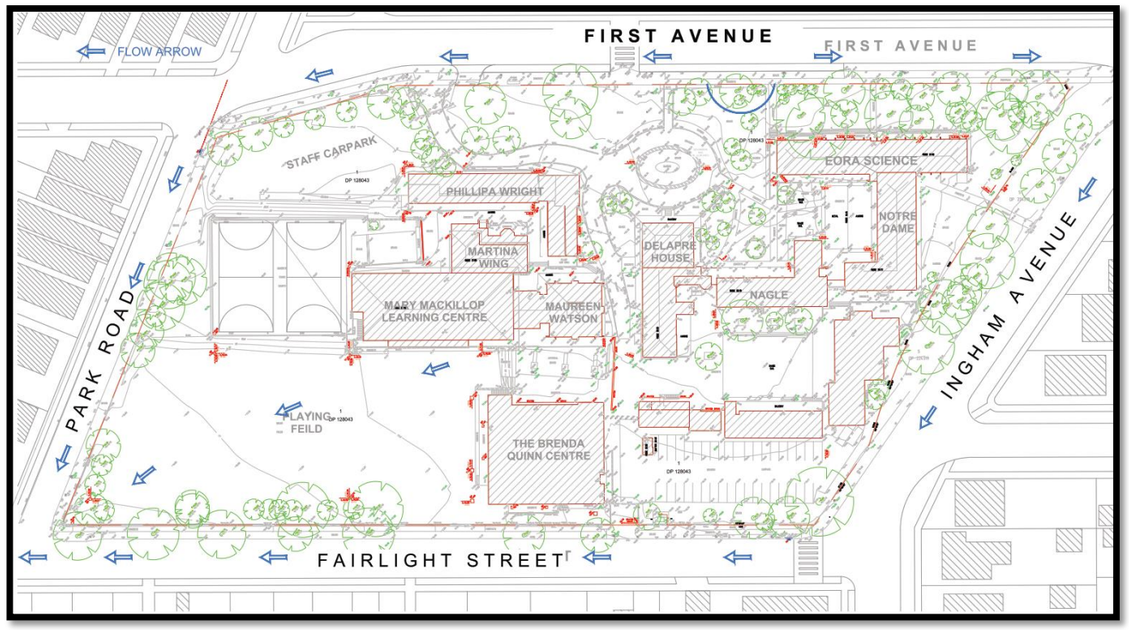


Figure 2. Existing Drainage

2.3 *Site Survey*

An overall survey of the existing site was undertaken by:

Surveyor Name:	LTS Lockley
Surveyor Contact Details:	Suite 1, Level 1 810 Pacific Highway, Gordon NSW 2072 Tel: 1300 587 000
Job Reference:	43724DT
Survey Date:	September 2016
Drawing Number:	13 Sheets

3 *Project Description*

The proposed development include the

- Demolition of a car park
- Demolition of the Orleans and Darby Centre buildings
- Construction of a new library and year 7 & 8 learning hub, to be located on south-east corner of the site
- Construction of a new staff car park on the north-west corner as shown in Figure 3.

The proposed development application site is about 5990 m^2, of which 4700 m^2 for the 2-storey Solais Project and surrounded area, and the rest to the car park.

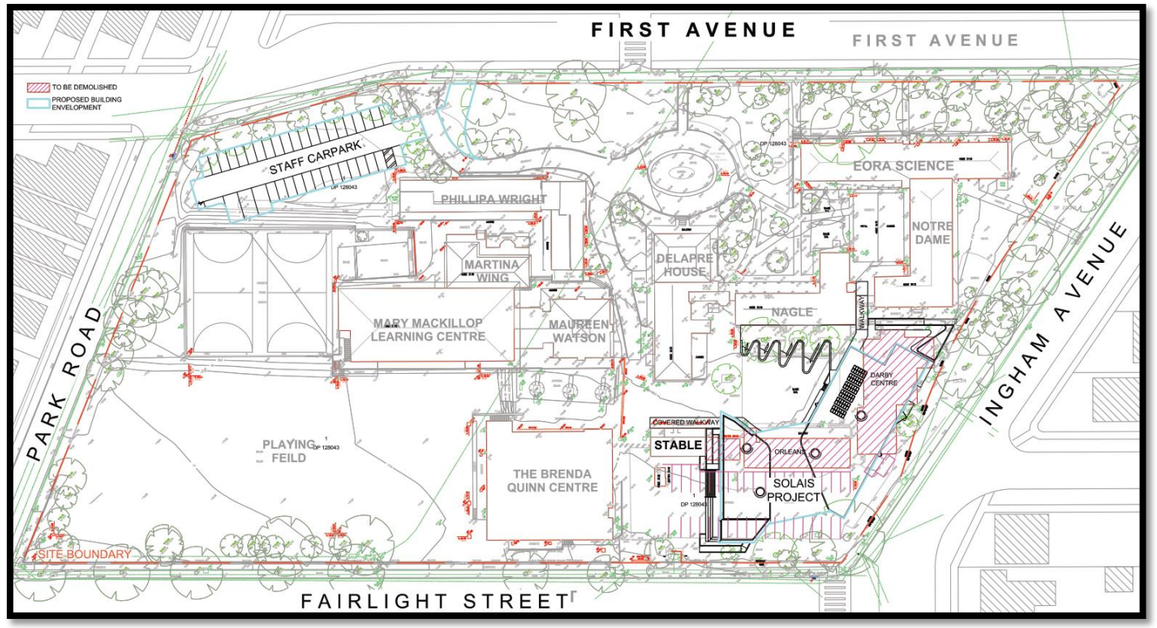


Figure 3: Building Location Map (figure to be updated with latest layout)

4 Design Standards

The following list indicates the relevant design guidelines and standards to be considered during the design of the project:

- Australian Rainfall & Runoff: Volume 1 & 2
- AS3500.3 Plumbing and Drainage: Stormwater Drainage
- Drainage Model Drawings – RTA.
- Guide to Road Design, Part 5 Drainage Design - AUSTROADS (2008).
- AS 3500.3-1990 National Plumbing and Drainage Code - Stormwater drainage.
- Waterway Design (A Guide to the Hydraulic Design of Bridges, Culverts and Floodways) – AUSTROADS 1994.
- Managing Urban Stormwater: Soils and Construction, "The Blue Book" – 4th edition 2004.
- Concrete Pipe Selection and Installation - Concrete Pipe Association 1990.
- Canada City Bay Council Development Control Plan 2017
- MWRC Development Design Specification - D5 - Stormwater Drainage Design

5 Stormwater Management and Water Quality

The overall site stormwater management objectives applicable to the site were identified as follows:

- Provision of safe overland flow paths within development an on public land.
- Provision of controls such as on-site stormwater detention, community basins and the like and on-site retention systems to reduce and control stormwater runoff.
- The installation of pipe/channel systems to minimise hazard to pedestrian and vehicular traffic caused by uncontrolled surface stormwater runoff.
- The installation of water quality control devices such as trash screens, gross pollutants traps, water quality ponds and the like and encouraging the use of water sensitive urban design to protect the quality of receiving waters.

According to Council's guidelines and the type of development, the following control types would be applied:

- On-site Stormwater Detention System (OSD)
- Water Sensitive Urban Design (WSUD)

The Stormwater Management Strategy proposed for site development has been prepared with consideration of the above objectives and Council's requirements and guidelines. The strategy focuses on minimising the impacts of the development on the adjoining properties and maximising the environmental, social and economic benefits achievable by utilising responsible and sustainable stormwater management practices.

5.1 *Drainage Design Criteria and Parameters*

The key design criteria and council requirements for stormwater drainage design are as follows:

- Post-Development stormwater discharge peak for event up to 100 year ARI storm is not to exceed the Permissible Site Discharge (PSD) calculated through the Catchment Based Method.
- Underground stormwater drainage system to be design to capturing the runoff produced from a 20 ARI storm.
- Concentrated discharge is limited to 25 l/s per 15 lineal metre of frontage for all storm event;
- Stormwater to drain by gravity to Council's stormwater system;

Drainage has been designed in accordance with the methods outlined in "Australian Rainfall and Runoff", Institution of Engineers. The software package DRAINS was used to design the new stormwater network including the OSD.

5.2 *Stormwater Collection*

5.2.1 Roof Levels

Gutters and downpipes will be designed by the Hydraulic Engineer. The roof drainage system of gutters, downpipes and associated pipework is to be designed in accordance with AS/NZS 3500.3 Plumbing and Drainage Part 3: Stormwater Drainage.

Downpipes conveying rainwater from the roof level of the proposed building will be connected to rain water harvesting tank or high early discharge chamber in OSD tank.

5.2.2 Surface Water

Runoff from the area adjacent to the new building, will be captured and conveyed by proposed stormwater pits and pipes to OSD tank.

Due to the topography, a small green area of the proposed development will be by passing the proposed detention system to discharge to council kerb and gutter.

5.3 *Water Sensitive Urban Design*

The development will achieve the pollution reduction targets identified in City of Canada Bay DCP by utilising water sensitive urban design (WSUD) treatment initiatives. The pollutant reduction requirements outlined in Table 1 below have been adopted as the minimum values for water quality treatment.

Table 1 Pollutants reduction target.

Pollutant Type	Percentage Retention of Post-development Loads
Total suspended solids (TSS)	80%
Total phosphorus (TP)	45%
Total Nitrogen (TN)	45%
Gross Litter	All Litter - 70% Material (>50mm) - 70%

5.3.1 WSUD Strategy

The WSUD Strategy proposed for the development may utilises a treatment train approach, consisting of the following: flow splitter, rain gardens, catch pit inserts and vegetated swales.

5.3.1.1 Flow Splitter

Flow splitters are specially designed to protect water quality devices, located downstream of the unit, of high flows produced by infrequent storms. The main objective of this device is split the low (up to 1 in 3 months ARI) from the high flow in the system.

A flow splitter is proposed downstream of the OSD tank. Low flow will be directed to a vegetated swale, whereas high flow will be diverted to the existing stormwater network to be discharged in council kerb and gutter.

5.3.1.2 Rain Garden

Raingardens are specially designed garden beds which filter stormwater runoff from surrounding areas or stormwater pipes. They are also called bio-retention systems as they provide biological treatment of stormwater using soil, plants, roots and microbes.

A raingarden lets water collect and settle on the garden surface then soak through the plants and filter media. Sediment is trapped on the surface. Nutrients dissolved in the stormwater are used by the plants and toxins stick to the soil. The soil and plant roots work together to naturally filter the water and remove pollutants.

A 20 m^2 raingarden has been proposed next to the new Staff Carpark.

5.3.1.3 Vegetated Swale

Vegetated swales are typically trapezoidal or dish-shaped open channels provided to convey and filter stormwater runoff through vegetation to remove coarse sediment and total suspended solids. Overflow pits will be provided within the swale to take in excess flows and discharge them into drainage system.

Vegetated swales are proposed along the south-west boundary to convey surface water to proposed OSD tank, as well as on the south-east corner on Fairlight Street as final link of the proposed treatment train.

5.3.1.4 Pit Inserts

Pit inserts, also known as litter baskets, are considered as an at-source primary treatment solution. It is an efficient and cost-effective pre-screening primary treatment system that captures and retains gross pollutants at drainage entry points. Pit inserts, consisting of a capture basket and a filter mesh liner, are usually fitted below the road invert or surface of the pit and hence are visually unobtrusive.

Pit inserts can be customised to fit almost any stormwater inlet pit and the mesh liner opening could vary depending on the targeted capture of solids, sediment and attached pollutants. Cleaning of the pit inserts is undertaken either manually or using a small vacuum truck. The cleaning frequency MUSIC Modelling.

5.3.1.5 Rainwater Tank

In addition to water savings, the rainwater harvesting tank will help reduce runoff volume from the proposed development during small storms and associated stormwater pollutants that would discharge from the site.

The Rainwater tank have not been defined at this stage, therefore is not shown in the model. However, the benefit of its use will be reflected as an extra improvement to the proposed treatment system.

5.3.2 Model Setup

A detailed water quality analysis to be develop using WSUD strategy for the proposed development to meet Council's water quality targets. The water quality modelling for this study will be undertaken using the industry standard software model MUSIC (Model for Urban Stormwater Improvement Conceptualisation) Version 6.2.

5.3.3 Modelling Data & Parameters

The nearest rainfall station with a reasonable period of 6-minute rainfall data is Sydney (Station 066037) which is about 14 km from the site. In MUSIC, rainfall data is available for this station from 1/01/1990 to 21/12/1999. However, for water quality modelling purposes, only rainfall data for the 6-minute period was used. Apart from addressing the required data length of 10 years, this period was selected for the quality and continuity of the available rainfall data. The mean annual rainfall (MAR) during this 10-year period is 1,035 mm which is slightly lower than the long-term MAR of 1,261 mm which was calculated from the rainfall data sourced from the Bureau of Meteorology (BOM) website.

The soil / groundwater parameters and the pollutant loading rates adopted for the site for Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN) used in the MUSIC model are consistent with the values recommended by both Sydney Metropolitan Catchment Management Authority (SMCMA) and Sydney Catchment Authority (SCA) guidelines.

5.3.4 Music Model Results

The MUSIC model generated for the development was used to estimate the annual pollutant loads attributed to the pre and post-development as well as the resultant pollutant loads leaving the site after flows go through the proposed treatment train.

The results show that the estimated average annual pollutant export loads from the proposed development have been reduced using the adopted treatment train stormwater management measures and that the treatment targets set at neutral or beneficial effect (NorBE) and Council's DCP guidelines have been met. The proposed treatment train is outlined in APPENDIX A.

Table 2. Music Model Results

	Sources	Residual Load	% Reduction
Flow (ML/yr)	6.15	6.07	1.3
Total Suspended Solids (kg/yr)	1140	90.1	92.1
Total Phosphorus (kg/yr)	2.28	0.638	72
Total Nitrogen (kg/yr)	15.4	8.31	45.9
Gross Pollutants (kg/yr)	143	0	100

6 *On-Site Stormwater Detention*

On-site stormwater detention (OSD) is required by Council to ensure there is no increase over the PSD in discharges from the site resulting from storm events up to the 100-year ARI event. This requirement applies to all developments that discharge stormwater into Council's drainage system and where an overland escape route or overflow system is provided for storms in exceedance of the 100-year ARI event.

Council's Catchment Based Method has been applied adopting the application area (5990 m^2) as site area, to determinate the Site Storage Requirement (SSR) and Permissible Site Discharge (PSD):

- SSR (200 m^3/hectare) = 120 m^3
- PSD (180 L/s/hectare) = 108 L/s

Due to the natural topography of the site and the restrictions mentioned in 5.1, two separates systems has been designed to restrict the flow in both the new car park as well as in the proposed new building.

A sag pit system has been proposed to reduce the discharge rate from the carpark. This system controls the flow by restricting the inlet capacity of the pit, providing storage on-grade.

The remaining catchment of the developed site area will be attenuated in an OSD system which will be designed as a below ground detention tank.

The proposed system has managed to reduce the discharge under the PSD values all ARI storm events up to the 100-year ARI as follow:

33 l/s carpark peak discharge

51 l/s OSD peak discharge

17 l/s by-pass area peak discharge

6.1 *Hydraulic Model*

A DRAINS hydraulic modelling has been undertaken to analyse and design the stormwater drainage network. The components of the system have been divided in two smaller models for practical reasons. The results of both models have been included in Appendix B for council verification.

Pit location and pipes invert levels and sizes, well as all the components of the system are detailed on the Civil Drawings (refer Appendix C). A long section to demonstrate that OSD will not have drowned outlet, has also been included in mentioned Appendix.

7 *Sediment and Erosion Control Plan*

The erosion and sediment control measures adopted for the development during the construction phase have been designed in accordance with Council guidelines and Soils and Construction – Managing Urban Stormwater – Landcom.

Erosion and sediment controls will be provided during the construction phase in accordance with Council guidelines. These control measures have been developed alongside consideration of the necessary earthworks associated with the development.

A sedimentation and erosion control plan has been prepared for the site works, and is provided in Appendix B. The plan includes measures such as: sediment fences surrounding disturbed areas to capture sediment runoff and a truck shaker tray at each point of access to the work area. The measures to be adopted are summarised in the Table 2.

Final details of sediment and erosion control measures for the early works and main works will be implemented on site by the successful contractor who will be provided with these drawings. The contractor will take into account the site works staging including the preferred site access points, site shed locations and temporary stockpile locations in developing and implementing these requirements but will be ultimately responsible for managing temporary stormwater and sediment and erosion control during construction.

Table 3. Sedimentation control measures

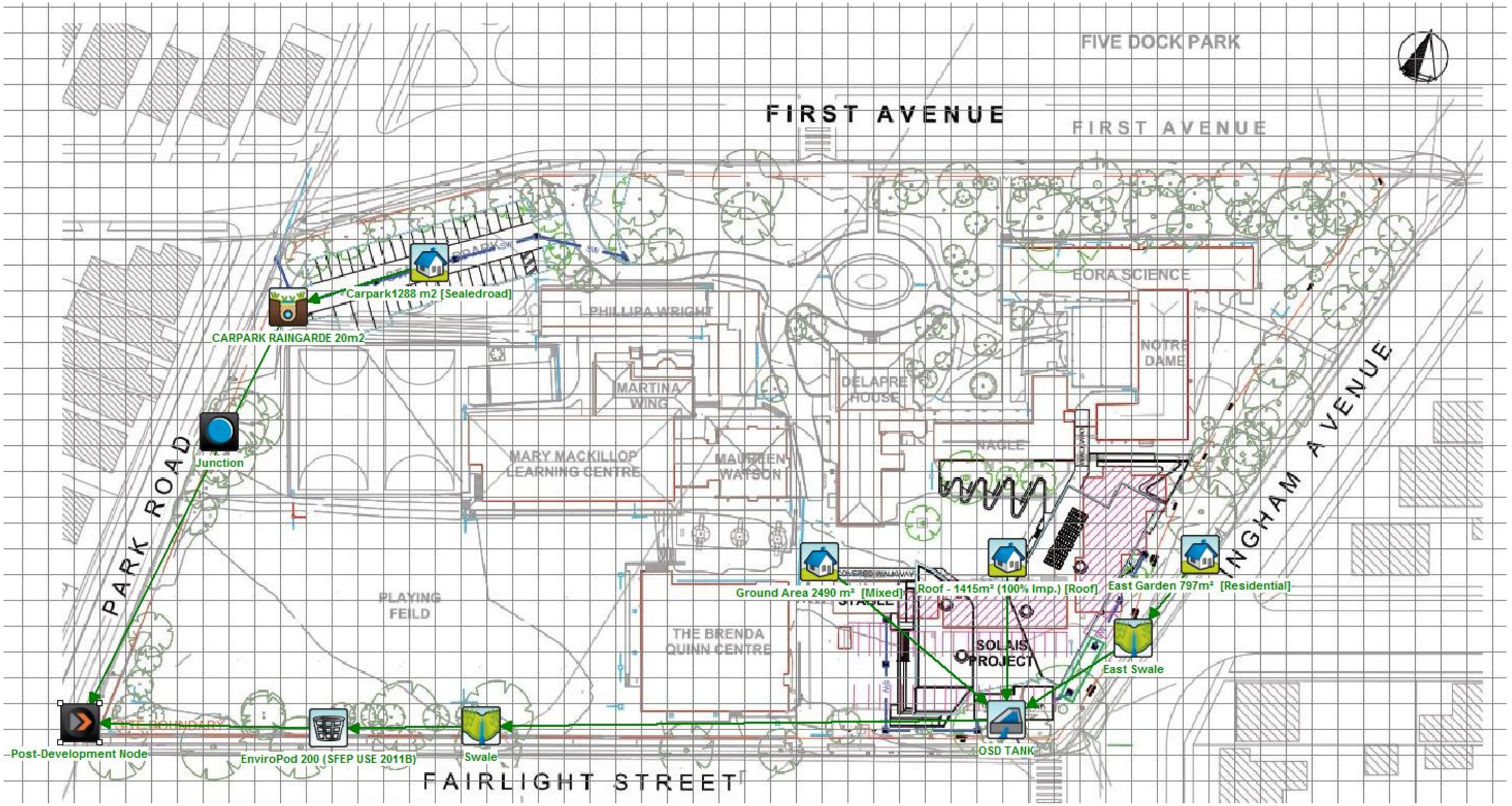
Measure	Location	Purpose
Sediment Fence	Near site boundary along the downstream side of the site.	To prevent sediment leaving the site with stormwater runoff. Stormwater will pass through the fence but the fence will trap the sediment.
Shaker Grid and Wash Down	At construction exit from the site.	To remove ground materials from the construction vehicle wheels prior to the vehicle leaving the site and discharging material onto the public roadway.
Sand Bag Sediment Traps	Directly upstream of all stormwater kerb inlet structures located in close proximity of the site.	To prevent sediment discharged from the site from entering the stormwater inlet structure and contaminating the water course.
Inlet Sediment Trap	Around any stormwater surface inlet structures	To prevent sediment discharged from the site from entering the stormwater inlet structure and contaminating the water course.
Sediment Basin	At the downstream end of the site near the boundary.	To store sediment on site during the construction phase. Basins to be cleaned out prior to the completion of the landscaping in the basins.

Erosion and sediment control will also be further addressed during detailed design and construction of this phase and future development.

Final details of Erosion and Sediment Control measures for the early works and main works to be implemented on site by the successful contractor. The Contractor will be required to take into account the site works staging including the preferred site access points, site shed locations and temporary stockpile locations in developing and implementing these requirements but will be ultimately responsible for managing temporary stormwater and sediment and erosion control during construction.

APPENDIX A

MUSIC MODEL


FIVE DOCK PARK
FIRST AVENUE
FIRST AVENUE
EORA SCIENCE
NOTRE DAME
PHILLIPA WRIGHT
MARTINA WING
DELAPRE HOUSE
MARY MACKILLOP LEARNING CENTRE
MAUREEN WATSON
NAGLE
PARK ROAD
Junction
Carpark1288 m2 [Sealedroad]
CARPARK RAINGARDE 20m2
PLAYING FEILD
THE BRENDA QUINN CENTRE
SOLAIS PROJECT
Ground Area 2490 m² [Mixed]
Roof - 1415m² (100% Imp.) [Roof]
East Garden 797m² [Residential]
East Swale
OSD TANK
Post-Development Node
EnviroPod 200 (SFEP USE 2011B)
Swale
FAIRLIGHT STREET

APPENDIX B

DRAINS MODEL

Calculation Sheet

Job	DOMREMY COLLEGE	Design	MM	Office	Sydney
	SOLAIS LAB PROJECT	Date	Jun-18	Job No	5503
	DRAINS Modelling	Checked			
		Date			

DOMREMY COLLEGE SOLAIS LAB PROJECT

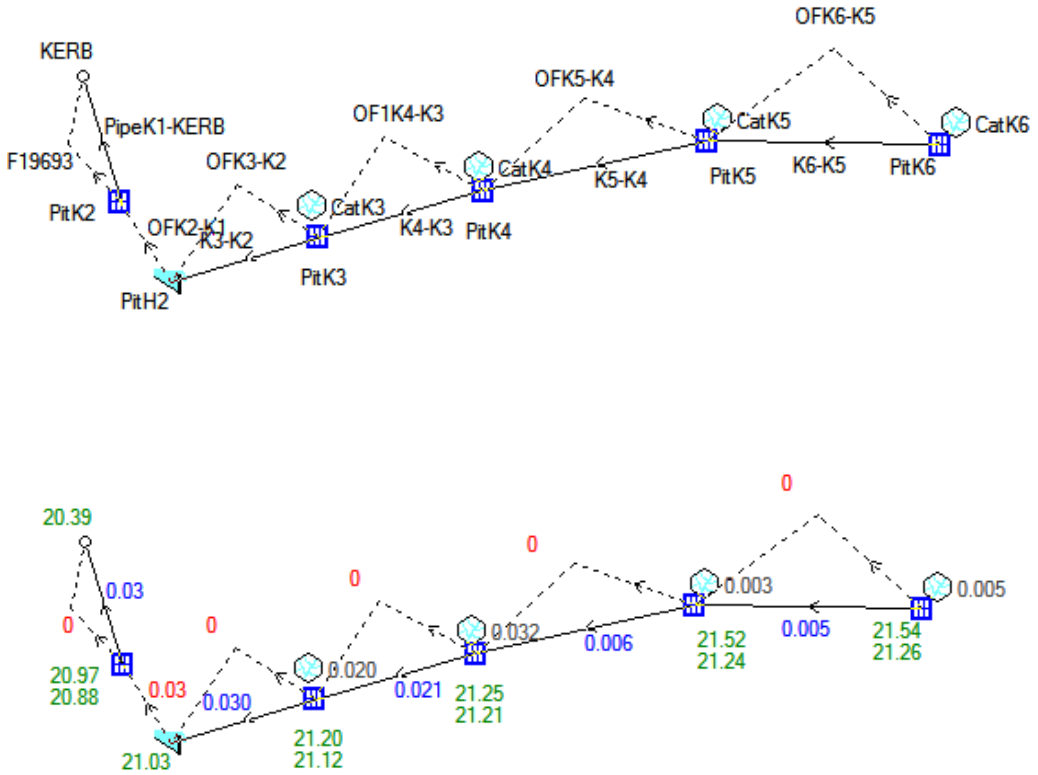
STORMWATER CONCEPT PLAN

STAFF CARPARK - PREMIUM HYDRAULIC MODEL

enstruct

DRAINS OUTPUT

June 2018



enstruct

PROJECT	DOMREMY COLLEGE SOLAIS LAB PROJECT	JOB No	5503		
TITLE	DRAINS DATA - DEVELOPED (WITH OSD) SCENARIO	PREPARED	MM	DATE	19/06/2018
		CHECKED	0	DATE	0/01/1900

DATA

DRAINS File Path:	P:\j1-5500\5503\00 - Enstruct Documents\0.3 - Analysis\Civil\OSD\DRAINS\CARPARK
DRAINS Version:	DRAINS Version 2017.11 - 26 Oct 2017
Modeller's Name:	Miqueas Moreno
Description:	CAR PARK Area

PIT / NODE DETAILS — Version 13

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is						
PitH6	Sag	NSW RTA SO V-Channel Pit,	Single SO1 Pit	1	1.9	21.51	0.15	0	0.5	681.52	-746.32	No	3627822	1 x Ku	No	New						
PitH5	Sag	Hornsby Council Inlets (Kl+gr	Hornsby 0.9 m lint	1.96	1.2	21.5	0.07	0	0.5	500.08	-743.44	No	3627813	1 x Ku	No	New						
PitH4	Sag	NSW RTA SO V-Channel Pit,	Single SO1 Pit	24	2.2	21.2	0.15	0	0.5	322.96	-782.32	No	3627815	1 x Ku	No	New						
PitH3	Sag	NSW RTA SO V-Channel Pit,	Single SO1 Pit	20	1.3	21.15	0.15	0	0.5	193.36	-819.76	No	3627818	1 x Ku	No	New						
PitF2	Sag	GRATE P-50 PITS	450sq GRATE-P3	2	2	20.9	0.2	0	0.5	39.28	-790.96	No	3627910	1 x Ku	No	New						
KERB	Node					20.25		0		9.04	-693.04		3627936		No							

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length	id							
PitH2	19.84	1		None						78.16	-854.32	No			3627928							
	21	1																				

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
CatH6	PitH6	0.011	100	0	0	5		5	5									0				1
CatH5	PitH5	0.006	100	0	0	5		5	5									0				1
CatH4	PitH4	0.069	100	0	0	5		5	5									0				1
CatH3	PitH3	0.043	100	0	0	5		5	5									0				1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	RI (m)	Chg (m)	RL (m)	etc (m)			
F6-F5	PitH6	PitH5	13	20.73	20.6	1	Concrete, under roads, 1% minimum slope	150	150	0.013	New	1	PitH6	0								
F5-F4	PitH5	PitH4	19	20.6	20.41	1	Concrete, under roads, 1% minimum slope	150	150	0.013	New	1	PitH5	0								
F4-F3	PitH4	PitH3	30	20.33	20.03	1	Concrete, under roads, 1% minimum slope	225	225	0.013	New	1	PitH4	0								
F3-F2	PitH3	PitH2	12	20.03	19.91	1	Concrete, under roads, 1% minimum slope	225	225	0.013	NewFixed	1	PitH3	0								
PipeF1-KERB	PitF2	KERB	5	20.3	20.25	1	Concrete, under roads, 1% minimum slope	150	150	0.013	New	1	PitF2	0								

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	Chg (m)	Bottom Elev (m)	Height of S (m)	etc etc												

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed									

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Storm (m)	SafeDepth Minor Storm (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %		id	U/S IL	D/S IL	Length (m)					
OFF6-F5	PitH6	PitH5	0.1				4 m wide pathway	0.3	0.15	0.4	1	0		3627896	21.66	21.5	12					
OFF5-F4	PitH5	PitH4	0.1				4 m wide pathway	0.3	0.15	0.4	1.95	0		3627898	21.57	21.2	19					
OF1F4-F3	PitH4	PitH3	0.3				4 m wide pathway	0.3	0.15	0.4	0.67	0		3627902	21.35	21.15	30					
OFF3-F2	PitH3	PitH2	0.1				4 m wide pathway	0.3	0.15	0.4	0.42	0		3627904	21.35	21.3	12					
OFF2-F1	PitH2	PitF2	0.1	21	3.6	1.96	4 m wide pathway	0.3	0.15	0.4	1	0		3627934	20.95	20.9	2					
OF19693	PitF2	KERB	0.1				4 m wide pathway	0.3	0.15	0.4	1	0		3627954	21.1	20.25	5					

enstruct

PROJECT	DOMREMY COLLEGE SOLAIS LAB PROJECT		
TITLE	20 YEAR ARI - RESULTS	JOB No	5503
		PREPARED ER	DATE 19/06/2018
		CHECKED 0	DATE 0/01/1900

DRAINS File Path:	P:\j1-5500\5503\00 - Enstruct Documents\0.3 - Analysis\Civil\OSD\DRAINS\CARPARK
DRAINS Version:	DRAINS Version 2017.11 - 26 Oct 2017
Modeller's Name:	Miqueas Moreno
Description:	CAR PARK Area

DRAINS results prepared from Version 2018.01

RESULTS 5% AEP

PIT / NODE DETAILS				Version 8								
Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint					
PitH6	21.26	21.54	0.006	0.1	0.25	0	Inlet Capacity					
PitH5	21.24	21.52	0.004	0.2	0.26	0	Inlet Capacity					
PitH4	21.21	21.25	0.04	7.4	0	0	Outlet System					
PitH3	21.12	21.2	0.025	3.6	0.03	0	Inlet Capacity					
PitF2	20.88	20.97	0.031	0.4	0.02	0	Inlet Capacity					
KERB	20.39		0									

SUB-CATCHMENT DETAILS												
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm					
CatH6	0.005	0.005	0	5	5	5	5% AEP, 5 min burst, Storm 1					
CatH5	0.003	0.003	0	5	5	5	5% AEP, 5 min burst, Storm 1					
CatH4	0.032	0.032	0	5	5	5	5% AEP, 5 min burst, Storm 1					
CatH3	0.02	0.02	0	5	5	5	5% AEP, 5 min burst, Storm 1					

PIPE DETAILS												
Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm							
F6-F5	0.005	0.29	21.267	21.252	5% AEP, 5 min burst, Storm 1							
F5-F4	0.006	0.36	21.224	21.207	5% AEP, 15 min burst, Storm 3							
F4-F3	0.021	0.52	21.195	21.117	5% AEP, 15 min burst, Storm 5							
F3-F2	0.03	0.76	21.079	21.026	5% AEP, 20 min burst, Storm 4							
PipeF1-KERB	0.03	1.72	20.585	20.394	5% AEP, 20 min burst, Storm 8							

CHANNEL DETAILS												
Name	Max Q (cu.m/s)	Max V (m/s)			Due to Storm							

OVERFLOW ROUTE DETAILS												
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm				
OFF6-F5	0	0	0.908	0	0	0	0					
OFF5-F4	0	0	1.268	0	0	0	0					
OF1F4-F3	0	0	0.743	0	0	0	0					
OFF3-F2	0	0	0.589	0	0	0	0					
OFF2-F1	0.03	0.03	0.908	0.074	0.02	4	0.74	5% AEP, 20 min burst, Storm 4				
OF19693	0	0	0.908	0	0	0	0					

DETENTION BASIN DETAILS												
Name	Max WL	MaxVol	Max Q	Max Q	Max Q							
			Total	Low Level	High Level							
PitH2	21.03	1.2	0.03	0	0.03							
Run Log for CARPARK run at 18:30:42 on 19/6/2018												
The maximum water level in these storages exceeds the maximum elevation you specified: PitH2.												
DRAINS has extrapolated the Elevation vs Storage table to a higher Elevation. Please provide accurate values for higher elevations.												
No water upwelling from any pit.												
Freeboard was less than 0.15m at PitF2, PitH3, PitH4												
Flows were safe in all overflow routes.												
IGNORE THESE WARNINGS AT YOUR OWN PERIL.\cf1												

enstruct

PROJECT	DOMREMY COLLEGE SOLAIS LAB PROJECT		
TITLE	20 YEAR ARI - RESULTS	JOB No	5503
		PREPARED MM	DATE 19/06/2018
		CHECKED 0	DATE 0/01/1900

DRAINS File Path:	P:\j1-5500\5503\00 - Enstruct Documents\0.3 - Analysis\Civil\OSD\DRAINS\CARPARK
DRAINS Version:	DRAINS Version 2017.11 - 26 Oct 2017
Modeller's Name:	Miqueas Moreno
Description:	CAR PARK Area

DRAINS results prepared from Version 2018.01

RESULTS 1% AEP

PIT / NODE DETAILS				Version 8								
Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint					
PitH6	21.32	21.55	0.008	0.1	0.19	0	Inlet Capacity					
PitH5	21.28	21.52	0.005	0.3	0.22	0	Inlet Capacity					
PitH4	21.23	21.3	0.053	11	0	0	Outlet System					
PitH3	21.14	21.21	0.033	4.5	0.01	0	Inlet Capacity					
PitF2	20.94	21.01	0.034	0.8	0	0	Outlet System					
KERB	20.39		0									

SUB-CATCHMENT DETAILS												
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm					
CatH6	0.007	0.007	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatH5	0.004	0.004	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatH4	0.042	0.042	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatH3	0.026	0.026	0	5	5	5	1% AEP, 5 min burst, Storm 1					

PIPE DETAILS												
Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm							
F6-F5	0.007	0.37	21.505	21.316	1% AEP, 5 min burst, Storm 1							
F5-F4	0.008	0.44	21.267	21.231	1% AEP, 20 min burst, Storm 4							
F4-F3	0.021	0.53	21.197	21.135	1% AEP, 10 min burst, Storm 1							
F3-F2	0.033	0.83	21.092	21.028	1% AEP, 20 min burst, Storm 8							
PipeF1-KERB	0.032	1.8	20.605	20.395	1% AEP, 20 min burst, Storm 4							

CHANNEL DETAILS												
Name	Max Q (cu.m/s)	Max V (m/s)			Due to Storm							

OVERFLOW ROUTE DETAILS												
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm				
OFF6-F5	0	0	1.479	0	0	0	0					
OFF5-F4	0	0	1.442	0	0	0	0					
OF1F4-F3	0	0	1.497	0	0	0	0					
OFF3-F2	0	0	1.509	0	0	0	0					
OFF2-F1	0.032	0.032	1.479	0.112	0.01	4	0.17	1% AEP, 20 min burst, Storm 8				
OF19693	0	0	1.479	0	0	0	0					

DETENTION BASIN DETAILS												
Name	Max WL	MaxVol	Max Q	Max Q	Max Q							
			Total	Low Level	High Level							
PitH2	21.03	1.2	0.032	0	0.032							
Run Log for CARPARK run at 18:28:14 on 19/6/2018												
The maximum water level in these storages exceeds the maximum elevation you specified: PitH2.												
DRAINS has extrapolated the Elevation vs Storage table to a higher Elevation. Please provide accurate values for higher elevations.												
No water upwelling from any pit.												
Freeboard was less than 0.15m at PitF2, PitH3, PitH4												
Flows were safe in all overflow routes.												
IGNORE THESE WARNINGS AT YOUR OWN PERIL.\cf1												

Calculation Sheet

Job	DOMREMY COLLEGE	Design	MM
	SOLAIS LAB PROJECT	Date	Jun-18
	DRAINS Modelling	Checked	
		Date	
		Office	Sydney
		Job No	5503

DOMREMY COLLEGE SOLAIS LAB PROJECT

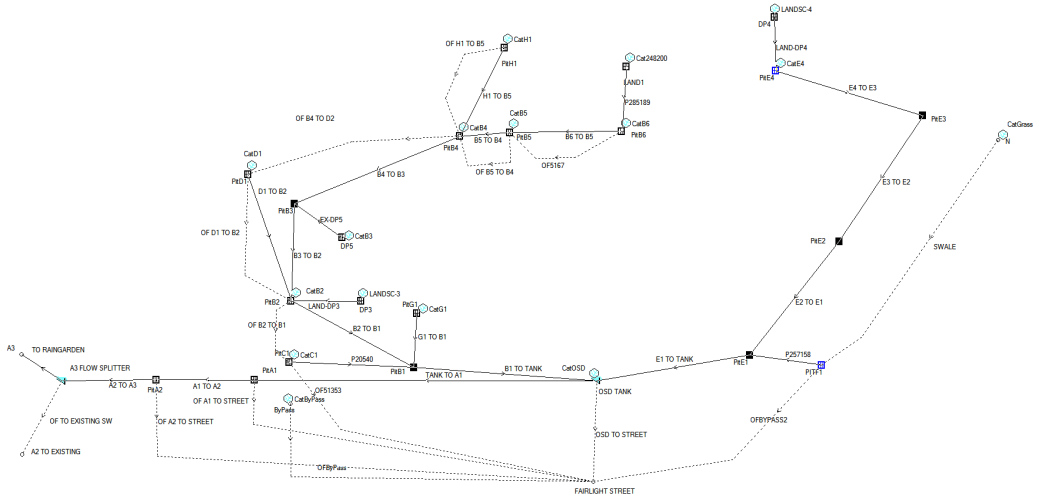
STORMWATER CONCEPT PLAN

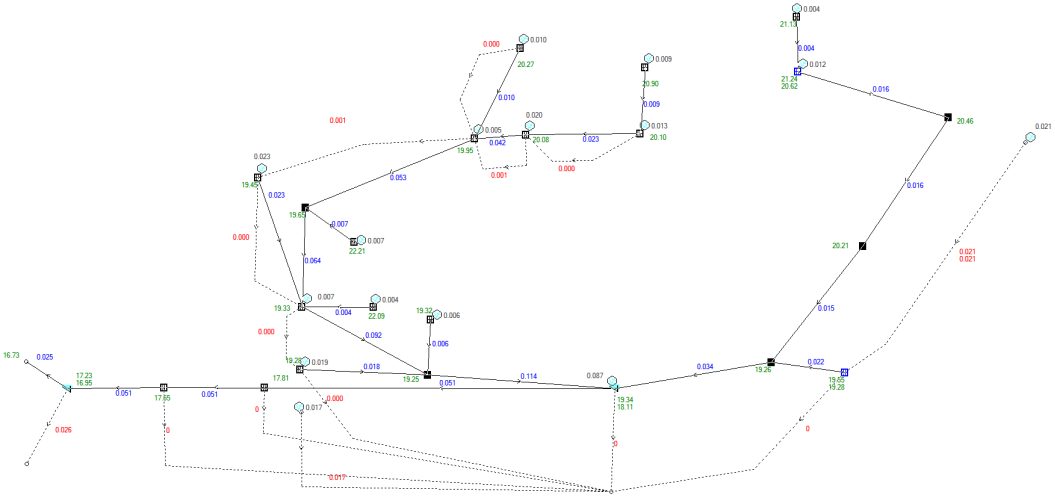
MAIN BUILDING - PREMIUM HYDRAULIC MODEL

enstruct

DRAINS OUTPUT

June 2018





enstruct

PROJECT	DOMREMY COLLEGE SOLAIS LAB PROJECT	JOB No	5503		
TITLE	DRAINS DATA - DEVELOPED (WITH OSD) SCENARIO	PREPARED	MM	DATE	19/06/2018
		CHECKED	0	DATE	0/01/1900

DATA

DRAINS File Path:	P:\j1-5500\5503\00 - Enstruct Documents\0.3 - Analysis\Civil\OSD\DRAINS\MAINBUILDING3
DRAINS Version:	DRAINS Version 2017.11 - 26 Oct 2017
Modeller's Name:	Miqueas Moreno
Description:	Main Building Area

PIT / NODE DETAILS — Version 13

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is							
PitD1	OnGrade	Grated Drain	0.2X4 m		5.9	20.03		0	0.3	579.28	-1241.68	No	17780	1 x Ku	No	New							
PitB2	OnGrade	GD	900sqm		2	19.87		0	0.3	685.84	-1549.84	No	17777	1 x Ku	No	New							
PitB1	OnGrade	Junction Pit or Manhole (seale	Junction Pit or Manhole		1.5	19.49		0	0.3	985.36	-1712.56	Yes	17784	1 x Ku	No	New							
PitA1	OnGrade	GRATE P-50 PITS	450x600 GRATE P-30		0.2	19.3		0	0.3	595.6	-1744	No	159067	1 x Ku	No	New							
PitA2	OnGrade	Junction Pit or Manhole (seale	Junction Pit or Manhole		1.5	17.68		0	0.3	355.6	-1742.8	No	15048256	1 x Ku	No	New							
A3	Node					16		0		24.88	-1680.88		10602706		No								
FAIRLIGHT STREET	Node					18.8		0		1424.56	-1991.92		76349		No								
A2 TO EXISTING	Node					16		0		26.32	-1925.68		159257		No								
PitH1	OnGrade	GD	900sqm		5.9	20.91		0	0.3	1207.12	-930.64	No	2073213	1 x Ku	No	New							
PitB4	OnGrade	GRATE P-50 PITS	900SQ GRATE P-30		1.8	20.5		0	0.3	1098.4	-1147.6	No	17773	1 x Ku	No	New							
PitB3	OnGrade	Junction Pit or Manhole (seale	Junction Pit or Manhole		2.4	20.2		0	0.3	693.04	-1312.24	Yes	76294	1 x Ku	No	New							
N	Node					20.95		0		2415.28	-1156.72		2815622		No								
DP3	OnGrade	Downpipe	Downpipe		5.9	22.95		0	0.3	856	-1551	No	4955609	1 x Ku	No	New							
DP4	OnGrade	Grated Drain	0.2X4 m		5.9	22.1.25		0	0.3	1868.08	-857.2	No	4955635	1 x Ku	No	New							
PitE4	Sag	GRATE P-50 PITS	900SQ GRATE P	2	2.8	21.22	0.05	0	0.5	1872.4	-988	No	17858	1 x Ku	No	New							
PitE3	OnGrade	Junction Pit or Manhole (seale	Junction Pit or Manhole		2.9	21.14		0	0.3	2232.4	-1097.2	Yes	17865	1 x Ku	No	New							
PitE2	OnGrade	Junction Pit or Manhole (seale	Junction Pit or Manhole		0.2	20.9		0	0.3	2026.48	-1404.4	Yes	76308	1 x Ku	No	New							
PitE1	OnGrade	Junction Pit or Manhole (seale	Junction Pit or Manhole		0.7	20.9		0	0.3	1807.6	-1682.32	Yes	76338	1 x Ku	No	New							
PitG1	OnGrade	Grated Drain	0.2X4 m		5.6	20		0	0.3	992.56	-1581.52	No	4955756	1 x Ku	No	New							
PitC1	OnGrade	Grated Drain	0.2X4 m		3.3	19.42		0	0.3	680.08	-1699.6	No	4955791	1 x Ku	No	New							
ByPass	Node					18.59		0		682.96	-1801.84		5081041		No								
DP5	OnGrade	Downpipe	Downpipe		4.8	22.95		0	0.3	809.92	-1395.48	No	9212520	1 x Ku	No	New							
PITF1	Sag	GRATE P-50 PITS	600SQ GRATE P	1	0.7	19.5	0.1	0	0.5	1984.6	-1707.32	No	13231375	1 x Ku	No	New							
LAND1	OnGrade	Downpipe	Downpipe		5.9	21.25		0	0.3	1506.4	-977.2	No	14136333	1 x Ku	No	New							
PitB6	OnGrade	GD	1200sqm		0	20.72		0	0.3	1495	-1135.833	No	17706	1 x Ku	No	New							
PitB5	OnGrade	GD	900sqm		2.7	20.65		0	0	1220.8	-1138	No	17717	1 x Ku	No	New							

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length	id								
OSD TANK	17.3	1		Orifice		152	17.44			1433.2	-1745.68	Yes	18.75	4	17468								
	17.44	1																					
	17.45	53																					
	19.15	53																					
	19.16	1																					
	19.6	1																					
A3 FLOW SPLITTER	16.87	1		Orifice		150	16.9825			124.24	-1745.68	No			10602645								
	17.4	1																					

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%) %	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
CatD1	PitD1	0.0368	100	0	0	5	5	5										0				1
CatB2	PitB2	0.0121	95	5	0	5	10	5										0				1
CatOSD	OSD TANK	0.1416	100	0	0	5	5	5										0				1
CatH1	PitH1	0.0163	90	10	0	5	5	5										0				1
CatB4	PitB4	0.0084	87	13	0	5	5	5										0				1
CatGrass	N	0.0595	5	95	0	5	12	5										0				1
LANDSC-3	DP3	0.0094	10	90	0	5	10	5										0				1
LANDSC-4	DP4	0.007	100	0	0	5	10	5										0				1
CatE4	PitE4	0.0204	87.5	12.5	0	5	5	5										0				1
CatG1	PitG1	0.0093	100	0	0	5	5	5										0				1
CatC1	PitC1	0.0302	100	0	0	5	5	5										0				1
CatByPass	ByPass	0.0423	20	80	0	5	10	5										0				1
CatB3	DP5	0.0108	100	0	0	5	5	5										0				1
Cat248200	LAND1	0.0159	90	10	0	5	5	5										0				1
CatB6	PitB6	0.0222	90	10	0	5	5	5										0				1
CatB5	PitB5	0.0337	90	10	0	5	5	5										0				1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	Rl (m)	Chg (m)	RL (m)	etc (m)
D1 TO B2	PitD1	PitB2	12	19.28	19.12	1.33	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitD1	0					
B2 TO B1	PitB2	PitB1	22.78	18.94	18.712	1	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitB2	0					
B1 TO TANK	PitB1	OSD TANK	14.09	18.54	18.399	1	Concrete, not under roads, 0.5% minimum slo	375	375	0.3	NewFixed	1	PitB1	0					
TANK TO A1	OSD TANK	PitA1	39.21	17.33	17.14	0.48	Concrete, not under roads, 0.5% minimum slo	225	225	0.3	NewFixed	1	OSD TANK	0					
A1 TO A2	PitA1	PitA2	30	17.14	16.99	0.5	Concrete, not under roads, 1% minimum slope	225	225	0.3	New	1	PitA1	0					
A2 TO A3	PitA2	A3 FLOW SPLITTER	24	16.99	16.87	0.5	Concrete, not under roads, 0.5% minimum slo	225	225	0.3	NewFixed	1	PitA2	0					
TO RAINGARDEN	A3 FLOW SPLITTER	A3	4	16.87	16.65	5.5	Concrete, not under roads, 0.5% minimum slo	150	150	0.3	NewFixed	1	A3 FLOW S	0					
H1 TO B5	PitH1	PitB4	12.38	20.16	20.04	0.97	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitH1	0					
B4 TO B3	PitB4	PitB3	18.81	19.75	19.45	1.59	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitB4	0					
B3 TO B2	PitB3	PitB2	14.9	19.42	19.09	2.21	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitB3	0					

LAND-DP3	DP3	PitB2	10	22	19.12	28.8	Concrete, under roads, 1% minimum slope	100	100	0.3	New	1	DP3	0									
LAND-DP4	DP4	PitE4	10.32	21.05	20.51	5.23	Concrete, under roads, 1% minimum slope	150	150	0.3	New	1	DP4	0									
E4 TO E3	PitE4	PitE3	14.11	20.51	20.367	1.01	Concrete, not under roads, 0.5% minimum slo	225	225	0.3	New	1	PitE4	0									
E3 TO E2	PitE3	PitE2	22.15	20.36	20.139	1	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitE3	0									
E2 TO E1	PitE2	PitE1	21.9	20.13	19.911	1	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitE2	0									
E1 TO TANK	PitE1	OSD TANK	16.17	18.71	18.54	1.05	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	NewFixed	1	PitE1	0									
G1 TO B1	PitG1	PitB1	10	19.22	19.01	2.1	Concrete, under roads, 1% minimum slope	150	150	0.3	New	1	PitG1	0									
P20540	PitC1	PitB1	10	18.64	18.54	1	Concrete, under roads, 1% minimum slope	225	225	0.3	New	1	PitC1	0									
EX-DP5	DP5	PitB3	10	22	19.42	25.8	Concrete, under roads, 1% minimum slope	100	100	0.3	New	1	DP5	0									
P257158	PITF1	PitE1	4	18.75	18.71	1	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PITF1	0									
P285189	LAND1	PitB6	7.2	20.8	19.97	11.53	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	LAND1	0									
B6 TO B5	PitB6	PitB5	15.89	19.97	19.88	0.57	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitB6	0									
B5 TO B4	PitB5	PitB4	10.2	19.88	19.75	1.27	Concrete, not under roads, 0.5% minimum slo	300	300	0.3	New	1	PitB5	0									
DETAILS of SERVICES CROSSING PIPES																							
Pipe	Chg	Bottom	Height of Service	Chg	Bottom	Height of S	Chg	Bottom	Height of S	etc													
	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	etc													
CHANNEL DETAILS																							
Name	From	To	Type	Length	U/S IL	D/S IL	Slope	Base Width	L.B. Slope	R.B. Slope	Manning	Depth	Roofed										
				(m)	(m)	(m)	(%)	(m)	(1:?)	(1:?)	n	(m)											
OVERFLOW ROUTE DETAILS																							
Name	From	To	Travel	Spill	Crest	Weir	Cross	Safe Depth	SafeDepth	Safe	Bed	D/S Area		id	U/S IL	D/S IL	Length (m)						
			Time	Level	Length	Coeff. C	Section	Major Storm	Minor Storm	DxV	Slope	Contributing											
			(min)	(m)	(m)			(m)	(m)	(sq.m/sec)	(%)	%											
OF D1 TO B2	PitD1	PitB2	0.1				4 m wide pathway	0.3	0.15	0.4	8	0		76342	20.03	19.12	12						
OF B2 TO B1	PitB2	PitC1	0.1				4 m wide pathway	0.3	0.15	0.4	3	0		159003	19.87	19.42	15						
OSD TO STREET	OSD TANK	FAIRLIGHT STREET	0.1	19.5	4	2.15	4 m wide pathway	0.3	0.15	0.4	20	0		801633	18.2	17	6						
OF A1 TO STREET	PitA1	FAIRLIGHT STREET	0.1				4 m wide pathway	0.3	0.15	0.4	1	0		159078	19.3	17	6						
OF A2 TO STREET	PitA2	FAIRLIGHT STREET	0.1				4 m wide pathway	0.3	0.15	0.4	5.4	0		15530031	17.79	17.25	10						
OF TO EXISTING SW	A3 FLOW SPLITTER	A2 TO EXISTING	0.1	17.17	1	1.96	Channel section 600 mm wide	0.09	0.03	1	1	0		10602661	17.34	17.65	2						
OF H1 TO B5	PitH1	PitB4	0.1				4 m wide pathway	0.3	0.15	0.4	3.19	0		17910	20.9	20.65	7.83						
OF B4 TO D2	PitB4	PitD1	0.2				4 m wide pathway	0.3	0.15	0.4	2.51	0		76303	20.5	20.03	25.8						
SWALE	N	PITF1	2.1				DOMREMY SWALE 600mm	0.15	0.15	0.6	1.44	100		10474271	20.65	19.5	65						
OF51353	PitC1	FAIRLIGHT STREET	0.1				4 m wide pathway	0.3	0.15	0.4	14.2	0		6901547	19.42	18	10						
OFByPass	ByPass	FAIRLIGHT STREET	0.1				4 m wide pathway	0.3	0.15	0.4	1	0		5208548	18.59	18.59	10						
OFBYPASS2	PITF1	FAIRLIGHT STREET	0.1				4 m wide pathway	0.3	0.15	0.4	1	0		13419849	19.5	18.8	10						
OF5167	PitB6	PitB5	0.1				4 m wide pathway	0.3	0.15	0.4	0.82	0		76260	20.72	20.65	8.5						
OF B5 TO B4	PitB5	PitB4	0.1				4 m wide pathway	0.3	0.15	0.4	1.47	0		13295321	20.65	20.5	10.2						

enstruct

PROJECT	DOMREMY COLLEGE SOLAIS LAB PROJECT		
TITLE	20 YEAR ARI - RESULTS	JOB No	5503
		PREPARED ER	DATE 19/06/2018
		CHECKED 0	DATE 0/01/1900

DRAINS File Path:	P:\j1-5500\5503\00 - Enstruct Documents\0.3 - Analysis\Civil\OSD\DRAINS\MAINBUILDING3
DRAINS Version:	DRAINS Version 2017.11 - 26 Oct 2017
Modeller's Name:	Miqueas Moreno
Description:	Main Building Area

DRAINS results prepared from Version 2018.01

RESULTS 5% AEP

PIT / NODE DETAILS				Version 8								
Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint					
PitD1	19.43		0.022		0.6	0	None					
PitB2	19.17		0.007		0.7	0	None					
PitB1	18.9		0		0.59		None					
PitA1	17.69		0		1.61	0	None					
PitA2	17.48		0		0.2	0	None					
A3	16.73		0									
PitH1	20.25		0.009		0.66	0	None					
PitB4	19.93		0.006		0.57	0	None					
PitB3	19.63		0		0.57		None					
DP3	22.08		0.003		0.87		None					
DP4	21.12		0.004		0.98		None					
PitE4	20.6	21.24	0.012	0.5	0.62		Inlet Capacity					
PitE3	20.45		0		0.69		None					
PitE2	20.2		0		0.7		None					
PitE1	18.84		0		2.06		None					
PitG1	19.31		0.005		0.69		None					
PitC1	18.92		0.018		0.5	0	None					
DP5	22.13		0.006		0.82		None					
PITF1	18.85	19.54	0.018	0.2	0.65	0	Inlet Capacity					
LAND1	20.89		0.009		0.36		None					
PitB6	20.07		0.013		0.65	0	None					
PitB5	20.06		0.02		0.59	0	None					

SUB-CATCHMENT DETAILS												
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm					
CatD1	0.017	0.017	0	5	5	5	5% AEP, 5 min burst, Storm 1					
CatB2	0.005	0.005	0	5	10	5	5% AEP, 5 min burst, Storm 1					
CatOSD	0.067	0.067	0	5	5	5	5% AEP, 5 min burst, Storm 1					
CatH1	0.007	0.007	0.001	5	5	5	5% AEP, 15 min burst, Storm 10					
CatB4	0.004	0.003	0	5	5	5	5% AEP, 15 min burst, Storm 10					
CatGrass	0.016	0.001	0.015	5	12	5	5% AEP, 15 min burst, Storm 4					
LANDSC-3	0.003	0	0.002	5	10	5	5% AEP, 15 min burst, Storm 6					
LANDSC-4	0.003	0.003	0	5	10	5	5% AEP, 5 min burst, Storm 1					
CatE4	0.009	0.008	0.001	5	5	5	5% AEP, 15 min burst, Storm 10					
CatG1	0.004	0.004	0	5	5	5	5% AEP, 5 min burst, Storm 1					
CatC1	0.014	0.014	0	5	5	5	5% AEP, 5 min burst, Storm 1					
CatByPass	0.012	0.004	0.01	5	10	5	5% AEP, 15 min burst, Storm 7					

CatB3	0.005	0.005	0	5	5	5	5% AEP, 5 min burst, Storm 1					
Cat248200	0.007	0.007	0.001	5	5	5	5% AEP, 15 min burst, Storm 10					
CatB6	0.01	0.009	0.001	5	5	5	5% AEP, 15 min burst, Storm 10					
CatB5	0.015	0.014	0.001	5	5	5	5% AEP, 15 min burst, Storm 10					
PIPE DETAILS												
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm							
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)								
D1 TO B2	0.017	1.34	19.351	19.191	5% AEP, 5 min burst, Storm 1							
B2 TO B1	0.072	3.39	19.042	18.898	5% AEP, 15 min burst, Storm 9							
B1 TO TANK	0.089	0.96	18.833	18.825	5% AEP, 15 min burst, Storm 10							
TANK TO A1	0.048	1.21	17.95	17.784	5% AEP, 5 min burst, Storm 1							
A1 TO A2	0.046	1.15	17.774	17.479	5% AEP, 15 min burst, Storm 4							
A2 TO A3	0.046	1.15	17.402	17.219	5% AEP, 15 min burst, Storm 4							
TO RAINGARDEN	0.025	2.65	16.949	16.729	5% AEP, 15 min burst, Storm 4							
H1 TO B5	0.007	0.93	20.211	20.091	5% AEP, 15 min burst, Storm 10							
B4 TO B3	0.043	2.46	19.838	19.619	5% AEP, 5 min burst, Storm 1							
B3 TO B2	0.047	2.21	19.522	19.195	5% AEP, 15 min burst, Storm 9							
LAND-DP3	0.003	1.85	22.024	19.172	5% AEP, 15 min burst, Storm 6							
LAND-DP4	0.003	1.48	21.078	20.604	5% AEP, 5 min burst, Storm 1							
E4 TO E3	0.012	2.79	20.547	20.45	5% AEP, 15 min burst, Storm 10							
E3 TO E2	0.012	2.5	20.396	20.203	5% AEP, 10 min burst, Storm 1							
E2 TO E1	0.011	1.07	20.193	19.974	5% AEP, 15 min burst, Storm 9							
E1 TO TANK	0.023	0.9	18.826	18.823	5% AEP, 20 min burst, Storm 4							
G1 TO B1	0.004	1.16	19.26	19.05	5% AEP, 5 min burst, Storm 1							
P20540	0.014	0.36	18.904	18.899	5% AEP, 5 min burst, Storm 1							
EX-DP5	0.005	2.23	22.033	19.625	5% AEP, 5 min burst, Storm 1							
P257158	0.016	0.86	18.841	18.837	5% AEP, 15 min burst, Storm 4							
P285189	0.007	2.12	20.828	20.073	5% AEP, 15 min burst, Storm 10							
B6 TO B5	0.017	0.8	20.073	20.056	5% AEP, 5 min burst, Storm 1							
B5 TO B4	0.032	1.57	19.979	19.926	5% AEP, 15 min burst, Storm 9							
CHANNEL DETAILS												
Name	Max Q	Max V			Due to Storm							
	(cu.m/s)	(m/s)										
OVERFLOW ROUTE DETAILS												
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm				
OF D1 TO B2	0	0	1.38	0	0	0	0					
OF B2 TO B1	0	0	1.431	0	0	0	0					
OSD TO STREET	0	0	1.311	0	0	0	0					
OF A1 TO STREET	0	0	0.908	0	0	0	0					
OF A2 TO STREET	0	0	1.404	0	0	0	0					
OF TO EXISTING SW	0.021	0.021	0.007	0.043	0.02	2.16	0.55	5% AEP, 15 min burst, Storm 4				
OF H1 TO B5	0	0	1.432	0	0	0	0					
OF B4 TO D2	0	0	1.439	0	0	0	0					
SWALE	0.016	0.016	0.035	0.08	0.04	0.46	0.51	5% AEP, 15 min burst, Storm 4				
OF51353	0	0	1.333	0	0	0	0					
OFByPass	0.012	0.012	0.908	0.025	0.01	4	0.3	5% AEP, 15 min burst, Storm 7				
OFBYPASS2	0	0	0.908	0	0	0	0					
OF5167	0	0	0.822	0	0	0	0					
OF B5 TO B4	0	0	1.101	0	0	0	0					

DETENTION BASIN DETAILS												
Name	Max WL	MaxVol	Max Q	Max Q	Max Q							
			Total	Low Level	High Level							
OSD TANK	18.82	73.1	0.048	0.048	0							
A3 FLOW SPLITTER	17.22	0.3	0.046	0.025	0.021							
Run Log for MAINBUILDING3 run at 18:13:20 on 19/6/2018												
No water upwelling from any pit. Freeboard was adequate at all pits.												
The maximum flow in these overflow routes is unsafe: OF TO EXISTING SW												

enstruct

PROJECT DOMREMY COLLEGE SOLAIS LAB PROJECT

TITLE 20 YEAR ARI - RESULTS

JOB No 5503
PREPARED MM DATE 19/06/2018
CHECKED 0 DATE 0/01/1900

DRAINS File Path:	P:\j1-5500\5503\00 - Enstruct Documents\0.3 - Analysis\Civil\OSD\DRAINS\MAINBUILDING3
DRAINS Version:	DRAINS Version 2017.11 - 26 Oct 2017
Modeller's Name:	Miqueas Moreno
Description:	Main Building Area

DRAINS results prepared from Version 2018.01

RESULTS 1% AEP

PIT / NODE DETAILS				Version 8								
Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint					
PitD1	19.45		0.03		0.58	0	None					
PitB2	19.33		0.009		0.54	0	None					
PitB1	19.25		0		0.24		None					
PitA1	17.81		0		1.49	0	None					
PitA2	17.55		0		0.13	0	None					
A3	16.73		0									
PitH1	20.27		0.012		0.64	0	None					
PitB4	19.95		0.008		0.55	0.001	Inlet Capacity					
PitB3	19.65		0		0.55		None					
DP3	22.09		0.004		0.86		None					
DP4	21.13		0.005		0.97		None					
PitE4	20.62	21.24	0.016	0.7	0.6		Inlet Capacity					
PitE3	20.46		0		0.68		None					
PitE2	20.21		0		0.69		None					
PitE1	19.26		0		1.64		None					
PitG1	19.32		0.007		0.68		None					
PitC1	19.28		0.023		0.14	0	None					
DP5	22.21		0.008		0.74		None					
PITF1	19.28	19.55	0.024	0.3	0.22	0	Inlet Capacity					
LAND1	20.9		0.012		0.35		None					
PitB6	20.1		0.017		0.62	0	None					
PitB5	20.08		0.026		0.57	0.001	Inlet Capacity					

SUB-CATCHMENT DETAILS												
Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm					
CatD1	0.023	0.023	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatB2	0.007	0.007	0	5	10	5	1% AEP, 5 min burst, Storm 1					
CatOSD	0.087	0.087	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatH1	0.01	0.009	0.001	5	5	5	1% AEP, 5 min burst, Storm 1					
CatB4	0.005	0.004	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatGrass	0.021	0.002	0.02	5	12	5	1% AEP, 15 min burst, Storm 8					
LANDSC-3	0.004	0	0.003	5	10	5	1% AEP, 15 min burst, Storm 5					
LANDSC-4	0.004	0.004	0	5	10	5	1% AEP, 5 min burst, Storm 1					
CatE4	0.012	0.011	0.001	5	5	5	1% AEP, 5 min burst, Storm 1					
CatG1	0.006	0.006	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatC1	0.019	0.019	0	5	5	5	1% AEP, 5 min burst, Storm 1					
CatByPass	0.017	0.004	0.012	5	10	5	1% AEP, 10 min burst, Storm 7					

CatB3	0.007	0.007	0	5	5	5	1% AEP, 5 min burst, Storm 1					
Cat248200	0.009	0.009	0.001	5	5	5	1% AEP, 5 min burst, Storm 1					
CatB6	0.013	0.012	0.001	5	5	5	1% AEP, 5 min burst, Storm 1					
CatB5	0.02	0.019	0.001	5	5	5	1% AEP, 5 min burst, Storm 1					
PIPE DETAILS												
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm							
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)								
D1 TO B2	0.023	1.45	19.362	19.328	1% AEP, 5 min burst, Storm 1							
B2 TO B1	0.092	1.3	19.267	19.229	1% AEP, 10 min burst, Storm 1							
B1 TO TANK	0.114	1.03	19.222	19.519	1% AEP, 10 min burst, Storm 1							
TANK TO A1	0.051	1.28	18.116	17.818	1% AEP, 45 min burst, Storm 7							
A1 TO A2	0.051	1.28	17.798	17.549	1% AEP, 45 min burst, Storm 1							
A2 TO A3	0.051	1.28	17.43	17.226	1% AEP, 20 min burst, Storm 2							
TO RAINGARDEN	0.025	2.66	16.951	16.729	1% AEP, 45 min burst, Storm 9							
H1 TO B5	0.01	1.01	20.218	20.098	1% AEP, 5 min burst, Storm 1							
B4 TO B3	0.053	2.3	19.859	19.653	1% AEP, 10 min burst, Storm 8							
B3 TO B2	0.064	2.97	19.523	19.342	1% AEP, 10 min burst, Storm 10							
LAND-DP3	0.004	2.02	22.028	19.328	1% AEP, 15 min burst, Storm 5							
LAND-DP4	0.004	1.6	21.081	20.618	1% AEP, 5 min burst, Storm 1							
E4 TO E3	0.016	3.44	20.548	20.463	1% AEP, 10 min burst, Storm 1							
E3 TO E2	0.016	2.86	20.4	20.212	1% AEP, 10 min burst, Storm 6							
E2 TO E1	0.015	1.17	20.202	19.983	1% AEP, 10 min burst, Storm 1							
E1 TO TANK	0.034	0.48	19.284	19.541	1% AEP, 20 min burst, Storm 4							
G1 TO B1	0.006	1.25	19.266	19.229	1% AEP, 5 min burst, Storm 1							
P20540	0.018	0.47	19.236	19.229	1% AEP, 5 min burst, Storm 1							
EX-DP5	0.007	2.4	22.038	19.653	1% AEP, 5 min burst, Storm 1							
P257158	0.022	0.32	19.26	19.258	1% AEP, 20 min burst, Storm 1							
P285189	0.009	2.29	20.832	20.098	1% AEP, 5 min burst, Storm 1							
B6 TO B5	0.023	0.79	20.098	20.083	1% AEP, 5 min burst, Storm 1							
B5 TO B4	0.042	1.73	19.993	19.954	1% AEP, 10 min burst, Storm 1							
CHANNEL DETAILS												
Name	Max Q	Max V			Due to Storm							
	(cu.m/s)	(m/s)										
OVERFLOW ROUTE DETAILS												
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm				
OF D1 TO B2	0	0	1.38	0	0	0	0					
OF B2 TO B1	0	0	1.431	0	0	0	0					
OSD TO STREET	0	0	1.311	0	0	0	0					
OF A1 TO STREET	0	0	1.479	0	0	0	0					
OF A2 TO STREET	0	0	1.404	0	0	0	0					
OF TO EXISTING SW	0.026	0.026	0.206	0.046	0.03	2.33	0.59	1% AEP, 30 min burst, Storm 1				
OF H1 TO B5	0	0	1.432	0	0	0	0					
OF B4 TO D2	0.001	0.001	1.449	0.008	0	0.84	0.24	1% AEP, 10 min burst, Storm 1				
SWALE	0.021	0.021	0.035	0.096	0.05	0.49	0.56	1% AEP, 15 min burst, Storm 8				
OF51353	0	0	1.333	0	0	0	0					
OFByPass	0.017	0.017	1.479	0.027	0.01	4	0.34	1% AEP, 10 min burst, Storm 7				
OFBYPASS2	0	0	1.479	0	0	0	0					
OF5167	0	0	1.48	0	0	0	0					
OF B5 TO B4	0.001	0.001	1.47	0.009	0	0.94	0.22	1% AEP, 5 min burst, Storm 1				

DETENTION BASIN DETAILS												
Name	Max WL	MaxVol	Max Q	Max Q	Max Q							
			Total	Low Level	High Level							
OSD TANK	19.34	90.8	0.051	0.051	0							
A3 FLOW SPLITTER	17.23	0.4	0.051	0.025	0.026							
Run Log for MAINBUILDING3 run at 18:10:48 on 19/6/2018												
No water upwelling from any pit.												
Freeboard was less than 0.15m at PitA2, PitC1												
Flows were safe in all overflow routes.												

APPENDIX C

CIVIL DRAWINGS

URBIS

TOWER 2, LEVEL 23
DARLING PARK, 201 SUSSEX ST
SYDNEY NSW 2000

URBIS.COM.AU
Urbis Pty Ltd
ABN 50 105 256 228

4 July 2018

Mr Stuart Ardlie
Statutory Planner
City of Canada Bay
Locked Bay 1470
DRUMMOYNE NSW 1470

Via email: stuart.ardlie@canadabay.nsw.gov.au

Dear Stuart,

RE: DA2018/0076 DOMREMY COLLEGE: RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

We write on behalf of Sydney Catholic Schools (the Applicant) to address the issues raised within your formal request for additional information dated 17 May 2018 and subsequent emails relating to DA2018/0076 for Domremy College, 121 First Avenue, Five Dock. This DA was lodged with the City of Canada Bay Council on 16 March 2018 and sought approval for:

> *Demolition of two existing building, ancillary structures and removal of select vegetation. Relocation of existing car park and construction of a new two storey building with three temporary demountable buildings to be provided on site during construction.*

1. Request for Additional Information

The additional information requested is addressed in **Table 1** and the following documentation:

- Stormwater Management Concept Plan prepared by Enstruct (dated February 2018);
- Revised Site Plan and Shade Structure Section prepared by Hayball Architects (dated 29 June 2018);
- Traffic and Parking Statement prepared by PDC Consultants (dated 3 July 2018);
- Arborist Report prepared by McCardle Aboricultural (dated 28 June 2018).

We note that only limited design changes arise from the response to the RFI, and these changes do not introduce any statutory non-compliances or environmental impacts which differ from the impacts assessed in the Statement of Environmental Effects lodged with the DA.

URBIS

Table 1 – Response to Request for Information

Requested Information	Response
Stormwater Management	
Hard and electronic copies of the DRAINS Model used are to be provided.	Provided as part of revised Stormwater Management Concept Plan.
Stormwater drainage design calculations shall be provided to justify proposed system components (pits and pipes) sizes and to show flow rate through proposed discharge pipe system.	The DRAINS model contains design calculations of proposed stormwater system components and flow rates.
A plan layout of proposed OSD system is required and shall show its dimensions, size and location of access points, surface levels, invert levels, etc.	Refer to DWG CV-0211, STORMWATER DETAILS SHEET 1
Cross sectional details of required OSD shall also be provided.	Refer to DWG CV-0211, STORMWATER DETAILS SHEET 1
Access requirements for OSD must not be more than 5m apart.	Refer to DWG CV-0211, STORMWATER DETAILS SHEET 1
In accordance with Council's current DCP – Appendix 2 "Engineering Specifications", a maximum 50% rainwater re-use volume is permitted to be deducted from On-site Detention (OSD) system based on BASIX requirements.	Email correspondence from Council dated 19 June 2018 confirms these requirements do not apply to the DA.
As per Council's current DCP – Appendix 2 Engineering specifications, Rainwater Re-use system with a minimum capacity of 5000 Litres shall be provided.	
Cross sectional details of required rainwater tank shall be provided.	
Should downpipes be charged to rainwater re-use tank, clean out pits/inspection eyes shall be installed and located at the lowest point of charged lines. The locations shall be clearly marked on the plan. A section through clean out pit shall be provided.	
The consultant shall demonstrate that OSD will not have "Drowned outlet". A drowned outlet occurs when the water level at the connection point "Kerb Inlet Pit" is higher than the orifice centreline level. The tail-water influences will affect the discharge rate. Therefore, Hydraulic Grade Line assessment of the proposed discharge system shall be undertaken from the existing Kerb Inlet Pit to demonstrate that the Drowned Outlet does not occur at the OSDs. If the HGL levels at the point of connection are not known, HGL can be determined from the level which is 150mm below the surface level of the discharge pit.	Refer to DWG CV-0512, SITEWORKS DETAILS SHEET 2

Requested Information	Response
High Early Discharge (HED) shall also be provided to allow minor flow to bypass the storage facility and to prevent frequent maintenance of required OSD. Majority of the inlet pipes shall be directly connected to a Discharge Control Pit to prevent main storage being utilised all the time. If no (HED) is provided, basic storage volume shall be increased by 20%.	Refer to DWG CV-0211, STORMWATER DETAILS SHEET 1
A boundary discharge pit shall be provided and a section through it shall also be provided showing a silt and gross pollutant trap being included in accordance with Council' current Development Control Plan, Appendix 2 - Engineering specifications along with inlet and outlet connections etc.	Refer to DWG CV-0202, STORMWATER PLAN SHEET 2 and DWG CV-0212, STORMWATER DETAILS SHEET 2
Calculations to determine the size of discharge control device such as orifice plate shall be provided.	Refer to Revised Stormwater Concept Plan Section 6.1
Sediment and Erosion control measures and proposed discharge from sediment basins shall be incorporated in the Stormwater Concept Plan	Refer to DWG CV-0202 & CV-0400
Driveway Access	
Longitudinal section along the extreme wheel path of proposed driveway in First Avenue. The section shall extend from the centre line of the roadway and shall include all gradients including footpath cross fall to be at a maximum of 2.5%, change of grade and grade transition details and levels. It shall also include a standard layback crossing with a maximum of 100mm level difference from the invert of the gutter to top of layback. Layback levels shall be consistent with the detail survey levels.	Refer to DWG CV-0512 DRIVEWAY SECTION and Traffic Statement
The driveway profile shall also demonstrate compliance with the scraping provisions of AS/NZS 2890.1:2004 based on the 85th percentile vehicles ground clearance templates.	Refer Traffic Statement
Driveway entrance shall be perpendicular to the kerb and gutter alignment and should not be designed with kerb returns.	Refer to DWG CV-0512 DRIVEWAY PLAN and Traffic Statement
All redundant driveways shall be removed and footway and footpath reinstated. Any redundant stormwater outlets shall also be removed.	Refer to DWG CV-0550 PAVEMENT PLAN and Traffic Statement
Tree Officer and Heritage Advisor	
Tree No. 38 (*Phoenix Canariensis*) is to be retained. As such the driveway design and layout will need to be amended to both retain this tree and ensure the ongoing longevity is not impacted by the driveway location and construction. Please amend the proposal and provide a supporting statement from both your traffic engineer and your arborist proposing suitable tree protection measures.	As outlined in the Revised Site Plan and Traffic Statement, the alignment of the First Avenue driveway and internal roadway have been reconfigured to ensure that these are clear of Tree 38 and importantly, that Tree 38 is able to be retained.

Requested Information	Response
	In addition, the following tree protection measures to minimise impacts to the tree are outlined in Appendix D of the revised Arborist Report: - Tree protection fencing; - Trunk and branch protection with boards and padding strapped to trees; - Ground protection measures including a permeable membrane or crushed rock below rumble boards.

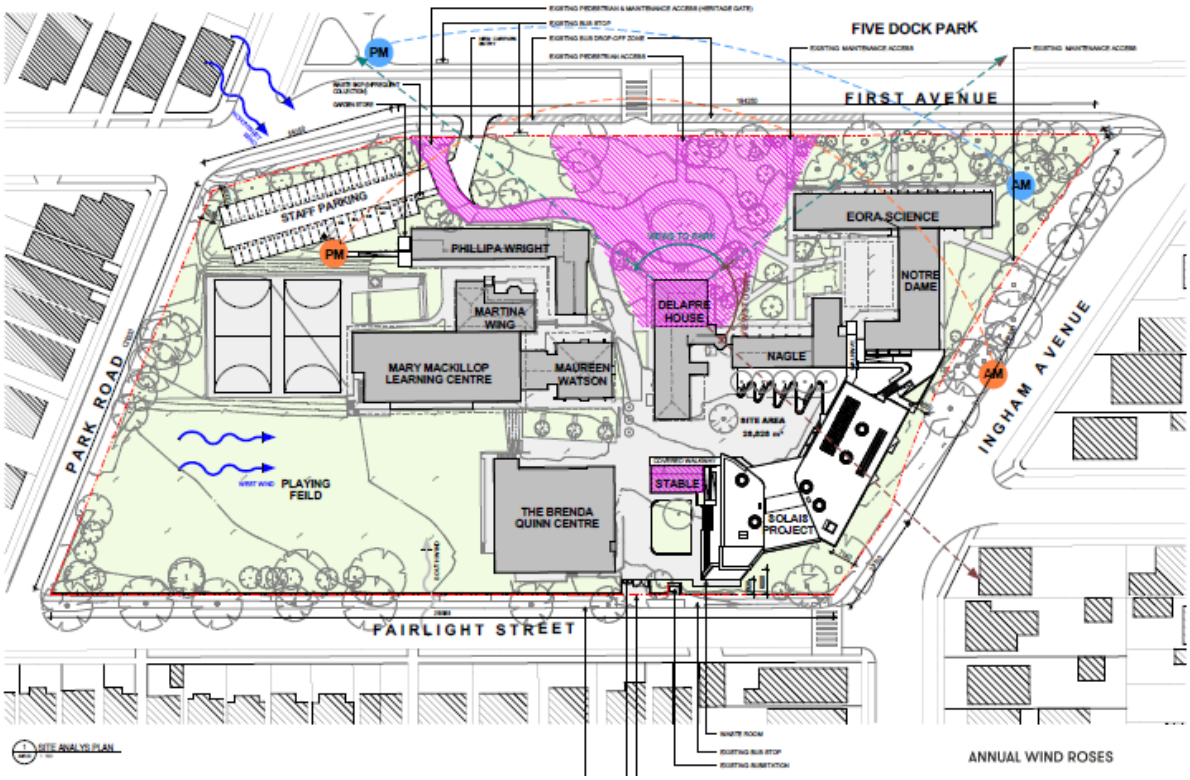
2. Request for Additional Information

Since lodgement of the DA with Council, the Applicant has amended the proposal to include a new shade structure to the north of the Mary Mackillop Learning Centre. Pursuant to section 55(1) of the *Environmental Planning and Assessment Regulation 2000*, this letter formally requests to amend the DA to seek development consent for the construction of the shade structure.

The proposed structure will be freestanding on steel posts and measure 22m by 13m, as shown in the revised Site Plan and Shade Structure Section. The structure will have a maximum height of 7.1m to match the eaves of the neighbouring Mary Mackillop Learning Centre. The existing grassed area below the shade structure will be replaced with a new paved surface or soft-fall.

Given the location of the shade structure towards the centre of the site, views of the structure from residential properties surrounding the site will be limited. In addition, the structure will not impact on the heritage values or setting of the identified heritage items within the site (refer **Figure 1**), given it is screened by surrounding buildings, including the Phillip Wright Building and Mary Mackillop Learning Centre.

Figure 1 – Location of Heritage Items (shown in Pink)



Source: Hayball and Urbis

In light of the above, the inclusion of the shade structure as part of the proposal is considered acceptable.

3. Summary

We trust the additional documentation will assist in your continued assessment of the development application. The proposal represents a sound development outcome worthy of Council support and ultimately approval from the Sydney Eastern City Planning Panel.

Should you require anything further please contact me on 8233 7668 or edethridge@urbis.com.au.

Yours sincerely,

Erin Dethridge
Senior Consultant

License No. TCAA13/1042/14 Jim McArdle Climbing Consulting Arborist

Arborist Impact Assessment

Prepared by

MCARDLE
ARBORICULTURAL
CONSULTANCY

Sydney Catholic Education Office
Domremy College,
121 First Avenue,
Five Dock, New South Wales
28th of June 2018

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1.0 ABSTRACT

1.1 The Catholic Education Office has commissioned an Arborist Impact Report relating to one hundred and seven (117) trees at Domremy College, First Avenue, Five Dock, New South Wales. Of these trees, (6) six will be removed and (15) fifteen will have encroachments to their TPZ. Ten of these trees are encroached by less than 10% are adjacent the carpark aligned to First Avenue. No trees of high value will be impacted, however (2) two moderate retention value trees may be impacted up to ten percent and greater by the newly installed street access from First Avenue.

1.2 The planning controls state that the site has heritage items of the old convent and planted trees have suitable values. The six (6) trees removed of low retention value will be replenished with indigenous species suitable for a school environment. Holding points include Tree Protection Fencing and certification of the replenishment.

1.3 The methodology used include Visual Tree Assessment (VTA) and Impact Assessment utilizing AS4970-200 Protection of Trees on Development site.

2.0 INTRODUCTION

2.1 The Catholic Education Office commissioned an Arborist Impact Report relating to one hundred and seven (107) trees at Domremy College, First Avenue, Five Dock, New South Wales. (6) Six trees of low to moderate value will be removed and replenished according to the Tree management plan. Indigenous tree stock of 40 litre potted volume, including *Lophostemon confertus* (Brush Box) and *Elaeocarpus reticulatus* (Blueberry Ash) or *Callistemon viminalis* (Red Bottle Brush)would be preferred to ensure character of the sited area for perpetuity and biodiversity values are maintained.

2.2(15) Fifteen trees will be impacted within there TPZ-Tree Protection Zone, but are retainable with supervisory AQF Level 5 supervision, certification and protection of these trees. Installing a new access drive and carpark will necessitate the encroachments and rootmapping with root pruning and pruning according to As4373 2007 Pruning of Amenity Trees, would be recommended by an AQF Level 5 arborist for these trees.

2.32 McArdle Arboricultural Consultancy Pty Ltd prepared the report. The arboricultural impact report is developed to assess the trees at the above address for health and status. James McArdle, AQF level 5 Consulting Arborist conducted the evaluation using Visual Tree Assessment (VTA) method for biological and lower level mechanical functions on the 4th of March 2017 and reviewed on the 28th June 2018. The systems are in accordance with industry best practice and impact assessments are based upon the Australian Standards, Protection of Trees on Development sites AS4970-2009.

3.0 REFERENCES

1. Canada Bay Local Environmental Plan 2013.
2. Canada Bay Development Control Plan 2013.
3. Site Plan of Details and Levels over Lot 1 in DP128043 known as No121 First Avenue ‘Domremy College”. LTS-Lockley Registered Surveyors. September 2016. Sheets 1-13.
4.Proposed Site Plan Author Hayball Architects Dated 28/6/18 DWG DA01.02 V6.

4.0 METHODOLOGY

4.1 A tree assessment uses a ground Visual Tree Assessment (VTA) method employed in this report. The VTA system is based on the theory of tree biology, physiology and tree architecture and structure and is a method used to identify visible signs on trees that indicate health and potential hazards. It identifies low level mechanical functions and biological functions according to Mattheck and Breloer (1994).

4.2 The collection of data is performed in the field by an Environmental Scientist, AQF Level 5 arborist. The assessment summaries the species, height and diameter, the tree health and structural condition of the tree, hazards, and retention categories were assigned. The scale drawing ratio were absent from the 'Arborist brief' and impacts percentages have not been calculated. These could be supplied on production of scaled drawings on the construction brief.

4.3 This data was recorded in a Tree Survey Table and various assessment methods were used including:

1. Tree Useful Life Expectancy. Adapted from Jeremy Barrel (SULE) gives extra assessment life expectancy categories range to no potential for life expectancy. Appendix A.

2. Health & Structural Condition of Tree Assessment. This describes the vigour and vitality of the tree. This has conditions associated with the VTA found in Appendix B.

3.Retention Values according to Melanie Howden and TCAA significance values. Appendix C.

4.Impacts are based on AS4970 2009 Protection of Trees on Development Sites. Extract in appendix D and setbacks given in table 1.

5.0 SITE

5.1 The site at Domremy College, First Avenue, Five Dock, New South Wales.

5.2 The collection of survey data was limited and an inspection was conducted on the 4th of March 2017 and reviewed on 28th June 2018.

SCALED SITE MAP

Plate 1. Aerial Plate of the site. Courtesy of Google maps.[1]

[1] *(https://www.google.com.au/maps/)*

6.0 TREE SURVEY TABLE 1

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure potential *(Health &Structure-defects & measurements)*	TULE	Retention Value	Impacts or Works
1.	Car park	*Cinnamomum camphora* Camphor laurel	20	9	132 133	15 3.73	Mature, good condition but poor development, stub cut at north side.	2a	Mod-high	Impact to TPZ ground protection and sensitive construction measure.
2.		*Cinnamomum camphora* Camphor laurel	W10 e10	7	60 80	7.2 3.01	Mature, lean to the west, suppressed.	2d	Mod	RETAIN
3.		*Cinnamomum camphora* Camphor laurel	N2 E5 W5 S5	9	100 104	12 3.36	Mature, inclusion at 1.4m, two main stems.	3d	Mod	RETAIN
4.		*Pittosporum undulatum* Sweet pittosporum	6	5.5	32 36	3.84 2.15	Mature, cavity at 1m	2d	Mod	RETAIN
5.		*Cinnamomum camphora* Camphor laurel	9	10	125 127	15 3.66	Mature, root damage and swelling, heavily pruned at 1.5m (300mm cut).	2d	Mod-high	RETAIN
6.		*Lophostemon confertus* Brush box	4	5	24 29	2.88 1.97	Immature, excellent condition	2a	Mod	RETAIN
7.		*Eucalyptus paniculata* Grey gum	4	5	34 34	4.08 2.1	Mature, good condition but poor development.	2a	Mod	RETAIN
8.		*Leptospermum Sp.* Tea tree	4	6	30 34	3.6 2.1	Mature, some dehydration damage, stem failed at 1m (200mm).	2d	Low-Mod	RETAIN
9.		*Leptospermum Sp.* Tea tree	3	4	12 15	2 1.5	Mature, heavily pruned at 1m, lean to the east.	3d	Low	RETAIN
10.		*Leptospermum Sp.* Tea tree	4	6	16 18	2 1.61	Mature, good condition but poor development, lean to the east.	3d	Low	RETAIN
11.		*Cinnamomum camphora* Camphor laurel	8	8	30/56 95	7.68 0.95	Mature, two stems, minor dehydration.	2d	Mod	RETAIN
12.		*Leptospermum Sp.* Tea tree	3	6	15 20	2 1.68	Mature, lean west.	2d	Low	RETAIN
13		*Leptospermum Sp.* Tea tree	5	6	12/20/ 14 30	3.24 2	Mature, sparse foliage crown, inclusion at base.	3d	Low-Mod	RETAIN
14		*Cinnamomum camphora* Camphor laurel	8	8	37/40 82	6.48 3.04	Mature, unbalanced canopy, slight lean west, two main stems	3d	Low-Mod	RETAIN
15		*Leptospermum Sp.* Tea tree	3	6	25 34	3 2.1	Immature, stem cut at base (90mm), lean.	3d	low	RETAIN

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure potential *(Health &Structure-defects & measurements)*	TULE	Retention Value	Impacts or Works
16		*Leptospermum Sp.* Tea tree	5	6	20/15/ 12/14 35	3.72 2.13	Mature, inclusion, sparse foliage crown, dieback at 20%.	3d	Low-Mod	RETAIN
17		*Leptospermum Sp.* Tea tree	4	5	15 18	2 1.61	Immature, heavily pruned at base, sparse foliage crown.	3d	Low	RETAIN
18		*Cinnamomum camphora* Camphor laurel	9	8	30/34 36/43	5.4 2.45	Mature, good condition but poor development.	2d	Mod	RETAIN
19	West, fence near sewage	*Leptospermum Sp.* Tea tree	7	7	23/30/ 20/10/ 10 55	5.4 2.57	Mature, heavily pruned at 1.3m, sparse foliage crown	3d	Low- Mod	RETAIN
20		*Lophostemon confertus* Brush box	4	6	25 28	3 1.94	Immature, twin leader, buildup of mulch at base near concrete pylon.	2a	Low	RETAIN
21		*Lophostemon confertus* Brush box	4	6	25 28	3 1.94	Immature, excellent condition.	2a	Low- Mod	RETAIN
22		*Leptospermum Sp.* Tea tree	5	7	23/37 67	5.28 2.8	Mature, unbalanced canopy and lean west, stem cut 350mm at 50cm, minor fungal attack.	3d	Low- Mod	RETAIN
23	West fence	*Ulmus parvifolia* Chinese elm	3	4	12 15	2 1.5	Immature, excellent condition	1a	Low	RETAIN
24		*Eucalyptus paniculata* Grey gum	6	10	26 16	3.12 1.53	Immature, good condition but poor development, some borer damage.	2d	Low- Mod	RETAIN
25		*Eucalyptus saligna* Blue box	8	9	30 35	3.6 2.13	Immature, some borer damage, unbalanced canopy east.	2d	Low- Mod	RETAIN
26		*Eucalyptus saligna* Blue box	4	8	18 22	2.16 1.75	Immature, some borer damage.	2d	Mod	RETAIN
27		*Eucalyptus paniculata* Large fruited ironbark	7	12	45 50	5.4 2.47	Immature, some insect damage on branch.	2d	Mod	RETAIN
28		*Eucalyptus paniculata* Grey ironbark	5	10	33 36	3.96 2.15	Immature, good condition but poor development, inclusion at 4m, sparse foliage crown.	2d	Mod	RETAIN
29		*Eucalyptus saligna* Blue box	s-w3 e-w6	13	20/15 47	3 2.41	Immature, physical damage- broken branch, unbalanced canopy north west.	2d	Mod-high	RETAIN
30		*Eucalyptus saligna* Blue box	7 east	12	47/49 84	8.16 3.08	Immature, unbalance canopy to the east.	2d	Mod	RETAIN

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree & Failure potential *(Health &Structure-defects & measurements)*	TULE	Retention Value	Impacts or Works
31		*Eucalyptus tereticornis* Forest red gum	8	12	50 53	6 2.53	Immature, good condition but poor development	2a	Mod	Adjacent proposed carpark. Ground and trunk protection.
32		*Lophostemon confertus* Brush box	8	10	45/22/ 15/30/ 30 77	8.04 2.97	Mature, Immature, good condition but poor development.	2a	Mod	Adjacent proposed carpark. Ground and trunk protection
33		*Corymbia maculata* Spotted gum	5	12	35 45	4.2 2.37	Immature, excellent condition.	2a	Mod	Adjacent proposed carpark Ground and trunk protection
34		*Corymbia maculata* Spotted gum	7	12	33 37	3.96 2.18	Immature, excellent condition	2a	Mod	Adjacent proposed carpark Ground and trunk protection
35		*Corymbia maculata* Spotted gum	5	10	25 27	3 1.91	Immature, excellent condition, compacted around base.	2a	Mod	Adjacent proposed carpark. Ground and trunk protection
36		*Lophostemon confertus* Brush box	7	10	27/28/ 38/18 79	6.84 3	Mature, slight lean to the north west.	2a	Mod	Adjacent proposed carpark Ground and trunk protection
37	Adjacent gate	*Phoenix canariensis* Phoenix palm	6	8	58 55	6.96 2.57	Mature, good condition but poor development.	2a	Mod-high	Retain. Adjacent proposed carpark Ground and trunk protection
38	Adjacent gate	*Phoenix canariensis* Phoenix palm	6	9	60 66	7.2 2.78	Mature, good condition but poor development	2a	Mod-high	Retain. Adjacent proposed carpark Ground and trunk protection
39		*Callistemon viminalis* Bottle brush	4	3	10*4 20	4.8 1.68	Immature, excellent condition, small shrub.	2a	Low- Mod	Remove impacted by New Building. Replenish tree.
40		*Brachychiton acerifolius* Flame tree	5	7	24/22 27	3.96 1.91	Immature, inclusion at 1m.	2a	Low- Mod	Remove impacted by New Building. Replenish tree.
41		*Melaleuca Sp.* Paperbark	5	5	20/26/ 25 63	4.92 2.73	Immature, inclusion at base, lean to the west.	2d	Low	Adjacent proposed carpark Ground and trunk protection
42		*Phoenix canariensis* Phoenix palm	6	5	60 70	7.2 2.85	Mature, slight lean to the west.	2d	Mod-high	RETAIN
43		*Lophostemon confertus* brush box	5	7	37/42/ 32 92	7.68 3.2	Mature, some physical damage, heavily pruned, unbalanced canopy, 350mm cut at 1m west side.	2a	Mod	RETAIN
44	North fence	*Pinus radiata* Radiata pine	9	11	70 75	8.4 2.93	Mature, previously pruned.	2d	Mod	Impacted by 10% &greater but remains viable. AQF supervision. RETAIN.
45	Adjacent drive way	*Phoenix canariensis* Phoenix palm	5	7	60 65	7.2 2.76	Immature, good condition but poor development	2a	Mod	Impacted by 10%&greater but remains viable. AQF supervision RETAIN.

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree *(Health &Structure-defects)*	TULE	Retention Value	Impacts or Works
46		*Cinnamomum camphora* Camphor laurel	10	7	40/40/37 102	8.16 3.34	Mature, unbalanced canopy, previously pruned,	3d	Low- Mod	RETAIN
47		*Ornamental Sp.*	e-w 12 n-s 5	3	30/25/25/15	5.88	Mature, cavity at 1.5m west.	3d	Low- Mod	RETAIN
48		*Gleditsia tricanthos* Honey locust	7	6	22/22/22	4.56	Mature, unbalanced canopy, some physical damage (250mm)	2a	Low- Mod	RETAIN
49		*Phoenix canariensis* Phoenix palm	6	8	75 82	9 3.04	Mature, excellent condition.	2a	Mod-high	RETAIN
50		*Tibouchina Sp.*	3	5	20 28	2.4 1.94	Immature, some physical damage, lean and unbalanced canopy east.	2d	Low- Mod	RETAIN
51		*Tibouchina Sp.*	3	5	28/22/14 56	4.56 2.59	Immature, twin stem.	2a	Mod	RETAIN
52		*Phoenix canariensis* Phoenix palm	6	9	22	2.64	Mature, physical damage due to barrier south.	2d	-	RETAIN
53	Adjacent path	*Eucalyptus microcorys* Tallow wood	3	6	23 28	2.76 1.94	Immature, good condition but poor development.	2a	Low	RETAIN
54		*Xmas bush Sp.*	4	5	20 18	2.4 1.61	Immature, good condition but poor development,	2a	Low	RETAIN
55	Seating area	*Camellia japonica* Japanese camellia	6	5	40 41	4.8 2.28	Immature, good condition but poor development	2a	Low- Mod	RETAIN
56		*Syncarpia glomulifera* Turpentine	5	6	26 26	3.12 1.88	Immature, excellent condition.	2a	Low- Mod	RETAIN
57	Garden bed	*Cupaniopsis anacardioides* Tuckeroo	4	5	22 27	2.64 1.91	Immature, good condition but poor development, physical damage at 4m (tarpaulin)	2a	Low	RETAIN
58		*Phoenix canariensis* Phoenix palm	6	7.5	70 50	8.4 2.47	Mature, excellent condition.	2a	Mod	RETAIN
59		*Phoenix canariensis* Phoenix palm	6	7	66 78	7.92 2.98	Mature, excellent condition.	2a	Mod	RETAIN
60		*Eucalyptus paniculata* Grey ironbark	5	10	32 36	3.84 2.15	Immature, good condition but poor development	2a	Mod	RETAIN
61		*Ornamental Sp.*	5	3	20/15/12/12/8 40	3.72 2.25	mature, good condition but poor development	2a	Low- Mod	RETAIN

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree *(Health &Structure-defects)*	TULE	Retention Value	Impacts or Works
62		*Pinus radiata* Radiata pine	5	7.5	54 56	6.48 2,59	Immature, some root damage, lean to the west.	2a	Low	RETAIN
63		*Cinnamomum camphora* Camphor laurel	8	8	37/34/ 40 124	7.68 3.62	Mature, plants growing in cavity at 1m, previously cut.	2d	Mod	RETAIN
64		*Camellia japonica* Japanese camellia	3	4	10*7	8.4	Immature, good condition but poor development, unbalanced canopy.	2a	Low	RETAIN
65	Front fence	*Camellia japonica* Japanese camellia	3	3	15*9 70	15 2.85	Immature, excellent condition.	2a	Low	RETAIN
66		*Camellia japonica* Japanese camellia	3	3	3*10 30	3.6 2	Immature, good condition but poor development, dead branch at 50cm (150mm).	2a	Low	RETAIN
67		*Callistemon viminalis* Bottle brush	8	7	16/20/ 20/20 57	4.56 2.61	Mature, cavity at 1m east.	3d	Mod	Minor pruning to canopy and tree protection. RETAIN.
68		*Callistemon viminalis* Bottle brush	5	6	20/25 32	3.84 2.05	Mature, lean and unbalanced canopy to the south, suppressed.	3d	Low- Mod	Minor pruning to canopy and tree protection. RETAIN.
69		*Syzygium smithii* Lilly pilly	3	7	14 15	2 1.5	Immature, lean west.	2a	Low	RETAIN
70	Adjacent parking	*Jacaranda mimosifolia* Jacaranda	6	8	30/26 45	4.8 2.37	Immature, two main stems.	2d	Mod	Remove impacted by New Building. Replenish tree.
71		*Brachychiton acerifolius* Flame tree	4	7	52 55	6.24 2.57	Mature, heavily pruned at 4m (300mm cut)	3d	Mod	Remove impacted by New Building. Replenish tree.
72		*Lophostemon confertus* Brush box	8	11	87 89	10.44 3.15	Mature, good condition but poor development, minor dehydration.	2d	Mod-high	Remove impacted by New Building. Replenish tree.
73		*Lophostemon confertus* Brush box	7	8	45/48 78	7.92 2.98	Mature, lean to the west heavily pruned at 4m. Surrounding roots under asphalt.	2a	Mod	Remove impacted by New Building. Replenish tree.
74		*Callistemon viminalis* Bottlebrush	4	5	10/10/ 10 20	2.04 1.68	Immature, good condition but poor development	2a	Low	RETAIN
75		*Banksia integrifolia* Coastal banksia	3	5	12/12 20	2.04 1.68	Immature, unbalanced canopy west	2d	Low	RETAIN
76		*Melaleuca quinquenervia* Narrow leaf paper bark	2	5	14 15	2 1.5	Immature, excellent condition	2a	Low	RETAIN
77		*Tristaniopsis laurina* Water gum	3	5	14 15	2 1.5	Immature, excellent condition	2a	Low	RETAIN

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree *(Health &Structure-defects)*	TULE	Retention Value	Impacts or Works
78	North side	*Dead Pittosporum sp.*	-	7	30 40	3.6 2.25	Dead tree	4c	Very low	Remove
79	Fence	*Cuppressus sp.* *Pine*	14	18	109 120	13.08 3.57	Mature, heavily pruned at 3 and 3.5m (300mm), lean and unbalanced canopy south east.	3d	Mod-high	RETAIN
80		*Pittosporum undulatum* Sweet pittosporum	5	7	22 25	2.64 1.85	Immature, unbalanced canopy and lean west.	2a	Mod	RETAIN
81	Front	*Cinnamomum camphora* Camphor laurel	7	10	85 85	10.2 3.09	mature, good condition but poor development, twin stem.	2d	Mod	RETAIN
82		*Cinnamomum camphora* Camphor laurel	8	8	46/43/ 34 134	8.64 3.27	Mature, some root damage east side, dehydration.	2d	Mod	RETAIN
83		*Cinnamomum camphora* Camphor laurel	11	7	26/25/ 40 66	6 2.78	Mature, sparse foliage crown, previously pruned, broken branch.	3d	Low	RETAIN
84		*Ornamental sp.*	4	4	30 40	3.6 2.25	Immature, multi stemmed.	2d	Very low	RETAIN
85		*Cinnamomum camphora* Camphor laurel	4	7	10*8 45	9.6 2.37	Multi stemmed	2d	Low	RETAIN
86		*Pittosporum undulatum* Sweet pittosporum	4	5	10/15 26	2.16 1.88	Immature, unbalanced canopy and lean west	3d	Low	RETAIN
87		*Cinnamomum camphora* Camphor laurel	10	10	41/33/ 33 113	7.44 3.48	Mature, cavity at 1m, heavily pruned.	3d	Low- Mod	RETAIN
88		*Pittosporum undulatum* Sweet pittosporum	5	7	22/16/ 18/16 40	4.32 2.25	Mature, root damage and cavity at roots north side.	3d	-	RETAIN
89		*Cinnamomum camphora* Camphor laurel	7	7	13/30/ 30 70	5.28 2.85	Immature, dieback is greater than 20%, sparse foliage crown.	3a	Mod	RETAIN
90		*Cinnamomum camphora* Camphor laurel	8	7	38/32/ 32	7.08	Mature, cavity at 1m, sparse foliage crown, girdling root, previously pruned.	3a	Mod	RETAIN
91	North fence	*Cinnamomum camphora* Camphor laurel	5	6	18/12/ 20 36	3.48 2.05	Immature, some epicormics, sparse foliage crown.	3d	Low	RETAIN
92	North fence	*Pittosporum undulatum* Sweet pittosporum	5	5	15/14/ 21	3.48	Mature, three main stems, some dehydration.	3d	Low	RETAIN

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree *(Health &Structure-defects)*	TULE	Retention Value	Impacts or Works
93		*Cuppressus sempervirens* Mediterranean cypress	6	12	149 149	15 3.91	Mature, heavily pruned at base to 3m, spreading habit.	3d	Mod-high	RETAIN
94		*Cinnamomum camphora* Camphor laurel	12	8	80*9 149	15 3.91	Mature, nine stems	-	Mod	RETAIN
95		*Corymbia maculata* Spotted gum	14	18	120 124	14.4 3.62	Some fungal damage at base	2d	High	RETAIN
96		*Cinnamomum camphora* Camphor laurel	10	10	50/40/ 30 80	8.52 3.01	Over mature, cavity on east side, cavity west at 2m	4c	Very low	Remove
97	X4	*Camellia sasanqua* Sasanqua camellia	3	3-4	10*3 20	3.6 1.68	Immature, excellent condition	2a	Low	RETAIN
98		*Lagerstroemia* Crepe myrtle	3	5	10*7 25	8.4 1.85	Immature, good condition but poor development, heavily pruned at 4m.	3a	Low	RETAIN
99	Adjacent building	*Ulmus parvifolia* Chinese elm	5	3	14 15	2 1.5	Immature, excellent condition	1a	Low	RETAIN
100	Street scape east side	*Lophostemon confertus* Brush box	8	7	36 45	4.32 2.37	Immature, good condition but poor development	2a	Mod	RETAIN
101	Street scape east side	*Cinnamomum camphora* Camphor laurel	10	10	60/30/ 38	9.24	Over mature, cavity at base (60cm depth)	4a	Low	RETAIN
102	Street scape east side	*Lophostemon confertus* Brush box	10	8	80/25/ 26 78	10.56 2.98	Mature, cavity at 4m and dehydration	3d	Mod	RETAIN
103	Street scape east side	*Pinus radiata* Radiata pine	15	17	96 101	11.52 3.32	Mature, unbalanced canopy and lean to the west, some termite damage.	3d	Mod-high	Impact to TPZ .requires ground and Trunk Protection. RETAIN
104		*Pinus ayacahuite* Mexican pine	14	18	41 41	4.92 2.28	mature, good condition but poor development, slight lean northwest.	2d	High	RETAIN
105		*Cinnamomum camphora* Camphor laurel	W10 E4 N4 S0	8	45 48	5.4 2.43	Mature, cavity at base (30cm), heavy lean north.	2d	Low- Mod	RETAIN
106		*Cinnamomum camphora* Camphor laurel	12	12	54 58	6.48 2.63	Mature, unbalanced canopy east, minor pruning.	2d	Mod	RETAIN
107		*Cinnamomum camphora* Camphor laurel	10 to the east	13	60 70	7.2 2.85	Mature, unbalanced canopy east.	2d	Mod	RETAIN
108		*Pinus ayacahuite* Mexican pine	16	18	110 108	13.2 3.42	Mature, two main stems, good condition but poor development, minor fungal attack.	2a	High	RETAIN

Tree No.	Locality	Scientific& Common Name	Crown Spread m	Height (m)	Diam (cm)	TPZ SRZ (m)	Condition of Tree *(Health &Structure-defects)*	TULE	Retention Value	Impacts or Works
109		*Cinnamomum camphora* Camphor laurel	8	8	42/26/ 31/18/ 10 98	7.44 3.28	Mature, multi-stemmed.and has a spreading habit.	2a	Low-	RETAIN
110		*Cinnamomum camphora* Camphor laurel	18	12	106 103	12.72 3.35	Mature, good condition but poor development, unbalanced canopy east	2a	Mod-high	RETAIN
111	Street scape	*Cinnamomum camphora* Camphor laurel	6	8	53 55	6.36 2.57	Immature, unbalanced canopy south, heavily pruned at 2m (350mm cut)	3d	Low- Mod	RETAIN
112	South side	*Cinnamomum camphora* Camphor laurel	8	9	84 89	10.08 3.15	Mature, dehydration.	2a	Mod	RETAIN
113	South side	*Lophostemon confertus* Brush box	8	12	65 70	7.8 2.85	Mature, previously pruned, good condition but poor development.	2a	Mod-high	RETAIN
114		*Lophostemon confertus* Brush box	10	10	66 70	7.92 2.85	Mature, old, heavily pruned (callous), minor dehydration.	2e	Mod	RETAIN
115		*Ficus rubiginosa* Port Jackson fig	11	10	55 58	6.6 2.63	Immature, very unusually pruned, with crown lifting and adjacent pole. Canopy is a broad dome	2d	Mod	RETAIN
116		*Cinnamomum camphora* Camphor laurel	10	10	77 80	9.24 3.01	Semi mature, cut stem at 3m (350mm), some dehydration	3d	Mod-high	RETAIN
117		*Cinnamomum camphora* Camphor laurel	12	11	93 98	11.16 3.28	Semi mature, sparse foliage crown and minor decay.	3d	Mod	RETAIN

7.0 ANALYSIS OF MAPPING CONTROLS

Canada Bay Local Environmental Plan 2013

Following are *mapping sets that detail each mapping theme,*

http://www.legislation.nsw.gov.au ; https://maps.planningportal.nsw.gov.au/

Planning Portal Map

Fig 1. Zoning is within Canada Bay Locality.

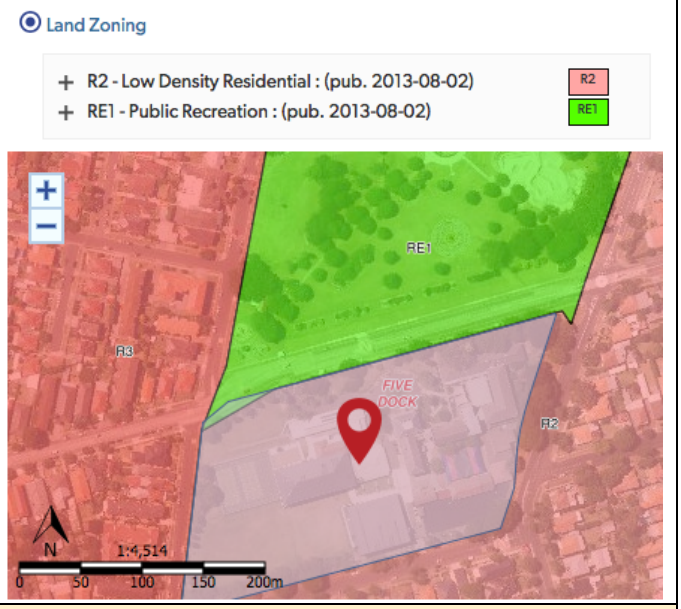

Fig 2. Land Zoning R2 Low Density Residential.

Fig 3. Locality of class 5 acidic sulphate soils.

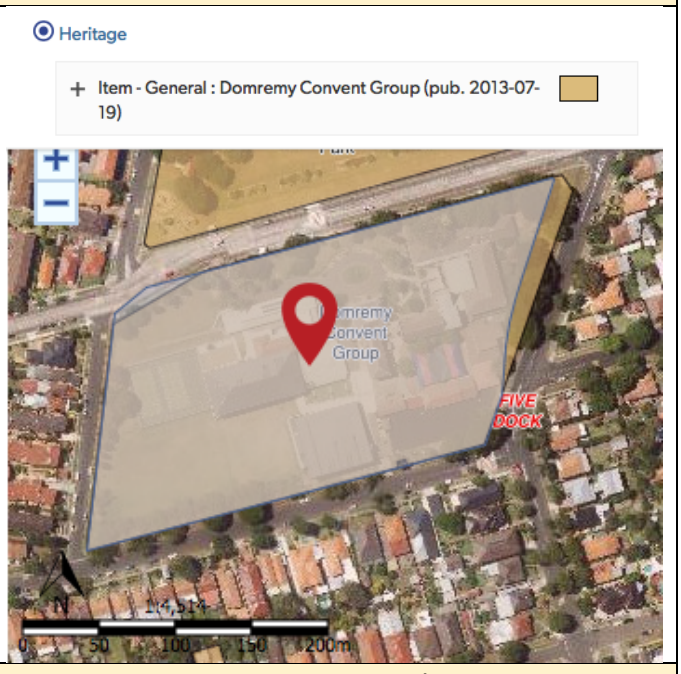

Fig 4. Heritage Conservation and Item-Domremy Convent. Surrounding vegetation.

Fig 5. Locality within the Five Dock Precinct.

Fig 6. Riparian corridors and greenspace areas surround ding the site.

8.0 DISCUSSION

8.1 The assessed trees are mostly outside of development and (117) one hundred and seventeen were assessed regarding the proposal. Of these trees the proposal indicates (6) six trees will be removed due to impacts by the new driveway access and the new building.

8.2 These (6)six trees have moderate value with tree 67 Callistemon viminalis (Red Bottlebrush) having a cavity and some structural issue, tree 72 Lophostemon confertus (Brush box) has a moderate to high value and 70-73 have moderate value and all have been heavily pruned. Tree 70 Jacaranda mimosifolia (Jacaranda) and tree 71 Brachychiton acerifolius (Illawarra flame tree). Tree 71 has been very damaged by heavy pruning with a 300mm cut across its stem at four (4) metres height from base. Trees 701,72&73 are mature age trees and have had the un-tolerable conditions (locality) of the school courtyard with compaction and typical school wear damage. Tree 73 has asphalt surrounding its rootzone and would continue to degrade without continuous maintenance.

8.3 A replenishment of these trees would be suited according to the tree management plan with six indigenous new plant stock of similar species selected according to *As2303 2015 Tree stock for Landscape Use*.

8.4 For the trees located adjacent these developed areas we propose tree protection and additional Tree Fence or Trunk Protection. This will include the trees within the northern side of the new carpark. These consist of two high value Phoenix canariensis (Phoenix palms) numbered 37&38 which will have some encroachment to their TPZ. Trees 31,32,33,34,35,36,41 have impacts to their TPZ which will include excavation and construction of the carpark. The table 2 indicates trees impacted and whether sensitive construction techniques, replenishment will be required.

8.5 Trees 44&45 will have impacts to their canopy and root system of less than ten percent but must be protected and pruned with an AQF Level 5 arborist present. This supervisory requirement will assist in the pruning of branches less than 40mm in diameter according to AS4373 2007 *Pruning of Amenity Trees*. As the road may access the TPZ area root pruning would be suitable with an AQF level 5 arborist certifying roots are cut cleanly prior to the installation of the road works. Tree trunk and canopy protection would be suitable, utilising hardwood lengths placed along their trunks vertically with 150mm air gaps and canopy protection of hessian adjacent there access. This can be reinforced with steel mesh panelling to restrict access into the TPZ. Inside the TPZ mulch of 150mm depth and clean certified mulch would be specified for ground protection.

8.6 TABLE 2. Trees with TPZ encroachment

Tree No.	Impacts	Tree Replenishment/Works Requirements
1	Excavation and construction of the carpark	Sensitive construction techniques where encroaching greater than 10%.
31,32,33,34,35,36,37,38,41	Excavation and construction of the carpark	Sensitive construction techniques where encroaching greater than 10%.
39,40	Remove impacted 100% by new access driveway to carpark.	Replenish (2) two trees with indigenous species or similar species.
44&45	Retain impacted greater than 10% by new access driveway to carpark.	Retain trees and utilise tree canopy and trunk protection.
67&68	Encroachment less than 10%	Minor pruning of canopy and ground and trunk protection installed.
70,71,72,73.	Remove impacted 100% by new building.	Replenish four trees indigenous species or similar species.
103	Construction of footings.	Sensitive construction techniques where encroaching greater than 10%.

9.0 HOLDING POINT

REQUIREMENTS PRIOR TO THE COMMENCEMENT OF ANY WORKS, INCLUDING DEMOLITION

1.1 The project arborist is to Mark the proposed trees to be removed with a waterproof marker at a visible height with a yellow cross.

1.2 Removal of Trees 39,40,70,71,72&73 by a Certified 3 arborist.

1.3 Any pruning greater than 40mm within TPZ of preserved trees will need to be cut cleanly under supervision of an AQF Level 5 Arborist. This will include clearances and crown canopy modification of any type.

1.4 Certification of tree protection as per Tree Protection Plan by AQF level 5 Arborist prior to any demolition, construction or re-landscaping.

1.5 No changes in soil level within TPZ of retained tree.

1.6 Root mapping for trees 1,31-38,4,44,45&103 prior to demolition and construction. Any roots greater than 40mm within TPZ but outside the SRZ of preserved trees will need to be cut cleanly under supervision of an AQF Level 5 Arborist.

1.7 Prohibitions are listed in appendix D 1,2,3&4 to be complied with and certified by an AQF level 5 arborist.

1.8 Replenishment of indigenous stock of 40litre potted volume selected from Appendix E list and planted according to the Tree Management Plan. (privy to production of a landscape plan)

1.9 Certifications of the compliance and bimonthly reports would be adequate for this development ensuring trees which are retained and preserved can be remediated if damage occurs. Remediation reports must be completed within one week of reporting in order to complete remedial works within the shortest timeframe and (likely) ensuring viability of trees.

1.10 The Project arborist name and contact details is to be made visible and legible with waterproof ink. with signage attached at 1.4m high to tree protection fencing, indicating the TPZ are not to be entered during or post construction unless supervised by the AQF level 5 arborist.

10.0 RECOMMENDATION

1. Removal of (6) six trees numbered; 39,40,70,71,72&73.
2. Completion of holding points 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 ,1.7,1.8.,1.9. &1.10
3. Root mapping of trees 1,31-38,41,44,45 &103 prior to construction.

To assist in the trees being managed competently the following recommendation is given:

In maintaining the quality of the contractor selected to maintain the work in accordance with AS/4743-2007 Pruning of Amenity Trees and Work safe "The Guide". The owner should engage a contractor from the following associations; a registered current member of Tree Contractors Association Australia (TCAA) or Arborists Australia (AA) must complete the works.

11.0 GLOSSARY

Crown: The width of the foliage in the upper canopy of the assessed tree to the four cardinal points.

Crown lifting means the removal of the lower branches of the tree

Crown thinning means the portion of the tree consisting of branches and leaves and any part of the stem from which branches arise.

Drip line: Where the canopy releases water shed from the foliage during precipitation.

DBH/Diameter: Diameter of trunk at 1.4meters in height of assessed tree.

Dead wooding means the removal dead branches from a tree.

Dieback: Tree deterioration where the branches and leaves die.

Flush cut: A cut that damages or removes the branch collar or removes the branch and stem tissue and is inconsistent with the branch attachment as indicated by the bark branch ridge.

Genus/ Species: The Genus and species of each tree has been identified using its scientific name. Where the species name is not known the letters species is used. The common name for trees may vary considerably in each area of geographical differences and so will not be used in the field survey.

Height: Height has been estimated to + / - 2 meters.

ISA: International Society of Arboriculture.

Maturity: Tree maturity has been assessed as over mature (last one third of life expectancy), mature (one third to two thirds life expectancy) and semi mature (less than one third life expectancy).

Remedial (restorative) pruning: includes: Removing damaged, deadwood; trimming diseased or infested branches. Trimming branches back to undamaged tissue in order to induce the production of shoots from latent or adventitious buds, from which a new crown will be established.

SRZ- Structural Root Zone: An area within the trees root zone in which roots stabilize the tree. Roots cut in this zone can cause instability and lead to anchorage loss.

Structural Integrity: Describes the internal supporting timber. (Substantial to frail)

TULE- Tree Useful Life Expectancy: An estimation of the trees useful life expectancy using appropriate industry methods with an inspection regime.

TPZ- Tree Protective Zone: This zone should be considered as optimal for tree growth and sustainability however the size of the zone is subjective and should be reassessed when individual design and construction methods are being discussed.

Tree Age: Trees have either been assessed as mature, immature or semi-mature.

Tree Numbering: All trees listed in the tree survey have been numbered and plotted

Vigor: This is an indication of the tree health. Trees have either been assessed as Good Vigor, Normal Vigor or Low Vigor.

12.0 BIBLIOGRAPHY

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WEBSITE

http://maps.six.nsw.gov.au/
https://www.planningportal.nsw.gov.au

APPENDIX A TULE – TREE USEFUL LIFE EXPECTANCY

Table 1 Revised 14.4.14 *ADAPTED FROM JEREMY BARREL (SULE) FOR TCAA CLIMBING CONSULTANT ARBORISTS*

	1 Long TULE	**2 Medium TULE**	**3 Short TULE**	**4 Remove**	**5.No Potential for Retention REMOVE IMMEDIATELY**	**6 Small, Young or Regularly clipped**
	Trees that appeared to be retainable at the time of assessment for more than 40 years with low level of risk	**Trees that appeared to be retainable at the time of assessment for 15 to 40 years with and with low to medium level risk**	**Trees that appeared to be retainable at the time of assessment for 5 to 15 years with medium to high level of risk**	**Trees that should be removed within the next 5 years High to Very high level of risk**	**Trees that must be removed immediately. Very high to Extreme level of risk**	**Trees that can be easily transplanted or replaced.**
A	Structurally sound trees located in positions that can accommodate future growth	Trees that may only live for between 15 and 40 more years	Trees that may only live for between 5 and 15 more years	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Dead, dying or declining trees diseased or inhospitable conditions.	Small trees less than 5 meters in height
B	Trees that could be made suitable for retention in the long term by Intervention Works.	Trees that may live for more than 40 years, but would need to be removed for safety or Nuisance reasons	Trees that may live for more than 15 years, but would need to be removed for safety or nuisance reasons	Dangerous trees through instability or recent loss of adjacent trees	Dangerous trees through instability or recent loss of adjacent trees	Young trees less than 15 years old but over 5 meters in height
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention	Trees that may live for more than 40 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting	Trees that may live for more than 15 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form	Trees that have been regularly pruned to artificially control growth
D		Trees that could be made suitable for retention in the medium term by Intervention Works.	Trees that require substantial Intervention Works, and are only suitable for retention in the short term	Damaged trees that are clearly not safe to retain	Damaged trees that are clearly not safe to retain and must be removed immediately	
E				Trees that may live for more than 5 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting	High Toxicity Allegan trees, asthmatic and poisonous trees and must be removed immediately.	
F				Trees that may cause damage to existing structures within 5 years	OTHER with legitimate explanation to be removed immediately	
G				Trees that will become dangerous after removal of other trees for reasons given in 1A-1F		
INSPECTION FREQUENCY	Inspection frequency 1-5 Years by competent inspector unless event monitored.	Inspection frequency 1-5 Years by competent inspector unless event monitored.	Inspection frequency 1-3 years by competent inspector unless event monitored.	Inspection frequency to 1 year by competent inspector unless event monitored.	1-7 days by competent inspector and event monitored	Inspection frequency Biannually by competent inspector

Health & Structural Condition of Tree	
1. *J- Juvenile; im- Immature; SM-Semi- Mature; M-Mature*	
2. Excellent Condition	
3. Good Condition but Poor Development / Habit	
4. Dieback is more than 20%.	4b Epicpormics
5. Sparse Foliage Crown	5b Unbalanced Canopy
6. Physical Damage	
7. Cavity	
8. Lean	
9. Heavily Pruned	
10. Inclusions	
11. Damage to roots	
12. Insect Damage	12b Borers
13. Termite Damage	
14. Fungal Attack	
15. Parasitic Vine Present	
16. Damage by Climbing Plant	
17. Habitat Tree	
18. Endangered Species	
19. Endangered community	

Developed by Claus Mattheck in: *The Body Language of Trees(*1994), which have adapted versions from Hornsby Shire Council.

APPENDIX C RETENTION VALUES

TABLE 3 – DETERMINING LANDSCAPE SIGNIFICANCE RATING

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m²; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m²; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m²; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage item.	The subject tree is listed as an Environment Weed Species in the Leichhardt Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

DETERMINING THE RETENTION VALUE OF TREES ON DEVELOPMENT SITES 4
EARTHSCAPE HORTICULTURAL SERVICES
December 2011

RETENTION VALUE	RECOMMENDED ACTION
"High"	• These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority. • Proposed site design and placement of buildings and infrastructure should consider the Tree Protection Zones as discussed in the following section to minimise any adverse impact. • In addition to Tree Protection Zones, the extent of the canopy (canopy drip-line) should also be considered, particularly in relation to high rise developments. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.
"Moderate"	• The retention of these trees is desirable. • These trees should be retained as part of any proposed development if possible, however they trees are considered less critical for retention. • If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replacement Policy to compensate for loss of amenity.
"Low"	• These trees are not considered to worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE. • These trees should not be considered as a constraint to the future development of the site.
"Very Low"	• These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds. • The removal of these trees is therefore recommended regardless of the implications of any proposed development.

APPENDIX D TREE PROTECTION

Extract from Australian Standard AS4970 2009 Protection of trees on development sites

4.5 OTHER TREE PROTECTION MEASURES

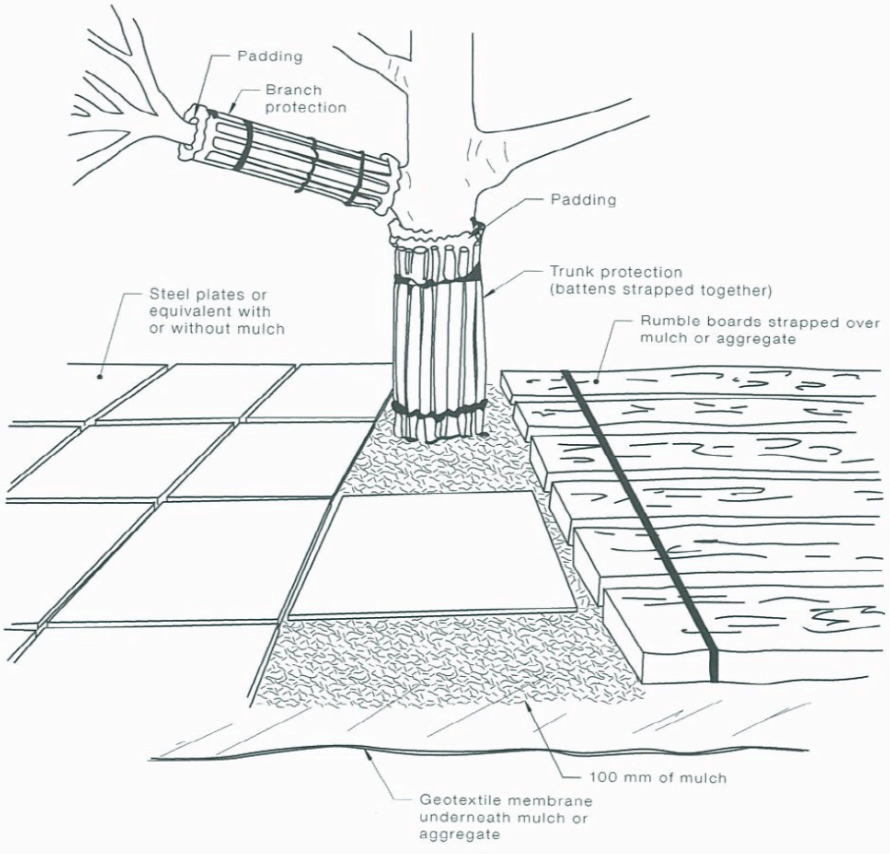
When tree protection fencing cannot be installed due to restricted access e.g. tree located along side an access way or requires temporary removal, other tree protection measure should be used, including those set out below;

4.5.2 TRUNK AND BRANCH PROTECTION see fig4.

4.5.3 GROUND PROTECTION

If temporary access for machinery is required within the TPZ, ground protection measure will be required to prevent compaction in the root zone. Measures may include permeable membrane such as geotextile fabric beneath a layer of mulch (100mm) or crushed rock below rumble boards as per fig 4.

Examples of Trunk, Branch and ground protection



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

FIGURE 4 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION

4.4.5 Installing underground services within TPZ

"All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches. The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees. For manual excavation trenches the project arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools.

PROHIBITIONS

1.The following activities shall not be carried out within any Tree Protection Zone:
I. Disposal of chemicals and liquids (including concrete and mortar slurry, solvents, paint, fuel or oil);
ii. Stockpiling, storage or mixing of materials;
iii. Refuelling, parking, storing, washing and repairing tools, equipment, machinery and vehicles;
iii. Disposal of building materials and waste;

2.The following activities shall not be carried out within any Tree Protection Zone unless under the supervision of the Project Arborist:
A. Increasing or decreasing soil levels (including cut and fill);
B. Soil cultivation, excavation or trenching;
C. Placing offices or sheds;
D. Erection of scaffolding or hoardings; and/or
E. Any other act that may adversely affect the vitality or structural condition of the tree.

3.All work undertaken within or above a Tree Protection Zone shall be supervised by the Project Arborist. (See below fig5-8).

4.Excavation within the Tree Protection Zone of any tree to be retained shall:
A. Be undertaken using non-destructive methods (eg. an Airspade or by hand) to ensure no roots greater than 40mm in diameter are damaged, pruned or removed. All care shall be taken to preserve and avoid damaging roots; B.not occur within the Structural Root Zone.

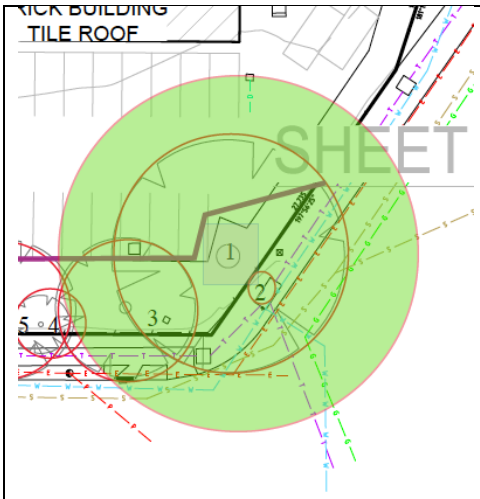


Fig 5. Tree 1 TPZ encroachment greater than 10%

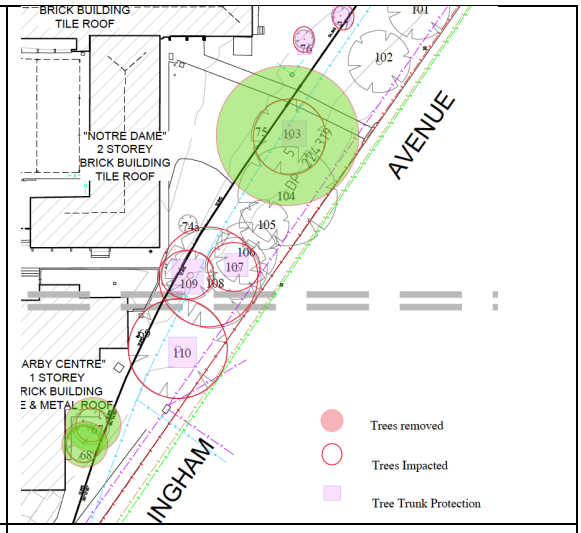


Fig 6. Tree 103 TPZ encroached greater than 10%

Fig7. TPZ encroachment requiring rootmapping to tree 31-41.(Not 38,39)

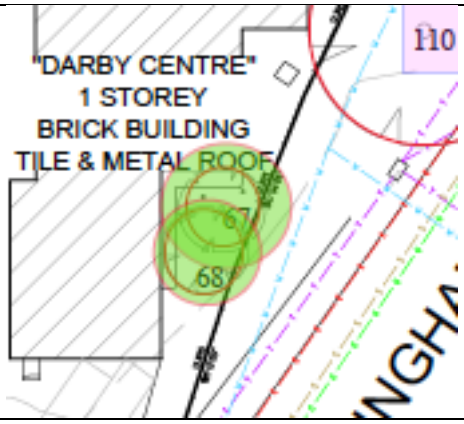


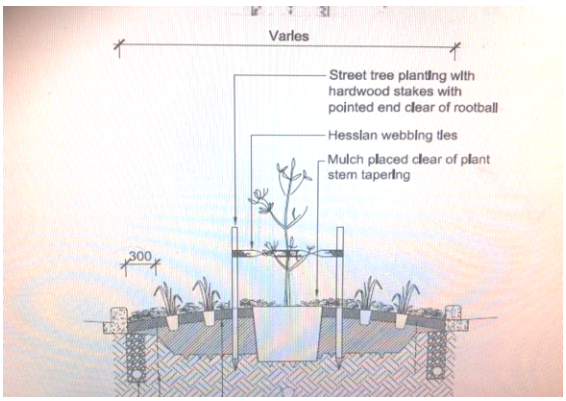
Fig 8. Tree 67&68 TPZ will be encroached and have minor pruning.

Before planting, careful consideration should be given to the location of trees and shrubs to minimise future problems. Review *As2030 2015* for selection criteria of Planting Stock for Landscape Use. A basic guide for planting follows:

1. Don't plant too close to buildings or in-ground pools or plant large trees too close together: Determine the height and canopy of trees when fully grown. Allow room for root growth (at least twice the height of the tree). Large trees should be planted at least three meters from buildings.
2. Check when planting under wires or over drainage lines: Determine the mature size of the tree and the size and nature of its root system.
3. Consider your neighbors when choosing plants: Consider the effect on neighbouring properties (i.e. shading, loss of views, impact on foundations, fences and services).
4. Use trees to provide your home with summer shade and/or winter sun: Plant deciduous trees (suitable to the climate and soils of this Shire). Consider the summer and winter shadows of evergreen trees.
5. Don't grow climbers on trees: Climbers can strangle trees, leading to the tree's eventual death.
6. Retain and protect as many trees as possible when building or extending your home. (This will be a Council requirement).
7. Use locally native and non-invasive species in your garden: Increase the success rate of your garden. Attract native fauna to your garden. Reduce the amount of watering required.
8. Don't excavate or alter the ground level around trees: Can cause root damage or starving of the roots. Can cause limb drop, instability or tree death. Substantially altering soil level within three meters of the trunk is in breach of the Tree Preservation Order.
9. When buying plants, check their characteristics: Check on mature size, shade characteristics, potential for roots to cause damage, flowers, fruits and pollen, to determine their suitability.

Mature trees do need maintenance: Remove or trim misshapen branches. Check for fungal rots or other diseases. If in doubt, contact Council for a tree inspection or contact an experienced Arborist. Indiscriminate lopping can be dangerous to your safety and the health of the tree.

Staking of trees should be carried out similar to the diagram.



Replacement Tree Species Low Allergy Trees *Agonis flexuosa* Willow Myrtle *Araucaria heterophylla* Norfolk Is. Pine *Bauhinia blakeana* Butterfly Tree *Eucalyptus spp.* Eucalyptus Trees *Grevillea robusta* Silky Oak *Hakea laurina* Pincushion Plant *H. salicifolia* Willow Leaved Hakea *Magnolia grandiflora* Bull Bay *Malus floribunda* Crab Apple *Melaleuca quinquenervia* Broad Leaved Paperbark *Nyssa sylvatica* Tupelo *Pistaciachinensis* Pistachio *Prunus x blireana* Flowering Plum *Szygium smithii* Lilly Pilly	Recommended Replacement Species **Szygium smithii* Lilly Pilly *Tristaniopsislaurina* Water Gum *Corymbia exemia* Yellow Bloodwood **Backhousia citriodora* Lemon Scented Myrtle **Elaeocarpusreticulatus* Blueberry Ash **Waterhousia floribunda* Weeping Lilly Pilly *Syzygium leuhmannii*Riberry *Hymenosporumflavum* Native Frangipani *E. paniculata* Grey Ironbark *Eucalyptus microcorys* Tallowood *Eucalyptus leucoxylon* Yellow Gum Eucalyptus crebra Narrow Leaved Ironbark *Syncarpia glomulifera* Turpentine *Lophostemon confertus* Brush Box

- Recommended for this site.

Suitable Understory Plants **Understory trees:** *Pittosporum undulatum* Sweet Pittosporum *Elaeocarpus reticulatus* Blueberry Ash *Allocasuarina torulosa* Forest Oak	 **Understory shrubs** *Breynia oblongifolia* Coffee Bush *Pittosporum revolutum* Rough-fruited Pittosporum *Polyscius sambucifolia* Elderberry Panax *Myrsine variabilis* Muttonwood

DISCLAIMER

McArdle Arboricultural Consulting Pty Ltd does not assume responsibility for liability associated with the tree on or adjacent to this project site, their future demise and/or any damage, which may result therefrom.

Any legal description provided to McArdle Arboricultural Consultancy Pty Ltd is assumed to be correct. Any titles and ownerships to any property are assumed to be good and sound. McArdle Arboricultural Consultancy Pty Ltd takes care to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

McArdle Arboricultural Consultancy's reports and recommendations shall not be viewed by others or for any other reason outside its intended target, either partially or whole, without the prior written consent of the consultant. Unauthorised alteration or separate use of any section of the report invalidates the whole report. McArdle Arboricultural Consultancy Pty Ltd cannot be held responsible for any consequences as a result of work carried out outside specifications, not in compliance with Australian Standards or by inappropriately qualified staff.

Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale. All recommendations contained within this report represent the current industry best practice methods of inspection. McArdle Arboricultural Consultancy Pty Ltd shall not be required to give testimony or to attend court by reason of this report unless subsequent contractual arrangements are made, including payment of an additional fee for such services.

LIMITS OF OBSERVATION
McArdle Arboricultural Consultancy Pty Ltd makes every effort to accurately identify current tree health and safety issues. Results may or may not correlate to actual tree structural integrity. There are many factors that may contribute to limb or total tree failure. Not all these symptoms are visible. There can be hidden defects that may result in a failure even though it would seem that other, more obvious defects would be the likely cause of failure.

All standing trees have an element of unpredictable risk. McArdle Arboricultural Consultancy Pty Ltd endeavors to identify the risk that the tree represents; however a level of risk associated with every tree will remain. McArdle Arboricultural Consultancy Pty Ltd does not provide any warranty or guarantee that problems, deficiencies or failures with regard to the plant/s, property or building/s will not arise in the future.

Ongoing monitoring may foresee deterioration of a tree and allow remedial action to be taken to prevent injury or damage. The timing for re-inspection on individual trees is subjective and will vary however an annual inspection is advisable for trees in subsequent years.

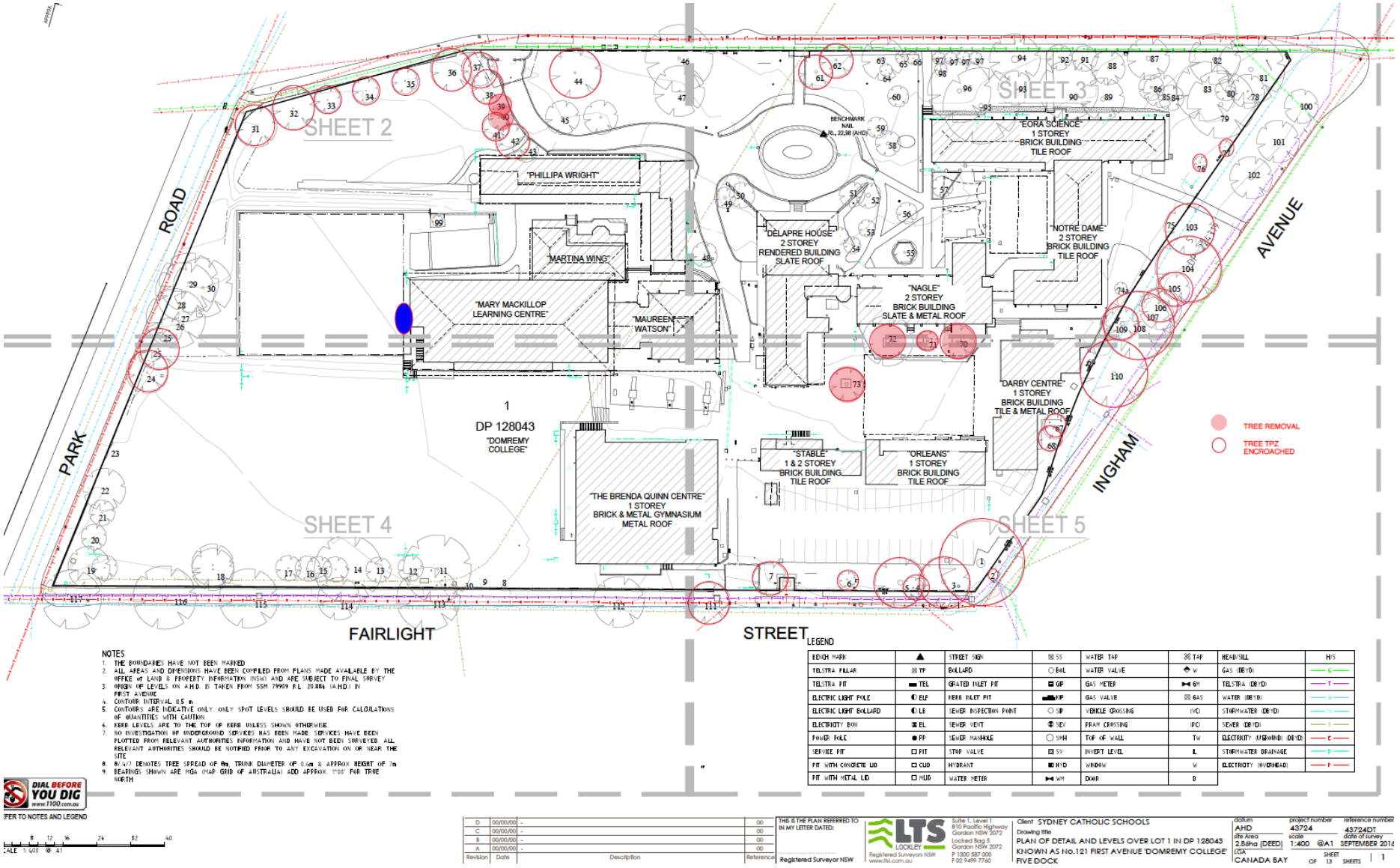
FURTHER RESEARCH *The report does not cover threatened, heritage or existing trees in relation to remnant forest. Further reporting may be considered as part of the relevantRISK ASSESSMENT.*

LIMIT OF OBSERVATIONS
"There are many factors that may contribute to limb or total tree failure. Factors include, decay (in the trunk, crown or branch junctions), external damage to branches leading to decay, poor branch taper, included bark, root rot/ decay. Not all these symptoms are visible i.e. internal decay; of these some external symptoms may indicate the presence of deadwood but not the extent of decay. The most solid looking piece of timber may be riddled with breaks in continuity of growth caused by insect damage or poor pruning practices or other physical damage caused many years previous. Trees don't heal; they simply box in the damaged area ((CODIT) Compartmentalization of Decay In Trees.) and continue to expand in girth, completely disguising the fact that the branch or trunk has a hollow or decayed section. Having said this, not all areas, of decay past or present suggest a point of failure."

In addition to this information, other variables that can contribute to limb or total tree failure are tree species, wood densities, weight, age, location, exposure to the elements, soil types, disease and pests, birds using trees as habitat and food sources, termites causing structural problems and human influences such as, altered drainage, compaction or leaching of miner.

Tree Location Plan

TREE IMPACTS PLANS



NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED
2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY THE OFFICE of LAND & PROPERTY INFORMATION (NSW) AND ARE SUBJECT TO FINAL SURVEY
3. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM SSM 79909 R.L. 20.886 (A.H.D.) IN FIRST AVENUE
4. CONTOUR INTERVAL 0.5 m
5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
6. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
7. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. SERVICES HAVE BEEN PLOTTED FROM RELEVANT AUTHORITIES INFORMATION AND HAVE NOT BEEN SURVEYED. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
8. W/47 DENOTES TREE SPREAD OF 9m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
9. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

LEGEND

BENCH MARK	▲	STREET SIGN	SS	WATER TAP	TAP	HEAD/SILL	H/S
TELSTRA PILLAR	TP	BOLLARD	BOL	WATER VALVE	W	GAS (DBYD)	G
TELSTRA PIT	TEL	GRATED INLET PIT	GIP	GAS METER	GM	TELSTRA (DBYD)	T
ELECTRIC LIGHT POLE	ELP	KERB INLET PIT	KIP	GAS VALVE	GAS	WATER (DBYD)	W
ELECTRIC LIGHT BOLLARD	LB	SEWER INSPECTION POINT	SIP	VEHICLE CROSSING	(VC)	STORMWATER (DBYD)	SW
ELECTRICITY BOX	EL	SEWER VENT	SEV	PRAM CROSSING	(PC)	SEWER (DBYD)	S
POWER POLE	PP	SEWER MANHOLE	SMH	TOP OF WALL	TW	ELECTRICITY (UNDERGROUND) (DBYD)	E
SERVICE PIT	PIT	STOP VALVE	SV	INVERT LEVEL	IL	STORMWATER DRAINAGE	D
PIT WITH CONCRETE LID	CLID	HYDRANT	HYD	WINDOW	W	ELECTRICITY (OVERHEAD)	P
PIT WITH METAL LID	MLID	WATER METER	WM	DOOR	D		

DIAL BEFORE YOU DIG www.1100.com.au

REFER TO NOTES AND LEGEND

SCALE 1:400 @ A1

Revision	Date	Description	Reference
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	00/00/00	-	00

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

Registered Surveyor NSW

LTS LOCKLEY Registered Surveyors NSW www.ltsl.com.au

Suite 1, Level 1 810 Pacific Highway Gordon NSW 2072 Locked Bag 5 Gordon NSW 2072 P 1300 587 000 F 02 9499 7760

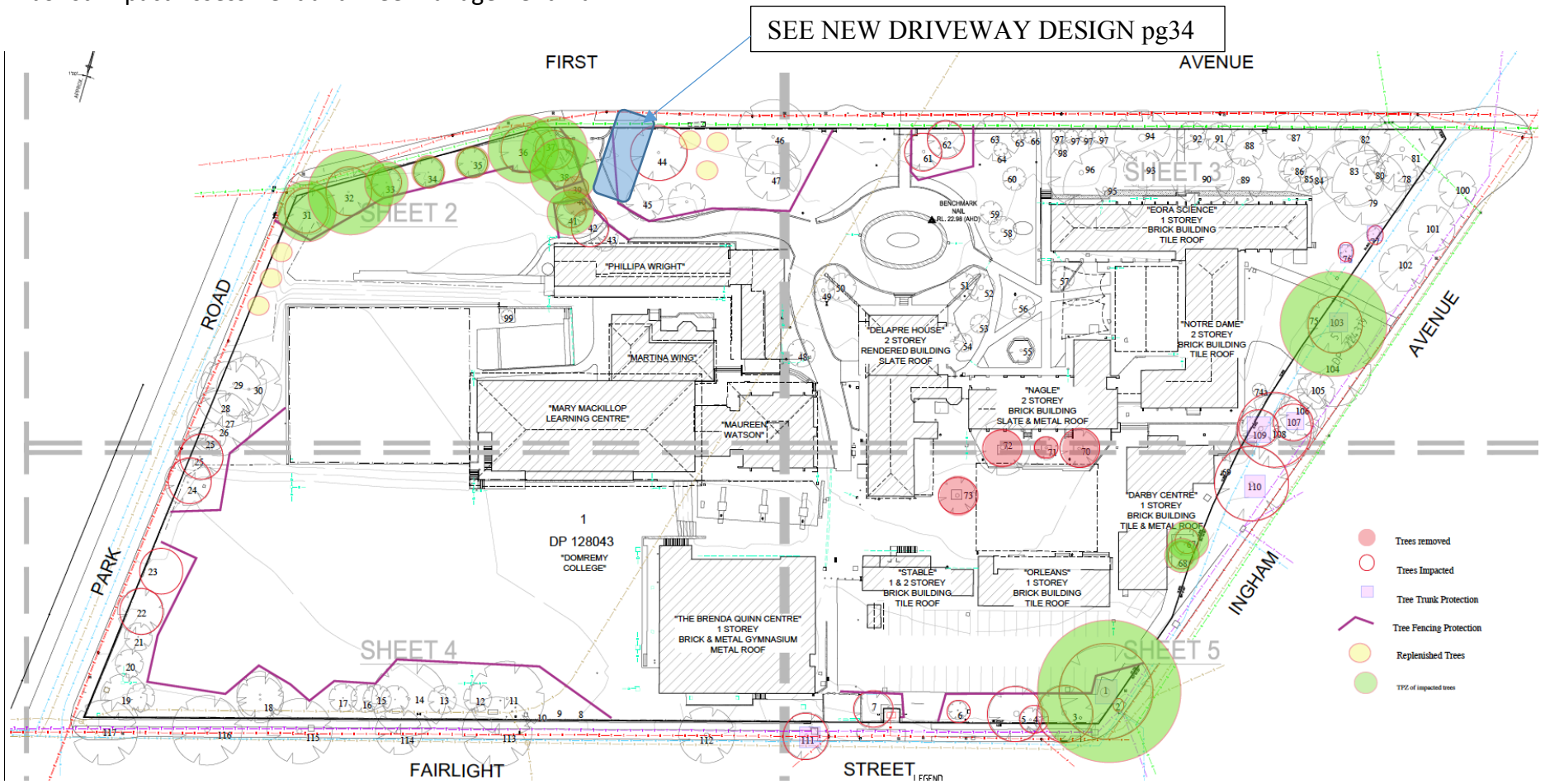
Client SYDNEY CATHOLIC SCHOOLS

Drawing title PLAN OF DETAIL AND LEVELS OVER LOT 1 IN DP 128043 KNOWN AS No.121 FIRST AVENUE 'DOMREMY COLLEGE' FIVE DOCK

datum AHD | site Area 2.84ha (DEED) | LGA CANADA BAY

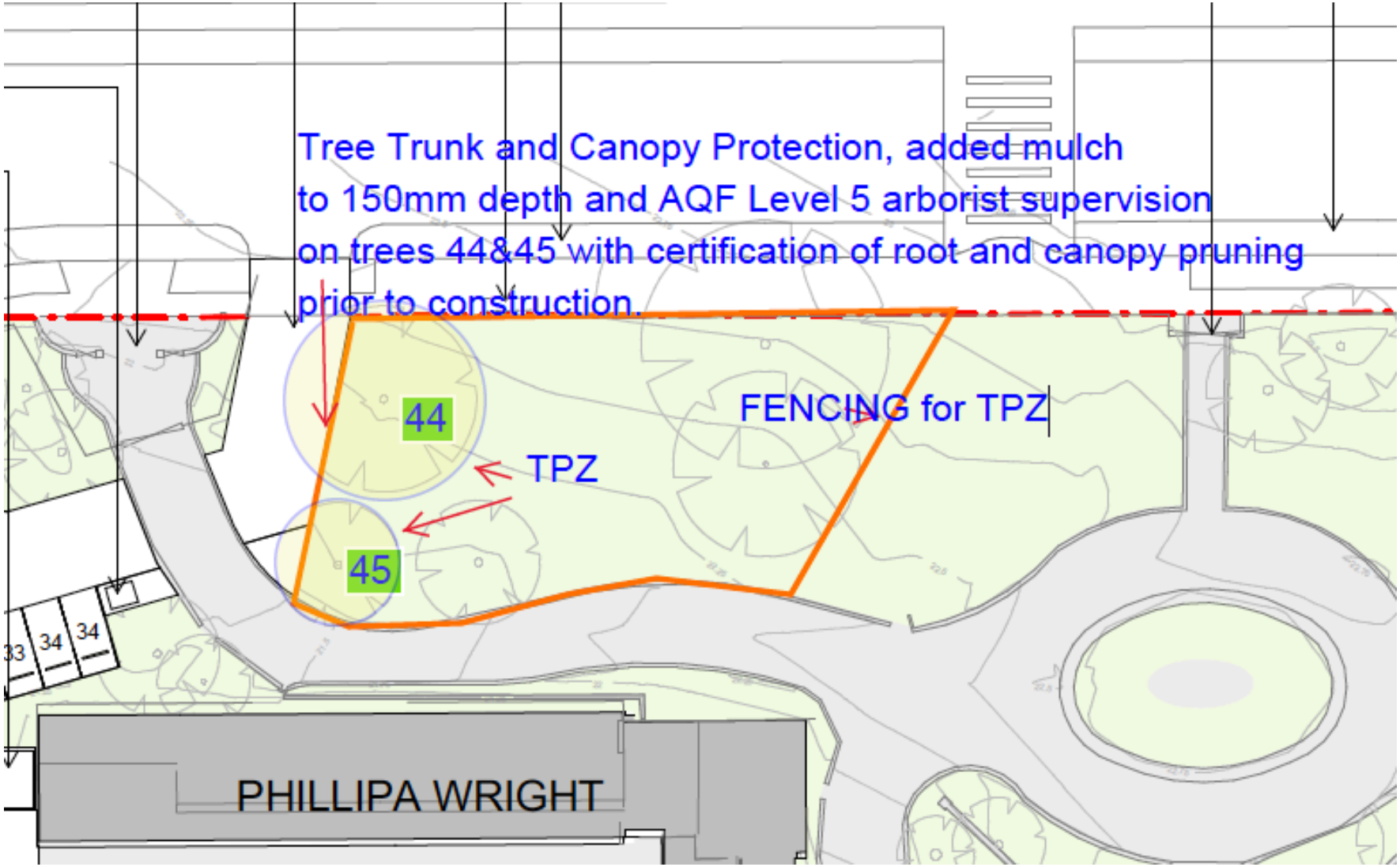
project number 43724 | scale 1:400 @A1 | reference number 43724DT | date of survey SEPTEMBER 2014

SHEET 1 OF 13 SHEETS



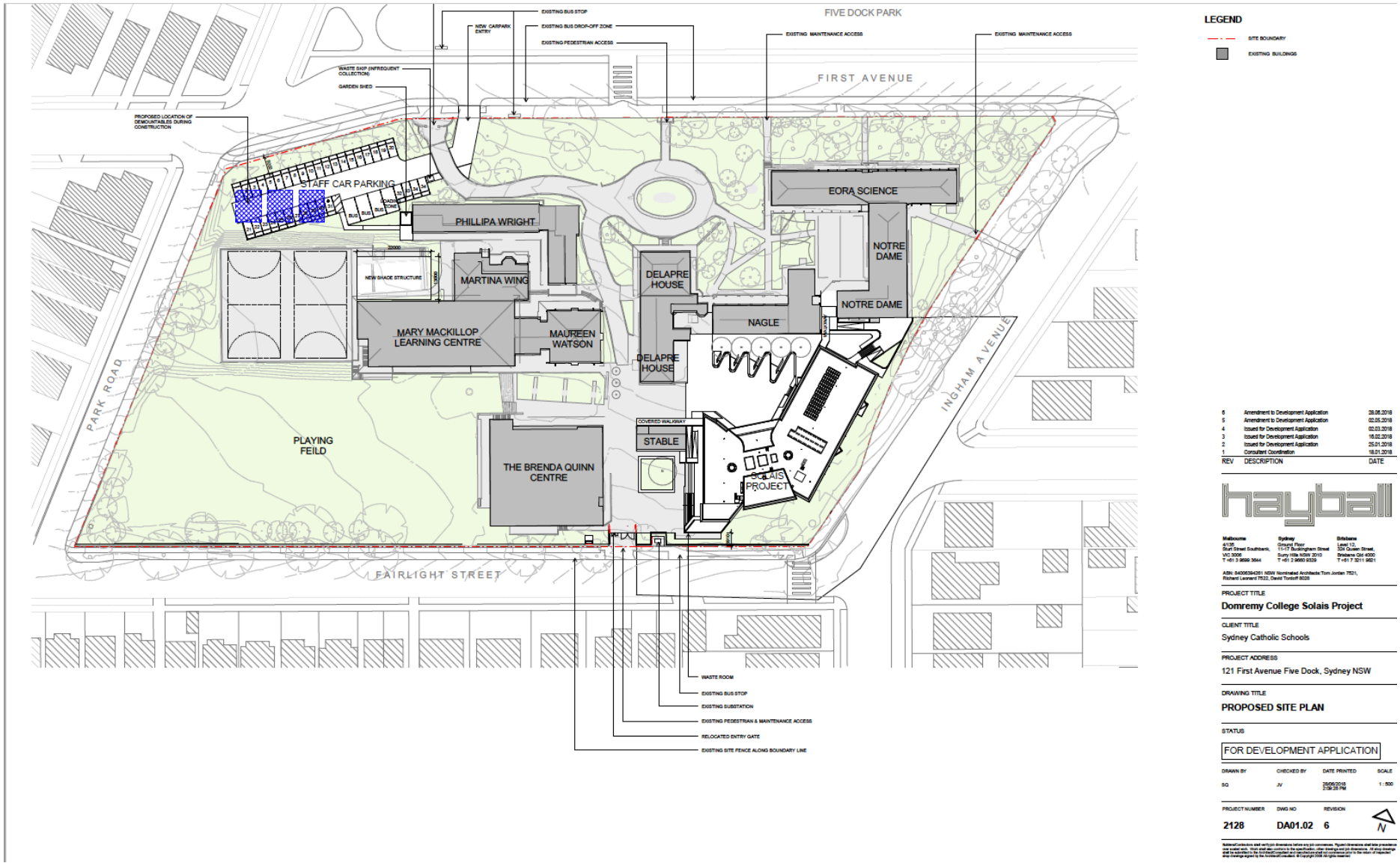
TREE MANAGEMENT PLAN

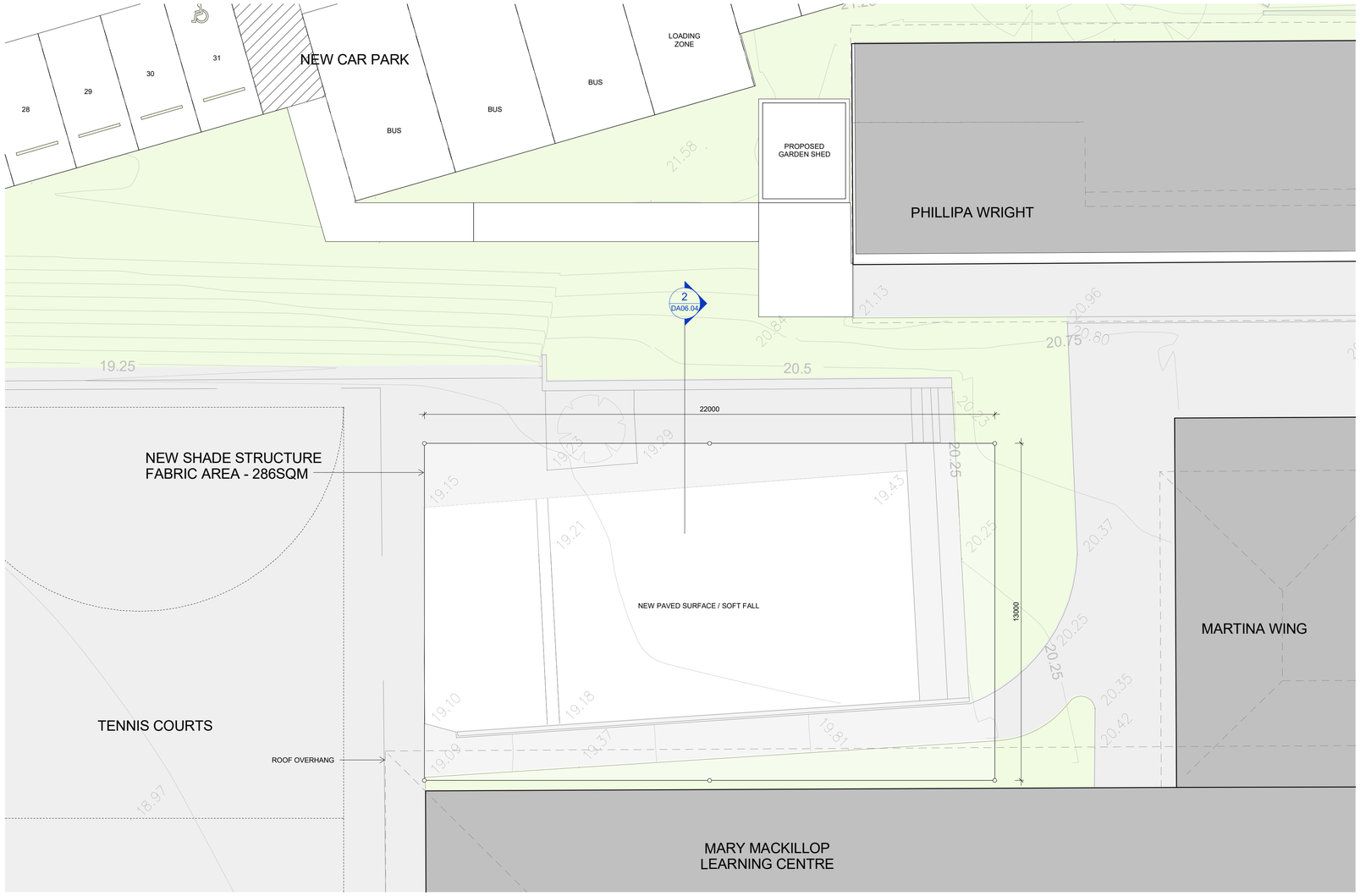
UPDATED DRIVEWAY SECTION



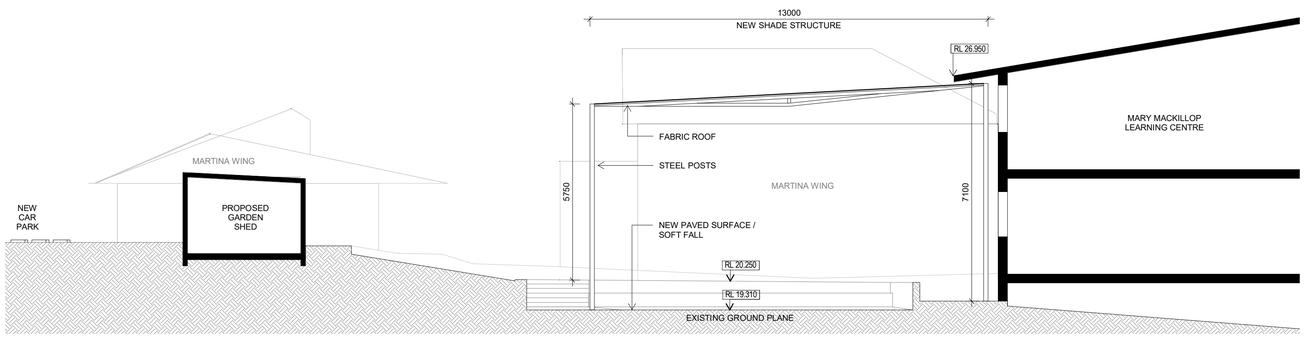
(Note the updated plan is attached on page 35).

UPDATED PLAN





1 SHADE STRUCTURE PLAN
A03.53 1 : 100



2 SHADE STRUCTURE SECTION
DA06.04 1 : 100

REV	DESCRIPTION	DATE
1	Amendment to Development Application	28.06.2018

Melbourne
4/135
Sturt Street Southbank,
VIC 3006
T +61 3 9699 3644

Sydney
Ground Floor
11-17 Buckingham Street
Surry Hills NSW 2010
T +61 2 9660 9329

Brisbane
Level 12,
324 Queen Street,
Brisbane Qld 4000
T +61 7 3211 9821

ABN: 84006394261 NSW Nominated Architects:Tom Jordan 7521, Richard Leonard 7522, David Tordoff 8028

PROJECT TITLE
Domremy College Solais Project

CLIENT TITLE
Sydney Catholic Schools

PROJECT ADDRESS
121 First Avenue Five Dock, Sydney NSW

DRAWING TITLE
SHADE STRUCTURE SECTION

STATUS
FOR DEVELOPMENT APPLICATION

DRAWN BY	CHECKED BY	DATE PRINTED	SCALE
SQ	JV	28/06/2018 2:15:27 PM	1 : 100

PROJECT NUMBER	DWG NO	REVISION
2128	DA06.04	1

PDC Consultants
Level 5, 104 Commonwealth Street
Surry Hills NSW 2010
T: +61 2 7900 6514
ABN: 70 615 064 670

Ref: 0057r01v01

3/07/2018

Impact Group
Level 1, 51 Walker Street
North Sydney NSW 2060

Attention: Josh Partridge

RE: DOMREMY CATHOLIC COLLEGE - 121 FIRST AVENUE, FIVEDOCK (DA 2018/0076)
LETTER OF RESPONSE TO COUNCIL

Dear Josh,

We refer to recent correspondence concerning the abovementioned development and in particular, the subject Development Application DA 2018 / 0076 which is currently under assessment by Canada Bay Council.

Council's Statutory Planner issued an email on the 17/05/2018 requesting clarification / additional information to be provided regarding a number of aspects of the proposed development, including aspects relating to the design of the proposed driveway onto First Avenue. In this regard, we confirm that we have taken Council's comments into consideration and now provide a response to each of Council's comments separately below. Our response is provided separately underneath each of Council's comments and is shown indented and in *italics*.

Council's Comment No. 1

Longitudinal sections are to be provided along the extreme wheel path of proposed driveway in First Avenue. The section shall extend from the centre line of the roadway and shall include all gradients including footpath cross fall to be at a maximum of 2.5%, change of grade and grade transition details and levels. It shall also include a standard layback crossing with a maximum of 100mm level difference from the invert of the gutter to top of layback. Layback levels shall be consistent with the detail survey levels.

> *A longitudinal section has been prepared in accordance with the above requirements, for the two (2) extreme wheel paths of the proposed access driveway onto First Avenue. These have been prepared by Enstruct Group and included in* ***Attachment 1*** *for reference.*

Council's Comment No. 2

The driveway profile shall also demonstrate compliance with the scraping provisions of AS/NZS 2890.1:2004 based on the 85th percentile vehicles ground clearance templates.

> *As stipulated in AS/NZS 2890.1:2004 (AS 2890.1), the 85th percentile vehicle (B85) ground clearance template is to be used for domestic driveways only. Accordingly, for the purposes of a more conservative assessment and to ensure compliance with AS 2890.1, a ground clearance assessment was undertaken using the 99th percentile vehicle (B99) ground clearance template defined in AS 2890.1.*
>
> *Our assessment was undertaken along each edge of the First Avenue access driveway using the two longitudinal sections provided in* ***Attachment 1****. The results of the vertical clearance test are included in* ***Attachment 2*** *and confirm the proposed access driveway complies with the relevant provisions of AS 2890.1, and that no scraping of the vehicle undercarriage will occur.*

Council's Comment No. 3

Driveway entrance shall be perpendicular to the kerb and gutter alignment and should not be designed with kerb returns.

> *The Enstruct Group drawings included in* ***Attachment 1*** *confirm that the proposed access driveway onto First Avenue shall be constructed perpendicular to the kerb and gutter alignment, and will not incorporate kerb returns.*

Council's Comment No.4

All redundant driveways shall be removed, and footway and footpath reinstated. Any redundant stormwater outlets shall also be removed.

> *All redundant driveways shall be removed, and footway and footpath reinstated. Any redundant stormwater outlets shall also be removed.*

Separate to the above, we note that comments have been received from Council's tree officer and heritage advisor advising that the proposed driveway onto First Avenue should be relocated to ensure that Tree 38 is able to be retained. In response, we note that the alignment of the First Avenue driveway and internal roadway have been reconfigured to ensure that these are clear of Tree 38 and importantly, that Tree 38 is able to be retained. The revised arrangements are shown by the amended Site Plan, prepared by Hayball, included in **Attachment 3**.

The revised arrangements have also been assessed using swept path analysis for a 7.6 metre Toyota Coaster and 8.8 metre Medium Rigid Vehicle (MRV). The results are included in **Attachment 2** and confirm that satisfactory entry and exit movements will be achieved, clear of Tree 38. We do however note that access by an 8.8 metre MRV will only be permitted outside of school hours when the car park is vacant. This will ensure that there is ample space for an 8.8 metre MRV to turn around on-site as demonstrated by the swept path results.

An updated swept path of an 8.8 metre MRV accessing the waste collection area is also included in **Attachment 2** for reference. This confirms that satisfactory entry and exit movements will be achieved to the waste collection area, which would also occur outside of school hours.

We trust the above satisfactorily resolves all of the parking design concerns raised by Council. Please contact the undersigned should you have any queries or require anything further.

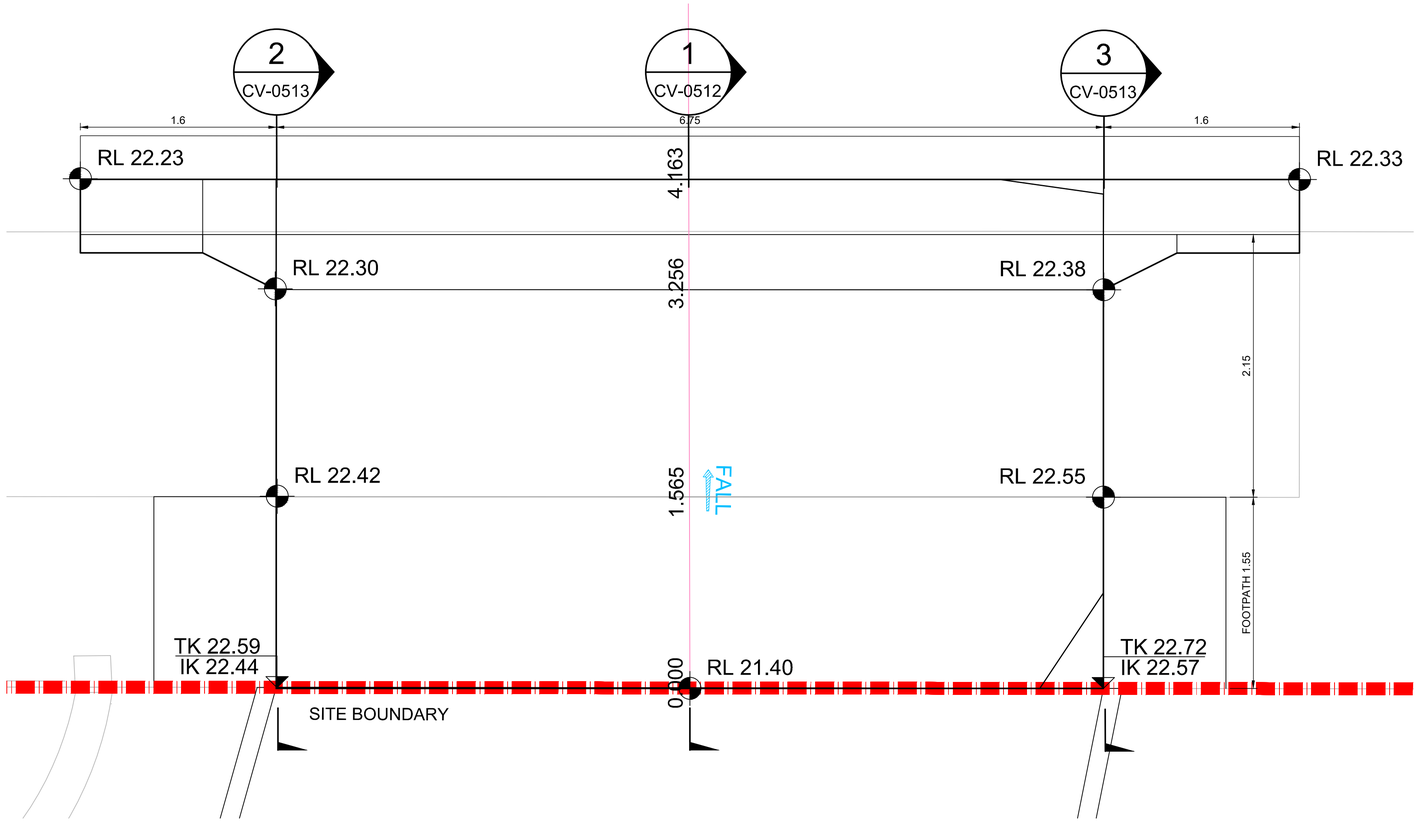
Yours sincerely,

Julius Boncato
Traffic Engineer, PDC Consultants

Email: jboncato@pdcconsultants.com.au

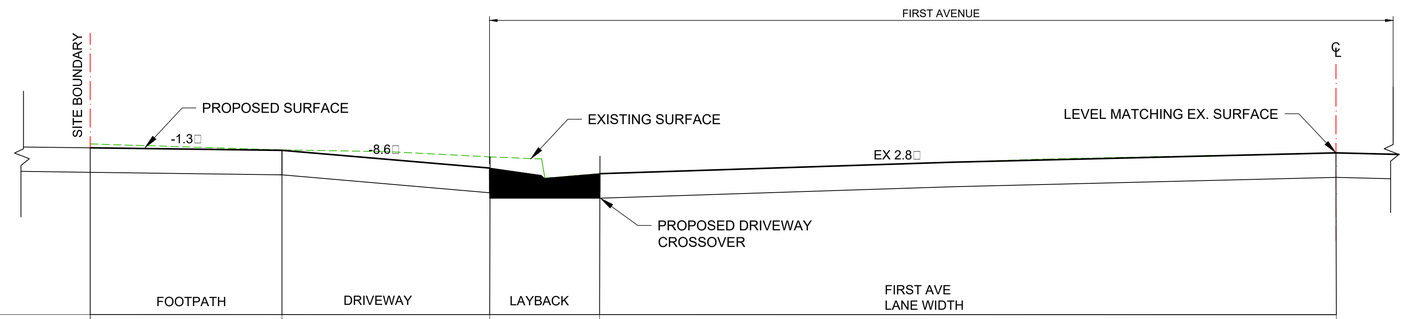
Attachments:
1) *Civil Drawings of the Proposed Driveway onto First Avenue*
2) *Vertical Clearance Test & Swept Path Analysis Results*
3) *Amended Site Plan*

Attachment 1



FIRST AVENUE DRIVEWAY PLAN

SCALE 1:25



	FOOTPATH	DRIVEWAY	LAYBACK	FIRST AVE LANE WIDTH	
DESIGN LEVELS	22.505	22.485	22.340	22.296	22.465
EXISTING LEVELS	22.532	22.487	22.430	22.296	22.465
CHAINAGE	0.000	1.565	3.256	4.163	10.176

DRIVEWAY SECTION 1-1

SCALE 1:25

STORMWATER DRAINAGE LONG SECTION

SCALE VERTICAL 1:50
HORIZONTAL 1:500

NOT FOR CONSTRUCTION

rev	date	description	drn	chk
02	18/06/18	65□ DESIGN DEVELOPMENT. SECTIONS ADDED	JF	MM
01	18/06/18	65□ DESIGN DEVELOPMENT UPDATED	JF	MM

enstruct group pty ltd
Level 4, 2 Glen Street
Milsons Point NSW 2061
Australia
Telephone (02) 8904 1444
Facsimile (02) 8904 1555
www.enstruct.com.au

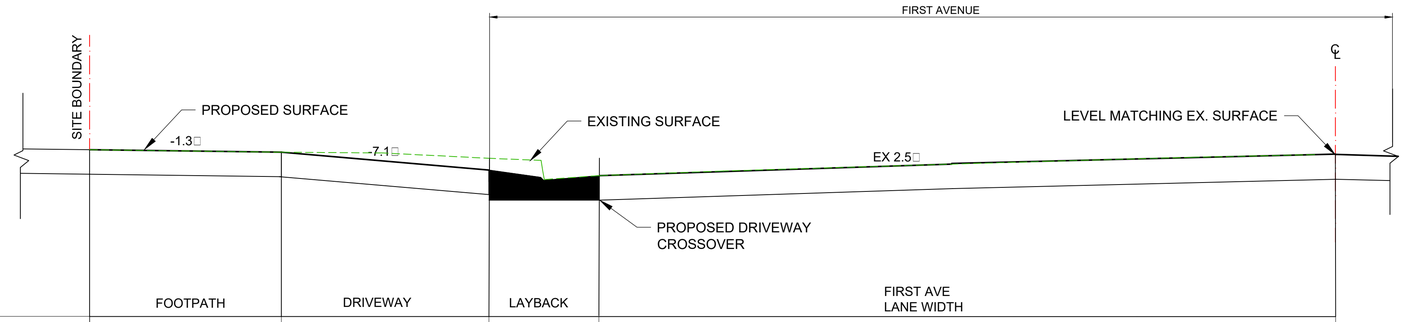
project: DOMREMY COLLEGE
SOLAIS LAB PROJECT
FIVE DOCK

drawing title: SITEWORKS DETAILS
SHEET 2

status: FOR INFORMATION ONLY

scale at A1	drawn by	checked	date
NTS	ML	MM	JUN-18

project no.	drawing no.	rev.
5503	CV-0512	02

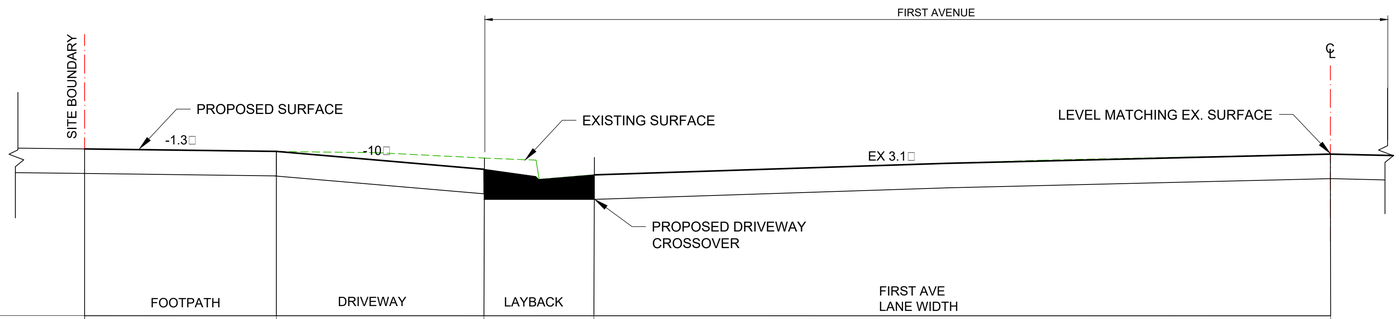


	FOOTPATH	DRIVEWAY	LAYBACK	FIRST AVE LANE WIDTH	
DESIGN LEVELS	22.440	22.420	22.300	22.225	22.404
EXISTING LEVELS	22.440	22.487	22.430	22.225	22.404
CHAINAGE	0.000	1.565	3.256	4.163	10.176

SECTION 2
SCALE 1:25 CV-0513

DRIVEWAY SECTION 2-2

SCALE 1:25



	FOOTPATH	DRIVEWAY	LAYBACK	FIRST AVE LANE WIDTH	
DESIGN LEVELS	22.570	22.455	22.380	22.330	22.523
EXISTING LEVELS	22.57	22.455	22.430	22.330	22.523
CHAINAGE	0.000	1.565	3.256	4.163	10.176

SECTION 3
SCALE 1:25 CV-0513

DRIVEWAY SECTION 3-3

SCALE 1:25

NOT FOR CONSTRUCTION

rev	date	description	drn	chk
01	29/06/18	65□ DESIGN DEVELOPMENT UPDATED	JF	MM

rev	date	description	drn	chk

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Australia

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Facsimile (02) 8904 1555
www.enstruct.com.au

enstruct

project
DOMREMY COLLEGE
SOLAIS LAB PROJECT
FIVE DOCK

drawing title
SITEWORKS DETAILS
SHEET 3

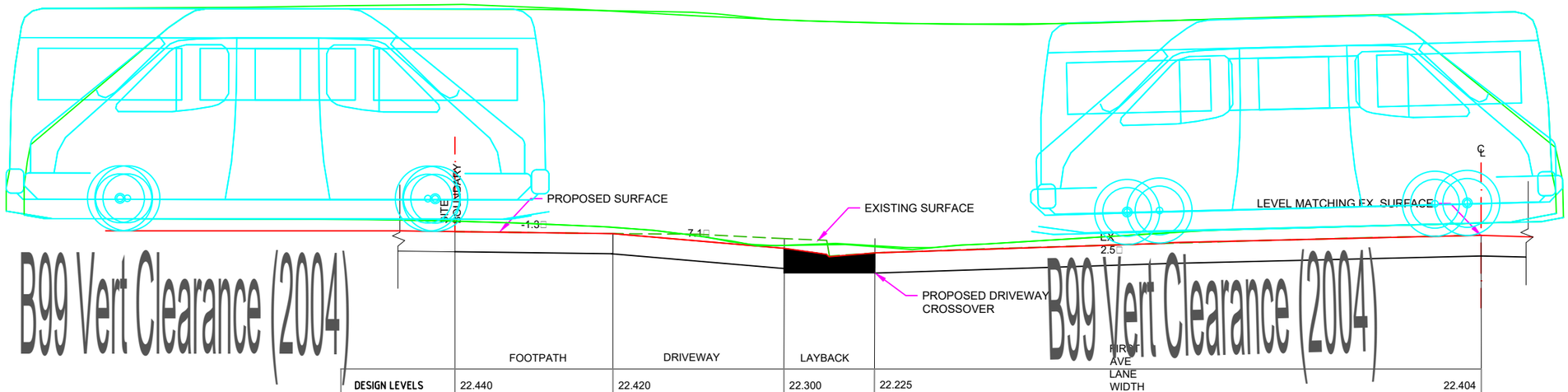
status
FOR INFORMATION ONLY

scale at A1	drawn by	checked	date
1:25	JF	MM	JUN-18

project no.	drawing no.	rev.
5503	CV-0513	01

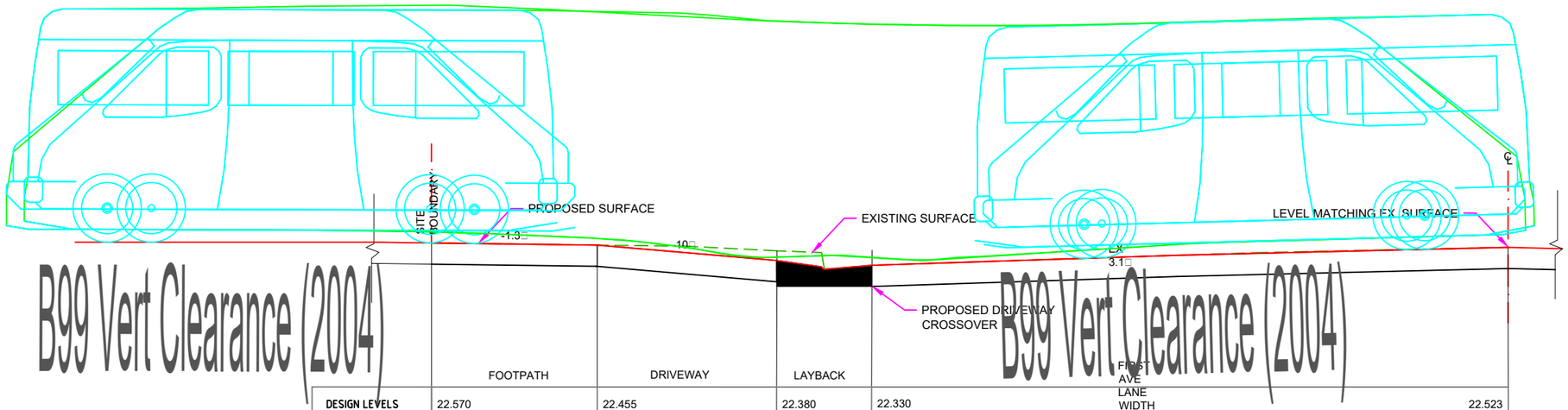
Attachment 2

DRIVEWAY SECTION 2-2



	FOOTPATH	DRIVEWAY	LAYBACK	FIRST AVE LANE WIDTH	
DESIGN LEVELS	22.440	22.420	22.300	22.225	22.404
EXISTING LEVELS	22.440	22.487	22.430	22.225	22.404
CHAINAGE	0.000	1.565	3.256	4.163	10.176

DRIVEWAY SECTION 3-3



	FOOTPATH	DRIVEWAY	LAYBACK	FIRST AVE LANE WIDTH	
DESIGN LEVELS	22.570	22.455	22.380	22.330	22.523
EXISTING LEVELS	22.57	22.455	22.430	22.330	22.523
CHAINAGE	0.000	1.565	3.256	4.163	10.176

No. Date Description

Swept Path Key
- Vehicle Wheel Path
- Vehicle Body Envelope
- 300mm Vehicle Clearance

North

Drawing Prepared By

PDC Consultants
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t: +61 2 7900 6514
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ABN: 70 615 064 670

Civil Engineer
Enstruct Group
Level 4, 2 Glen Street
Milsons Point NSW 2061

Client
Sydney Catholic Schools

Project
Domremy College, Five Dock

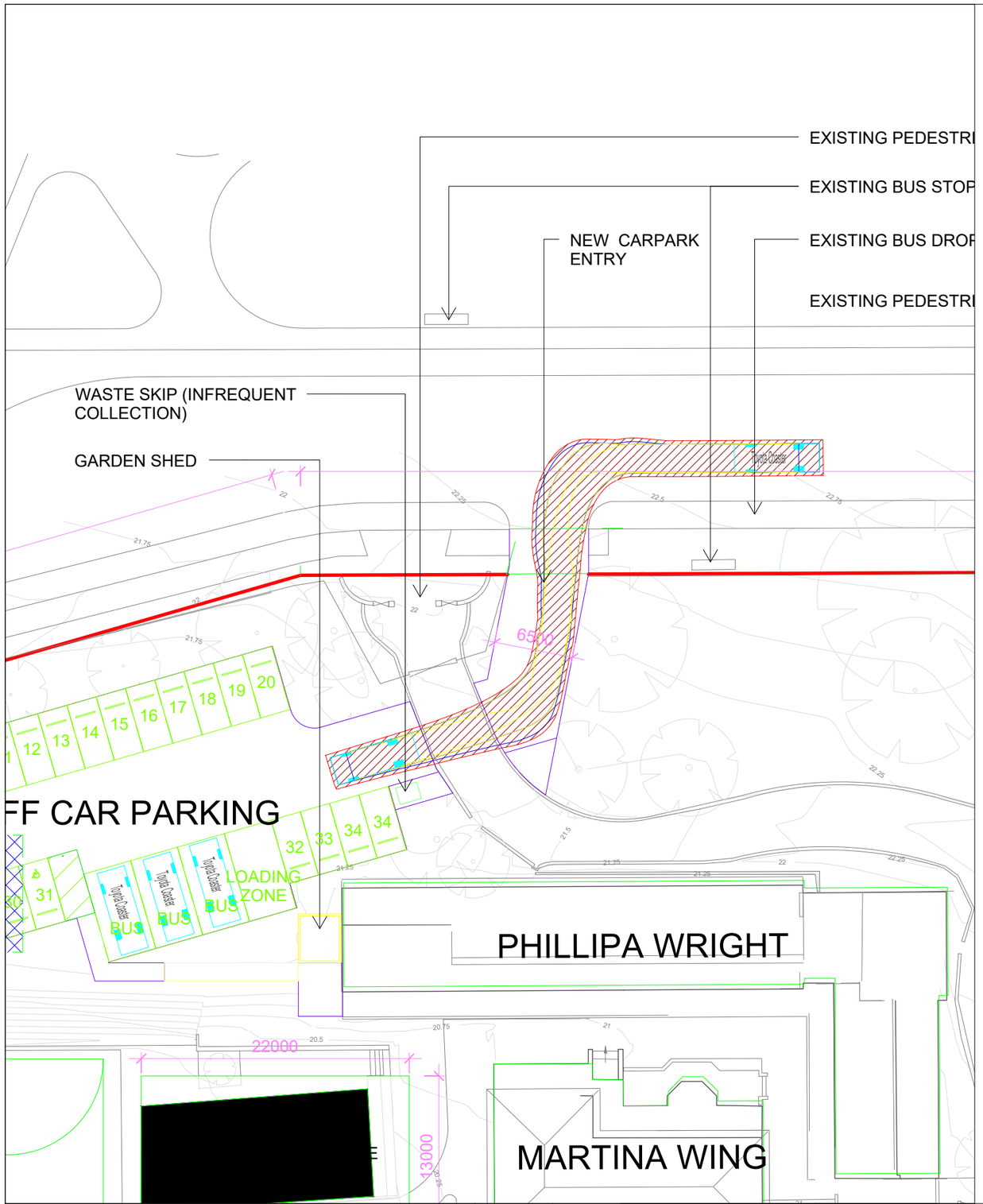
Project No
0057

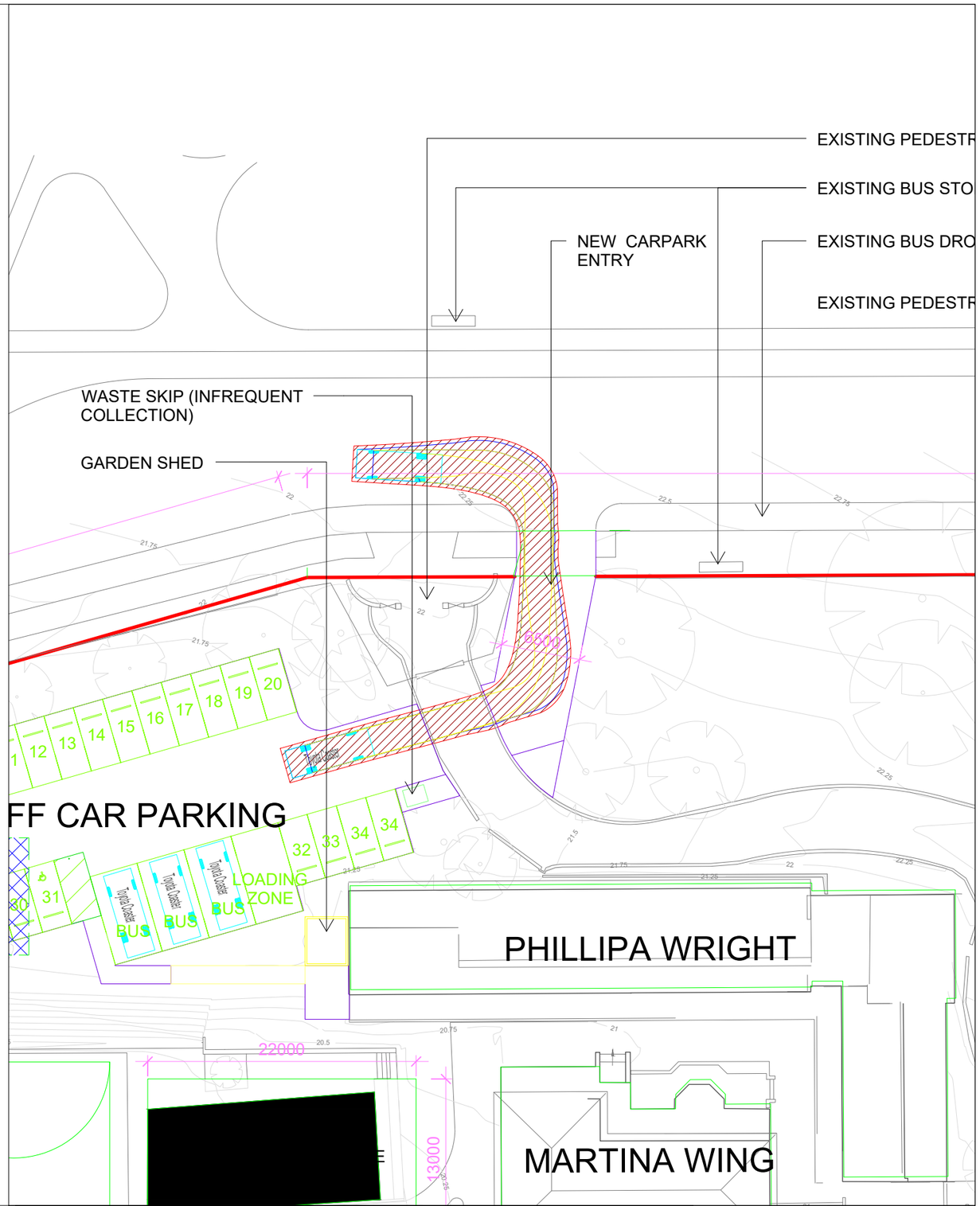
Drawing Title
Longitudinal Sections - First Avenue Access Driveway
B99 Vehicle Swept Path Analysis
Vertical Clearance Test

Sheet Status
NOT FOR CONSTRUCTION

Drawing No. 008
Revision No. -
Drawn By JB
Date 3/07/2018

Scale
1:50 @ A3
0m 0.5 1.0 1.5 2.0





No.	Date	Description

Swept Path Key
- Wheel Path
- Vehicle Body Envelope
- 300mm Clearance Envelope

North

Drawing Prepared By

PDC Consultants
Level 5, 104 Commonwealth Street
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t: +61 2 7900 6514
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Architect
Hayball
11-17 Buckingham Street
Surry Hills NSW 2010

Client
Sydney Catholic Schools

Project
Domremy College
Five Dock NSW

Project No
17.130

Drawing Title
Proposed Site Plan
7.6m Toyota Coaster Swept Path Analysis
First Avenue - Site Entry/Exit Movements

Sheet Status
NOT FOR CONSTRUCTION

Drawing No. 002

Revision No. E

Drawn By PC

Date 3/07/2018

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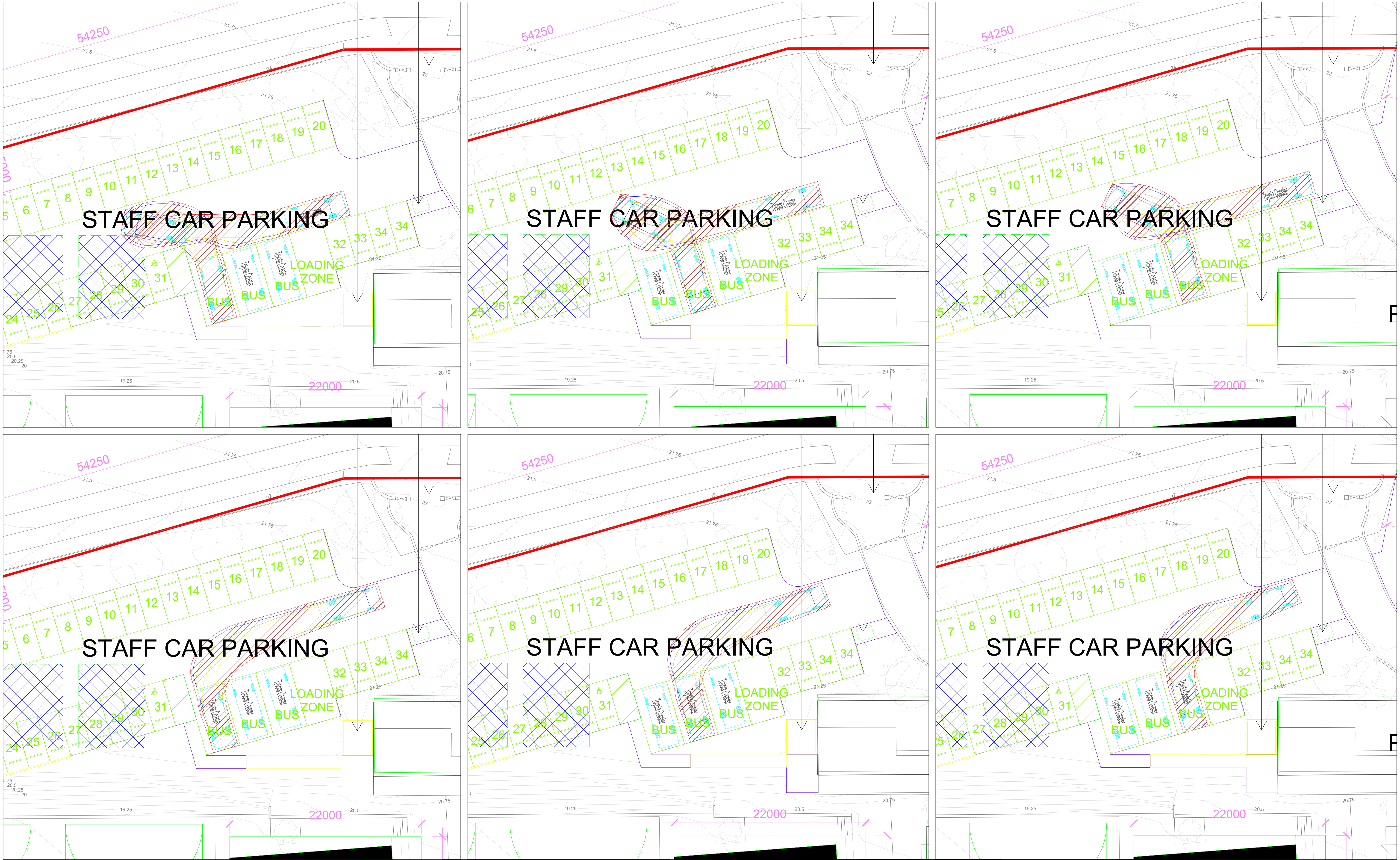
0m 4 8 12 16



No.	Date	Description

Swept Path Key
- Wheel Path
- Vehicle Body Envelope
- 300mm Clearance Envelope

North

Drawing Prepared By

PDC Consultants
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Surry Hills NSW 2010
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Architect
Hayball
11-17 Buckingham Street
Surry Hills NSW 2010

Client
Sydney Catholic Schools

Project
Domremy College
Five Dock NSW

Project No
17.130

Drawing Title
Proposed Site Plan
7.6m Toyota Coaster Swept Path Analysis
Entry/Exit Movements to Parking Bays

Sheet Status
NOT FOR CONSTRUCTION

Drawing No.
005

Revision No.
D

Drawn By
PC

Date
3/07/2018

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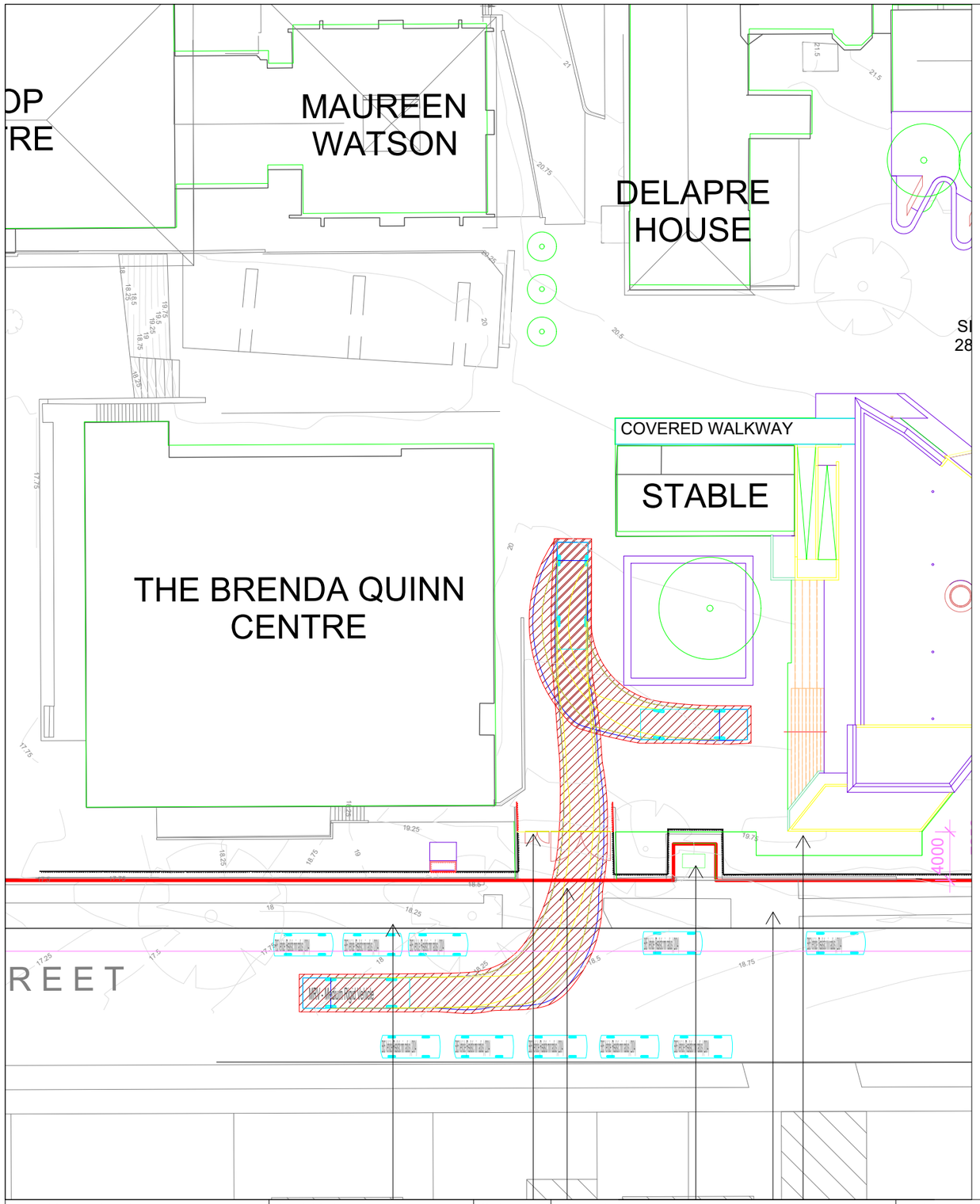

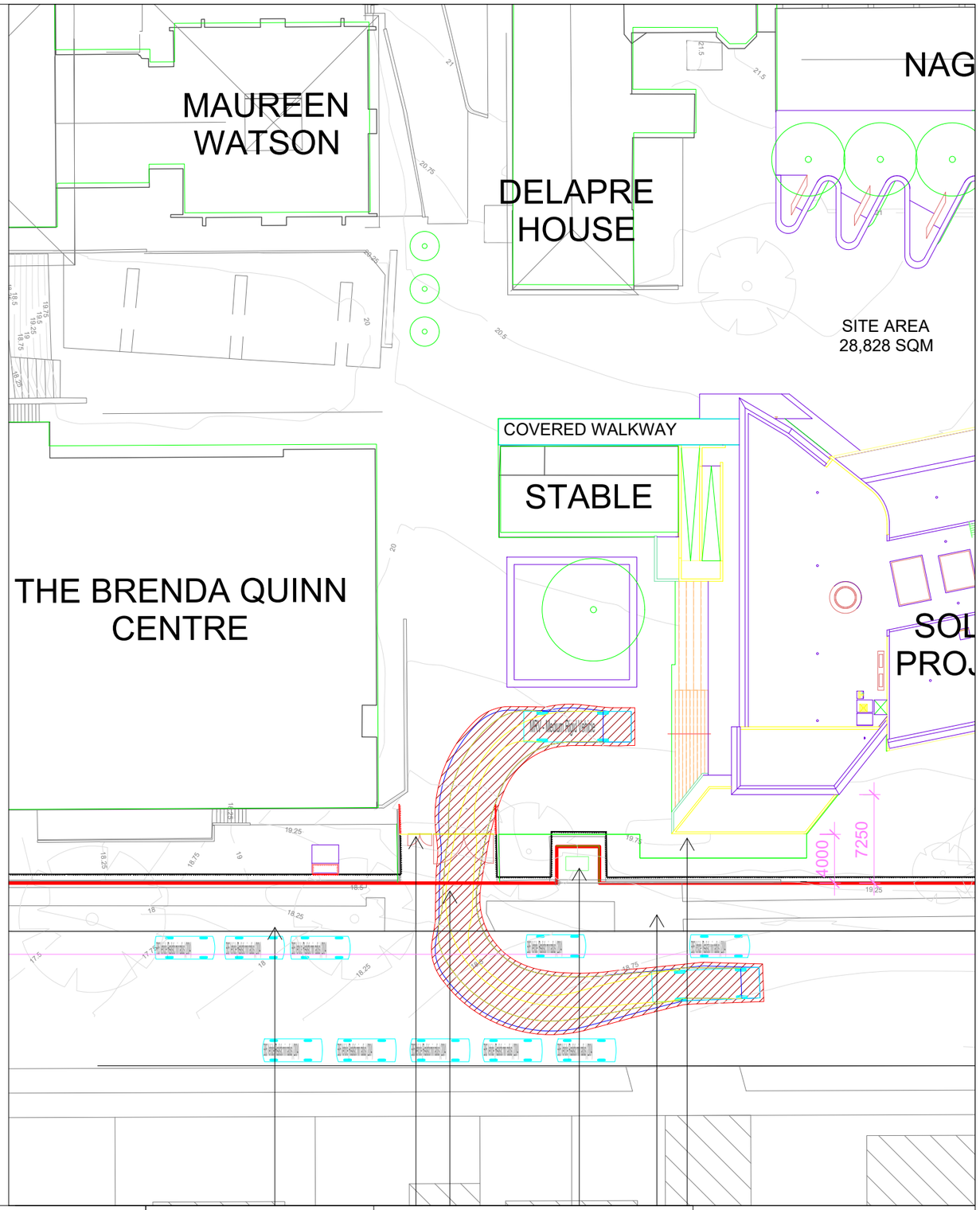

No.	Date	Description

Swept Path Key
- Wheel Path
- Vehicle Body Envelope
- 300mm Clearance Envelope

North

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Client
Sydney Catholic Schools

Project
Domremy College
Five Dock NSW

Project No
17.130

Drawing Title
Proposed Site Plan
8.8m MRV Swept Path Analysis
Fairlight Street - Site Entry/Exit Movements

Sheet Status
NOT FOR CONSTRUCTION

Drawing No. 006

Revision No. D

Drawn By PC

Date 3/07/2018

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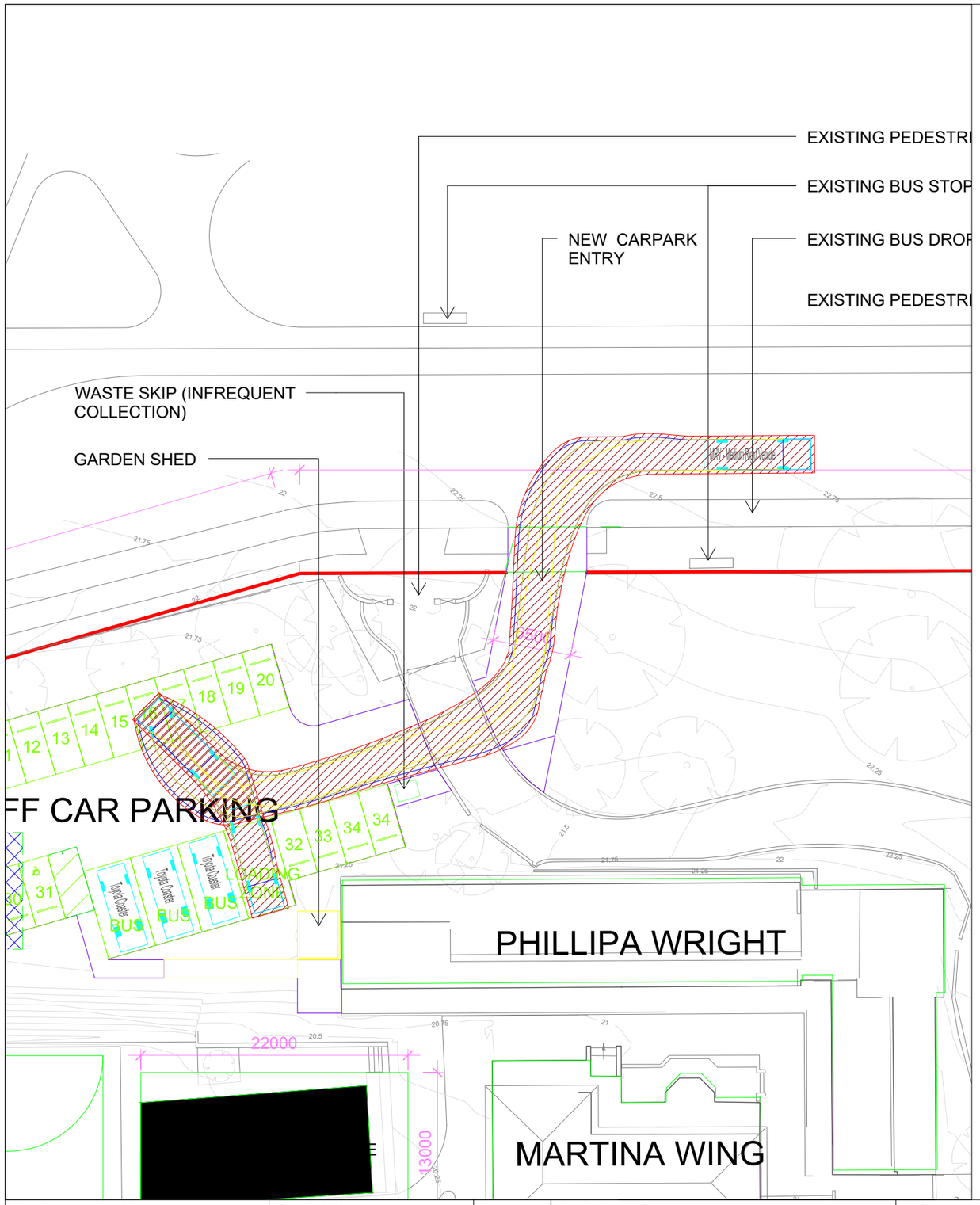

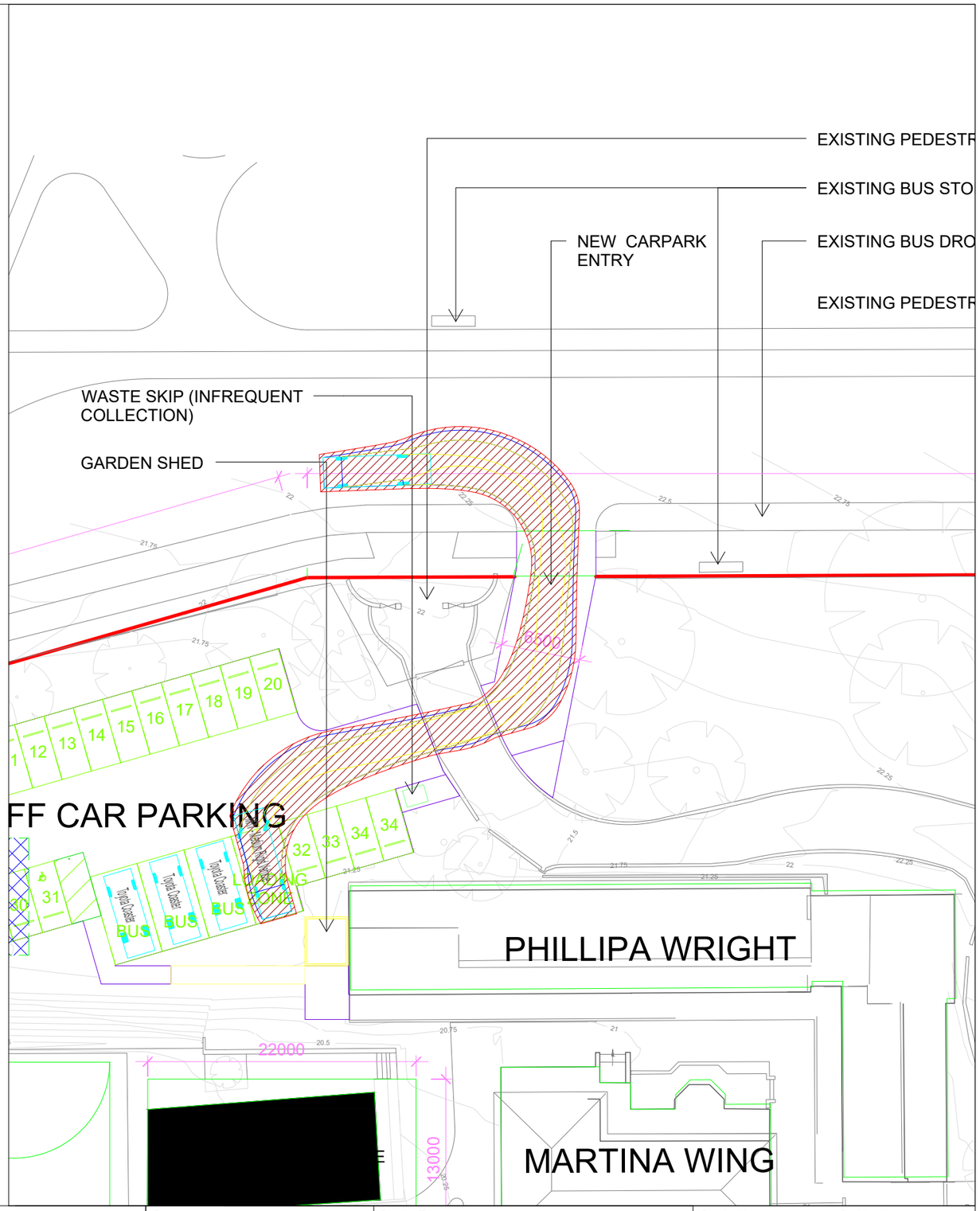

No.	Date	Description

Swept Path Key
- Wheel Path
- Vehicle Body Envelope
- 300mm Clearance Envelope

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Drawing Title
Proposed Site Plan
8.8m MRV Swept Path Analysis
Site Entry/Exit Movements

Sheet Status
NOT FOR CONSTRUCTION

Drawing No.
007

Revision No.
A

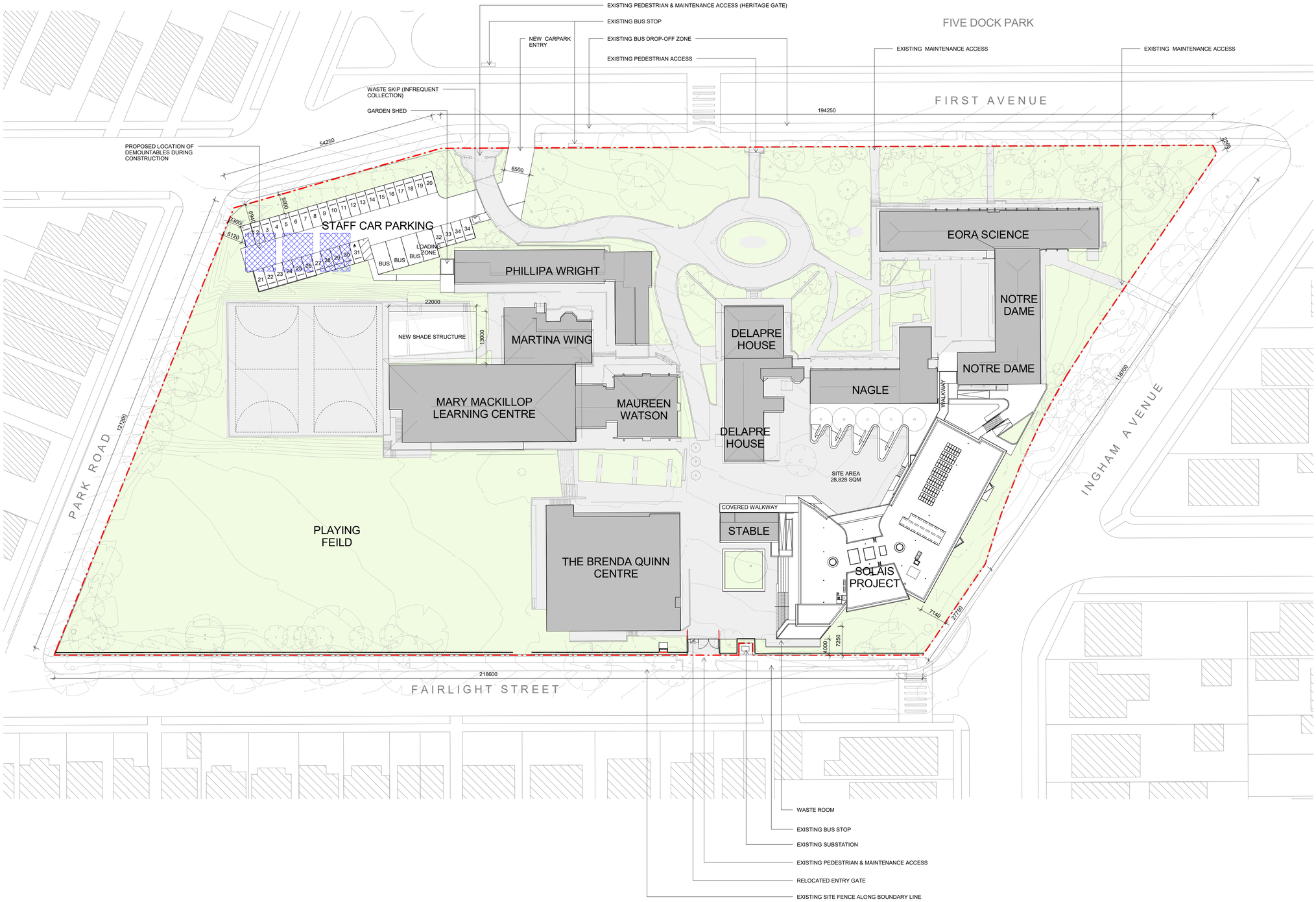
Drawn By
PC

Date
3/07/2018

Scale
1:400 @ A3

0m 4 8 12 16

Attachment 3



LEGEND

- SITE BOUNDARY
- EXISTING BUILDINGS

REV	DESCRIPTION	DATE
6	Amendment to Development Application	28.06.2018
5	Amendment to Development Application	02.05.2018
4	Issued for Development Application	02.03.2018
3	Issued for Development Application	16.02.2018
2	Issued for Development Application	25.01.2018
1	Consultant Coordination	18.01.2018

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ABN: 84006394261 NSW Nominated Architects:Tom Jordan 7521, Richard Leonard 7522, David Tordoff 8028

PROJECT TITLE

Domremy College Solais Project

CLIENT TITLE

Sydney Catholic Schools

PROJECT ADDRESS

121 First Avenue Five Dock, Sydney NSW

DRAWING TITLE

PROPOSED SITE PLAN

STATUS

FOR DEVELOPMENT APPLICATION

DRAWN BY	CHECKED BY	DATE PRINTED	SCALE
SQ	JV	3/07/2018 4:31:02 PM	1 : 500

PROJECT NUMBER	DWG NO	REVISION
2128	**DA01.02**	**6**

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