MONTEFIORE AGED CARE FACILITY

SIR MOSES MONTEFIORE JEWISH HOME

100-120 KING STREET, RANDWICK

PART 3A CONCEPT PLAN

STORMWATER DRAINAGE CONCEPT PLAN

RESIDENTIAL SCHEME

Prepared for:

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Date: 1 September, 2015

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1. INTRODUCTION

This development is for the extensions to the Sir Joseph Montefiore Jewish Home Aged Care facility (Montefiore) in the Sydney suburb of Randwick. The site is situated at the corner of King and Dangar Streets, Randwick, and covers an area of 2.93 Ha. Montefiore was constructed on land previously used as a transport depot and the initial stages were substantially completed in late 2006.

The initial development comprised construction of about 50% of the total site area and Emerson Associates Pty. Ltd., the author of this report, designed the detention system and Council diversion pipeline for that original development.

The topography of the original transport depot formed a natural drainage depression sloping towards the west between Govett Lane to the north and King Street to the south and carried a drainage pipe in a Council Easement discharging through the site and through downstream properties.

The adjacent downstream property, constructed at about the same time as the Montefiore development, does not contain an overland flow path and so this site cannot allow for overland flow discharge.

As part of the initial construction, extensive stormwater drainage modeling was carried out on the site and in surrounding streets covering a total catchment area of about 38 Ha. A drainage system, including a Council diversion pipeline through the site, was then designed to meet specific Council requirements including:

- Site discharge to be limited by detention to the equivalent flow produced by a 1 hour 5 year ARI storm for the undeveloped site assessed at 323 l/sec,
- Combined flow from the site discharge and Council pipeline discharge to be limited to the capacity of downstream pipework assessed at 1030 l/sec,
- Total detention storage capacity to be increased by 50% to allow for the lack of an overland flow path through the downstream property, and
- Council pipeline to be oversized so that flow through the site is capable of being increased in the future if and when downstream pipework in upgraded.

Whilst external roads are subject to overland flow, and low points in Dangar Street and Govett Lane are subject to ponding in major storm events, the site itself is not part of an overland flow route and is not subject to external flood threat. Internal overland runoff not within the pipe system travels via the internal road network to the open detention basin at the low part of the site.

2. ORIGINAL DEVELOPMENT

The Council diversion pipeline through the site was installed to run from King Street on the south of the site in a drainage easement along the south and west boundaries, stepping around the existing childcare facility in the south west corner of the site, and to discharge at a point along the western boundary to pipework installed in the adjoining development.

The pipe sizing of the Council pipeline is designed for a flow suitable for its catchment which is greater than the flow limit downstream. Flow is restricted in the downstream pipework by an orifice plate fixed to the outlet of a pit adjacent to King Street with an overflow to pipework in King Street.

The orifice plate can be removed to allow a future increase in flow within the pipeline, and hence reduced overland flow in King Street, subject to future downstream upgrading of the Council pipeline through the bus depot and other downstream properties.

A section of this pipeline downstream of the orifice plate and overflow pit stepping around the existing child-care facility was installed as a temporary pipe within a temporary easement pending redevelopment of the child-care facility, at which time it was proposed to install the final pipe route along the south and west boundaries.

The internal drainage design for the original Montefiore development required strict flow limits as the discharge was into the Council pipeline and the resultant peak flow, when combined with the flow downstream of the orifice plate in the Council diversion pipeline, had to conform to the flow limit placed on the downstream Council pipework.

The flow limit for the downstream pipework was set at 1030 l/sec and the Montefiore site discharge limit was set at 323 l/sec. The flow in the Council pipeline downstream of the orifice plate was set to allow this limit to be achieved with excess flow discharging to King Street.

The Montefiore site has no overland flow path from the lowest portion of the site and Council required 50% additional detention capacity to allow the on-site storage of stormwater in the event of an exceedence of the 100 year ARI design criteria or a blockage or failure in the downstream pipework.

Total detention provided in the original construction was around 1590 cu.m. of primary storage for the 100 year ARI storm event and a further informal 795 cu.m. of storage as air space above the open detention area (R-1) near the outlet to allow for the 50% additional detention required in the approval.

All discharge from the site is by gravity to the Council pipeline at the point where it leaves the site.

3. PROPOSED WORKS

The works proposed under the Part 3A Concept Plan for the Residential Scheme includes the construction of 3 new accommodation buildings labelled 'D', 'E' and 'F' along the southern half of the site. These buildings will be constructed over shared basement car parking and will incorporate a child care facility and a retail plaza at ground level. Existing buildings on site include 'A', 'B' and 'C' and will not be affected by the new development.

The proposed drainage works will allow for the following construction works:

a. The removal of the structural detention tank 'M-1' near building 'C' and the pipe detention tank 'M-2' near the western boundary;

b. Construction of a new 275 kl detention tank M-1A adjacent to the Basement Level 1 car park between Building 'E' and existing building 'C' to replace the existing detention tank 'M-1' removed above;

c. Construction of a new 600 kl detention tank M-2A under the floor slab of Basement Level 1 accommodation units and car parking in building 'F' to replace the existing detention tank 'M-2' removed above;

d. Construction of a 750 kl recycle water storage tank collecting the roof discharge from buildings 'E' and 'F' and overflowing to Basin M-2A;

e. Extending existing open detention basin 'R-1' to the north to form basin 'R-1A' in order to maintain the 50% reserve capacity air space volume at or below RL 38.3;

f. Modify the outlet pit to basin 'R-1A' as shown to adjust capacity to permitted limits; and

g. Installation of the 1200 dia. Council pipeline to the southern and western boundaries after demolition of the existing child care facility.

The detention system will at all times maintain the existing approval conditions. All discharge from the proposed detention system will be by gravity flow.

The relocation to the final easement of the Council pipeline through the site will be carried out when the existing childcare facility is removed. The orifice plate in pit A6, which reduces downstream flow to suit the 1030 l/sec combined flow limit, will be relocated over the new outlet pipe and the new pipework will be installed to the final size of 1200 mm dia. to allow for future removal of the flow restriction by Council if and when required.

All roof-water from buildings 'E' and 'F' will be directed to the recycle tank which will overflow to the adjacent detention tank 'M-2A' when full. The stored water will be used for toilet flush, irrigation, car wash and/or other non-potable uses. Air space above normal Top Water Level in this tank will be used to supplement detention volumes.

Discharge from detention tank 'M-1A' will be taken to the second new detention tank ('M-2A') under Building 'F' via new pipework in the relocated entry road from King Street.

The proposed tank 'M-2A' will have an open base to allow soakage into the sand below the outlet level and in order to provide a horizontal floor to increase headroom for man access for maintenance. Any stored water below the outlet level will infiltrate into the sand after the storm is finished and is not relied upon in the detention calculations.

The outflow from detention tank 'M-2A' will discharge via existing pipework parallel with the Council pipeline easement along the western boundary to the site outlet control pit 'P- 4'.

Open detention basin 'R-1A' will be enlarged by excavation and reshaping at the northern end to increase available volume. The reshaped detention basin will be called 'R-1A'.

The outlet control pit 'P-4' will be modified by removing the orifice plate. This is due to the fact that extensive modelling has determined that detention is more efficient upstream and basins have been provided at 'M-1A, and 'M-2A'. An outlet orifice of 450 mm (i.e. equal to the outlet pipe diameter) is most efficient at 'R-1A' with Basins 'N-1' and 'M-2A' discharging directly to basin 'R-1A'. Basin 'R-1A' is thus controlled by the outlet pipe diameter and not an orifice plate.

The Council pipeline will be relocated to its final location and size in this phase of the works. The orifice plate restricting flow in the 1200 dia Council pipe (to be removed when upgraded downstream) will be relocated over the new outlet and the existing disused bypass pipeline will be discarded.

4. DESIGN CRITERIA

The following design criteria were used for the analysis of the proposed new works:

- Plan area of new detention tank 'M-1A' is assumed to be 85 sq.m. with the outlet control orifice diameter assumed to be 280 mm and the centre of the orifice and base of the tank to be at RL 37.50 to 37.70 AHD.
- Plan area of new detention tank 'M-2A' is assumed to be 646 sq.m. with the outlet control orifice diameter assumed to be 450 mm and the centre of the orifice and base of the tank to be at RL 37.10 AHD.

5. ANALYSIS RESULTS

The system was analysed in the urban stormwater computer program, DRAINS, using the model schematic shown in the appendix and with results also as shown in the appendix. The system was optimized for a maximum discharge flow of 323 l/sec, being the upper limit permitted by Council.

Detention basin performance was as follows:

Proposed Detention Basin Performance

Name	Max WL AHD	MaxVol cu.m.
Basin M-1A	40.91	273
Basin M-2A	38.12	594
Basin R-1A	37.61	219
Basin N-1	39.45	500
Recycled Tank	39.06	138
TOTAL		1724

As previously stated, there is no overland flow path from this site and consequently the proposed detention system for the Part 3A Concept Plan was designed for the 100 year ARI rainfall event and then a 50% reserve volume was added to the open detention basin ('R-1A') over the volume required for the 100 year ARI design to cater for partial blockages in the system or limited exceedence of the 100 year ARI rainfall rate.

The following table shows the peak water levels in the open detention basin during the critical 100 year ARI rainfall events and the water level at 50% additional storage in basin R-1 and R-1A.

	Basin R-1A Peak Water Level (m AHD)	
Storm Event	Existing	Proposed
100 year ARI	37.2	37.6
+ 50% volume	37.6	38.2

Note that the lowest habitable floor levels exposed to the water levels in the development are at RL 38.50 AHD whilst the lowest entrance to the basement car park is at RL 40.99. The sunken loading dock road level in the existing building is at RL 37.27 AHD with the dock floor level at RL 38.30 AHD. Car park and lift foyer levels in level 1 of the existing building are also at RL 38.30 AHD and hence clear of all calculated peak water levels.

The existing landscape level along the western boundary against the adjoining downstream property is approximately RL 38.00 with an existing masonry boundary wall above this level to provide flood security from stored detention water within the 50% excess capacity zone.

6. CONCLUSION

This stormwater concept plan conforms to Randwick City Council's Private Stormwater Code (2013) and to conditions imposed for the original development in 2005 and 2006.

The proposed design arrangements and analysis show that the existing discharge restrictions and 100 year ARI plus 50% additional storage requirements can be accommodated after the construction for the proposed Part 3A Concept Plan Building works at the site.

Replacing the existing basins 'M-1' and 'M-2' with new basins and re-contouring of the landscape for basin 'R-1' can be carried out to future designs to suit the building works, landscape objectives and detention requirements whilst achieving the required discharge limits and storage volumes.

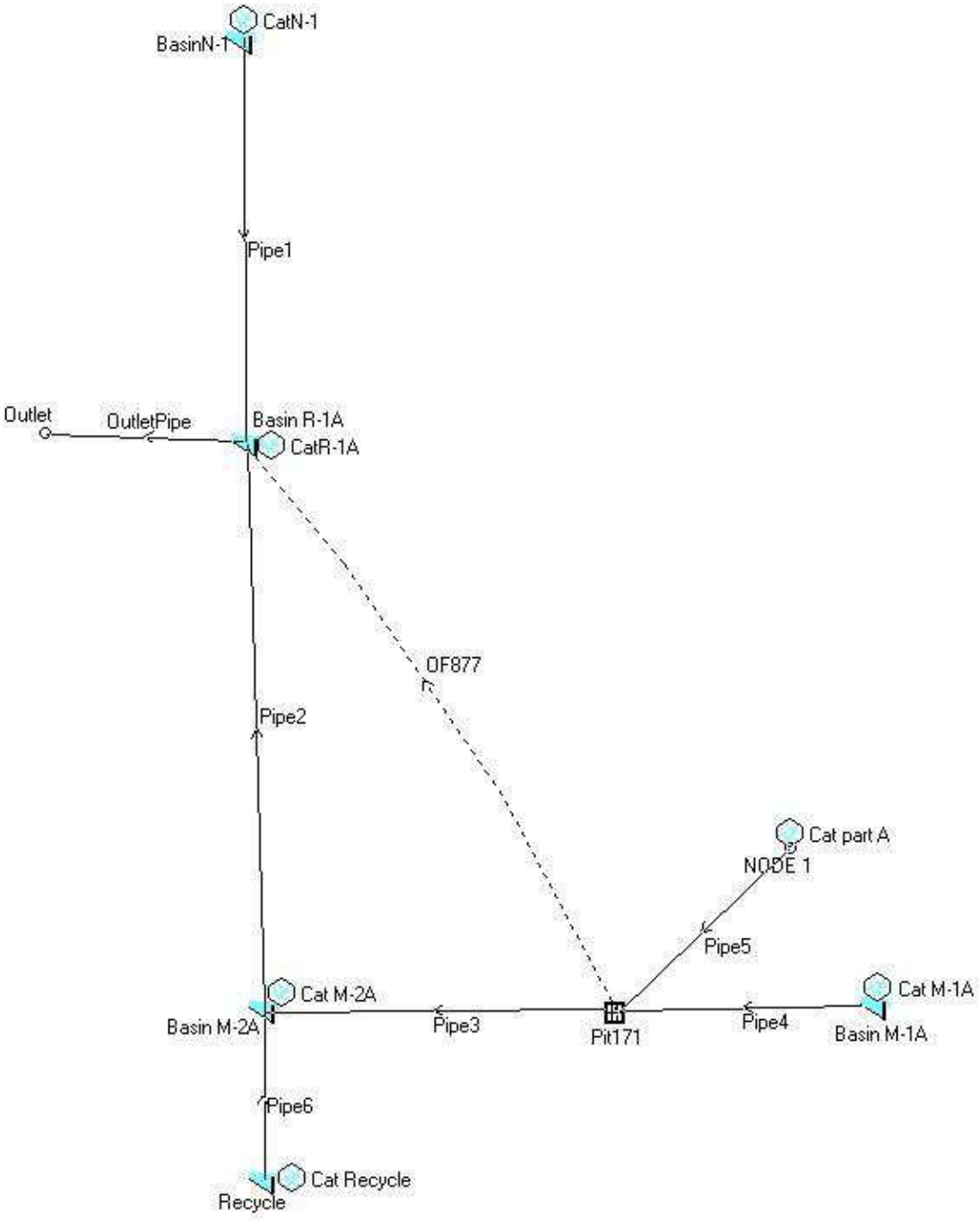
Roofwater recycling will be implemented with a rainwater storage tank between buildings 'E' and 'F' and will be for non-potable uses such as toilet flush and irrigation. This will supplement existing stormwater recycle storage located near the northern boundary of the site which would be suitable for irrigation with adequate filtration.

The Council pipeline will also be completed to its final locations and diameter as part of the proposed works.

7. APPENDICES

The following diagrams, calculation results and drawings are appended hereto:

1. DRAINS computer modeling layout diagram.
2. DRAINS result sheet for the development.
3. Drawings:
    a. 1144-SW01 - PROPOSED LAYOUT
    b. 1144-SW02 - DETENTION BASINS SKETCH DETAILS
    c. 1144-SW03 - OUTLET PIT AND LONG SECTION



DRAINS Layout Diagram

DRAINS results prepared 21 August, 2015 from Version 2013.11

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)
CatN-1	0.424	0.31	0.114	7	10	5
CatR-1	0.28	0.162	0.123	7	8	0
Side Cat	0.132	0.107	0.027	7	8	5
Cat M-3	0.189	0.119	0.074	7	8	5
Cat5350	0.215	0.215	0	5	5	5
Cat M-1	0.567	0.482	0.092	7	8	5

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
Pipe1	0.05	0.45	37.646	37.609	100 year, 2 hours storm
OutletPipe	0.304	2.45	37.109	36.688	100 year, 1.5 hours storm
Pipe5	0.131	1.19	38.161	38.158	100 year, 20 minutes storm
Pipe3	0.364	1.02	38.125	38.115	100 year, 1.5 hours storm
Pipe2	0.293	1.35	37.655	37.609	100 year, 1 hour storm
Pipe7637	0.051	1.12	38.118	38.115	100 year, 1 hour storm
Pipe4	0.274	1.27	38.274	38.158	100 year, 1 hour storm

OVERFLOW ROUTE DETAILS

Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width
OF877	0	0	1.138	0	0	0

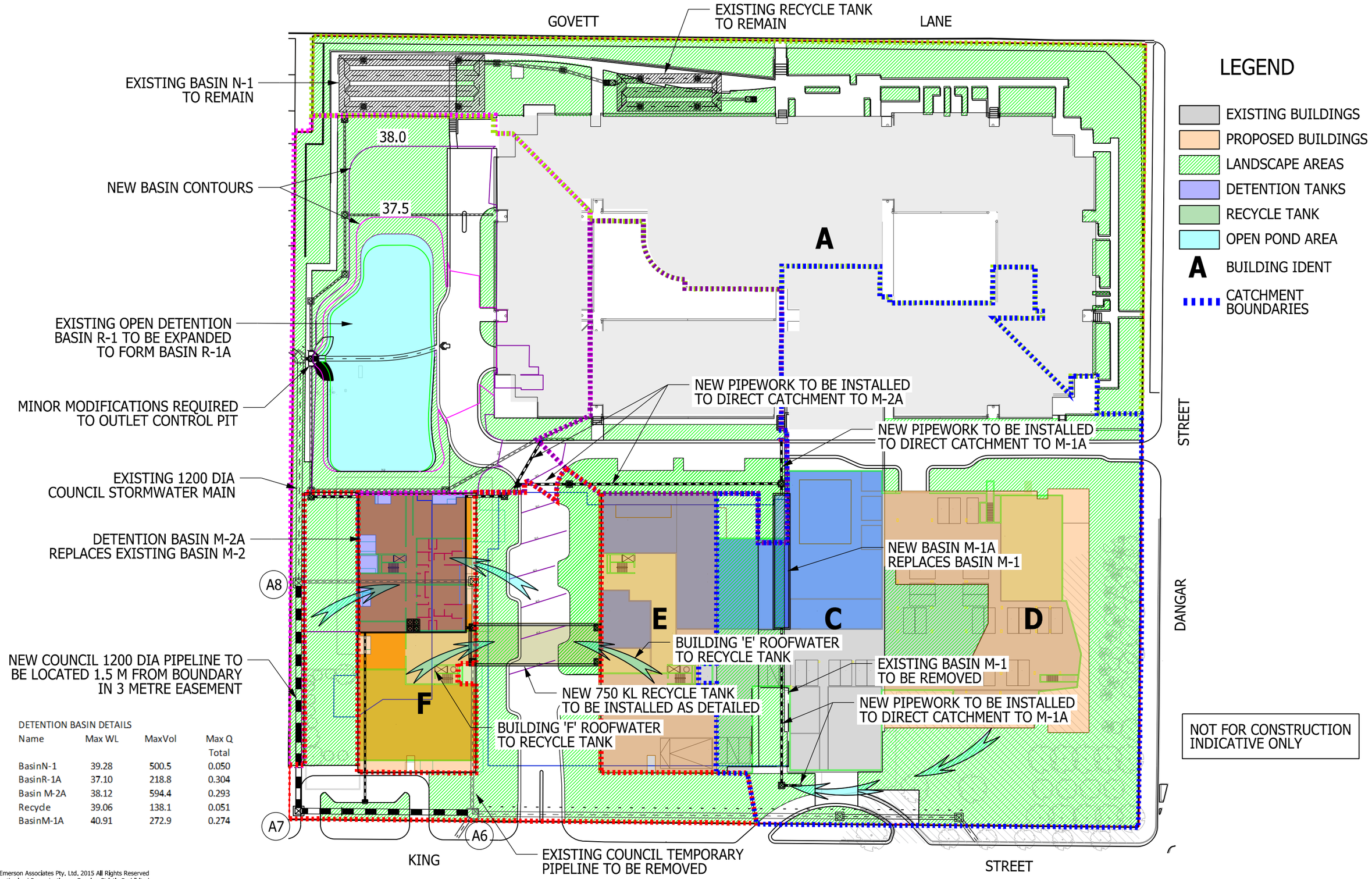
DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total	Max Q Low Level	Max Q High Level
BasinN-1	39.28	500.5	0.05	0.05	0
BasinR-1A	37.10	218.8	0.304	0.304	0
Basin M-2A	38.12	594.4	0.293	0.293	0
Recycle	39.06	138.1	0.051	0.051	0
BasinM-1A	40.91	272.9	0.274	0.274	0

Run Log for MontefioreStage4.drn run at 16:10:02 on 21/8/2015

No water upwelling from any pit. Freeboard was adequate at all pits.
Flows were safe in all overflow routes.

DRAINS Results



DETENTION BASIN DETAILS

Name	Max WL	MaxVol	Max Q Total
BasinN-1	39.28	500.5	0.050
BasinR-1A	37.10	218.8	0.304
Basin M-2A	38.12	594.4	0.293
Recycle	39.06	138.1	0.051
BasinM-1A	40.91	272.9	0.274

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ISSUE	BY	AMENDMENT	DATE
B	JE	UPDATED	31/08/2015
A	JE	INITIAL ISSUE	21/08/2015

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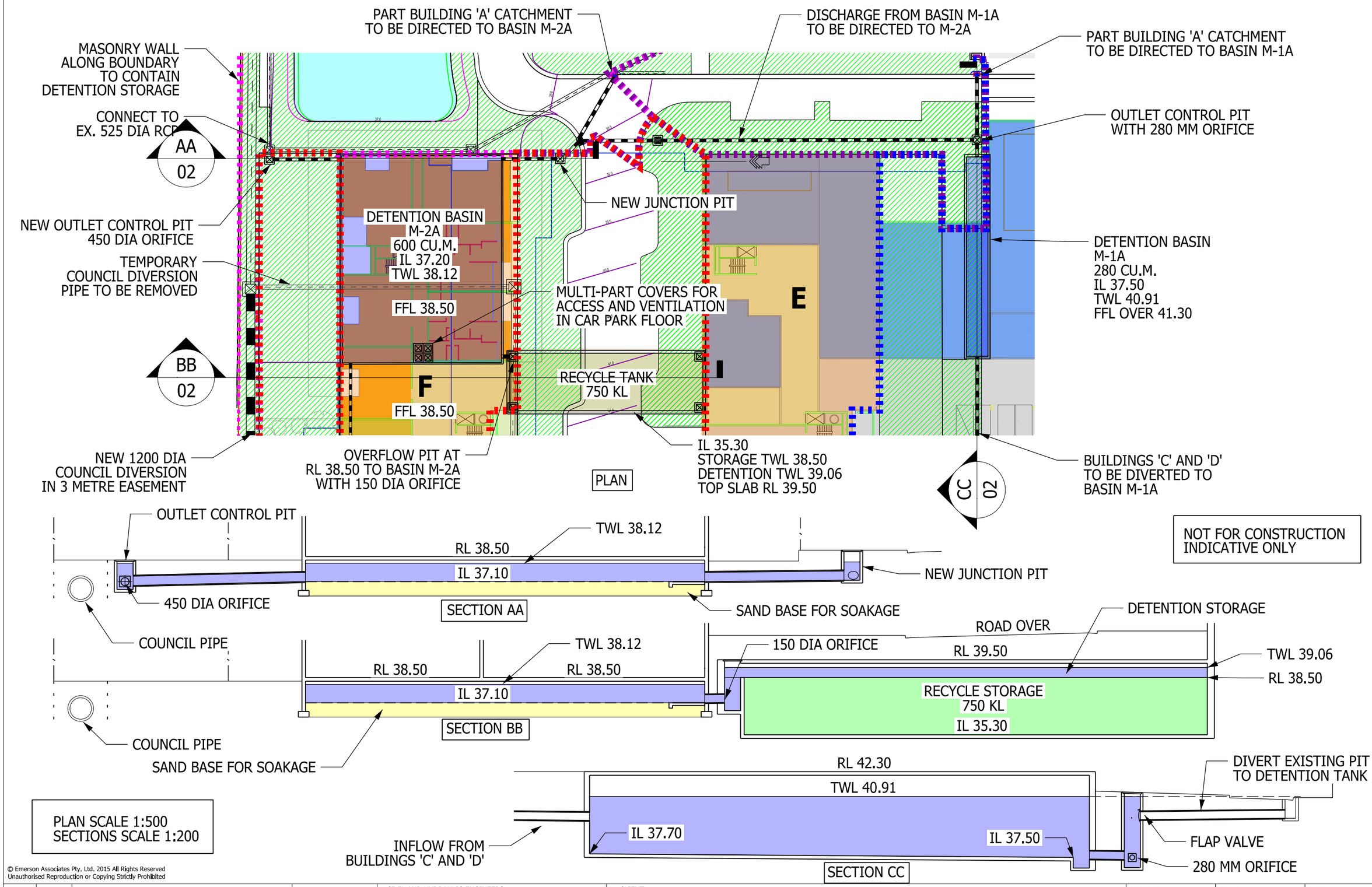
CLIENT	SIR MOSES MONTEFIORE JEWISH HOME	PROJECT No. 1144	SCALE 1:750	DATE AUGUST 2015	
PROJECT	STORMWATER CONCEPT PLAN - RESIDENTIAL SCHEME	DESIGNER/DRAWN JE	DRAWING No. 1144-SW- 01		ISSUE B
DRAWING	PROPOSED LAYOUT	CHECKED JE			



PLAN SCALE 1:500
SECTIONS SCALE 1:200

ISSUE	BY	AMENDMENT	DATE
B	JE	UPDATED	31/08/2015
A	JE	INITIAL ISSUE	21/08/2015

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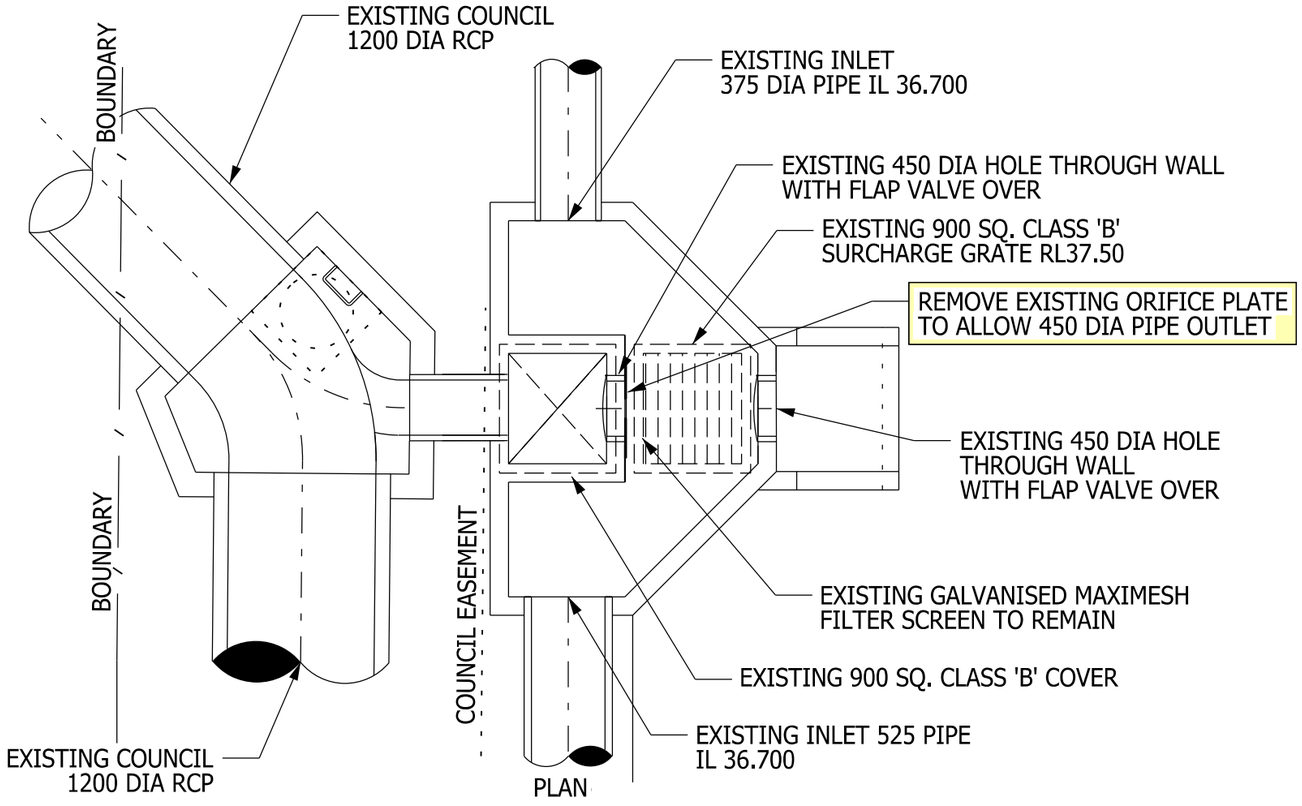
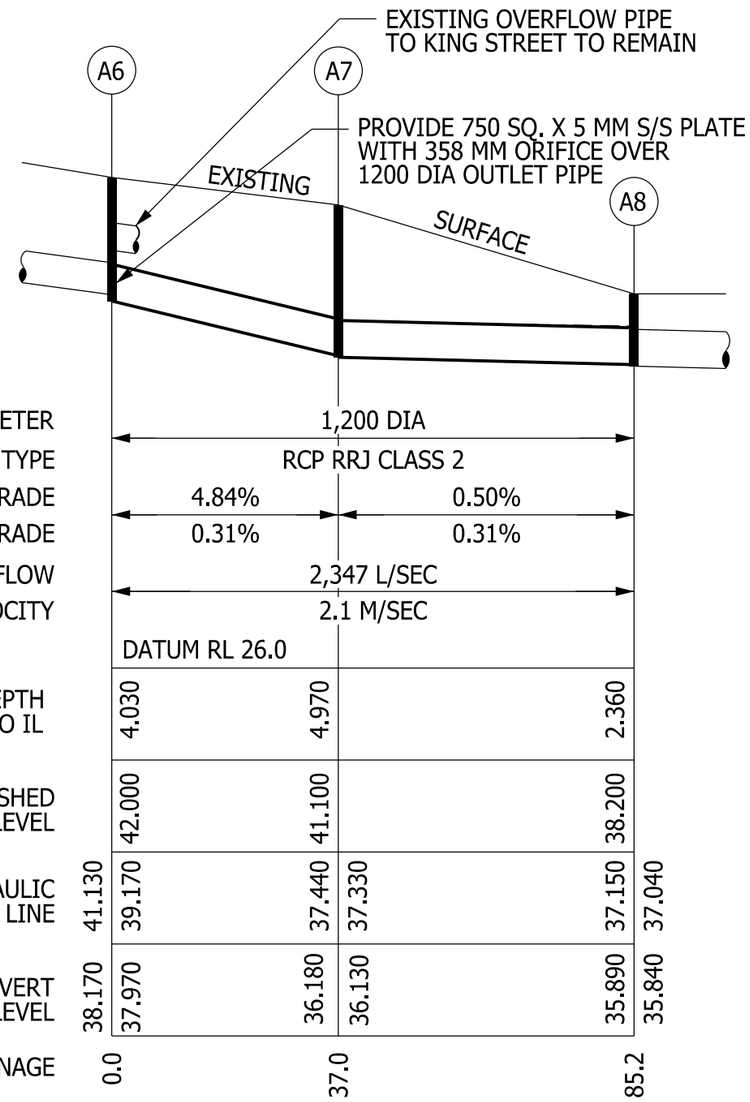
PROJECT	STORMWATER CONCEPT PLAN - RESIDENTIAL SCHEME	DESIGNER/DRAWN JE	DRAWING No. 1144-SW- 02		ISSUE B
DRAWING	DETENTION BASIN SKETCH DETAILS	CHECKED JE			



NOTE:
ACTS AS HIGH EARLY DISCHARGE WITH FLOW FROM SIDE PIPES DISCHARGING THROUGH GRATE APPLYING CONSTANT HEAD TO SITE OUTLET.

MODIFICATIONS TO OUTLET PIT AT DETENTION BASIN R-1A

SCALE 1:20



	A6	A7	A8
DIAMETER	1,200 DIA		
PIPE TYPE	RCP RRJ CLASS 2		
PIPE GRADE	4.84%	0.50%	
HYDRAULIC GRADE	0.31%	0.31%	
Q100 FLOW	2,347 L/SEC		
VELOCITY	2.1 M/SEC		
	DATUM RL 26.0		
DEPTH FSL TO IL	4.030	4.970	2.360
FINISHED LEVEL	42.000	41.100	38.200
HYDRAULIC GRADE LINE	41.130 / 39.170	37.440	37.330 / 37.150 / 37.040
INVERT LEVEL	38.170 / 37.970	36.180	36.130 / 35.890 / 35.840
CHAINAGE	0.0	37.0	85.2

LINE A

PRELIMINARY COUNCIL DIVERSION LONGITUDINAL SECTION

SCALE V-1:200 H-1:1000

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CLIENT	SIR MOSES MONTEFIORE JEWISH HOME	PROJECT No. 1144	SCALE AS SHOWN	DATE AUGUST 2015
PROJECT	STORMWATER CONCEPT PLAN - RESIDENTIAL SCHEME	DESIGNER/DRAWN JE	DRAWING No. 1144-SW- 03	ISSUE B
DRAWING	OUTLET PIT AND LONG SECTION	CHECKED JE		