

# Water Sensitive Urban Design Strategy Report

## PROPOSED COMMERCIAL DEVELOPMENT

Corner Punchbowl and Cosgrove Road, Enfield

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REVISION 005

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## Document Control

| Revision | Date     | Description        | Prepared | Reviewed | Approved |
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## Introduction

Sparks & Partners have been engaged by Flower Power Pty Ltd, to provide civil engineering services to support the proposed Development Application for a proposed commercial development at the corner of Punchbowl and Cosgrove Road, Enfield. The engineering services include the design and documentation of the storm water drainage infrastructure and finished pavement levels for the proposed development.

Strathfield City Council being the approval authority for the proposed development, require a Water Sensitive Urban Design (WSUD) Strategy Plan be prepared that takes into consideration the objectives and controls under Strathfield Development Control Plan 2005 (SCC DCP) Part N. In response to this requirement Sparks and Partners has undertaken modelling of the proposed integrated water management measures and prepared this report to demonstrate that the proposed Commercial development identifies and incorporates water conservation and stormwater management measures into its design and operation in accordance with the requirements of Part N of the SCC DCP.

## *Existing Site*

The Existing site is approximately 2.470 ha and consists of an existing building which is heritage listed. The proposed development extents do not extend to all boundaries of the subject property as it is part of the intermodal facility and access is provided through the existing site. The site is bounded by Mount Enfield to the west, 123 Cosgrove Road to the north, Cosgrove Road to the east and Punchbowl road to the South. Sydney Water Channel Coxs Creek is located north of the site and is beyond a nearby Frog Pond area requiring preservation; measures to be put in place to mitigate any disturbances within this area.

## *Proposed Development*

The proposed development will be used as a commercial site (Flower Power Garden Center). The existing building, being heritage listed, will be used as part of the proposed development, car park and storage pavement areas, and landscaping areas. The building occupies 0.617 ha, the pavement area proposed is to occupy 1.163 ha and the landscaping will occupy 0.690 ha. Retaining walls will be provided along Mount Enfield due to the proposed extents of the carparking are requiring the reshaping of the existing terrain.

## WSUD Objectives

The objective of WUSD is to provide a strategy that brings together the different aspects of the water cycle as a whole rather than an ad hoc approach to water management. This includes the management aspects of freshwater, wastewater and stormwater and to minimize the impacts on the urban water cycle. The following WSUD objectives according to Part N of the Strathfield Council DCP have been considered and addressed for the proposed development:

- Protect and enhance natural water systems (creeks and rivers etc.)
- Treat urban stormwater to meet water quality objectives for reuse and/or discharge to receiving waters.
- Match the natural water runoff regime as closely as possible (where appropriate).
- Reduce potable water demand through water efficient fittings and appliances, rainwater harvesting and wastewater reuse.
- Provide objectives and controls for specific WSUD elements including water conservation, stormwater quality and waterway stability management.

To demonstrate the above concept, stormwater drainage plans and associated details have been prepared along with detailed modelling using the Council endorsed MUSIC software package. The concept stormwater drainage plans (included in Appendix A) detail the location of the water management infrastructure and this report describes the treatment measures taken to achieve these objectives and Strathfield Council's Water treatment targets. Coordination has been undertaken with Sydney Water to connect to the Coss Creek Channel just north of the site. In order to connect to their Channel, water treatment targets set by Sydney Water which are the same as those set by Strathfield Council will need to be met.

## *Rainwater Reuse*

Through the reuse of collected roofwater for non-potable reuse the proposed demand on potable water resources is reduced. The proposed development will capture roof water from part of the building roof area (0.3ha – maximum 50% of roof area can be connected to Rainwater Tank – SCC WUSD reference Guidelines part 2.4 Table 6). This collected roofwater will be conveyed to a 30kL tank for storage and reuse throughout the development. Re-use purposes will primarily include toilet flushing and irrigation uses. A water balance of the proposed reuse system has been completed to model the effectiveness and efficiency of the system. The water balance model was constructed using the MUSIC software package with the following inputs:

- Sydney Airport Rainfall data (Rainfall Station 066037, 6 minute time step and in 1979-1988 modelling period).
- Total approximate non-potable reuse of 1000kL per year plus 600L/day based on the following assumptions:
  - 100 persons using the facility each day and using the toilet (6L per flush) facilities one time each per day (6L per person x 100 persons = 600L).
  - 2500m<sup>2</sup> of irrigated area requiring 10mm rainfall per week equates to approx. 1000kL per year with a distribution factor for Potential Evapotranspiration.

Using the above determined non-potable demand the MUSIC model determines the rainwater tank met the reuse demand up to 82.6% (SCC WUSD minimum water use demand of 80% met according to Strathfield Council WUSD Fact Sheet). This efficiency results in an approximate reduction in the proposed demand on potable water supplies of 1000kL per year.

## *Stormwater Quality*

To ensure the quality of stormwater leaving the site is acceptable and complies with Strathfield Council's and Sydney Water's requirements, specific water quality treatment measures are to be

employed. These treatment measures are to treat the collected stormwater runoff prior to discharge into the Sydney Water Channel (Coxs Creek) located to the north of the site. The treatment measures consist of Enviropods from Stormwater 360, a Rainwater Tank which is to collect no more than 50% of the roof catchment, and a Sandfilter Chamber within the On-site Detention Tank. The combination of these measures provides a treatment train approach to the treatment of stormwater runoff.

Modelling of the proposed treatment measures has been undertaken using the MUSIC software package version 6. The modelling results of the water quality achieved for the site is detailed in Table 1 – MUSIC Model Results below, along with a figure of the prepared model.

Further Details of the MUSIC Model including catchment details, source nodes, treatment nodes etc. are shown in Appendix B. Soil parameters for the source nodes were set according to Table 4 of Section 2.2 (Rainfall runoff Parameters in SCC WSUD reference Guideline March 2011). Nodes verified by a third party (Blacktown City Council) have been utilized within the model to demonstrate treatment train effectiveness.

|                                | Source Load | Residual Load | % Reduction Achieved | SW % Reduction Requirement | SCC % Reduction Requirement | Compliance with SCC Requirement |
|--------------------------------|-------------|---------------|----------------------|----------------------------|-----------------------------|---------------------------------|
| Total Suspended Solids (kg/yr) | 3590        | 314           | 91.3                 | 85                         | 85                          | Yes                             |
| Total Phosphorus (kg/yr)       | 11          | 2.33          | 78.9                 | 65                         | 65                          | Yes                             |
| Total Nitrogen (kg/yr)         | 37.4        | 19.7          | 47.3                 | 45                         | 45                          | Yes                             |
| Gross Pollutants (kg/yr)       | 432         | 0.00146       | 100                  | 90                         | 90                          | Yes                             |

Table 1 - MUSIC Model Results

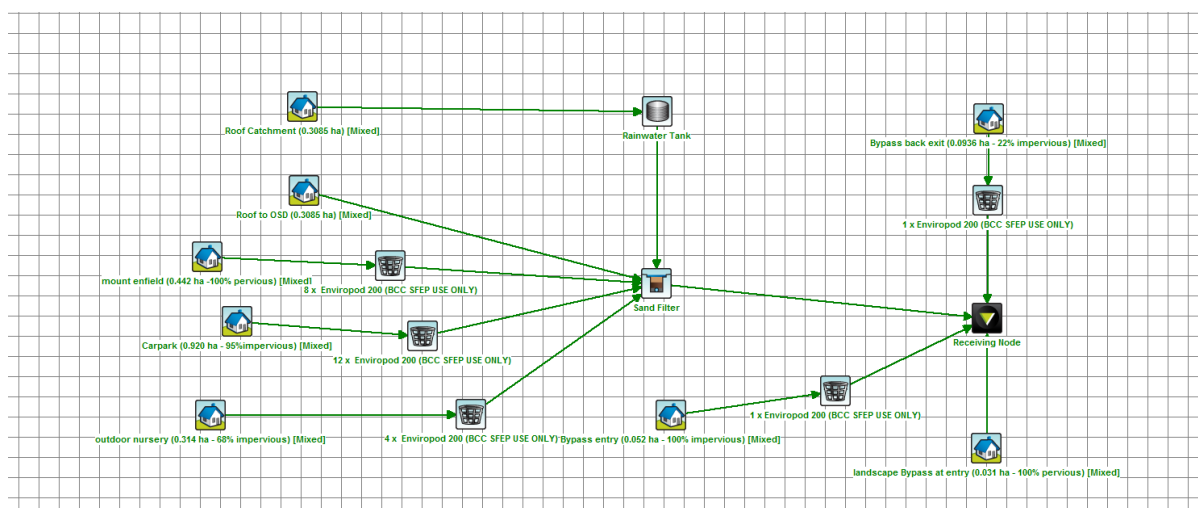


Figure 2 - MUSIC Model

## Stormwater Quantity

The proposed development requires the implementation of on-site detention (OSD) as per the SCC Stormwater Management Code 1994 part 5 for Development to control stormwater discharge from the site. The proposed development has an approximate area of 93% draining to the proposed on-site detention (OSD) facility which includes hardstand (10,905m<sup>2</sup>), roof (6,170m<sup>2</sup>) and landscaped (5858m<sup>2</sup>) areas. There are two separate areas of catchment bypassing the OSD, one draining to the Sydney Water Channel (936m<sup>2</sup>) and one draining to Council's drainage system (833m<sup>2</sup>). Both these

Bypass catchment areas are treated with an Stormwater 360 EnviroPod prior to discharge. A catchment plan of the proposed development is included in Appendix C conveying the areas described above.

Liaising with Sydney Water was undertaken to establish a connection with the Sydney Water Channel (Coxs Creek), north of the site. Based on the above catchment areas the storage required for the proposed development is 494m<sup>3</sup> with a maximum discharge of 583L/sec, given by Sydney Water. Email from Sydney Water is shown in Appendix D.

### ***Maintenance and Monitoring***

To ensure the continued efficient and correct operation of the proposed integrated water management infrastructure, a 'maintenance and monitoring schedule' is included in Appendix E of this report. The schedule details the frequency of inspections, what is to be inspected and what rectifications to make if required for the water management infrastructure located within the proposed development. The schedule is to be implemented upon commissioning of the water management infrastructure and remain in place for the life of the development; with all records kept on site for inspection should the approval authority deem it necessary.

### **Flooding Review**

A pre DA meeting was held with Council on the 23<sup>rd</sup> December 2015 and it was raised that Councils flood mapping indicated that the site may be partially flood affected. Council was contacted to obtain this flood mapping to allow for further analysis against the proposed development. Further advice was sought from Council with regard to the flood mapping/modelling however discussions held (Said Saeed) indicated that their current modelling does not extend into the site itself. Appendix F details the correspondence and flood mapping received from Council.

Further to the above a review of the Environmental Impact Statement, Hydrology and Hydraulics (EISHH) completed in 2005 by Sinclair Knight Mertz (SKM) for the Intermodal Logistics Center was undertaken to determine relevant flood levels for the proposed development. The EISHH details the impact of the intermodal facility on the hydrology and hydraulics of the surrounding catchment, and as such includes Coxs Creek which is located to the north of the development. Figure 19 and Appendix B of the EISHH detail the modelling flood extents and relevant flood levels for the Coxs Creek Channel, and are included Appendix G of this report for reference. The modelling indicates that at chainage 287.1 the 1:100yr ARI flood level is approximately 16.119 AHD. This flood level is significantly below the proposed lowest finished levels of the proposed building and services areas of 21.000 and 19.000 respectively (refer to plan DA4.02 in Appendix A), therefore there is approximately 2.9m of freeboard from the mainstream flooding of Coxs Creek to the proposed development.

## Conclusion

Based on the preparation of the concept stormwater drainage plans and MUSIC modeling results it is demonstrated that the principles of Water Sensitive Urban Design have been incorporated into the design and operation of the proposed commercial development at the corner of Cosgrove Road and Punchbowl Road, Enfield in accordance with SCC DCP 2005 Part N. It is demonstrated that the proposed development achieves reductions in potable water by capturing rainwater on site and reusing this for non-potable uses including irrigation and toilet flushing, achieves pollution reduction targets set by council, and employs OSD for the control of stormwater discharge from the site in accordance with targets set by Strathfield Council and Sydney Water. It is demonstrated that the water conservation measures of the proposed development will continue to operate effectively and efficiently through the implementation and use of a monitoring and maintenance schedule ensuring the integrity of the system is maintained. With respect to flooding a review has been undertaken and the proposed development is determined to be located above the mainstream flooding extents of Coxs Creek with sufficient freeboard provided.

# PROPOSED COMMERCIAL DEVELOPMENT

## CORNER COSGROVE ROAD AND PUNCHBOWL ROAD ENFIELD

### CONCEPT STORMWATER MANAGEMENT

#### SITE WORKS - GENERAL

1. ALL WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH LOCAL COUNCIL, AUSTRALIAN AND AUTHORITY STANDARDS.
2. ALL TRENCHING WORKS ARE TO BE RESTORED TO ORIGINAL CONDITION.
3. THE INTEGRITY OF ALL EXISTING AND NEW SERVICES IS TO BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD.
4. ALL PLANS ARE TO BE READ IN CONJUNCTION WITH APPROVED ARCHITECTS, STRUCTURAL ENGINEERS AND OTHER CONSULTANT'S PLANS. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER FOR CLARIFICATION.
5. THE ENGINEER SHALL BE GIVEN A MIN. OF 48 HOURS NOTICE FOR ALL STORMWATER DRAINAGE AND PAVEMENT INSPECTIONS. CONCRETE SHALL NOT BE DELIVERED UNTIL ENGINEERS APPROVAL IS OBTAINED.

#### SITE WORKS - ACCESS AND SAFETY

1. ALL WORKS ARE TO BE UNDERTAKEN IN A SAFE MANNER IN ACCORDANCE WITH ALL STATUTORY AND INDUSTRIAL RELATION REQUIREMENTS.
2. ACCESS TO ADJACENT BUILDINGS AND PROPERTIES SHALL BE MAINTAINED AT ALL TIMES.
3. WHERE NECESSARY SAFE PASSAGE SHALL BE PROVIDED FOR VEHICLES AND PEDESTRIANS THROUGH OR ADJACENT TO THE SITE.

#### SEDIMENT AND EROSION CONTROL

1. THE CONTRACTOR SHALL INSTIGATE ALL SEDIMENT AND EROSION CONTROL MEASURES IN ACCORDANCE WITH STRATHFIELD COUNCIL STANDARDS AND THE "BLUE BOOK" (MANAGING URBAN STORMWATER SOILS AND CONSTRUCTION, PRODUCED BY THE DEPARTMENT OF HOUSING). THESE MEASURES ARE TO BE REGULARLY INSPECTED AND MAINTAINED.
2. THE SEDIMENT & EROSION CONTROL PLAN PRESENTS CONCEPTS ONLY. THE CONTRACTOR SHALL AT ALL TIMES BE RESPONSIBLE FOR THE ESTABLISHMENT & MANAGEMENT OF A DETAILED SCHEME MEETING COUNCIL'S DESIGN, AND ALL OTHER REGULATORY AUTHORITY REQUIREMENTS.
3. WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE SHALL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
  - a. INSTALL ALL TEMPORARY SEDIMENT FENCES AND BARRIER FENCES. WHERE FENCES ARE ADJACENT TO EACH OTHER THE SEDIMENT FENCE CAN BE INCORPORATED INTO THE BARRIER FENCE.
  - b. CONSTRUCT TEMPORARY STABILISED SITE ACCESS, INCLUDING SHAKE DOWN AND WASH PAD.
  - c. INSTALL SEDIMENT CONTROL MEASURES AS OUTLINED ON THESE SEDIMENT AND CONTROL PLANS (ONCE APPROVED)
4. THE CONTRACTOR SHALL UNDERTAKE SITE DEVELOPMENT WORKS SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF MINIMUM WORKABLE SIZE.
5. AT ALL TIMES AND IN PARTICULAR DURING WINDY AND DRY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL. TACIFIERS MAY BE USED TO CONTROL DUST DURING EXTENDED PERIODS OF DRY WEATHER.
6. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) SHALL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
7. WATER SHALL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN STABILISED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED OUT.
8. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES SHALL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE STABILISED / REHABILITATED.
9. THE CONTRACTOR SHALL ALLOW FOR THE ESTABLISHMENT OF ANY OTHER EROSION PROTECTION MEASURES. (IF APPLICABLE).
10. THE CONTRACTOR SHALL REGULARLY INSPECT (MINIMUM TWICE PER WEEK) ALL EROSION AND SEDIMENT CONTROL MEASURES TO ENSURE THEY ARE OPERATING EFFECTIVELY. REPAIRS AND/OR MAINTENANCE SHALL BE UNDERTAKEN REGULARLY AND AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.
11. ACCEPTABLE RECEPTORS SHALL BE USED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER. WASTE FROM THESE RECEPTORS SHALL BE DISPOSED OF IN ACCORDANCE WITH REGULATORY AUTHORITY REQUIREMENTS. PAY ALL FEES AND PROVIDE EVIDENCE OF SAFE DISPOSAL.

#### STORMWATER

1. DESIGN CRITERIA.
  - 1.1. ROOF DRAINAGE (Eaves and Gutter) - 1:20YR ARI
  - ROOF DRAINAGE (Box Gutters) - 1:100YR ARI
  - 1.2. PIPED DRAINAGE (MINOR STORM)- 1:50YR ARI
  - 1.3. OVERLAND FLOW (MAJOR STORM) - BETWEEN 1:50YR-1:100YR ARI
2. ALL WORKS ARE TO BE UNDERTAKEN IN ACCORDANCE WITH THE FOLLOWING AUSTRALIAN STANDARDS AS2032, AS3500 AND AS3725 AS A MINIMUM.
3. ALL PIPES LESS THAN OR EQUAL TO Ø300mm IN SIZE ARE TO BE SOLVENT WELD-JOINTED UPVC CLASS S88 U.N.O.
4. ALL PIPES Ø375mm OR GREATER IN SIZE ARE TO BE MIN. CLASS 2 RUBBER RING JOINTED (RRJ) REINFORCED CONCRETE PIPE (RCP) OR FIBRE REINFORCED CONCRETE (FRC) WITH DUAL V-RING AND COLLAR U.N.O.
5. ALL PIPES ARE TO BE LAID AT MIN. 1.0% GRADE U.N.O.
6. PIPE BEDDING IS TO BE HS2 UNDER ROADS AND TRAFFICKED AREAS AND SHALL BE H2 IN LANDSCAPED AND PEDESTRIAN TRAFFICKED AREAS U.N.O.
7. ALL PIPE BENDS AND JUNCTIONS ARE TO BE MADE WITH EITHER PURPOSE MADE FITTINGS OR STORMWATER DRAINAGE PITS.
8. MINIMUM COVER FROM THE OVERT OF THE STORMWATER PIPE OF 300mm IS TO BE PROVIDED IN LANDSCAPED AREAS AND 600mm IN VEHICULAR TRAFFICKED AREAS U.N.O.
9. WHERE MINIMUM COVER CANNOT BE ACHIEVED CONCRETE ENCASEMENT OF THE AFFECTED PIPE IS MAY BE UNDERTAKEN WITH 20MPa CONCRETE WITH A MIN. COVER OF 150mm TO ALL SIDES OF THE PIPE. THE CONTRACTOR SHALL CONFIRM THIS REQUIREMENT WITH THE ENGINEER OR SUPERINTENDENT.
10. LAID PIPELINES ARE TO HAVE THE FOLLOWING CONSTRUCTED TOLERANCES:
  - a. HORIZONTAL-1:300 ANGULAR DEVIATION FROM REQUIRED ALIGNMENT;
  - b. VERTICAL-1:300 ANGULAR DEVIATION FROM REQUIRED ALIGNMENT.
10. ALL DRAINAGE PITS ARE TO BE CAST IN-SITU, PRECAST DRAINAGE PITS MAY BE USED WITH APPROVAL FROM THE ENGINEER. THE CONTRACTOR SHALL SUBMIT A PRECAST PIT INSTALLATION WORK METHOD STATEMENT FOR ASSESSMENT BY THE ENGINEER FOR APPROVAL.
11. DRAINAGE PIT COVERS ARE TO BE EITHER GALVANISED STEEL OR CAST IRON CLASS 'B' IN LANDSCAPED AND PEDESTRIAN TRAFFICKED AREAS AND CLASS 'D' IN ALL VEHICULAR TRAFFICKED AREAS U.N.O.
12. DRAINAGE PIT COVERS ARE TO BE 'HEELSAFE' TYPE IN ALL PEDESTRIAN TRAFFICKED AREAS U.N.O.
13. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED PRIOR TO COMMENCING WORKS ON SITE.
14. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
15. DOWN PIPES CONNECTED DIRECT TO PIPES TO BE CONNECTED AT 45° TO THE FLOW DIRECTION WITH A CLEANING EYE PROVIDED AT GROUND LEVEL.

#### FINISHED LEVELS

1. LEVELS BASED ON SURVEY PREPARED BY BOXALL SURVEYORS PTD. LTD., DATED 25.06.15 (REF: 10215). THE CONTRACTOR SHALL VERIFY LEVELS PRIOR TO CONSTRUCTION COMMENCEMENT, ANY DISCREPANCIES SHALL BE NOTIFIED TO THE ENGINEER OR SUPERINTENDENT FOR CLARIFICATION.
2. CARPARK & SERVICE AREA LAYOUT AND GRADES TO COMPLY WITH AS2890.
3. DRIVEWAY LAYOUT AND DESIGN TO COMPLY WITH STRATHFIELD COUNCIL ACCESS DRIVEWAY DESIGN AND CONSTRUCTION SPECIFICATION.
4. ALL CONTOUR LINES & SPOT LEVELS INDICATE FINISHED PAVEMENT LEVELS U.N.O. ON PLAN.
5. PERMANENT BATTER SLOPES ARE TO HAVE A MAXIMUM GRADE OF 1V:3H U.N.O.
6. ALL FOOTPATHS ARE TO FALL AWAY FROM THE BUILDING AT 2.5% NOMINAL GRADE U.N.O.
7. BUILDING PAD LEVELS SHOWN AT +/-0.5m TO ALLOW FOR CONSTRUCTION TOLERANCES AND ADJUSTMENT TO SITE LEVELS AS REQUIRED TO ACHIEVE BALANCED CUT TO FILL.

#### DESIGN SUMMARY

##### STORMWATER QUALITY AND RETENTION

REFER TO WSUD REPORT

##### ON-SITE DETENTION

OSD DESIGNED IN ACCORDANCE WITH SYDNEY WATER STANDARDS AND REGULATIONS SINCE THE DISCHARGE CONNECTION POINT IS WITH SYDNEY WATER CHANNEL (COXS CREEK).

EFFECTIVE OSD VOLUME AND PERMISSIBLE SITE DISCHARGE GIVEN BY SYDNEY WATER FOR THE PROPOSED POST DEVELOPED SITE INFORMATION SHOWN BELOW:

TOTAL SITE AREA: 24,606m<sup>2</sup>  
IMPERVIOUS AREA DRAINING TO OSD: 10,799m<sup>2</sup> (43.9%)  
PERVIOUS AREA DRAINING TO OSD: 5858m<sup>2</sup> (23.8%)  
ROOF CATCHMENT AREA = 6170m<sup>2</sup> (25.1%)  
BYPASS CATCHMENT AREA DRAINING TO SYDNEY WATER CHANNEL = 946m<sup>2</sup> (3.8% OF TOTAL SITE - 22% IMPERVIOUS)  
BYPASS CATCHMENT AREA DRAINING TO COSGROVE ROAD (COUNCIL DRAINAGE SYSTEM)= 833m<sup>2</sup> (3.4% OF TOTAL SITE - 62.4% IMPERVIOUS)

OSD VOLUME: 494m<sup>3</sup>  
PERMISSIBLE SITE DISCHARGE: 583L/s



#### LOCALITY PLAN

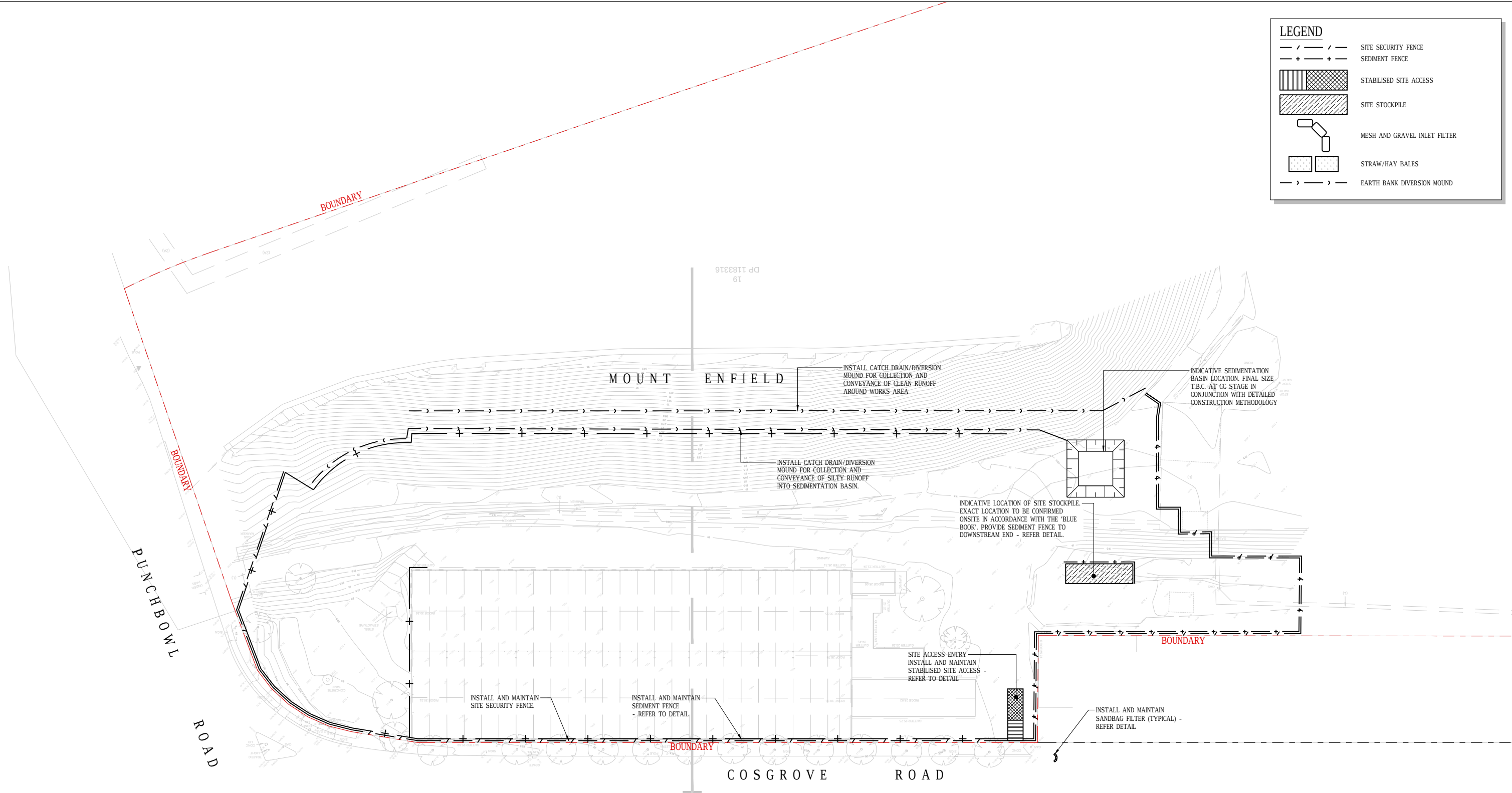
NOT TO SCALE - COURTESY OF SIX MAPS

#### DRAWING SCHEDULE

- DA1.01 COVER SHEET, DRAWING SCHEDULE AND LOCALITY PLAN
- DA2.01 CONCEPT SEDIMENT AND EROSION CONTROL PLAN
- DA2.02 CONCEPT SEDIMENT AND EROSION CONTROL DETAILS
- DA4.01 CONCEPT STORMWATER MANAGEMENT PLAN SHEET 1
- DA4.02 CONCEPT STORMWATER MANAGEMENT PLAN SHEET 2
- DA4.05 CONCEPT STORMWATER MANAGEMENT CATCHMENT PLAN
- DA4.11 CONCEPT STORMWATER MANAGEMENT PLAN DETAILS SHEET 1
- DA4.12 CONCEPT PIT SCHEDULE

ISSUED FOR DA

|                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                   |                                   |                 |                              |            |                                              |                  |               |              |            |                   |              |             |               |                                                                                                  |                                                                                          |                                                                     |                                 |                               |                                                           |               |                 |          |
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VERIFICATION  
COMPLETION OF THE DRAWING STATUS IS EVIDENCE THAT THE DESIGN HAS BEEN VERIFIED AS CONFORMING TO THE REQUIREMENTS OF THE PROJECT QUALITY PLAN

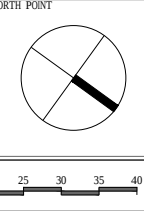
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| SK       | 2016 |         |      |
| SK       | 2016 |         |      |

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FOR CLIENT APPROVAL  
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PLOT DATE  
November 23, 2016

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| 23.11.16 |    | RE-ISSUED FOR DA | SK   | 2   |
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CLIENT

ARCHITECT

**BN** Architecture  
Urban Design  
Masterplanning  
Graphics  
Interiors

PROJECT

PROPOSED COMMERCIAL DEVELOPMENT  
CORNER COSGROVE ROAD AND  
PUNCHBOWL ROAD ENFIELD

DRAWING TITLE

CONCEPT SEDIMENT AND EROSION  
CONTROL PLAN

DATE  
2016

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JOB No  
15200

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SK

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BWG No  
DA2.01

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**SPARKS + PARTNERS**  
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HYDRAULIC | CIVIL | FIRE

Level 1, 91 George Street | Parramatta | NSW 2150  
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au

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Diagram illustrating the cross-section of a drainage ditch with the following specifications:

- GRADIENT OF DRAIN:** 1% TO 5%
- CAN BE CONSTRUCTED WITH OR WITHOUT CHANNEL**
- ALL BATTER GRADES:**  $2(H)(V)$  MAX
- DIRECTION OF FLOW:** Indicated by an arrow pointing right.
- MINIMUM DITCH DEPTH:** 150mm MIN
- MINIMUM DITCH WIDTH:** 2m MIN
- MINIMUM BATTER GRADE:** 300mm MIN

1. BUILD WITH GRADIENTS BETWEEN 1% AND 5%
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION



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 50L/s IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 200mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND AT 2.0m INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
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. 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.



1. THE TEMPORARY ACCESS SHALL BE MAINTAINED IN A CONDITION THAT PREVENTS TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS OF WAY.
2. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL GRAVEL AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
3. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS OF WAY MUST BE REMOVED IMMEDIATELY.
4. INSTALL BARRIER ON EITHER SIDE OF SHAKER PAD.
5. TO ENSURE VEHICLES ARE GUIDED ON TO THE PAD.
6. INVERT OF SHAKER PAD TO BE DRAINED VIA AGRICULTURAL PIPE WRAPPED IN GEOTEXTILE FABRIC.



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 IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOR FIGHTING THE APPROVED ESCP OR SWMP 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.



1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA
2. CONSTRUCT A CUT-OFF TRENCH 500mm DEEP AND 1200mm wide ALONG THE CENTERLINE OF THE EMBANKMENT  
EXTENDING TO A POINT ON THE GULLY WALL LEVEL WITH THE RISER CREST
3. MAINTAIN THE TRENCH FREE OF WATER AND RECOMPACT THE MATERIAL WITH EQUIPMENT AS SPECIFIED IN THE  
SPECIFICATIONS
4. SELECT FILL FOLLOWING THE SWMP THAT IS FREE OF ROOTS, WOOD, ROCK, LARGE STONE OR FOREIGN MATERIAL
5. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING TO AT LEAST 100mm TO HELP BOND COMPACTED FILL TO  
THE EXISTING SUBSTRATE
6. SPREAD THE FILL IN 100mm TO 150mm LAYERS AND COMPACT IT AT OPTIMUM MOISTURE CONTENT FOLLOWING THE  
SPECIFICATIONS
7. CONSTRUCT THE EMERGENCY SPILLWAY
8. REHABILITATE THE STRUCTURE FOLLOWING THE SWMP

NOTE: TYPE OF SOIL T.B.C.

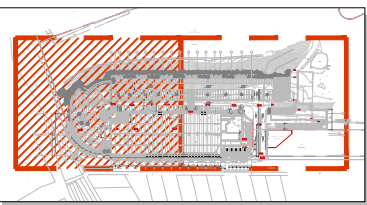
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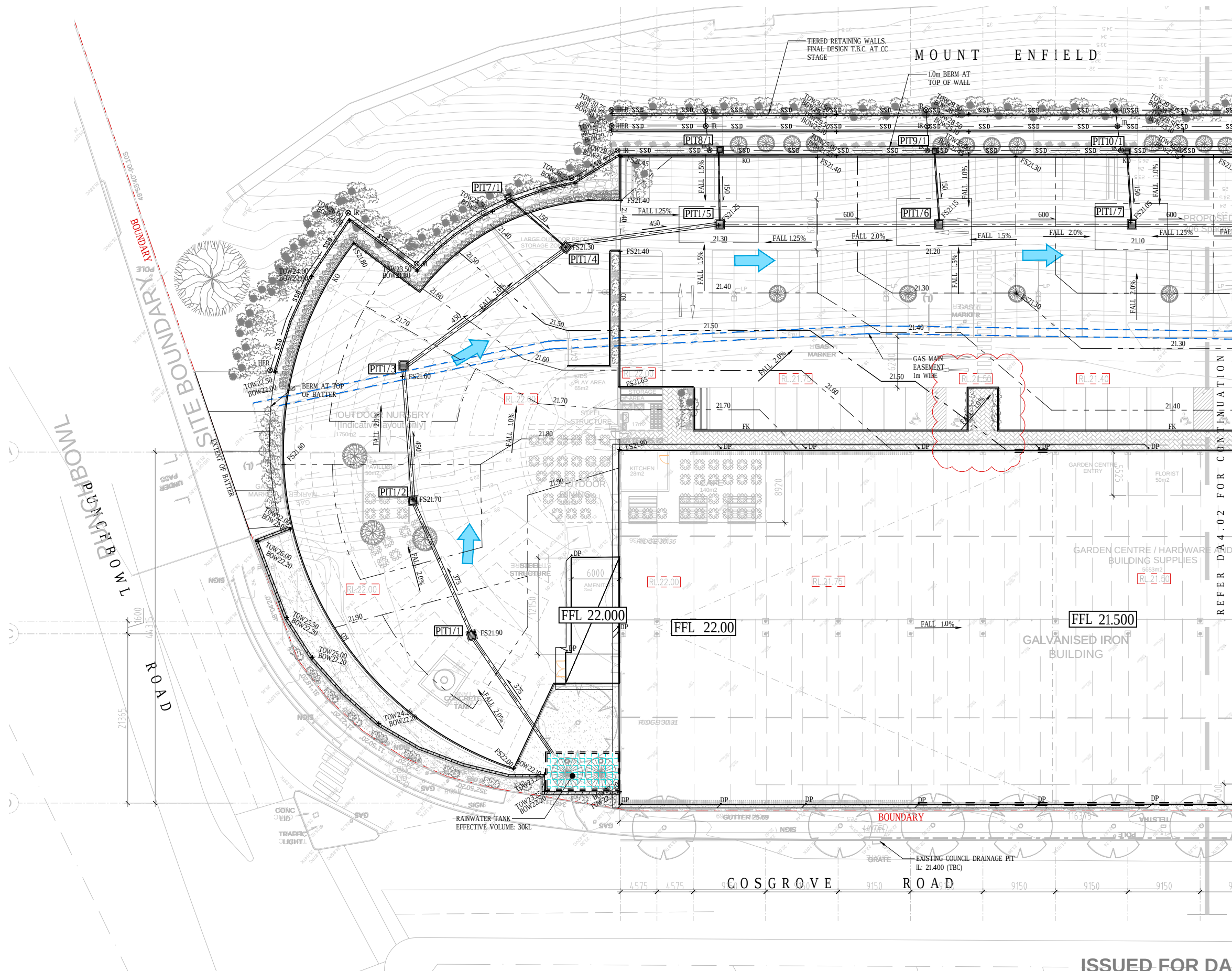
|  |                                           |
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|  | PROPOSED STORMWATER PIPE                  |
|  | GASMAIN EASEMENT                          |
|  | EXISTING STORMWATER PIPE                  |
|  | PROPOSED STORMWATER PIT                   |
|  | EXISTING KERB INLET PIT                   |
|  | PIPE FLOW DIRECTION AND SIZE              |
|  | PROPOSED GRATED TRENCH DRAIN              |
|  | PROPOSED DOWNPIPE                         |
|  | ONSITE DETENTION TANK                     |
|  | RAINWATER TANK                            |
|  | PROPOSED SUBSOIL DRAINAGE LINE            |
|  | HIGH END RISER                            |
|  | INTERMEDIATE RISER                        |
|  | OVERLAND FLOW PATH                        |
|  | PIT TAG                                   |
|  | FINISHED SURFACE MAJOR CONTOUR LINE       |
|  | FINISHED SURFACE MINOR CONTOUR LINE       |
|  | DIRECTION OF SURFACE FALL                 |
|  | FINISHED FLOOR LEVEL OF PROPOSED BUILDING |
|  | FINISHED SURFACE LEVEL                    |
|  | EXISTING SURFACE LEVEL                    |
|  | TOP OF WALL LEVEL                         |
|  | BOTTOM OF WALL LEVEL                      |
|  | PROPOSED KERB ONLY                        |
|  | PROPOSED FLUSH KERB                       |
|  | EXTENT OF BATTER                          |
|  | RETAINING WALL                            |
|  | VEHICLE BARRIER FENCE                     |

# NOTES

1. REFER TO DRAWING DA1.01 FOR GENERAL NOTES, DRAWING SCHEDULE & SPECIFICATION.
2. REFER TO DRAWING DA1.01 FOR OSD DESIGN DETAILS.
3. REFER TO DRAWING DA4.11 FOR OSD SECTIONS AND DETAILS.
4. REFER TO DRAWING DA4.12 FOR PIT SCHEDULE.



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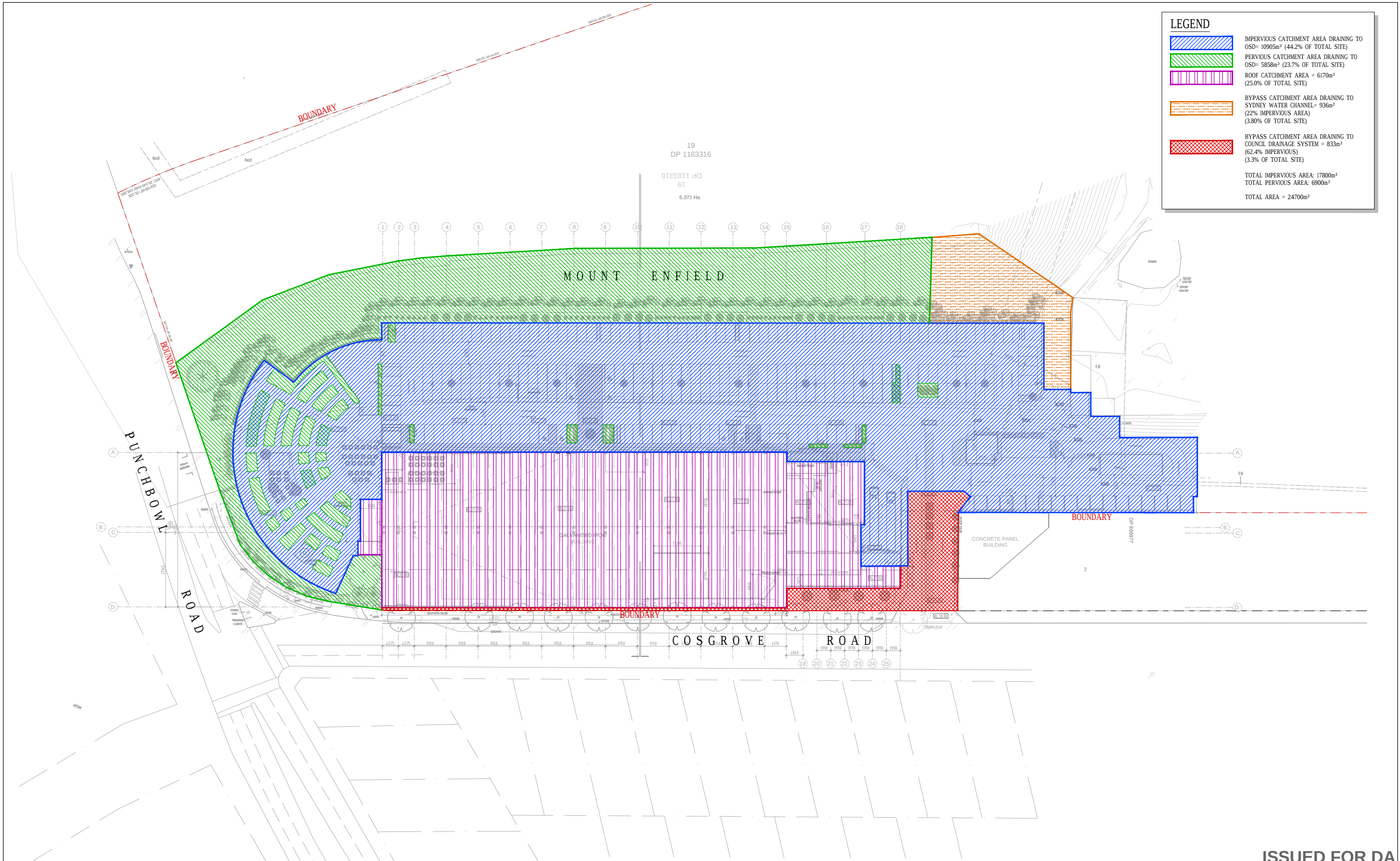
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LEGEND

IMPERVIOUS CATCHMENT AREA DRAINING TO OSD= 10905m<sup>2</sup> (44.2% OF TOTAL SITE)

PERVIOUS CATCHMENT AREA DRAINING TO OSD= 5858m<sup>2</sup> (23.7% OF TOTAL SITE)

ROOF CATCHMENT AREA = 6170m<sup>2</sup> (25.0% OF TOTAL SITE)

BYPASS CATCHMENT AREA DRAINING TO SYDNEY WATER CHANNEL= 936m<sup>2</sup> (22% IMPERVIOUS AREA) (3.80% OF TOTAL SITE)

BYPASS CATCHMENT AREA DRAINING TO COUNCIL DRAINAGE SYSTEM = 833m<sup>2</sup> (62.4% IMPERVIOUS) (3.3% OF TOTAL SITE)

TOTAL IMPERVIOUS AREA: 17800m<sup>2</sup>

TOTAL PERVIOUS AREA: 6900m<sup>2</sup>

TOTAL AREA = 24700m<sup>2</sup>

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PROJECT

PROPOSED COMMERCIAL DEVELOPMENT  
CORNER COSGROVE ROAD AND  
PUNCHBOWL ROAD ENFIELD

DRAWING TITLE

CONCEPT STORMWATER  
MANAGEMENT CATCHMENT PLAN

Level 1, 91 George Street | Parramatta | NSW 2150  
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au

DATE

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1. STRUCTURAL DESIGN OF OSD TANK TO BE UNDERTAKEN BY STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION CERTIFICATE SUBMISSION
2. REFER TO DRAWING DA1.01 FOR OSD DESIGN SUMMARY

[illegible]

| PIT No. | PIT TYPE          | CHAMBER SIZE | COVER TYPE                | COVER RL | EASTING | NORTHING | COMMENTS                                |
|---------|-------------------|--------------|---------------------------|----------|---------|----------|-----------------------------------------|
| 1 / 1   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.90    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 2   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.70    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 3   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.60    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 4   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.30    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 5   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.25    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 6   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.15    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 7   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.05    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 8   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 21.05    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 9   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 20.95    |         |          | FITTED WITH ENVIROPOD                   |
| 1 / 10  | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 20.85    |         |          | FITTED WITH ENVIROPOD                   |
| 2 / 1   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 20.80    |         |          | FITTED WITH ENVIROPOD                   |
| 3 / 1   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 20.20    |         |          | FITTED WITH ENVIROPOD                   |
| 3 / 2   | JUNCTION PIT      | 900 x 900    | 900 x 900 CLASS 'D' COVER | 20.60    |         |          |                                         |
| 3 / 3   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 20.35    |         |          | FITTED WITH ENVIROPOD                   |
| 4 / 1   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 19.91    |         |          | FITTED WITH ENVIROPOD AND SILT ARRESTOR |
| 4 / 2   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 19.00    |         |          | FITTED WITH ENVIROPOD                   |
| 4 / 3   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 19.70    |         |          | FITTED WITH ENVIROPOD                   |
| 5 / 1   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 19.00    |         |          | FITTED WITH ENVIROPOD                   |
| 6 / 1   | JUNCTION PIT      | 900 x 900    | 900 x 900 CLASS 'D' COVER | 20.00    |         |          |                                         |
| 6 / 2   | SURFACE INLET PIT | 900 x 900    | 900 x 900 CLASS 'D' COVER | 15.50    |         |          | FITTED WITH ENVIROPOD                   |
| 6 / 3   | JUNCTION PIT      | 900 x 900    | 900 x 900 CLASS 'D' COVER | 14.75    |         |          |                                         |
| 6 / 4   | JUNCTION PIT      | 900 x 900    | 900 x 900 CLASS 'D' COVER | T.B.C.   |         |          |                                         |
| 7 / 1   | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 24.40    |         |          | FITTED WITH ENVIROPOD                   |
| 8 / 1   | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 25.00    |         |          | FITTED WITH ENVIROPOD                   |
| 9 / 1   | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 24.90    |         |          | FITTED WITH ENVIROPOD                   |
| 10 / 1  | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 24.90    |         |          | FITTED WITH ENVIROPOD                   |
| 11 / 1  | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 24.90    |         |          | FITTED WITH ENVIROPOD                   |
| 12 / 1  | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 23.90    |         |          | FITTED WITH ENVIROPOD                   |
| 13 / 1  | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 21.90    |         |          | FITTED WITH ENVIROPOD                   |
| 14 / 1  | SURFACE INLET PIT | 600 x 600    | 600 x 600 CLASS 'B' COVER | 20.45    |         |          | FITTED WITH ENVIROPOD                   |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |  |  |  |  |  |  |  |  |                                                                                                                                                                                                     |  |                       |  |                                                                                                                               |  |  |  |  |  |                                                       |  |  |  |  |  |        |  |                                                                                                  |  |                                                                                                                               |  |
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## Appendix B – MUSIC Model Parameters

Table 1. Catchment Details and Stormwater Quality Parameters of Source Nodes in MUSIC Model

| Source Node                 | Land use Category | Fraction Impervious | TSS Storm Flow          | TSS Base Flow           | TP Storm Flow            | TP Base Flow             | TN Storm Flow            | TN Base Flow             |
|-----------------------------|-------------------|---------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Roof Catchment to RWT       | Roof Areas        | 1.0                 | Mean: 1.30<br>STD: 0.32 | 0.0                     | Mean: -0.89<br>STD: 0.25 | 0.0                      | Mean: 0.3<br>STD: 0.19   | 0.0                      |
| Roof Catchment to OSD       | Roof Areas        | 1.0                 | Mean: 1.30<br>STD: 0.32 | 0.0                     | Mean: -0.89<br>STD: 0.25 | 0.0                      | Mean: 0.3<br>STD: 0.19   | 0.0                      |
| Mount Enfield               | Forest/Natural    | 0.0                 | Mean: 1.6<br>STD: 0.32  | Mean: 0.78<br>STD: 0.17 | Mean: -1.1<br>STD: 0.25  | Mean: -1.52<br>STD: 0.19 | Mean: -0.05<br>STD: 0.19 | Mean: -0.52<br>STD: 0.12 |
| Outdoor Nursery             | Commercial        | 0.65                | Mean: 2.15<br>STD: 0.32 | Mean: 1.20<br>STD: 0.17 | Mean: -0.60<br>STD: 0.25 | Mean: -0.85<br>STD: 0.19 | Mean: 0.30<br>STD: 0.19  | Mean: 0.11<br>STD: 0.12  |
| Carpark                     | Road Areas        | 0.95                | Mean: 2.43<br>STD: 0.32 | 0.0                     | Mean: -0.03<br>STD: 0.25 | 0.0                      | Mean: 0.30<br>STD: 0.19  | 0.0                      |
| Bypass at entry             | Road Areas        | 1.0                 | Mean: 2.43<br>STD: 0.32 | 0.0                     | Mean: -0.03<br>STD: 0.25 | 0.0                      | Mean: 0.30<br>STD: 0.19  | 0.0                      |
| Landscape Bypass at Entry   | Forest/Natural    | 0.0                 | Mean: 1.6<br>STD: 0.32  | Mean: 0.78<br>STD: 0.17 | Mean: -1.1<br>STD: 0.25  | Mean: -1.52<br>STD: 0.19 | Mean: -0.05<br>STD: 0.19 | Mean: -0.52<br>STD: 0.12 |
| Bypass at Back exit of Site | Commercial        | 0.25                | Mean: 2.15<br>STD: 0.32 | Mean: 1.20<br>STD: 0.17 | Mean: -0.60<br>STD: 0.25 | Mean: -0.85<br>STD: 0.19 | Mean: 0.30<br>STD: 0.19  | Mean: 0.11<br>STD: 0.12  |

Table 2. Percent Reduction of each treatment System in MUSIC Model

| Treatment Node  | Treating source node           | Description of the function and intent of treatment system                 | TSS % reduction | TP % reduction | TN % reduction | Gross Pollutants % reduction |
|-----------------|--------------------------------|----------------------------------------------------------------------------|-----------------|----------------|----------------|------------------------------|
| Rainwater Tank  | 50 % of Roof Area              | For irrigation and greywater reuse                                         | 50.2            | 40.2           | 39.7           | 100                          |
| 8 Enviropods    | Mount Enfield                  | Filter Runoff from Mount Enfield                                           | 54              | 30             | 21             | 0                            |
| 4 Enviropods    | Outdoor Nursery                | Filter Runoff from the Outdoor Nursery                                     | 54              | 30             | 21             | 100                          |
| 12 Enviropods   | Carpark Area                   | Filter runoff from the Carpark area                                        | 53.9            | 30             | 21             | 100                          |
| Sandfilter Tank | 93% of site                    | Treatment of runoff at OSD tank before discharge into Sydney Water Channel | 93.9            | 81.8           | 48.9           | 100                          |
| 1 Envirpod      | Bypass at entry to site        | Filter runoff in Bypass area at entry of site                              | 54              | 30             | 21             | 100                          |
| 1 Envirpod      | Bypass on western side of site | Filter runoff in Bypass area before discharge into Sydney Water Channel    | 53.8            | 29.9           | 21             | 100                          |

Figure 1. Parameters of Sandfilter Tank in MUSIC Model

Using MUSIC version 6.1.0, a Media Filtration Treatment Node was used for the Sandfilter and the figure below shows the values entered for the Treatment Node. The values entered were referenced from MUSIC Modelling Guidelines Version 1.0 – 2010 Section 4.12 for Sand filter nodes.

**Properties of Sand Filter**

Location: Sand Filter

**Inlet Properties**

Low Flow By-pass (cubic metres per sec): 0.000

High Flow By-pass (cubic metres per sec): 100.000

**Storage Properties**

Extended Detention Depth (metres): 1.60

Surface Area (square metres): 300.0

Exfiltration Rate (mm/hr): 0.00

**Filtration Properties**

Filter Area (square metres): 50.0

Filter Depth (metres): 0.6

Filter Median Particle Diameter (mm): 0.75

Saturated Hydraulic Conductivity (mm/hr): 400.00

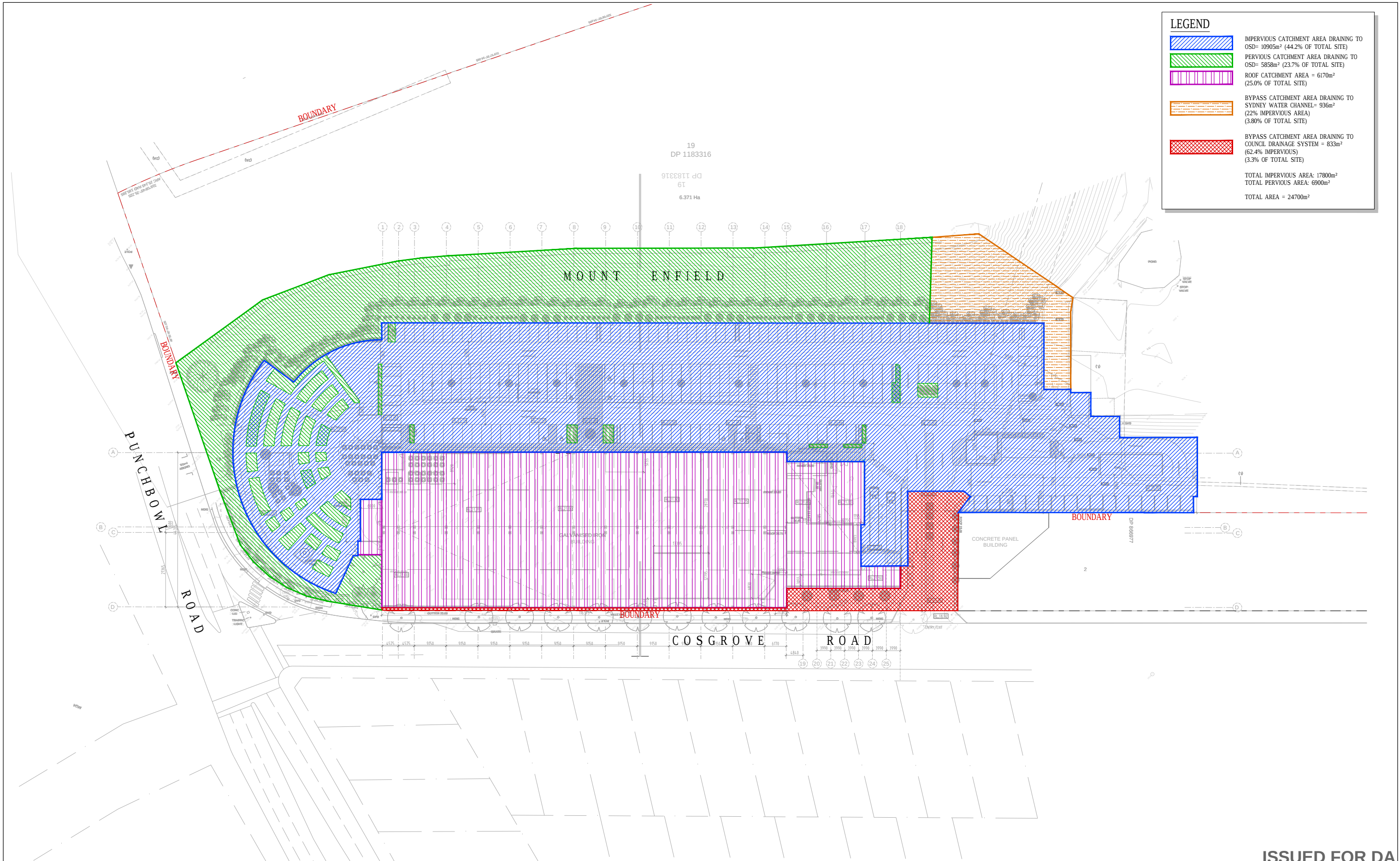
Depth below underdrain pipe (% of Filter Depth): 0.1

**Outlet Properties**

Overflow Weir Width (metres): 2.0

Buttons: Fluxes..., Notes..., More, Cancel, Back, Finish

## Appendix C – Concept Catchment Plan



LEGEND

IMPERVIOUS CATCHMENT AREA DRAINING TO OSD= 10905m<sup>2</sup> (44.2% OF TOTAL SITE)

PERVIOUS CATCHMENT AREA DRAINING TO OSD= 5858m<sup>2</sup> (23.7% OF TOTAL SITE)

ROOF CATCHMENT AREA = 6170m<sup>2</sup> (25.0% OF TOTAL SITE)

BYPASS CATCHMENT AREA DRAINING TO SYDNEY WATER CHANNEL= 936m<sup>2</sup> (22% IMPERVIOUS AREA) (3.80% OF TOTAL SITE)

BYPASS CATCHMENT AREA DRAINING TO COUNCIL DRAINAGE SYSTEM = 833m<sup>2</sup> (62.4% IMPERVIOUS) (3.3% OF TOTAL SITE)

TOTAL IMPERVIOUS AREA: 17800m<sup>2</sup>  
TOTAL PERVIOUS AREA: 6900m<sup>2</sup>  
TOTAL AREA = 24700m<sup>2</sup>

1. DO NOT SCALE OFF THIS DRAWING. USE DIMENSIONS & ARCHITECTURAL DRAWINGS ONLY.

2. DRAWINGS TO BE READ IN CONJUNCTION WITH SPECIFICATION.

3. LEVELS ARE INDICATIVE ONLY AND ARE TO BE CHECKED PRIOR TO COMMENCEMENT OF ANY WORKS.

4. AUTHORITIES MANS AND/OR EXISTING SERVICES ARE TO BE LOCATED AND CHECKED PRIOR TO COMMENCEMENT OF ANY WORKS.

5. COMPLETION OF THE QUALITY RECORD IS EVIDENCE THAT THE DESIGN AND DRAWING HAVE BEEN VERIFIED.

CHECKED

DATE

APPROVED

DATE

PAGE

PLOT DATE

A1

November 23, 2016

VERIFICATION

COMPLETION OF THE DRAWING STATUS IS EVIDENCE THAT THE DESIGN HAS BEEN VERIFIED AS CONFORMING TO THE REQUIREMENTS OF THE PROJECT QUALITY PLAN

PRELIMINARY

INITIAL

DATE

FOR INFORMATION ONLY

FOR CLIENT APPROVAL

FOR TENDER

FOR CONSTRUCTION

0

5

10

15

20

25

30

35

40

METERS

NORTH POINT

| DATE     | No | AMENDMENT        | INIT | REV |
|----------|----|------------------|------|-----|
| 11.03.16 |    | PRELIMINARY      | SK   | 1   |
| 23.11.16 |    | RE-ISSUED FOR DA | SK   | 2   |
|          |    |                  |      |     |
|          |    |                  |      |     |
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|          |    |                  |      |     |
|          |    |                  |      |     |

| DATE | No | AMENDMENT | INIT | REV |
|------|----|-----------|------|-----|
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|      |    |           |      |     |
|      |    |           |      |     |

CLIENT

ARCHITECT

Architecture  
Urban Design  
Masterplanning  
Graphics  
Interiors

PROJECT

PROPOSED COMMERCIAL DEVELOPMENT  
CORNER COSGROVE ROAD AND  
PUNCHBOWL ROAD ENFIELD

DRAWING TITLE

CONCEPT STORMWATER  
MANAGEMENT CATCHMENT PLAN

ISSUED FOR DA

CONSULTING ENGINEERS  
HYDRAULIC | CIVIL | FIRE

Level 1, 91 George Street | Parramatta | NSW 2150  
P 02 9891 5033 | F 02 9891 3898 | E admin@sparksandpartners.com.au

| DATE | DESIGNED | DRAWN | CHECKED | APPROVED |
|------|----------|-------|---------|----------|
| 2016 | SK       | SK    |         |          |

SCALE

1:500 @ A1

JOB No

15200

DA4.05

OF

2

## Appendix D – OSD Design Coordination with Sydney Water

Reply Reply All Forward



Stormwater <Stormwater@sydneywater.com.au>

Daniel Drewitt

**RE: 15200 - Garden Center, Enfield. Site Drainage Options**

**i** You replied to this message on 12/4/2015 11:00 AM.

Click here to download pictures. To help protect your privacy, Outlook prevented automatic download of some pictures in this message.

Daniel,

The On Site Detention requirements for the 24,500 square meter site at Garden Center, Enfield is as follows:

- On Site Detention 494 cubic meter
- Permissible Site Discharge 583 L/s



Best regards,  
**Jeya Jeyadevan** | Waterway Planner

**Liveable City Solutions** | Sydney Water  
Level 10, 1 Smith St Parramatta NSW 2150  
PO Box 399 Parramatta NSW 2124  
T 8849 6118 | M 0409 318 827  
E [jeya.jeyadevan@sydneywater.com.au](mailto:jeya.jeyadevan@sydneywater.com.au)  
[sydneywater.com.au](http://sydneywater.com.au)

**From:** Daniel Drewitt [<mailto:Daniel@sparksandpartners.com.au>]

**Sent:** Friday, 4 December 2015 10:33 AM

**To:** Stormwater

**Subject:** RE: 15200 - Garden Center, Enfield. Site Drainage Options

## Appendix E – Maintenance and Monitoring Schedule

## STORMWATER DRAINAGE SYSTEM MONITORING AND MAINTENANCE SCHEDULE

Site: 123 Cosgrove Road, Enfield

Owner: \_\_\_\_\_

Commencement Date: \_\_\_\_\_

Designer Signature

Simon Kapsis

Date

11.03.16

STORMWATER DRAINAGE SYSTEM MONITORING AND MAINTENANCE SCHEDULE



Author Name & Signature:
 Date:

123 Cosgrove Road, Enfield

- General Notes:**
- 1 - Maintenance is to be carried out with regard to relevant occupational health and safety guidelines and standards. This includes all confined space, traffic management, fall arrest and other requirements.
  - 2 - Initial monitoring and inspections of the stormwater system post commissioning are to be carried out every 3 months for the first year of operation. The amount and type of debris is to be noted and recorded. This information shall be used to determine if modification of the frequency of inspections is required.
  - 3 - The frequency of inspections shown in the stormwater maintenance schedule are the maximum periods. Inspection frequencies may be reduced upon completion of the initial monitoring and inspection program as noted in note 2.
  - 4 - Blank copies of the maintenance schedule are to be made and filled out during each subsequent inspection with the details kept on site for future reference.

Inspected by: .....  
 Date of Inspection: .....  
 Date of Next Inspection: .....

| Item to be Inspected                                                       | Frequency                          | Performed by                      | Inspected | Maintenance Required | Maintenance Procedure                                                                                                                                                                                                                                                                                                  | Maintenance Completed |
|----------------------------------------------------------------------------|------------------------------------|-----------------------------------|-----------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
|                                                                            |                                    |                                   | Yes/No    | Yes/No               |                                                                                                                                                                                                                                                                                                                        | Date                  |
| General                                                                    |                                    |                                   |           |                      |                                                                                                                                                                                                                                                                                                                        |                       |
| Eaves/Box Guttering System and Downpipes                                   | Six Monthly/<br>After Major Storm  | Owner /<br>Maintenance Contractor |           |                      | Inspect and remove any build up of sediment, debris, litter and vegetation within gutter system.                                                                                                                                                                                                                       |                       |
| Stormwater surface inlet and junction pits                                 | Four Monthly/<br>After Major Storm | Owner /<br>Maintenance Contractor |           |                      | Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter and vegetation. (e.g. Vacuum/eductor truck) Inspect and ensure grate is clear of sediment, debris, litter and vegetation. Ensure flush placement of grate on refitment                          |                       |
| General inspection of complete stormwater drainage system (that's visible) | Bi-annually                        | Owner /<br>Maintenance Contractor |           |                      | Inspect all drainage structures noting any dilapidation, carry out required repairs.                                                                                                                                                                                                                                   |                       |
| Rainwater Tank                                                             |                                    |                                   |           |                      |                                                                                                                                                                                                                                                                                                                        |                       |
| First Flush Device                                                         | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Inspect first flush device to ensure correct operation. Remove accumulated litter & debris. If device is not functioning properly repair or replace.                                                                                                                                                                   |                       |
| Internal Inspection                                                        | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Check for evidence of access by animals, birds or insects including the presence of mosquito larvae. If present, identify access point and close. If evidence of algal growth, find and close points of light entry.                                                                                                   |                       |
| Tank and tank roof                                                         | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Check structural integrity of tank including roof and access covers. Any dilapidation including holes or gaps are to be noted and repaired.                                                                                                                                                                            |                       |
| Sand Filter                                                                |                                    |                                   |           |                      |                                                                                                                                                                                                                                                                                                                        |                       |
| Sedimentation chamber                                                      | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Check chamber for build up of sediment, if sediment is greater than 1/3 depth of sedimentation chamber remove collected sediment                                                                                                                                                                                       |                       |
| Evidence of inlet surface erosion                                          | 6 Monthly                          | Maintenance Contractor            |           |                      | Check for scour of filter media at sedimentation chamber overflow. If scour present rake back filter media and provide scour protection.                                                                                                                                                                               |                       |
| Sand filter media                                                          | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Inspect for surface clogging/ponding in sand filter. If clogging or ponding present check subsoil drainage line for blockage and cleanout. If no blockage present in sub-soil drainage remove clogged filter media and replace with specified filter media.                                                            |                       |
| Sand filter area                                                           | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Inspect sand filter area for build up of litter and debris, remove any litter present. Inspect sand filter for distribution of media, if required rake filter media to provide even depth through sand filter area.                                                                                                    |                       |
| Outlet/overflow spillway                                                   | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Inspect spillway to ensure in good condition with no deterioration present. If required provide repairs.                                                                                                                                                                                                               |                       |
| On-Site Detention Tank                                                     |                                    |                                   |           |                      |                                                                                                                                                                                                                                                                                                                        |                       |
| Trash Screen                                                               | Six Monthly/<br>After Major Storm  | Owner /<br>Maintenance Contractor |           |                      | Inspect trash screen to ensure correct operation. Remove accumulated litter & debris. If device is not functioning properly repair or replace.                                                                                                                                                                         |                       |
| Orifice Plate                                                              | Six Monthly/<br>After Major Storm  | Owner /<br>Maintenance Contractor |           |                      | Inspect orifice plate to ensure correct operation. Check orifice diameter size is correct and no damage is present to orifice edge. Check orifice plate is securely fastened to wall with no gaps present between plate and face of wall. If gaps are present fill with sealant or mortar to provide water tight seal. |                       |
| Weep Holes in base of sump                                                 | Six Monthly/<br>After Major Storm  | Owner /<br>Maintenance Contractor |           |                      | Inspect weep holes in base of sump. Ensure weep holes are able to drain effectively and remove accumulated sediment and debris if present.                                                                                                                                                                             |                       |
| Tank and tank roof                                                         | 6 Monthly                          | Owner /<br>Maintenance Contractor |           |                      | Check structural integrity of tank including roof and access covers. Any dilapidation including holes or gaps are to be noted and repaired.                                                                                                                                                                            |                       |

## Appendix F – Council Correspondence Re: Flooding

## Morgan Walter

---

**From:** Morgan Walter  
**Sent:** Wednesday, February 17, 2016 12:42 PM  
**To:** 'Said Saqeb'  
**Cc:** Simon Kapsis  
**Subject:** RE: 15200 - 127 Cosgrove Rd, Strathfield South - Flooding Information

Hi Said,

Thanks for the screen shot. It appears that the flooding is wholly contained within the road carriageway and not extending into adjacent properties. Can you confirm with the consultant is the modelling suggesting that this is local overland flow and not flooding in terms of flood inundation?

Thanks

Morgan Walter  
Civil Engineering Manager  
BE (Civil & Environmental) MEEM MIEAust  
Direct 0414 930 828



Sparks & Partners Consulting Engineers / Office 02 9891 5033 / Fax 02 9891 3898  
PO Box 979 / Level 1, 91 George Street / Parramatta NSW 2150 / [sparksandpartners.com.au](http://sparksandpartners.com.au)

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---

**From:** Said Saqeb [mailto:Said.Saqeb@strathfield.nsw.gov.au]  
**Sent:** Wednesday, February 17, 2016 8:14 AM  
**To:** Morgan Walter <Morgan@sparksandpartners.com.au>  
**Subject:** FW: 15200 - 127 Cosgrove Rd, Strathfield South - Flooding Information

Hi Morgan,

Please find attached below the 1 in 100 year flood extent at the subject site. I will seek advice from Consultant about the 1 in 100 year flood level.

Regards

Said



**Said Saqeb** | *Drainage Engineer*

**P** 9748 9938 **F** 9764 1034

65 Homebush Road, Strathfield NSW 2135

[www.strathfield.nsw.gov.au](http://www.strathfield.nsw.gov.au)

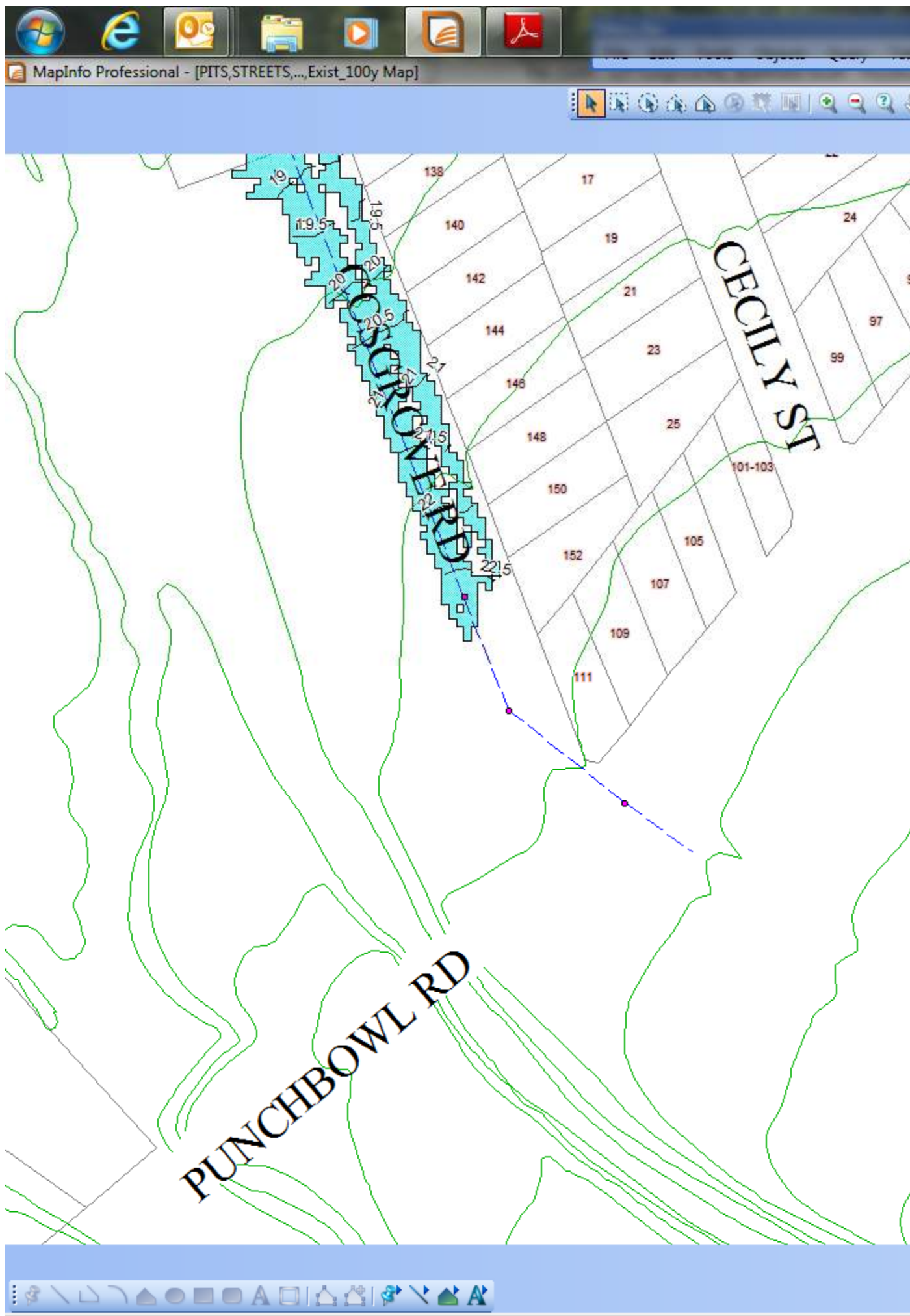


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---

**From:** Morgan Walter [<mailto:Morgan@sparksandpartners.com.au>]  
**Sent:** Wednesday, 17 February 2016 7:59 AM  
**To:** Said Sageb  
**Cc:** Simon Kapsis  
**Subject:** RE: 15200 - 127 Cosgrove Rd, Strathfield South - Flooding Information

Hi Said,

Refer to the attached SIX Maps markups for your reference to locate the site. It is at the corner of Cosgrove Rd and Punchbowl Rd being the old Tarpaulin Shed.

Regards

Morgan Walter  
Civil Engineering Manager  
BE (Civil & Environmental) MEEM MIEAust  
Direct 0414 930 828



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---

**From:** Said Sageb [<mailto:Said.Sageb@strathfield.nsw.gov.au>]  
**Sent:** Tuesday, February 16, 2016 4:00 PM  
**To:** Morgan Walter <[Morgan@sparksandpartners.com.au](mailto:Morgan@sparksandpartners.com.au)>  
**Subject:** RE: 15200 - 127 Cosgrove Rd, Strathfield South - Flooding Information

Hi Morgan,

Please attach a plan to your email that shows 127 Cosgrove Road. I was unable to find the subject site on Council's GIS.

Regards

Said



**Said Saqeb** | *Drainage Engineer*  
P 9748 9938 F 9764 1034  
65 Homebush Road, Strathfield NSW 2135  
[www.strathfield.nsw.gov.au](http://www.strathfield.nsw.gov.au)



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---

**From:** Morgan Walter [<mailto:Morgan@sparksandpartners.com.au>]  
**Sent:** Wednesday, 10 February 2016 11:57 AM  
**To:** Said Saqeb  
**Subject:** 15200 - 127 Cosgrove Rd, Strathfield South - Flooding Information

Hi Said,

We have been given your contact details from Sophie Olsen in relation to obtaining flood information for the property at 127 Cosgrove Rd, Strathfield South.

A Pre DA meeting was held on the 23<sup>rd</sup> December 2015, with item 4. noting the site is subject to flooding. As we are undertaking the Civil engineering design for the project can you please provide the information (Flood Mapping etc) indicating where the site is partially affected by the 1:100yr flood event.

Should you have any questions please contact me.

Regards

**Morgan Walter**  
**Civil Engineering Manager**  
BE (Civil & Environmental) MEEM MIEAust  
Direct 0414 930 828



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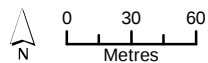
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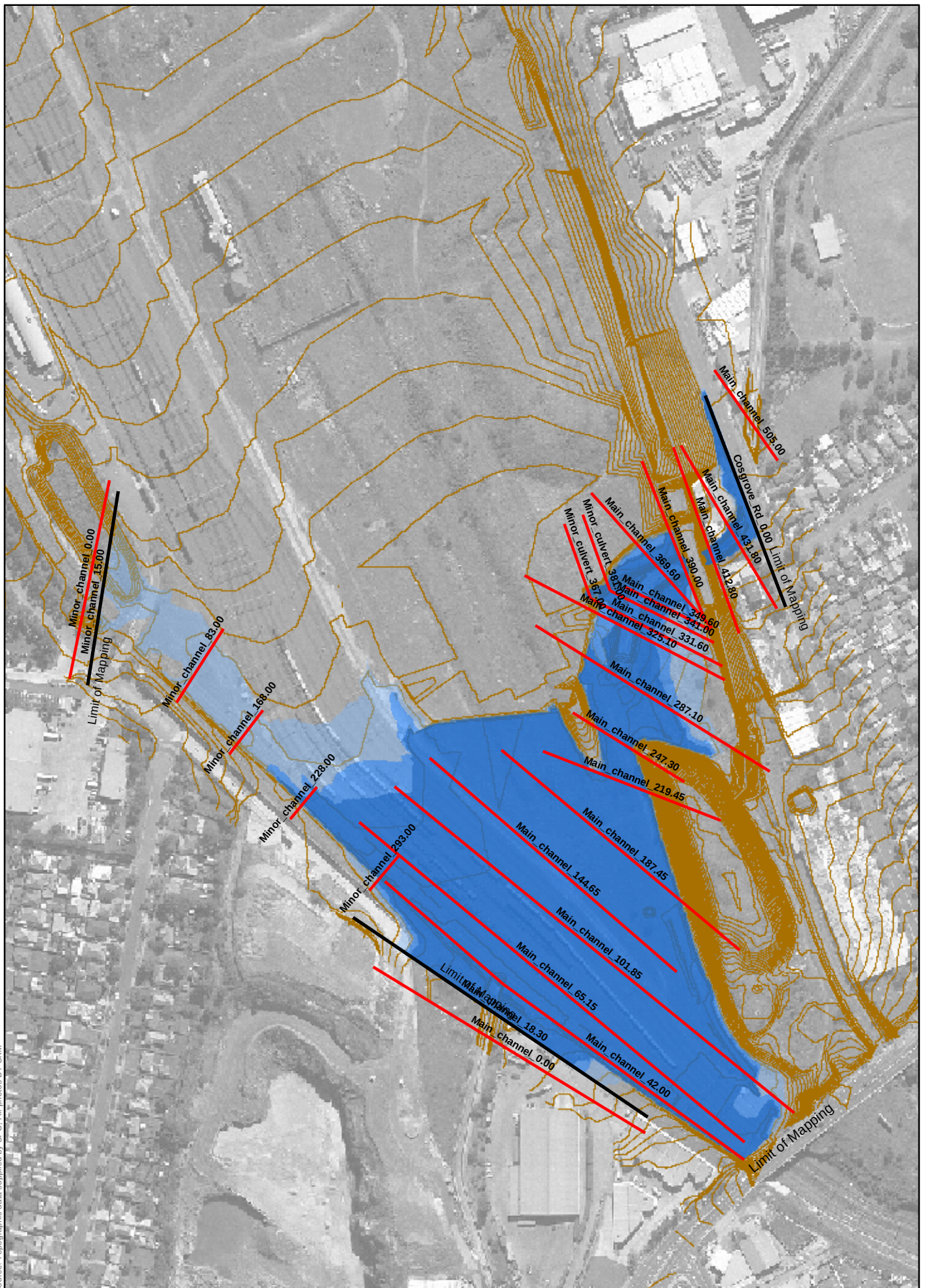
## Appendix G – Excerpts from the Environmental Impact Statement (EIS) for Intermodal Logistics Center, Enfield.



#### Legend

- |                        |                          |
|------------------------|--------------------------|
| Mike 11 Cross Sections | ■ Proposed 10 yr ARI     |
| — Limit of Mapping     | ■ Proposed 20 yr ARI     |
| — Cross Sections       | ■ Proposed 100yr ARI     |
|                        | — Proposed 0.5m Contours |

**Figure 19**  
**Proposed Inundation Envelope**  
**for 10, 20, 100 Year ARI**



## B.1 Summary of Mike-11 Flood Level Results, 10 and 20 year ARI

| Cross-sections |          | 10 year ARI |          |        | 20 year ARI |          |        | Notes                            |
|----------------|----------|-------------|----------|--------|-------------|----------|--------|----------------------------------|
| Flowpath       | Chainage | Existing    | Proposed | Change | Existing    | Proposed | Change |                                  |
| MINOR_CHANNEL  | 15       | 16.085      | 16.085   | 0      | 16.798      | 16.798   | 0      |                                  |
| MINOR_CHANNEL  | 83       | 16.010      | 15.999   | -0.011 | 16.424      | 16.415   | -0.009 |                                  |
| MINOR_CHANNEL  | 168      | 16.038      | 16.025   | -0.013 | 16.431      | 16.425   | -0.006 |                                  |
| MINOR_CHANNEL  | 228      | 16.039      | 16.025   | -0.014 | 16.442      | 16.437   | -0.005 |                                  |
| MINOR_CHANNEL  | 293      | 16.260      | 16.236   | -0.024 | 16.490      | 16.469   | -0.021 |                                  |
| MAIN_CHANNEL   | 18.3     | 16.248      | 16.225   | -0.023 | 16.476      | 16.460   | -0.016 |                                  |
| MAIN_CHANNEL   | 42       | 16.263      | 16.240   | -0.023 | 16.486      | 16.470   | -0.016 |                                  |
| MAIN_CHANNEL   | 65.15    | 16.256      | 16.234   | -0.022 | 16.480      | 16.464   | -0.016 |                                  |
| MAIN_CHANNEL   | 101.85   | 16.252      | 16.230   | -0.022 | 16.477      | 16.461   | -0.016 |                                  |
| MAIN_CHANNEL   | 144.65   | 16.250      | 16.228   | -0.022 | 16.476      | 16.460   | -0.016 | Approx. upstream site boundary   |
| MAIN_CHANNEL   | 187.45   | 16.244      | 16.227   | -0.017 | 16.468      | 16.459   | -0.009 |                                  |
| MAIN_CHANNEL   | 219.45   | 16.212      | 16.221   | 0.009  | 16.431      | 16.452   | 0.021  |                                  |
| MAIN_CHANNEL   | 247.3    | 16.039      | 16.055   | 0.016  | 16.235      | 16.271   | 0.036  |                                  |
| MAIN_CHANNEL   | 287.1    | 15.593      | 15.587   | -0.006 | 15.787      | 15.755   | -0.032 |                                  |
| MAIN_CHANNEL   | 325.1    | 14.728      | 14.598   | -0.130 | 15.180      | 15.038   | -0.142 |                                  |
| MAIN_CHANNEL   | 331.6    | 14.735      | 14.608   | -0.127 | 15.182      | 15.045   | -0.137 |                                  |
| MINOR_CULVERT  | 367      | 14.773      | 14.620   | -0.153 | 15.220      | 15.044   | -0.176 |                                  |
| MAIN_CHANNEL   | 341      | 14.720      | 14.592   | -0.128 | 15.166      | 15.035   | -0.131 |                                  |
| MINOR_CULVERT  | 381      | 14.783      | 14.627   | -0.156 | 15.216      | 15.064   | -0.152 |                                  |
| MAIN_CHANNEL   | 349.6    | 14.763      | 14.638   | -0.125 | 15.189      | 15.066   | -0.123 |                                  |
| MAIN_CHANNEL   | 369.6    | 14.792      | 14.643   | -0.149 | 15.221      | 15.077   | -0.144 |                                  |
| MAIN_CHANNEL   | 390      | 14.784      | 14.612   | -0.172 | 15.225      | 15.048   | -0.177 |                                  |
| MAIN_CHANNEL   | 412.8    | 12.626      | 12.627   | 0.001  | 12.626      | 12.626   | 0      | Approx. downstream site boundary |
| MAIN_CHANNEL   | 431.8    | 12.815      | 12.814   | -0.001 | 12.815      | 12.815   | 0      |                                  |
| COSGROVE_RD    | 0        | 13.067      | 13.059   | -0.008 | 13.124      | 13.118   | -0.006 |                                  |

## B.2 Summary of Mike-11 Flood Level Results, 100 year ARI and PMF

| Cross-sections |          | 100 year ARI |          |        | PMF      |          |         | Notes                            |
|----------------|----------|--------------|----------|--------|----------|----------|---------|----------------------------------|
| Flowpath       | Chainage | Existing     | Proposed | Change | Existing | Proposed | Change  |                                  |
| MINOR_CHANNEL  | 15       | 17.953       | 17.953   | 0      | 19.440   | 19.768   | 0.328   |                                  |
| MINOR_CHANNEL  | 83       | 17.127       | 17.127   | 0      | 19.430   | 19.763   | 0.333   |                                  |
| MINOR_CHANNEL  | 168      | 16.872       | 16.864   | -0.008 | 19.407   | 19.755   | 0.348   |                                  |
| MINOR_CHANNEL  | 228      | 16.870       | 16.862   | -0.008 | 19.399   | 19.749   | 0.350   |                                  |
| MINOR_CHANNEL  | 293      | 16.865       | 16.859   | -0.006 | 19.363   | 19.729   | 0.366   |                                  |
| MAIN_CHANNEL   | 18.3     | 16.855       | 16.849   | -0.006 | 19.336   | 19.706   | 0.370   |                                  |
| MAIN_CHANNEL   | 42       | 16.866       | 16.859   | -0.007 | 19.351   | 19.712   | 0.361   |                                  |
| MAIN_CHANNEL   | 65.15    | 16.859       | 16.853   | -0.006 | 19.342   | 19.704   | 0.362   |                                  |
| MAIN_CHANNEL   | 101.85   | 16.856       | 16.850   | -0.006 | 19.341   | 19.704   | 0.363   |                                  |
| MAIN_CHANNEL   | 144.65   | 16.854       | 16.848   | -0.006 | 19.338   | 19.704   | 0.366   | Approx. upstream site boundary   |
| MAIN_CHANNEL   | 187.45   | 16.841       | 16.845   | 0.004  | 19.283   | 19.701   | 0.418   |                                  |
| MAIN_CHANNEL   | 219.45   | 16.788       | 16.834   | 0.046  | 19.151   | 19.686   | 0.535   |                                  |
| MAIN_CHANNEL   | 247.3    | 16.548       | 16.638   | 0.090  | 18.950   | 19.672   | 0.722   |                                  |
| MAIN_CHANNEL   | 287.1    | 16.184       | 16.119   | -0.065 | 18.417   | 19.672   | 1.255   |                                  |
| MAIN_CHANNEL   | 325.1    | 16.042       | 15.931   | -0.111 | 18.403   | 19.670   | 1.267   |                                  |
| MAIN_CHANNEL   | 331.6    | 16.019       | 15.932   | -0.087 | 18.339   | 19.655   | 1.316   |                                  |
| MINOR_CULVERT  | 367      | 16.151       | 15.926   | -0.225 | 18.416   | 19.668   | 1.252   |                                  |
| MAIN_CHANNEL   | 341      | 15.977       | 15.921   | -0.056 | 18.274   | 19.641   | 1.367   |                                  |
| MINOR_CULVERT  | 381      | 16.064       | 15.932   | -0.132 | 18.416   | 19.667   | 1.251   |                                  |
| MAIN_CHANNEL   | 349.6    | 15.982       | 15.926   | -0.056 | 18.266   | 19.638   | 1.372   |                                  |
| MAIN_CHANNEL   | 369.6    | 16.057       | 15.934   | -0.123 | 18.417   | 19.666   | 1.249   |                                  |
| MAIN_CHANNEL   | 390      | 16.068       | 15.91    | -0.158 | 18.434   | 19.651   | 1.217   |                                  |
| MAIN_CHANNEL   | 412.8    | 12.627       | 12.626   | -0.001 | 14.336*  | 13.856*  | -0.480* | Approx. downstream site boundary |
| MAIN_CHANNEL   | 431.8    | 12.812       | 12.814   | 0.002  | 14.375*  | 13.985*  | -0.390* |                                  |
| COSGROVE_RD    | 0        | 13.240       | 13.242   | 0.002  | 14.373*  | 14.008*  | -0.365* |                                  |

\* Flood level results at these cross-sections are subject to boundary condition effects