

SSDA Design Report -Civil Stormwater

ATC & RNSW Winx Stand Project

SCP Ref: 180196

Client Mostyn Copper Group c/- Australian Turf Club

Project ATC Randwick Public Infrastructure Project

Date 29 October 2019

Revision table

Rev #	Date	Issue description	Prepared by	Reviewed by	Issued by
A	15/10/2019	Draft	JC	-	JC
B	21/10/2019	Final	JC	JB	JC
C	29/10/2019	Final	JC	-	JC

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1 Introduction

SCP Consulting has been engaged by the Australian Turf Club to prepare a Civil Design Report for a State Significant Development (SSD) at Royal Randwick Racecourse for the construction of a new spectator stand (SSD 10285). This Design Report will accompany the Environmental Impact Statement (EIS) as requested by the Planning Secretary's Environmental Assessment Requirements (SEARs).

The Royal Randwick Racecourse lies within the Randwick Council Local Government Area.

Figure 1 below presents the proposed site for the new spectator stand, known as the Winx Stand, which will be located on the current Leger Lawn. Royal Randwick is bounded by Alison Road and Centennial Park to the north, existing residential lots to the west between Anzac Parade and Doncaster Av, the UNSW to the south along High St, and existing residential lots to the east along Wansey Rd

The proposed site sits to the south of the existing QEII grandstand and east of the Multi-storey carpark adjacent the Course Proper.



Figure 1 – Locality Plan

2 The Site

The site of the proposed Winx Stand is the current Ledger Lawn south west of the QE Grandstand, east of the existing race day stalls and Multi Deck carpark. Figure 2 below presents the proposed site layout.

The development will consist of a two-level spectator stand approximately 100m long by 40m wide with associated landscaping on all sides surrounding the stand. Access to the ground level will be through the northern, eastern and western facades. A link bridge will be installed to provide a connection from Level 1 of the Winx Stand through to Level 1 of the southern drum of the QE Grandstand.

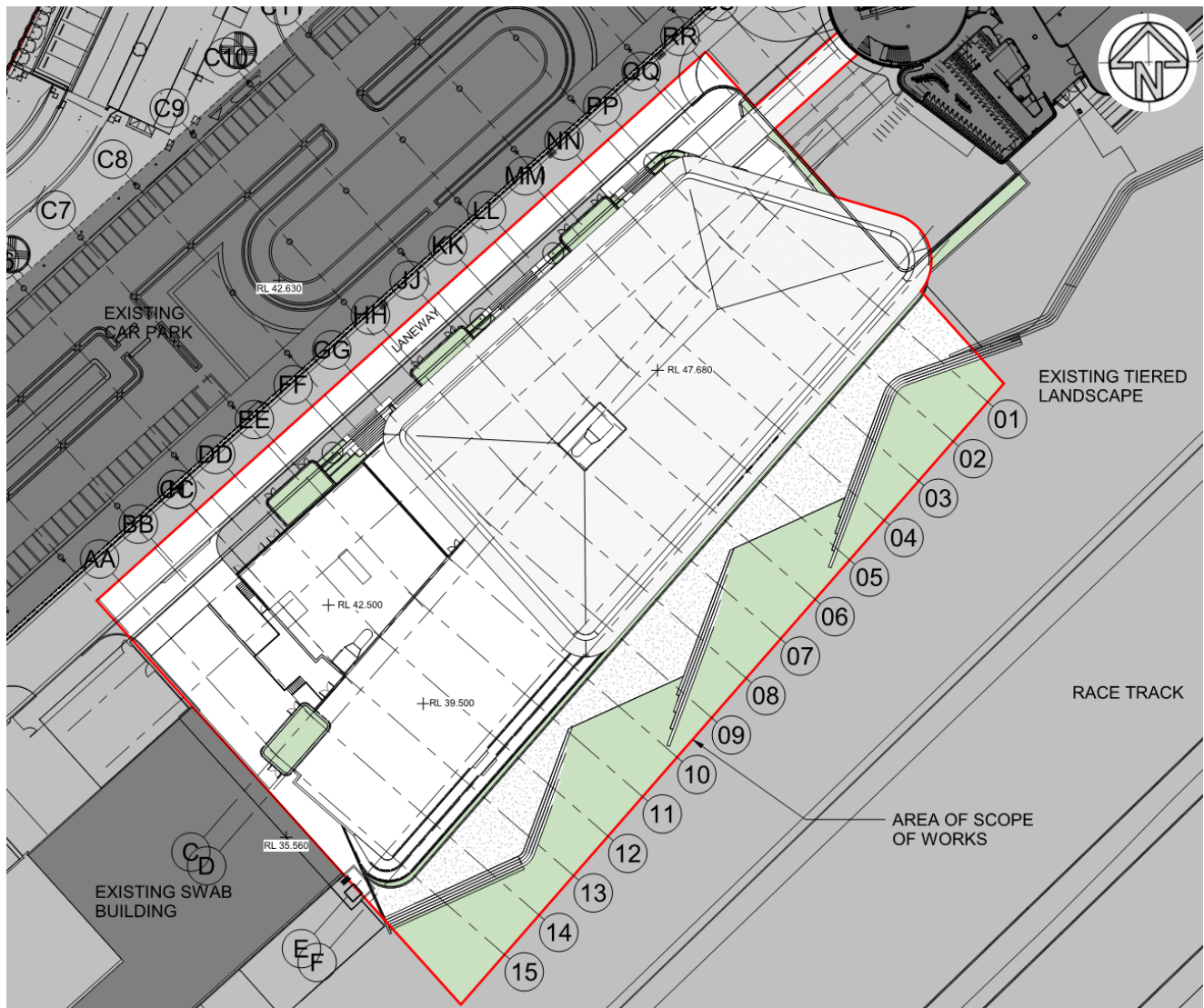


Figure 2 – Site Plan

2.1 Topography

A detailed survey has been completed by Rygate Surveyors which indicates that the site falls from north east to south west and consists of two flat pads with batters to match into surrounding areas and between the two flat areas. The higher pad along the northern edge is at approximately RL 31.5 and the lower pad to the south varies between RL 31.0 and RL 30.7.

The existing road to the west of the Ledger Lawn and between the race day stalls and the Multi Deck carpark is at RL 30.0 with very slight falls to the south along the frontage of the site. The Course Proper falls from RL 29.8 to RL 29.7 towards the south along the eastern edge of the site.

2.2 Services

A number of existing services traverse the site including potable water, stormwater, sewer, electrical and communications.

A detailed geophysical survey has been conducted which indicates that there are a number of existing services within the public infrastructure stand footprint. All services impacted by the project that are required to be retained will have to be diverted or adjusted to suit the proposed layout. Existing services no longer required shall be disused as required.

The location of the proposed development is on the site of the former St Ledger Stand. A geophysical survey has located a number of existing buried foundations that formed the substructure of the St Ledger Stand. These foundations will remain and be co-ordinated with the substructure of the proposed public infrastructure project.

3 Design Criteria

3.1 Basis of Design

The basis for the design of the Civil Works has been through inclusion of the following:

- Architectural layout of the site by Cox Architecture;
- Survey by Rygate Surveyors;
- Geophysical survey by MALA.

The following services by others have also been taken into consideration for coordination:

- Landscape Architecture by Sturt Noble and Associates;
- Structural concept design by M+G Consulting
- Hydraulic services by ADP;

3.2 Design Criteria and Standards

The design criteria and standards for the civil works include:

- Australian Rainfall and Runoff (2016);
- Planning Secretary's Environmental Assessment Requirements (SEARs) for SSD 10285 specifically items 14 and 15
- Randwick City Council Development Guidelines including:
 - Randwick City Council Local Environmental Plan 2012;
 - Randwick City Council Development Control Plans 2013;
 - Randwick City Council Private Stormwater Code 2013;
- Soil and Water Management, Landcom's Soil and Construction Manual (Blue Book);
- Relevant Australian Standards;

4 Flooding and Stormwater

4.1 Flooding

SEARs item 15 requires flood risk, and stormwater drainage to be considered for the proposed development.

Royal Randwick Racecourse forms a major part of the Kensington – Centennial Park stormwater management network resulting in significant overland flows for the 1% Annual Exceedance Probability (AEP) storm event across the Racecourse. These flows enter the Racecourse from the north east and flow in a south westerly direction to the existing detention basins located at the final turn of the Racecourse.

Figure 3 below presents the existing flood conditions for the 1% AEP storm event as assessed by WMA Water in the Kensington Centennial Park Flood Study dated 2013 and demonstrates that the Ledger Lawn is not impact by flooding.



Figure 3 – 1% AEP Kensington-Centennial Park Flood Map excerpt (WMA Water 2013)

The proposed development has a Finished Floor Level (FFL) of RL 32.00 which up to 2.0m above existing roads and Course Proper levels. This future protects the development from any potential future climate change impacts.

The proposed development is not required to comply with flood planning criteria as outlined in the NSW Floodplain Development Manual (2005) or Randwick City Council's Development Control Plan 2013 since the site is not prone to flooding as presented in Figure 3.

4.2 Stormwater Design

SEARs items 14 and 15 require a stormwater management plan to be prepared for the proposed development and with consideration to Randwick City Council's Private Stormwater Code 2013

The proposed stormwater system has been designed to accommodate the 5% Annual Exceedance Probability (AEP) storm event within a pit and pipe system with failsafe overland flow paths provided for the 1% AEP storm.

The proposed Winx stand will occupy most of the site area. A roof water drainage system will manage flows from the roof and superstructure being captured in downpipes and reticulating the total roof area to an absorption trench located on the eastern side of the development.

Surface stormwater will be captured through a series of grated drains and grated inlet pits which will reticulate to the north and south of the proposed development to the absorption trench to the east. Refer to Section 4.3 for the design parameters of the absorption trench.

Refer to Civil Concept plans for further details on the stormwater drainage system.

4.3 On-Site Detention

SEARs items 14 and 15 require a stormwater management plan to be prepared for the proposed development and with consideration to Randwick City Council's Private Stormwater Code 2013 Randwick City Council's DCP 2013 Part B8 – Section 3.2 specifies the following controls regarding On-Site Detention:

Controls

- i) On-site detention and infiltration systems shall be designed and constructed to comply with the requirements of [Council's Private Stormwater Code](#).
- ii) On-site detention storage volume may be reduced through the use of stormwater infiltration systems.

The site covers an area of 6,600m² and is 80% impervious in its developed state which includes the total roof area, loading dock and OB van parking area within the site. The pervious area is made up of landscaping mostly in the area between the development and the Course Proper.

It is proposed that an absorption trench will be provided to allow storage and infiltration of all storms up to and including the 1% Annual Exceedance Probability (AEP) storm.

From previous geotechnical advice received on the Kensington Track Re-Development in 2016 the infiltration rate into the underlying Botany sands is 3×10^{-4} metres/sec which equates to 0.3L/sec/m² of infiltration across the whole of the trench base. A mass curve analysis has been conducted with the Peak Site Discharge selected as the total infiltration rate. This results in a 210m³ infiltration trench required to store the 1% AEP storm.

The minimum footprint of the tank is required to be 190m² to ensure a minimum infiltration rate of 59.0 L/sec.

In the event of a blockage or an extreme storm event the infiltration trench will be connected to the existing DN375 stormwater pipe connected to the infield drainage. The grated inlet pits at connection points to the infiltration trench will also act as emergency relief points.

The infiltration trench will be constructed of a modular polymer cell wrapped in permeable geofabric. The maximum depth of the infiltration trench will be 1.6m to ensure that there is no impact from the anticipated fluctuating water table that occurs during extended periods of rainfall in the Randwick area. A typical section of the absorption has been provided in Figure 4.

Infiltration Tank (Absorption)

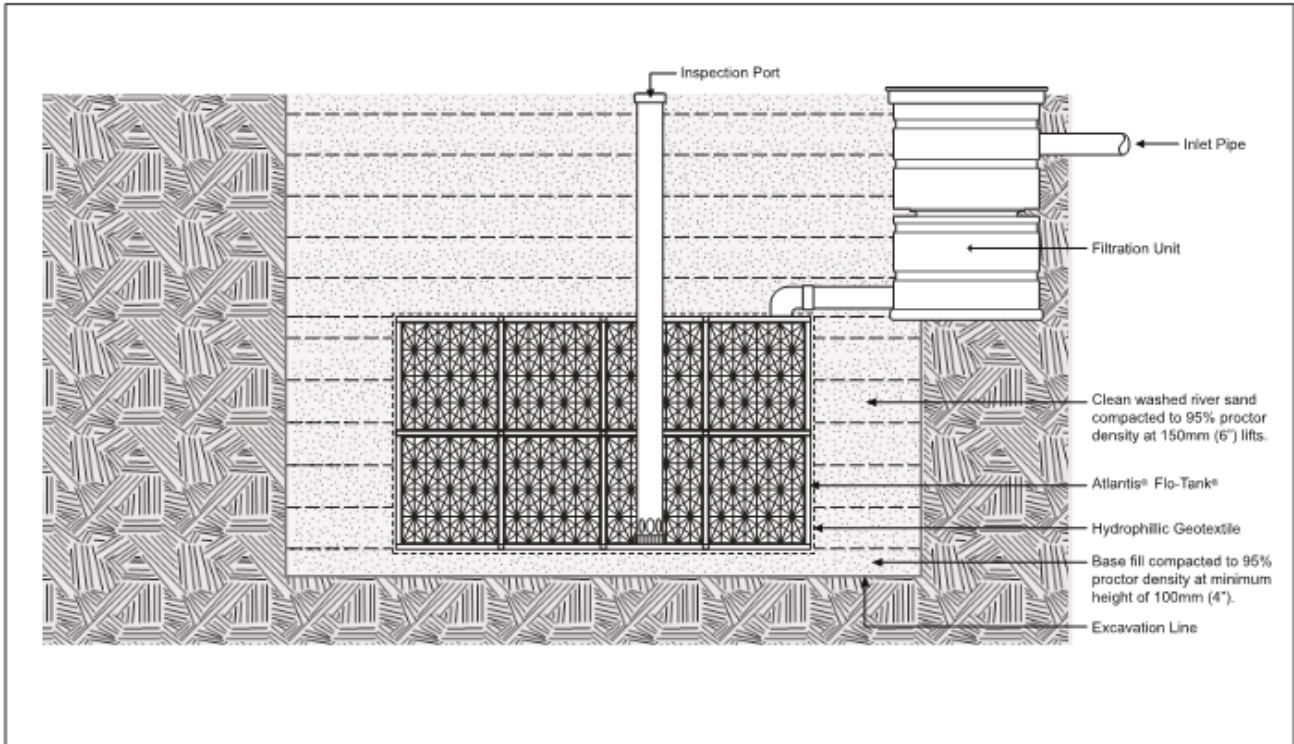


Figure 4 – Typical infiltration tank section (Atlantis Corporation 2016)

Refer to site stormwater drainage plans and details and infiltration trench calculations appended to this report for further details.

4.4 Stormwater Quality

SEARs item 14 requires potential impacts to stormwater quality including ground water be considered for the proposed development. With reference to Randwick City Council DCP 2013, all new developments are required to provide stormwater quality to meet objectives outlined below:

- 90% reduction in Gross Pollutants;
- 85% reduction in Total Suspended Solids
- 65% reduction in Total Phosphorus
- 45% reduction in Total Nitrogen

The proposed development has provided the following stormwater treatment train to achieve the objectives above:

- Litter baskets in all grated stormwater inlet pits
- Oil absorption pads in litter baskets in vehicular areas
- 210m³ infiltration trench

Since all stormwater up to the 1% AEP storm is retained on-site and infiltrated into the subsurface sands there is no discharge from site into the downstream pit and pipe network which results in a 100% reduction in pollutants being released downstream of the site.

Three main stormwater catchments exist for the proposed development:

1. Roof area which includes a majority of the site. This is considered clean water and drains directly to the absorption trench without any required treatment;
2. Landscape areas with pedestrian access only. Hardscape areas are captured, and grated inlets fitted with litter baskets to remove gross pollutants before draining to the absorption trench. Softscape areas infiltrate into the surface;
3. Landscape areas with vehicular access. All pavements are captured, and grated inlets fitted with litter baskets and oil absorption pads to remove gross pollutants, hydrocarbons and oils before draining to the absorption trench;

Due to the treatment train above and the total infiltration of clean water through the infiltration trench the pollutant reduction objectives are deemed as met as there is no discharge into the downstream stormwater network.

Groundwater quality is protected through the use of oil absorption pads to eliminate chemicals from being absorbed into the ground. No adverse movements are anticipated within the site and are not considered as part of the water quality treatment train.

5 Erosion and Sediment Control

An Erosion and Sediment Control Plan has been prepared in accordance with Landcom's Soil and Construction manual (commonly known as the Blue Book), Volume 1, March 2004 since the disturbed site area will be greater than 2,500m².

Temporary sediment basins, construction exits, sandbags and sediment control fences will be required to manage erosion and sediment throughout the construction of the project.

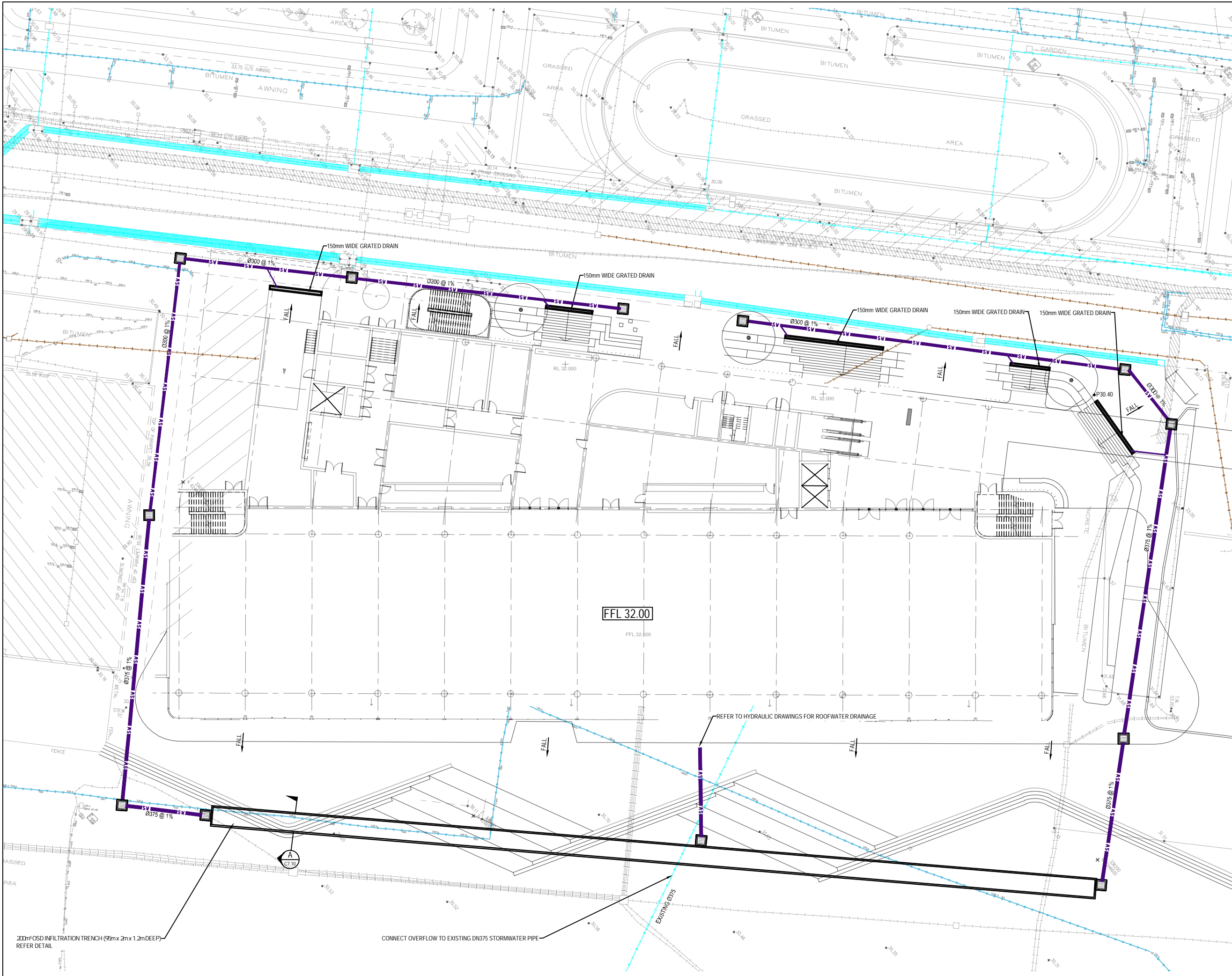
Refer to Erosion and Sediment Control plan and details appended to this report.

6 Conclusion

This Civil Design report outlines the existing site conditions, relevant design standards and criteria which form the constraints of the stormwater management for the site.

Flood risk, potential future climate change impacts and associated stormwater management including On-Site Detention and stormwater quality are addressed in this report to satisfy the SEARs items 14 and 15.

Appendix A Civil DA Drawings



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- NOTE:
1. ALL PITS TO BE 900 SQUARE STORMWATER PITS
 2. ALL PITS TO BE FITTED WITH OCEANGUARD PIT BASKETS.
 3. DOWNPIPES TO HYDRAULIC ENGINEERS DETAILS. FLOWS TO BE PROVIDED TO SCP FOR INCLUSION IN CIVIL DRAINAGE DESIGN.
 4. PROVIDE MIN 1% FALLS AWAY FROM BUILDING FACADE LINES

Rev	Revision Description	Date
B	ISSUE FOR INFORMATION	21.10.2019
A	ISSUE FOR INFORMATION	16.10.2019



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Client
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Project
ATC RANDWICK LEDGER LAWN

Title
STORMWATER PLAN

Scale
0 4000 10000
1:200 @ A1

Drawn	Checked	Approved
LW	JC	---

Project Number
180196

Drawing Number
C3.01

Revision
B

	SEDIMENT FENCE
	KERB INLET PROTECTION. PROVIDE AT ALL EXISTING ROAD STORMWATER PITS.
	OVERLAND FLOW PATHS (1% SLOPE)
	TEMPORARY CONSTRUCTION ENTRY/WASHDOWN
	SEDIMENT FILTER
	KERB INLET PIT FILTER
	TEMPORARY SEDIMENT BASIN

GENERAL INSTRUCTIONS

E1. THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE ENGINEERING PLANS, AND ANY OTHER PLANS OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED AND RELATING TO DEVELOPMENT AT THE SUBJECT SITE.

E2. THE SITE SUPERINTENDENT WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE LOCATED AS INSTRUCTED IN THIS SPECIFICATION.

E3. ALL BUILDERS AND SUB-CONTRACTORS WILL BE INFORMED OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS.

CONSTRUCTION SEQUENCE

E4. THE SOIL EROSION POTENTIAL ON THIS SITE SHALL BE MINIMISED. HENCE WORKS SHALL BE UNDERTAKEN IN THE FOLLOWING SEQUENCE :

a. INSTALL SEDIMENT FENCES, TEMPORARY CONSTRUCTION EXIT AND GEOTEXTILE INLET SEDIMENT TRAP.

b. UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE.

EROSION CONTROL

E5. DURING WINDY CONDITIONS, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.

E6. FINAL SITE LANDSCAPING WILL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 20 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.

FENCING

E7. STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.

E9. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.

E10. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.

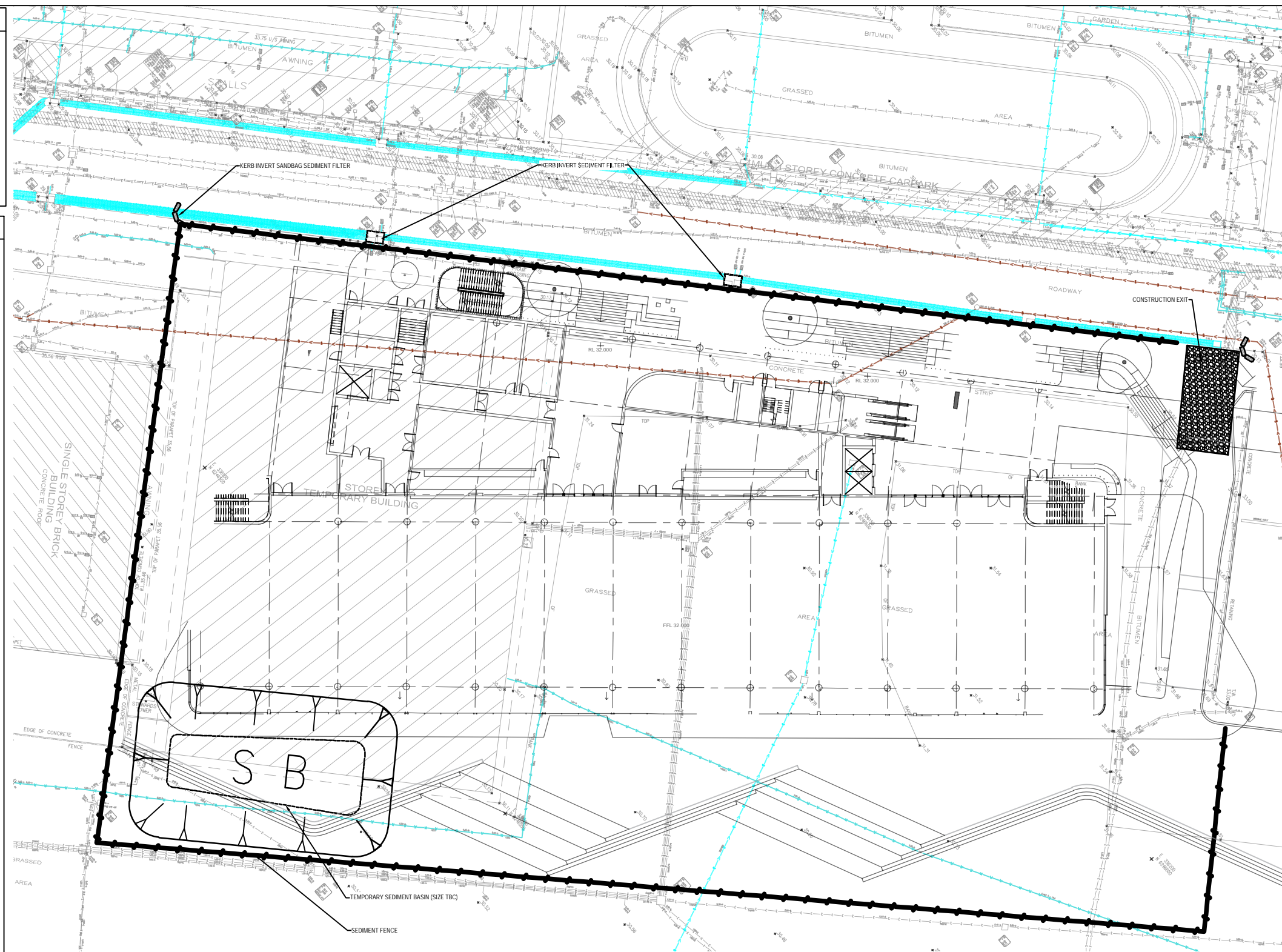
OTHER MATTERS

E11. ACCEPTABLE RECEPTORS WILL BE PROVIDED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.

E12. RECEPTORS FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER ARE TO BE EMPTIED AS NECESSARY. DISPOSAL OF WASTE SHALL BE IN A MANNER APPROVED BY THE SITE SUPERINTENDENT.

SITE INSPECTION & MAINTENANCE

E13. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSPECTED AFTER RAINFALL EVENTS TO ENSURE THAT THEY OPERATE EFFECTIVELY. REPAIR AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED.



B	ISSUE FOR INFORMATION	21.10.2019
A	ISSUE FOR INFORMATION	16.10.2019
Rev	Revision Description	Date



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Project	ATC RANDWICK LEDGER LAWN
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Title	SOIL EROSION AND SEDIMENT CONTROL PLAN
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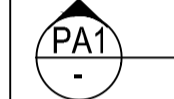


Drawn LW	Checked JC	Approved ---	
Project Number 180196		Drawing Number C6.01	Revision B



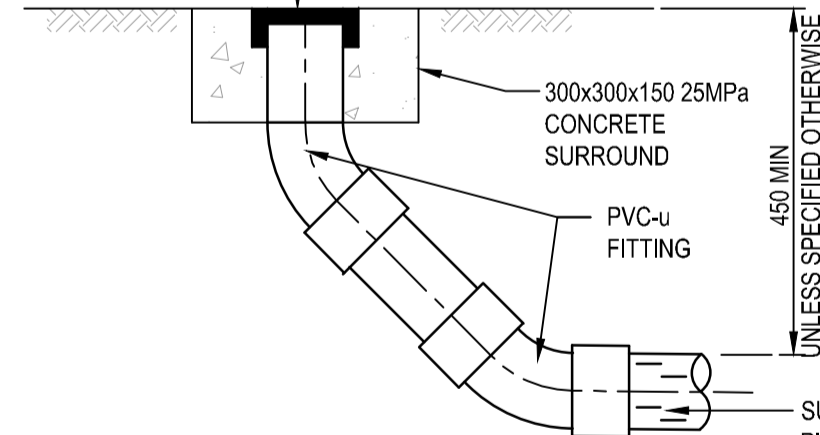
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Project Number	Drawing Number	Revision
180196	C6.10	A

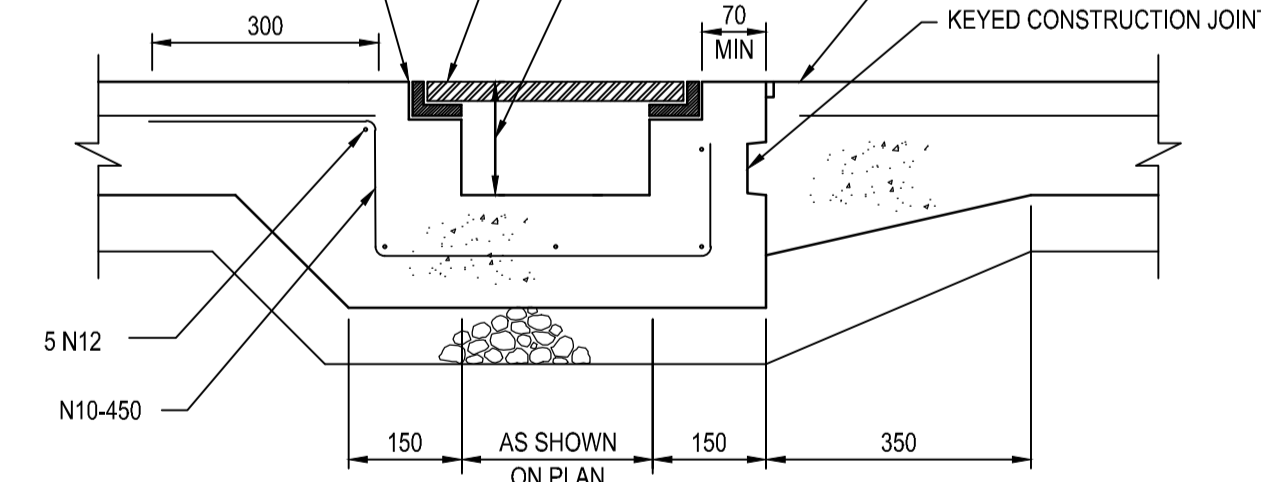


SCALE 1:20

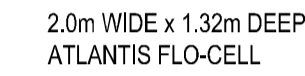
NOTE: PITS DENOTED * SHALL BE USED ONLY WHERE SPECIFIED IN DRAINAGE SCHEDULE OR ON PLAN.



N.T.S.



SCALE 1:10



SCALE 1:20



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A	ISSUE FOR INFORMATION	16.10.2019
Rev	Revision Description	Date



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Project	ATC RANDWICK LEDGER LAWN
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Title	DETAILS SHEET
-------	---------------

Scale

AS SHOWN AT A1

Drawn LW	Checked GK	Approved ---	
Project Number 180196		Drawing Number C7.10	Revision A

Appendix B Absorption Trench Sizing

Infiltration Trench Sizing (STW)	
Project Number:	180196
Project Name:	ATC Ledger Lawn
Date	21/10/2019
Field Results	
Water Loss (average)	18.000000 L/min/m2
	0.300000 L/sec/m2
Trench Information	
Width	2 m
Length	96 m
Height	1.2 m
Trench Medium	Plastic crates
Void Ratio	0.9
Calculations	
Outflow	59.04 L/sec
Storage Volume Provided	207.36 m3
Storage Volume Required	206.47 m3
Result	OK

Geotechnical
Investigation

Mass Curve Analysis - 1
in 100 Year ARI

STORMWATER DRAINAGE
On Site Detention Sizing by Mass Curve Technique

Project Name: ATC Ledger Lawn

Reference No.: 180196

Engineer: JC

Date: 21/10/2019

DURATION (hr)	RAINFALL INTENSITY 100 Year ARI (mm/hr)	CO-EFFICIENT OF RUNOFF (C_{10})	SITE AREA (m^2)	ACTUAL DISCHARGE (L/s)	ACTUAL DISCHARGE VOLUME (m^3)	PERMISSIBLE SITE DISCHARGE (L/s)	PERMISSIBLE DISCHARGE VOLUME (m^3)	REQUIRED ON-SITE STORAGE (m^3)
0.083	260.0	0.81	6600	386.10	115.37	59.04	17.64	97.73
0.167	205.0	0.81	6600	304.43	183.02	59.04	35.49	147.53
0.33	147.0	0.81	6600	218.30	261.69	59.04	70.78	190.91
0.50	117.0	0.81	6600	173.75	312.74	59.04	106.27	206.47
1	76.5	0.81	6600	113.60	408.97	59.04	212.54	196.43
2	50.0	0.81	6600	74.25	534.60	59.04	425.09	109.51
3	39.4	0.81	6600	58.51	631.90	59.04	637.63	-5.73
6	26.8	0.81	6600	39.80	859.64	59.04	1275.26	-415.63
12	18.5	0.81	6600	27.47	1186.81	59.04	2550.53	-1363.72
24	12.7	0.81	6600	18.86	1629.46	59.04	5101.06	-3471.60
48	8.2	0.81	6600	12.24	2114.45	59.04	10202.11	-8087.66
72	6.2	0.81	6600	9.13	2367.21	59.04	15303.17	-12935.96

MAX REQUIRED OSD (m^3) 206.47