STORMWATER MANAGEMENT REPORT
MARSDEN PARK PUBLIC SCHOOL
STATE SIGNIFICANT DEVELOPMENT APPLICATION (SSD 9809)

Revision 3 – For SSDA
April 2020

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Project Verification

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Client contact	Elizabeth Creswell (ADCO)

	Name	
Prepared By	Nicholas Wetzlar	
Checked by	Andrew Francis	
Issued by	Nicholas Wetzlar	
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1. Introduction

This report has been prepared for Schools Infrastructure NSW (SINSW) to supplement the State Significant Development Application (SSD-9809) for the proposed Marsden Park Public School. It has been prepared to satisfy matters relating to civil engineering received in Blacktown City Council's submission dated 21 November 2019. Additional references will be made to pre-lodgment with Blacktown City Council's drainage engineers on the 21st January 2020. It is generally understood from review of the submission and further discussions at the pre-lodgment meeting that the main matters to be considered and addressed relate to the provision of On-site Stormwater Detention (OSD) basin, Stormwater Quality Control and the sizing of Rainwater Tanks.

2. Proposal Background Information

The site is located in a rapidly changing context on the northern extent of a master-planned urban release area as part of the larger North West Growth Centre (Marsden Park Precinct) – the Elara Stockland Residential Community. The partially prepared site was delivered in Marsden Park Precinct 3 (MPP3) of the Stockland Holdings, refer Figure 1. The MPP3 subdivision encompasses Stages 27-32 of the Elara Subdivision which was submitted for Development Application in June 2017 and was designed by Cardno (Development Application number DA-16-05045).

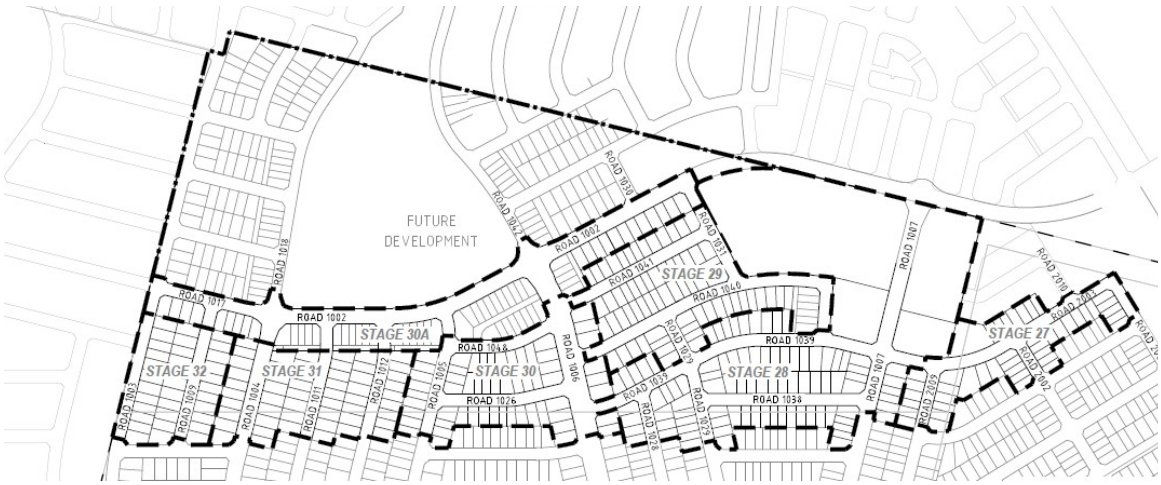


Figure 1: Draft Plan of Subdivision for MPP3 – Cardno 2016

The site currently falls from the south to the north and is drained via a drainage channel which captures stormwater from the site and drains to a temporary on-site detention basin to the west, Figure 2. The temporary OSD basin, Temporary Basin No 4, was constructed during earlier stages (MPP2 civil works) and is wholly contained within Stockland Property. Temporary Basin number 4 is currently acting as on-site stormwater detention for MPP2 and MPP3. The basin was constructed as an interim solution due to timing of works within adjacent developments, and is proposed to be retained until downstream water management infrastructure is constructed as per the Marsden Park Precinct Masterplan. The Marsden Park Precinct Masterplan shows MPP2 and MPP3 discharging north into the Permanent Basin 4 Clydesdale Precinct within the Hai Sheng property. The permanent basin is provided to control stormwater discharges from the site in accordance with the approved Marsden Park Precinct Masterplan prepared by J. Wyndham Prince (JWP) as part of the rezoning process.



Figure 2: Site photograph, Site locality and drainage channel to Temporary basin number 4. (W&G 2018)

To the north of the development lies the future road to be completed as part of Stage 2 of the Clydesdale Precinct works which at the time of the letter (March 2020) is currently under construction. These works were designed by J.Wyndham Prince (JWP). The site is currently subject to minor regrading and drainage works required to facilitate the construction of the road. These works included the regrading of the upper portion of the site following the removal of the drainage channel traversing the site and the installation of two stormwater pits located to the north of the site, shown in Figure 3.

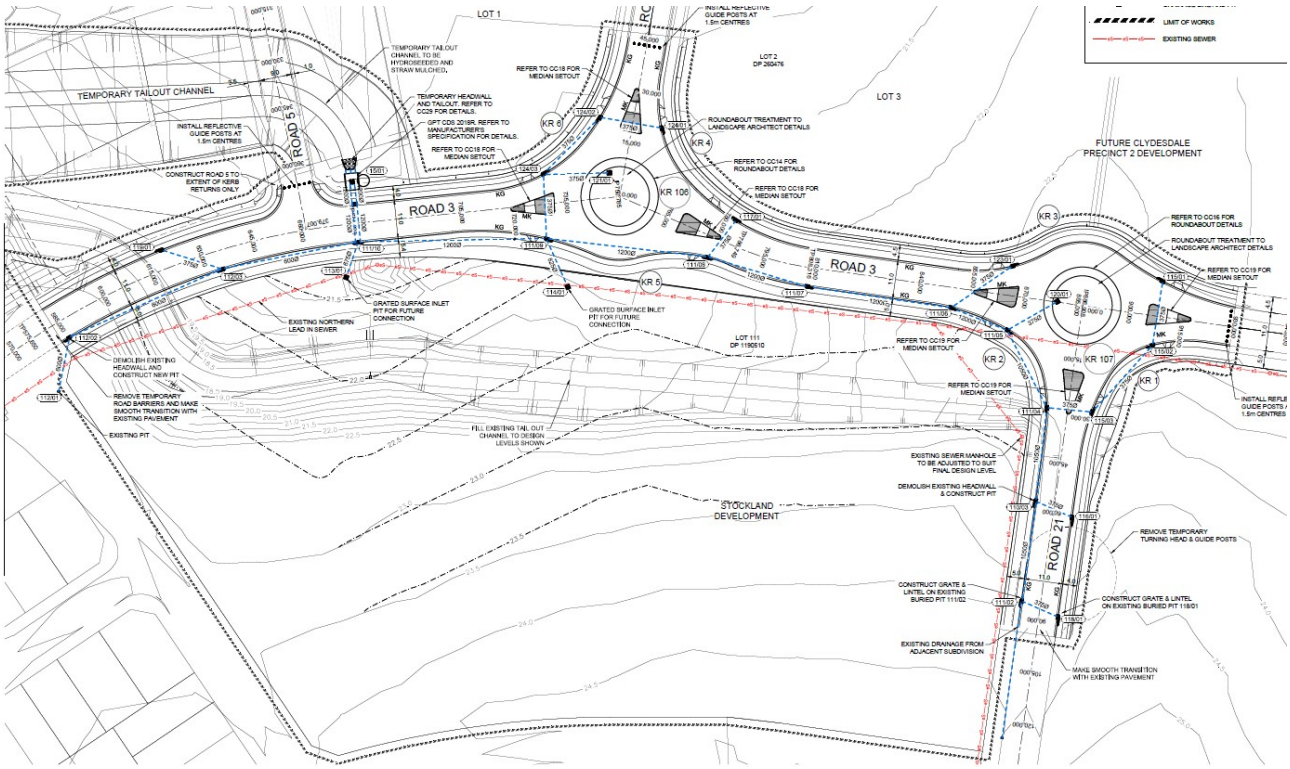


Figure 3: Plan of northern access road works, excerpt of drawing 11028822/CC05 (JWP 2019)

3. On-site Stormwater Detention

Due to the constantly changing nature of the Elara subdivision combined with the staged construction of downstream subdivisions, roads and infrastructure, review of documentation of the subdivision designers Cardno and JWP was undertaken to determine how the proposed development's stormwater system will relate to the greater region's system context. Additionally, a review of precinct planning documentation was undertaken considering the revised basin strategy of the region as documented in North West Growth Centre (NWGC) Stormwater Management Strategy Review, February 2018.

For the purpose of this report the key features of the review are noted below, full drawings and details are available in Appendices 1 & 2:

- Issue for Construction Catchment Plans of Subdivision Drawings prepared by Cardno show the proposed school site. The site is divided into two catchments: Catchment A047/01 and Catchment A003/01. Catchments measure 1.4655ha and 2.0063ha respectively. Reference Plan: CardnoUT-CV-ST07-2301 in Appendix 1. Note: catchment A00/01 includes proposed park to the south.
- Issued for Construction Road and Stormwater Plans shows prepared by Cardno show the two catchments attributed to the school site draining via the drainage channel to Temporary Basin Number 4. Reference Plan: CardnoUT-CV-ST07-1301 in Appendix 1.
- Subdivision Engineering Report: Precinct 3 Engineering Services and Civil Infrastructure Report dated Nov 2016 states Temporary Basin Number 4 has been designed to cater for on-site stormwater detention requirements of the entire MPP3, encompassing the school site. The report also notes the basin will remain an interim solution to such a date the permanent basin downstream will be constructed.
- Correspondence from Cardno's representative confirms the site has been allowed for in the subdivision stormwater/OSD design, however, the design assumes the School site is at an undeveloped state.
- Issued for Construction Approval Site Engineering Plan prepared by JWP show construction of northern road and regrading of northern portion of school site. The drawings also show the removal of the drainage channel through the north of the site. The drawing shows the provision of two drainage pits at the north of the site, pits are designated with tags 113/01 and 114/01. The drainage pits are shown to drain beneath the northern access road to headwall outlet within a tail out channel. The tail out channel is shown to drain to Temporary Basin Number 4. Reference Drawing 11028822/CC04-05 in Appendix 2.
- Issued for Construction Approval Catchment Plans prepared by JWP show two catchments for the school site, catchment 113/01 and catchment 114/01. Catchments measure 1.4655ha and 2.011ha respectively. The catchments are shown to drain to the two pits 113/01 and 114/01. Reference Drawing: 11028822/CC20 in Appendix 2. Note: catchment A00/01 includes proposed park to the south.
- Issued for Construction Approval Drainage Calculation Sheets shows the two catchments 113/01 and 114/01 with an impervious ratio of 85% impervious with a 5 minunte impervious time of concentration. Refer drawing: 11028822/CC27 in Appendix 2.
- Issued for Construction Approval Drainage Long Sections show the run-off induced from developed catchments 113/01 and 114/01 can be can be wholly contained within the

downstream in ground stormwater network. Reference drawing: 11028822/CC22-C25 in Appendix 2.

Given the complex nature of the development, and the ongoing development within the subdivision, consultation was undertaken with Blacktown City Council in regards to the provision of OSD for development. A summary of the proposed stormwater system was submitted to Blacktown City Council late February that detailed a design responding to the applicant's understanding of the aforementioned subdivision documentation. The design was formulated on the basis that:

a) The subdivision's communal on-site stormwater detention basin has been designed to accommodate and detain run-off induced stormwater flows from an undeveloped school site, and;

b) Downstream drainage infrastructure linking the proposed development to the subdivision's communal on-site stormwater detention basin has been confirmed and is suitably sized to convey un-detained pre-developed run-off induced stormwater flows from the proposed development.

The applicant proposed to provide on-site stormwater detention storage that is sized to detain post developed flows to equal magnitude of that of the pre development state. The OSD design proposes to fulfill the intent of Council's OSD policy while responding to the subdivision's specific allowances, constraints and design. The preliminary OSD volume calculated under this method is 409m^3.

A pre-lodgment meeting was held on the 2nd of March to discuss the proposed stormwater system, including OSD sizing and obtain any relevant feedback. The design was presented to Council's Senior Stormwater Engineers with the relevant return commentary on the OSD design from the Engineers presented below (full meeting minutes provided in Appendix 3):

- Pre and post OSD sizing method is acceptable in-principle provided pre and post development flow rate calculations (by review of DRAINS model) could be reviewed and approved by Council.
- Pre development flow rates will need to be based on the site prior to subdivision construction. Allowable discharge rates for the pre and post method would be limited to pre-construction site run-off induced flow rates. Allowable discharge rates cannot be set equal to that of the site discharge flow rates allowed for during the design of the subdivision.

Hydrological models (DRAINS models) were exchanged between Henry & Hymas Engineers and BCC's drainage engineers to ascertain pre development flows that are appropriate for reasonable OSD sizing, representative of the site prior to subdivision construction and approved for detailed design by BCC's Drainage Engineers. Discussions centered around the specification of modelling parameters, estimation of the OSD storage volume and the potential impact upon the amenity of the School (particularly the playing field) if extensive OSD storage volumes are required. To reduce the impact of the provision for OSD storage on the School, correspondence was provided by BCC's City Architect Bill Tsakalos to confirm BCC's Stormwater Engineers would accept sizing of OSD to detain post developed flows in the 2 Year ARI storm event to equal or lesser flow to that of the pre developed flow for the 2 Year ARI storm event (refer Appendix 4 for full correspondence).

Following further discussions relating to modelling parameters BCC's Stormwater Engineer Laith Almoil provided a review of a DRAINS model provided by Henry & Hymas Engineers on the 19th of August. The model was amended with results defined by BCC's Engineers. The model and results were confirmed and agreed upon with Henry & Hymas Engineers. The main results are presented below (refer Appendix 4 for full correspondence):

- Permissible Site Discharge (PSD) of 25 l/s in the 2-year ARI storm event.
- On-site Detention Volume (OSD) of 530m^2 to be stored below the 2-year ARI overflow weir.

Based on the above confirmation Henry & Hymas Engineers finalised the design of the OSD to detain post developed flows in the 2 Year ARI Storm Event to equal or lesser flow to that of the pre developed flow for the 2 Year ARI storm event, and where possible conform with BCC's WSUD standard drawings. Due to safety issues, special consideration was given to pit specification and reach distance for access pits immediately adjacent to the playing field. The final OSD design submitted for SSDA is documented on civil engineering drawings 19D28_SSDA_C209 and 19D28_SSDA_C210 (refer Appendix 5).

4. Water Quality

Pollution and contamination dislodged or inherent to and in stormwater and stormwater run-off from urban developments have the potential to damage the ecology and health of local creeks and waterways. As such stormwater quality improvement devices (SQIDs) that aim to minimise pollution during construction and operation of the development have been incorporated into the overall stormwater management design. These devices have been sized, specified and designed in accordance with BCC (DCP) Part J 2015, and BCC water sensitive urban design standard drawings. A summary of the implements SQIDs can be seen in later sections.

The performance of the stormwater quality improvement devices (SQIDs) in mitigating pollution from urban development can be assessed by simulating a post developed pollutant reduction rate for the stormwater system as a whole. In accordance with part J (2016) all commercial developments must achieve a minimum percentage reduction of the post developed average annual loads of pollutants in accordance with the Table 1 below:

Pollutant	% Post Development Reduction Target Blacktown City Council
Litter / Gross pollutants	90
Total Suspended Solids	85
Total Phosphorous	65
Total Nitrogen	45

Table 1: Post developed pollutant reduction targets.

In order to better determine the conceptual design of the water quality treatment trains and to ensure the treatment trains satisfy the reduction parameters outlined in Table 1, a Model for Urban Stormwater Improvement Conceptualisation (MUSIC) was developed.

The MUSIC model was set up with the in-built rainfall station, time period data, evapotranspiration data, source node data, treatment node data and run-off parameters provided by the BCC council MUSIC link system, the development MUSIC model is provided in Appendix 6. A schematic of the MUSIC model can be viewed above in Figure 4. The schematic illustrates the interrelationship between source nodes (catchments) and treatment nodes (water quality treatment measures) for the catchment. The MUSIC modelling catchment plan and detailed catchment plan relating to the

site-specific topography used for the MUSIC model schematic layout is documented on civil engineering drawings 19D28_SSDA_C250 and 19D28_SSDA_C251. (refer Appendix 5).

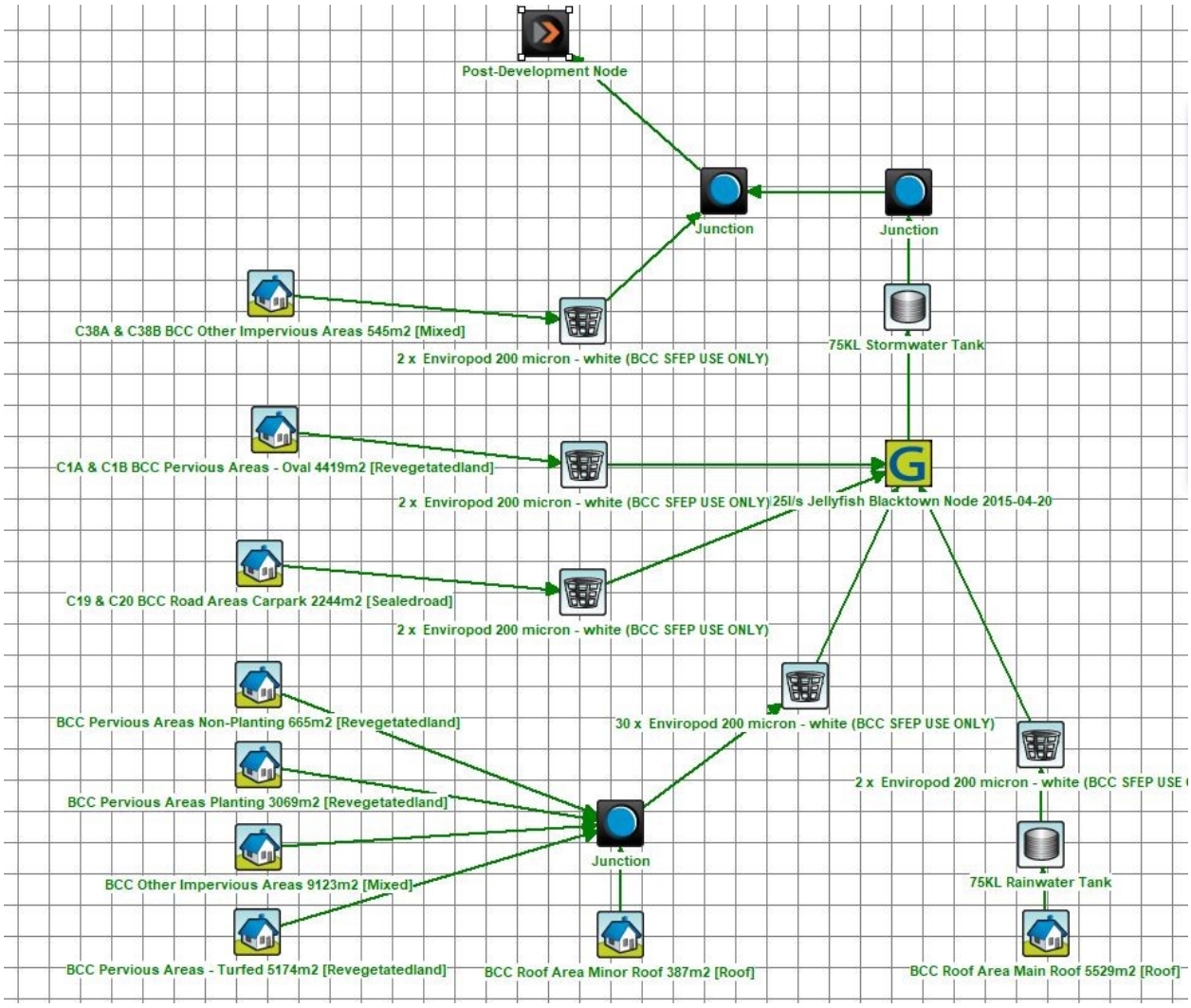


Figure 4: Schematic of Site Music Model.

The resultant reduction in post developed pollutants calculated by the simulation are presented in Table 2 below. With the implementation of the following stormwater quality improvement (SQIDs) devices, the resultant post developed pollutant loads have been reduced below the reduction target for all targeted pollutants.

Pollutant	% Post Development Reduction Target Blacktown City Council	Resultant % Post Development Reduction Obtained
Litter / Gross pollutants	90	99.9
Total Suspended Solids	85	90.3
Total Phosphorous	65	65
Total Nitrogen	45	58

Table 2: Resultant post developed pollutant reduction targets obtained.

Stormwater quality improvement devices

Primary Treatment - Pit Baskets

As part of an effective treatment train for the site system, selected areas of the development or targeted removal zones (TRZs), will be pre-treated via passive screening pit baskets. To form a site wide primary treatment system the TRZ for the development encompasses all external areas not beneath roofs and exposed to surface run-off. Target zones, mostly comprising of highly trafficked and hardstand areas that are subject to higher instances of pollution and litter, and stand most to benefit from effective pre-treatment and have been modelled individually in MUSIC to confirm overflow capacities of the basket inserts are accurately taken into account.

The pit basket proposed to be used is the “200-micron mesh Oceanguard” pit basket filter by OceanProtect. Pit baskets to be fitted with the “Oceanguard” bit basket are noted on drawing 19D28_SSDA_C200 and MUSIC catchment plan 19D28_SSDA_C250.

In certain locations throughout the development where hydraulic and site grading permits, downpipes collector lines servicing the roof drainage will be directed through the pit baskets. For this purpose, the pit baskets have been set down below the invert of the incoming downpipe line with adequate distance below for drainage via the outlet pipe, please refer to detail on 19D29_SDDA_C201.

The maintenance of the pit baskets is important to ensure the effective removal of pollutants. As such, a maintenance schedule will be required to be detailed at the Construction Certificate stage. For this submission we have provided the generic maintenance schedule as prepared by Ocean Protect, refer Appendix 7.

Secondary Treatment – Media Filtration

In order to meet the water quality requirements, and to achieve a successful implement a treatment train approach, a media filtration chamber is located at the end of the major stormwater drainage line immediately upstream of the below ground OSD tank. The media filtration (Ocean Protect Jellyfish Unit) targets the removal of gross pollutants, suspended solids, targeted nutrients and hydrocarbons within the stormwater run-off generated by developed site areas.

Media filtration will be incorporated into stormwater system by the addition of a Jellyfish Filter manhole chamber placed ‘offline’ with relevant diversion pits and access infrastructures. A single Jellyfish manhole unit is proposed on the drainage line immediately following the confluence of the three major stormwater lines and upstream of the OSD tank. MUSIC modelling determined the Jellyfish unit will need to have a minimum treatable flow rate of 125 l/s, this translates to a JF3250-23-4 with 23 high-flow cartridges and 4 drain-down cartridges. Internal site stormwater will be directed to the filter chamber as shown on our detail plans 19D28_SSDA101-C104. Sections and details of the filter units including configurations, external diversion weirs and internal weir heights and locations are documented on drawings 19D28_SDDA_C211-C212.

The maintenance of the filter cartridges is important to ensure the effective removal of pollutants. As such, a maintenance schedule will be required to be detailed at the Construction Certificate stage. For this submission we have provided the generic maintenance schedule as prepared by Ocean Protect, refer Appendix 7.

5. Water Conservation – Rainwater Reuse

To assist with water conservation, water reuse is required for all new developments as outlined in BCC's DCP Part J. The requirements state that for industrial/commercial developments, a minimum of 80% of the non-potable water demand on site is to be met through rainwater. Water demand must allow for internal rainwater reuse at the rate of 0.1 KL/day per toilet/urinal and an external landscape watering (excluding turf areas) at rate of 0.4 kL/year/m^2 modelled as PET-Rain.

As mentioned in the Blacktown City Council submission the applicant proposes to optimise the rainwater reuse system by providing both a rainwater tank system (RWT) and a stormwater tank (SWT) system. The rainwater tank aims to capture and store stormwater run-off from the roof for toilet and urinal flushing. The Stormwater tank will store stormwater run-off following water quality treatment for reuse for landscape watering.

A preliminary water quality MUSIC model was established to determine preliminary tank sizes and to assess the feasibility of provision of reuse onsite. The following assumptions are listed below and present for review by Blacktown City Council (refer Appendix 6):

- Internal rainwater reuse at the rate of 0.1 KL/day per toilet/urinal.
- Internal rainwater reuse rate multiplied by 5/7 for non-attendance school days.
- External landscape watering 0.4kL/year/m^2 for irrigation modelled as PET-Rain.
- Post treatment major external catchment directed through SWT following primary and secondary water quality treatment i.e. post filter cartridges/bioretention.
- 100% of roof area (5529m^2) draining to rainwater tank.
- 58 Toilets and urinals included in model.

Preliminary water quality MUSIC modelling was performed in accordance with BCC music link feature, MUSIC modelling guidelines and with the above assumptions listed above. The preliminary model was able to establish a SWT volume which satisfies in excess of 80% non-potable water demand for irrigation only of 60kl. Incorporating a 20% loss for anerobic digestion the specified **SWT volume will be 75kL.**

Difficulties were encountered when determining a rainwater tank volume for toilet flushing largely due to the high number of toilets required for schools in relation to minimised roof and footprint area.

To further investigate the rainwater tank volume and establish data points for a more depth analysis the MUSIC model was run with provisioned rainwater tank volumes starting at 10kL to 100kL. The aim of the investigation was to incrementally increase the rainwater tank size and record the corresponding demand meet in order to establish a relationship between the two variables. The results were recorded with their corresponding percentage of re-use demand meet, these are shown in Table 3 below. As depicted in Figure 5 the relationship between percentage of re-use demand meet and rainwater storage volume closely fits a logarithmic function with a co-efficient of determination of 99%. As with logarithmic functions a point of diminishing returns is found where increasing the rainwater tank size has a marginal increase in the percentage of re-use demand meet. Data points for the relationship are shown in Table 4 below.

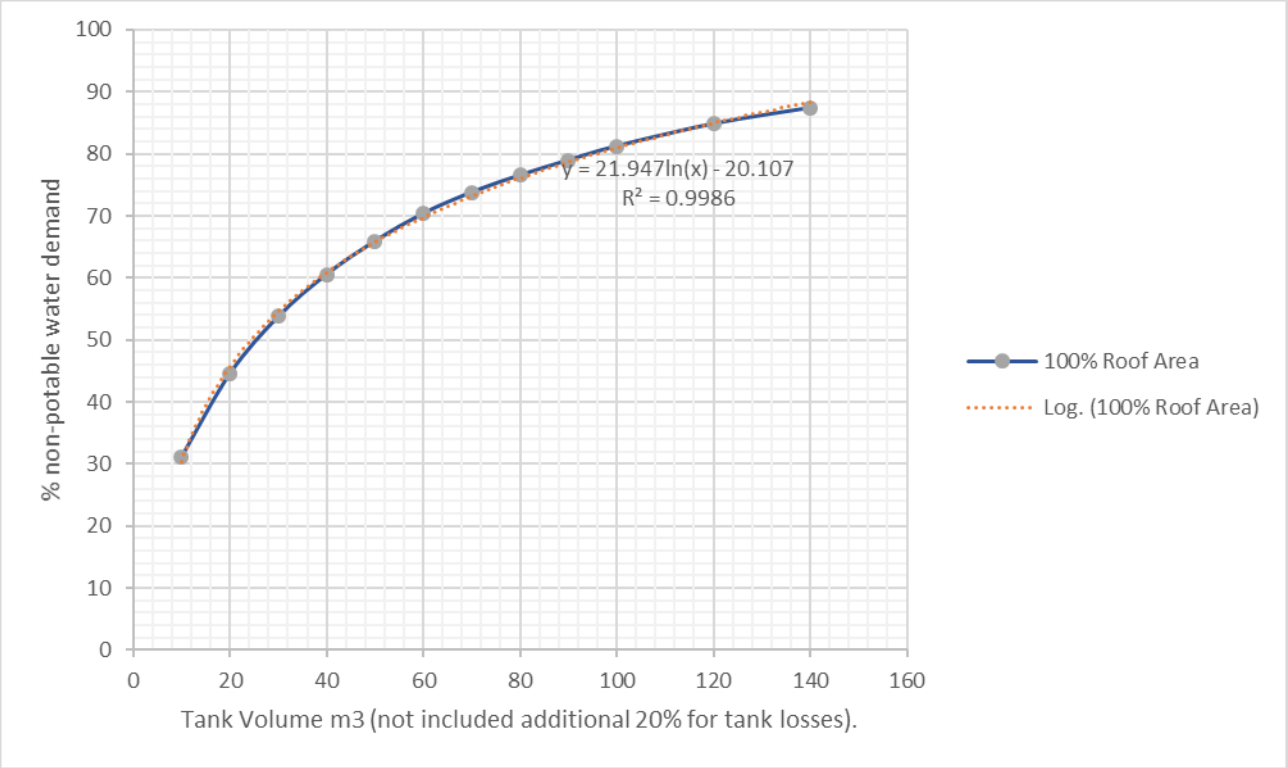


Figure 5: Relationship of % non-potable water demand and tank volume.

Volume (kL)	Volume + 20% Loss(kL)	% Non-Potable Demand Achieved
10	12.5	31.17
20	25	44.58
30	37.5	53.78
40	50	60.56
50	62.5	65.94
60	**75**	**70.38 (Selected)**
70	87.5	73.8
80	100	76.54
90	112.5	78.95
100	125	81.2

Table 3: Relationship of % non-potable water demand and tank volume in tabluar form.

The investigation established that efficiency began to diminish sharply as the volume of rainwater tank provided exceeded 50kL, refer Figure 5 above. On this basis the applicant proposes to provide a reasonable **rainwater tank size of 75kL** that fulfills the intent of BCC re-use policy. The rainwater tank has been increasing to incorporate 20% loss of volume for anerobic digestion.

6. Sediment and Erosion Control

During construction, appropriate sediment and erosion control measures need to be implemented to ensure that downstream receiving waters are not adversely impacted as a result of construction activities. The engineering drawings 19D28_SSDA_SE01-SE02 (refer Appendix 5) by Henry & Hymas outline appropriately designed and detailed measures to mitigate against this risk. These measures have been designed in accordance with the requirements of the publication "Landcom – Managing Urban Stormwater - Soils and Construction, Volume 1, 4th Edition March 2004" and Blacktown City Council requirements.

7. Conclusion

In general, the engineering objectives of stormwater management elements mentioned above is to create a system which based on the architectural layout, incorporates the natural topography and site constraints to produce a cost-effective and appropriate drainage system that meets best industry practice and governing water quality and quantity objectives.

We trust the information provided in this report satisfies matters raised in the submission phase of the SSDA application relating to the provision of On-site Stormwater Detention, Water Quality Controls and sizing of Rainwater Tanks. Feel free to contact project Engineer Nicholas Wetzlar (Ph. 9417 8400) for additional details.

8. Appendices

List of Appendices:

Appendix 1
Supporting documentation by Cardno

Appendix 2
Supporting documentation by J.Wyndham Prince (JWP)

Appendix 3
Pre-application Council meeting minutes dated 02.03.2020

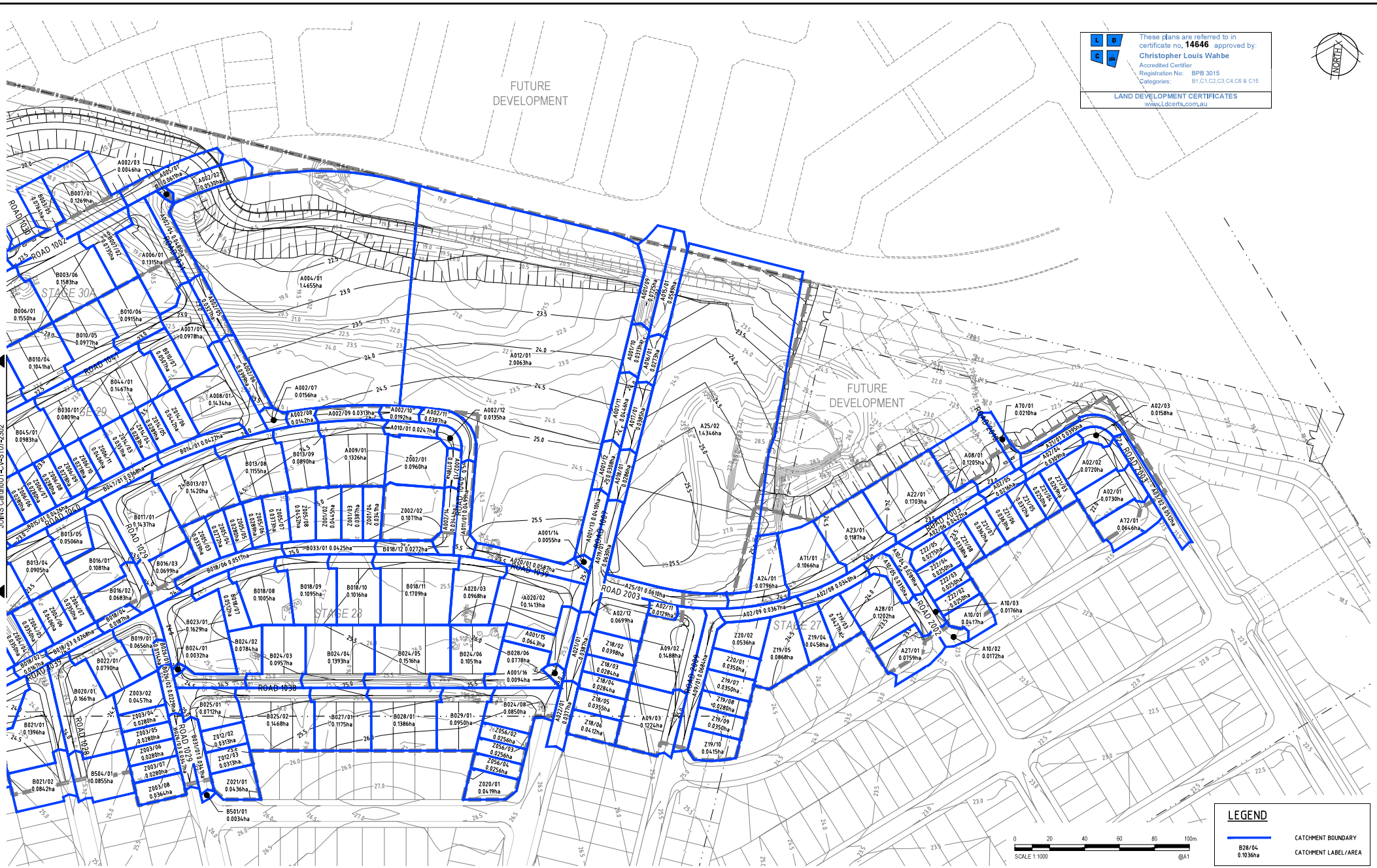
Appendix 4
Key Correspondence with Blacktown City Council's Planners and Engineers

Appendix 5
Civil Engineering Drawings

Appendix 6
Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model. Zip file

Appendix 7
Maintenance Manuals – Ocean Guard Pit baskets & Jellyfish Unit

Appendix 1
Supporting documentation by Cardno



Rev.	Date	Description	AGL Des.	CEV Verif.	HAM Appd.
A	18/12/2017	ISSUED FOR CONSTRUCTION			

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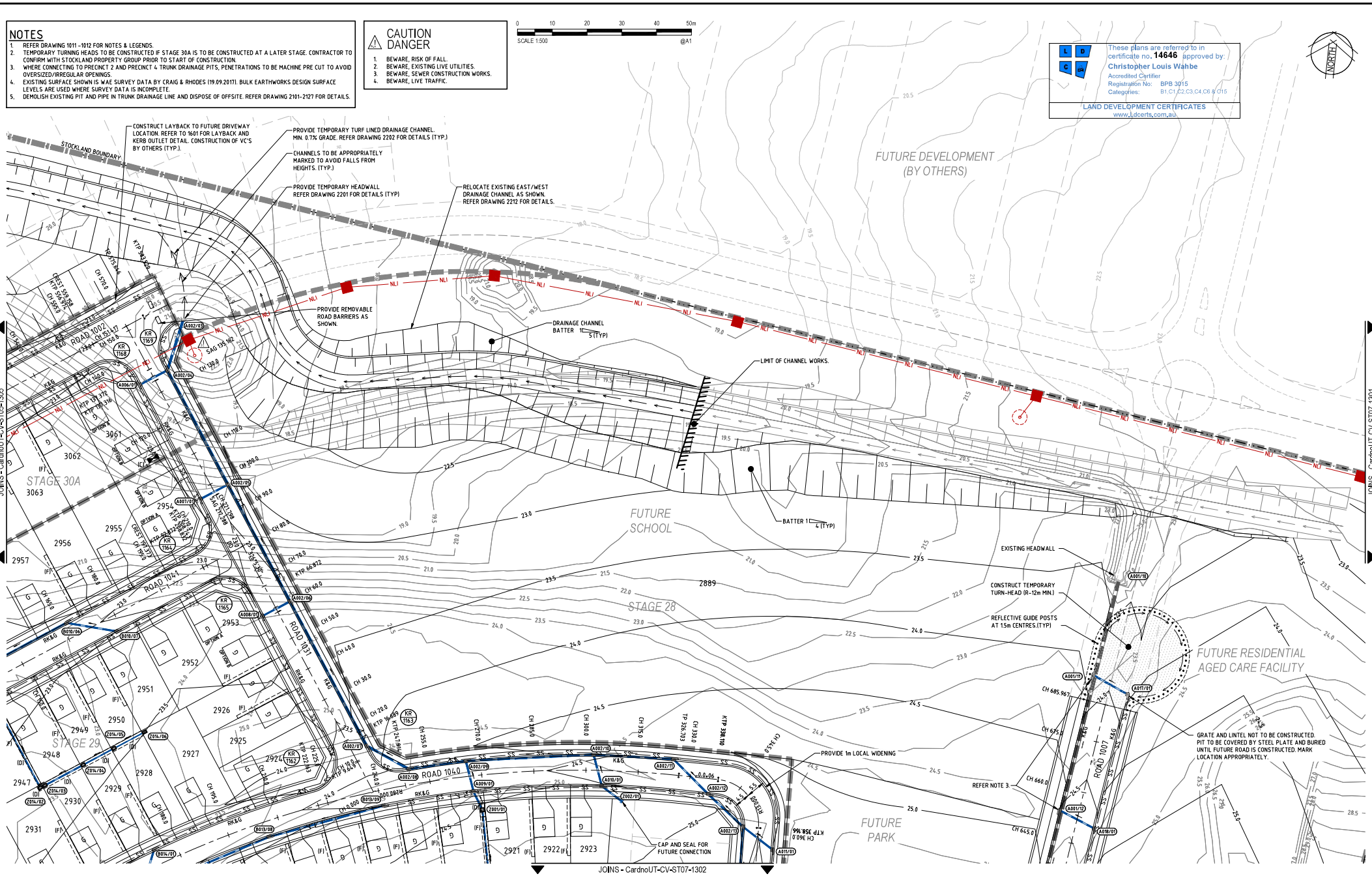
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Project: ELARA
STAGES 27-32
FOR CONSTRUCTION
Title: STORMWATER CATCHMENT PLAN
SHEET 01

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES

DATUM	DATE	Scale	Size
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Drawing Number: CardnoUT-CV-ST07-2301
Revision: A

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Client: STOCKLAND
Project: ELARA
STAGES 27-32
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Title: ROADS AND STORMWATER PLAN
SHEET 03

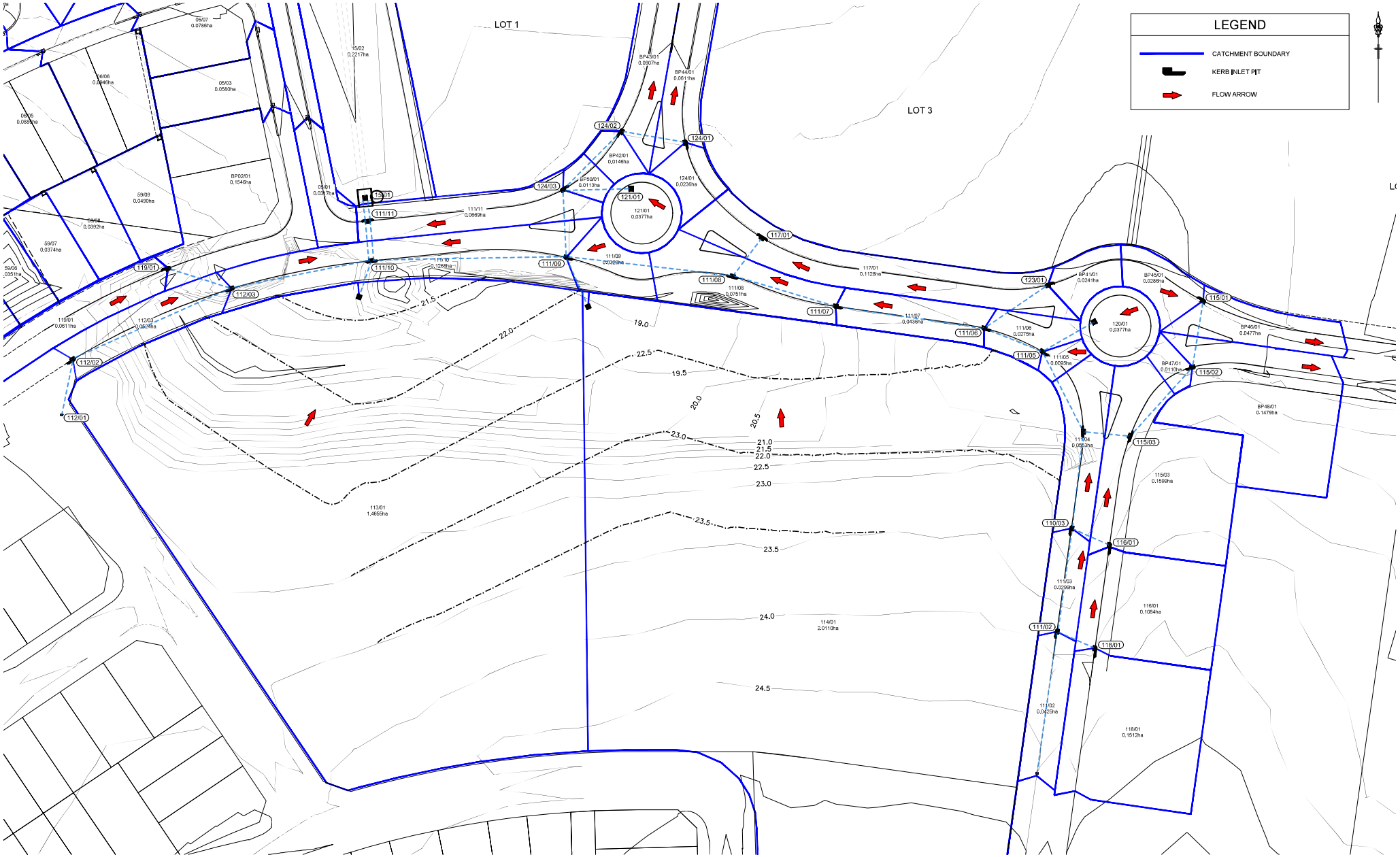
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Appendix 2
Supporting documentation by J.Wyndham Prince (JWP)



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METRES

CLIENT: BHL GROUP

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B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
A	FOR DA APPROVAL	DG	AC	AM	MS	18/12/18
	AMENDMENT	DES	DRN	CKD	APR	DATE

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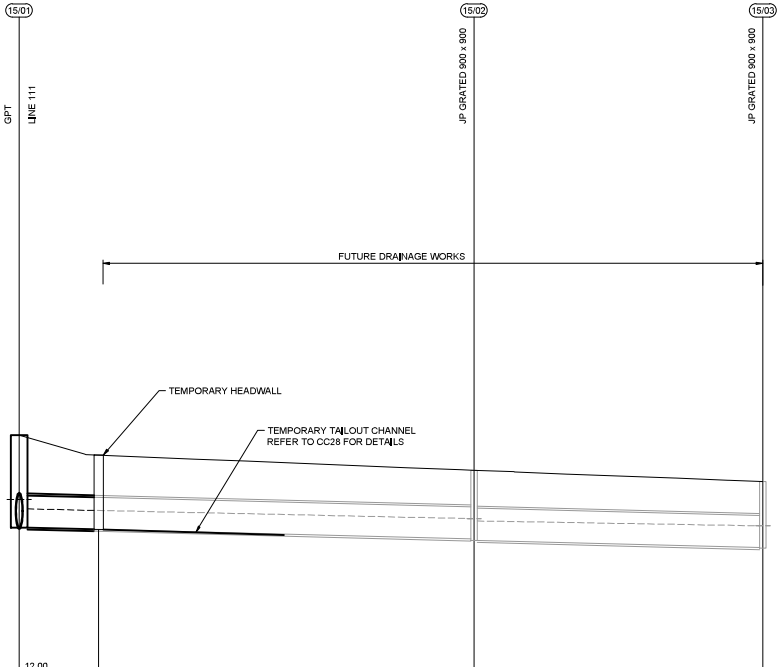
AZIMUTH:
DATUM:
ORIGIN:

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ROAD AND DRAINAGE WORKS
MARSDEN PARK - CLYDESDALE
CATCHMENT PLAN

PLAN No: 11028822/CC20 B
FILE No: 11028822CC20
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:11:44 PM File Name: J:\110288 - Marsden Park - Clydesdale - Hal Sheng\22 - Stage 2\CD\CC\11028822CC20.dwg



DATUM (m)	12.00		
PEAK FLOW (L/s)		3881	3938
PIPE SIZE (mm)		(2x)1200	(2x)1200
PIPE CLASS		RRJ2	RRJ2
PIPE GRADE (%)		0.5	0.5
PIPE COVER MINIMUM		1.29	1.20
FULL PIPE VELOCITY (m/s)		2.12	2.44
HGL GRADE (%)		0.43	0.34
WAE			
HYDRAULIC GRADE LINE	18.20	17.84	17.75 / 17.57
INVERT LEVEL	17.50	17.43 / 17.08	17.03 / 16.76
DESIGN SURFACE LEVEL	20.96	19.64	
ROAD CHAINAGE			
PIPE CHAINAGE	0.00	14.85	85.09

LINE 15

10% AEP HGL SHOWN

H 1:500 (AT A1) 10 0 10 20 30 40 50 METRES

V 1:100 (AT A1) 2 1 0 1 2 3 4 5 6 7 8 9 10 METRES

	AMENDMENT	DES	DRN	CKD	APR	DATE
B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
A	FOR DA APPROVAL	DG	AC	AM	MS	18/12/18

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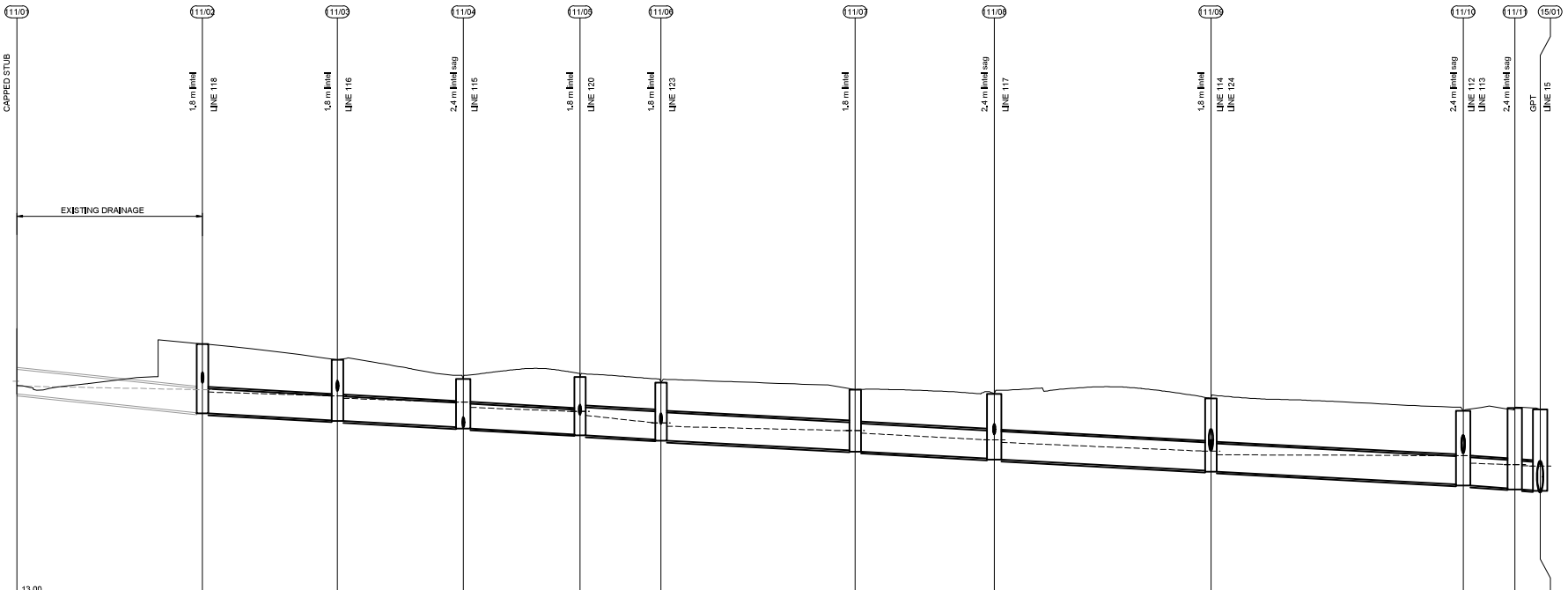
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ROAD AND DRAINAGE WORKS
MARSDEN PARK - CLYDESDALE
DRAINAGE LONGITUDINAL SECTIONS
SHEET 1

PLAN No: 11028822/CC22 B
FILE No: 11028822CC22
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:11:36 PM File Name: J:\110288 - Marsden Park - Clydesdale - Hai Sheng\22 - Stage 2\CDCC\11028822CC22.dwg



DATUM (m)	13,00										
PEAK FLOW (L/s)	2249	2259	2290	2348	2353	2361	2478	2471	2920	3867	3885
PIPE SIZE (mm)	1050	1050	1050	1050	1200	1200	1200	1200	1200	(2x)1200	(2x)1200
PIPE CLASS	RRJ2	RRJ2	RRJ2	RRJ2	RRJ2	RRJ2	RRJ2	RRJ2	RRJ2	RRJ2	RRJ2
PIPE GRADE (%)	2,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0	0,7
PIPE COVER MINIMUM	-0,88	1,48	1,08	1,15	1,30	1,33	1,37	1,67	1,92	1,98	2,20
FULL PIPE VELOCITY (m/s)	3,72	3,01	2,82	2,75	2,82	3,32	3,08	3,40	3,03	1,78	1,90
HGL GRADE (%)	0,37	0,55	0,6	0,72	1,87	0,45	0,95	0,81	0,08	0,65	0,32

WAE												
HYDRAULIC GRADE LINE	21,95	21,80	21,70	21,54	21,43	21,27	21,05	20,87	20,71	20,38	20,24	20,06	19,95	19,67	19,56	19,18	19,04	19,00	18,68	18,61	18,57	18,55	18,20
INVERT LEVEL	21,61	20,81	20,78	20,50	20,47	20,20	20,15	19,90	19,85	19,68	19,63	19,22	19,17	18,87	18,82	18,36	18,31	17,77	17,72	17,61	17,56	17,53	17,50
DESIGN SURFACE LEVEL	24,40		23,74	23,06		22,25		22,34		22,10		21,80		21,62		21,42		20,81		21,02		20,86	
ROAD CHAINAGE	125,04		85,58	56,91		30,15		866,70		850,00		808,72		780,59		728,88		675,47		675,60			
PIPE CHAINAGE	0,00		39,46	68,13		94,89		119,66		136,85		178,14		207,69		253,72		307,31		318,31		323,67	

LINE 111

10% AEP HGL SHOWN

H 1:500 (AT A1) 10 0 10 20 30 40 50 METRES

V 1:100 (AT A1) 2 1 0 1 2 3 4 5 6 7 8 9 10 METRES

B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
A	FOR DA APPROVAL	DG	AC	AM	MS	18/12/18
	AMENDMENT	DES	DRN	CKD	APR	DATE

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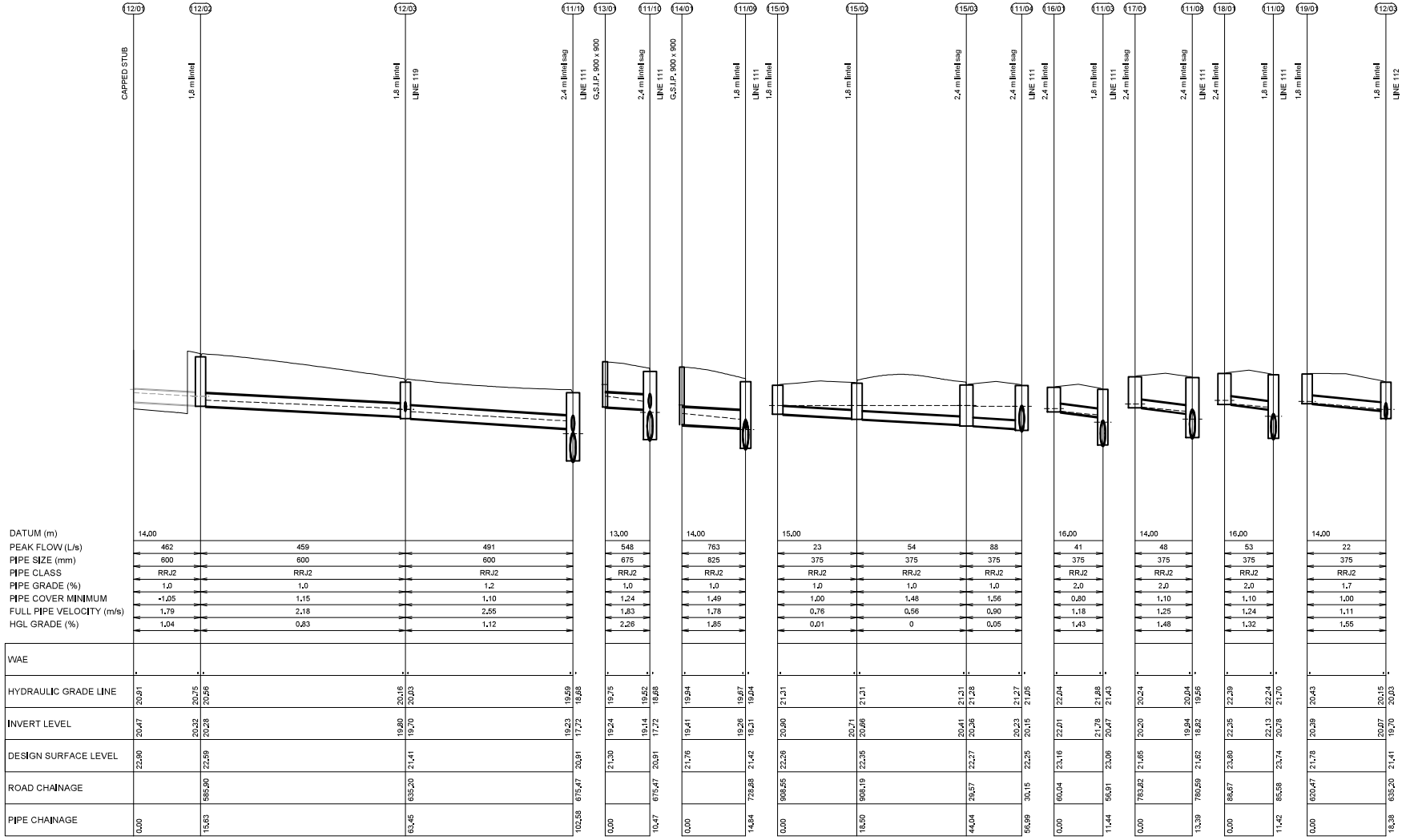
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ROAD AND DRAINAGE WORKS
MARSDEN PARK - CLYDESDALE
DRAINAGE LONGITUDINAL SECTIONS
SHEET 2

PLAN No: 11028822/CC23 B
FILE No: 11028822CC23
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:11:37 PM File Name: J:\110288 - Marsden Park - Clydesdale - Hai Sheng\22 - Stage 2\CDCC\11028822CC23.dwg



H 1:500 (AT A1) 10 0 10 20 30 40 50 METRES

V 1:100 (AT A1) 2 1 0 1 2 3 4 5 6 7 8 9 10 METRES

B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
A	FOR DA APPROVAL	DG	AC	AM	MS	18/12/18
	AMENDMENT	DES	DRN	CKD	APR	DATE

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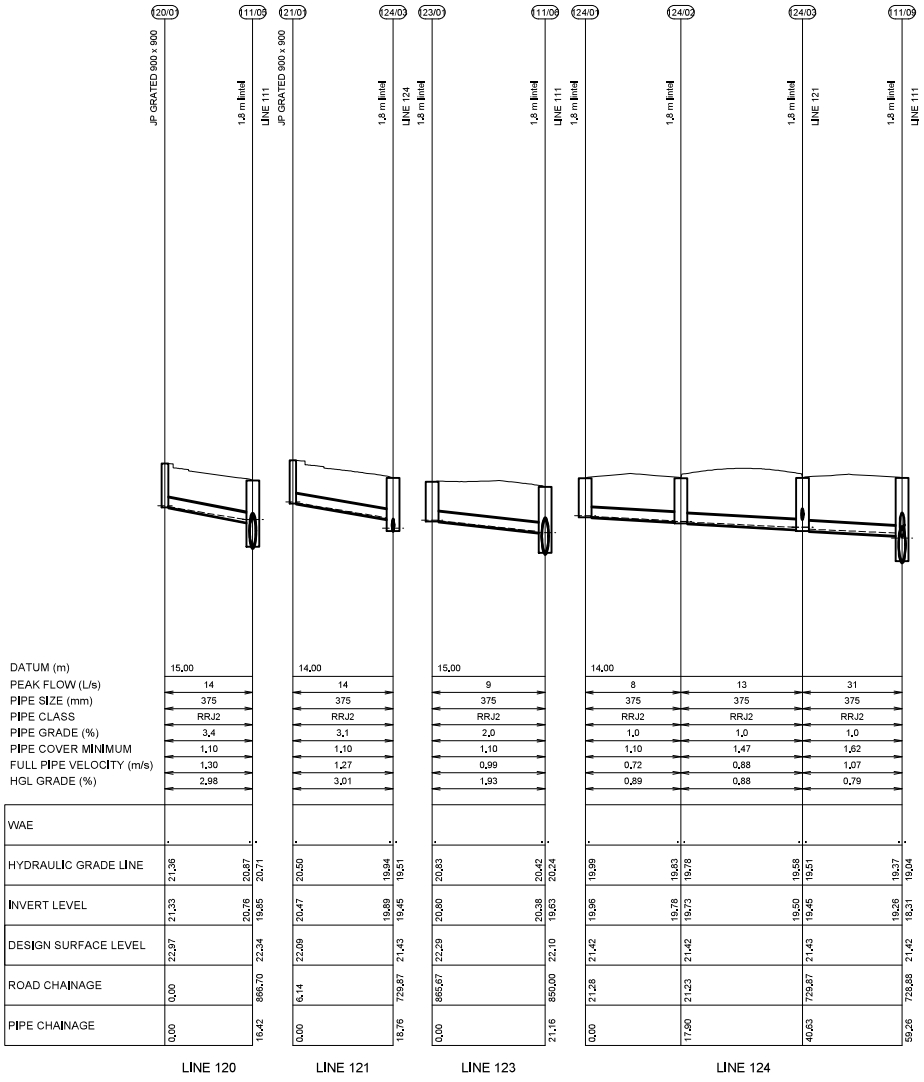
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ROAD AND DRAINAGE WORKS
MARSDEN PARK - CLYDESDALE
DRAINAGE LONGITUDINAL SECTIONS
SHEET 3

PLAN No: 11028822/CC24 B
FILE No: 11028822CC24
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:11:37 PM File Name: J:\110288 - Marsden Park - Clydesdale - Hai Sheng\22 - Stage 2\CDCC\11028822CC24.dwg



DATUM (m)	15,00			14,00			15,00			14,00													
PEAK FLOW (L/s)	14			14			9			8			13			31							
PIPE SIZE (mm)	375			375			375			375			375			375							
PIPE CLASS	RRJ2			RRJ2			RRJ2			RRJ2			RRJ2			RRJ2							
PIPE GRADE (%)	3,4			3,1			2,0			1,0			1,0			1,0							
PIPE COVER MINIMUM	1,10			1,10			1,10			1,10			1,47			1,62							
FULL PIPE VELOCITY (m/s)	1,30			1,27			0,99			0,72			0,88			1,07							
HGL GRADE (%)	2,98			3,01			1,93			0,89			0,88			0,79							
WAE																							
HYDRAULIC GRADE LINE	21,36		20,87	20,50		19,94	20,83		20,42	19,99		19,83	19,78		19,58	19,51		19,37	19,04				
INVERT LEVEL	21,33	20,76	19,85	20,47		19,89	20,80	20,38	19,83	19,96	19,78	19,73	19,50		19,45	19,26		18,31					
DESIGN SURFACE LEVEL	22,97		22,34	22,09		21,43	22,29		22,10	21,42		21,42	21,43			21,42							
ROAD CHAINAGE	0,00		866,70	6,14		729,87	865,67		850,00	21,28		21,23	729,87			728,88							
PIPE CHAINAGE	0,00		16,42	0,00		18,76	0,00		21,16	0,00		17,90	40,63			59,26							
	LINE 120			LINE 121			LINE 123			LINE 124													

10% AEP HGL SHOWN

H 1:500 (AT A1) 10 0 10 20 30 40 50 METRES

V 1:100 (AT A1) 2 1 0 1 2 3 4 5 6 7 8 9 10 METRES

B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
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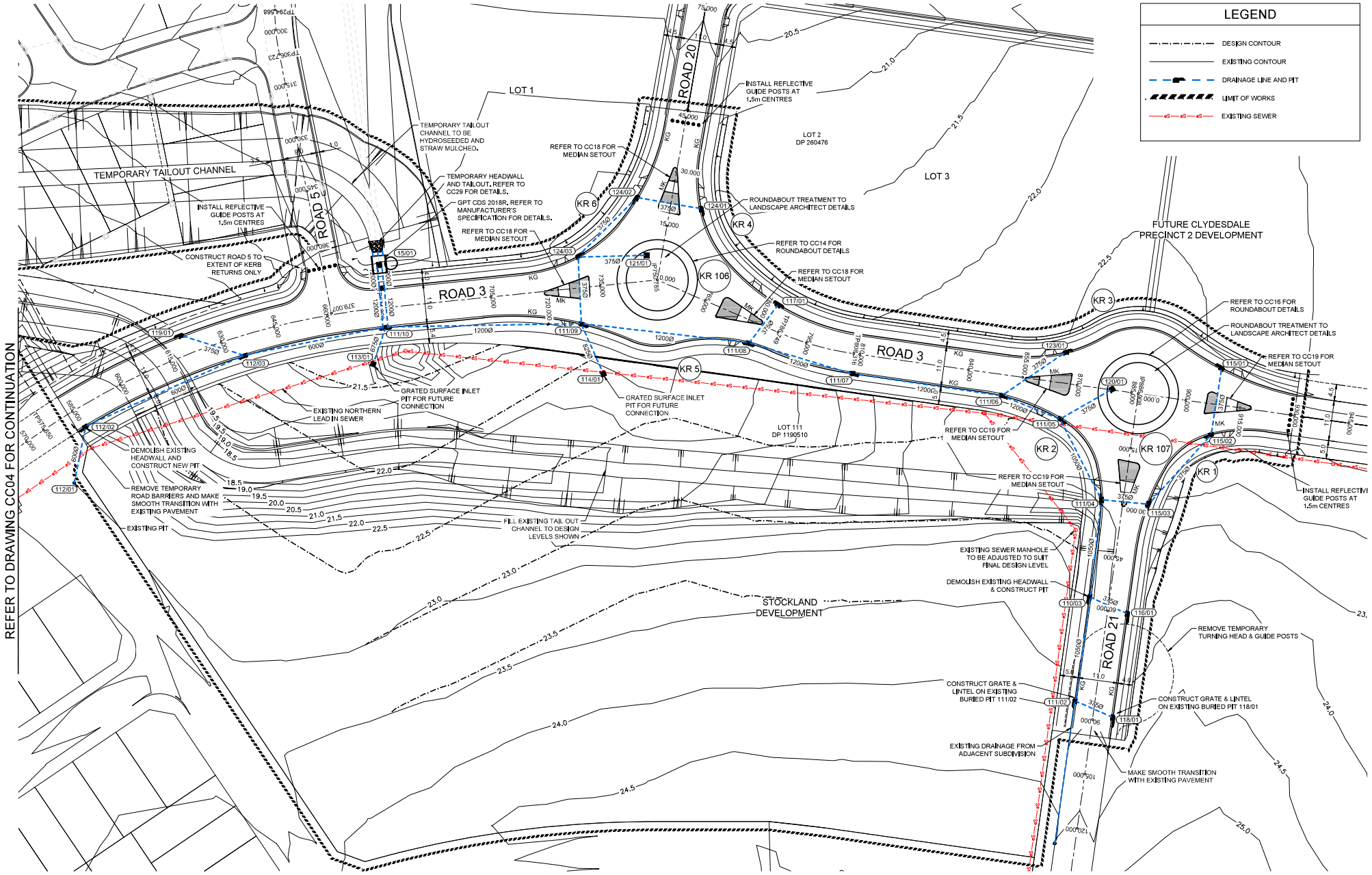
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ROAD AND DRAINAGE WORKS
MARSDEN PARK - CLYDESDALE
DRAINAGE LONGITUDINAL SECTIONS
SHEET 4

PLAN No: 11028822/CC25 B
FILE No: 11028822CC25
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:11:38 PM File Name: J:\110288 - Marsden Park - Clydesdale - Hai Sheng\22 - Stage 2\CDC\11028822CC25.dwg



PLAN
1:500

1:500 (AT A1)
1:1000 (AT A3)

10 0 10 20 30 40 50
METRES

B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
A	FOR DA APPROVAL	DG	AC	AM	MS	18/12/18
	AMENDMENT	DES	DRN	CKD	APR	DATE

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ROAD AND DRAINAGE WORKS MARSDEN PARK - CLYDESDALE

ENGINEERING PLAN
SHEET 2

PLAN No: 11028822/CC05 B
FILE No: 11028822CC05
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:11:03 PM File Name: J:\110288 - Marsden Park - Clydesdale - Hai Sheng\22 - Stage 2\CDCC\11028822CC05.dwg

HYDROLOGY NOTES:

1. STORMWATER SYSTEM DESIGNED USING 12D DYNAMIC (ILSAX) SYSTEM.
2. BP LINES ARE DUMMY PITS AND ARE USED TO MORE ACCURATELY DETERMINE APPROACH FLOWS AT UPSTREAM PITS AND SAG LOCATIONS. RESULTS ON THESE DUMMY LINES MAY NOT BE VALID/RELEVANT.
3. MAXIMUM FLOW WIDTHS OF 2m IN GUTTERS HAVE GENERALLY BEEN ADOPTED HOWEVER EXTENDED TO 2.2m IN SOME LOCATIONS TO REDUCE THE NUMBER OF PITS REQUIRED DUE TO FLAT ROAD GRADES.

DESIGN STORM 1:100yr ARI HYDROLOGIC RESULTS

PIT NAME (-)	PIT TYPE (-)	CATCHMENT AREA (Ha)	PERCENT IMPERVIOUS (%)	Tc IMP (min)	Tc PERV (min)	CRITICAL STORM (min)	APPROACH FLOW (L/s)	CAPTURED FLOW (L/s)	UNCAPTURED FLOW (L/s)	GRATE DEPTH (mm)	ROAD GRADE (%)	ROAD CROSSFALL (%)	BYPASS PIT (-)	BYPASS CHANNEL FLOW (L/s)	U/S FLOW WIDTH (m)	U/S VxD (m/s^2)	D/S FLOW WIDTH (m)	D/S VxD (m/s^2)	COMMENTS (-)
15/01	GPT	0.067	85	5	5	20	9	0	0	108			15/02	117	2.74	0.11	2.74	0.11	CDS 2018R
111/01	CAPPED STUB		0			20	2935	2935	0	65	1.4	3	111/02	22	1.32	0.05	1.32	0.05	EXISTING PIT/LINE
111/02	1.8 m lintel	0.043	85	5	5	20	22	17	5	60	1.9	3	111/03	20	1.14	0.05	1.15	0.05	PROVIDE LINTEL TO EXIST. PIT
111/03	1.8 m lintel	0.03	95	5	5	20	20	16	4	60	3	3	111/04	23	1.15	0.05	4.88	0.05	EXISTING H.W.
111/04	2.4 m lintel sag	0.055	95	5	5	20	23	23	196	160	0.6	3	111/05	0	0	0	0	0	
111/05	1.8 m lintel	0.009	95	5	5	20	0	0	0	59	1.5	1.4	111/06	14	1.1	0.03	1.7	0.02	
111/06	1.8 m lintel	0.027	95	5	5	20	14	11	3	76	1	2.7	111/07	25	1.7	0.04	2.21	0.03	
111/07	1.8 m lintel	0.044	95	5	5	20	25	19	5	92	0.7	3	111/08	43	2.21	0.05	2.14	0.05	
111/08	2.4 m lintel sag	0.075	95	5	5	20	43	55	0	85	0.3	3	111/09	0	0	0	0	0	
111/09	1.8 m lintel	0.033	95	5	5	20	4	3	1	80	2.6	0.8	111/10	34	1.81	0.05	2.93	0.04	
111/10	2.4 m lintel sag	0.127	95	5	5	20	95	89	0	113	0.1	3	111/11	0	0	0	0	0	
111/11	2.4 m lintel sag	0.067	95	5	5	20	30	20	7	48		3	15/01	7	0.75	0.02	2.71	0.01	
112/01	CAPPED STUB		0			20	583	466	117	103			112/02	117	2.6	0.11	2.6	0.11	EXISTING PIT
112/02	1.8 m lintel		0			20	117	59	57	90	1.6	3	112/03	80	2.14	0.1	2.14	0.1	
112/03	1.8 m lintel	0.052	85	5	5	20	80	47	34	89	2.6	3	111/10	56	2.11	0.07	2.93	0.06	
113/01	G.S.I.P. 900 x 900	1.465	85	5	7	20	754	754	0	37			111/10	7	0.42	0.03	2.93	0.02	
114/01	G.S.I.P. 900 x 900	2.011	85	5	5	20	1065	1065	0	34			111/09	4	0.39	0.02	1.81	0.01	
115/01	1.8 m lintel		0			20	15	11	74	99	2	1.6	BP46/01	87	2.45	0.09	2.47	0.09	
115/02	1.8 m lintel		0			20	6	4	38	93	2.4	0.7	BP48/01	78	2.26	0.09	2.63	0.07	
115/03	2.4 m lintel sag	0.16	85	5	5	20	112	117	0	145	0.5	1.8	111/04	0	0	0	0	0	
116/01	2.4 m lintel	0.108	85	5	5	20	80	51	29	96	2.8	3	115/03	112	2.37	0.12	3.99	0.08	
117/01	2.4 m lintel sag	0.113	85	5	5	20	58	67	0	96	0.2	2.1	BP57/01	0	0	0	0	0	
118/01	2.4 m lintel	0.151	85	5	5	20	80	56	24	91	1.9	3	116/01	80	2.18	0.1	2.37	0.09	PROVIDE LINTEL TO EXIST. PIT
119/01	1.8 m lintel	0.061	85	5	5	20	32	25	8	89	2.4	3	BP02/01	73	2.11	0.09	2.51	0.07	
120/01	JP GRATED 900 x 900	0.038	85	5	5	20	20	20	0	0									
121/01	JP GRATED 900 x 900	0.038	85	5	5	20	20	20	0	0									
123/01	1.8 m lintel		0			20	13	10	3	96	1.8	1.8	117/01	58	2.37	0.06	2.37	0.06	
124/01	1.8 m lintel		0			20	0	0	0	70	2.4	1.4	201/01	32	1.48	0.06	1.48	0.06	
124/02	1.8 m lintel		0			20	8	6	2	81	2.3	1.3	202/01	47	1.85	0.07	2.47	0.05	
124/03	1.8 m lintel		0			20	6	5	1	25	2.4	1.1	111/11	1	0.29	0.01	0.86	0	
BP41/01	BYPASS NODE	0.024	95	5	5	20	13	0	0	57	0	2.2	123/01	13	1.05	0.03	2.37	0.01	
BP42/01	BYPASS NODE	0.015	95	5	5	20	8	0	0	48	-0.1		124/02	8	0.73	0.03	1.85	0.01	
BP45/01	BYPASS NODE	0.029	95	5	5	20	15	0	0	60	-0.1	2.2	115/01	15	1.15	0.04	2.45	0.03	
BP47/01	BYPASS NODE	0.011	95	5	5	20	6	0	0	34	0.4		115/02	6	0.4	0.03	2.26	0.01	
BP50/01	BYPASS NODE	0.011	95	5	5	20	6	0	0	42	0.2		124/03	6	0.54	0.02	0.54	0.02	

DESIGN STORM 1:100yr ARI HYDRAULIC RESULTS

PIPE NAME (-)	PIPE DIAMETER (mm)	PIPE TYPE (-)	PIPE LENGTH (m)	PIPE GRADE (%)	CRITICAL STORM (min)	PEAK FLOW (L/s)	CAPACITY RATIO (-)	PEAK VELOCITY (m/s)	PIPE U/S IL (m)	PIPE D/S IL (m)	PIPE D/S DROP (m)	U/S PIT Ku (-)	D/S PIT Kw (-)	PIT LOSS (Ku.V'head) (m)	WSE LOSS (Kw.V'head) (m)	U/S PIPE HGL (m)	D/S PIPE HGL (m)	HGL GRADE (%)	MINIMUM COVER (m)	MINIMUM FREEBOARD (m)	COMMENTS
15/01 to 15/02	(2x)1200	RRJ2	85.09	0.5	20	5080	0.85	2.36	17.502	17.077	0.05	2	2	0.51	0.51	18.98	18.938	0.05	1.29	2.12	
111/01 to 111/02	1050	RRJ2	39.46	2.03	90	2937	0.7	3.76	21.613	20.813	0.03	0.3	0.3	0.29	0.18	23.624	23.271	0.89	-0.88	1.24	EXISTING LINE
111/02 to 111/03	1050	RRJ2	28.68	1	90	2947	1	3.4	20.783	20.496	0.03	0.3	0.3	0.18	0.18	23.104	22.838	0.93	1.48	1.132	EXISTING LINE
111/03 to 111/04	1050	RRJ2	26.76	1	20	2984	1.01	3.45	20.466	20.198	0.05	0.3	0.3	0.18	0.18	22.666	22.41	0.96	1.08	0.908	
111/04 to 111/05	1050	RRJ2	24.77	1	90	3040	1.03	3.51	20.148	19.901	0.05	0.6	0.6	0.38	0.38	22.062	21.832	0.93	1.15	0.511	
111/05 to 111/06	1200	RRJ2	17.2	1	90	3057	0.72	3.03	19.851	19.679	0.05	0.6	0.6	0.22	0.22	21.635	21.555	0.47	1.3	1.194	
111/06 to 111/07	1200	RRJ2	41.28	1	90	3289	0.78	3.33	19.629	19.216	0.05	0.3	0.3	0.25	0.13	21.455	21.26	0.47	1.33	1.248	
111/07 to 111/08	1200	RRJ2	29.55	1	90	3121	0.74	3.27	19.166	18.87	0.05	0.3	0.3	0.2	0.12	21.159	21.017	0.48	1.37	1.218	
111/08 to 111/09	1200	RRJ2	46.03	1	20	3206	0.76	3.45	18.82	18.36	0.05	0.31	0.28	0.24	0.11	20.915	20.678	0.51	1.67	1.283	
111/09 to 111/10	1200	RRJ2	53.59	1	20	3863	0.91	3.42	18.31	17.774	0.05	0.8	0.31	0.31	0.18	20.523	20.082	0.82	1.92	1.445	
111/10 to 111/11	(2x)1200	RRJ2	11	1	20	5090	0.6	2.25	17.724	17.614	0.05	2.05	2.52	0.52	0.62	19.612	19.573	0.35	1.98	1.504	
111/11 to 15/01	(2x)1200	RRJ2	5.35	0.7	20	5090	0.72	2.25	17.564	17.527	0.025	0.23	0.23	0.06	0.06	19.516	19.496	0.37	2.2	2.113	
112/01 to 112/02	600	RRJ2	15.63	1	20	466	0.7	1.7	20.473	20.317	0.04	1.2	1.2	0.17	0.17	21.01	20.943	0.43	-1.05	1.792	EXISTING LINE
112/02 to 112/03	600	RRJ2	47.82	1	20	536	0.81	2.14	20.277	19.798	0.094	1.27	1.34	0.25	0.25	20.741	20.47	0.57	1.15	1.74	
112/03 to 111/10	600	RRJ2	39.13	1.21	20	647	0.88	2.51	19.704	19.231	1.507	0.53	0.53	0.17	0.14	20.363	20.082	0.72	1.1	1.193	
113/01 to 111/10	675	RRJ2	10.47	1	20	752	0.83	2.33	19.242	19.137	1.413	4.5	4.5	0.64	1.01	20.231	20.082	1.42	1.24	0.554	
114/01 to 111/09	825	RRJ2	14.84	1	20	1064	0.68	2.31	19.407	19.259	0.949	3.76	3.76	0.75	0.76	20.696	20.678	0.12	1.49	1.036	
115/01 to 115/02	375	RRJ2	18.5	1	20	-65	-0.34	0.74	20.896	20.711	0.05	4.5	4.5	0.12	0.04	22.356	22.443	-0.47	1	0.421	
115/02 to 115/03	375	RRJ2	25.55	1	20	84	0.44	0.8	20.661	20.406	0.05	0.62	0.52	0.06	0.01	22.444	22.41	0.13	1.48	0.526	
115/03 to 111/04	375	RRJ2	12.94	1	20	200	1.05	1.81	20.356	20.226	0.078	5.62	5.57	0.29	0.29	22.413	22.41	0.02	1.56	0.458	
116/01 to 111/03	375	RRJ2	11.44	2	20	89	0.33	1.23	22.007	21.778	1.312	4.5	4.5	0.19	0.15	22.843	22.838	0.04	0.8	0.958	
117/01 to 111/08	375	RRJ2	13.39	2	20	94	0.35	1.31	20.203	19.935	1.115	4.5	4.5	0.24	0.17	21.028	21.017	0.08	1.1	1.241	
118/01 to 111/02	375	RRJ2	11.42	2	20	97	0.36	1.24	22.354	22.125	1.342	4.5	4.5	0.2	0.18	23.276	23.271	0.04	1.1	1.157	
119/01 to 112/03	375	RRJ2	18.38	1.75	20	25	0.1	1.13	20.394	20.073	0.369	4.5	4.5	0.1	0.01	20.434	20.47	-0.2	1	1.283	
120/01 to 111/05	375	RRJ2	16.42	3.45	20	34	0.1	1.37	21.327	20.761	0.91	4.5	4.5	0.14	0.02	21.833	21.832	0.01	1.1	1.562	
121/01 to 124/03	375	RRJ2	18.76	3.11	20	23	0.07	1.36	20.47	19.886	0.436	4.5	4.5	0.1	0.01	20.711	20.707	0.02	1.1	1.544	
123/01 to 111/06	375	RRJ2	21.16	2	20	53	0.2	1.01	20.8	20.377	0.748	4.5	4.5	0.17	0.05	21.567	21.555	0.06	1.1	1.435	
124/01 to 124/02	375	RRJ2	17.9	1	20	-48	-0.25	0.74	19.957	19.778	0.05	4.5	4.5	0.11	0.02	20.727	20.714	0.07	1.1	1.397	
124/02 to 124/03	375	RRJ2	22.73	1	20	85	0.45	0.96	19.728	19.5	0.05	1.2	1.2	0.11	0.04	20.713	20.713	0	1.47	1.461	
124/03 to 111/09	375	RRJ2	18.64	1	20	127	0.67	1.15	19.45	19.264	0.954	2.11	2.66	0.12	0.1	20.71	20.678	0.17	1.62	1.465	

B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
A	FOR DA APPROVAL	DG	AC	AM	MS	18/12/18
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS

PO Box 4366 PENRITH WESTFIELD NSW 2750

P 02 4720 3300 F 02 4720 3399 W www.jwprince.com.au E jwp@jwprince.com.au

AZIMUTH:

DATUM:

ORIGIN:

CLIENT: BHL GROUP

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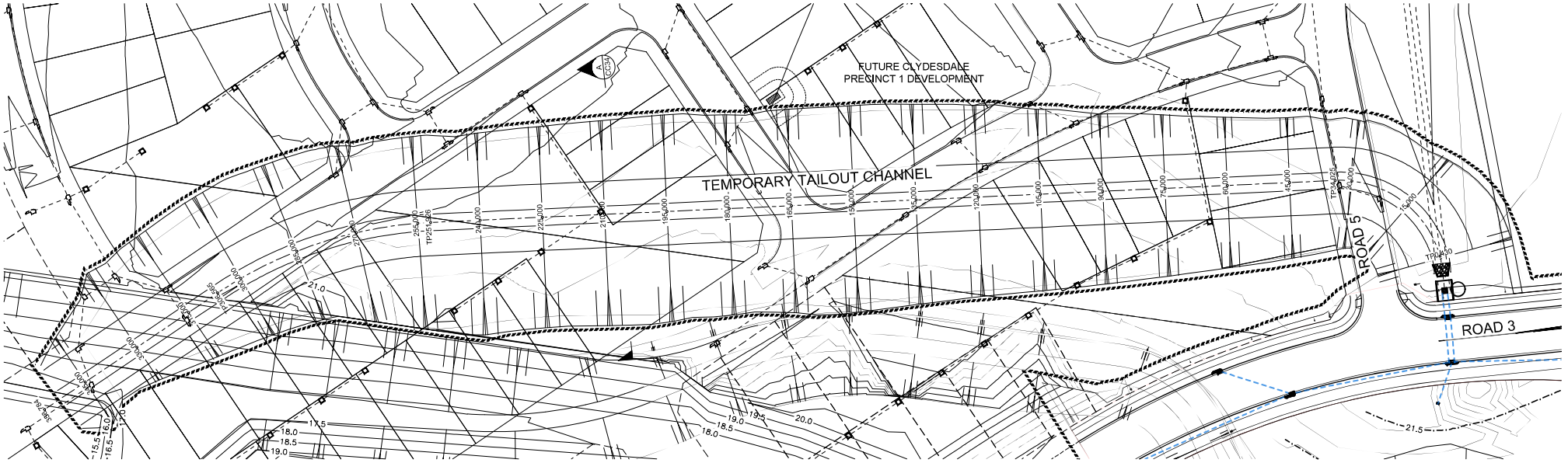
ROAD AND DRAINAGE WORKS
MARSDEN PARK - CLYDESDALE
DRAINAGE CALCULATION
SHEET 2

PLAN No: 11028822/CC27 B

FILE No: 11028822CC27

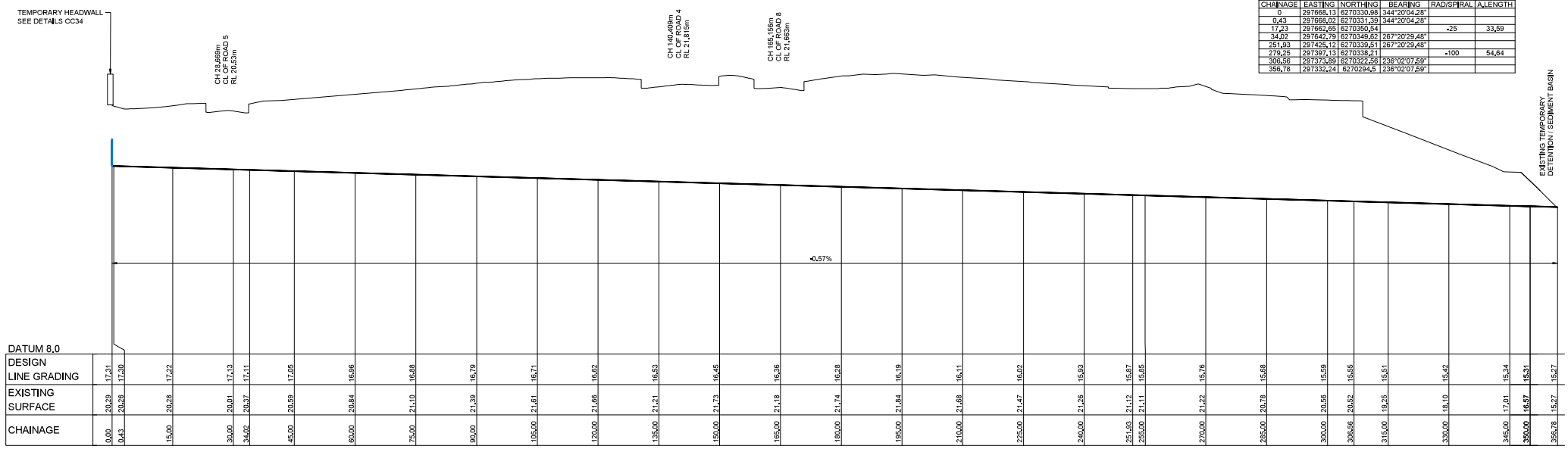
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:11:52 PM File Name: J:\11028 - Marsden Park - Clydesdale - Hai Sheng\22 - Stage 2\CDCC\11028822CC27.dwg



PLAN
SCALE 1:500

TEMPORARY TAILOUT CHANNEL					
CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	LENGTH
0	297668.13	6270330.98	344°20'04.28"		
0.43	297668.02	6270331.39	344°20'04.28"		
17.23	297662.65	6270350.54		-25	33.59
34.02	297642.79	6270349.62	267°20'29.48"		
251.93	297425.12	6270339.51	267°20'29.48"		
279.25	297397.13	6270338.21		-100	54.64
306.56	297373.89	6270322.56	236°02'07.59"		
356.78	297332.24	6270294.5	236°02'07.59"		



LONGITUDINAL SECTION - TEMPORARY TAILOUT CHANNEL
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

1:500 (AT A1)
1:1000 (AT A3)
10 0 10 20 30 40 50
METRES

B	ISSUE FOR CC APPROVAL	DG	NDW	MS	RO	18/04/19
A	FOR DA APPROVAL	DG	AC	AM	MS	18/12/18
	AMENDMENT	DES	DRN	CKD	APR	DATE

J. WYNDHAM PRINCE CONSULTING CIVIL INFRASTRUCTURE ENGINEERS & PROJECT MANAGERS
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AZIMUTH:
DATUM:
ORIGIN:

CLIENT: BHL GROUP

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ROAD AND DRAINAGE WORKS
MARSDEN PARK - CLYDESDALE
TEMPORARY CHANNEL PLAN & LONGITUDINAL SECTION

PLAN No: 11028822/CC28 B
FILE No: 11028822CC28
SHEET SIZE: A1 ORIGINAL

Plotted: 18 April, 2019 4:12:10 PM File Name: J:\110288 - Marsden Park - Clydesdale - Hai Sheng\22 - Stage 2\CDCC\11028822CC28.dwg

Appendix 3
Pre-application Council meeting minutes dated 02.03.2020

TSA

Minutes.

Project:	New Marsden Park Public School			
Meeting Title:	Blacktown City Council – New Marsden Park Public School Development			
Date:	Monday, 2 March 2020			
Time:	2:00pm - 3:30pm			
Location:	Blacktown City Council - 62 Flushcombe Road, Blacktown			
Attendees:	Luma Araim (Lar)	Blacktown City Council	BCC	-
	Matthew Sales (MS)	Snr Architect - City	BCC	-
	Laith Almoil (LA)	Engineer Design - Drainage	BCC	-
	Tony Merrilees (TM')	Senior Engineer – Drainage	BCC	
	Darnell Cordova (DC)	Dev. Services Engineer	BCC	-
	Abdun Noor (AN)	Senior Traffic Mgmt Officer	BCC	-
	Fiona Frost (FF)	Access & Transport Mgmt	BCC	-
	Alaine Roff (AR)	Associate Director	URBIS	aroff@urbis.com.au
	Jermey Stott (JS)	Project Director	SINSW	jeremy.stott4@det.nsw.edu.au
	Hussien Najdi (HN)	Senior Project Officer	SINSW	hussein.najdi@det.nsw.edu.au
	Elizabeth Creswell (EC)	Senior Design Manager	ADCO	ecreswell@adcoconstruct.com.au
	Nick Wetzlar (NW)	Civil Engineer	H&H	nwetzlar@hhconsult.com.au
	Mark Lucas (ML)	Senior Transport Planner	GHD	mark.lucas@ghd.com
	Emma Bunn (EB)	Project Manager	TSA	Emma.bunn@tsamgt.com

Item	Description	Status
1	**Welcome**	
1.1	All attendees introduced themselves.	Note
1.2	AR outlined the purpose of the meeting to discuss Council Response to Submission (RtS) revised comments (attached) concerning civil, road and traffic.	Note
1.3	It was discussed that documentation was issued to Council on 20 February. FF and AN advised that they had been moving offices and had not had opportunity to review the documents prior to the meeting. Consequently, they advised that they would not make any formal comment on compliance of traffic items in this forum.	Note
2	**Road and Traffic**	
2.1	Re Council's comment concerning loading bay and waste management: ML presented the strategy for waste collection by an 11m vehicle from a waste area at the north west corner of the carpark with a left in / left out arrangement. It was	ML

Item	Description	Status
	discussed that the islands in the carpark were to be linemarked only to enable the truck to partially traverse the outer bays of the central parking run. BCC recommended that curfews be discussed with the private contractor for waste collection with the school to mitigate clash of vehicles and peak periods of occupancy at the school site. ML to ensure this is captured within the Operational Plan for the schools adoption and proposed that this could be conditioned in a consent.	
2.2	Re Council's comments concerning road and traffic/ pick-up and drop-off bay to the east side of Northbourne Drive: ML confirmed that ANs previous request of the Northbourne Drive pick-up and drop-off area be placed on the school site (western side) and additional land provided to enable the provision of a 2.5m shared path has been incorproated within the design documentation updates. It was discussed that this will involve elimination of the current planter bed on the public domain for the length of the pick-up and drop-off bay to achieve a shared footpath in compliance with Council's standard. Council requested a cross-section be prepared to further clarify the arrangement in this area.	Note
2.3	ML confirmed that AN and FF request for additional access gates at the bus and vehicle pick-up and drop-off bays have been provided. Management of these gates will be by the school to meet site security requirements outside of peak periods of morning and afternoon activity and further detailed within the school operational plan prepared by ML.	Note
3	**Traffic**	
3.1	Re Council's comment concerning traffic/ carparking spaces: ML presented a revised parking layout in response to Council's SSD comments which increased parking provision from 48 to 56 bays. AN/FF raised further concerns with the reduction in carparking numbers from 60 spaces to 56 spaces noting the preference for 60 spaces as specified in the DCP to be provided. FF noted that her position re 60 carparks is a result of past experience between schools and Councils not providing enough provision for parking and it then impacting the surrounding streets, especially if the school where to surpase the nominated capacity of 1000 students with the addition of demountables. JS confirmed that the Primary School is a Core 35 with a capacity of 1000 which is the maximum size school SINSW cater for.JS also advised that maximum number of staff would be 50. ML discussed that further work had been done around the GTP catchments areas, recommended bus routes in line with start and finish times at the school, active transport networks and the like which supports the inclusion of 56 carparking spaces rather than 60.	AN/FF 06/03/20

Item	Description	Status
	AN noted non compliance is not going to be agreed or disagreed in this meeting and advice will formally being provided on review of the supplied updated documentation in due course.	
3.2	Re Council's comment concerning traffic/ Green Travel Plan: AN advised supporting sustainable travel by encouraging active transport facilities (walking school bus) would enhance a GTP. It was agreed, that a preliminary GTP would be issued to Council prior operation of the school. JS expanded on the comments previously raised by AN noting that SINSW has changed their mentality around the implementation of GTP and Traffic Operational Plans. Noting there will be a concentrated effort between the project team, SINSW Transport Sector, Transport Consultant, Principal and Senior staff to finalise both the GTP and Traffic Operational Plan prior to the opening of the school to mitigate Councils concerns around management of the drop off/pick up management and ensure the school is appropriately informed on their required undertakings. JS to connect Transport sector lead Rebecca with FF and BCC to establish specific requirements for further consideration.	JS
3.3	Re Council's comment concerning traffic/ wombat crossings: ML confirmed three wombat crossings have been provided in accordance with councils requests and do not conflict with vehicle entry points to adjancent sites. FF and AN confirmed that the provision on the drawing was satisfactory. Team to provide detailed documentation for Council for approval by their engineers prior to construction.	Note
3.4	Re Council's comment concerning road and traffic/ pick-up and drop-off bay to the western side of Northbourne Drive: ML presented updated analysis re the bus bay drop off zone located on the western side of Northbourne drive noting this had been discussed with TfNSW. ML confirmed two buses can be held at any point in time which meets anticipated bus usage level based on catchment data. U-turns for the buses have been addressed through the roundabout and overlaid on the Ausroad template to support the design proposal.	Note
3.5	Re Council's comment concerning traffic/ support unit access: ML presented new strategy for SSU drop off and pick up – Drop of zone has been incorporated within the carpark. Four SSU carparking spaces are in included at a suitable width for DDA with a shared parking space located next to the last SSU bay. FF noted support for the carparking rearrangement based on this comment. JS reconfirmed that all line marking will be reviewed to ensure compliance with PCA/BCA requirements.	Note
3.6	AN/FF advised no further comments required from Traffic Consultants – formal comments will be provided in due course once they have been able to review the documentation.	AN/FF 06/03/202

Item	Description	Status
4	**OSD**	
4.1	In response to Council's comments concerning stormwater/OSD: NW provided an overview of the proposed site stormwater system in terms of proposed OSD location, major drainage lines, stormwater quality improvement devices (SQIDs) specification and locations. NW presented in further detail the proposed OSD system. NW discussed the proposed sizing method (pre and post method) and talked through the modelling parameters utilised to establish the proposed OSD sizing of 409m^3. BCC explained OSD is typically provisioned in accordance with Council's deemed to comply OSD spreadsheet design tool. BCC explained the spreadsheet tool would typically yield a sustainably larger required OSD volume. NW elaborated on the reasoning behind the implementation of the proposed OSD sizing method (pre and post) referencing; • The existence of a communal subdivision on-site stormwater detention basin that has been design to accommodate run-off for the site (undeveloped conditions). • Confirmation on the subdivisions downstream stormwater network that has been design to accommodate run-off from the site (undeveloped conditions). • The high portion of pervious landscaping areas. • The potential implications of providing an OSD sized under the spreadsheet tool (approx. 1200m^3 of storage) within the development; in terms of tank size, tank buildability, and the reduction of amenity of proposed sports fields by the requirement for access infrastructure (grates) within the proposed field. BCC returned comments stating: • To reduce the impact to the playing field, BCC explained the required OSD storage could be divided and provisioned throughout the site, perhaps beneath the carpark or as above ground storage on the oval. • Pre and post OSD sizing method is acceptable in-principle provided pre and post development flow rate calculations (by review of DRAINS model) could be reviewed and approved by Council. • Pre development flow rates will need to be based of the site prior to subdivision construction. Allowable discharge rates for the pre and post method would be limited to pre-construction site run-off induced flow rates. Allowable discharge rates cannot be set equal to that of the site discharge flow rates allowed for during the design of the subdivision.	NW 03/03/20

Item	Description	Status
	BCC requested H&H provide the following; • Catchment plan • DRAINS modelling to confirm OSD sizing • MUSIC modelling to confirm RWT sizing BCC confirmed they will be able to provide formal comments within 1-2days of receipt of the model and confirm acceptance of the non-conformance.	
4	**Water Conservation**	
4.1	In response to Council's comments concerning water conservation/ RW tank: NW discussed the intended water conservation strategy which includes: • 75KL stormwater tank (SWT) meeting 80% external non-potable demand. Tank was modelled downstream of Jellyfish unit and collects a high portion of non-roof draining treated site run-off. External landscape watering rate of 0.3kL/year/m2 for drip irrigation was applied modelled as PET-Rain. 20% anerobic digestion loss was applied. • 62.5KL Rainwater tank (RWT) meeting 65.94% internal non-potable water demand. Internal reuse rate of 0.1 KL/day per toilet/urinal for 58 toilets was applied. 20% anerobic digestion loss was applied. RWT collects 100% of roof area. BCC generally accepted the SWT volume proposed (upon review), however requested the RWT size be increased to meet the required 80% internal non-potable water demand target. NW presented the rainwater tank optimistation curve and elaborated on the MUSIC modelling of the RWT. NW stated the practice of increasing the RWT to meet the required target would be inefficient as the tank would need to effectively double in size to meet an additional approx. 15% non-potable water demand. BCC in principle accepted the provision of an optimised "non-compliant" tank size, however, requested the MUSIC model and catchment plans to verify the tank optimisation and provided comment on a suitable size.	NW 03/03/20
4.2	BCC requested that a temporary school stormwater drainage plan incorporated within the SSD RtS that will need to be adopted if the temporary school development is required to be implemented as a result of construction delays. NW commented that a Temporary School stormwater drainage plan would be included in the SSD RtS submission.	Note
5	**Other Business**	

Item	Description	Status
5.1	AR followed up status of S.455 modification issued through to Samuel Vance for EW DA. LA advised she will follow this up with SV and provided a status update.	Note
5.2	AR reiterated the importance of SINSW lodging the SSD RtS by week ending 06/03/20 to mitigate further project delays as such formal response to updated Council RtS would be much appreciated to understand what further amendments may need to be incorporated prior to lodgement.	Note

Enclosed: nil

Appendix 4
Key Correspondence with Blacktown City Council's Planners and Engineers

Nick Wetzlar

From: Laith Almoil <Laith.Almoil@blacktown.nsw.gov.au>
Sent: Friday, 20 March 2020 2:01 PM
To: Nick Wetzlar
Cc: Keysha Milenkovic; Rachel Gray; Emma Bunn; Alaine Roff; jeremy.stott4@det.nsw.edu.au; Bill Tsakalos; Elizabeth Creswell; Tony Merrilees
Subject: RE: Marsden Park new Primary School - DRAINS models

Hi Nick,

After a review of the travel distance for the pre-dev. catchment, the travel distance is 210m and not 137m with max 1.67% slope.
This would result in a pre-dev. Flow of 25L/s rather than 36L/s.

I have fixed the modelling and the final results are:
2yr OSD volume=530m3 below the overflow weir with 2yr PSD=25L/s.

No further modelling for the OSD is required based on the above outcome. Please proceed to submit the final items as stated
Previously by Keysha.

Regards

Laith Almoil
Engineer Design - Drainage Gateway

9839 6821
Laith.Almoil@blacktown.nsw.gov.au
PO Box 63 Blacktown NSW 2148
blacktown.nsw.gov.au

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From: Laith Almoil
Sent: Thursday, 19 March 2020 9:37 AM
To: Nick Wetzlar (nwetzlar@hhconsult.com.au) <nwetzlar@hhconsult.com.au>
Cc: Keysha Milenkovic <Keysha.Milenkovic@blacktown.nsw.gov.au>; Rachel Gray <Rachel.Gray@tsamgt.com>; Emma Bunn <Emma.Bunn@tsamgt.com>; Alaine Roff <aroff@urbis.com.au>; jeremy.stott4@det.nsw.edu.au; Bill Tsakalos <Bill.Tsakalos@blacktown.nsw.gov.au>; Elizabeth Creswell <ecreswell@adcoconstruct.com.au>; Tony Merrilees <Tony.Merrilees@blacktown.nsw.gov.au>
Subject: RE: Marsden Park new Primary School - DRAINS models

Hi Nick,

Can you please make consistent the models used for the pre and post.

The pre used the 87ARR method and the post should also use the 87ARR method.

Cc: Keysha Milenkovic <Keysha.Milenkovic@blacktown.nsw.gov.au>; Georg Eberl <Georg.Eberl@blacktown.nsw.gov.au>; Glennys James <Glennys.James@blacktown.nsw.gov.au>
Subject: Marsden Park new Primary School

Hi Jeremy,
As a follow on from our meeting on Wednesday I clarify the following:

- Stocklands have not paid any S7.11 contributions
- Stocklands have built a temporary detention basin to allow an early start to their project
- The temporary basin ultimately will be replaced by permanent detention when Clydesdale is developed
- Stocklands will ultimately pay S7.11 contributions
- We have a Ministerial directive (Minster for Planning) in relation to CP21 (within which your site sits) to enact an IPART recommendation to apportion infrastructure costs for the development of school lands.

The Minister's request that we amend the rates in the plan allows us to opportunity to consider the provision of OSD on your site. Once we have amended the rates in CP21 all future developments (including Department of Education school developments) will be required to pay the amended contributions.

We have reviewed the requirements for stormwater on-site detention (OSD) for your project and my engineers will accept provision of OSD for flows up to the 2 year ARI design standard instead of the 100 year. This should reduce the storage required to a volume similar to your Option 2 amount (653 m3). If you provide amended documentation using the parameters requested by my engineers for this reduced standard this application can be finalised.

I hope this will assist you to complete the SSD process and gain planning approval.

Regards,
Bill

Blacktown City Council

Bill Tsakalos
City Architect & Director Transformational Design

9839 6965
0418 257 336
Bill.Tsakalos@blacktown.nsw.gov.au
PO Box 63 Blacktown NSW 2148
blacktown.nsw.gov.au

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Appendix 5
Civil Engineering Drawings

MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
CIVIL ENGINEERING WORKS



LOCALITY SKETCH

SCALE: N.T.S.

DRAWING SCHEDULE	
19D28_SSDA_C000	COVER SHEET, DRAWING SCHEDULE & LOCALITY SKETCH
19D28_SSDA_C010	NOTES
19D28_SSDA_C050	TEMPORARY SCHOOL PLAN - SHEET 1 OF 2
19D28_SSDA_C051	TEMPORARY SCHOOL PLAN - SHEET 2 OF 2
19D28_SSDA_C100	GENERAL ARRANGEMENT PLAN
19D28_SSDA_C101	DETAIL PLAN - SHEET 1 OF 4
19D28_SSDA_C102	DETAIL PLAN - SHEET 2 OF 4
19D28_SSDA_C103	DETAIL PLAN - SHEET 3 OF 4
19D28_SSDA_C104	DETAIL PLAN - SHEET 4 OF 4
19D28_SSDA_C110	ROADWORKS DETAIL SHEET
19D28_SSDA_C200	STORMWATER MISCELLANEOUS DETAILS & PIT LID SCHEDULE
19D28_SSDA_C201	STORMWATER MISCELLANEOUS DETAILS
19D28_SSDA_C209	OSD TANK PLAN
19D28_SSDA_C210	OSD TANK SECTIONS AND DETAILS
19D28_SSDA_C211	JELLY FISH DETAILS AND SECTION
19D28_SSDA_C212	STORMWATER TANK PLAN, SECTION AND DETAILS
19D28_SSDA_C250	STORMWATER CATCHMENT PLAN
19D28_SSDA_C251	DETAIL CATCHMENT PLAN
19D28_SSDA_C300	RETAINING WALL PLAN
19D28_SSDA_C310	RETAINING WALL DETAILS
19D28_SSDA_SE01	SEDIMENT & EROSION CONTROL PLAN
19D28_SSDA_SE02	SEDIMENT & EROSION CONTROL TYPICAL SECTIONS & DETAILS
19D28_SSDA_BE01	BULK EARTHWORKS PLAN

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR SSDA APPROVAL ONLY	KR	NW	24.03.2020					
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020					
01	PRELIMINARY	IK	NW	12.02.2020					

Client
ADCO CONSTRUCTIONS PTY LTD

Architect
NBRS ARCHITECTURE

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Project
MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title
COVER SHEET, DRAWING SCHEDULE & LOCALITY SKETCH

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	**Approved**	**Scale @A1**
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 19D28_SSDA_C000

Revision: 03

GENERAL NOTES:

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH BLACKTOWN CITY COUNCIL SPECIFICATION. CONTRACTOR TO OBTAIN AND RETAIN A COPY ON SITE DURING THE COURSE OF THE WORKS.
2. ALL NEW WORKS ARE TO MAKE A SMOOTH JUNCTION WITH EXISTING CONDITIONS AND MARRY IN A 'WORKMANLIKE' MANNER.
3. THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL SERVICES WITH EACH RELEVANT AUTHORITY. ANY DAMAGE TO SERVICES SHALL BE RECTIFIED BY THE CONTRACTOR OR THE RELEVANT AUTHORITY AT THE CONTRACTOR'S EXPENSE. SERVICES SHOWN ON THESE PLANS ARE ONLY THOSE EVIDENT AT THE TIME OF SURVEY OR AS DETERMINED FROM SERVICE DIAGRAMS. H & H CONSULTING ENGINEERS PTY. LTD CANNOT GUARANTEE THE INFORMATION SHOWN NOR ACCEPT ANY RESPONSIBILITY FOR INACCURACIES OR INCOMPLETE DATA.
4. SERVICES & ACCESSES TO THE EXISTING PROPERTIES ARE TO BE MAINTAINED IN WORKING ORDER AT ALL TIMES DURING CONSTRUCTION.
5. ADJUST EXISTING SERVICE COVERS TO SUIT NEW FINISHED LEVELS TO RELEVANT AUTHORITY REQUIREMENTS WHERE NECESSARY.
6. REINSTATE AND STABILISE ALL DISTURBED LANDSCAPED AREAS.
7. MINIMUM GRADE OF SUBSOIL SHALL BE 0.5% (1:200) FALL TO OUTLETS.
8. ALL TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS, EROSION AND SEDIMENTATION CONTROL PLAN AND BLACKTOWN CITY COUNCIL REQUIREMENTS WHERE APPLICABLE.
9. CONTRACTOR TO CHECK AND CONFIRM SITE DRAINAGE CONNECTIONS ACROSS THE VERGE PRIOR TO COMMENCEMENT OF SITE DRAINAGE WORKS.
10. PROPERTIES AFFECTED BY THE WORKS ARE TO BE NOTIFIED IN ADVANCE WHERE DISRUPTION TO EXISTING ACCESS IS LIKELY.

EXISTING SERVICES & FEATURES

1. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF ALL EXISTING SERVICES IN AREAS AFFECTED BY WORKS WITHIN THE
2. CONTRACT AREA OR AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT.
3. THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED.
4. PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN APPROVAL OF HIS PROGRAM FOR THE RELOCATION/ CONSTRUCTION OF TEMPORARY SERVICES.
5. CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN SUPPLY TO EXISTING BUILDING REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND
6. APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED, THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
7. INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE TO THE PRINCIPAL. CONTRACTOR TO GAIN APPROVAL FROM THE
8. SUPERINTENDENT FOR TIME OF INTERRUPTION.
9. EXISTING SERVICES, BUILDINGS, EXTERNAL STRUCTURES AND TREES SHOWN ON THESE DRAWINGS ARE EXISTING FEATURES PRIOR TO ANY DEMOLITION WORKS.
10. EXISTING SERVICES UNLESS SHOWN ON SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLETE A 'DIAL BEFORE YOU DIG' SEARCH AND TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
11. ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MINIMUM OF 500mm BEYOND EDGE OF PAVING.

SITEWORKS NOTES

1. DATUM : A.H.D.
2. ORIGIN OF LEVELS : REFER TO BENCH OR STATE SURVEY MARKS WHERE SHOWN ON PLAN.
3. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
4. ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS & THE DIRECTIONS OF THE SUPERINTENDENT.
5. EXISTING SERVICES UNLESS SHOWN ON THE SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
6. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS ACHIEVED.
7. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
8. CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATION IS TO BE UNDERTAKEN OVER TELSTRA OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.
9. CONTRACTOR TO OBTAIN AUTHORITY APPROVALS WHERE APPLICABLE.
10. MAKE SMOOTH TRANSITION TO EXISTING SURFACES AND MAKE GOOD.
11. THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED LANDSCAPE, ARCHITECTURAL, STRUCTURAL, HYDRAULIC AND MECHANICAL DRAWINGS AND SPECIFICATIONS
12. OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED RELATING
13. TO DEVELOPMENT AT THE SITE.
14. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MINIMUM OF 50mm IN BITUMINOUS PAVING.
15. ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MINIMUM OF 500mm BEYOND EDGE OF PAVING.
16. GRADES TO PAVEMENTS TO BE AS IMPLIED BY RL'S ON PLAN . GRADE EVENLY BETWEEN NOMINATED RL'S. AREAS EXHIBITING PONDING GREATER THAN 5mm DEPTH WILL NOT BE ACCEPTED UNLESS IN A DESIGNATED SAG POINT.
17. ALL COVERS AND GRATES ETC TO EXISTING SERVICE UTILITIES ARE TO BE ADJUSTED TO SUIT NEW FINISHED SURFACE LEVELS WHERE APPLICABLE.

SURVEY NOTES

1. THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY THE SURVEYOR SPECIFIED IN THE TITLE BLOCK.
2. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. HENRY AND HYMAS PTY. LTD. DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.
3. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT HENRY AND HYMAS PTY. LTD. THE FOLLOWING NOTES HAVE BEEN TAKEN DIRECTLY FROM ORIGINAL SURVEY DOCUMENTS.

- ORIGIN OF LEVELS SSM191370
- DATUM A.H.D.
- CONTOUR INTERVAL 0.5m

COMPACTION REQUIREMENTS

1. PREPARATION FOR PAVEMENT:
   CLEAR SITE, STRIP TOP-SOIL, CUT AND FILL AND PREPARATIONS OF SUB-GRADE SHALL BE AS DESCRIBED IN " SUBGRADE PREPARATION".
2. SUB-GRADE SHALL BE COMPACTED TO 98% STANDARD DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1., TOP 300MM TO 100% SDD.
3. LOWER BASE COURSE SHALL BE CONSTRUCTED FROM CRUSHED SANDSTONE COMPACTED TO 100% STANDARD DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1. OF THICKNESS NOTED ON DRAWINGS.
4. BASE COURSE SHALL BE CONSTRUCTED FROM FINE CRUSHED ROCK COMPACTED TO 100% STANDARD DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1 OF THICKNESS NOTED ON DRAWINGS.
5. WEARING SURFACE SHALL BE ASPHALTIC CONCRETE TO STANDARD SPECIFICATION, MINIMUM THICKNESS = 30mm U.N.O.
6. TESTING OF THE SUBGRADE AND PAVEMENT LAYERS SHALL BE CARRIED OUT BY APPROVED N.A.T.A. REGISTERED LABORATORY.

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR SSDA APPROVAL ONLY	KR	NW	24.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	12.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD
Architect: NBRS ARCHITECTURE

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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
Title: NOTES

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 19D28_SSDA_C010
Revision: 03

PIT/STRUCTURE NUMBER	DESCRIPTION
T-1 T-2 T-3 T-4 T-5 T-6 T-7 T-8 T-9	PROPOSED INLET PIT WITH 600x600 HINGED LIGHT DUTY GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT. PIT TO BE MADE REDUNDANT IN ULTIMATE STAGE

FOR OTHER PIT SPECIFICATIONS REFER TO DRAWING 19D28_SSDA_C200

EXISTING Ø675 RCP STORMWATER LINE

CUT AND SHORTED EXISTING Ø675 STORMWATER LINE.

2.9m WIDE DRAINAGE SWALE TO COLLECT TEMPORARY SCHOOL RUN-OFF. LOW FLOW TO BE DIRECTED TO STORMWATER QUALITY TREATMENT SYSTEM. STORM EVENTS ABOVE 2 YEAR TO BE DIRECTED TO OSD

GRADE OSD BYPASS AREA TO DRAINAGE PIT Z-1. CONNECT DRAINAGE PIT Z-1 TO OSD VIA Ø225uPVC MIN. 2 % FALL

530m³ ON-SITE DETENTION TANK. TEMPORARY SCHOOL ROOF AND COURTYARD DRAINAGE TO BE DIRECT TO JELLYFISH UNIT AND ON-SITE DETENTION TANK.

EXISTING PIT TO BE REMOVED

1M WIDE SWALE TO PIT Z-1

SEDIMENTATION BASIN, REFER TO DRAWING SE01 FOR ADDITIONAL DETAILS

BUND TO PROVIDE PONDING OVER PIT X-2

DENOTES TEMPORARY DOWNPIPE COLLECTION STUB FOR ROOF DRAINAGE.

Ø225 UPVC MIN 1.5% TEMPORARY LINE TO BE MADE REDUNDANT AT ULTIMATE STAGE

FORM 300mm HIGH BUND TO CREATE CATCH DRAIN. DRAIN TO DIRECT RESIDUAL LOT RUN-OFF TO SEDIMENTATION BASIN. REFER TO DRAWING SE01 FOR DETAILS ON SEDIMENTATION BASIN

PROPOSED INTERNAL BOUNDARY DETAILS BY PROJECT ARCHITECT

Ø225 UPVC MIN 1.5% TEMPORARY LINE TO BE MADE REDUNDANT AT ULTIMATE STAGE

DENOTES TEMPORARY DOWNPIPE COLLECTION STUB FOR ROOF DRAINAGE.

Ø150 UPVC MIN 1.5% TEMPORARY LINE TO BE MADE REDUNDANT AT ULTIMATE STAGE

EXISTING KERB INLET PIT DENOTED 111/10 ON JWP DRAWING WAE 11028822/CC05
RL 20.92
INV INLET 19.08
INV OUTLET 17.67
HGL 19.52

Ø600 RCP C2 AT 2% FALL

EXISTING SEWER MANHOLE. OSD TANK TO BE LOCATED MINIMUM 2m FROM MANHOLE

Ø225 uPVC AT 1% FALL

Ø600 RCP C2 AT 1% FALL

Ø300 uPVC AT 1% FALL IF TEMPORARY SCHOOL SCENARIO IS IMPLEMENTED OTHERWISE PROVIDE Ø225 uPVC

LINE DENOTES LOW FLOW LINE TO DIRECT FIELD RUN-OFF TO STORMWATER QUALITY TREATMENT SYSTEM

Ø150 UPVC MIN 1.5% TEMPORARY LINE TO BE MADE REDUNDANT AT ULTIMATE STAGE. LINE TO BE TRENCHED WITH FIELD SUBSOIL SYSTEM

Ø150 UPVC MIN 1.5% TEMPORARY LINE TO BE MADE REDUNDANT AT ULTIMATE STAGE. LINE TO BE TRENCHED WITH FIELD SUBSOIL SYSTEM

DENOTES TEMPORARY DOWNPIPE COLLECTION STUB FOR ROOF DRAINAGE.

PIT T-9 TO BE MADE REDUNDANT IN ULTIMATE STAGE

DENOTES TEMPORARY DOWNPIPE COLLECTION STUB FOR ROOF DRAINAGE.

OCEAN PROTECT JELLYFISH UNIT TO PROVIDE TREATABLE FLOW RATE OF 0.125m³/s. UNIT ID JF3250-23-4. 23 HIGH FLOW CARTS AND 4 DRAIN DOWN CARTS. TEMPORARY SCHOOL ROOF AND COURTYARD DRAINAGE TO DRAIN TO JELLYFISH FILTER

STORMWATER REUSE TANK. VOLUME = 75KL. CONNECT OVERFLOW TO OSD TANK. REFER DRAWING C212 FOR DETAILS

DIVERSION PIT TO SPLIT TREATABLE FLOW RATE FROM REGULAR FLOWS. TREATABLE FLOW RATE OF 0.125m³/s

STUB TO BE CONNECTED TO SEDIMENTATION BASIN VIA HIGH LEVEL OUTLET. SEDIMENTATION BASIN TO BE LOCATED AT MAIN SCHOOL CONSTRUCTION ZONE LOW POINT AND TO COLLECT ALL RUN-OFF FROM CONSTRUCTION ZONES.

REMOVE EXISTING PIT. CUT AND CAP EXISTING STORMWATER LINE

PROVIDE TEMPORARY DOWNPIPE COLLECTION STUB FOR HALL ROOF DRAINAGE

MULTIPURPOSE SPORTS COURTS

Ø150 uPVC TO BE MADE REDUNDANT IN ULTIMATE STAGE

1m WIDE DRAINAGE CHANNEL TO COLLECT RUN OFF FROM CONSTRUCTED CONCRETE STAIRS

Ø450 RCP C2 AT 1% FALL

Ø450 RCP C2 MIN 1% FALL

STUB FOR FUTURE CONNECTION

LIMIT OF WORKS FOR TEMP SCHOOL BUILDING OUTLINE. CONTRACTOR TO DIVERT STORMWATER RUN-OFF FROM MAIN SCHOOL TO SEDIMENTATION BASIN SIZED IN ACCORDANCE WITH SE02.

PITS D-1 AND D-2 TO BE FINISHED AT LOW LEVEL AND PIT LIDS INSTALLED AT LEVEL SHOWN ON PLAN. PIT LIDS TO BE REMOVED AND RISERS EXTENDED TO FINAL DESIGN LEVEL IN ULTIMATE SCENARIO

NOTE: STORMWATER RUN-OFF FROM CONSTRUCTION SITE TO BE MANAGED BY TEMPORARY SEDIMENT AND EROSION CONTROL STRUCTURES. CONTRACTOR TO MINIMSE RUNOFF DIRECTED TO SCHOOL SYSTEM TO PROTECT JELLYFISH FILTERS

FOR CONTINUATION REFER TO DWG 19D28_SSDA_C051

TEMPORARY SCHOOL PLAN

SCALE 1:200

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	25.03.2020
01	PRELIMINARY	IK	NW	14.02.2020

Client: ADCO CONSTRUCTION PTY LID
Architect: NBRS ARCHITECTURE

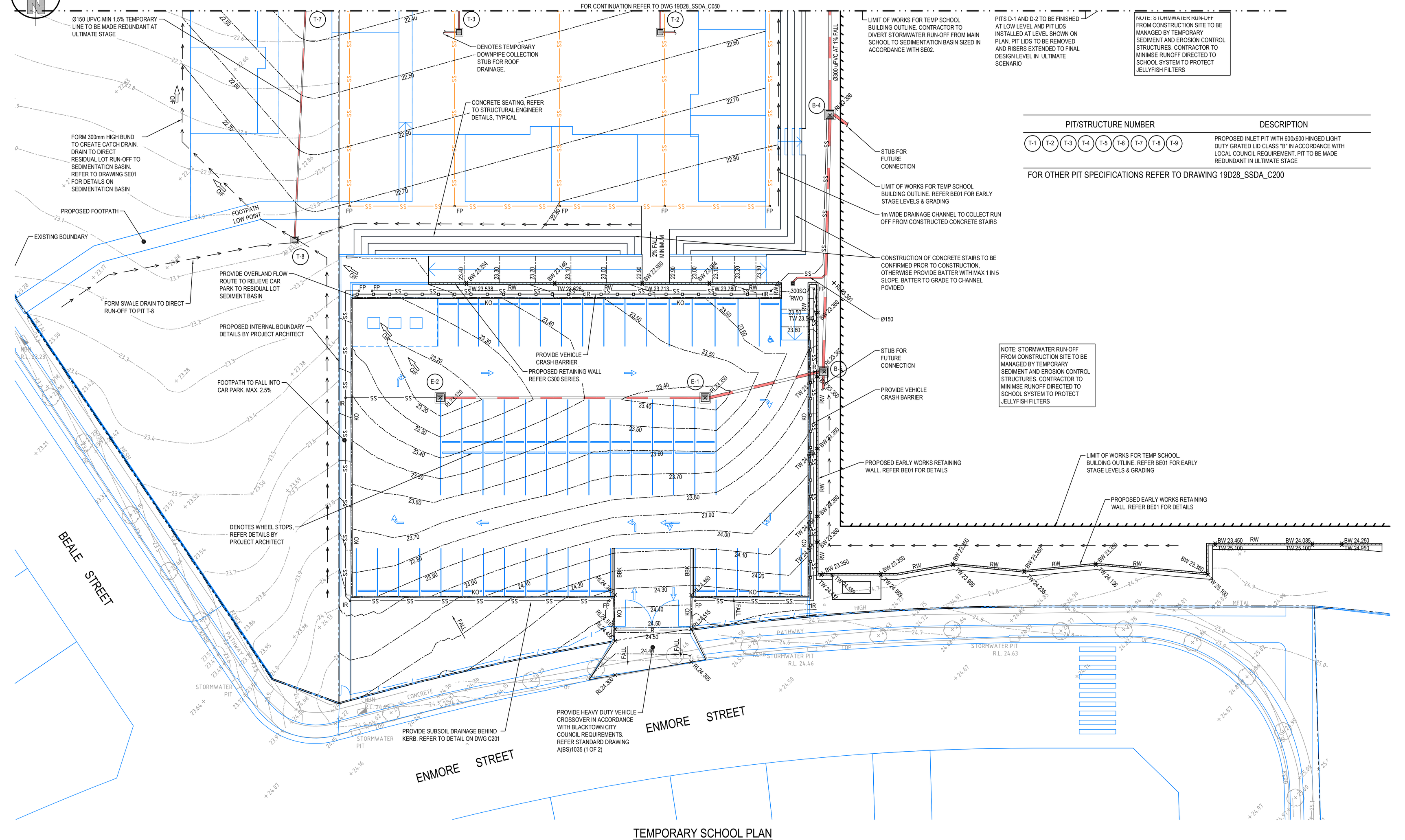
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
Title: TEMPORARY SCHOOL PLAN
SHEET 1 OF 2

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number: 19D28_SSDA_C050
Revision: 02



PIT/STRUCTURE NUMBER	DESCRIPTION
T-1 T-2 T-3 T-4 T-5 T-6 T-7 T-8 T-9	PROPOSED INLET PIT WITH 600x600 HINGED LIGHT DUTY GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT. PIT TO BE MADE REDUNDANT IN ULTIMATE STAGE

FOR OTHER PIT SPECIFICATIONS REFER TO DRAWING 19D28_SSDA_C200

TEMPORARY SCHOOL PLAN

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	24.03.2020
01	PRELIMINARY	IK	NW	14.02.2020

Client: ADCO CONSTRUCTION PTY LID
Architect: NBRS ARCHITECTURE

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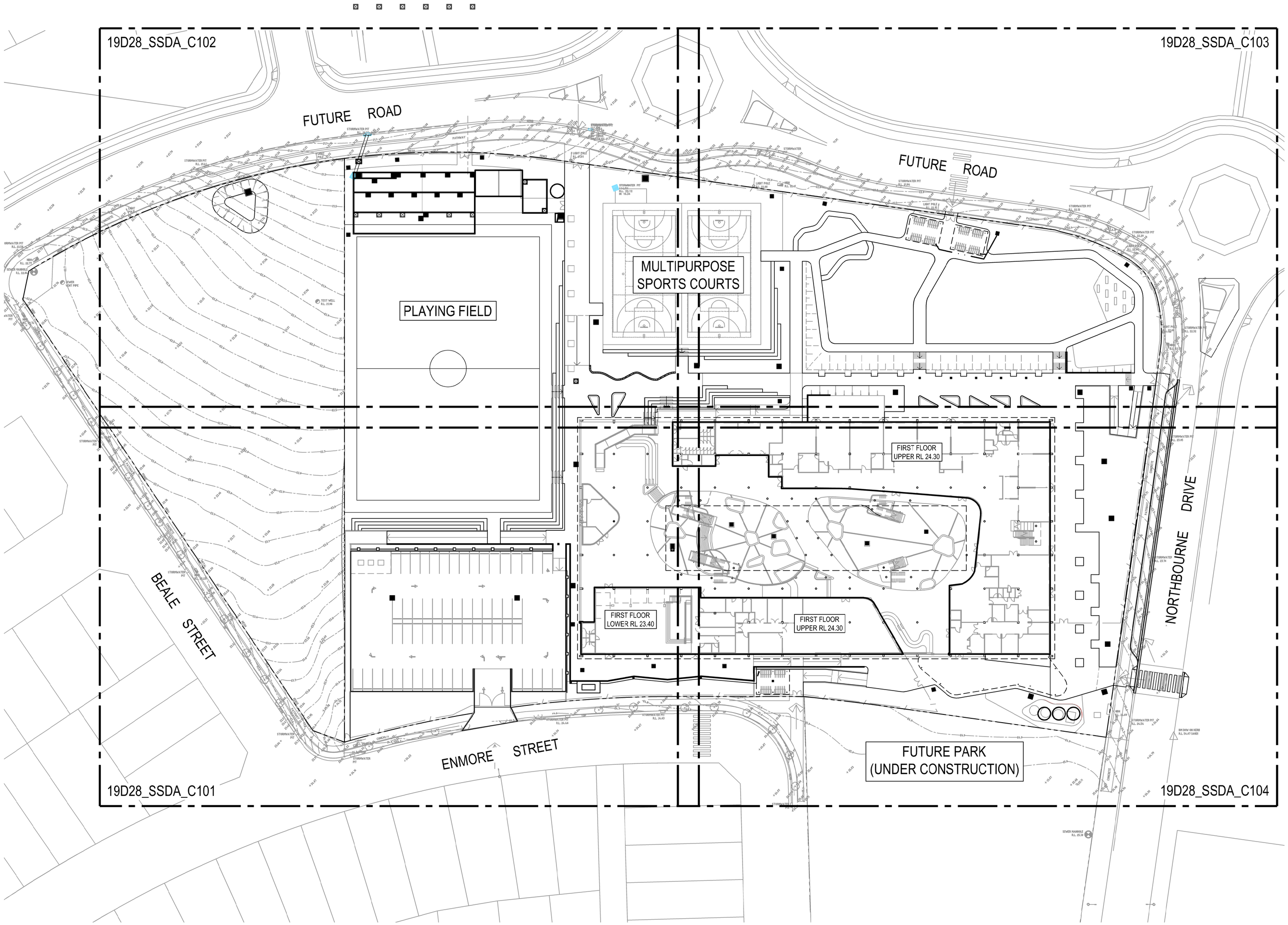
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: TEMPORARY SCHOOL PLAN
SHEET 2 OF 2

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number: 19D28_SSDA_C051
Revision: 02



LEGEND

- EXISTING BOUNDARY
- PROPOSED JUNCTION PITS
- PROPOSED SURFACE INLET PITS
- PROPOSED PIT TAG (A-1: LINE LETTER, PIT NUMBER)
- STORMWATER UPSTREAM INVERT RL. (40.125)
- STORMWATER PIPE DIAMETER & CLASS (Ø425RCP)
- STORMWATER PIPE LENGTH (20.450m)
- STORMWATER PIPE GRADE (1.5%)
- STORMWATER DOWNSTREAM INVERT RL. (39.818)
- PROPOSED GRATED DRAIN
- PROPOSED STORMWATER PIPE
- PROPOSED SUBSOIL LINE (SS)
- EXISTING STORMWATER PIPE
- PROPOSED BATTER LINE
- EXISTING CONTOURS (22.7)
- PROPOSED CONTOURS (22.80)
- PROPOSED SPOT LEVEL (RL24.300)
- EXISTING SPOT LEVEL (22.30)
- PROPOSED TOP OF WALL LEVEL (TW 24.300)
- PROPOSED BOTTOM OF WALL LEVEL (BW 23.300)
- 300 SQ RAINWATER OUTLET WITH Ø150mm OUTLET PIPE (RWO)
- PROPOSED KERB ONLY (KO)
- PROPOSED STORMWATER SWALE
- PRCPOSED RETAINING WALL (RW)
- PROPOSED RIDGE LINE (R)
- PROPOSED FLUSHING POINT (FP)
- PROPOSED INTERMEDIATE RISER (IR)

GENERAL ARRANGEMENT PLAN

SCALE 1:500

0 10 20 30 40 50m

10 8 6 4 2

SCALE 1:500

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
04	ISSUED FOR SSDA APPROVAL ONLY	KR	NW	24.03.2020
03	ISSUED FOR TENDER ONLY	BH	BH	05.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	12.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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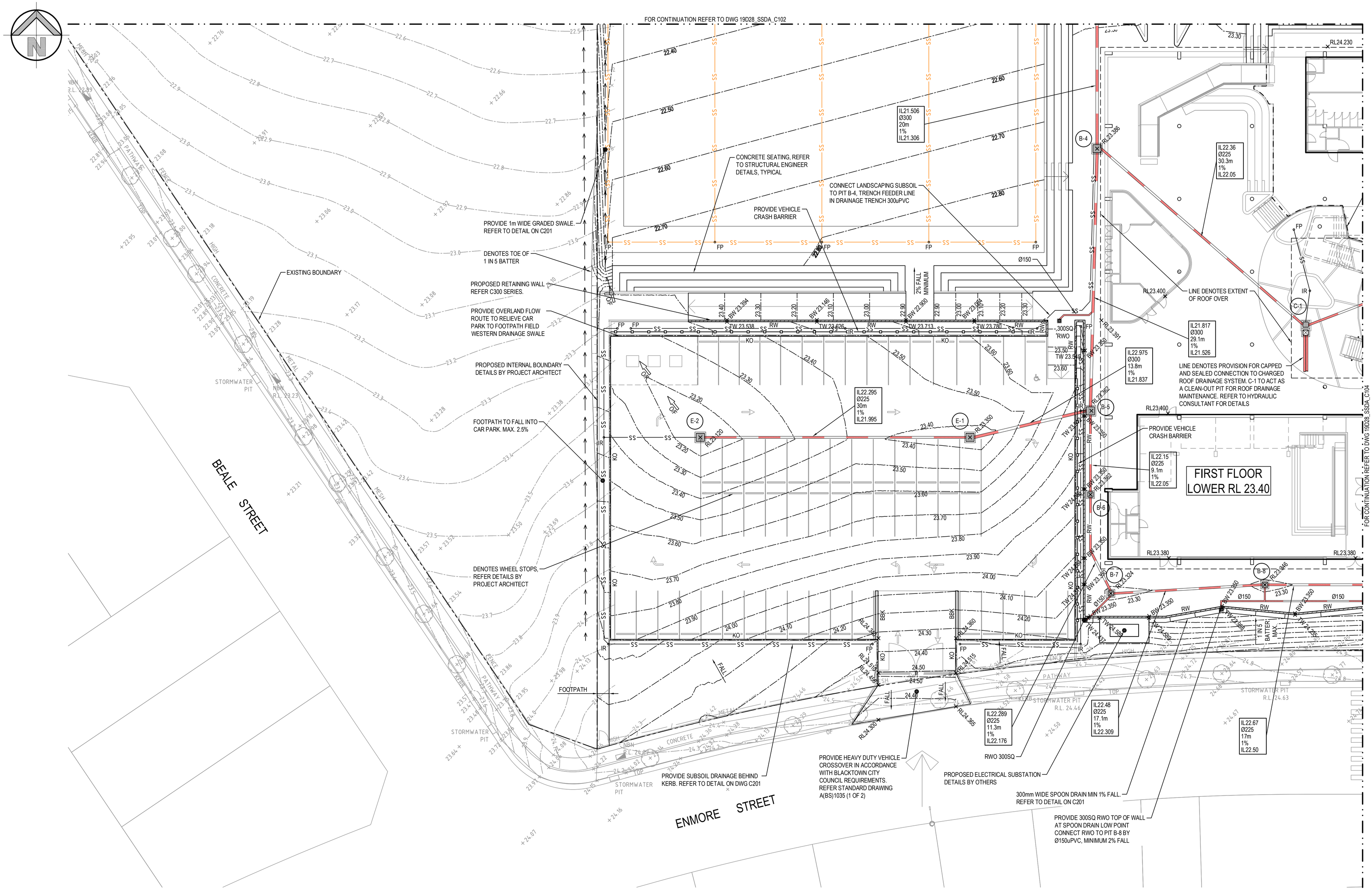
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: GENERAL ARRANGEMENT PLAN

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:500

Drawing number: 19D28_SSDA_C100
Revision: 04



DETAIL PLAN

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
04	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	24.03.2020
03	ISSUED FOR TENDER ONLY	BH	BH	05.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	12.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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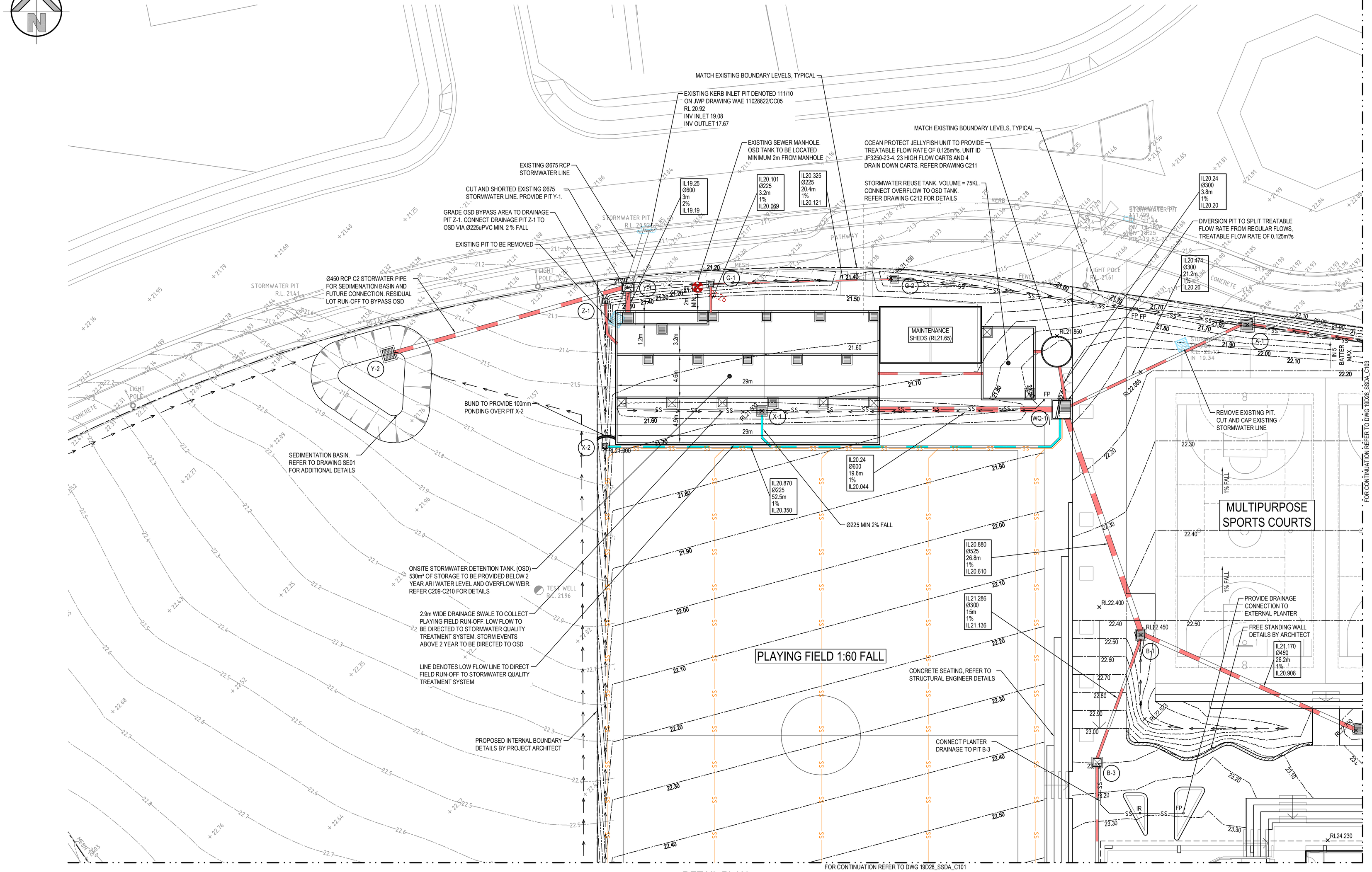
Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: DETAIL PLAN
SHEET 1 OF 4

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number: 19D28_SSDA_C101

Revision: 04



DETAIL PLAN

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

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DATUM: A.H.D.
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02	PRELIMINARY	IK	NW	14.02.2020
01	PRELIMINARY	IK	NW	12.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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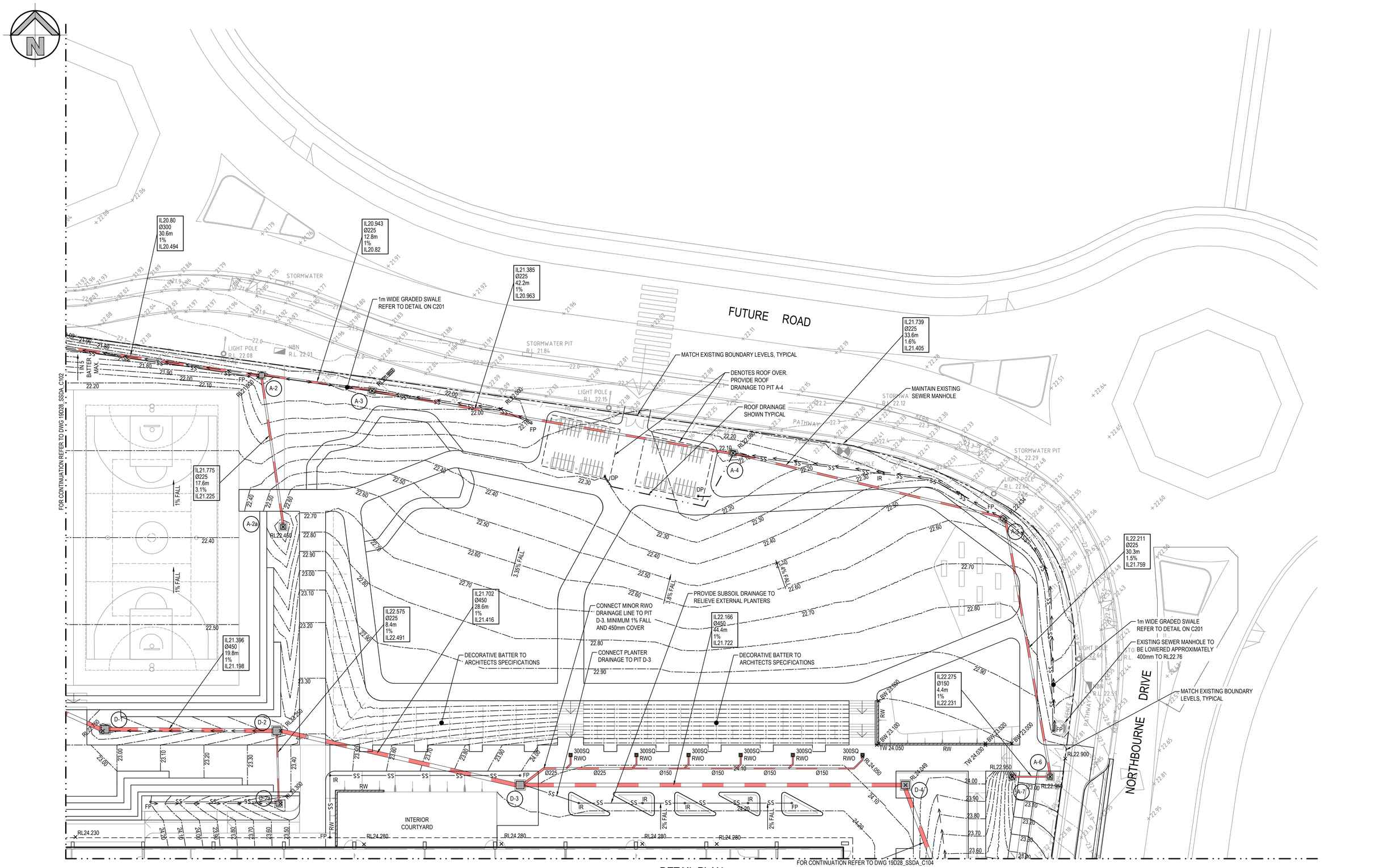
Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: DETAIL PLAN
SHEET 2 OF 4

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number: 19D28_SSDA_C102

Revision: 05



DETAIL PLAN

SCALE 1:200

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
04	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	24.03.2020
03	ISSUED FOR TENDER ONLY	BH	BH	05.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	12.02.2020

Client
ADCO CONSTRUCTIONS PTY LTD

Architect
NBRS ARCHITECTURE

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henry&hymas

Project
MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title
DETAIL PLAN
SHEET 3 OF 4

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number
19D28_SSDA_C103

Revision
04

FOR CONTINUATION REFER TO DWG 19D28_SSDA_C103

FOR CONTINUATION REFER TO DWG 19D28_SSDA_C101

INTERIOR COURTYARD

FIRST FLOOR UPPER RL 24.30

LINE DENOTES APPROXIMATE LOCATION OF BUILDING STEP

LINE DENOTES EXTENT OF ROOF OVER

RAMP GRADING BY PROJECT ARCHITECT

CONNECT 100% OF ROOF AREA TO RWT. DOWNPIPE AND ROOF DRAINAGE LINES SHOWN INDICATIVELY. REFER TO HYDRAULIC CONSULTANT FOR DETAILS

ROOF DRAINAGE SHOWN INDICATIVELY

DENOTES HIGH POINT IN SWALE

PROVIDE Ø150uPVC STUB CONNECTION FOR NEIGHBOURING ROOF DRAINAGE

IL22.35
Ø450
17.6m
1%
IL22.18

IL22.500
Ø450
13.8m
1%
IL22.361

IL22.53
Ø225
15m
1%
IL22.38

IL22.98
Ø225
10.5m
1%
IL22.87

IL23.23
Ø225
22.5m
1%
IL23.00

IL23.40
Ø225
14.4m
1%
IL23.25

IL22.822
Ø450
30.2m
1%
IL22.52

IL23.297
Ø450
11.5m
1%
IL23.182

IL22.82
Ø150
12.2m
1%
IL22.70

IL23.066
Ø225
22.4m
1%
IL22.846

IL23.32
Ø225
23.4m
1%
IL23.086

REFER C110 FOR KISS AND DROP TYPICAL SECTION

MATCH EXISTING BOUNDARY LEVELS, TYPICAL

EMERGENCY OVERFLOW LOCATION FOR RAINWATER TANKS

PROVIDE 1m WIDE GRADED SWALE. REFER TO DETAIL ON C201

PROVIDE 300SQ RWO TOP OF WALL AT SPOON DRAIN LOW POINT

Ø150 uPVC MIN 2% FALL

DENOTES ROOF OVER. CONNECT ROOF DRAINAGE TO PIT B-9

DENOTES LINE OF ROOF OVER

75KL OF RAINWATER STORAGE. SHOWN INDICATIVELY ON PLAN. CONNECT %100 OF ROOF AREA TO RAINWATER TANKS. CONNECT RAINWATER TANK OVERFLOW TO PIT H-1. REFER HYDRAULIC ENGINEER FOR FURTHER SPECIFICATIONS.

DIRECT 2 x Ø300 OVERFLOW PIPES TO PIT H-1. H-1 TO BE FITTED WITH 2 x OCEAN GUARD PIT BASKETS. EACH Ø300uPVC OVERFLOW LINE TO DISCHARGE INTO A SINGLE OCEAN GUARD PIT BASKET. REFER TO C201 FOR TYPICAL DETAIL.
OVERFLOW PIPE INVERT = 23.88
OCEAN GUARD SURFACE LEVEL = 23.78
OUTLET PIPE LEVEL = 23.297

2 x Ø300OVERFLOW PIPE

NORTHBOURNE DRIVE

ENMORE STREET

STORMWATER PIT R.L. 23.05

STORMWATER PIT R.L. 23.76

STORMWATER PIT R.L. 24.54

STORMWATER

DETAIL PLAN

SCALE 1:200

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
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Architect: NBRS ARCHITECTURE

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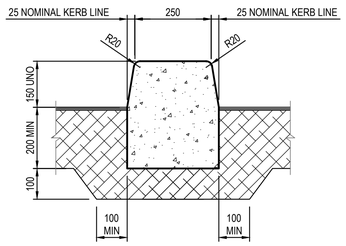
Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: DETAIL PLAN
SHEET 4 OF 4

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

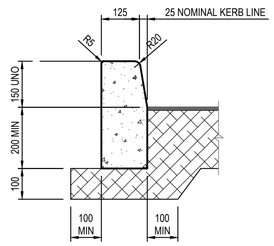
Drawing number: 19D28_SSDA_C104

Revision: 04



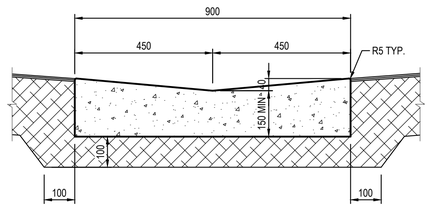
BACK TO BACK KERB (BBK)

SCALE 1:10



KERB ONLY (KO)

SCALE 1:10



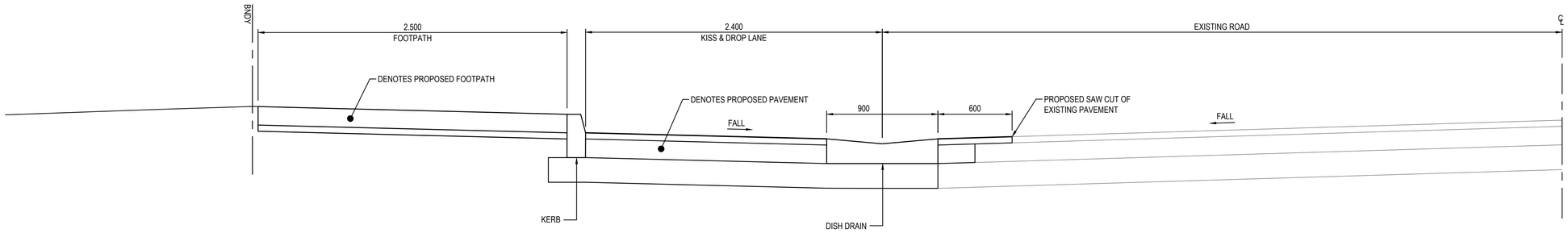
DISH DRAIN (DD)

SCALE 1:10

KERBING NOTES:

INCLUDES ALL KERBS, GUTTERS, DISH DRAINS, CROSSING AND EDGES.

1. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSING TO BE CONSTRUCTED ON MINIMUM 75mm GRANULAR BASE COURSE COMPACTED TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1.
2. EXPANSION JOINTS (EJ) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILTER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATION IN KERBS.
3. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
4. BROAMED FINISHED TO ALL RAMPED AND VEHICULAR CROSSINGS, ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
5. IN THE REPLACEMENT OF KERBS
   EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm FROM LIP OF GUTTER. UPON COMPLETION OF NEW KERBS, NEW BASE COURSE AND SURFACE IS TO BE LAID 900mm WIDE TO MATCH EXISTING MATERIALS AND THICKNESS. EXISTING ALLOTMENT DRAINAGE PIPE ARE TO BE BUILT INTO NEW KERB WITH A 100mm DIA HOLE.
   EXISTING KERBS ARE TO BE COMPLETELY REMOVED WHERE NEW KERBS ARE SHOWN.



KISS & DROP TYPICAL SECTION

SCALE 1:20

0 400 800 1200 1600 2000mm

400 200

SCALE 1:20

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

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01	ISSUED FOR SSDA APPROVAL ONLY	NW	BH	24.03.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: ROADWORKS DETAILS SHEET

Drawn	Designed	Date
B.Hurlstone	B.Hurlstone	MAR 2020
Checked	Approved	Scale
N.Wetzlar	A.Francis	AS NOTED

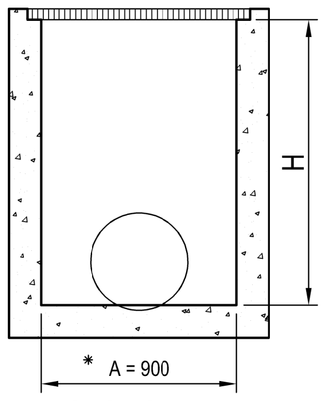
Drawing number: 19D28_SSDA_C110

Revision: 01

TYPICAL PIT CHAMBER SIZES

IT IS THE CONTRACTORS RESPONSIBILITY TO SELECT PIT CHAMBER SIZE WITH REGARDS TO PIPE SIZE, DEPTH TO INVERT AND SKEW ANGLE. REFER SKETCHES BELOW.

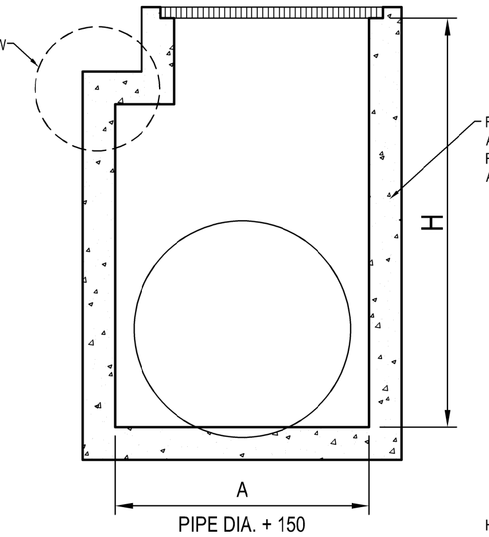
1. SELECT PIT CHAMBER USING THE STEPS BELOW:
2. SELECT PIT CHAMBER SIZE DEPENDING ON THE PIPE DIAMETERS.
3. CHECK PIT CHAMBER SIZE TO SATISFY DEPTH TO INVERT REQUIREMENTS.
   CHECK PIT CHAMBER DIMENSIONS TO SATISFY THE SKEW ANGLE IN THE TABLE.



SECTION
NTS

*A = 600 FOR PIPES UP TO 375 DIA.

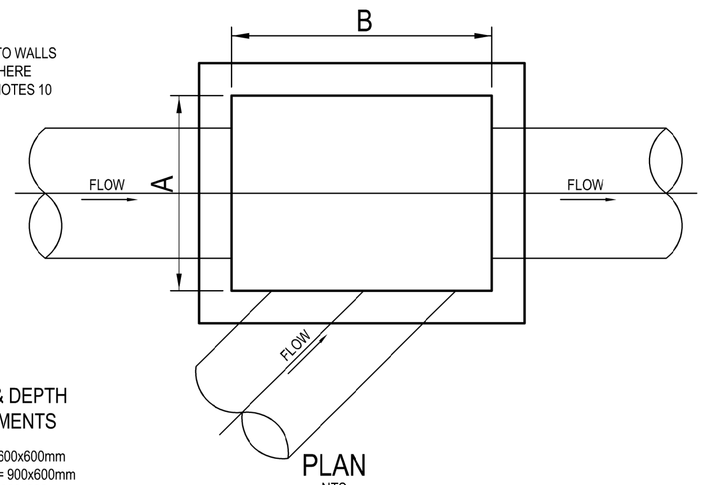
1 PIT CHAMBER DIMENSIONS FOR PIPES UP TO 600 DIA.



SECTION
NTS

1 PIT CHAMBER FOR PIPES GREATER THAN 600 DIA.

FOR B = 600mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 225mm
FOR B = 900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 375mm
FOR B = 1200mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 600mm
FOR B = 1500mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 825mm
FOR B = 1900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 1050mm



PLAN
NTS

3 PIT CHAMBER FOR SIDE ENTRY ON SKEW

2 PIT SIZE & DEPTH REQUIREMENTS

H = 0-900mm - AxB = 600x600mm
H = 900-1200mm - AxB = 900x600mm
H = >1200mm - AxB = 900x900mm

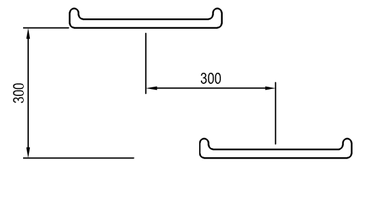
TABLE 1	
SIEVE SIZE (MM)	WEIGHT PASISNG (%)
75.0	100
9.5	100 TO 50
2.36	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

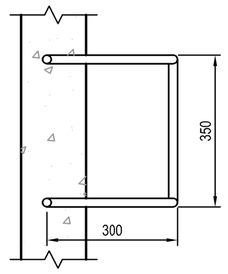
TABLE 2	
SIEVE SIZE (MM)	WEIGHT PASISNG (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

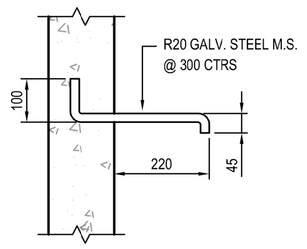
TABLE 3				
SUPPORT TYPE	BED ZONE X	HAUNCH ZONE Y	BED AND HAUNCH ZONES COMPACTION	MAX BEDDING FACTOR
HS1	100 IF D<=1500, OR 150 IF D>=1500	0.1D	50	2.0
HS2		0.3D	60	2.5
HS3		0.3D	70	4.0

PIT LID SCHEDULE

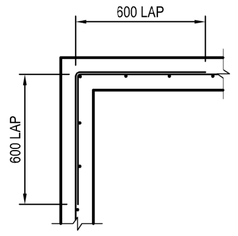
PIT/STRUCTURE NUMBER	DESCRIPTION
B-3	PROPOSED JUNCTION PIT WITH 900x900 MEDIUM DUTY SEALED ,ID CLASS "C" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
C-1, C-2, C-3, C-4, C-5, B-9, A-2a, D-9, D-2a, B-6, B-7, B-8, A-2, A-3, A-4, A-5, A-6, G-1, G-2, X-2, A-7, Z-1	PROPOSED INLET PIT WITH 600x600 HINGED LIGHT DUTY GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
D-1, D-2, D-4, D-5, D-6, D-7, D-8, B-5, A-1, B-1, X-1	PROPOSED INLET PIT WITH 900x900 HINGED LIGHT DUTY GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
H-1	PROPOSED INLET PIT WITH 600x1200 HINGED LIGHT DUTY GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
E-1, E-2	PROPOSED INLET PIT WITH 900x900 HINGED HEAVY DUTY GRATED LID CLASS "D" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
B-4, D-3	PROPOSED INLET PIT WITH 900x900 HINGED MEDIUM DUTY GRATED LID CLASS "C" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
WQ-1	PROPOSED INLET PIT WITH 900x900 HINGED LIGHT DUTY GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT. PIT DIMENSIONS TO BE CUSTOMISED TO SUIT INTERNAL WEIR DIVERTING TREATABLE FLOW RATE.
Y-1	PROPOSED JUNCTION PIT WITH 1200x900 LIGHT DUTY SEALED ,ID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
Y-2	PROPOSED INLET PIT WITH 900x900 HINGED LIGHT DUTY SURCHARGE STYLE GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.
Z-1	PROPOSED INLET PIT WITH 600x600 HINGED LIGHT DUTY GRATED LID CLASS "B" IN ACCORDANCE WITH LOCAL COUNCIL REQUIREMENT.



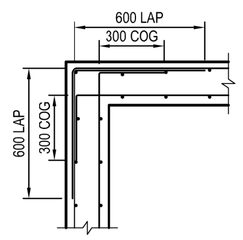




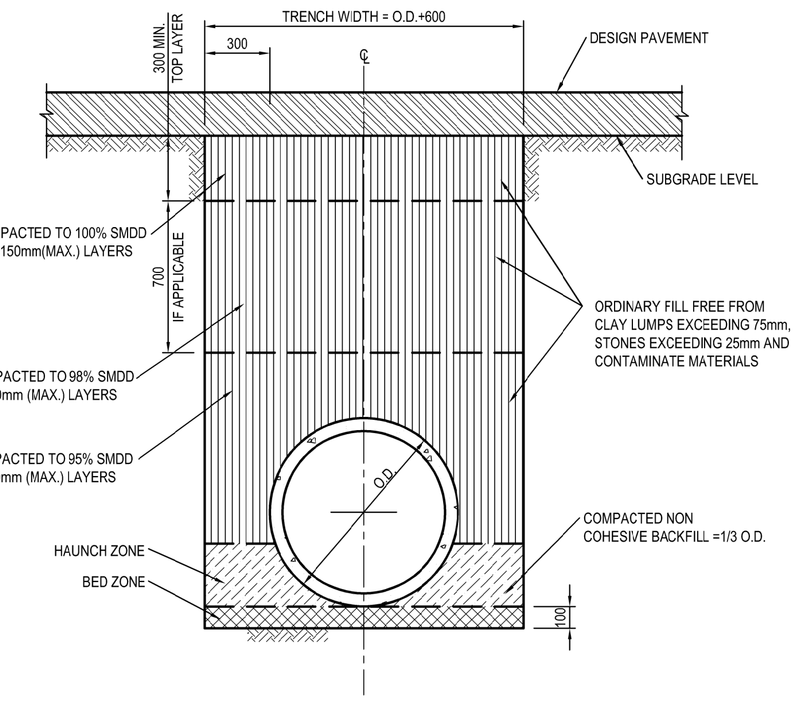
TYPICAL STEP IRON DETAIL
SCALE 1:10



150 WALL - CORNER DETAIL
SCALE 1:20

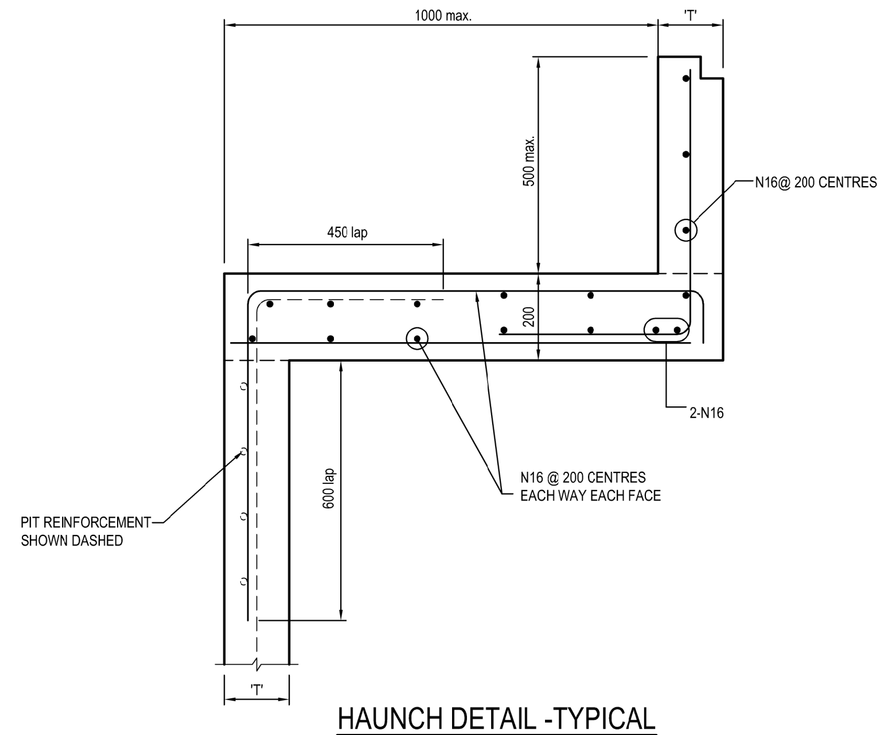


200 WALL - CORNER DETAIL
SCALE 1:20



PIPE TRENCH INSTALLATION BENEATH PAVEMENT
(H1 & H2 SUPPORT)
SCALE 1:20

PIPE TRENCH INSTALLATION IN LANDSCAPE AREAS
(H1 & H2 SUPPORT)
SCALE 1:20



HAUNCH DETAIL -TYPICAL
SCALE 1:10

NOTES:

- ALL GRATED INLET PITS TO CONTAIN OCEAN PROTECT 200 MICRON PIT BASKETS OR APPROVED EQUIVALENT UNLESS NOTED ON PLAN. REFER DRAWING C201 & C250 FOR DETAILS.
- ALL PITS IN FOOTPATH TO BE FITTED WITH SLIP RESISTANT HEELGUARD LID.
- PIT SCHEDULE ABOVE DOES NOT INCLUDE PIT LIDS FOR WATER QUALITY DEVICES OR BELOW GROUND OSD TANKS, REFER DRAWINGS C210 AND C211.

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

0 200 400 600 800 1000mm
200 100
SCALE 1:10

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SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

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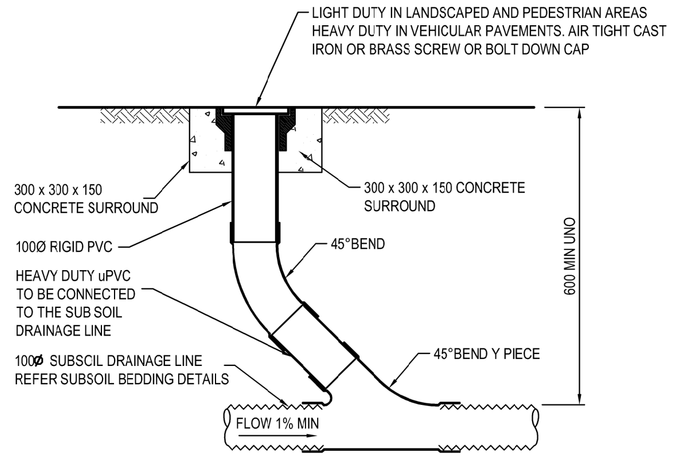
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: STORMWATER MISCELLANEOUS DETAILS & PIT LID SCHEDULE

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JUNE 2019
Checked	Approved	Scale
N.Wetzlar	A.Francis	AS NOTED

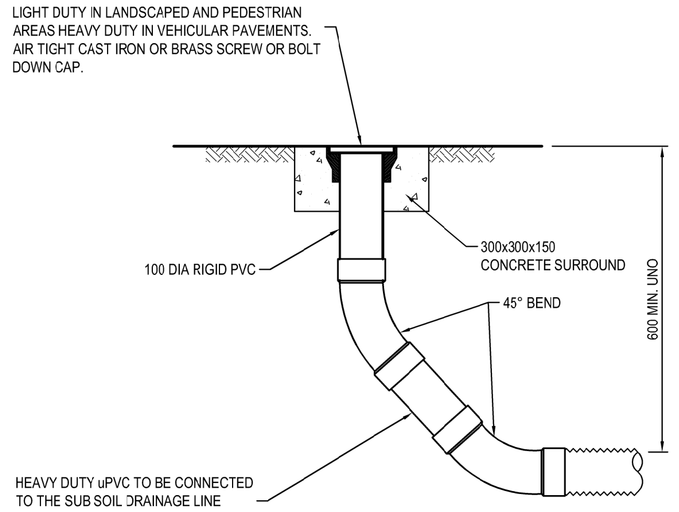
Drawing number: 19D28_SSDA_C200
Revision: 03



INTERMEDIATE RISER (IR)

SCALE 1:10

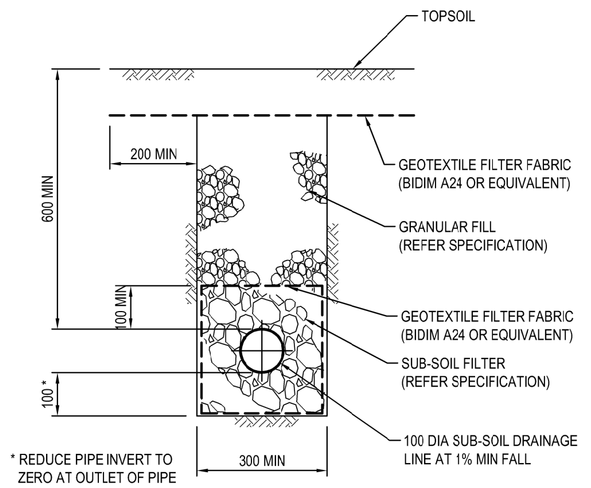
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



FLUSHING POINT (FP)

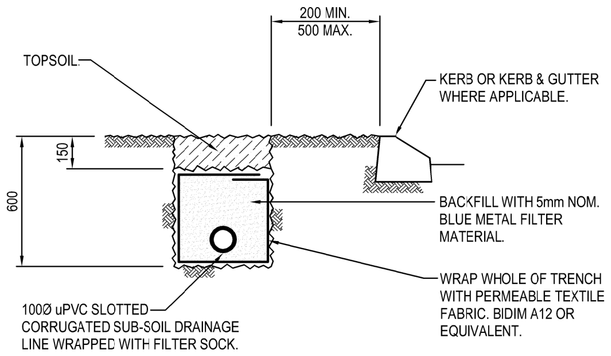
SCALE 1:10

NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



SUB-SOIL IN LANDSCAPED AREAS

SCALE 1:10



SUB-SOIL DRAIN DETAIL

SCALE 1:20

SUBSOIL DRAINAGE NOTES

1. GENERALY PROVIDE SUBSOIL DRAINS TO INTERCEPT GROUNDWATER SEEPAGE AND PREVENT WATER BUILD-UP BEHIND WALLS AND UNDER FLOORS AND PAVEMENTS. CONNECT SUBSOIL TO SURFACE DRAINS OR TO THE STORMWATER DRAINAGE SYSTEM AS APPLICABLE.

2. PIPE DEPTH:
PROVIDE THE FOLLOWING MINIMUM CLEAR DEPTH, MEASURED TO THE CROWN OF THE PIPE, WHERE THE PIPE PASSES BELOW THE FOLLOWING ELEMENTS:

- 100mm BELOW FORMATION LEVEL OF THE PAVEMENT, KERB OR CHANNEL.
- 100mm BELOW THE AVERAGE GRADIENT OF THE BOTTOM OF FOOTINGS.

3. JOINTING:
AT JUNCTIONS OF SUBSOIL PIPES PROVIDE TEES, COUPLINGS OR ADAPTORS TO AS2439.1.

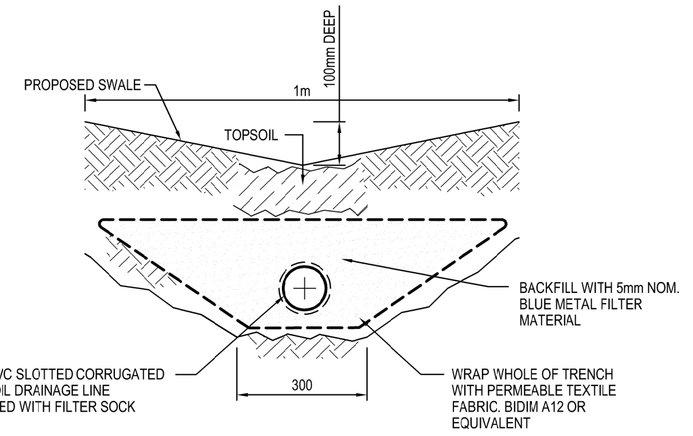
4. TRENCH WIDTH MINIMUM 300mm.

5. PIPE UNDERLAY
GENERAL: GRADE THE TRENCH FLOOR EVENLY TO THE GRADIENT OF THE PIPELINE. IF THE TRENCH FLOOR IS ROCK, CORRECT ANY IRREGULARITIES WITH COMPACTED BEDDING MATERIAL. BED PIPING ON A CONTINUOUS UNDERLAY OF BEDDING MATERIAL, AT LEAST 75mm THICK AFTER COMPACTION. LAY THE PIPE WITH ONE LINE OF PERFORATIONS AT THE BOTTOM.

CHASES: IF NECESSARY TO PREVENT PROJECTIONS SUCH AS SOCKETS AND FLANGES FROM BEARING ON THE TRENCH BOTTOM OR UNDERLAY.

6. PIPE SURROUNDS:
GENERAL: PLACE THE MATERIAL IN THE PIPE SURROUND IN LAYERS SMALLER THAN OR EQUAL TO 200mm LOOSE THICKNESS, AND COMPACT WITHOUT DAMAGING OR DISPLACING PIPING.
DEPTH OF OVERLAY: TO THE UNDERSIDE OF THE BASE OF OVERLYING STRUCTURES SUCH AS PAVEMENTS, SLABS AND CHANNELS TO WITHIN 150mm OF THE FINISHED SURFACE OF UNPAVED OR LANDSCAPED AREAS.

7. FILTER SOCKS:
PROVIDE POLYESTER PERMEABLE SOCKS CAPABLE OF RETAINING PARTICLES OF 0.25mm SIZES. SECURELY FIT OR JOIN THE SOCK AT EACH JOINT.



SUBSOIL DRAIN DETAIL IN SWALES

SCALE 1:10

0 200 400 600 800 1000mm
200 100
SCALE 1:10

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

DRAINAGE NOTES:

1. ALL STORMWATER WORK TO COMPLY WITH AS 3500 PART 3.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE MINIMUM COVER OF 600mm ON ALL PIPES.

3. PROTECTION OF PIPES DUE TO LOADS EXCEEDING W7 WHEEL LOAD SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

4. BEDDING TYPE SHALL BE TYPE H2 FOR RCP. WHERE NECESSARY THE OVERLAY ZONE SHALL BE REDUCED TO ACCOMMODATE PAVEMENT REQUIREMENTS. REFER TO THIS DRAWING FOR DETAILS.

5. MINIMUM COVER OVER EXISTING PIPES FOR PROTECTION DURING CONSTRUCTION SHALL BE 800mm.

6. NO CONSTRUCTION LOADS SHALL BE APPLIED TO PLASTIC PIPES.

7. FINISHED SURFACE LEVELS SHOWN ON LAYOUT PLAN DRGS TAKE PRECEDENCE OVER DESIGN DRAINAGE SURFACE LEVELS.

8. ALL PIPES UP TO AND INCLUDING 300 DIA. SHALL BE SOLVENT OR RUBBER RING JOINTED PVC CLASS SH PIPE TO AS1260. ALL OTHER PIPES TO BE RCP USING CLASS 2 RUBBER RING JOINTED PIPE. HARDIES FRC PIPE MAY BE USED IN LIEU OF RCP IF DESIRED IN GROUND. ALL AERIAL PIPES TO BE PVC CLASS SH.

9. ALL PITS IN NON TRAFFICABLE AREAS TO BE PREFABRICATED POLYESTER CONCRETE "POLYCRETE" WITH "LIGHT DUTY" CLASS B GALV. MILD STEEL GRATING AND FRAME.
ALL PITS IN TRAFFICABLE AREAS (CLASS "D" LOADING MAX) TO HAVE 150mm THICK CONCRETE WALLS AND BASE CAST IN-SITU f'c=32 MPa, REINFORCED WITH N12-200 BOTH LOADING WAYS CENTRALLY PLACE .U.N.O. ON SEPARATE DESIGN DRAWINGS IN THIS SET. GALV.MILD STEEL GRATING AND FRAME TO SUIT DESIGN LOADING. PRECAST PITS, RECTANGULAR OR CIRCULAR IN SHAPE, MAY BE USED IN LIEU AND SHALL COMPLY WITH RELEVANT AUSTRALIAN STANDARDS.

10. ALL PITS, GRATINGS AND FRAMES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION AND TO BE IN ACCORDANCE WITH AS3500.3 AND AS3996.

11. PIT CHAMBER DIMENSIONS ARE TO BE SELECTED TO SATISFY THE FOLLOWING:
- PIPE SIZE
- DEPTH TO INVERT
- SKEW ANGLE
REFER TYPICAL PIT CHAMBER DETAILS BELOW
IF PIT LID SIZE IS SMALLER THAN THE PIT CHAMBER SIZE THEN THE PIT LID IS TO BE CONSTRUCTED ON THE CORNER OF THE PIT CHAMBER WITH THE STEP IRONS DIRECTLY BELOW. ALTERNATIVELY THE PIT LID TO BE USED, IS TO BE THE SAME SIZE AS THE PIT CHAMBER.

12. FOR PIPE SIZES GREATER THAN Ø300mm, PIT FLOOR IS TO BE BENCHED TO FACILITATE FLOW.

13. GALVANISED STEP IRONS SHALL BE PROVIDED AT 300 CTS FOR PITS HAVING A DEPTH EXCEEDING 1200mm. SUBSOIL DRAINAGE PIPE SHALL BE PROVIDED IN PIPE TRENCHES ADJACENT TO INLET PIPES. (MINIMUM LENGTH 3m).

14. ALL SUBSOIL PIPES SHALL BE 100mm SLOTTED PVC IN A FILTER SOCK, UNO, WITH 3m INSTALLED UPSTREAM OF ALL PITS.

15. ALL PIPEWORK SHALL HAVE MINIMUM DIAMETER 100.

16. MINIMUM GRADE FOR ROOFWATER DRAINAGE LINES SHALL BE 1%.

17. ALL PIPE JUNCTIONS AND TAPER UP TO AND INCLUDING 300 DIA. SHALL BE VIA PURPOSE MADE FITTINGS.

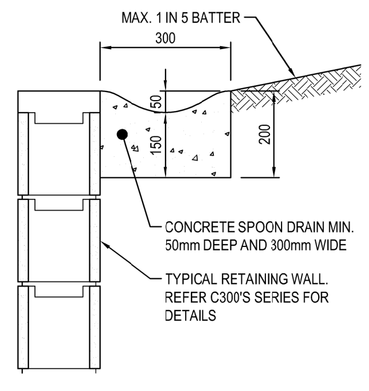
18. ALL ROOF DRAINAGE TO BE INSTALLED IN ACCORDANCE WITH AS3500, PART 3. TESTING TO BE UNDERTAKEN AND REPORTS PROVIDED TO THE SUPERINTENDENT.

19. LOCATION OF THE DIRECT DOWN PIPE CONNECTIONS MAY VARY ON SITE TO SUIT SITE CONDITIONS, WHERE CONNECTION SHOWN ON LONG SECTIONS CHAINAGES ARE INDICATIVE ONLY.

20. PITS IN EXCESS OF 1.5 m DEEP TO HAVE WALL AND FLOOR THICKNESS INCREASED TO 200mm. REINFORCED WITH N12@200 CTS CENTRALLY PLACED BOTH WAYS THROUGHOUT U.N.O.ON SEPARATE DESIGN DRAWINGS IN THIS SET. IF DEPTH EXCEEDS 5m CONTACT ENGINEER.

21. SUBSOIL DRAINAGE LINES FOR LANDSCAPE AREA NOT SHOWN ON THESE DRAWINGS. REFER TO LANDSCAPING PLANS FOR DETAILS.

22. ALL STORMWATER PITS TO HAVE Ø100 uPVC SLOTTED SUBSOIL PIPES CONNECTED TO THEM. THESE SUBSOILS TO EXTEND 3m UPSTREAM OF THE PIT AT A MINIMUM GRADE.



RW SPOON DRAIN DETAIL

SCALE 1:10

PLAN ID	MAXIMUM PIT PLAN DIMENSIONS
S	450mm x 450mm
M	600mm x 600mm
L	900mm x 900mm
XL	1200mm x 1200mm

DEPTH ID	BAG DEPTH	OVERALL DEPTH
1	170	270
2	300	450
3	600	700

		DEPTH ID		
		1	2	3
PLAN ID	S	■		
	M	■	■	
	L	■	■	■
	XL	■	■	■

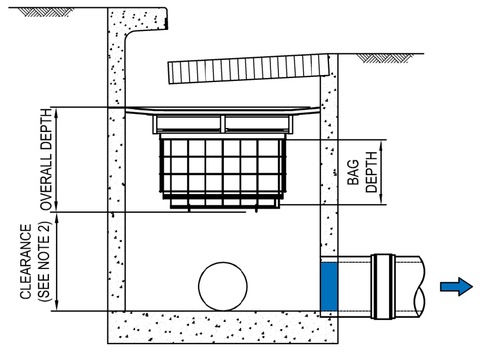


GENERAL NOTES

1. THE MINIMUM CLEARANCE DEPENDS ON THE CONFIGURATION (SEE NOTE 2) AND THE LOCAL COUNCIL REQUIREMENTS.
2. CLEARANCE FOR ANY PIT WITHOUT AN INLET PIPE (ONLY USED FOR SURFACE FLOW) CAN BE AS LOW AS 50mm. FOR OTHER PITS, THE RECOMMENDED CLEARANCE SHOULD BE GREATER OR EQUAL TO THE PIPE OBVERT SO AS NOT TO INHIBIT HYDRAULIC CAPACITY.
3. OCEAN PROTECT PROVIDES TWO FILTRATION BAG TYPES:- 200 MICRON BAGS FOR HIGHER WATER QUALITY FILTERING AND A COARSE BAG FOR TARGETING GROSS POLLUTANTS.
4. DRAWINGS NOT TO SCALE.

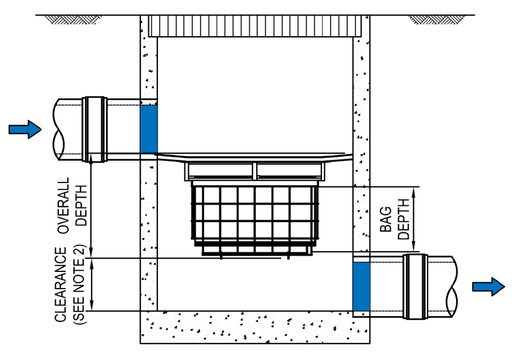
OCEAN PROTECT
PHONE: 1300 354 722 www.oceanprotect.com.au

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TYPCIAL ARRANGEMENTS
SPECIFICATION DRAWING



SURFACE FLOW CONFIGURATION

SCALE: 1:20



PIPE FLOW CONFIGURATION

SCALE: 1:20

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR SSDA APPROVAL ONLY	KR	NW	24.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	12.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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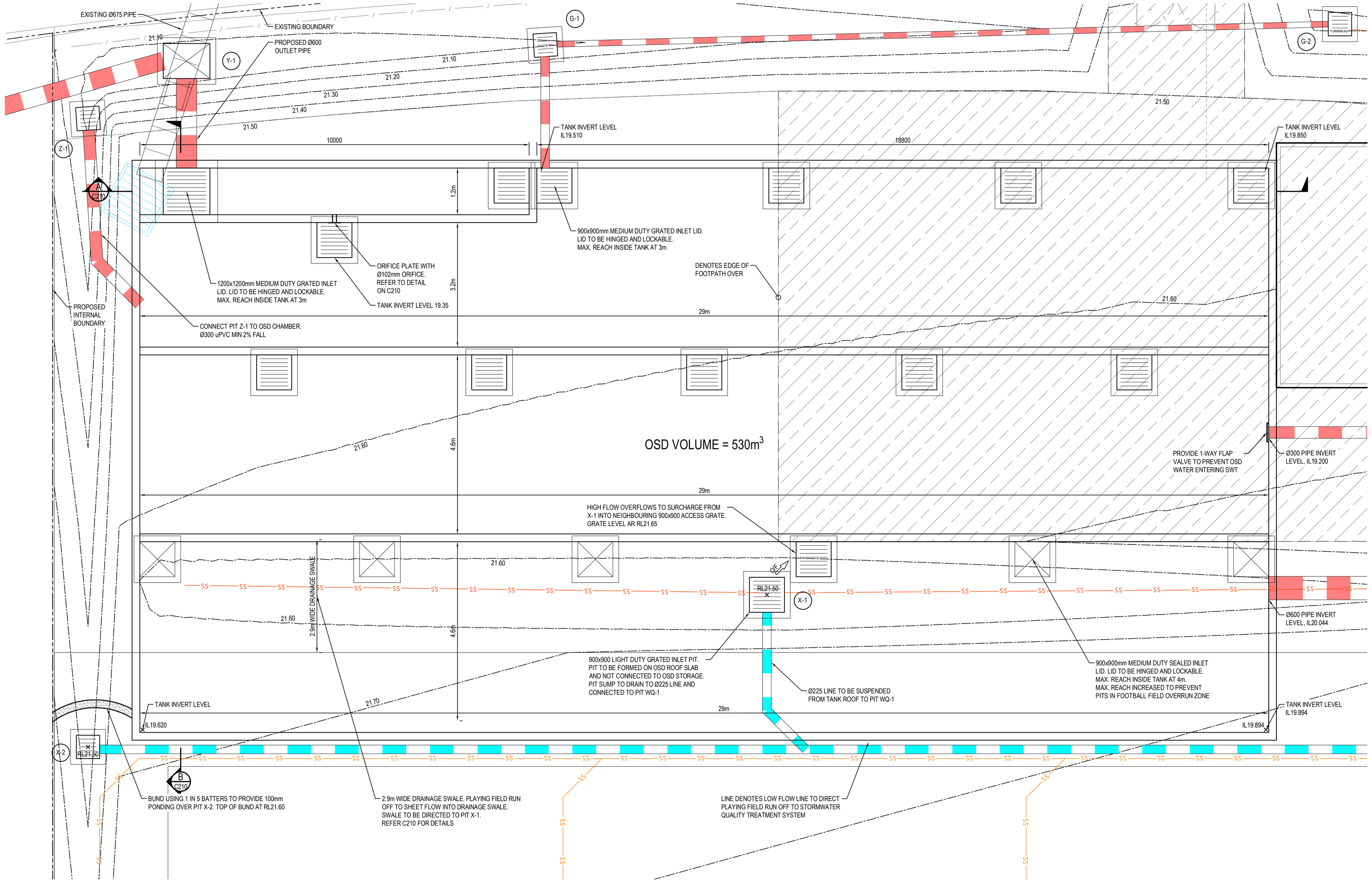
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: STORMWATER MISCELLANEOUS DETAILS

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JUNE 2019
Checked	Approved	Scale
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 19D28_SSDA_C201
Revision: 03



OSD TANK PLAN

SCALE 1:50

0 1000 2000 3000 4000 5000mm
1000 600 200

SCALE 1:50

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	24.03.2020					

Client: ADCO CONSTRUCTIONS PTY LTD
Architect: NBRS ARCHITECTURE

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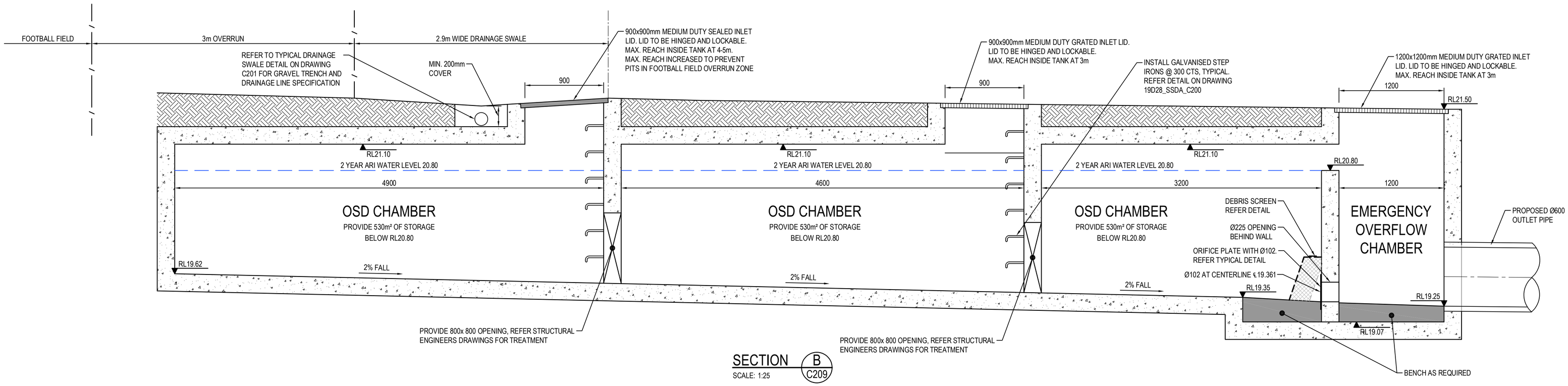
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

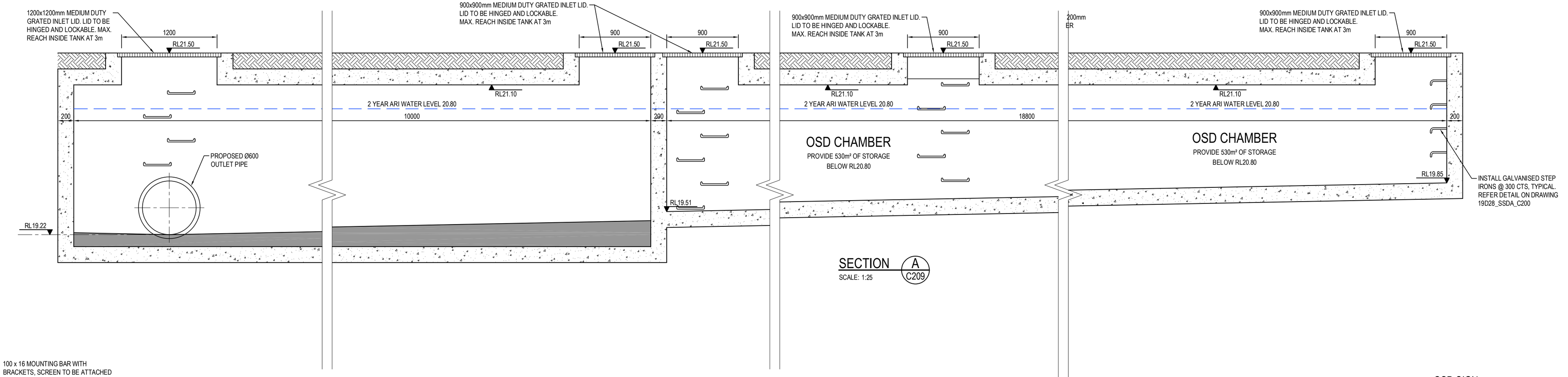
Title: OSD TANK PLAN

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JUNE 2019
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 19D28_SSDA_C209
Revision: 01



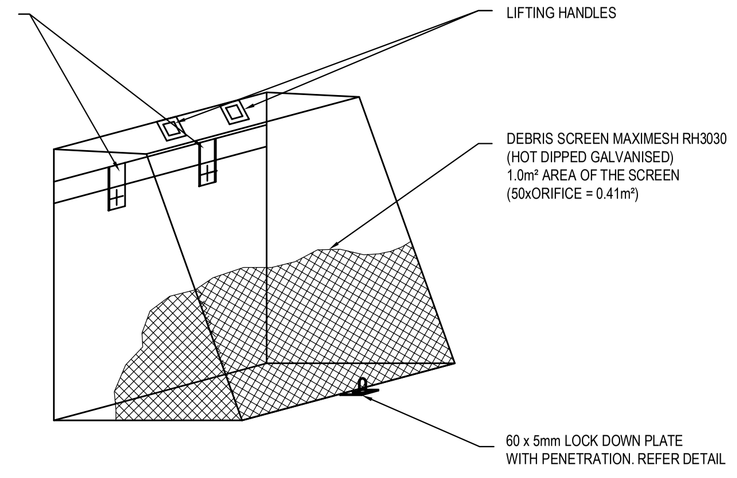
SECTION B
SCALE: 1:25
C209



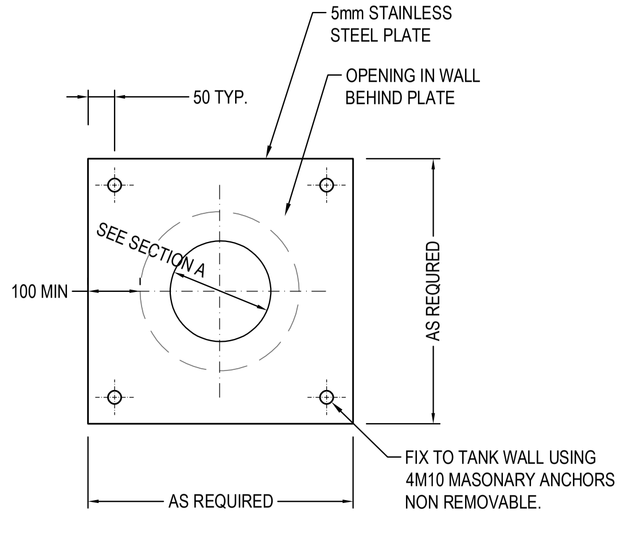
SECTION A
SCALE: 1:25
C209

100 x 16 MOUNTING BAR WITH BRACKETS, SCREEN TO BE ATTACHED (GENERALLY ON A SLIDING MECHANISM) TO THE WALL, BUT SHOULD BE REMOVABLE (WITHOUT THE USE OF TOOLS) TO PERMIT CLEANSING AND EASY INSPECTION OF THE OUTLET CONTROL. ALL STEEL TO BE HOT DIPPED GALVANISED.

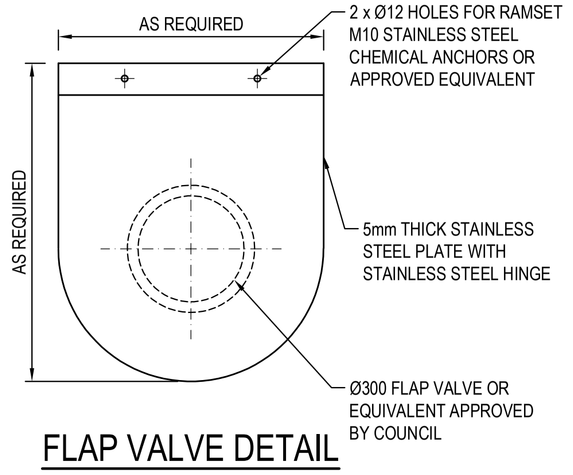
MAXIMESH RH3030 IS RECOMMENDED FOR ORIFICES LESS THAN 150mm IN DIAMETER AND SCREEN AREA 50xTHE ORIFICE AREA REFER BLACKTOWN CITY COUNCIL STANDARD DRAWINGS FOR DETAILS



DEBRIS SCREEN DETAIL
NOT TO SCALE
ALL STEEL TO BE HOT DIPPED GALVANISED



ORIFICE PLATE
SCALE 1:10



FLAP VALVE DETAIL
SCALE 1:10

CONFINED SPACE DANGER SIGN

DANGER

CONFINED SPACE
NO ENTRY WITHOUT CONFINED SPACE TRAINING

COLOURS:	DANGER AND BACKGROUND	WHITE
	ELLIPTICAL AREA	RED
	RECTANGLE CONTAINING ELLIPSE	BLACK
	OTHER LETTERING AND BOARDER	BLACK

A) A CONFINED SPACE DANGER SIGN SHALL BE POSITIONED IN A LOCATION SUCH THAT IT IS CLEARLY VISIBLE TO PERSONS PROPOSING TO ENTER THE BELOW GROUND TANKS/ CONFINED SPACE AT ALL ACCESS POINTS OF THE TANK/ CONFINED SPACE.

B) SIGN TO BE MINIMUM DIMENSIONS:- 300mm x 450mm (LARGE ENTRIES SUCH AS DOORS)
250mm x 180mm (SMALL ENTRIES I.E.. GRATES, MANHOLES)

C) SIGN SHALL BE MANUFACTURED FROM COLOUR BONDED METAL OR POLYPROPYLENE

D) SIGN SHALL BE AFFIXED TO A SURFACE WITH SCREWS AT EACH CORNER.

OSD SIGN

THIS IS AN
ON-SITE STORMWATER DETENTION SYSTEM
REQUIRED BY YOUR LOCAL COUNCIL
IT IS AN OFFENCE TO REDUCE THE VOLUME OF THE TANK OR BASIN OR TO INTERFERE WITH THE ORIFICE PLATE THAT CONTROLS THE OUTFLOW
THE BASE OF THE OUTLET CONTROL PIT AND THE DEBRIS SCREEN MUST BE CLEANED OF DEBRIS AND SEDIMENT ON A REGULAR BASIS BY THE OWNER
THIS PLATE MUST NOT BE REMOVED

SIZE: 110mm X 80mm
CORNERS: SQUARE
COLOUR: ETCHED AND FILLED BLACK LEGEND ON NATURAL SILVER BACKGROUND
MATERIAL: ALUMINIUM 0.9MM MILL

0 200 400 600 800 1000mm
200 100
SCALE 1:10

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	24.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	13.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD
Architect: NBRS ARCHITECTURE

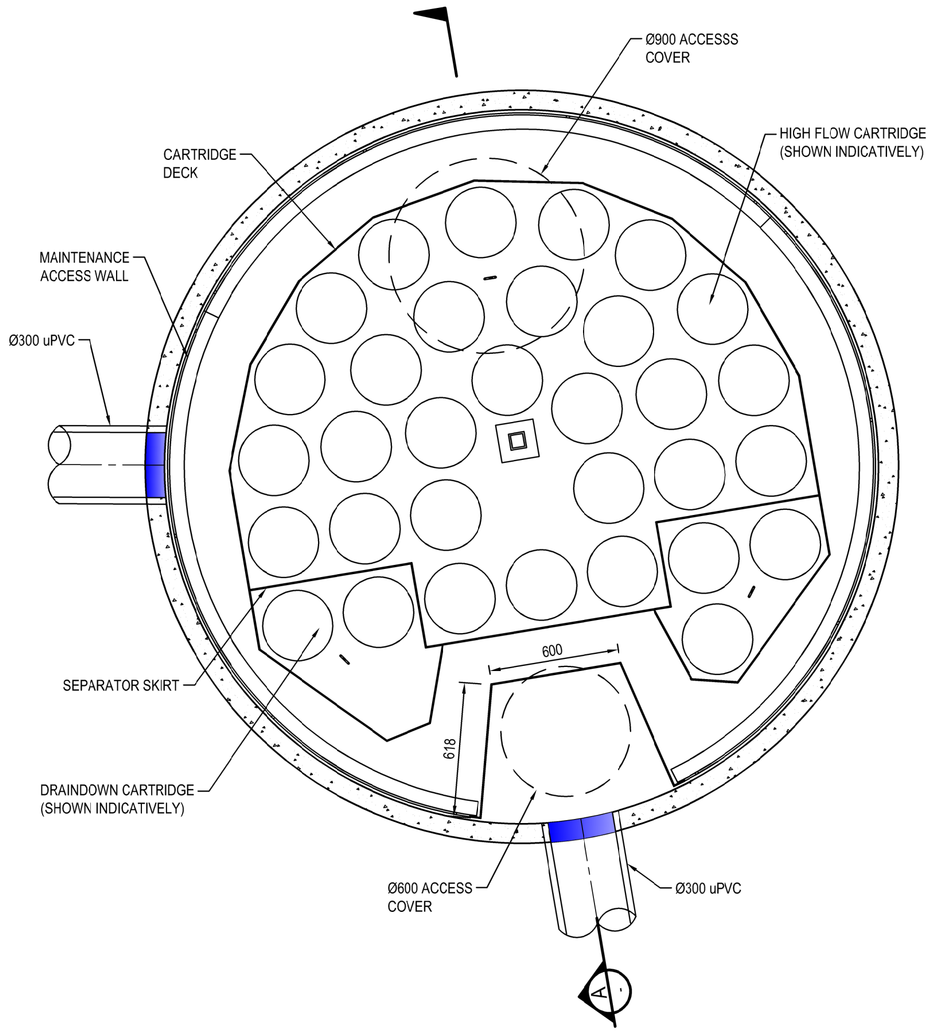
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henry&hymas

Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
Title: OSD TANK SECTIONS AND DETAILS

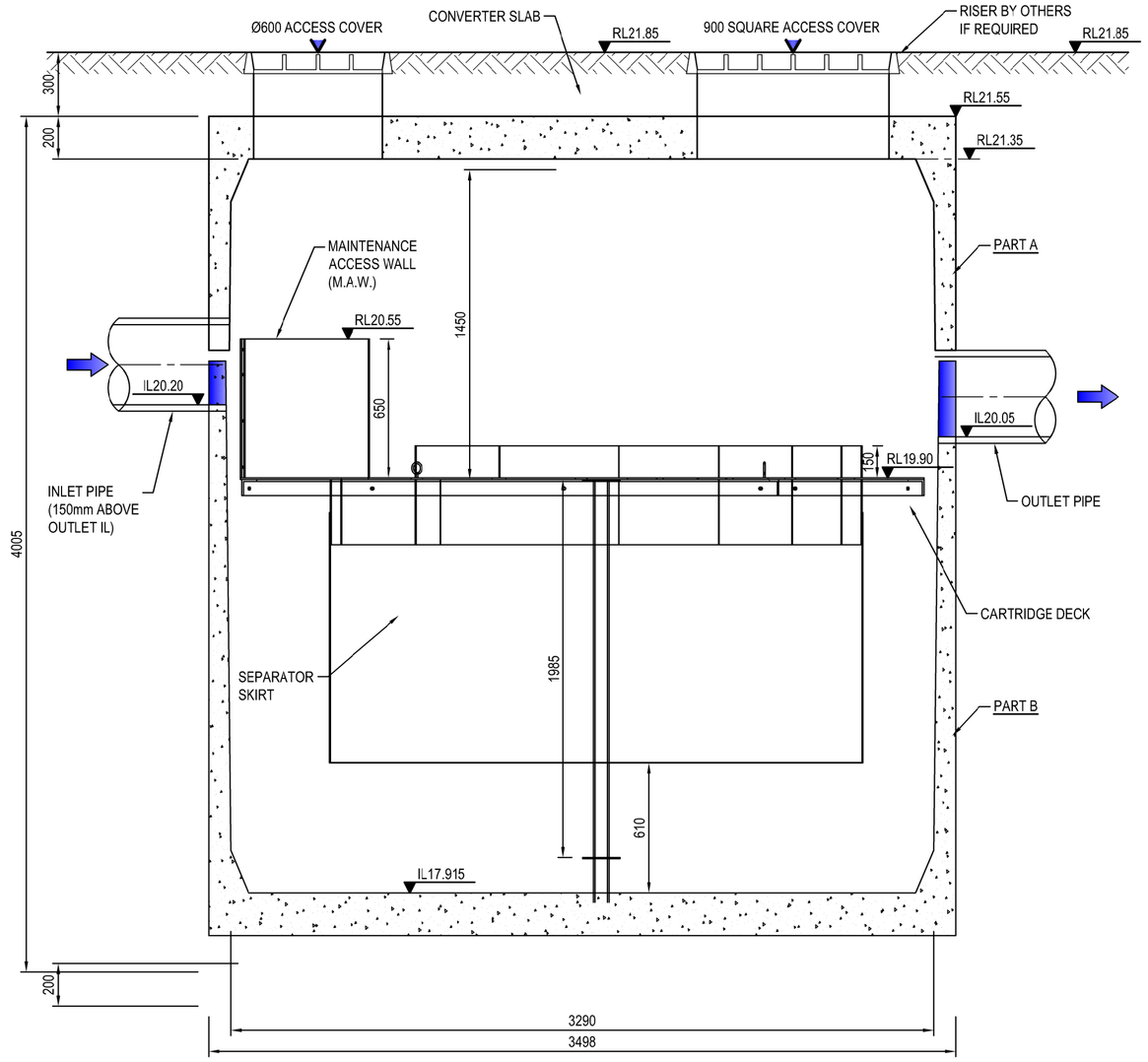
Drawn	Designed	Date
I.Khachab	N.Wetzlar	JUNE 2019
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 19D28_SSDA_C210
Revision: 03



JELLYFISH PLAN

SCALE: 1:20



SECTION A

SCALE: 1:20

JELLY FISH UNIT JF 3250-23-4	
TREATABLE FLOW RATE	125 L/S
HIGH FLOW CARTRIDGES	23 CARTRIDGES
DRAINDOWN CARTRIDGES	4 CARTRIDGES

0 400 800 1200 1600 2000mm

400 200

SCALE 1:20

ISSUED FOR APPROVAL

SURVEY INFORMATION

SURVEYED BY LCG

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ORIGIN OF LEVELS: SSM191370

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01	PRELIMINARY	IK	NW	13.02.2020					

Client: ADCO CONSTRUCTIONS PTY LTD

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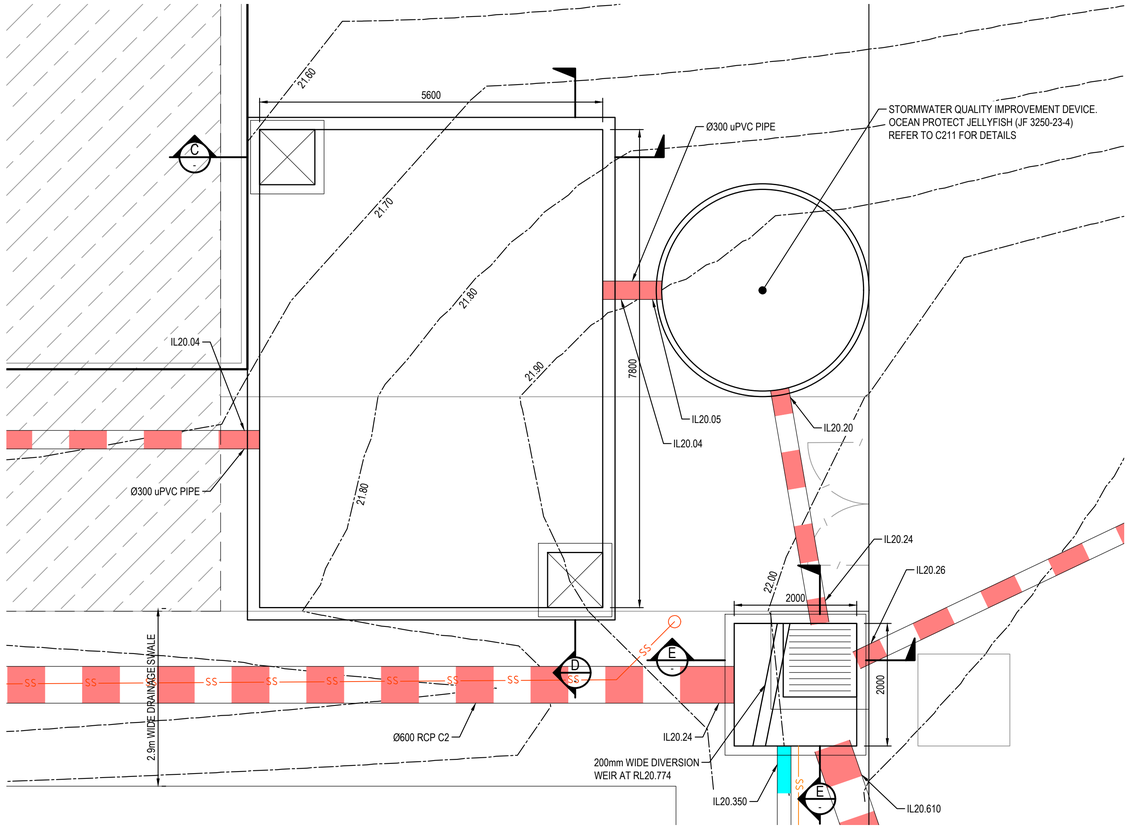
Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: JELLY FISH DETAILS AND SECTION

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JUNE 2019
Checked	Approved	Scale
N.Wetzlar	A.Francis	AS NOTED

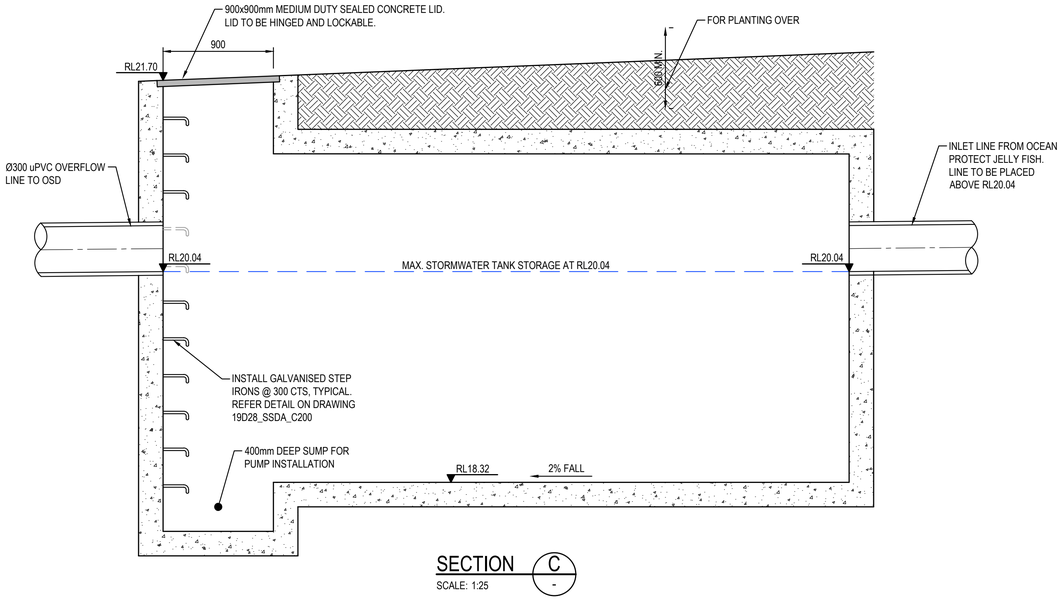
Drawing number: 19D28_SSDA_C211

Revision: 03



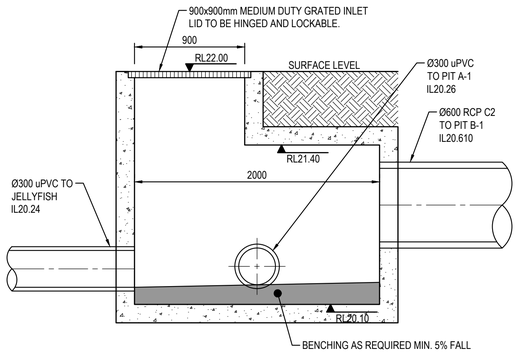
RAINWATER TANK

SCALE: 1:50



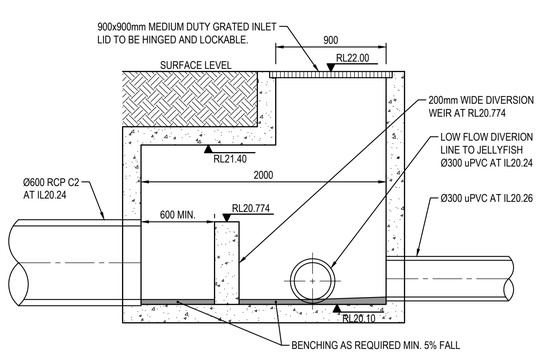
SECTION C

SCALE: 1:25



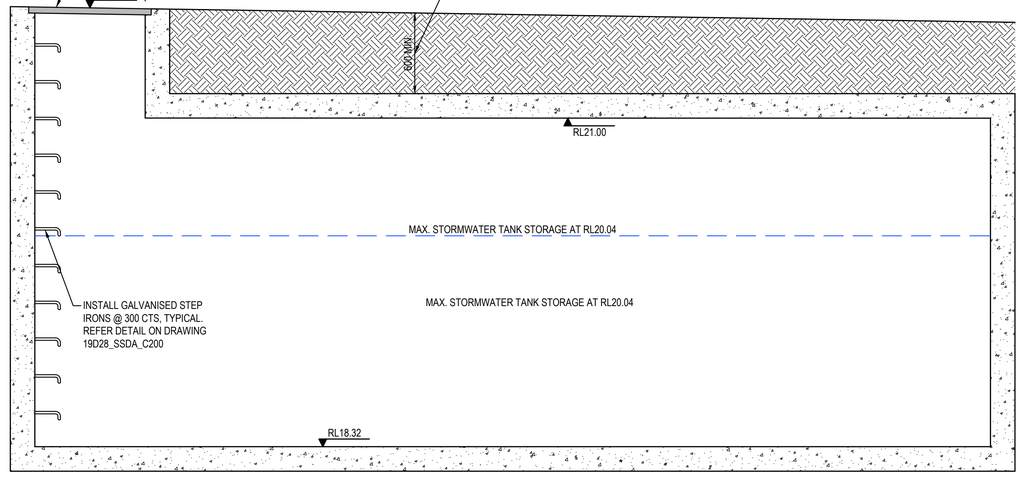
SECTION F

SCALE: 1:25



SECTION E

SCALE: 1:25



SECTION D

SCALE: 1:25

0 400 800 1200 1600 2000mm

400 200

SCALE 1:20

ISSUED FOR APPROVAL

SURVEY INFORMATION

SURVEYED BY LCG

DATUM: A.H.D.

ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	24.03.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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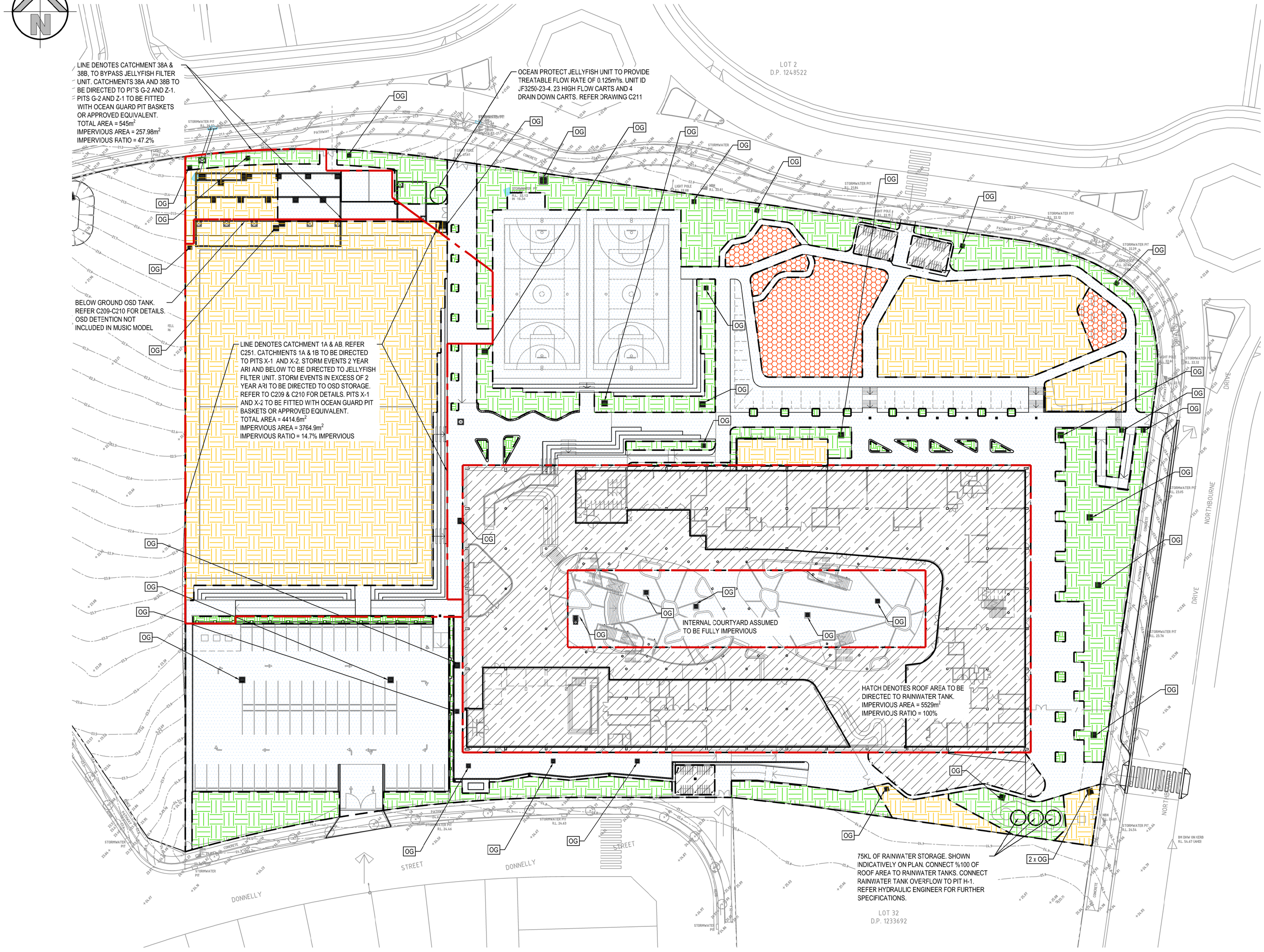
Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: RAINWATER TANK PLAN AND SECTIONS

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JUNE 2019
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 19D28_SSDA_C212

Revision: 01



LEGEND

EXISTING BOUNDARY

OG — OCEAN GUARD PIT BASKET, 200 MICRON MESH PIT INSERT OR APPROVED EQUIVALENT

TOTAL SITE AREA: 23947m²

ROOF AREA
AREA= 5916m²
5529m² OF ROOF AREA DIRECTED TO RWT

IMPERVIOUS AREA
AREA= 9123m²

TOTAL PERVIOUS AREA = 8908m²

TURFED AREA
AREA= 5174m²

LANDSCAPING AREA PLANTED
AREA= 3069m²

LANDSCAPING AREA NON PLANTED
AREA= 665m²

CATCHMENT PLAN

SCALE 1:400

0 8 16 24 32 40m
8 6 4 2
SCALE 1:400

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY RPS
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR SSDA APPROVAL ONLY	KR	NW	24.03.2020
01	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD
Architect: NBRS ARCHITECTURE

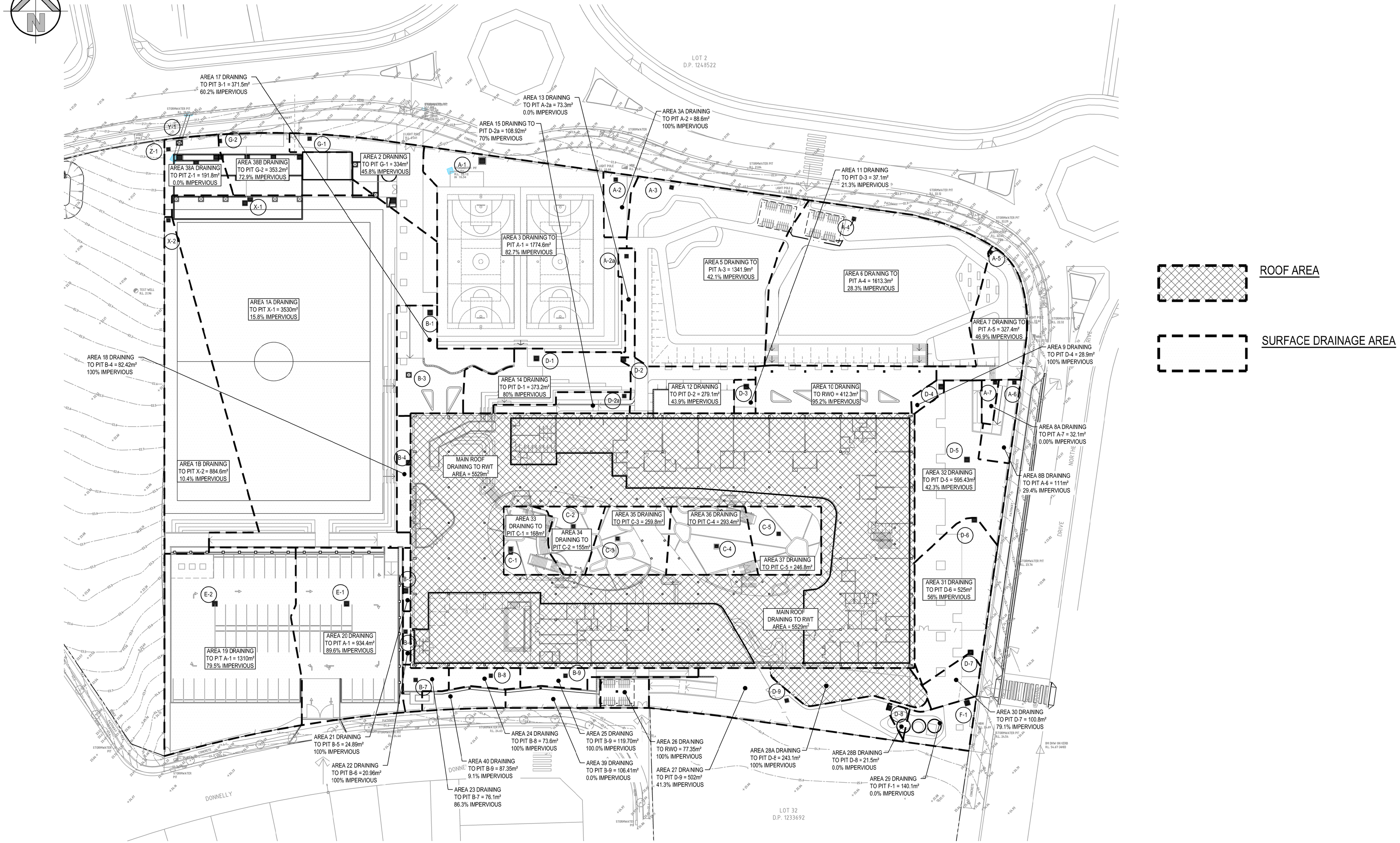
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
Title: CATCHMENT PLAN

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:400

Drawing number: 19D28_SSDA_C250
Revision: 02



ROOF AREA

SURFACE DRAINAGE AREA

DETAIL CATCHMENT PLAN

SCALE 1:400

0 8 16 24 32 40m

8 6 4 2

SCALE 1:400

ISSUED FOR APPROVAL

SURVEY INFORMATION

SURVEYED BY RPS

DATUM: A.H.D.

ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR SSDA APPROVAL ONLY	KR	NW	24.03.2020
01	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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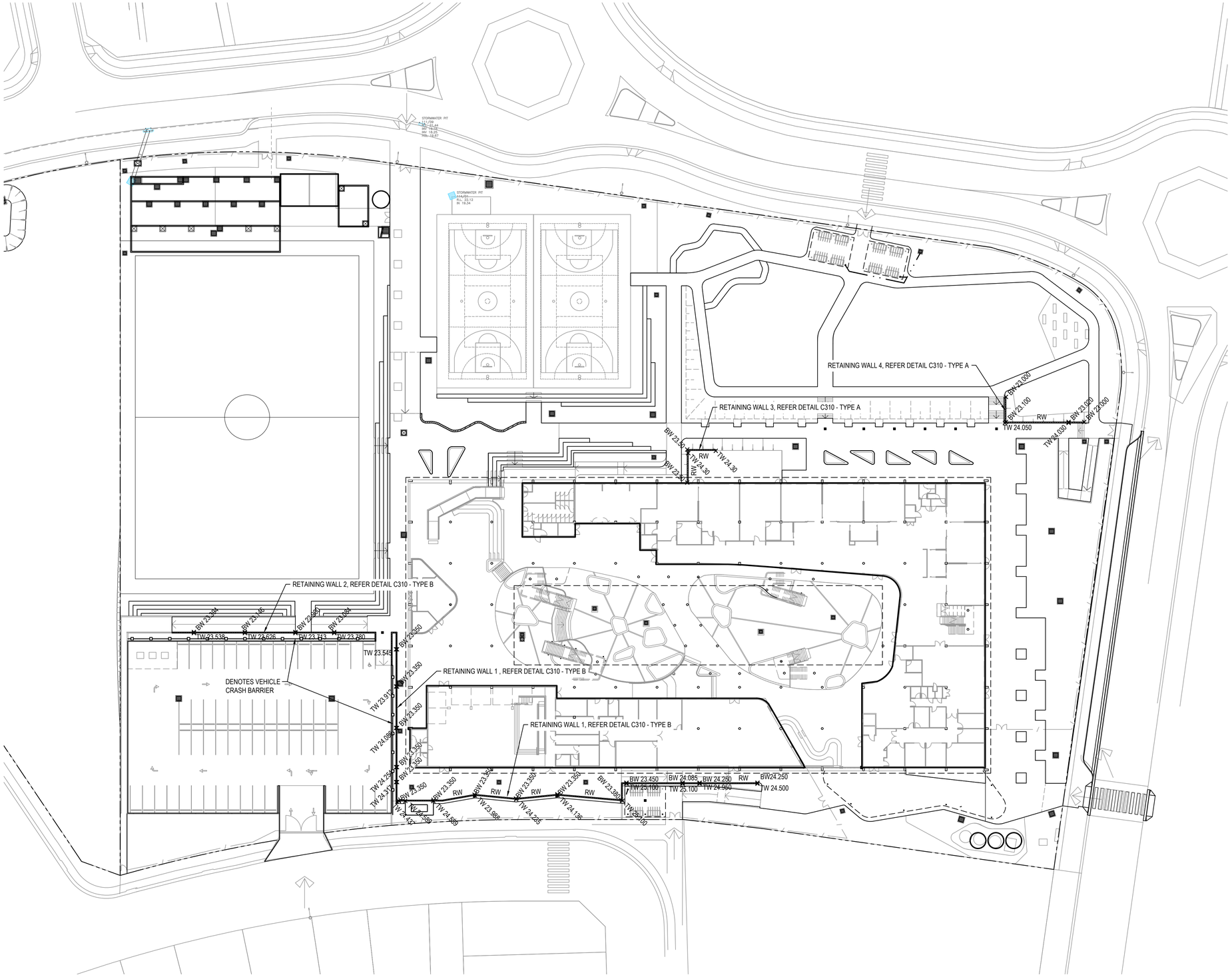
Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: DETAIL CATCHMENT PLAN

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:400

Drawing number: 19D28_SSDA_C251

Revision: 02



RETAINING WALL PLAN

SCALE 1:400

0 8 16 24 32 40m

8 6 4 2

SCALE 1:400

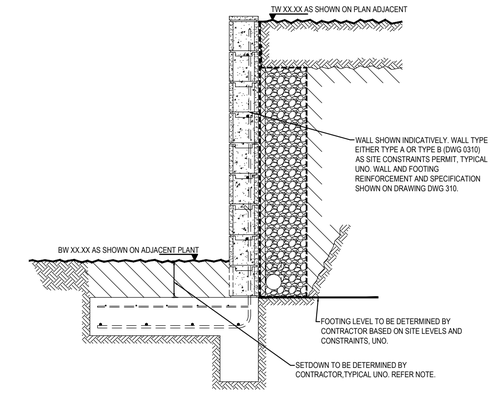
N

LEGEND

RW — PROPOSED 190 BLOCK WORK RETAINING WALL

RETAINING WALLS NOTES

1. DRAINAGE SHALL BE PROVIDED AS SHOWN ON THE DRAINAGE DRAWINGS.
2. BACKFILLING SHALL BE CARRIED OUT AFTER GROUT OR CONCRETE HAS REACHED A MINIMUM STRENGTH OF 0.85f'c. BACKFILLING SHALL BE APPROVED GRANULAR MATERIAL COMPACTED IN LAYERS NOT EXCEEDING 200mm TO 95% STANDARD COMPACTION UNLESS NOTED OTHERWISE.
3. PROVIDE WATERPROOFING TO BACK WALLS AS SPECIFIED OR NOTED.
4. WHERE RETAINING WALLS RELY ON CONNECTING STRUCTURAL ELEMENTS FOR STABILITY, DO NOT BACKFILL AGAINST THE WALL UNLESS IT IS ADEQUATELY PROPPED OR THE ELEMENTS HAVE BEEN CONSTRUCTED AND HAVE SUFFICIENT STRENGTH TO WITHSTAND THE LOADS.
5. FOR ALL TEMPORARY BATTERS OBTAIN GEOTECHNICAL ENGINEERS RECOMMENDATIONS.



FOOTING SETDOWN AND STEPS TO BE DETERMINED ON-SITE BY CONTRACTOR TO SUIT SITE CONDITIONS AND CONSTRAINTS. IF REQUIRED, CONTACT LANDSCAPE ARCHITECT FOR PLANTING SETDOWN ALLOWANCES AND CIVIL ENGINEER FOR PAVEMENT AND SERVICE SETDOWN ALLOWANCES.

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR SSDA APPROVAL ONLY	IK	NW	24.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	13.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: RETAINING WALL PLAN

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:400

Drawing number: 19D28_SSDA_C300

Revision: 03

MASONRY CONSTRUCTION:

B1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3700 AND AS NOTED ON THE DRAWINGS.

B2 BRICK AND BLOCK COMPRESSIVE STRENGTH (f'uc) SHALL BE 15 MPa MINIMUM UNO. STRENGTH GRADE SHALL BE CLEARLY INDICATED ON THE DELIVERY DOCKETS.

B3 JOINT MORTAR SHALL BE OF CLASS M3 WITH 1:1:6 (CEMENT: LIME: SAND) PROPORTIONS BY VOLUME AND COMPLY WITH AS3700. MORTAR JOINTS SHALL BE 10 mm THICK AND HAVE A MAXIMUM TOOLED DEPTH OF 3 mm UNO.

B4 NON-LOAD BEARING WALLS SHALL BE SEPARATED FROM THE LOAD-BEARING ELEMENTS BY 15 mm THICK 'CANEITE' OR EXPANDED POLYSTYRENE UNO AT BOTH HORIZONTAL AND VERTICAL FACES.

NON-LOAD BEARING WALLS SHALL BE TIED TO THE SOFFITS OF BEAMS OR SLABS OVER BY USING 'MET 4-1' TIES (OR APPROVED EQUIVALENT), AT 800 mm MAX. CENTRES, UNO ON THE DRAWINGS, TO MANUFACTURER'S SPECIFICATIONS

B5 WHERE CONCRETE SLABS BEAR ON UNREINFORCED MASONRY, INCLUDING CLAY BRICKS, RENDER THE BEARING SURFACE OF THE MASONRY WALL WITH 1:3 (CEMENT : SAND) MORTAR TO ACHIEVE A LEVEL SURFACE AND PLACE A PRE-GREASED METAL SLIP JOINT PROTECTED BY 0.2 mm POLYETHYLENE SHEET TAPED TO THE FORMWORK BEFORE PLACING CONCRETE. SPECIAL DETAILS SUCH AS WATER-PROOFING MAY APPLY FOR ROOF SLABS OR SIMILARLY EXPOSED ELEMENTS.

B6 CONTROL JOINTS

1. CONTROL JOINTS SHALL BE PROVIDED IN MASONRY WALLS AS PER THE TABLE BELOW UNLESS CLOSER SPACINGS ARE SPECIFIED ELSEWHERE IN THE DOCUMENTATION.

MASONRY TYPE	LOCATION	JOINT SIZE (mm)	SPACING (m)
CONCRETE MASONRY	- EXTERNAL	10	7.0
	- EXTERNAL (WITH OPENINGS > 900mm IN HEIGHT)	10	5.0
	- INTERNAL (FACE FINISHED)	10	6.0
	- INTERNAL (RENDERED)	10	5.0
LIGHT-WEIGHT MASONRY	- INTERNAL / EXTERNAL	10	6.0
CLAY MASONRY	- INTERNAL / EXTERNAL	15	6.0 *
	- PARAPET WALLS	15	4.0

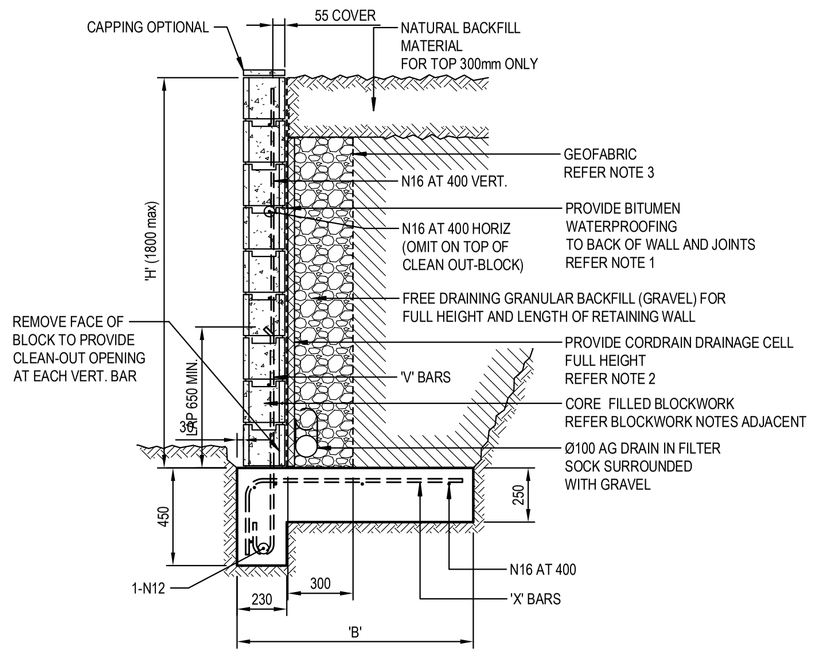
* - FOR REACTIVE ' CLASS M' SITES ONLY. REFER TABLE 4.3 OF AS3700.2011 FOR ARTICULATION JOINTS IN CLAY MASONRY.

2. CONTROL JOINTS SHALL BE PLACED AT HALF THE SPECIFIED SPACING FROM A CORNER. PROVIDE JOINTS TO MATCH JOINTS IN THE SUPPORTING STRUCTURE.
3. CONTROL JOINTS MUST BE KEPT FREE OF MORTAR AND SEALED WITH A POLYETHYLENE FOAM BACKING ROD SQUEEZED INTO THE GAP AND A GUNNED-IN MASTIC SEALANT. IF THE WALL IS TO BE FIRE-RATED, A FIRE-RATED SEALING SYSTEM WILL BE REQUIRED INSTEAD.

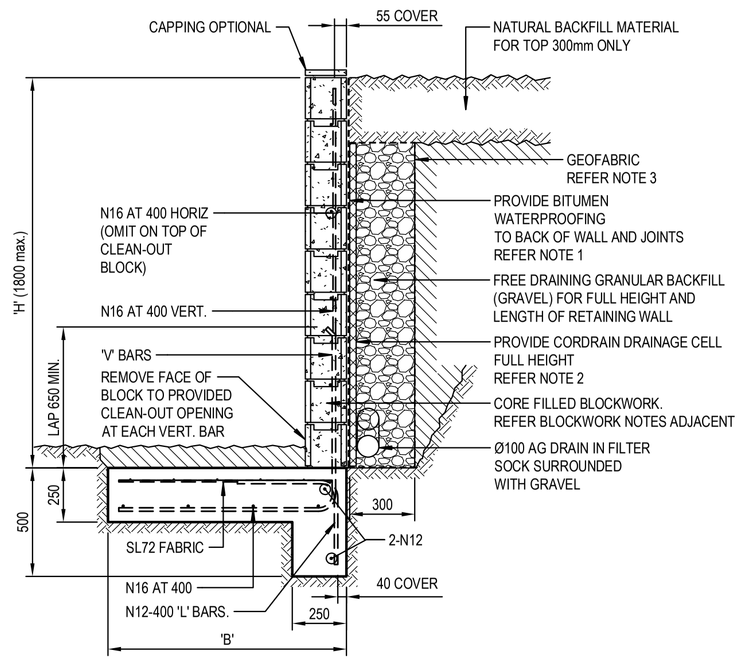
B7 BLOCKWORK

1. IN CORE-FILLED BLOCKWORK, EXCESS MORTAR PROTRUDING INTO THE CORES SHALL BE REMOVED BY RODDING AFTER EACH COURSE IS LAID. EVERY CORE FILLED WITH GROUT SHALL HAVE A CLEANOUT BLOCK IN THE BOTTOM COURSE.
2. REINFORCEMENT SHALL BE PLACED AND SECURELY TIED IN POSITION AS SHOWN ON THE DRAWINGS. STARTER BARS SHALL BE HELD IN PLACE BY TYING TO HORIZONTAL BARS AT CLEANOUT BLOCKS. PROVIDE COVER TO REINFORCEMENT AS SHOWN IN THE DETAILS.
3. CORE FILLING GROUT SHALL BE AS NOTED IN CONCRETE NOTES IN LIFTS NO MORE THAN 1200mm IN HEIGHT.

Element	Slump	Max. Agg. Size	Cement Type	Exposure Classifn.	Min. Conc. Grade (fc) MPa U.N.O	Conc. Cover (U.N.O.)
Core Filling Grout	230±30	10	GP	-	20	-



200 SERIES BLOCK WALL - TYPE A



200 SERIES BLOCK WALL - TYPE B

RETAINING WALL SECHEDULE - TYPE A

TOTAL HEIGHT 'H' (mm)	HEIGHT OF BLOCK TYPE			'B' (mm)	'V' & 'X' BARS	'K' BARS
	150 SERIES	200 SERIES	300 SERIES			
800	800	-	-	800	N12 AT 400	-
1000	1000	-	-	900	N12 AT 400	-
1200	1200	-	-	1000	N12 AT 400	-
1400	-	1400	-	1100	N16 AT 400	-
1600	-	1600	-	1200	N16 AT 400	-
1800	-	1800	-	1400	N16 AT 400	-

NOTES:

1. ENSURE REAR FACE OF RETAINING WALL IS FULLY WATERPROOFED. USE EMER-PROOF ECOFLEX OR APPROVED EQUIVALENT IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION. EG: 2 COATS min. APPLIED IN OPPOSITE DIRECTIONS AND ALLOWED TO CURE FOR 7 DAYS. (TO BE CONIRMED BY THE ARCHITECT)
2. INSTALL FULL HEIGHT DRAINAGE CELL TO REAR OF WALL, USE NYLEX CORDRAIN/18 OR APPROVED EQUIVALENT, AT 1500 CENTRES.
3. PROVIDE GEOFABRIC MATERIAL AS SEPARATION BETWEEN GRANULAR BACKFILL (GRAVEL) AND NATURAL BACKFILL MATERIAL. USE BIDIM A24 OR APPROVED EQUIVALENT.
4. MINIMUM ALLOWABLE BEARING PRESSURE AT BASE = 150 kPa

RETAINING WALL SCHEDULE - TYPE B

TOTAL HEIGHT 'H' (mm)	HEIGHT OF BLOCK TYPE		'B' (mm)	'V' & 'X' BARS	'K' BARS
	200 SERIES	300 SERIES			
800	800	-	800	N16 AT 400	-
1000	1000	-	1200	N16 AT 400	-
1200	1200	-	1500	N16 AT 400	-
1400	1400	-	1800	N16 AT 400	-
1600	1600	-	2100	N16 AT 400	-
1800	1800	-	2300	N16 AT 200	-

NOTES:

1. ENSURE REAR FACE OF RETAINING WALL IS FULLY WATERPROOFED. USE EMER-PROOF ECOFLEX OR APPROVED EQUIVALENT IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION. EG: 2 COATS min. APPLIED IN OPPOSITE DIRECTIONS AND ALLOWED TO CURE FOR 7 DAYS. (TO BE CONIRMED BY THE ARCHITECT)
2. INSTALL FULL HEIGHT DRAINAGE CELL TO REAR OF WALL, USE NYLEX CORDRAIN/18 OR APPROVED EQUIVALENT, AT 1500 CENTRES.
3. PROVIDE GEOFABRIC MATERIAL AS SEPARATION BETWEEN GRANULAR BACKFILL (GRAVEL) AND NATURAL BACKFILL MATERIAL. USE BIDIM A24 OR APPROVED EQUIVALENT.
4. MINIMUM ALLOWABLE BEARING PRESSURE AT BASE = 150 kPa

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

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Client: ADCO CONSTRUCTIONS PTY LTD
Architect: NBRS ARCHITECTURE

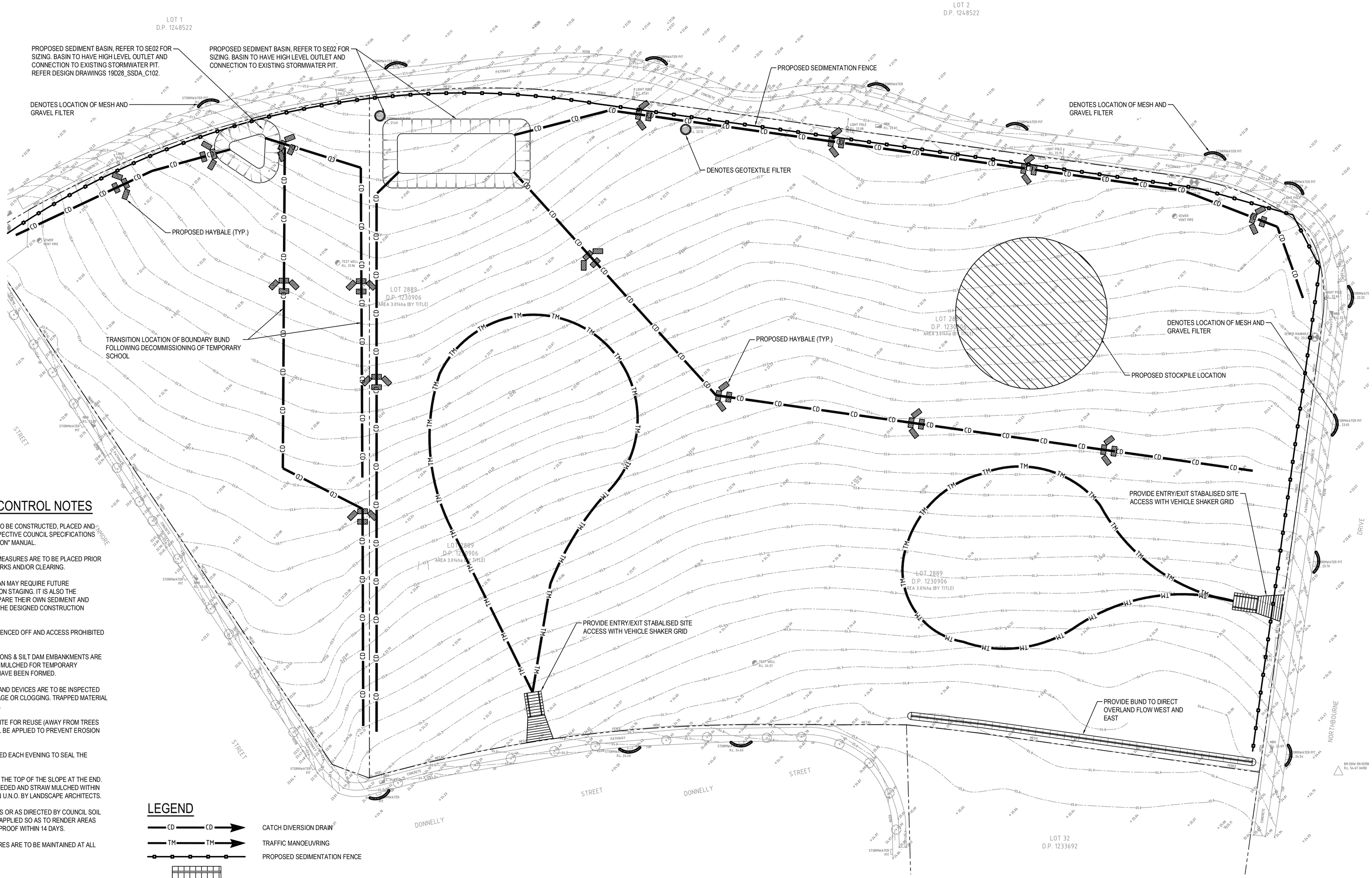
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
Title: RETAINING WALL DETAILS

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:20

Drawing number: 19D28_SSDA_C310
Revision: 03



SEDIMENT & EROSION CONTROL NOTES

- ALL SEDIMENT CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH RESPECTIVE COUNCIL SPECIFICATIONS AND LANDCOM'S "SOIL AND CONSTRUCTION" MANUAL.
- ALL PERIMETER & SILTATION CONTROL MEASURES ARE TO BE PLACED PRIOR TO, OR AS THE FIRST STEP IN EARTH WORKS AND/OR CLEARING.
- THE SEDIMENT & EROSION CONTROL PLAN MAY REQUIRE FUTURE ADJUSTMENT TO REFLECT CONSTRUCTION STAGING. IT IS ALSO THE CONTRACTORS RESPONSIBILTY TO PREPARE THEIR OWN SEDIMENT AND EROSION CONTROL PLAN WHICH SUITS THE DESIGNED CONSTRUCTION STAGING.
- FILTRATION BUFFER ZONES ARE TO BE FENCED OFF AND ACCESS PROHIBITED TO ALL PLANT AND MACHINERY.
- ALL TEMPORARY EARTH BERMS, DIVERSIONS & SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED & MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
- ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING. TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE LOCATION.
- ALL TOPSOIL IS TO BE STOCKPILED ON SITE FOR REUSE (AWAY FROM TREES AND DRAINAGE LINES). MEASURES SHALL BE APPLIED TO PREVENT EROSION OF THE STOCKPILES.
- ALL EARTHWORK AREAS SHALL BE ROLLED EACH EVENING TO SEAL THE EARTHWORKS.
- ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND STRAW MULCHED WITHIN 14 DAYS OF COMPLETION OF FORMATION U.N.O. BY LANDSCAPE ARCHITECTS.
- UPON COMPLETION OF ALL EARTHWORKS OR AS DIRECTED BY COUNCIL SOIL CONSERVATION TREATMENTS SHALL BE APPLIED SO AS TO RENDER AREAS THAT HAVE BEEN DISTURBED, EROSION PROOF WITHIN 14 DAYS.
- EROSION AND SILT PROTECTION MEASURES ARE TO BE MAINTAINED AT ALL TIMES.

LEGEND

- CD CD — CATCH DIVERSION DRAIN
- TM TM — TRAFFIC MANOEUVRING
- PROPOSED SEDIMENTATION FENCE
- PROPOSED VEHICLE SHAKER GRID
- PROPOSED STOCKPILE LOCATION
- PROPOSED STABILISED SITE ACCESS
- PROPOSED HAYBALE FILTER

0 8 16 24 32 40m
8 6 4 2
SCALE 1:400

SEDIMENT & EROSION CONTROL PLAN

SCALE 1:400

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
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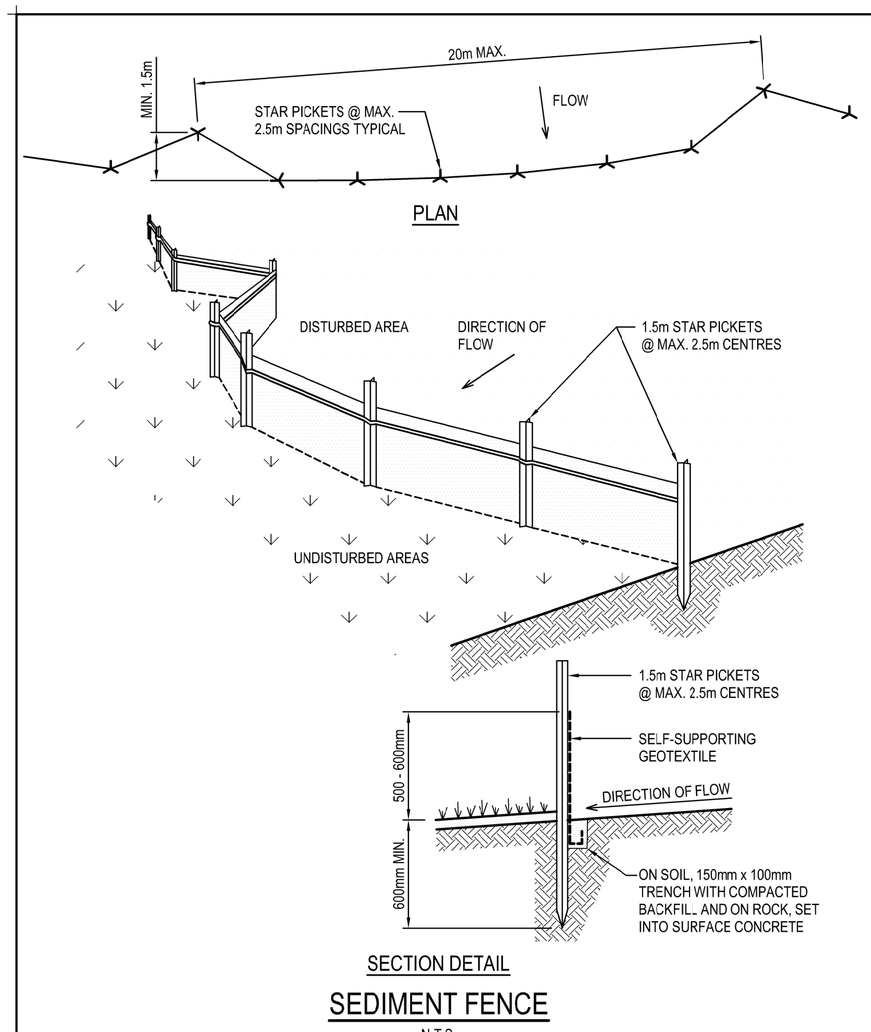
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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
Title: SEDIMENT & EROSION CONTROL PLAN

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:400

Drawing number: 19D28_SSDA_SE01
Revision: 03

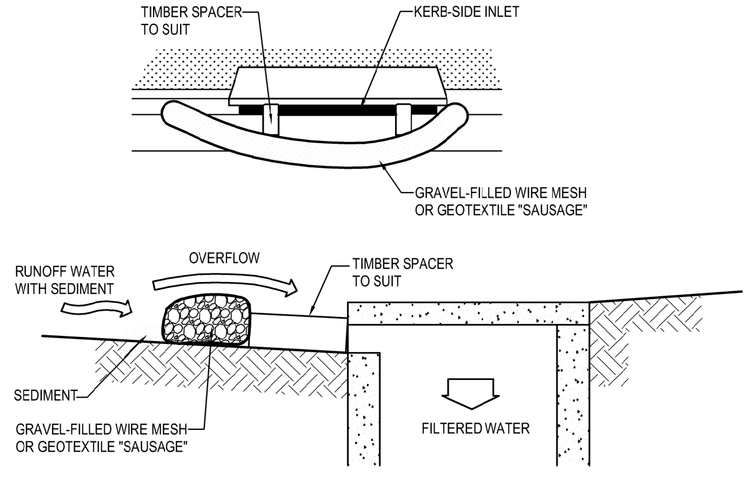


SEDIMENT FENCE

N.T.S.

SEDIMENT FENCE CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. 3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND @ 2.5m INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. 4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. 5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP. 6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

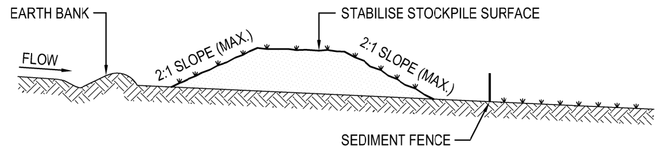


MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

1. FABRICATE A SLEEVE MADE FROM GECTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
3. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
4. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
5. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY CAN FIRMLY ABUT EACH OTHER AND SEDIMENT / LADEN WATERS CANNOT PASS BETWEEN.

MESH & GRAVEL INLET FILTER

N.T.S.



STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACED FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED E.S.C.P. OR S.W.M.P. TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

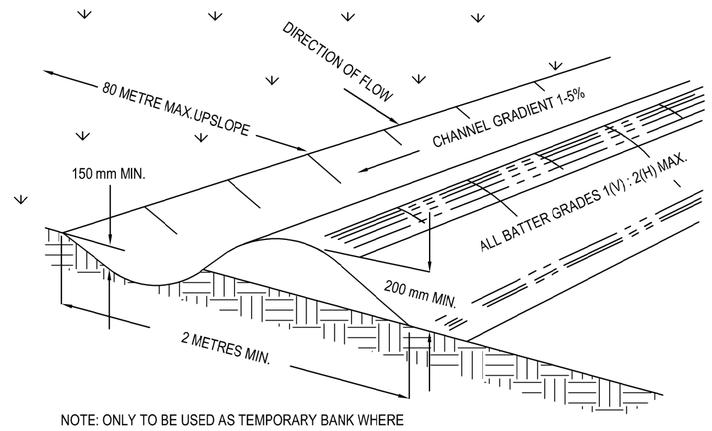
STOCKPILES

N.T.S.

CONSTRUCTION SEQUENCE

WORKS SHALL BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:

1. INSTALL SEDIMENT FENCING AND CUT DRAINS TO MEET THE REQUIREMENTS OF THE SEDIMENT AND EROSION CONTROL PLAN. WASTE COLLECTION BINS SHALL BE INSTALLED ADJACENT TO SITE OFFICE.
2. CONSTRUCT STABILISED SITE ACCESS IN ACCORDANCE WITH LOCAL COUNCIL'S REQUIREMENTS.
3. REDIRECT CLEAN WATER AROUND THE CONSTRUCTION SITE.
4. INSTALL SEDIMENT CONTROL PROTECTION MEASURES AT ALL NATURAL AND MAN-MADE DRAINAGE STRUCTURES. MAINTAIN UNTIL ALL THE DISTURBED AREAS ARE STABILISED.
5. CLEAR AND STRIP THE WORK AREAS. MINIMISE THE DAMAGE TO THE GRASS AND LOW GROUND COVER OF NON-DISTURBED AREAS.
6. ANY DISTURBED AREAS, OTHER THAN BUILDING PAD AREAS, SHALL IMMEDIATELY BE COVERED WITH SITE TOPSOIL WITHIN 7 DAYS OF CLEARING. BUILDING PAD AREAS SHALL BE COVERED WITH BITUMEN EMULSION AS SPECIFIED.
7. APPLY PERMANENT STABILISATION TO SITE (LANDSCAPING).



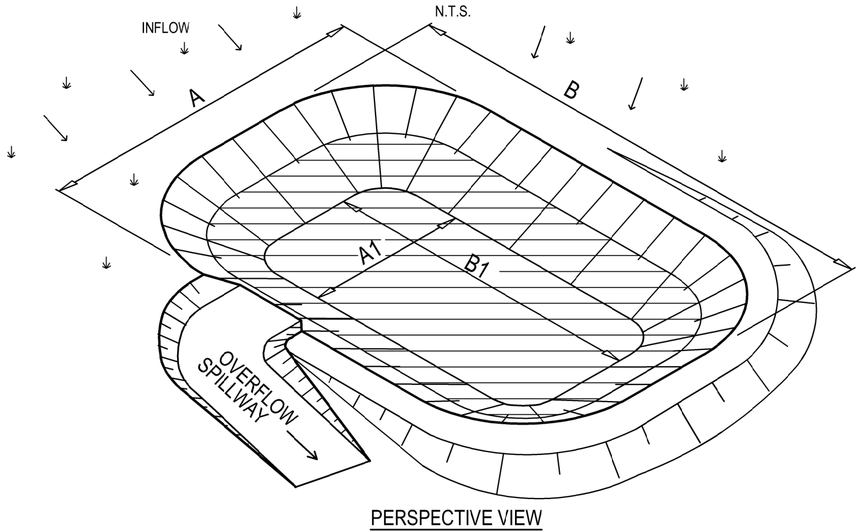
NOTE: ONLY TO BE USED AS TEMPORARY BANK WHERE MAC.UPSLOPE LENGTH IS 80 METERS.

CATCH DRAIN CONSTRUCTION NOTES:

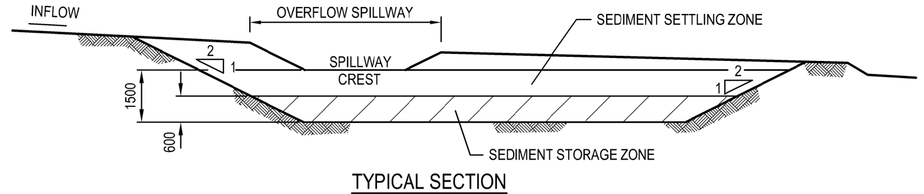
1. CONSTRUCT ALONG GRADIENT AS SPECIFIED.
2. MAXIMUM SPACING BETWEEN BANKS SHALL BE 80 METRES.
3. DRAINS TO BE OF PARABOLIC OR TRAPEZOIDAL CROSS SECTION NOT V-SHAPED.
4. EARTH BANKS TO BE ADEQUATELY COMPACTED IN ORDER TO PREVENT FAILURE.
5. CONSTRUCTION IS OF A TEMPRORARY NATURE AND SHALL BE COMPACTED AT THE END A DAYS WORK OR IMMEDIATELY PRIOR RAIN.
6. ALL OUTLETS FROM DISTURBED LANDS ARE TO FEED INTO SEDIMENT BASIN OR SIMILAR.
7. DISCHARGE RUNOFF COLLECTED FROM UNDISTURBED LANDS ONTO EITHER A STABILISED OR AN UNDISTURBED DISPOSAL AISTE WITHIN THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED.
8. COMPACT WITH A SUITABLE IMPLEMENT IN SITUATIONS WHERE THEY ARE REQUIRED TO FUNCTION FOR MORE THAN FIVE DAYS.
9. EARTH BANKS TO BE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT WILL IMPEDE NORMAL FLOW.

CATCH DRAINS

N.T.S.



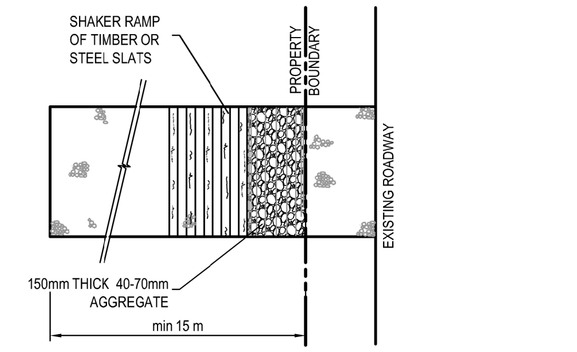
PERSPECTIVE VIEW



TYPICAL SECTION

TYPE 'D' & 'F' SEDIMENTATION BASIN

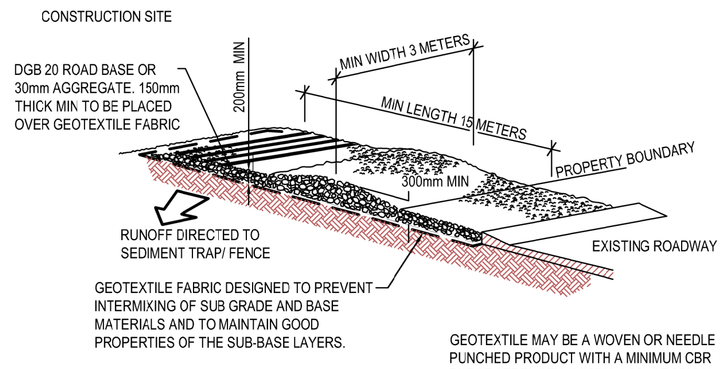
N.T.S.



PLAN

STABILISED SITE ACCESS WITH SHAKER RAMP

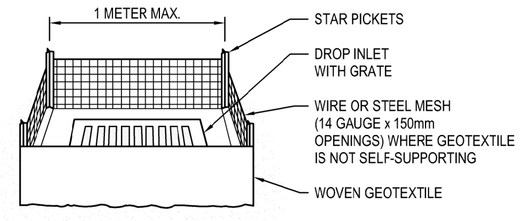
N.T.S.

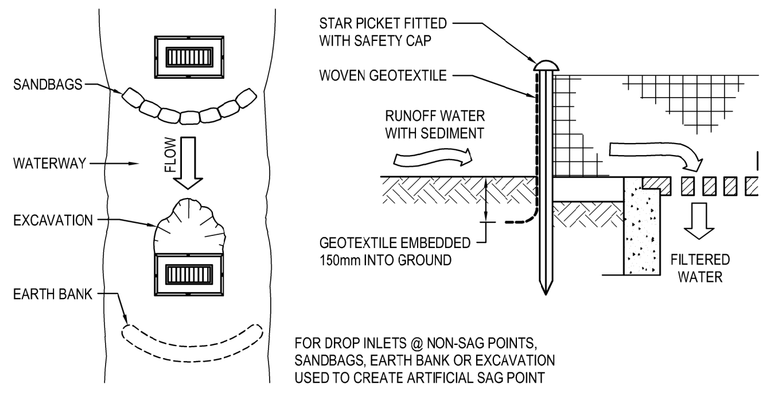


STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.

NOTES:
1. THIS DEVICE IS TC BE LOCATED AT ALL EXITS FROM CONSTRUCTION SITE.
2. THIS DEVICE IS TO BE REGULARLY CLEANED OF DEPOSITED MATERIAL SO AS TO MAINTAIN A 50mm DEEP SPACE BETWEEN PLANKS.
3. ANY UNSEALED ROAD BETWEEN THIS DEVICE AND NEAREST ROADWAY IS TO BE TOPPED WITH 100mm THICK 40-70mm SIZE AGGREGATE.
4. ALTERNATIVELY, THREE(3) PRECAST CONCRETE CATTLE GRIDS (AS MANUFACTURED BY "HUMES CONCRETE MAY BE USED. 1, 2 & 3 ABOVE ALSC APPLY.





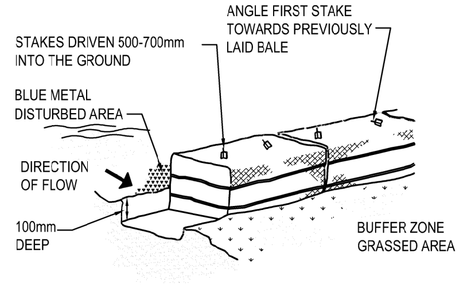
FOR DROP INLETS @ NON-SAG POINTS, SANDBAGS, EARTH BANK OR EXCAVATION USED TO CREATE ARTIFICIAL SAG POINT

GEOTEXTILE INLET FILTER CONSTRUCTION NOTES:

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE.
2. PICKET SPACING TO BE MAXIMUM 1.0m.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILES UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER

N.T.S.



HAYBALE BARRIERS

N.T.S.

SEDIMENT BASIN SIZING

1. THE SEDIMENT BASIN SHALL BE CONSTRUCTED ON A RATE PER HECTARE BASIS AND HAS BEEN IN ACCORDANCE WITH THE REQUIREMENTS OF THE LANDCOM MANUAL "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION", FOR SEDIMENTATION **TYPE D** SOILS. THE DISTURBED AREA WITHIN THIS CATCHMENT AT ANY ONE TIME SHOULD BE LIMITED TO AN AREA FOR WHICH EACH SEDIMENT BASIN CAN HANDLE. EACH BASIN SHALL BE SIZED IN ACCORDANCE WITH THE TABLE BELOW.

SEDIMENT BASIN SIZING TYPE D SOILS	
VOLUMETRIC RUNOFF COEFFICIENT, CV	0.25 (APPENDIX F - TABLE F2)
75TH PERCENTILE 5 DAY TOTAL RAINFALL DEPTH, R	19.00 mm
CATCHMENT AREA, A	1 Ha (UNIT AREA)
SETTLING ZONE VOLUME (PER HECTARE) 10 CV A R	47.50 m³
DISTURBED CATCHMENT AREA	1 Ha (UNIT AREA)
R K LS P C	110.87 m³
SEDIMENT ZONE VOLUME (0.17 A (R K LS P C)/1.3	14.5m³ < 50% SETTLING VOL ADOPT 48.3 m³ PER HECTARE
TOTAL SEDIMENT BASIN VOLUME REQUIRED :	71.25 m³/Ha

* (LANDCOM MANAGING URBAN STORMWATER MANUAL REFERENCE)

2. THE FOLLOWING DESIGN PARAMETERS HAVE BEEN ASSESSED FOR THE SITE:

CONSTRAINT	VALUE	(SOURCE)*
RAINFALL EROSIVITY (R-FACTOR)	2350	APPENDIX B
LENGTH/SLOPE GRADIENT FACTOR, LS	0.955	APPENDIX A - TABLE A1
SOIL ERODIBILITY (K-FACTOR)	0.038	(ASSUMED BASED ON SOIL TYPE)
EROSION CONTROL PRACTICE FACTOR (P-FACTOR)	1.3 (COMPACTED)	APPENDIX A - TABLE A2
COVER FACTOR (C-FACTOR)	1.0 (DURING EARTHWORKS)	APPENDIX A - FIGURE A5
CALCULATED SOIL LOSS, A (RUSLE EQUATION)	110.87 t/Ha/YR	A = R K LS P C
SOIL HYDROLOGIC GROUP	GROUP C	(ASSUMED BASED ON SOIL TYPE)
SEDIMENT TYPE	TYPE D	(ASSUMED BASED ON SOIL TYPE)
75TH PERCENTILE 5-DAY RAINFALL EVENT	19.0 mm (BLACKTOWN)	TABLE 6.3A

* (LANDCOM MANAGING URBAN STORMWATER MANUAL REFERENCE)

BASIN MANAGEMENT

1. THE CAPTURED STORMWATER IN THE SETTLING ZONE SHOULD BE DRAINED TO MEET THE MINIMUM STORAGE CAPACITY REQUIRED WITHIN A FIVE (5) DAY PERIOD FOLLOWING RAINFALL, PROVIDED THE ACCEPTABLE WATER QUALITY (NFR) AND TURBIDITY HAVE BEEN ACHIEVED.
2. CHEMICAL FLOCCULENT SUCH AS GYPSUM MAY BE DOSED TO AID SETTLING WITHIN 24 HOURS OF CONCLUSION OF EACH STORM. THE APPLIED DOSING RATES SHOULD ACHIEVE THE TARGET QUALITY WITHIN 36 TO 72 HOURS OF THE STORM EVENT.
3. INSPECT THE SEDIMENT BASINS AFTER EACH RAINFALL EVENT AND/OR WEEKLY. ENSURE THAT ALL SEDIMENT IS REMOVED ONCE THE SEDIMENT STORAGE ZONE IS FULL (REFER TO PEGS INSTALLED IN BASINS IN ACCORDANCE WITH THE SWMP). ENSURE THAT OUTLET AND EMERGENCY SPILLWAY WORKS ARE MAINTAINED IN A FULLY OPERATIONAL CONDITION AT ALL TIMES.

SOWING SEASON	SEED MIX
AUTUMN/WINTER	OATS@40KG/Ha + JAPANESE MILLET@10kg/Ha
SPRING/SUMMER	OATS@20kg/Ha + JAPANESE MILLET@20kg/Ha

NOTE : THESE PLANT SPECIES ARE FOR TEMPORARY REVEGETATION ONLY. THEY WILL ONLY PROVIDE PROTECTION FROM EROSION FOR SIX MONTHS. WHERE THE LOTS ARE TO BE LEFT UNDEVELOPED FOR A LONGER PERIOD, THE CONTRACTOR SHALL SEEK ADVICE FROM THE SITE SUPERINTENDENT AS TO MORE APPROPRIATE REVEGETATION METHODS.

REVEGETATION IN ACCORDANCE WITH THE ABOVE TABLE WILL BE ENHANCED BY ADDING LIME AT A RATE OF 4kg/TONNE OF TOPSOIL AND 7.5kg/TONNE OF SUBSOIL.

4. THE LONG TERM GROUND COVER FACTORS FOR THE CONSTRUCTION WORKS IS NOT TO EXCEED THE FOLLOWING LIMITS:

LAND	MAXIMUM C-FACTOR	REMARKS
WATERWAYS AND OTHER AREAS OF CONCENTRATED FLOWS, POST CONSTRUCTION	0.05	APPLIES AFTER TEN WORKING DAYS OF COMPLETION OF FORMATION AND BEFORE CONCENTRATED FLOWS ARE APPLIED. FOOT AND VEHICULAR TRAFFIC IS PROHIBITED IN THIS AREA AND 70% GROUND COVER IS REQUIRED.
STOCKPILES, POST CONSTRUCTION	0.10	APPLIES AFTER TEN WORKING DAYS FROM COMPLETION OF FORMATION. 60% GROUND COVER IS REQUIRED.
ALL LANDS, INCLUDING WATERWAYS AND STOCKPILES, DURING CONSTRUCTION.	0.15	APPLIES AFTER 20 DAYS OF INACTIVITY, EVEN THOUGH WORKS MAY BE INCOMPLETE. 50% GROUND COVER IS REQUIRED.

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY LCG
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR SSDA APPROVAL ONLY	KR	NW	24.03.2020
02	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
01	PRELIMINARY	IK	NW	13.02.2020

Client: ADCO CONSTRUCTIONS PTY LTD
Architect: NBRS ARCHITECTURE

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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW
Title: SEDIMENT & EROSION CONTROL TYPICAL SECTIONS & DETAILS

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 19D28_SSDA_SE02
Revision: 03



BULK EARTHWORKS PLAN

SCALE 1:500

BULK EARTHWORKS/ SUBGRADE PREPARATION - SITEWORKS.

1. REFER TO GEOTECHNICAL INVESTIGATION REPORT OR INFORMATION RELATING TO EXISTING GROUND CONDITIONS, SITE TREATMENT AND SUPERVISION.
2. THE LOCATIONS OF UNDERGROUND SERVICES SHOWN ON THESE DRAWINGS HAVE BEEN PLOTTED FROM SURVEY AND AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE.
3. HENRY AND HYMAS PTY LTD CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS, ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN ARISING FROM ANY CAUSE WHATSOEVER. CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION. FOR COMMENCEMENT OF WORKS ON SITE, SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.
4. ALL SERVICES ARE TO BE LOCATED AND CUT OFF PRIOR TO THE COMMENCEMENT OF EXCAVATION AND FILLING OPERATIONS.
5. ALL TOP SOIL, ORGANIC MATTER AND FILL MATERIAL SHALL BE REMOVED FROM ALL AREAS UNDER BUILDING AND CARPARK LOCATIONS TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER. AREAS TO BE FULLY STRIPPED OF EXISTING FILL AND DARK BROWN BLACK UPPER ORGANIC ALLUVIUM, OR OBVIOUS UNSUITABLE MATERIAL.
6. EXCAVATE TO ACHIEVE SUBGRADE LEVELS WHERE NECESSARY.
7. THE EXPOSED SUBGRADE AFTER STRIPPING AND/ OR EXCAVATION IS TO BE PROOF ROLLED USING NOT FEWER THAN 5 PASSES OF A MINIMUM 8 TONNE DEAD WEIGHT STEEL SMOOTH-DRUM ROLLER UNDER THE SUPERVISION OF AN EXPERIENCED GEOTECHNICAL ENGINEER OR AN EXPERIENCED CIVIL ENGINEER. ANY AREAS ON THE SUBGRADE EXHIBITING EXCESSIVE DEFLECTION / MOVEMENT UNDER ROLLER TO BE EXCAVATED TO A MIN. DEPTH OF 0.5m AND REPLACED WITH APPROVED GRANULAR MATERIAL COMPACTED IN 250mm LOOSE LAYERS OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
8. ENGINEERED FILL FOR REPLACEMENT OF SOFT OR HEAVING AREAS OR FOR BULK FILLING TO COMPRISE ESSENTIALLY OF GRANULAR MATERIALS (EG. EXCAVATED SHALE), WITH A PARTICLE SIZE NOT GREATER THAN 75mm DIAMETER. ENGINEERED FILL TO BE PLACED IN LAYERS NOT EXCEEDING 250mm LOOSE THICKNESS AND COMPACTED TO 100% OF STANDARD MAXIMUM DRY DENSITY (SMDD) WITHIN ± 2% OF OPTIMUM MOISTURE CONTENT (OMC).
9. IMPORTED FILLING (IF REQUIRED) IS TO BE TO THE APPROVAL OF THE GEOTECHNICAL ENGINEER. THE CONTRACTOR IS TO NOMINATE THE SOURCE AND PROVIDE A SAMPLE FOR APPROVAL PRIOR TO IMPORTATION AND PLACEMENT ON SITE.
10. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING.
    FREE FORM ORGANIC AND PERISHABLE MATTER
    MAXIMUM PARTICLE SIZE = 75mm
    MAXIMUM PLASTICITY INDEX = 15%
11. ALL EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH GEOTECH REPORT

LEGEND

EXISTING BOUNDARY	
472.00	CONTOURS BE
BEL 24.50	BULK EARTHWORKS LEVEL
RW	PROPOSED RETAINING WALL
HEIGHT = 1.200m	PROPOSED RETAINING HEIGHT

DEPTH OF CUT & FILL RANGE

LOWER VALUE		UPPER VALUE		COLOUR
-3.00	to	-2.00	m	
-2.00	to	-1.50	m	
-1.50	to	-1.00	m	
-1.00	to	-0.80	m	
-0.80	to	-0.60	m	
-0.60	to	-0.40	m	
-0.40	to	-0.20	m	
-0.20	to	-0.10	m	
-0.10	to	-0.05	m	
-0.05	to	0.00	m	
0.0	to	0.05	m	
0.05	to	0.10	m	
0.10	to	0.20	m	
0.20	to	0.40	m	
0.40	to	0.60	m	
0.60	to	0.80	m	
0.80	to	1.00	m	
1.00	to	1.50	m	
1.50	to	2.00	m	
2.00	to	3.00	m	

BULK EARTHWORKS QUANTITIES

TOTAL AREA (23,995m²)

CUT	5,866	m³
FILL	2,617	m³
EXCESS OF CUT OVER FILL	3,249	m³

EXCAVATION FOR SERVICE TRENCHES NOT INCLUDED IN CALCULATION

EXCAVATION FOR RETAINING WALL FOOTINGS NOT INCLUDED IN CALCULATION

THE VOLUME SHOWN ABOVE HAS BEEN CALCULATED AFTER STRIPPING THE TOP SOIL OFF THE EXISTING SURFACE TOPSOIL STRIPPING HAS BEEN ASSUMED AT 100mm.

ADDITIONAL CONSIDERATIONS NOT INCLUDED IN THE ABOVE CALCULATIONS. BULK EARTHWORKS ALLOWANCE FOR **OSD = 904m³**. BULK EARTHWORKS ALLOWANCE FOR **SWT = 181.7m³**. CONSIDERATION FOR SLAB THICKNESS AND GRANULAR DRAINAGE BACKFILL INCLUDED IN ABOVE ALLOWANCE CALCULATIONS.

PAVEMENT THICKNESS "INCLUDING BEDDING THICKNESS"

CARPARK	340	mm
BUILDING	230	mm
SPORT COURTS	250	mm
FOOTPATHS/HARDSTAND AREAS	220	mm
LANDSCAPING/BATTER AREAS	100	mm

0 10 20 30 40 50m

10 8 6 4 2

SCALE 1:500

ISSUED FOR APPROVAL

SURVEY INFORMATION
SURVEYED BY RPS
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM191370

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
05	ISSUED FOR SSDA APPROVAL ONLY	BH	BH	24.03.2020
04	ISSUED FOR TENDER ONLY	BH	BH	18.03.2020
03	ISSUED FOR TENDER ONLY	KR	NW	24.02.2020
02	ISSUED FOR PRELIMINARY - QUANTITES UPDATED	BH	BH	12.02.2020
01	ISSUED FOR PRELIMINARY	BH	BH	31.01.2020

Client: ADCO CONSTRUCTIONS PTY LTD

Architect: NBRS ARCHITECTURE

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Project: MARSDEN PARK PUBLIC SCHOOL
NORTHBOURNE DR MARSDEN PARK NSW

Title: BULK EARTHWORKS CUT AND FILL PLAN

Drawn	Designed	Date
I.Khachab	N.Wetzlar	JAN 2020
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:500

Drawing number: 19D28_SSDA_BE01

Revision: 05

Appendix 6
Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model.

Refer to accompany Zip file named: 19D28_MUSIC_Model_NR

Appendix 7
Maintenance Manuals – Ocean Guard Pit baskets & Jellyfish Unit

OCEAN PROTECT

OceanGuard™

Operations & Maintenance Manual

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Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes as recommended by the manufacturer.

The OceanGuard technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of Filtration liners, designed to remove gross pollutants, total suspended solids and attached pollutants as either a standalone technology or as part of a treatment train with our StormFilter or Jellyfish Filtration products. OceanGuard pit baskets are highly effective, easy to install and simple to maintain.

Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the OceanGuard.

Health and Safety

Access to pits containing an OceanGuard typically requires removing (heavy) access covers/grates, but typically it is not necessary to enter into a confined space. Pollutants collected by the OceanGuard will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or sharp objects such as broken glass and syringes. For these reasons, there should be no primary contact with the waste collect and all aspects of maintaining and cleaning your OceanGuard require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the OceanGuard pit insert, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

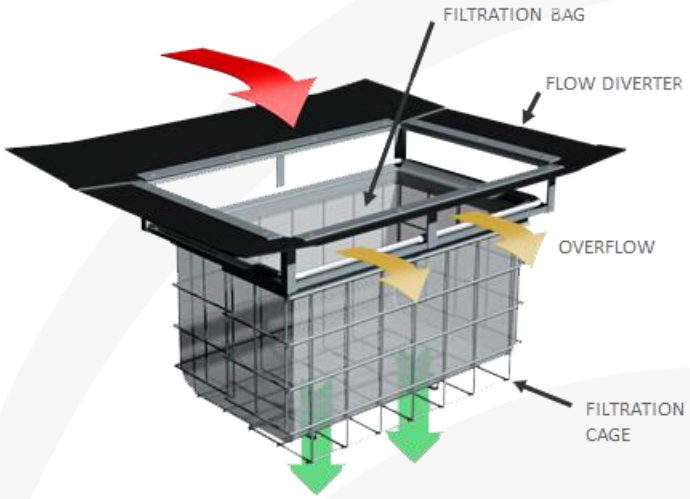
- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

The OceanGuard pit insert is designed to be maintained from surface level, without the need to enter the pit. However depending on the installation configuration, location and site specific maintenance requirements it may be necessary to enter a confined space occasionally. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry.

How does it Work?

OceanGuard is designed to intercept stormwater as it enters the stormwater pits throughout a site. The OceanGuard has diversion panels that sit flush with the pit walls, this ensures that as stormwater enters at the top of the pit it is directed to the middle of the insert where the Filtration bag is situated. The filtration bag allows for screening to occur removing 100% of pollutants greater than the opening of the filtration material (200micron, 1600micron bags available).



During larger rain events the large flows overflow slots in the flow diverter of the OceanGuard ensure that the conveyance of stormwater is not impeded thus eliminating the potential for surface flooding. As the flow subsides, the captured pollutants are held in the OceanGuard Filtration bag dry. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

Maintenance Procedures

To ensure that each OceanGuard pit insert achieves optimal performance, it is advisable that regular maintenance is performed. Typically the OceanGuard requires 2-4 minor services annually, pending the outcome of these inspections additional maintenance servicing may be required.

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the OceanGuard.

	Description of Typical Activities	Frequency
Minor Service	Filter bag inspection and evaluation Removal of capture pollutants Disposal of material	2-4 Times Annually
Major Service	Filter Bag Replacement Support frame rectification	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to return the OceanGuard device back to optimal operating performance. This type of service can be undertaken either by hand or with the assistance of a Vacuum unit.

Hand Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Use two lifting hooks to remove the filtration bag
4. Empty the contents of the filtration bag into a disposal container
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Vacuum Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Vacuum captured pollutants from the filtration bag
4. Remove filtration bag
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Major Service (Filter Bag Replacement)

For the OceanGuard system, a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event from Minor Service	Maintenance Action
Filtration bag inspection reveals damage	Replace the filtration bag[1]
Component inspection reveals damage	Perform rectification works and if necessary replace components[1]

[1] Replacement filtration bags and components are available for purchase from Ocean Protect.

Additional Reasons of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, all OceanGuard pits that potentially received flow should be inspected and cleaned. Specifically all captured pollutants from within the filtration bag should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. All filtration bags should be rejuvenated (replaced if required) and re-installed.

Blockages

The OceanGuards internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. In the unlikely event that flooding occurs around the stormwater pit the following steps should be undertaken to assist in diagnosing the issue and implementing the appropriate response.

1. Inspect the OceanGuard flow diverter, ensuring that they are free of debris and pollutants
2. Perform a minor service on the OceanGuard
3. Remove the OceanGuard insert to access the pit and inspect both the inlet and outlet pipes, ensuring they are free of debris and pollutants

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the OceanGuard pit insert after a major storm event. The inspection should focus on checking for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants disposed.

Disposal of Waste Materials

The accumulated pollutants found in the OceanGuard must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filtration bag has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanGuard system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement filter bags.

For more information please visit www.OceanProtect.com.au

OCEAN PROTECT

Jellyfish Filter

Operations & Maintenance Manual

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Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the Jellyfish Filter as recommended by the manufacturer.

The Jellyfish Filter is a stormwater quality treatment technology featuring high surface area and high flow rate membrane filtration at low driving head. By incorporating pre-treatment with light-weight membrane filtration, the Jellyfish Filter removes floatables, trash, oil, debris, TSS and a high percentage of particulate-bound pollutants; including phosphorus and nitrogen, metals and hydrocarbons.

Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that suitably qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the Jellyfish.

Health and Safety

Access to a Jellyfish unit requires removing heavy access covers/grates, and entry into a confined space. Pollutants collected by the Jellyfish will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your Jellyfish require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the Jellyfish, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

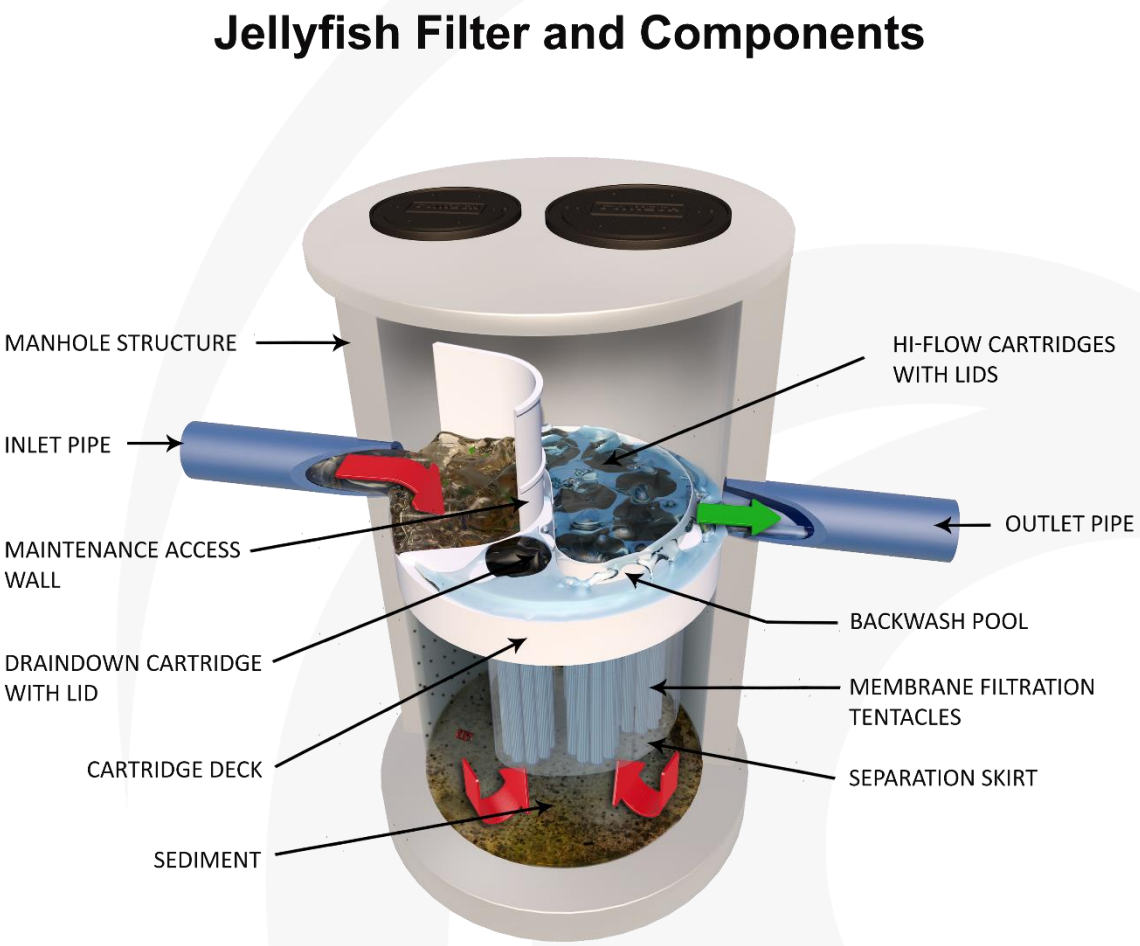
- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of Jellyfish maintenance can be performed from surface level, there will be a need to enter the Jellyfish pit (confined space) for both minor and major services. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

How does it Work?

Stormwater enters the Jellyfish system through the inlet pipe where floatable pollutants are captured behind the maintenance access wall. As stormwater enters the treatment chamber a separation skirt ensures the retention of oils whilst simultaneously protecting the filtration cartridges and allowing coarse particles to settle below on the chamber floor. Stormwater then passes through the Jellyfish cartridges and onto the Jellyfish deck, at this point the backwash pool will fill and overflow allowing treated stormwater to exit via the outlet pipe.



As the storm event subsides, the treated water held in the backwash pool passes back through the high flow cartridges into the treatment chamber. This passive backwash helps to clear the cartridge surface by dislodging sediment onto the chamber floor. The drain down cartridge(s) located outside the backwash pool enables water levels to balance, leaving the cartridge deck level free of standing water.

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically the Jellyfish requires a service every 6 months, additionally as the Jellyfish cartridges capture pollutants they will need to be replaced (expected cartridge life is 2-5 years with a maximum cartridge life of 5 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the Jellyfish.

	Description of Typical Activities	Frequency
Minor Service	Removal & rinsing of cartridges Wash down of deck level Removal of large floatable pollutants Removal of accumulated sediment (if required)	Every 6 Months
Major Service	Replacement of Jellyfish cartridges	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to assess the condition of the Jellyfish cartridges and record necessary information that will establish whether a major service is required.

1. Establish a safe working area around the access point
2. Remove access covers
3. Using a vacuum unit or net remove any floatable gross pollutants contained behind the maintenance access wall
4. Using a vacuum unit decant the water until the level drops below the base of the cartridges
5. Remove Jellyfish cartridges*
    a. Remove cartridge lid
    b. Remove cartridges vertically from chamber, lifting from eye nut lifting points only
    c. Replace and secure cartridge lid back into deck to reduce trip hazards during maintenance
6. Unscrew all 11 tentacles from the cartridge head plate, keep all components for reassembly*
7. Rinse each tentacle individually NOTE: excessive water pressure may damage the tentacles
    a. Position tentacle in a container (to capture runoff) with the open end facing down
    b. Rinse entire length of cartridge using only low pressure water source (e.g. garden hose).
    c. Evaluate and note the condition of the tentacles
    d. Ensure runoff is disposed appropriately
    e. Re-assemble cartridges ready for reinstallation*
8. Wash down deck level to remove any built up sediment (if required)
9. Measure the level of accumulated sediment in the chamber if depth is greater than 300mm use vacuum unit to remove sediment.
10. Re-install Jellyfish cartridges
    a. Remove cartridge lid
    b. Lower cartridge into chamber, lifting from eye nut lifting points only
    c. Insert cartridge vertically into cartridge receptacle, and secure cartridge lid back in place
11. Replace access covers

**Refer appendix 1 for Jellyfish Cartridge Schematic*

Major Service (Filter Cartridge Replacement)

For the Jellyfish system a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event	Maintenance Action
Rinsing does not remove accumulated sediment from the tentacles	Replace Jellyfish tentacles[1]
Jellyfish tentacles are damaged	Replace Jellyfish tentacles[1]
Jellyfish cartridges have been in operation for 5 years	Replace Jellyfish tentacles[1]

[1] Replacement filter tentacles and components are available for purchase from Ocean Protect.

This service is designed to return the Jellyfish device back to optimal operating performance

1. Establish a safe working area around the access point
2. Remove access covers
3. Using a vacuum unit or net remove any floatable gross pollutants contained behind the maintenance access wall
4. Using a vacuum unit decant the water until the level drops below the base of the cartridges
5. Remove Jellyfish cartridges*
    a. Remove cartridge lid
    b. Remove cartridges vertically from chamber, lifting from eye nut lifting points only
    c. Replace and secure cartridge lid back into deck to reduce trip hazards during maintenance
6. Unscrew all 11 tentacles from the cartridge head plate for disposal, keep all components for fixing of new tentacles to existing head plate*
7. Wash down deck level to remove any built up sediment (if required)
8. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
9. Install replacement tentacles into each head plate*
10. Install Jellyfish cartridges
    a. Remove cartridge lid
    b. Lower cartridge into chamber, lifting from eye nut lifting points only
    c. Insert cartridge vertically into cartridge receptacle, and secure cartridge lid back in place
11. Replace access covers

**Refer appendix 1 for Jellyfish Cartridge Schematic*

Additional Types of Maintenance

Occasionally events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the Jellyfish unit should be inspected and serviced accordingly. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess their contamination, depending on the type of spill event it may be necessary to replace the filtration cartridges.

Blockages

The Jellyfish treatment system is designed to operate in an offline arrangement, where an upstream high flow bypass structure is in used. In the unlikely event that flooding occurs upstream of the Jellyfish system, the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure to ensure that it is free of debris and pollutants
2. Inspect the Jellyfish unit checking both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the Jellyfish after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary, damaged components should be replaced and accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the Jellyfish must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter cartridges have been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our Jellyfish system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement cartridges.

For more information please visit www.OceanProtect.com.au

Appendix 1 – Jellyfish Cartridge Schematic

