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# STORMWATER MANAGEMENT PLAN

FOR

93 ST HILLIERS ROAD, AUBURN

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AUBURN HOTEL

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REPORT NO. R02153-SWMP  
REVISION A

JANUARY 2020

## PROJECT DETAILS

Property Address: 93 St Hilliers Road, Auburn

Development Proposal: Auburn Hotel

## REPORT CERTIFICATION

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## DOCUMENT CONTROL

REVISION	ISSUE DATE	ISSUED TO	ISSUED FOR
A	3 February 2020	Good Luck Plaza Jackson Teece Architects Cumberland Council	DA

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## 1. INTRODUCTION

### 1.1 Background

This Stormwater Management Plan & Report has been prepared in accordance with Cumberland Council's requirements under the Auburn Development Control Plan 2010 (DCP) to support the Development Application (DA) for the proposed hotel development at 93 St Hilliers Road, Auburn.

The scope of this report includes a comprehensive assessment of the stormwater management requirements for the proposed development. Accordingly, this report includes findings of the assessment and proposes a best practice stormwater management strategy.

The report describes the principles and operation of the proposed stormwater systems as well as the primary components of the drainage system. As the assessment is required under the conditions of consent, the final stormwater system layout may need to be revised in the future during the application for a Construction Certificate.

The following information and documents were utilised in this investigation:

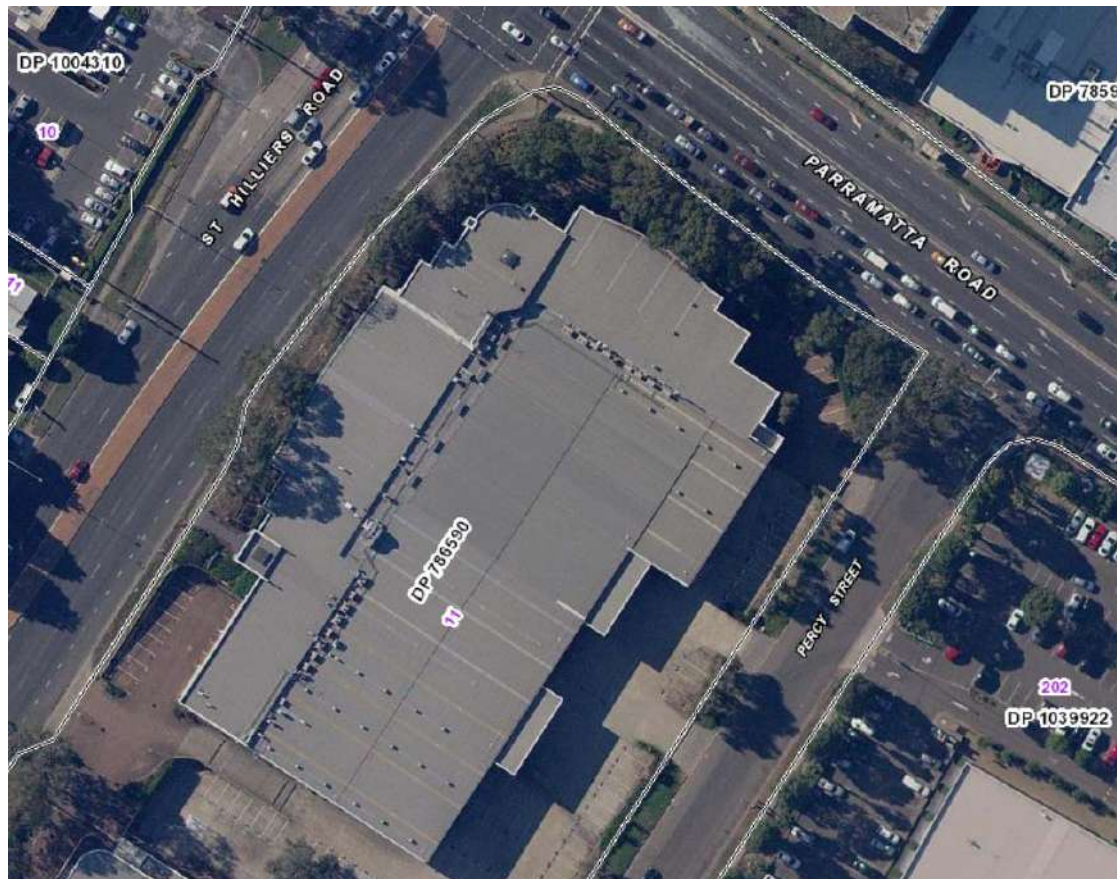
- Concept Civil Engineering Drawings for the Development Application submission prepared by C&M Consulting Engineers;
- Proposed Architectural Drawings for the Development Application submission prepared by Jackson Teece Architects;
- Auburn Development Control Plan 2010;
- "Australian Rainfall and Runoff – A Guide to Flood Estimation", Institute of Engineers, Australia (2016);
- AS3500.3:2018 – Plumbing and drainage: Stormwater drainage;
- "Upper Parramatta River Catchment Trust – On-site Stormwater Detention Handbook (3<sup>rd</sup> Edition – June 2004)";
- "Australian Runoff Quality – A Guide to Water Sensitive Urban Design", Engineers Australia (2006);

The increase in impervious areas and alteration of the natural topography due to land development has the potential to increase and concentrate peak storm flows. This has the potential to impact on flow regimes and cause erosion of the downstream drainage network and associated waterways.

To avoid any adverse impact on the downstream drainage systems, the site's stormwater management system must be designed to ensure the safe conveyance of flows throughout the site and within the capacity of the downstream trunk drainage systems in a healthy environmental state for Ecological Sustainable Development.

## 1.2 The Site

The site is located at 93 St Hilliers Road, Box Hill and is bounded by Parramatta Road, St Hilliers Road and Percy Street (Refer to Figure 1).



**Figure 1 - Aerial Photo of Existing Site**  
(Source: NSW Six Maps)

The area generally has a commercial and industrial (business) landuse.

The land generally falls to the south east towards the sag in Percy Street which is where the St Hilliers Branch Channel crosses (west to east). This channel is a tributary of Haslams Creek (which is part of the Parramatta River catchment area).

## 1.3 Key Issues

The key issues to be addressed in this report include:

- **Water Quantity** – Increases in impervious areas as a result of development (such as roofs, driveways, etc) has the potential to increase stormwater flows from the site during storm events. To avoid impacting on the site and downstream properties, the site stormwater system must be designed to safely convey flows through the site and within the capacity of the downstream drainage system.
- **Water Quality** – Urban developments have the potential to increase gross pollutants, sediments and nutrient concentrations in storm water runoff. To limit

the impact on the downstream water quality, pollution control measures will be provided within the sites stormwater management system prior to discharging into the drainage network.

- **Flooding** – The existing site is affected by overland flow in St Hilliers Road and Percy Street and some mainstream flooding at the southern end of the property which is adjacent to the St Hilliers Branch Channel of Haslam Creek. The portion of the site being redeveloped as a hotel (the subject of this development application) is not flood affected.

## **2. RELEVANT GUIDELINES**

### **2.1 Design Guidelines**

The site based stormwater management and planning elements are to be designed and constructed in accordance with the following:

#### Water Quantity

Guidelines: Auburn Development Control Plan 2010  
Upper Parramatta River Catchment Trust – On-site Stormwater  
Detention Handbook (3<sup>rd</sup> Edition – June 2004)

The proposed development increases the total impervious area of the existing site and therefore may increase the discharge rate to the downstream drainage network and waterways. As a result, on-site detention (OSD) has been incorporated as part of the development to maintain the existing discharge.

#### Water Quality

Guidelines: Auburn Development Control Plan 2010

Developments of this type within the former Auburn LGA are required to provide the following water quality measures:

- Rainwater tank with a minimum volume of 10kl;
- Stormwater treatment measures capable of removing litter, oil, hydrocarbon and coarse sediment.

#### Flooding

Guidelines: Auburn Development Control Plan 2010

The existing site is affected by overland flow in St Hilliers Road and Percy Street and some mainstream flooding at the southern end of the property which is adjacent to the St Hilliers Branch Channel of Haslam Creek.

The portion of the site being redeveloped as a hotel (the subject of this development application) is not flood affected but is still subject to Council's flood related development controls.

### **2.2 Objectives and Targets**

The objective is to provide stormwater controls that ensure that the proposed development does not adversely impact on the quantity or quality of stormwater flows within, adjacent and downstream of the site. Compatible with the legislation, policy and requirements, the objectives and targets for stormwater management are as provided in Table 1.



**Table 1 - Stormwater Management Objectives**

STORMWATER MANAGEMENT	OBJECTIVES	TARGET
Quantity	<ul style="list-style-type: none"> <li>The existing runoff flow regimes for the full storm events should be maintained, and provide safe conveyance system for the major storm events.</li> <li>The existing runoff from the external catchment be safely mitigated through the site.</li> </ul>	<ul style="list-style-type: none"> <li>Maintain existing runoff from development: <ul style="list-style-type: none"> <li>Provide safe flood mitigation measures to minimise any impact on the site, and</li> <li>No adverse impact on downstream properties.</li> </ul> </li> </ul>
Quality	<ul style="list-style-type: none"> <li>The full range of typical urban stormwater pollutants shall meet Council requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Runoff from site is to achieve natural dry and wet weather concentrations for the catchment.</li> </ul>
Flooding	<ul style="list-style-type: none"> <li>To ensure the development is not affected by the 100 year ARI flood.</li> <li>To ensure the development does not adversely affect the flood levels adjacent to the site.</li> </ul>	<ul style="list-style-type: none"> <li>Provide an appropriate freeboard for the proposed development.</li> <li>Provide a safe overland flow path to convey flood water through the site where required.</li> <li>Ensure no additional flood impact on neighbouring properties.</li> </ul>

## 2.3 Overall Strategies

The proposed stormwater management strategies to manage runoff and ensure no detriment to the receiving environments have been divided into both short and long term strategies are summarised in Table 2.



**Table 2 - Stormwater Management Strategies**

STRATEGY	DESCRIPTION
<b>Short Term Strategies</b>	<p>Short term strategies generally refer to control of soil and water erosion control during the construction phase. The primary risk occurs while soils are exposed during construction works when suspended sediment and associated pollutants can be washed into downstream waterways.</p> <p>The strategies to prevent this potential degradation include adequate provision of sediment and erosion control measures that should be documented prior to commencement of the works in a Construction Environmental Management Plan (CEMP). The controls will limit movement of sediment in disturbed areas, and will be designed to remove sediment from runoff prior to discharge from site.</p>
<b>Long Term Strategies</b>	<p>Long term strategies to maintain stormwater quantity and quality discharged from the site include utilisation of a number of permanent measures to control peak flows and remove litter, suspended solids, and nutrients effectively.</p> <p>The main measures to be implemented include stormwater detention, rainwater tanks to collect roof water for water re-use, gross pollutant traps and bio-retention areas.</p>

This report addresses the long term impacts of the development. For short term effects (i.e. during the construction phase) water quality control is achieved by implementing the measures in the Sedimentation & Erosion Control Plans to be included with the Construction Certificate Application.

### **3. STORMWATER QUANTITY CONTROL**

#### **3.1 Introduction**

The main criteria for stormwater quantity control is to ensure that the post-developed peak flows do not exceed those from the pre-development scenario which would otherwise cause detriment to the downstream waterways and/or Council's existing drainage network.

#### **3.2 Proposed Drainage System**

The drainage system for the proposed development will be designed to collect the majority of concentrated flows from impermeable surfaces such as access ways, parking areas and buildings. Where possible (and practical), runoff from pervious areas will also be collected.

The proposed stormwater management system for the development includes:

- A pit and pipe network to collect minor storm runoff from areas;
- Overland flow paths to carry major storms through the site;
- An on-site detention (OSD) storage tank with orifice and weir control;
- 10kl rainwater tank for harvesting and reuse;

A reduced set of concept civil engineering drawings is included in Appendix A.

##### **3.2.1 On-Site Stormwater Detention**

On-site stormwater detention (OSD) is required for the development of the site as per Council's DCP. The requirements for the OSD design are to provide sufficient storage is provided to ensure flow rates at any point within the downstream drainage system do not increase as a result of the development during all storm events up to the 100 year ARI.

As the site falls within the Lower Haslams Creek Catchment a permissible site discharge (PSD) of 150 l/s/ha and a site storage requirement (SSR) of 325m<sup>3</sup>/ha was applied in the stormwater calculations.

As such, it is recommended that the OSD requirements are covered by the provision of an underground detention tank with a minimum volume of 181m<sup>3</sup> with orifice plate and weir control.

The On Site Detention calculation sheet has been attached to this report as Appendix B.

##### **3.2.2 Rainwater Tank**

Council's requirement for this type of development is a minimum 10kl rainwater tank. 10kl of rainwater storage has been provided as a separate chamber within the proposed OSD system.

## **4. WATER QUALITY CONTROL**

### **4.1 Introduction**

The quality of runoff from a catchment depends upon many factors such as land use, degree of urbanisation, population density, sanitation, waste disposal practices, landform, soil types, and climate. Pollutants typically transported by runoff include litter, sediment, nutrients, oil, grease, and heavy metals. Whilst these pollutants have a deleterious impact on the receiving water quality, suspended solids and nutrients cause the highest detrimental impact to the environment. Litter, oils, and other surfactants have an aesthetic impact.

Activity within a catchment during urbanisation includes the disturbance of vegetation, removal of topsoil, land shaping, road construction, installation of services, and building works. It is during this phase that the sediment movement is greatest and is estimated that the sediment production levels may be up to 6 times higher than under the existing conditions. However, once development is completed, the sediment loading may return to the existing level or remain at a higher level depending on land management practices.

As with all development projects, soil erosion during the construction phase presents a potential risk to water quality. The primary risk occurs while soils are exposed during earthworks when suspended sediment and associated pollutants can be washed into downstream watercourses.

This section of the report addresses the long term impacts of the development on water quality. For short term effects (i.e. during the construction phase) water quality control is achieved by implementing the measures in the Sedimentation & Erosion Control Plans to be included with future Construction Certificate submissions.

### **4.2 Water Quality Control Measures**

There are a number of measures that can reduce pollutant loadings, varying in effectiveness depending on land use type, topography and the control target.

The proposed treatment train for this development will provide efficient and manageable measures suited to the subject development setting.

The measures proposed for the development are summarised in Table 3.

**Table 3 - Water Quality Control Measures**

MEASURES	DESCRIPTIONS
<b>Gross Pollutant Traps</b>	<ul style="list-style-type: none"> <li>An Ocean Baskets (EnviroPods) is a catch basin insert installed inside inlet pits. It is effective in removing trash, debris and other pollutants from runoff.</li> <li>Ocean Baskets (EnviroPods) proposed for the project utilise a 200 micron filter system.</li> <li>These filter baskets will be installed in all grated inlet pits for the development.</li> </ul>
<b>Rainwater Tanks</b>	<ul style="list-style-type: none"> <li>Rainwater tanks are effective in the removal of pollutant loads at source. The pollutant removal process occurs by harvesting runoff for reuse, thereby limiting the nutrients that are discharged into the waterways.</li> <li>It is a requirement of the DCP that a minimum 10kl rainwater tank is provided for this type of development.</li> </ul>
<b>Hydrodynamic Separator</b>	<ul style="list-style-type: none"> <li>The Vortechs system is a hydrodynamic separator designed to enhance the separation of materials within stormwater flows.</li> <li>The VX1000 device has been selected for its ability to remove sediment, oils and hydrocarbons.</li> </ul>

In addition to the above measures for pollutant control, vegetated buffers via landscape areas will be maintained along the edges of roads, accesses, and areas of activity, which will further reduce pollutants.

## 5. FLOODING

### 5.1 Introduction

The existing site is affected by overland flow in St Hilliers Road and Percy Street and some mainstream flooding at the southern end of the property which is adjacent to the St Hilliers Branch Channel of Haslam Creek.

The portion of the site being redeveloped as a hotel (the subject of this development application) is not flood affected but is still subject to Council's flood related development controls.

### 5.2 Flood Impact Assessment

To determine the appropriate estimate flood levels at the site, we have reviewed the following information:

- Flood Level Information available from Council (refer Appendix C) based on "Haslams Creek Overland Flood Study" (Report) (March 2016) prepared by Royal Haskoning DHV;
- "Haslams Creek Floodplain Risk Management Study and Plan" (Report) (January 2003) prepared by Bewsher Consulting Pty Ltd.

The estimated flood levels relevant to this development are summarised as follows:

Flood Event	PMF <sup>2</sup> (mAHD)	1% AEP <sup>1</sup> (mAHD)	5% AEP <sup>2</sup> (mAHD)
Mainstream Flood Level (AHD)	10.8	8.4	8.2
Overland Flow in Percy Street	-	7.6	-
Overland Flow in St Hilliers Road <sup>3</sup>	-	11.6	-

Notes:

1. "Haslams Creek Overland Flood Study" (Report) (March 2016).
2. "Haslams Creek Floodplain Risk Management Study and Plan" (Report) (January 2003).
3. This overland flow level is a gutter flow level. Flows are contained within the St Hilliers Road carriageway and do not enter the development site.

The area of the site that is proposed for redevelopment is within a Low Flood Risk area. However as some areas at the south of the site (not being redeveloped) are adjacent to the St Hilliers Branch Channel, we have assessed the proposed development against Council's requirements for a Medium Flood Risk for the Haslam Creek Floodplain under Auburn Council's Development Control Plan 2010 as follows:

<u>Flood Risk Planning Requirement</u>	<u>Assessment</u>
<u>Floor Level</u>	
<ul style="list-style-type: none"> <li>Floor levels of open car parking areas to be equal to or greater than the 20 year ARI flood plus freeboard. Enclosed car parking (e.g. garages or basement car parking) must be protected from the 100 year flood.</li> </ul>	<ul style="list-style-type: none"> <li>The existing FFL of the lower ground level carpark area is RL9.7 which provides +1.3m freeboard to the estimated 100 year flood and therefore complies with this requirement.</li> <li>There are no external openings to the lower ground level carpark area from St Hilliers Road and therefore this area is effectively “bunded” from overland flow in St Hilliers Road.</li> </ul>
<ul style="list-style-type: none"> <li>Habitable floor levels to be equal to or greater than the 100 year ARI flood plus freeboard.</li> </ul>	<ul style="list-style-type: none"> <li>The proposed FFL of the ground floor lobby off Percy Street is RL11.26 which provides +2.86m freeboard to the estimated 100 year flood and therefore complies with this requirement.</li> <li>The proposed FFL of the ground floor lobby off St Hilliers Road is RL13.07 which provides +1.47m freeboard to the estimated 100 year overland flow level and therefore complies with this requirement.</li> </ul>
<u>Building Components</u>	
<ul style="list-style-type: none"> <li>All structures to have flood compatible building components below or at the 100 year ARI flood level</li> </ul>	<ul style="list-style-type: none"> <li>The entire building is above the 100 year flood and therefore complies with this requirement.</li> <li>This type of development is typically of a reinforced concrete construction and therefore the building components will be flood compatible.</li> </ul>
<u>Structural Soundness</u>	
<ul style="list-style-type: none"> <li>Applicant to demonstrate that any structure can withstand the forces of flood water, debris and buoyancy up to and including a 100 year flood.</li> </ul>	<ul style="list-style-type: none"> <li>The entire building is above the 100 year flood and therefore complies with this requirement.</li> <li>Typically design certification will be provided by the project’s Structural Engineering during the Construction Certificate Application phase of the project.</li> </ul>

<u>Flood Affection</u>	
<ul style="list-style-type: none"> <li>The impact of the development on flooding elsewhere to be considered.</li> </ul>	<ul style="list-style-type: none"> <li>The existing site levels in the area of the proposed redevelopment are higher than the estimated 100 year flood levels. Therefore the proposed development (whilst higher than the estimated 100 year flood level) will not impact on flooding in the area and therefore complies with this requirement.</li> </ul>
<u>Evacuation</u>	
<ul style="list-style-type: none"> <li>Reliable access for pedestrians or vehicles is required to an area of refuge above the PMF level, either on-site or off-site.</li> </ul>	<ul style="list-style-type: none"> <li>The lowest proposed FFL is the ground floor lobby off Percy Street which is at RL11.26 which provides 460mm freeboard to the estimated PMF flood and therefore provides a safe refuge which complies with this requirement.</li> <li>The St Hilliers Road lobby area and Parramatta Road frontage of the proposed redevelopment area is above the PMF level and therefore provides an area of safe evacuation which also complies with this requirement.</li> </ul>
<ul style="list-style-type: none"> <li>Applicant to demonstrate that the development is to be consistent with any relevant DISPLAN or flood evacuation strategy.</li> </ul>	<ul style="list-style-type: none"> <li>There is no relevant flood evacuation strategy for this area.</li> <li>The hotel will have their own operational requirements and strategies that document procedures for all sorts of emergencies including flooding as appropriate.</li> </ul>



<u>Management and Design</u>	
<ul style="list-style-type: none"> <li>Site Emergency Response Flood Plan required where floor levels are below the design flood level.</li> </ul>	<ul style="list-style-type: none"> <li>The hotel will have their own operational requirements and strategies that document procedures for all sorts of emergencies including flooding as appropriate.</li> </ul>
<ul style="list-style-type: none"> <li>Applicant to demonstrate that area is available to store goods above the 100 year flood plus freeboard.</li> </ul>	<ul style="list-style-type: none"> <li>The existing FFL of the lower ground level carpark area is RL9.7 which provides +1.3m freeboard to the estimated 100 year flood and therefore complies with this requirement.</li> <li>There are no external openings to the lower ground level carpark area from St Hilliers Road and therefore this area is effectively “bunded” from overland flow in St Hilliers Road.</li> <li>The proposed FFL of the ground floor lobby off Percy Street is RL11.26 which provides +2.86m freeboard to the estimated 100 year flood and therefore complies with this requirement.</li> <li>The proposed FFL of the ground floor lobby off St Hilliers Road is RL13.07 which provides +1.47m freeboard to the estimated 100 year overland flow level and therefore complies with this requirement.</li> </ul>
<ul style="list-style-type: none"> <li>No external storage of materials below design floor level which may cause pollution or be potentially hazardous during any flood.</li> </ul>	<ul style="list-style-type: none"> <li>It is not proposed to store material external to the building.</li> </ul>

This Flood Impact Assessment shows that the proposed development is in accordance with Council’s Development Controls relating to flood impact and risk.

## 6. RECOMMENDATIONS

The proposed development of the site could potentially lead to significant changes in water quantity and quality if a water sensitive urban design approach is not adopted as part of the development strategy. The traditional stormwater management approach that only considers impacts of flooding and flood mitigation is no longer appropriate. Stormwater management best practice must now also consider water quality, aquatic habitats, riparian vegetation, recreation, aesthetic and economic issues.

The key strategies to be adopted for this development include the following:

1. A pit and pipe network to collect minor storm runoff from surface areas which will minimise nuisance flooding;
2. Overland flow paths to carry major storms through and around the site without causing damage to property from flooding;
3. An on-stormwater detention tank with a minimum storage capacity of 181m<sup>3</sup> to maintain peak stormwater discharges at a pre-development level;
4. 200um Ocean Baskets (EnviroPods) installed within all grated surface inlet pits to remove gross pollutants (litter);
5. A VX1000-Vortechs hydrodynamic separator to remove sediment, oils and hydrocarbons from stormwater runoff;
6. 10 kl rainwater retention tank.

Implementation of the above stormwater management recommendations will ensure that the proposed development can provide a safe and ecologically sustainable environment with regards to stormwater.

## 7. REFERENCES

- Concept Civil Engineering Drawings for the Development Application submission prepared by C&M Consulting Engineers;
- Proposed Architectural Drawings for the Development Application submission prepared by Jackson Teece Architects;
- Auburn Development Control Plan 2010;
- “Australian Rainfall and Runoff – A Guide to Flood Estimation”, Institute of Engineers, Australia (2016);
- AS3500.3:2018 – Plumbing and drainage: Stormwater drainage;
- “Upper Parramatta River Catchment Trust – On-site Stormwater Detention Handbook (3<sup>rd</sup> Edition – June 2004)”;
- “Australian Runoff Quality – A Guide to Water Sensitive Urban Design”, Engineers Australia (2006);

APPENDIX A

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CONCEPT CIVIL ENGINEERING DRAWINGS



# 93 ST HILLIERS ROAD, AUBURN

## STORMWATER DRAINAGE PLANS

### FOR DEVELOPMENT APPLICATION

#### DRAWING INDEX:

DRAWING No.	DRAWING TITLE
02153_100	COVER SHEET, GENERAL NOTES, LEGEND, DRAWING INDEX & LOCALITY SKETCH
02153_201	GENERAL ARRANGEMENT PLAN - SHEET 01
02153_202	GENERAL ARRANGEMENT PLAN - SHEET 02
02153_601	STORMWATER DRAINAGE - OSD CALCS & CATCHMENT PLAN
02153_651	STORMWATER DRAINAGE - OSD SECTION AND DETAILS
02153_701	SEDIMENT AND EROSION CONTROL PLAN AND DETAILS

#### LEGEND

---	BOUNDARY
---	STORMWATER LINE (1000 uPVC U.N.O.)
---	FINISHED SURFACE CONTOUR
---	200mm GRATED DRAIN (GTD)
GSIP	GRATED SURFACE INLET PIT
JP	JUNCTION PIT / ACCESS LID
▶	DIRECTION OF FLOW
○	DOWN PIPE
C	DROPPER
RL 91.06	FINISHED SURFACE LEVEL
GRL 91.86	FINISHED STORMWATER PIT LID/GRATE LEVEL
—	RISER
—	SERVICE TYPE
—	SERVICE SIZE
—	DROPPER
—	RETAINING WALL

#### GENERAL NOTES:

- ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH CUMBERLAND COUNCIL WORKS STANDARD AND TO COUNCIL ENGINEERS REQUIREMENTS.
- THE CONSTRUCTOR SHALL PREPARE A DILAPIDATION REPORT FOR THE EXISTING INFRASTRUCTURE WITHIN THE ROAD RESERVE, INCLUDING BUT NOT LIMITED TO KERBS, GUTTERS, FOOTPATHS, VEHICULAR CROSSINGS, STREET SIGNS, SERVICE FITTING COVERS, ETC.
- THE CONSTRUCTOR SHALL REVIEW, BE AWARE AND AT ALL TIMES COMPLY WITH THE SPECIFIC REQUIREMENTS FOR THIS DEVELOPMENT AS SET OUT IN THE DEVELOPMENT APPROVAL FOR THE PROJECT.
- ANY CHANGES MADE BY THE CONSTRUCTOR TO ANY LEVEL, DIMENSION, LOCATION, POSITION, ALIGNMENT ETC., OF ANY OF THE WORKS SHOWN ON THE DRAWINGS WITHOUT THE WRITTEN CONSENT OF C&M CONSULTING ENGINEERS PTY. LTD. AND/OR THE COUNCIL ENGINEER IS DONE SO AT THE CONSTRUCTORS OWN RISK.
- THE CONSTRUCTOR SHALL ALLOW TO LIAISE WITH AND PROVIDE SUFFICIENT NOTICE TO THE COUNCIL ENGINEER TO ENSURE THAT ALL WORKS ARE INSPECTED TO ENABLE COMPLIANCE CERTIFICATES TO BE ISSUED THROUGHOUT THE CONSTRUCTION PERIOD. THE CONSTRUCTOR SHALL LIAISE WITH THE COUNCIL ENGINEER PRIOR TO ANY CONSTRUCTION WORKS COMMENCING AND PREPARE AN INSPECTION AND TEST PLAN WITH A MUTUALLY AGREED WITNESS AND HOLD POINTS FOR THE CONSTRUCTION WORKS.
- THE CONSTRUCTOR MUST CONTACT CUMBERLAND COUNCIL'S WORKS DIVISION TO ENABLE THEIR INSPECTION OF ALL WORKS (INCLUDING EROSION AND SEDIMENT CONTROL MEASURES) WITHIN THE ROAD RESERVE AREA.
- ALL NEW WORKS SHALL MAKE A SMOOTH CONNECTION WITH ANY FORMATIONS, STRUCTURES, ETC.
- ALL ALTERATIONS AND/OR ADDITIONS TO EXISTING WORK, THE CONSTRUCTOR SHALL VERIFY THE DIMENSIONS OF THE EXISTING WORK BEFORE PROCEEDING AND NOTIFY THE SUPERINTENDENT AND/OR THE COUNCIL ENGINEER OF DISCREPANCIES.
- THE CONSTRUCTOR SHALL USE MANUFACTURED ITEMS IN THE WORK ONLY IN ACCORDANCE WITH THE CURRENT PUBLISHED RECOMMENDATIONS OF THE MANUFACTURER RELEVANT TO SUCH USE.
- THE WORKS SHALL BE CONSTRUCTED IN SUCH A MANNER THAT THERE IS MINIMUM DISTURBANCE TO EXISTING TREES AND VEGETATION.
- ALL BOUNDARY LOCATIONS, DIMENSIONS, BEARINGS, AREAS, ETC., SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY AND ARE SUBJECT TO A FINAL SURVEY AND REGISTRATION OF THE FINAL PLAN OF SUBDIVISION WITH LAND AND PROPERTY INFORMATION NSW.
- THE PUBLIC FOOTWAY AND ROADWAYS SHALL BE MAINTAINED IN A SAFE AND UNOBSTRUCTED MANNER AT ALL TIMES DURING THE CONSTRUCTION WORKS.
- THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR REPAIRING TO THE SATISFACTION OF THE ASSET OWNER, ANY DAMAGE CAUSED TO ANY EXISTING INFRASTRUCTURE WITHIN THE ROAD RESERVE, INCLUDING BUT NOT LIMITED TO KERBS, GUTTERS, FOOTPATHS, VEHICULAR CROSSINGS, STREET SIGNS, SERVICE FITTING COVERS, ETC.
- THE SITE SHALL BE KEPT IN A TIDY CONDITION AT ALL TIMES. LITTER RUBBISH AND BUILDING RUBBLE SHALL BE PLACED IN CONTAINERS OR BINS AND REGULARLY REMOVED FROM SITE AS REQUIRED.

#### SETTING OUT NOTES:

- THE CONSTRUCTOR SHALL USE A SUITABLY QUALIFIED SURVEYOR TO SET OUT ALL WORKS. THE SURVEYOR SHALL ISSUE A CERTIFICATE TO THE PRINCIPAL CERTIFYING AUTHORITY CERTIFYING THAT THE WORKS HAVE BEEN SET OUT IN ACCORDANCE WITH THE APPROVED DRAWINGS PRIOR TO THE WORKS BEING CONSTRUCTED.
- THE SURVEY WORK ASSOCIATED WITH THE CONTRACT SHALL INCLUDE SETTING OUT THE FOLLOWING COMPONENTS OF THE WORK:

- DRAINAGE STRUCTURES

#### SERVICES NOTES:

- IT IS THE CONSTRUCTORS RESPONSIBILITY TO NOTIFY THE RELEVANT SERVICES AUTHORITIES OF THE WORKS AND VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO ANY CONSTRUCTION ACTIVITIES COMMENCING.
- THE CONSTRUCTOR SHALL LIAISE AND COORDINATE THE TIMING OF THE CONSTRUCTION OF THE WORKS WITH THE RELEVANT SERVICES AUTHORITIES AND/OR OTHER CONSTRUCTORS INSTALLING SERVICES CONCURRENTLY AT THIS SITE.
- THE LOCATION OF ALL EXISTING SERVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY AND HAVE BEEN TAKEN FROM INFORMATION PROVIDED BY THE RELEVANT SERVICE AUTHORITIES.
- THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE CAUSED TO EXISTING SERVICES AS A RESULT OF THE CONSTRUCTION WORKS.

#### STORMWATER NOTES:

- STORMWATER DESIGN CRITERIA:
  - MINOR STORM ARI: 20 YEARS
  - MAJOR STORM ARI: 100 YEARS
- IFD DATA LOCALITY: AUBURN
- PIPES DN375 AND LARGER TO BE STEEL REINFORCED CONCRETE PIPES CLASS '2' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS U.N.O.
- PIPES DN300 AND SMALLER SHALL BE GRADE 5H (SEWER GRADE) uPVC WITH RUBBER RING JOINTS.
- EQUIVALENT STRENGTH FIBRE REINFORCED CONCRETE PIPES MAY BE USED UP TO DN450.
- PIPES FOR SUB-SOIL DRAINS SHALL BE SLOTTED 100MM DIAMETER CLASS 1000 WRAPPED IN GEOFABRIC, U.O.N. COMPLYING WITH THE REQUIREMENTS OF AS 2439.
- PRECAST PITS, WHERE ALLOWED, AND THE INSITU BASE SHALL COMPLY WITH THE REQUIREMENT OF THE MANUFACTURER.
- STORMWATER KERB OUTLET TO BE INSTALLED ON THE LOWER SIDE OF EACH LOT.
- PROVIDE STEP IRONS FOR PITS DEEPER THAN 12m.
- COMPRESSIVE STRENGTH FOR CAST IN-SITU PITS SHALL BE 25MPa UNLESS NOTED OTHERWISE.
- ALL PITS SHALL BE BENCHED AND FLOW STREAMLINED.
- ALL MILD STEEL FIXTURES INCLUDING GRATES, FRAMES, STEP IRONS, LADDERS, ETC., SHALL BE HOT DIP GALVANISED. GALVANISING SHALL COMPLY WITH THE REQUIREMENTS OF AS 1214 OR AS 1650, AS APPROPRIATE.
- GEOFABRIC FILTER SHALL BE PERMEABLE, NON-WOVEN FABRIC MANUFACTURED FROM A POLYMER SUCH AS POLYPROPYLENE OR POLYESTER OF MASS NOT LESS THAN 135G/M2.
- THE MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:
  - CONCRETE AND FRC PIPES: EXTERNAL PIPE DIAMETER PLUS 400MM.
  - uPVC PIPE: EXTERNAL DIAMETER OF PIPE PLUS 200MM.
  - SUBSOIL PIPE: 250MM.
- ALL PIPES SHALL BE PLACED CENTRALLY WITHIN THE TRENCH WITH EQUAL CLEARANCE EACH SIDE.
- 100mm DIA. SUBSOIL DRAINAGE PIPE 3m LONG WRAPPED IN FILTER SOCK TO BE PROVIDED IN PIPE TRENCHES UPSTREAM OF ALL PITS.
- PIPE BEDDING MATERIAL SHALL BE CLEAN COARSE RIVER SAND WITH DEPTH AS FOLLOWS:
  - CONCRETE AND FRC PIPES: 100MM (175MM IN ROCK)
  - uPVC PIPE: 75MM (100MM IN ROCK)
  - SUBSOIL DRAINS: 50MM
- ALL PIPES SHALL BE BACKFILLED WITH GRANULAR MATERIAL SUCH AS QUARRY FINES OR COARSE RIVER SAND TO A MINIMUM OF 150MM ABOVE THE PIPE. THE GRANULAR MATERIAL SHALL BE PLACED IN 150MM THICK MAXIMUM LAYERS AND COMPACTED TO ACHIEVE A DENSITY INDEX (DI) OF 70%. FREQUENCIES OF COMPACTION TESTS FOR TRENCHES SHALL BE 1 TEST PER 2 LAYERS PER 40 LINEAR METRE.
- BACKFILL THE REMAINDER OF THE TRENCH ABOVE THE SAND TO SUBGRADE LEVEL WITH TRENCH MATERIAL. PLACE AND COMPACT MATERIALS IN LAYERS NOT EXCEEDING 150MM LOOSE THICKNESS. MATERIAL LOWER THAN 500MM BELOW SUBGRADE LEVEL SHALL BE COMPACTED TO AT LEAST 95% OF STANDARD MAXIMUM DRY DENSITY. THE TOP 500MM BELOW PAVEMENT SUBGRADE LEVELS SHALL BE COMPACTED TO AT LEAST 100% STANDARD MAXIMUM DRY DENSITY.
- SUBSOIL DRAINAGE SHALL BE PROVIDED ALONG THE CUT SIDE OF ALL NEW ROADS WHERE NO DRAINAGE IS PROVIDED, ALONG THE CENTRE LINE OF HALF ROAD CONSTRUCTION WORKS, AT LOW SPOTS, WHERE REQUIRED BY THE PAVEMENT DESIGN REPORT, AND WHERE DIRECTED BY COUNCIL'S ENGINEER.
- FILTER MATERIAL FOR SUBSOIL SHALL BE COARSE SAND OR CRUSHED STONE COMPLYING WITH ONE OF THE GRADINGS IN THE TABLE BELOW. WHERE NOTED ON THE DRAWINGS THE 7MM CRUSHED ROCK FILTER MATERIAL SHALL BE ENCLOSED WITHIN FILTER FABRIC SHEET AS SPECIFIED. FILTER MATERIAL SHALL BE PLACED IN 250MM LAYERS AND COMPACTED TO DENSITY INDEX (DI) OF 60%.

AS SIEVE SIZE (mm)	SAND	7mm ROCK
9.5	100	100
6.7	-	75-100
4.75	90-100	20-55
2.36	75-100	0-15
1.18	50-90	
0.6	20-60	
0.3	10-30	
0.15	2-10	
0.075	0-3	0-2

- UNLESS OTHERWISE DETAILED OR PERMITTED, THE MINIMUM GRADE OF ALL PIPE WORKS SHALL BE 1.0%.
- PRIOR TO ISSUE OF PRACTICAL COMPLETION THE CONTRACTOR SHALL CARRY OUT CCTV SURVEY OF ALL PIPES AND SUBMIT DVD AND WRITTEN REPORT THAT ALL PIPES ARE FREE OF DEFECTS LAID TO THE SPECIFICATION.
- OVERLAND FLOW PATHS TO BE FORMED AT TIME OF CONSTRUCTION.
- ALL CHANNELS, OPEN DRAINS ETC. TO BE TURFED UNLESS NOTED OTHERWISE.
- WHERE OVERLAND FLOW PATHS CROSS OVER FOOTPATHS THE CROSS FALL SHALL BE REVERSED.
- STRUCTURAL CERTIFICATION REQUIRED FOR CONSTRUCTION OF MAJOR AND NON-STANDARD STRUCTURES.

#### ENVIRONMENTAL CONTROL NOTES:

##### EROSION AND SEDIMENT CONTROL

- THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONTROL OF EROSION AND SEDIMENTATION TO THE SATISFACTION OF COUNCIL, THE RELEVANT STATE AUTHORITIES AND THE SUPERINTENDENT. TO THIS END, THE EROSION AND SEDIMENTATION CONTROLS SHOWN ON THE DRAWINGS SHALL ONLY BE USED AS A GUIDE BY THE CONTRACTOR, AND SHALL REPRESENT THE MINIMUM REQUIREMENT ONLY.
- NO CONSTRUCTION WORKS ARE TO COMMENCE ON SITE UNTIL ALL EROSION AND SEDIMENT CONTROL MEASURES ARE IN PLACE AND HAVE BEEN INSPECTED AND APPROVED BY THE COUNCIL ENGINEER AND/OR SUPERINTENDENT.
- ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REGULARLY INSPECTED, IN PARTICULAR AFTER STORMS, AND REPAIRED OR MAINTAINED AS REQUIRED TO ENSURE THE MEASURES CORRECT AND EFFICIENT FUNCTION THROUGHOUT THE DURATION OF THE WORKS, UNTIL SUCH TIME AS THE COUNCIL ENGINEER AND/OR SUPERINTENDENT AUTHORISES THE REMOVAL OF SUCH MEASURES.
- ALL STOCKPILES SHALL BE CLEAR OF ALL TREES AND DRAINAGE LINES (INCLUDING OVERLAND FLOW PATHS) AND PROTECTED FROM EROSION.
- IN THE CASE OF THE TEMPORARY CONSTRUCTION EXIT, THE CONTRACTOR SHALL UNDERTAKE WEEKLY SURFACE CLEANING BY DRAG BROOM OR EQUIVALENT, TO REMOVE ALL BUILD UP OF FOREIGN MATERIAL TO THE SATISFACTION OF THE SUPERINTENDENT.

##### TRAFFIC CONTROLS

- THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONTROL OF TRAFFICS INCLUDING VEHICLES AND PEDESTRIANS TO THE SATISFACTION OF COUNCIL, THE RELEVANT STATE AUTHORITIES AND THE SUPERINTENDENT.
- THE CONTRACTOR IS TO PREPARE A TRAFFIC MANAGEMENT PLAN TO THE REQUIREMENTS OF THE RMS - TRAFFIC CONTROL AT WORK SITE, AS 1742 - AUSTRALIAN STANDARD MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, AND LOCAL COUNCIL STANDARDS.

##### OTHER ENVIRONMENTAL CONTROLS

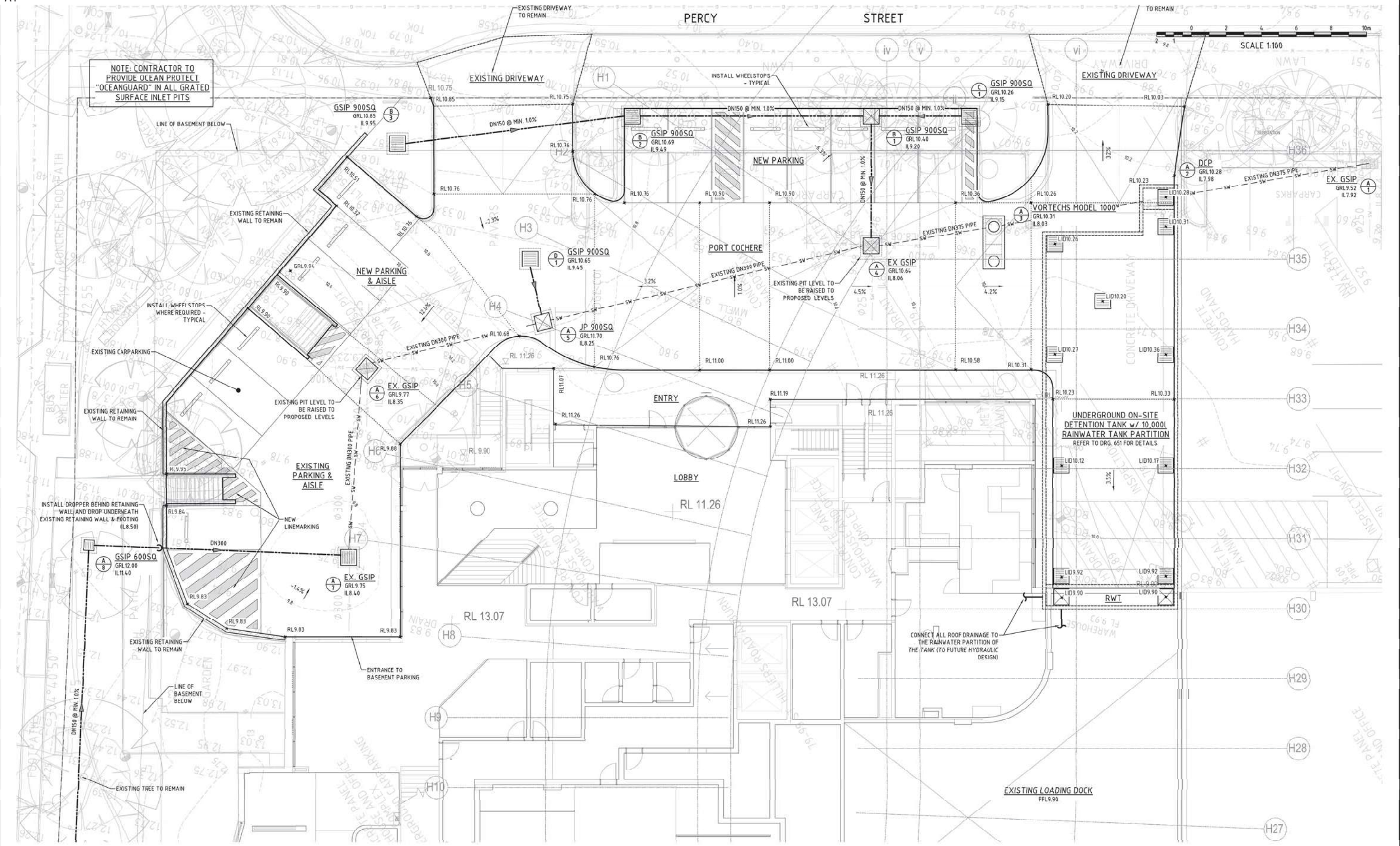
- OTHER ENVIRONMENTAL CONTROLS LIKE NOISE, DUST, VIBRATION, FLORA & FAUNA, FIRE, HAZMAT, AND CONTAMINATIONS MUST BE CONTROLLED TO THE REQUIREMENT OF THE COUNCIL AND THE RELEVANT STATE AUTHORITIES.



LOCALITY SKETCH  
NOT TO SCALE

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CLIENT



CIVIL AND HYDRAULIC  
ENGINEERING DESIGN AND  
PROJECT MANAGEMENT

SUITE 26  
11 - 13 BROOKHOLLOW AVE  
NORWEST NSW 2153

PHONE: (02) 9680 3100  
FAX: (02) 9634 6989  
ABN 21 118 134 240

DESIGNER	T.T.	DATE	03/07/19
ENGINEER	A.M.	LGA	CUMBERLAND
VERIFIER	A.M.	SCALE @ A1	1:100

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93 ST. HILLIERS ROAD, AUBURN	
GENERAL ARRANGEMENT PLAN - SHEET 01	
STATUS	DA
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REVISION	01



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VERIFIER	A.M.	SCALE @ A1	1:100

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93 ST. HILLIERS ROAD, AUBURN

GENERAL ARRANGEMENT PLAN - SHEET 02

STATUS DA DRAWING No. 02153\_202 REVISION 01





### DRAINAGE DESIGN SUMMARY

Project:	Auburn Marriott	SUB/DA No.:	PN02153
Location:	Corner Parramatta Road & St Hilliers R	Client:	

#### PRELIMINARY DESIGN:

Site area:		=	0.5434 ha	[A]
Basic storage volume:	325 x [A]	=	176.6 cu.m	[B]
Basic discharge:	0.150 x [A]	=	0.0815 cu.m/s	[C]
Area of site drained to storage:		=	0.4958 ha	[D]
Proportion of site stored:	[D] / [A] x 100	=	91 %	[E]
Storage per ha of contributing area:	[B] / [D]	=	356 cu.m/ha	[F]
Adjusted PSD:		=	117.9 l/s/ha	[G]
Final PSD:	[G] x [D]	=	58.48 l/s	[H]

#### DESIGN DCP:

Maximum area draining to DCP		=	0.4958 ha	
Rainfall intensity for site,	ARI= 100	=	231.0 mm/hr	
Peak discharge to DCP	C= 1	Q <sub>max</sub> =	0.318 cu.m/s	
Peak flow over weir to primary storage		Q <sub>w</sub> =	0.260 cu.m/s	
Width of weir		L =	1.800 m	
Design flow over weir	ARI= 100	Q =	0.260 cu.m/s	
Height of flow over weir in DCP		h=(Qw/CL) <sup>0.66</sup>	0.201 m	
Maximum head to orifice centre:		H <sub>max</sub> =	1.401 m	[K]
Head for high early discharge: (to weir crest)		H <sub>min</sub> =	1.200 m	[M]
Selected orifice diameter:	(0.464 x Q / sqrt(h)) ^ 0.5	=	0.151 m	[J]

#### SCREEN DESIGN:

Minimum screen area required (where orifice is <= 150mm):	=	0.900 sq.m	
Minimum screen area required (where orifice is > 150mm):	=	0.360 sq.m	
Diameter of Outlet pipe (D):	=	400 mm	
Height of Screen (H <sub>min</sub> + 0.5D):	=	1.400 m	
Minimum Width of Screen (where orifice is <= 150mm):	=	0.643 m	
Minimum Width of Screen (where orifice is > 150mm):	=	0.257 m	
Actual Width of Screen:	=	1.100 m	
Screen area provided:	=	1.540 sq.m	

#### REVISE SITE DISCHARGE:

Maximum discharge:		=	58.48 l/s	[L]
High early discharge: (HED):	{[L] x SQRT([M] / [K])}	=	54.12 l/s	[N]
Approximate mean discharge:	([L] + [N]) / 2	=	56.30 l/s	[P]
Average discharge / ha:	[P] / [D]	=	113.5 l/s/ha	[Q]

#### REVISE SITE STORAGE:

Final storage volume per hectare:		=	366.2 cu.m/ha	[R]
Determine final SSR:	[R] x [D]	=	181.6 cu.m	[S]

#### SITE STORAGE: (See Figure 5.2)

Primary storage proportion:	%[W]= 100	ARI= 100	=	181.6 cu.m	[T]
Secondary storage proportion:	%[W]= 0	ARI= 0	=	0.0 cu.m	[U]
Tertiary storage proportion:	%[W]= 0	ARI= 0	=	0.0 cu.m	[V]
Check storage:		[T] + [U] + [V]	=	181.6 cu.m	[W]



REV.	DES.	DATE	VER.	DESCRIPTION
01	T.T.	03/02/20	A.M.	ISSUED FOR DA APPROVAL



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TENDER/CONSTRUCTION UNLESS ENDORSED BELOW

PROJECT VERIFIER'S SIGNATURE: DATE:

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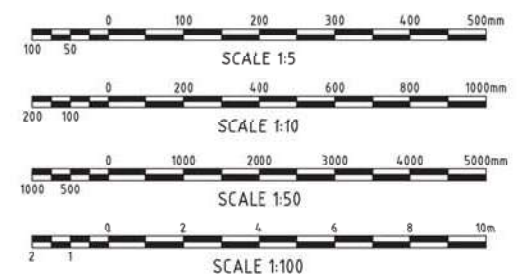
CIVIL AND HYDRAULIC  
ENGINEERING DESIGN AND  
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SUITE 26  
11 - 13 BROOKHOLLOW AVE  
NORWEST NSW 2153  
PHONE: (02) 9680 3100  
FAX: (02) 9634 6989  
ABN 21 118 134 240

DESIGNER	T.T.	DATE	03/07/19
ENGINEER	A.M.	LGA	CUMBERLAND
VERIFIER	A.M.	SCALE @ A1	1:200

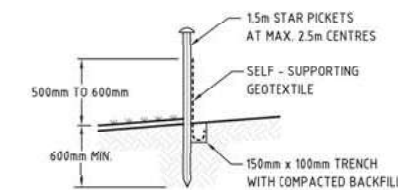
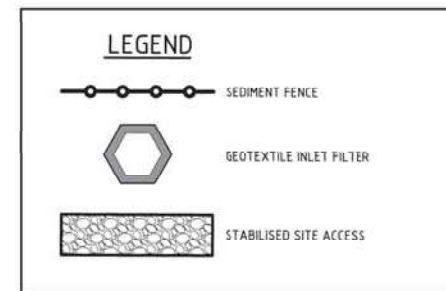
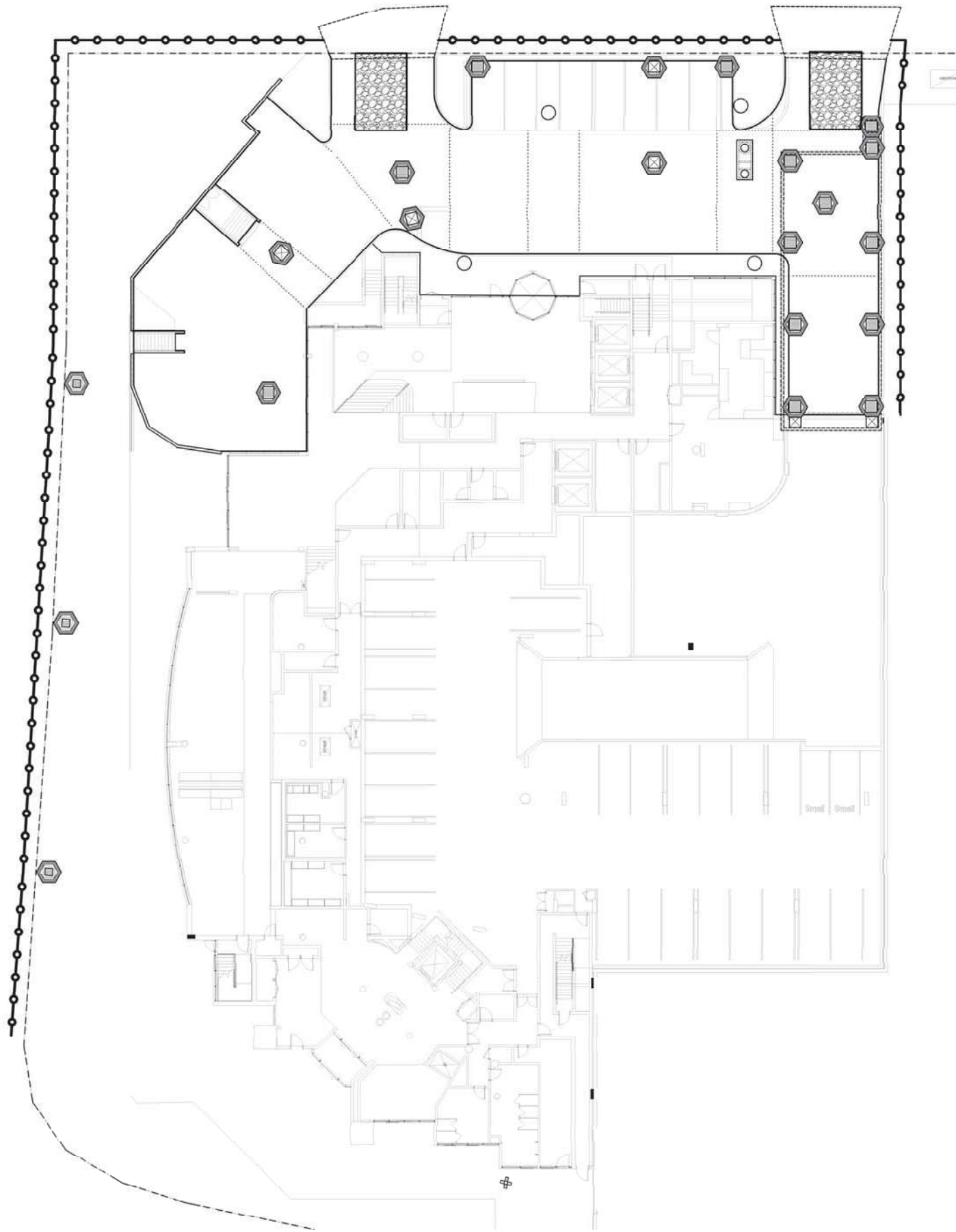
93 ST. HILLIERS ROAD, AUBURN

STORMWATER DRAINAGE  
CATCHMENT PLAN & CALCS

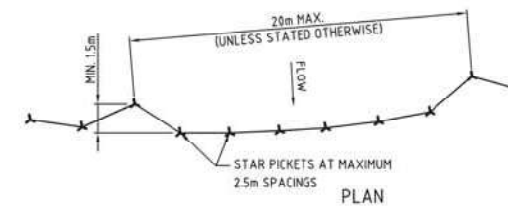
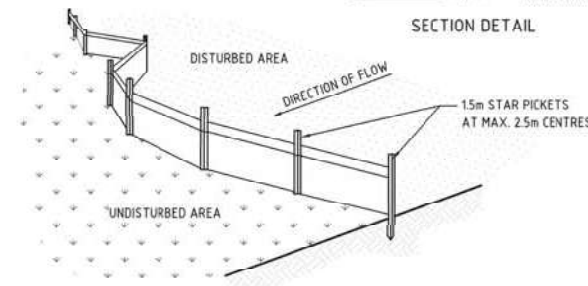
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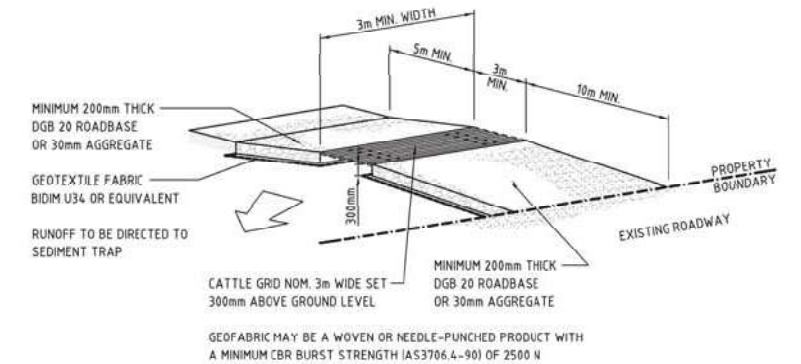
PLAN

**CONSTRUCTION NOTES:**

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 15 METRE LONG STAR PICKETS INTO THE GROUND AT 2.5 METRE 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 PICKETS 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 150-mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

**SEDIMENT FENCE DETAIL**

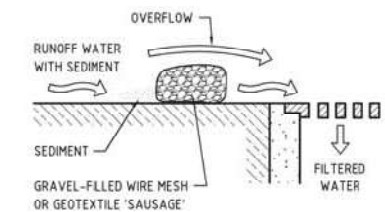
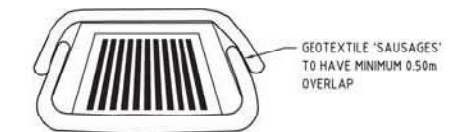
NOT TO SCALE

**CONSTRUCTION NOTES:**

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15m LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3m WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

**STABILISED SITE ACCESS WITH SHAKER GRID DETAIL**

NOT TO SCALE

**CONSTRUCTION NOTES:**

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

**GEOTEXTILE INLET FILTER DETAIL**

FOR PITS WITHIN PAVEMENT AREAS

NOT TO SCALE



REV.	DES.	DATE	VER.	DESCRIPTION
01	T.T.	03/02/20	A.M.	ISSUED FOR DA APPROVAL



THIS DRAWING IS NOT TO BE USED FOR TENDER/CONSTRUCTION UNLESS ENDORSED BELOW

PROJECT VERIFIER'S SIGNATURE: DATE:

CLIENT



CIVIL AND HYDRAULIC  
ENGINEERING DESIGN AND  
PROJECT MANAGEMENT

SUITE 26  
11 - 13 BROOKHOLLOW AVE  
NORWEST NSW 2153

PHONE: (02) 9680 3100  
FAX: (02) 9634 6989  
ABN 21 118 134 240

DESIGNER	T.T.	DATE	03/07/19
ENGINEER	A.M.	LGA	CUMBERLAND
VERIFIER	A.M.	SCALE @ A1	1:200

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93 ST. HILLIERS ROAD, AUBURN			
SEDIMENT AND EROSION CONTROL PLAN & DETAILS			
STATUS	DA	DRAWING No.	02153_701
		REVISION	01

## APPENDIX B

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### OSD CALCULATION SHEET (UPRCT v3)

## DRAINAGE DESIGN SUMMARY

Project:	Auburn Marriott	SUB/DA No.:	PN02153
Location:	Corner Parramatta Rd & St Hilliers Rd	Client:	

### PRELIMINARY DESIGN:

Site area:		=	0.5434 ha	[A]
Basic storage volume:	325 x [A]	=	176.6 cu.m	[B]
Basic discharge:	0.150 x [A]	=	0.0815 cu.m/s	[C]
Area of site drained to storage:		=	0.4958 ha	[D]
Proportion of site stored:	[D] / [A] x 100	=	91 %	[E]
Storage per ha of contributing area:	[B] / [D]	=	356 cu.m/ha	[F]
Adjusted PSD:		=	117.9 l/s/ha	[G]
Final PSD:	[G] x [D]	=	58.48 l/s	[H]

### DESIGN DCP:

Maximum area draining to DCP		=	0.4958 ha	
Rainfall intensity for site,	ARI= 100	=	231.0 mm/hr	
Peak discharge to DCP	C= 1	Qmax =	0.318 cu.m/s	
Peak flow over weir to primary storage		Qw =	0.260 cu.m/s	
Width of weir		L =	1.800 m	
Design flow over weir	ARI= 100	Q =	0.260 cu.m/s	
Height of flow over weir in DCP		$h=(Qw/CL)^{0.66}$	= 0.201 m	
Maximum head to orifice centre:		Hmax =	1.401 m	[K]
Head for high early discharge: (to weir crest)		Hmin =	1.200	[M]
Selected orifice diameter:		$(0.464 \times Q / \text{sqrt}(h))^{0.5}$	= 0.151 m	[J]

### SCREEN DESIGN:

Minimum screen area required (where orifice is <= 150mm):	=	0.900 sq.m	
Minimum screen area required (where orifice is > 150mm):	=	0.360 sq.m	
Diameter of Outlet pipe (D):	=	400 mm	
Height of Screen (Hmin + 0.5D):	=	1.400 m	
Minimum Width of Screen (where orifice is <= 150mm):	=	0.643 m	
Minimum Width of Screen (where orifice is > 150mm):	=	0.257 m	
Actual Width of Screen:	=	1.100 m	
Screen area provided:	=	1.540 sq.m	

### REVISE SITE DISCHARGE:

Maximum discharge:		=	58.48 l/s	[L]
High early discharge: (HED):	{[L] x SQRT([M] / [K])}	=	54.12 l/s	[N]
Approximate mean discharge:	([L] + [N]) / 2	=	56.30 l/s	[P]
Average discharge / ha:	[P] / [D]	=	113.5 l/s/ha	[Q]

### REVISE SITE STORAGE:

Final storage volume per hectare:		=	366.2 cu.m/ha	[R]
Determine final SSR:	[R] x [D]	=	181.6 cu.m	[S]

### SITE STORAGE: (See Figure 5.2)

Primary storage proportion:	%[W]= 100	ARI= 100	=	181.6 cu.m	[T]
Secondary storage proportion:	%[W]= 0	ARI= 0	=	0.0 cu.m	[U]
Tertiary storage proportion:	%[W]= 0	ARI= 0	=	0.0 cu.m	[V]
Check storage:		[T] + [U] + [V]	=	181.6 cu.m	[W]

Signature: Anthony Mancone  
Company: C&M Consulting Engineers

Date: 4/2/20

## APPENDIX C

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### COUNCIL FLOOD LEVEL INFORMATION



9 July 2019

Our Reference D-08-01/03  
Contact Rolyn Sario  
Telephone 8757 9536

Jim Mantzoros  
Shop 122, 4 Mount Street  
MOUNT DRUITT NSW 2065

Dear Sir/Madam

**FLOOD LEVELS AT NO 93 ST HILLIERS ROAD, AUBURN  
BEING LOT 11 DP 786590**

Council refers to your request dated 3 July 2019 requesting flood information at the above property.

The above property is shown to be affected by the 1% Annual Exceedance Probability (AEP) flood, according to the information available to Council from the "Haslams Creek Overland Flood Study" prepared by Royal Haskoning DHV in March 2016.

The 1% AEP flood level refers to a flood which has a 1% chance of being equalled or exceeded in any one year and this site has been assessed as a high flood risk. It should be noted that a flood could occur that is more severe than the 1% AEP flood at any time.

The maximum 1% AEP flood level relevant to the subject property has been determined (see the attached plan) to Australian Height Datum (AHD) as follows:

1. At location A	-	8.4 mAHD
2. At location B	-	8.6 mAHD
3. At location C	-	8.8 mAHD
4. At location D	-	9.0 mAHD
5. At location E	-	9.2 mAHD
6. At location F	-	9.4 mAHD
7. At location G	-	9.2 mAHD
8. At location H	-	9.0 mAHD
9. At location I	-	9.4 mAHD
10. At location J	-	11.6 mAHD
11. At location K	-	9.0 mAHD
12. At location L	-	7.6 mAHD
13. At location M	-	7.6 mAHD
14. At location N	-	7.6 mAHD
15. At location O	-	8.0 mAHD
16. At location P	-	8.4 mAHD
17. At location Q	-	8.4 mAHD



The subject property has been identified as Flood Control lot. Under the SEPP (Exempt & Complying Development) 2008 Regulation 3.36C, a Complying Development Certificate must not be issued for, *"any part of a flood control lot unless that part of the lot has been certified, for the purposes of the issue of the relevant complying development certificate, by the council or a professional engineer who specialises in hydraulic engineering as not being any of the following:*

- a) a flood storage area,*
- b) a floodway area,*
- c) a flow path,*
- d) a high hazard area,*
- e) a high risk area."*

Council has determined that part of the flood control lies in five of the five items above – items *a, b, c, d* and *e* therefore; a CDC cannot be issued on this site. The identified flood items are represented by the darker area within the 1% AEP flood extent on the attached map. If the development is proposed within any part of this zone (dark blue area), a pre and post flood study must accompany the Development Application. Alternatively, if the development is proposed within the uncoloured and/or light blue areas (flood fringe zone), a CDC may be considered for this site. However, the surface flows must not be impeded (blocked) and the redevelopment shall allow the free movement of the flood around any proposed structure(s).

In all cases, flood level on adjacent properties shall not be increased. Supporting documentation is to accompany the development.

Minimum habitable floor levels shall be 0.5m above the flood level at the upstream side of the structure. Minimum non-habitable floor levels (garages, laundry, sheds, etc.) shall be 0.15m above the flood level at the upstream side of the structure. Interpolation between flood levels is allowed.

The relationship between these levels and the ground surface may be determined by a survey of the property undertaken by a Registered Surveyor.

It should be noted that where the development or redevelopment of the property is proposed, reference should be made to the relevant Development Control Plan with regard to flooding and drainage issues. Please include a copy of this letter and map with any Development Application that you may lodge with Council for the subject site.


For flood modelling purposes, the models (pre and post development flood study) shall be calibrated to Council's 1%AEP Flood levels (or interpolated levels) at least 10 metres upstream and downstream from the property boundaries. Surface flows through the property shall not be obstructed nor diverted on to another property.

Council's drainage line is included in the Map attached for Hydraulic Grade Line (HGL) analysis.

Flood levels are not static due to changing circumstances (e.g. revision of the flood model) and accordingly the above flood level is only valid for six months from the above date.

If you have any further enquiries regarding this matter please contact Council's Senior Stormwater Engineer, Mr Mark Evens on 8757 9538 or Council's Drainage Engineer, Mr Rolyn Sario on 02 8757 9536.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Siva Sivakumar', with a long horizontal stroke extending to the right.

SIVA SIVAKUMAR  
MANAGER – ENGINEERING & TRAFFIC

