Warren Smith & Partners

KINGSGROVE RECYCLING FACILITY PROPOSED WASTE AND RESOURCE MANAGEMENT FACILITY

SITE SERVICING REPORT FOR DEVELOPMENT APPLICATION

August 2019

DOCUMENT INFORMATION

Client:	Kingsgrove Recycling Facility Pty Ltd
Project:	Kingsgrove Recycling Facility Proposed Resource Management Facility
Document Ref:	4986000-WS+P-CS-RP-01 – Development Application Report [G]
Job No.:	4986000

CONSULTANT INFORMATION

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DOCUMENT CONTROL

Rev #	Date	Description of Change
A	1st April 2015	Issue for Development Application
B	14th April 2015	Re-Issue for Development Application
C	24th August 2017	Re-Issue for Development Application
D	1st September 2017	Re-Issue for Development Application
E	12th August 2019	Re-Issue for Development Application
F	15th August 2019	Re-Issue for Development Application
G	12th December 2019	Re-Issue for Development Application

APPROVALS

Rev #	Author	Reviewer
A	Ivan Lim *Graduate Civil Engineer*	Michael Cahalane *Director of Civil & Water Engineering*
B	Ivan Lim *Graduate Civil Engineer*	Michael Cahalane *Director of Civil & Water Engineering*
C	Thomas Keddie *Intern Civil Engineer*	Michael Cahalane *Director of Civil & Water Engineering*
D	Thomas Keddie *Intern Civil Engineer*	Michael Cahalane *Director of Civil & Water Engineering*
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F	Laura Shaughnessy *Project Manager – Civil & Water Engineering*	Michael Cahalane *Director of Civil & Water Engineering*
G	Martyna Czarnota *Junior Designer – Civil & Water Engineering*	Michael Cahalane *Director of Civil & Water Engineering*

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SCHEDULES

1. INTRODUCTION

Warren Smith and Partners (WS+P) has been engaged by Kingsgrove Recycling Facility Pty Ltd to prepare and submit a Development Application Report for the proposed development relating to stormwater drainage. Please refer to Figure 1 below for an aerial view of the property boundary and proposed development area.

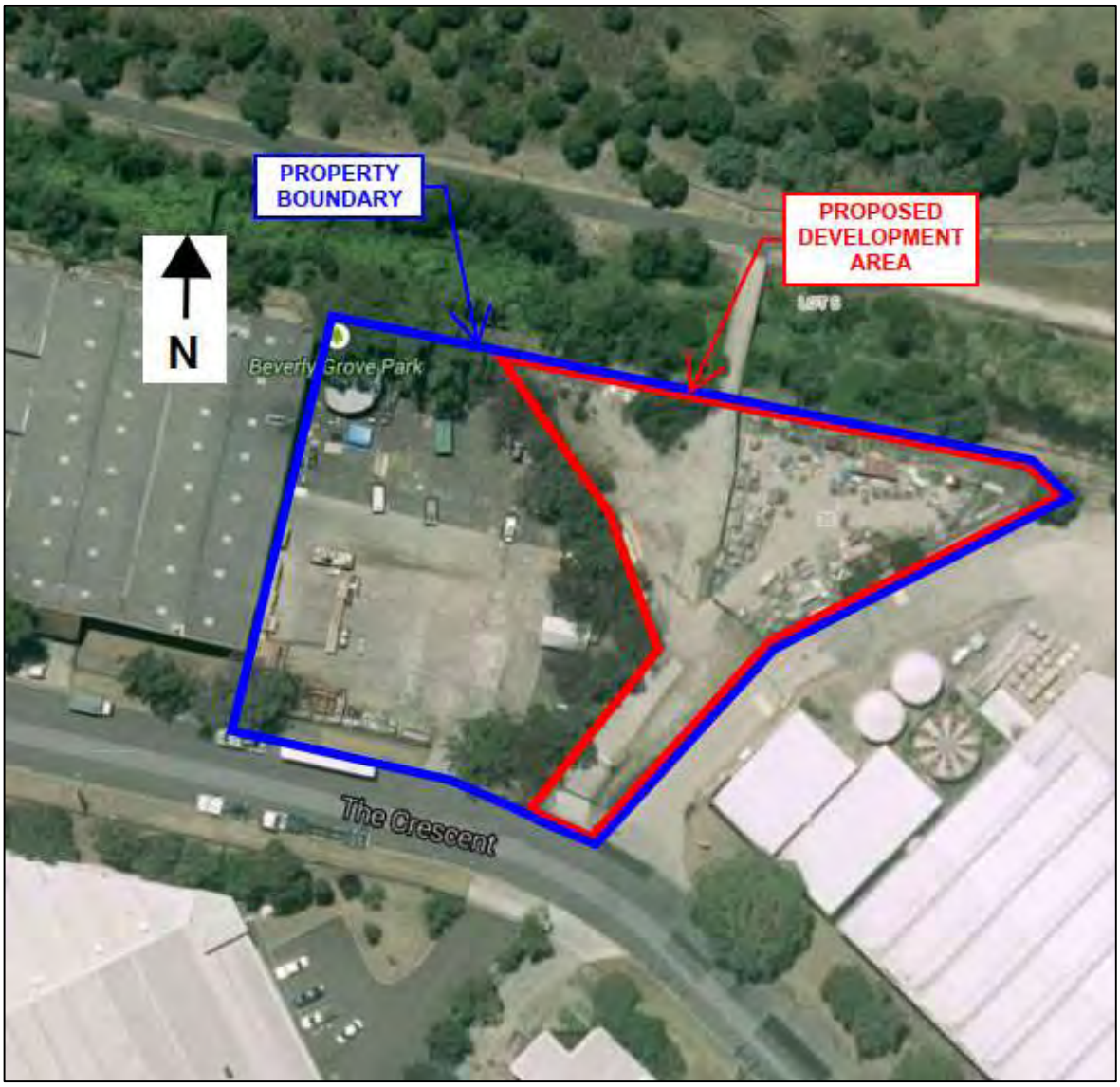


Figure 1: Aerial View of Property Boundary and Proposed Development Area (Source: Google Map)

The existing site is a vacant flat block of land located at 2D, The Crescent, Kingsgrove and is zoned as light industrial. The site is surrounded by industrial properties and a stormwater channel at the rear of the property. The proposed development involves the construction of a shelter shed covering approximately 1,000 square metres of the site which is to be used as a Waste and Resource Management Facility.

2. EXISTING STORMWATER DRAINAGE

The existing property includes the proposed development area and a western lot which is not the part of the proposed development area. An existing site survey plan has revealed the following:

Proposed Development Area

- The proposed development area grades in one direction towards a low point located in north-east corner of the site,
- Currently, there is no existing council drainage infrastructure fronting the property and no existing stormwater drainage within the proposed development area. It is proposed that stormwater infrastructure will be constructed within the development site to serve the proposed Waste and Resource Management Facility.

Western Lot

- The western lot which is adjacent to the proposed development area, grades in an easterly direction towards three (3) existing grated pits. The most northerly grated pit is a local sag pit located immediately west of a row of existing trees;
- The three (3) existing grated pits located within the western lot are connected by one (1) existing 300mm diameter stormwater pipe which reticulates north and discharges into the stormwater channel at the rear of the site.
- The western lot area is not part of development area and shall remain as per its pre-existing conditions.

Please refer to *Schedule 1 – Survey of Existing Development Site* for an illustration of the site grading.

3. AUTHORITY AND REGULATORY REQUIREMENTS

With reference to the Hurstville City Council Development Control Plan (DCP) No.1 Section 5, Appendix 2 and DCP No.2 – Car Parking, the council requirements are as follows:

3.1 STORMWATER DRAINAGE REQUIREMENTS

- All drainage is to be designed for a 1 in 20 year storm frequency except if the site is located in the Wolli Creek catchment, and for Hurstville area, this gives 185mm/hour intensity for a six (6) minute storm.
- Trunk drainage systems should provide for the 20 year ARI event with overland flow paths designed for the 100 year storm ARI event.
- All stormwater pits are to be grated pits.
- All outlet pipes from a grated pit are to have a minimum 150mm diameter graded at a minimum of 1%.
- All pipes are to be minimum sewer grade PVC.
- The last grated pit before entering a Council pipeline or kerb and gutter must have 150mm sump and galvanised mesh permanently fixed over the outlet pipes.
- Cast in situ concrete, brick or precast concrete grated pits must be used in trafficable areas.
- Grated drains to be installed across long driveways at the front boundary to prevent stormwater flowing across Council's footpath.

3.2 WATER SENSITIVE URBAN DESIGN (WSUD) REQUIREMENTS

- The quality of stormwater leaving development sites is consistent with water quality standards set by the Environment Protection Authority and ANZECC.

3.3 PAVEMENT DESIGN

- Straight ramps that are less than 20 metres long can have a maximum 1 in 5 (20%) grade.
- Changes of grade in excess of 1 in 8 (12.5%) will require the introduction of one or more transitions between the main grade lines. Such a transition is to be half the sum of the two adjacent grades.

4. PROPOSED STORMWATER SYSTEM

The total site area is 0.4640 ha, however the proposed development area has a total catchment area of approximately 0.2168 ha with a roof catchment area of approximately 0.1026 ha. The proposed stormwater system is to be installed along the eastern side of the development area, reticulating to a 70.40m³ onsite detention tank before discharging to the stormwater channel at the rear of the development site in the north-east corner.

The pit and pipe systems have been sized in accordance with the Hurstville City Council DCP and have a minimum capacity equivalent to the 20 year ARI storm event.

The stormwater runoff from the roof of the proposed shed will be captured by a 300mm wide box gutter along the south-west side and by a 200mm diameter half-pipe eaves gutter on the north-east side. All stormwater runoff will be connected into two (2) 10,000L rainwater re-use tanks which will each incorporate a first flush device. The rainwater collected by the tanks will be recycled and used for dust suppression purposes in the factory and yard. The rainwater re-use tanks will be located at the south-west corner and the north-east corner of the proposed shed. Please refer to Figure 2 below for the locations of the rainwater re-use tanks. A 225mm diameter overflow pipe will connect each rainwater re-use tank to the proposed stormwater system and discharge to the stormwater channel. Please refer to *Schedule 3 WS&P Design Drawings.*

Figure 2: Rainwater Reuse Tank Location Plan

The 300mm wide box gutter has been sized in accordance with AS3500.3, Plumbing and Drainage – Stormwater Drainage, and has a minimum capacity equivalent to the 100 year ARI storm event. The 200mm half-pipe eaves gutter has been sized in accordance with AS3500.3, Plumbing and Drainage – Stormwater Drainage, and has a minimum capacity equivalent to the 20 year ARI storm event. Please refer to *Schedule 2 Gutter Sizing Calculations for details*.

It is noted that the 100 year ARI flood level of 20.78m AHD has been interpolated from the M5 East Project Wolli Creek Flood Study conducted in 1998 by Willing & Partners. All floor levels and electrical equipment are to be provided at a minimum RL of 21.30m AHD which provides appropriate freeboard.

Please refer to *Schedule 3 – WS&P Design Drawings* for stormwater plan and details and *Schedule 4 – M5 East project Wolli Creek Flood Study*.

4.1 DRAINS INPUT PARAMETERS

The site discharge flows for different storm events have been calculated using a DRAINS model, which is a stormwater drainage system design and analysis program. DRAINS performs hydraulic grade line analysis and generates flows that occur in a drainage system for a particular AEP storm event.

The catchment characteristic factor values for the development site used in the DRAINS model are listed below:-

- Soil Type – Normal 3.0
- Paved (Impervious) Area Depression Storage 1mm
- Supplementary Area Depression Storage 1mm
- Grassed (Pervious) Area Depression Storage 5mm
- Antecedent Moisture Condition 3.0
- Minimum Pit Blockage (Sag Pits) 0.5
- Minimum Pit Blockage (On-Grade Pits) 0.3
- Minimum Pit Freeboard 150mm

The rainfall data has been taken from the Bureau of Meteorology Rainfall IFD Data System using local coordinates.

4.2 SITE DISCHARGE RESULTS

In order to comply with the Council stormwater drainage requirements, the existing site and proposed development were both modelled in DRAINS.

Refer to Table 4.1 for the pre-development and post development discharge flows.

Table 4.1: Site Discharge Results

Storm Event (% AEP)	Pre-Development Area Discharge (L/s)	Post Development Area Discharge (L/s)
1 Year ARI Storm Event	35	8
5 Year ARI Storm Event	76	12
10 Year ARI Storm Event	90	13
20 Year ARI Storm Event	108	15
50 Year ARI Storm Event	121	19
100 Year ARI Storm Event	137	21

5. WATER QUALITY MANAGEMENT

It is proposed that all grated inlet pits within the property be fitted with Enviropod filter baskets. It is also proposed that the OSD tank be fitted with four (4) Psorb 460mm stormfilter cartridges to provide further treatment to satisfy the WSUD Council requirements. The stormwater drainage system has been designed to direct all stormwater runoff from pavements and pervious areas within the development site to the treatment chamber of the OSD tank before discharging into the stormwater channel at the rear of the development. Please refer to Schedule 2 – WS&P Design Drawings.

6. PAVEMENT DESIGN

The pavement levels within the development site have been graded at a minimum of 1% towards the north-east corner of the site. This grading is to allow a safe overland flow path for the stormwater runoff, in the event of the pit and pipe system reaching full capacity during a high rainfall event, which will allow it to discharge safely into the stormwater channel.

7. SEDIMENT & EROSION CONTROL

The Contractor for the works is required to provide Erosion and Sedimentation Control in accordance with the general requirements outlined below.

7.1 SITE PROTECTION MEASURES

It is proposed to provide the following in order to inhibit the movement of sediment off the site during the demolition and construction phases.

7.1.1 SITE ACCESS

Construction vehicles leaving the site shall be required to pass over a Temporary Construction Vehicle Entry consisting of a 1.5m long by 3m wide 'cattle rack'.

7.1.2 SEDIMENT CONTROL

All exposed earth areas where it may be possible for runoff to transport silt down slope shall be protected with a sediment and erosion control silt fence generally installed along the boundaries of the site.

The fence will be constructed in accordance with details provided by the Department of Conservation and Land Management incorporating geotextile fabric which will not allow suspended particles greater than 50mg/L non-filterable solids to pass through, and as such comply with the appropriate provisions of the Clean Waters Act 1970.

The construction of the silt fence will include the following:-

- Geotextile fabric buried to a maximum of 100mm below the surface;
- Overlapping any joins in the fabric;
- Turning up on the ends for a length of 1 metre in order to prevent volumes of suspended solids escaping in a storm event;
- Any Council owned road kerb entry and or gully pits will be protected by Atlantis Filter Bales and EcoSock. Additional protection will be provided by inserting Water Clean Filter Cartridges into the gully opening, and;
- Internal site drainage pits shall be protected by Sediment Traps consisting of hay bales.

7.2 TEMPORARY STORMWATER SYSTEM (WHERE REQUIRED)

Site runoff within the zones of the excavation will be drained into a central holding well within the excavation. Runoff will be allowed to settle out suspended particles and debris and an acceptable water quality of 50mg per litre of Non Filterable Residues (NFR) is required to be achieved prior to discharge.

7.2.1 DUST CONTROL

The following dust control procedures will be adhered to:

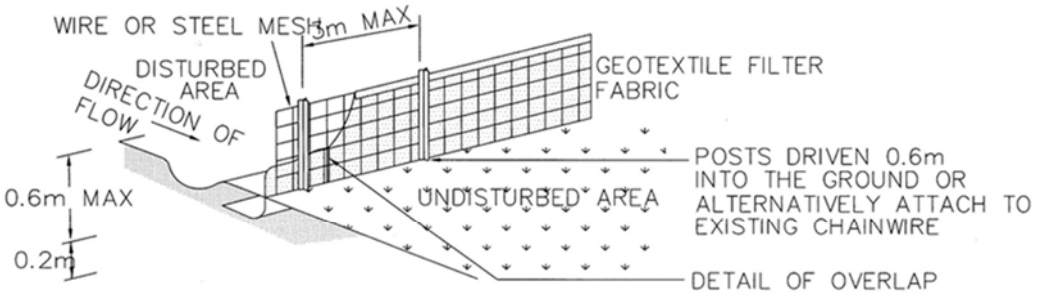
- Loose loads entering or leaving the site will be securely covered by a tarpaulin or like material in accordance with RTA and Council Guidelines.
- Soil transport vehicles will use the single main access to the site.
- There will be no burning of any materials on site.
- Water sprays will be used across the site to suppress dust. The water will be applied either by water sprinklers or water carts across ground surfaces whenever the surface has dried out and has the potential to generate visible levels of dust either by the operation of equipment over the surface or by wind. The watercraft will be equipped with a pump and sprays.
- Spraying water at the rate of not less than three (3) L/s and not less than 700kPa pressure. The area covered will be small enough that surfaces are maintained in a damp condition and large enough that runoff is not generated. The water spray equipment will be kept on site during the construction of the works.
- During excavation all trucks/machinery leaving the site will have their wheels washed and/or agitated prior to travelling on Council Roads.
- Fences will have shade cloth or similar fabric fixed to the inside of the fence.

7.2.2 MAINTENANCE

- It will be the responsibility of the site foreman for the building contractor to ensure sediment and erosion control devices on site are maintained. The devices shall be checked daily and the appropriate maintenance undertaken as necessary.
- Prior to the closing of the site each day, the road shall be swept and materials deposited back onto the site. Under no circumstances shall the laneway be washed down in order to clean or wash any materials deposited on the street.
- Gutters and roadways will be kept clean regularly to maintain them free of sediment.
- Appropriate covering techniques, such as the use of plastic sheeting will be used to cover excavation faces, stockpiles and any unsealed surfaces;

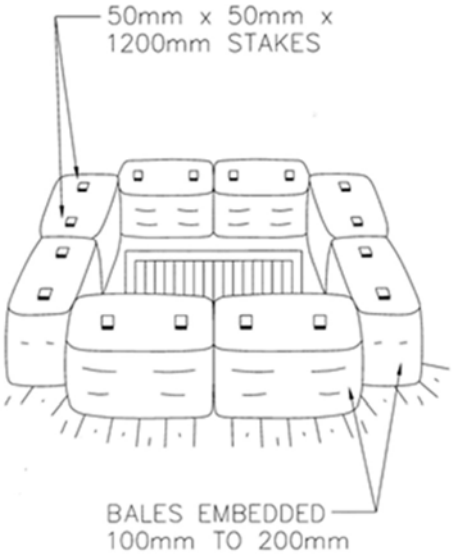
- If dust is being generated from a given surface, and water sprays fail;
- If fugitive emissions have the potential to cause the ambient as quality to foul the ambient air quality;
- The area of soils exposed at any one time will be minimised wherever possible by excavating in a localised progressive manner over the site; and,
- Materials processing equipment suitable comply with regulatory requirements. The protection will include the covering of feed openings with rubber curtains or socks.

It is considered that by complying with the above, appropriate levels of protection are afforded to the site and the adjacent public roads, footpaths and environment.



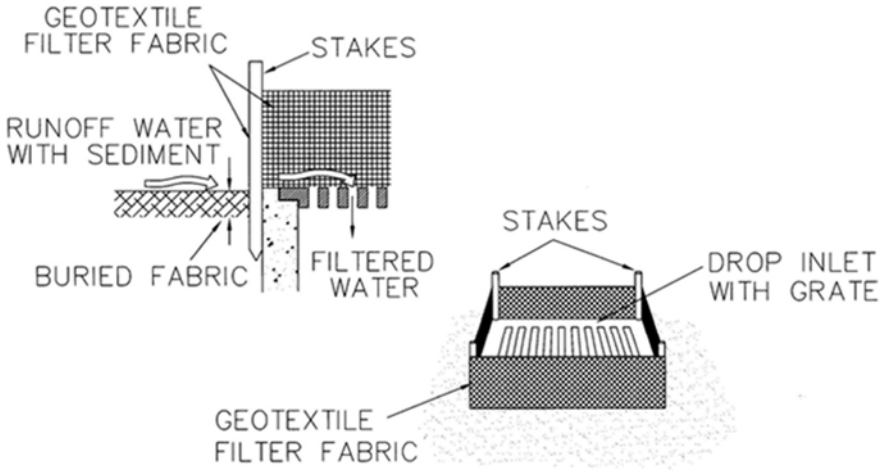
SEDIMENT CONTROL FENCE

NTS



STORMWATER PIT
SEDIMENT TRAP

NTS



GEOTEXTILE FILTER FABRIC DROP INLET
SEDIMENT TRAP

NTS

Atlantis Sediment Control Filter Bales

What are FilterBales?

Water Clean FilterBales are a unique new patented 7 stage sediment filter device developed to substantially reduce the migration of sediment and contaminants into drainage systems while allowing filtered water to easily pass through. FilterBales reduce customers' time and money by providing solutions to comply witht environmental and regulatory requirements.

Durable, Dependable, Reusable.
Replacing hay bales and other inadequate attempts to stop sediment run-off, FilterBales are durable and re-useable, effectively stopping your money from "pouring down the drain". They are also lightweight and easy to handle. Replaceable Water Clean Filter Cartridges guarantee peak performance is maintained.

Ask your local FilterBales stockist about replacement frequencies in your area. Cartridges and filter covers should be changed when the infiltration rate decreases. Water Clean FilterBales are suitable for a wide range of sediment and water management situations and can be easily secured in place for long term use. The unique multi-directional filter system allows you to position Water Clean FilterBales in any direction without reducing performance.

Water Clean FilterBales can be fixed to concrete or bitumen surfaces using an epoxy mortar-binder or fixed to earth surfaces using 6-10 mm pegs or stakes. When positioning, the side with the red reflective marker should be facing traffic.

www.atlantiscorp.com.au

1. FilterBales frames are a perforated plastic structure made from recycled wheelie bins, battery cases, milk bottles etc.

2. Filter medium (bio engineered soil media) used in the filter cartridges is made from a special blend of recycled organic (RO) materials from kerbside and vegetation drop off centres. The RO hosts enhanced naturally occurring micro-organisms. The blend also contains natural minerals to capture nutrients. The filter medium is as safe as normal soil.

3. FilterBales have a seven (7) stage filtration system.

1. In through the filter bag
2. Through the perforated plastic structure wall
3. In through the filter cartridge bag
4. Through the bio engineered filter medium
5. Out through the filter cartridge bag
6. Out through the perforated plastic structure wall
7. Out through the filter bag

4. The filter bag is made from 300-micron (one third of a millimetre) pore size geotextile. This is the first stage that filters much of the sediment and other suspended solids from the run-off water. The geotextile is designed to stop sediment and reduce clogging but allow water to pass through easily. The filter cartridge bags are made from a similar geotextile.

5. FilterBales work effectively up to "a one-in-one-year 48 hours, 100 mm "storm events". This is the largest storm event experienced since the commercialisation of FilterBales. Having handled this easily, Filter Bales are considered capable of handling much greater "storm events". During these storm events FilterBales were used inside gully pits in one application and on the ground surrounding the gully pit in another application.

6. EcoSocks are made from a similar geotextile to the filter cartridge bags and contain the same bio engineered soil media as the FilterBales. They appear able to stand up to as much wear and tear as a sandbag.

7. FilterBales are much lighter (at around 15 kgs dry weight) than hay bales. This reduces exposure to Occupational Health and Safety problems.

Product Range

Item No.	Description	
HFB001	**High FilterBale,** suitable for high flow situations and higher retention time applications. Contains two standard size WaterClean Filter Cartridges in upright formation to treat contaminated waters. (605mm x 485mm x 460mm)	
LFB002	**Low FilterBale,** suitable for low flow situations and kerb & gutter applications. Multi-directional module containing two standard size WaterClean Filter Cartridges. (605mm x 485mm x 220mm)	
ESF004	**Directional EcoSock,** can be used in conjunction with FilterBales to direct water. Will also provide some sediment filtration from seepage through bio-remediating media contained within the EcoSock (1135mm x 160mm x 30mm)	

Accessories

Item No.	Description	
FCR004	**WaterClean Filter Cartridges** contain a unique blend of fixating and bio-remediating products that treat common pollutants. To achieve maximum performance, each FilterBale uses two WaterClean Filter Cartridges. (440mm x 400mm x 100mm)	
HBC005 (High bale)	**Replaceable FilterBale covers,** made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	
HBC006 (Low bale)	**Replaceable FilterBale covers,** made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	

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Atlantis Water Management

V3-20/06/01

SCHEDULE 1 SURVEY OF EXISTING DEVELOPMENT SITE

METRES 1 2 3 4 5 10

SCHEDULE OF SHORT AND CURVED LINES

No	BEARING	DIST	ARC	RADIUS
1	58°26'20"	(0.61)		
2	4.0°35'15"	(7.135)		
4	293°40'00"	14.81	14.825	88.39
6	117°41'20"	(2.56)	(2.56)	88.39
7	24.0°56'10"	(7.19)		
8	153°23'00"	(2.51)		
9	118°26'15"	(0.25)	(0.25)	88.39

(A) EASEMENT FOR WATER SUPPLY PURPOSES 2.5 WIDE AND VARIABLE WIDTH (DP1200226)

(B) EASEMENT FOR WATER SUPPLY PURPOSES 2.5 WIDE AND VARIABLE WIDTH (DP1191624)

20.41 DETAIL & LEVELS SHOWN IN RED PREPARED BY CARDNO SURVEYORS ON 21/03/2017

GN

APPROX. TRUE NORTH (M.G.A.) (BY D.P.1200226)

KINDILAN STREET (UNFORMED)

DRAINAGE RESERVE

CONCRETE BRIDGE

VACANT

2 DP1237586 4638m²

VACANT No.2F

BITUMEN

"ALLIED PINNACLE " BRICK OFFICE METAL AND CONC. FACTORY No.4

201 D.P. 1030293

DIAGRAM N.T.S.

2 201 D P 1030293

THE CRESCENT

CRESCENT

CONC. EDGE V.C.

KERB & GUTTER

CONC. KERB & GUTTER

VEHICLE CROSSING

CONC. SLAB

MESH

FENCE

WIRE

GUTTER

SEE DIAGRAM

A 11.355 RAD. 88.39 CHORD 285°11'-11.345

A 14.825 RAD 88.39 CHORD 293°40'-14.61

58.07

49.12

32.705

32.705

107.575

20'

30"

10"

11°

281°

101°

238° 26' 00" - 49.12

220° 11' 00" - 32.705

(4.6+26')

(2.5 WIDE)

(128°35'15" - 28.635)

WARNING! The location of walls and detail points in relation to boundaries is approximate only!

NOTES

1. COPYRIGHT This drawing and/or design is the property of Harrison Friedmann & Associates Pty Ltd and should not be reproduced in part or whole without the written permission of the company.
2. Bearings and distances of boundaries and areas are from Land and Property Information records only.They are on ***Map Grid of Australia***. If accurate True North is required a further survey would be necessary.
3. NO BOUNDARY SURVEY HAS BEEN MADE. Relationship of improvements to boundaries is diagrammatic only. Boundary fences and retaining walls have not been accurately located and may not be shown on this plan.DO NOT SCALE OFF THIS PLAN. Where offsets from improvements, fences or walls to boundaries are critical for future building design and construction they MUST be confirmed by a further boundary survey. This survey has not investigated any subterranean structures.
4. The services information shown on this plan have been determined from visual inspection only. It is passed on with the understanding that no excavation or works will be commenced without a current services search of all services being obtained from "Dial before you dig" (DBYD) (phone 1100 or fax 1300 652 077) or from any individual service provider. Note that not all services providers are members of DBYD.
5. The location of Sydney Water's Sewer Main has been plotted approximately, based on visible maintenance holes and/or information from Sydney Water. This information can not be relied on. Any construction near Sydney Water Mains requires further investigation, a Service Protection Report (sewer pegout) and approval from Sydney Water.
6. The locations of spot levels are diagrammatic only. They are accurate to ± 0.3m in relation to boundaries. Levels critical to design, excavation or construction must be verified. If contours are shown they depict the topography rather than represent the exact level at any particular point. Care should be taken if extrapolating levels or contours.
7. The spread of the crown of the trees shown on this plan is diagrammatic only, based on the average spread observed in the field. Prior to any development proposal which might be affected by trees it is recommended that the tree spreads be verified by field inspection.
8. Australian Height Datum was established from P.M.2873 R.L. 21.376 located in The Crescent. Datum source obtained from S.C.I.M.S. 03/06/2013.

ALL ABOVE NOTES ARE AN INTEGRAL PART OF THIS PLAN

Legend

BB	Bottom of Bank	GM	Gas Meter	TK	Top of Kerb	VFL	Verandah Floor Level
BFL	Balcony Floor Level	INV	Invert Level	TP	Telstra Pillar	W	Window
BRK	Bottom of Rock	LW	Lower Window	TR	Top of Roof	WC	Toilet
BRW	Bottom Retaining Wall	ML	Metal Lid	TRK	Top of Rock	WM	Water Meter
CONC	Concrete	PAR	Parapet	TRW	Top Retaining Wall	G	GAS
EC	Edge of Concrete	PC	Pedestrian Crossing	TW	Top Wall	H	Hydrant
FL	Floor Level	RL	Relative Level	USA	Underside of Awning	LH	Lamp Hole
FP	Flag pole	TB	Top of Bank	USG	Underside of Gutter	LP	Light Pole
G	Grate	TF	Top of Fence	UW	Upper Window	MH	Man Hole
GFL	Garage Floor Level	TG	Top of Gutter	VC	Vehicle Crossing	PP	Power Pole

SP Sign Pole
SV Stop Valve
T Telstra
T Telstra Pillar
—S— Approximate Location of Sydney Water Sewer Main (vide Hydra)

HARRISON FRIEDMANN & ASSOCIATES PTY LTD
INCORPORATING THE PRACTICE OF **MICHAEL J. STYNES** ABN 69 001 953 331
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PLAN SHOWING SITE DETAILS AND LEVELS FOR BUILDING DESIGN PURPOSES AT 2F THE CRESCENT KINGSGROVE LOT 2 IN DP 1237586

FOR W & J LEE PROPERTY INVESTMENTS PTY LTD

REDUCTION RATIO 1:200 @ A1	SURVEYED / DRAWN DT/JC
DATUM A.H.D.	CHECKED
DATE 27/09/2019	REFERENCE 52378DT **65492 DT** SHEET 1 OF 1

PLOTTED: 12/12/19 - 4:36PM

CAD FILE NAME: 65492DT DET 3.DWG

SCHEDULE 2 GUTTER SIZING CALCULATIONS

ROOF STORMWATER DRAINAGE

EAVES GUTTER AND DOWN PIPE SIZING

Project Name: Combined Skips, Kingsgrove

Project No.: 4986000

Engineer: Ivan Lim

Date: 14/04/2015

Revision: B

DP No	AREA	AREA m^2	INTENSITY	RUNOFF "C"	DISCHARGE (L/s)	GUTTER SIZE(mm)	DOWN PIPE SIZE
		135	201	1	7.5	200mm Half Pipe	125
		135	201	1	7.5	200mm Half Pipe	125
		135	201	1	7.5	200mm Half Pipe	125

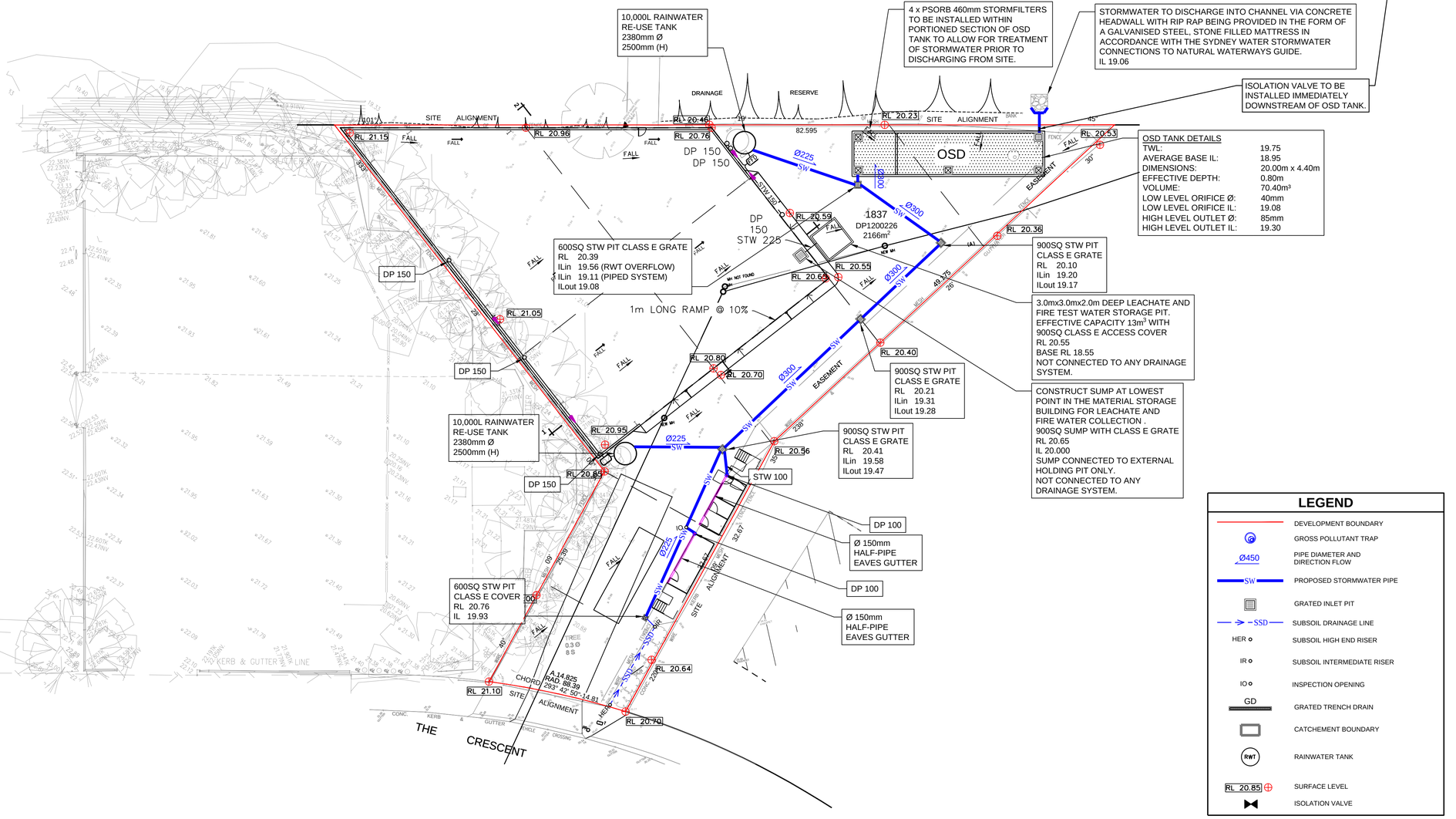
ROOF STORMWATER DRAINAGE

BOX GUTTER AND DOWNPIPE SIZING

Project Name:	Combined Skips, Kingsgrove	Project No.:	4986000
Engineer:	IL	Date:	13.04.2015
		Revision:	A

						Note 1	Note 2						Note 3		
DP No	AREA	INTENSITY $^{100}I_5$	RUNOFF	DISCHARGE	DISCHARGE	**ADOPTED GUTTER WIDTH**	D_G	FLOW DEPTH D_G - 25	LENGTH (MAX)	SLOPE	DEPTH HIGH POINT	DEPTH LOW POINT	**ADOPTED DEPTHS**		**DOWN PIPE**
													HIGH POINT	**LOW POINT**	
	m^2	mm/hr	C	L/s	L/min	mm	mm		mm	%	mm	mm	**mm**	mm	**mm**
	188	260	1	13.6	814.7	**300**	146	121	18154	1.0	182	364	**300**	**500**	150
	204	260	1	14.7	884.0	**300**	153	128	13100	1.0	192	323	**300**	**450**	150
	204	260	1	14.7	884.0	**300**	153	128	13100	1.0	192	323	**300**	**450**	150

SCHEDULE 3 WS&P DESIGN DRAWINGS



STORMWATER DRAINAGE PLAN

SCALE 1:200

LEGEND

- DEVELOPMENT BOUNDARY
- GROSS POLLUTANT TRAP
- Ø450 — PIPE DIAMETER AND DIRECTION FLOW
- SW — PROPOSED STORMWATER PIPE
- GRATED INLET PIT
- SSD — SUBSOIL DRAINAGE LINE
- HER — SUBSOIL HIGH END RISER
- IR — SUBSOIL INTERMEDIATE RISER
- IO — INSPECTION OPENING
- GD — GRATED TRENCH DRAIN
- CATCHEMENT BOUNDARY
- RWT — RAINWATER TANK
- RL 20.85 — SURFACE LEVEL
- ISOLATION VALVE

NOTES:-
1. ALL STORMWATER GRATED INLET PITS WITHIN THE DEVELOPMENT SITE TO BE FITTED ENVIROPOD FILTER BASKETS.
2. 4 x PSORB 460mm STORMFILTERS TO BE INSTALLED WITHIN THE PORTIONED SECTION OF THE OSD TANK.

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NORTH POINT

NORTH

NOTES

2.5 0 2.5 5.0 7.5 10.0m
PLAN SCALE 1:200 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SHEET SIZE: A1

ISSUE	AMENDMENT	DATE	ISSUE	AMENDMENT	DATE
A	PRELIMINARY ISSUE	01.04.15			
B	RE-ISSUE FOR REVIEW	14.04.15			
C	RE-ISSUE FOR DA	02.05.16			
D	FIRE WATER PIT ADDED	17.05.18			
E	OSD TANK ADDED	21.05.18			
F	SUBSOIL DRAINAGE ADDED	23.05.19			
G	ADDITION OF ISOLATION VALVE	05.06.19			
H	ADDITION OF OUTLET DETAILS	12.09.19			
J	RE-ISSUE FOR DA	12.12.19			

CLIENT: Combined Skips

PROJECT: PROPOSED RESOURCE MANAGEMENT FACILITY
2D THE CRESCENT, KINGSGROVE

Warren Smith & Partners Pty Ltd
1st Floor, 123 Clarence Street, Sydney 2000 NSW Australia
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CONSULTING ENGINEERS
Hydraulic Services Fire Protection Civil Engineering
Sydney Water Accredited Water Servicing Co-ordinator
Design Project Management - Building Plan Approvals
SERVING THE CONSTRUCTION INDUSTRY SINCE 1981.
Lic No: QAC/RS1/0771

TITLE: STORMWATER DRAINAGE PLAN

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	J.M	L.S	M.C.	M.C.

DATE	DRAWING No.	ISSUE
APRIL 2015	C-20	J

JOB No. 4986000

STATUS: PRELIMINARY ISSUE

STORMWATER CATCHMENT PLAN

SCALE 1:200

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NORTH POINT

NORTH

NOTES

2.5 0 2.5 5.0 7.5 10.0m
PLAN SCALE 1:200 A1 SHEET

ISSUE	AMENDMENT	DATE	ISSUE	AMENDMENT	DATE
A	PRELIMINARY ISSUE	01.04.15			
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CLIENT

Combined Skips

PROJECT

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Design Project Management - Building Plan Approvals

SERVING THE CONSTRUCTION INDUSTRY SINCE 1981.

Lic No: QAC/RS10771

TITLE

STORMWATER CATCHMENT PLAN

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	J.M	L.S	M.C.	M.C.
DATE	DRAWING No.		ISSUE	
APRIL 2015	C-22		J	
JOB No.	STATUS			
4986000	PRELIMINARY ISSUE			

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SHEET SIZE: A1

Xrefs: 4802020_AHL_SAVE(1)_FS-STORMWATER DRAINAGE
Plotted: 12 APR 2019 - 11:18 by Jagan Mohan Chandra
Cad File: T:\4986000\CAD\Cad\4986000-C-20.dwg

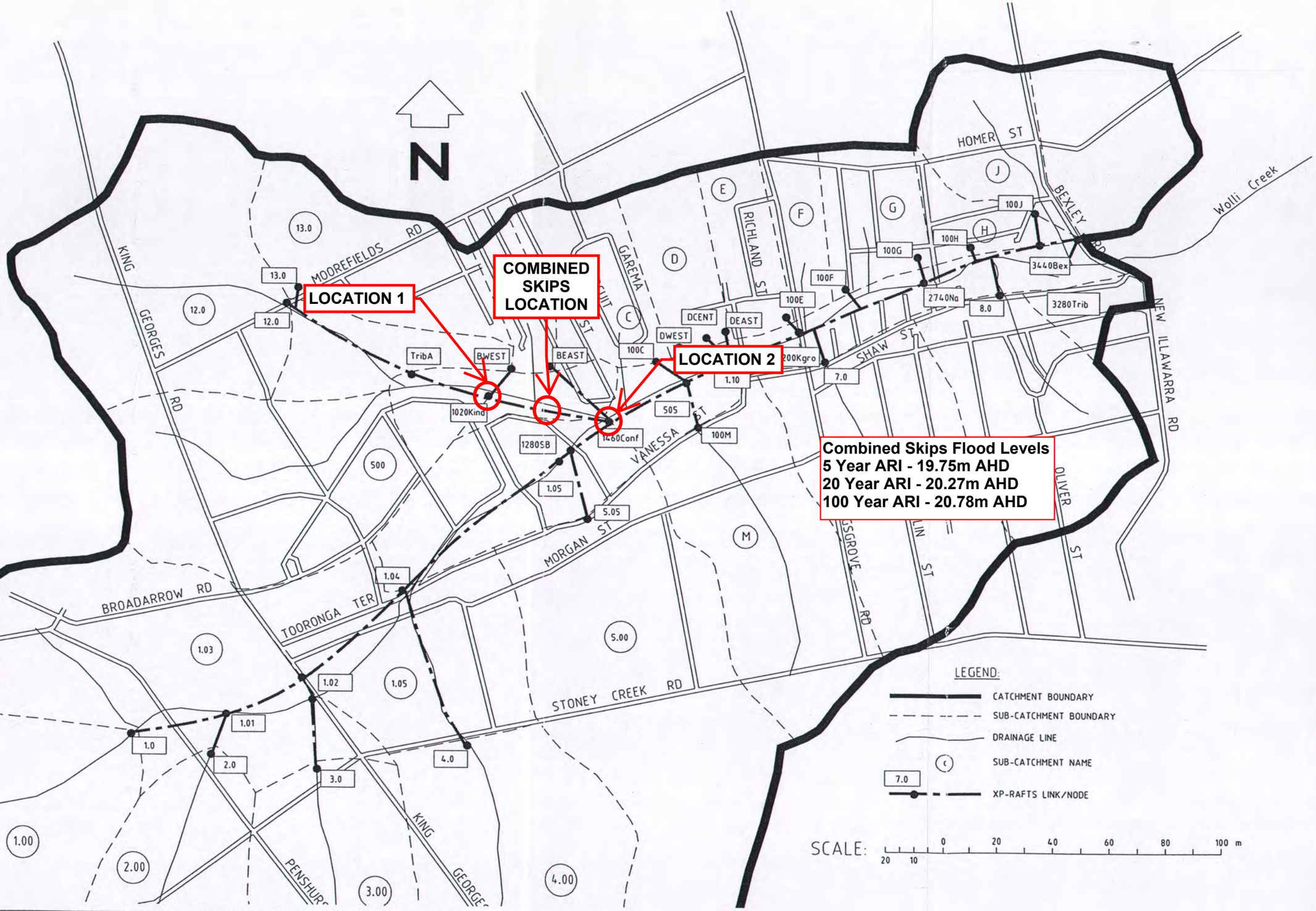
SCHEDULE 4 M5 EAST PROJECT – WOLLI CREEK FLOOD STUDY

TABLE 12 COMPARISON OF PRE AND POST M5 MOTORWAY FLOOD LEVELS

Node Name	Location	Existing Invert Elevation (m AHD)	5 Yr ARI Flood			20 Yr ARI Flood			100 Yr ARI Flood			Probable Maximum Flood		
			Existing Peak Elevation (m AHD)	Post M5 Peak Elevation (m AHD)	Peak Elevation Difference (m)	Existing Peak Elevation (m AHD)	Post M5 Peak Elevation (m AHD)	Peak Elevation Difference (m)	Existing Peak Elevation (m AHD)	Post M5 Peak Elevation (m AHD)	Peak Elevation Difference (m)	Existing Peak Elevation (m AHD)	Post M5 Peak Elevation (m AHD)	Peak Elevation Difference (m)
500		24.12	25.79	25.59	-0.20	25.89	25.73	-0.17	25.97	25.85	-0.12	26.23	26.20	-0.02
540		23.74	25.29	24.44	-0.86	25.35	24.64	-0.71	25.40	24.94	-0.46	25.69	26.00	0.31
580Kooemba	Kooemba Rd	23.23	25.08	24.11	-0.97	25.20	24.36	-0.85	25.38	24.65	-0.73	25.67	25.97	0.30
620		23.04	24.65	23.82	-0.83	25.11	24.14	-0.97	25.30	24.40	-0.90	25.52	25.96	0.44
660		22.14	24.05	*	*	24.19	*	*	24.28	*	*	24.82	25.94	1.12
700		22.24	24.00	*	*	24.15	*	*	24.24	*	*	24.77	25.91	1.14
720		22.01	23.99	*	*	24.13	*	*	24.23	*	*	24.75	25.85	1.10
740		21.84	23.98	*	*	24.13	*	*	24.22	*	*	24.74	25.82	1.08
760		21.68	23.98	*	*	24.12	*	*	24.22	*	*	24.73	25.80	1.07
780	Opposite	21.72	23.95	*	*	24.09	*	*	24.18	*	*	24.67	25.56	0.89
800	Tallawalla St	21.75	23.93	*	*	24.06	*	*	24.15	*	*	24.62	25.31	0.70
820		21.86	23.77	*	*	23.90	*	*	23.99	*	*	24.45	25.14	0.68
860		21.74	23.48	*	*	23.60	*	*	23.69	*	*	24.08	24.92	0.83
900		21.26	23.03	*	*	23.16	*	*	23.29	*	*	23.84	24.61	0.78
940		21.37	22.94	*	*	23.08	*	*	23.21	*	*	23.72	24.03	0.30
980		21.19	22.85	*	*	23.00	*	*	23.12	*	*	23.60	23.89	0.28
1020Kind	Kindilan St	20.70	22.51	21.30	-1.21	22.91	21.65	-1.26	23.02	22.12	-0.90	23.42	23.29	-0.14
1060		19.74	22.00	21.04	-0.96	22.17	21.41	-0.77	22.32	21.85	-0.47	22.86	23.00	0.14
1100		19.40	21.88	20.83	-1.05	22.06	21.20	-0.85	22.15	21.61	-0.53	22.65	22.68	0.03
1140		19.41	21.85	20.61	-1.24	22.02	21.00	-1.02	22.09	21.34	-0.74	22.52	22.32	-0.20
1180		20.28	21.85	20.43	-1.42	22.01	20.84	-1.17	22.06	21.18	-0.89	22.46	22.04	-0.41
1220		19.332	20.74	20.24	-0.50	21.02	20.68	-0.34	21.21	21.00	-0.21	21.69	21.67	-0.02
1260		19.05	20.43	20.00	-0.44	20.95	20.45	-0.50	21.14	20.79	-0.36	21.60	21.47	-0.12
1300		18.262	20.32			20.55			20.71			21.54		
1320Trib		18.38	20.31	19.66	-0.65	20.54	20.15	-0.39	20.70	20.50	-0.20	21.53	21.35	-0.18
1360		18.21	20.23			20.48			20.66			21.51		
1400		18.01	20.20	19.14	-1.06	20.46	19.57	-0.90	20.64	19.73	-0.91	21.50	21.28	-0.22
1440	Confluence of	17.81	20.19			20.46			20.64			21.49		
1460conf	nth & sth branches	17.654	20.19	18.28	-1.91	20.46	18.96	-1.50	20.64	19.51	-1.13	21.49	21.27	-0.22
1500	Opp Garema Cct	18.06	20.12	18.01	-2.12	20.37	18.69	-1.68	20.53	19.03	-1.50	21.28	21.25	-0.04
1540		17.82	20.12			20.36			20.51			21.20		
1580		15.785	18.47	17.66	-0.81	18.73	18.43	-0.30	18.97	18.73	-0.24	20.27	20.81	0.54
1600		15.63	18.22	17.59	-0.63	18.53	18.32	-0.21	18.79	18.65	-0.15	20.23	20.80	0.57
1640Trib		15.399	18.21			18.53			18.80			20.24		
1680		15.13	17.96	17.45	-0.51	18.28	18.06	-0.22	18.55	18.43	-0.12	20.14	20.75	0.61
1720		14.926	17.75			18.06			18.34			20.07		
1740		14.82	17.68	17.49	-0.19	17.99	17.96	-0.03	18.27	18.31	0.04	20.05	20.72	0.67
1760		14.726	17.60			17.92			18.20			20.03		
1780		14.63	17.52			17.84			18.13			20.01		
1820		14.383	17.40			17.72			18.01			19.98		
1860		14.21	17.25	16.88	-0.37	17.58	17.54	-0.04	17.90	17.95	0.05	19.95	20.64	0.69
1900		14.057	17.06			17.45			17.79			19.92		
1940		13.90	16.90	16.06	-0.85	17.34	17.22	-0.11	17.69	17.69	0.00	19.84	20.58	0.74
1980		13.748	16.74			17.23			17.60			19.79		
2020Kar	Karingal St	13.59	16.56	15.76	-0.80	17.10	16.80	-0.30	17.49	17.42	-0.07	19.74	20.47	0.73
2060		13.335	16.41			16.93			17.36			19.70		
2100		13.14	16.15	15.48	-0.67	16.77	16.40	-0.37	17.25	17.03	-0.22	19.67	20.24	0.57
2140		12.992	16.00			16.72			17.21			19.65		
2160		12.85	15.92	15.47	-0.45	16.69	16.41	-0.28	17.19	17.03	-0.16	19.64	20.12	0.48
2180		12.77	15.82			16.65			17.16			19.63		
2200Kgro	U/s Kingsgrove Rd	12.45	15.94	15.43	-0.51	16.67	16.37	-0.30	17.17	16.99	-0.18	19.63	20.08	0.45
2220Kgro	D/s Kingsgrove Rd	11.9	14.92	15.21	0.29	15.21	15.70	0.49	15.87	16.15	0.28	17.78	17.85	0.07
2240		11.78	14.91	15.27	0.36	15.46	15.76	0.30	15.77	16.20	0.43	17.71	17.90	0.19
2280		11.56	14.50			15.26			15.58			17.63		
2320York	York St	11.314	14.27	13.25	-1.02	15.06	13.70	-1.36	15.35	14.33	-1.02	17.22	17.13	-0.10
2360		11.05	14.21	13.05	-1.16	14.99	13.49	-1.50	15.28	14.03	-1.25	16.87	17.01	0.14
2400		10.82	13.80			14.92			15.20			16.56		
2440Korrel	Koreela St	10.63	13.59	12.58	-1.01	14.21	13.00	-1.21	14.55	13.60	-0.95	16.20	16.77	0.57
2480		10.318	13.32			13.90			14.28			16.06		
2520		10.05	12.95	12.15	-0.80	13.55	12.62	-0.93	13.93	13.24	-0.69	15.86	16.61	0.74
2540Girraw	Girraween St	9.82	13.04			13.53			13.91			15.85		
2600		9.56	12.51	11.80	-0.71	12.97	12.30	-0.67	13.36	12.82	-0.54	15.63	16.51	0.87
2640Bobad	Bobadah St	9.217	12.27	11.64	-0.63	12.70	12.08	-0.63	13.09	12.64	-0.45	15.50	16.48	0.97
2680		9.02	12.07	11.48	-0.58	12.46	11.98	-0.48	12.84	12.54	-0.30	15.39	16.46	1.07
2720		8.747	11.47			12.07			12.61			15.25		
2740Na	Nairn St	8.48	11.46	11.40	-0.06	12.05	11.89	-0.16	12.53	12.39	-0.14	15.16	16.38	1.21
2800		8.12	11.36	11.30		11.96	11.78		12.45	12.29		15.08	16.26	1.19
2860	Beaumont St	8.01	10.89	11.26		11.40	11.73		11.84	12.22		14.80	16.22	1.42
2900		7.695	10.76	10.48	-0.27	11.22	10.95	-0.27	11.62	11.45	-0.17	14.70	15.48	0.78
2940		7.44	10.62	10.46		11.09	10.90		11.49	11.38		14.60	15.43	0.83
2980		7.17	10.30			10.79			11.16			14.33		
3020	Near Flatrock Rd	6.61	9.50	9.60	0.11	10.19	10.12	-0.07	10.84	10.64	-0.20	14.00	14.70	0.70
3060	Bridge	6.06	9.30	9.58	0.28	9.92	10.09	0.17	10.45	10.61	0.15	13.43	14.56	1.13
3100		5.62	9.11	8.80	-0.31	9.70	9.43	-0.27	10.21	9.97	-0.24	13.00	13.86	0.86
3140		5.24	8.93	8.80	-0.12	9.47	9.43	-0.04	9.94	10.02	0.07	12.28	13.76	1.49
3180		4.99	8.85	8.75	-0.10	9.37	9.32	-0.06	9.83	9.89	0.06	12.00	13.58	1.59
3220		4.68	8.77	8.76	-0.01	9.26	9.30	0.04	9.70	9.81	0.11	11.59	13.45	1.86
3260		4.39	8.75	8.79	0.04	9.23	9.29	0.06	9.66	9.72	0.06	11.49	13.42	1.94
3280Trib		4.19	8.74	8.81	0.07	9.22	9.32	0.11	9.64	9.75	0.11	11.40	13.42	2.01
3320		3.81	8.73	8.77	0.04	9.21	9.25	0.04	9.62	9.65	0.03	11.00	13.30	2.30
3360		3.38	8.72	8.74	0.03	9.20	9.21	0.01	9.61	9.60	-0.01	11.00	13.25	2.25
3400		3.13	8.70	8.72	0.02	9.18	9.17	0.00	9.59	9.55	-0.04	11.22	13.19	1.97
3420		3.02	8.70	8.71	0.02	9.17	9.16	-0.01	9.58	9.53	-0.04	11.30	13.17	1.87
3440Bex	U/sBexley Rd	3.00	8.69	8.71	0.02	9.16	9.16	0.00	9.57	9.53	-0.04	11.35	13.16	1.81
3460Bex	D/s Bexley Rd	2.60	8.65	8.64	-0.02	9.10	9.05	-0.05	9.48	9.38	-0.11	11.54	12.76	1.22
1280SB	The Crescent	17.70	20.95	20.68	-0.28	21.29	21.00	-0.29	21.52	21.36	-0.16	22.99	22.51	-0.47
Beast		21.50	21.89			22.04			22.12			21.53		
100C		20.10	20.47	20.60	0.14	20.59	20.70	0.11	20.67	20.79	0.12	21.15	21.66	0.51
Dwest		16.50	17.25			17.58			17.90			19.95		
Deast		15.30	16.14			16.77			17.25			19.67		
100J		11.09	11.80	12.28	0.48	11.97	12.35	0.38	12.10	12.37	0.26	13.06	14.69	1.63
100L		16.00	16.22	16.22		16.28	16.28		16.33	16.33		16.86	17.00	
100M		18.00	18.28			18.34			18.36			19.96		
Outfall		2.50	8.60	8.60	0.00	9.00	9.00	0.00	9.30	9.30	0.00	12.00	12.00	0.00
TribA		22.20	24.78	23.38	-1.40	24.95	23.72	-1.23	25.10	24.11	-0.99	25.70	29.00	3.30
Bwest		22.50	22.92			23.12			23.16			23.42		
Dcent		15.80	16.74			17.23			17.60			19.79		
100E		14.25	16.36	18.11	1.75	16.46	18.13	1.67	16.50	18.15	1.65	17.78	20.42	
100F		13.50	15.61			15.73			15.76			16.06		0.03
100G		14.60	18.04	18.08	0.04	18.06	18.09	0.02	18.08	18.10	0.02	18.23	18.27	

* Flow fully contained in culverts

Table Version 2.31



A	ORIGINAL ISSUE	X/XX	XX
AMDT.	DESCRIPTION	DATE	INIT.

AMENDMENTS

SCALES:

CO-ORDINATE SYSTEM	HEIGHT DATUM

WILLING & PARTNERS (N.S.W.) PTY LTD
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Tel No. +61 1021 9959 5002

DATE: DEC' 98	DESIGNED: JT
DRAWN: TT	VERIFIED: BCP

FOR HYDER CONSULTING

PROJECT: MS EAST PROJECT
WOLLI CREEK FLOOD STUDY

TITLE: XP-RAFT LINK-NODE DIAGRAM

DRAWING No.: FIGURE C1

ISSUE No.:

0 50 100 150 200 300 on original A1

CAD ref: \3906\3906-fc1.DWG, PLOT SCALE:1:1, DRAWN:T.T., DATE:1/03/99, AutoCAD r13. International

COMBINED SKIPS FLOOD LEVEL INTERPOLATION

5 YEAR ARI	
Combined Skips Chainage (x)	22
Location 2 Chainage (x2)	43
Location 1 Chainage (x1)	0
Location 2 Post M5 Flood Level (y2)	18.28
Location 1 Post M5 Flood Level (y1)	21.3
Combined Skips Post M5 Flood Level (y)	19.75488

20 YEAR ARI	
Combined Skips Chainage (x)	22
Location 2 Chainage (x2)	43
Location 1 Chainage (x1)	0
Location 2 Post M5 Flood Level (y2)	18.96
Location 1 Post M5 Flood Level (y1)	21.65
Combined Skips Post M5 Flood Level (y)	20.27372

100 YEAR ARI	
Combined Skips Chainage (x)	22
Location 2 Chainage (x2)	43
Location 1 Chainage (x1)	0
Location 2 Post M5 Flood Level (y2)	19.51
Location 1 Post M5 Flood Level (y1)	22.12
Combined Skips Post M5 Flood Level (y)	20.78465

NOTE:

1. Location 1 = Node 1020Kind, Location 2 = Node 1460Conf
2. $y = y1 + (y2 - y1) * ((x - x1) / (x2 - x1))$

STORMWATER DRAINAGE
PIPE SIZING SCHEDULE

Project Name: Combined Skips, Kingsgrove

Project No.: 4986000

Engineer: Ivan Lim

Date: 1/04/2015

Revision: A

Note 1 : Rainfall intensity from Bureau of Meteorology

							SUB. TOTAL						CUM. TOTAL
LINE	AREA	CATCHMENT AREA m^2	TOTAL AREA m^2	RUNOFF COEFF.	RAINFALL INTENSITY (Note 1) mm/hr	DISCHARGE L/s	Branch (eg : ST1)	SUB TOTAL DISCHARGE L/s	MIN. PIPE GRADE %	PIPE SIZE mm	PIPE ROUGHNESS K	CAPACITY L/s	TOTAL DISCHARGE L/s
	1	111.65	111.7	1	94.5	2.9		2.9	1	225	0.015	79	2.9
	2	311	422.8	1	94.5	8.2		11.1	1	225	0.015	79	11.1
	3	215	637.6	1	94.5	5.6		16.7	1	225	0.015	79	16.7
	4	101	738.8	1	94.5	2.7		19.4	1	225	0.015	79	19.4
	5	302	1040.8	1	94.5	7.9		27.3	1	225	0.015	79	27.3
	6	99	1139.4	1	94.5	2.6		29.9	1	225	0.015	79	29.9
		Total	**1139.4**									**Total**	**29.9**

Warren Smith & Partners

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