

**CONCEPT STORMWATER DRAINAGE  
QUALITY CONTROL REPORT**

**FOR**

**FORSTER SOLARIS  
CIVIC PRECINCT AND MIXED USE DEVELOPMENT**

**at**

**34-36 WEST STREET, FORSTER**

Prepared for  
**Enyoc Pty Ltd**

**March 2017 – Issue 1**

**Project: 16148**

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## 1. Introduction

Enyoc Pty Ltd, as trustee for Graham Dong Family Trust, commissioned Coastplan Group Pty Ltd in December 2016 to prepare a concept stormwater drainage quality control report for the proposed development.

## 2. Site Locality and Existing Site Condition

Figures 1 and 2 below provide an aerial view and detail survey of the subject site.



Figure 1: Aerial view of subject site

Source: Google Earth



Figure 2: Detail survey of subject site

Source: Client

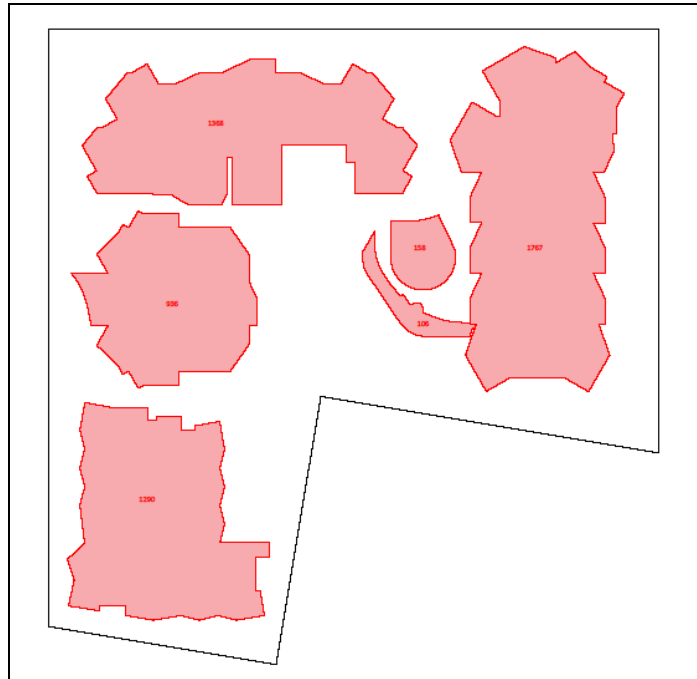
The existing site drains overland towards the western boundary and the southern boundary.

The site has hard surface areas in the form of bitumen sealed area over parts of Lot 12.

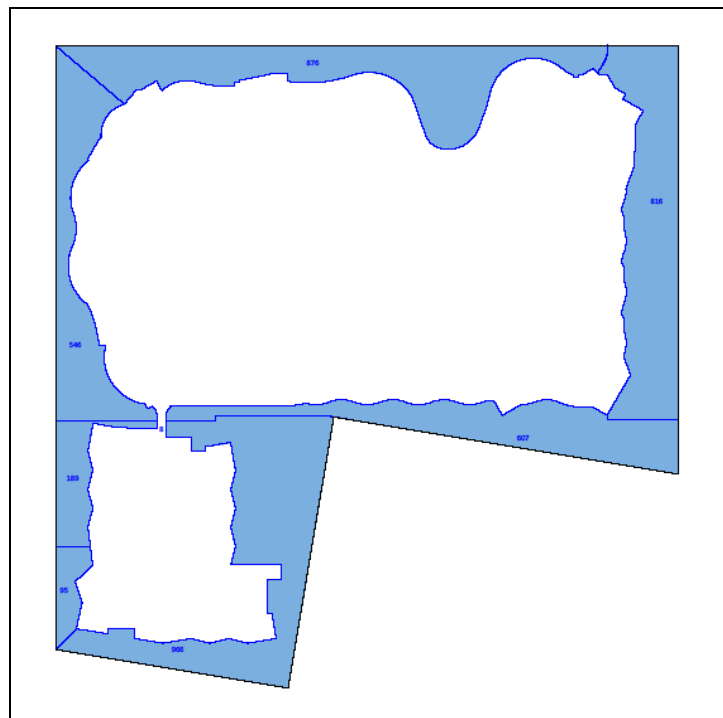
### 3. Developed Site Conditions

The proposed development contains different types of catchment areas. The following diagrams show the extent of the each of the sub catchment area.

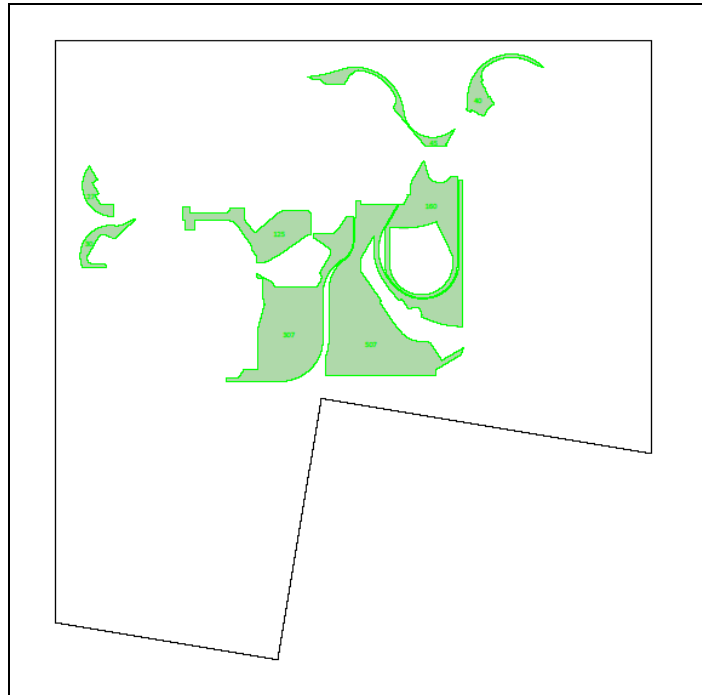
#### 3.1 Roof Area



#### 3.2 Mixed Area



### 3.3 Elevated Landscaped Areas



### 3.4 Elevated Hard Surface Area

The following diagram shows the elevated hard stand area, being the non-shaded areas.



## 4. Stormwater Drainage Treatment Concept

The concept is described as per the following:

1. Collect all roof runoff to a central rainwater tank positioned below the basement.
2. Reuse the collected roof runoff from the tank to the following:
  - laundry & toilet for all 143 units;
  - 74 toilets for commercial units; and
  - 110 toilets for all hotel units.
3. The elevated terrace area between Building A and Building B drains to an above ground rainwater tank for the purpose of reuse in irrigation of the landscaped areas in the community garden. The overflow from the tank connects to the bioretention area described below. This area has a mixed surface cover between hard and soft surface cover types. The areas which receive the rainfall are on higher levels above the ground level. The area contains the footprint of the uncovered balconies and terraces.
4. The area between the eastern boundary and Building A drains to a bioretention area within the community garden located in the south eastern corner. The bioretention area, in combination with the rainwater tank, is proposed to be used as education tool for the purpose of the promotion of water sensitive urban design.
5. The area between the Lake Street frontage and the Lake Street boundary drains to bioretention areas along the street frontage.
6. The area between the West Street frontage and the West Street boundary drains to bioretention areas along the street frontage.
7. The area between the Middle Street frontage and Building C drains to bioretention areas along the street frontage.
8. The street drainage system is improved with landscaped islands including bio retention areas to treat stormwater runoff. These areas generally do not treat site runoff but instead treat and improve stormwater flows from the public street. A small 10m<sup>2</sup> bioretention area in the Middle Street frontage does treat site stormwater.

Due to the sandy site condition, and the position of the proposed bioretention areas either outside the basement footprint or within a deep soil zone, the bottom of the bioretention areas will act as an infiltration bioretention.

The overflow from the bioretention areas could either drain to the street kerb and gutter system or via pipes to the south west corner of the development to the Middle Street drainage system.

Except for two (2) locations which are constrained by site coverage and levels, the bioretention areas used in the analysis for the effectiveness of the treatment areas are located within the site boundaries. These two (2) locations are near the south east corner and very small areas along the Lake Street frontage.

## **5. Overall Stormwater Drainage Quality Control Targets**

The existing site is considered to be “urban” with some impervious area existing on site. This classification is for the purpose of stormwater drainage quality control assessment. Based on the advice from MidCoast Council, the stormwater drainage quality control target for this development is neutral or beneficial effect.

## **6. MUSIC Model**

A MUSIC model was established to estimate the effectiveness of the proposed stormwater quality management for this site.

### **6.1 Existing Site Condition**

The existing site was modelled as a residential node with no hard stand area. This is considered a conservative approach as the site has some hard stand coverage.

### **6.2 Development Site Condition**

The model for the developed site was established utilising pollutant generation nodes representing the proposed surface coverage for each node. The pollutant generation nodes for the areas next to West and Middle streets were represented as total hardstand areas, which are considered to be a conservative approach.



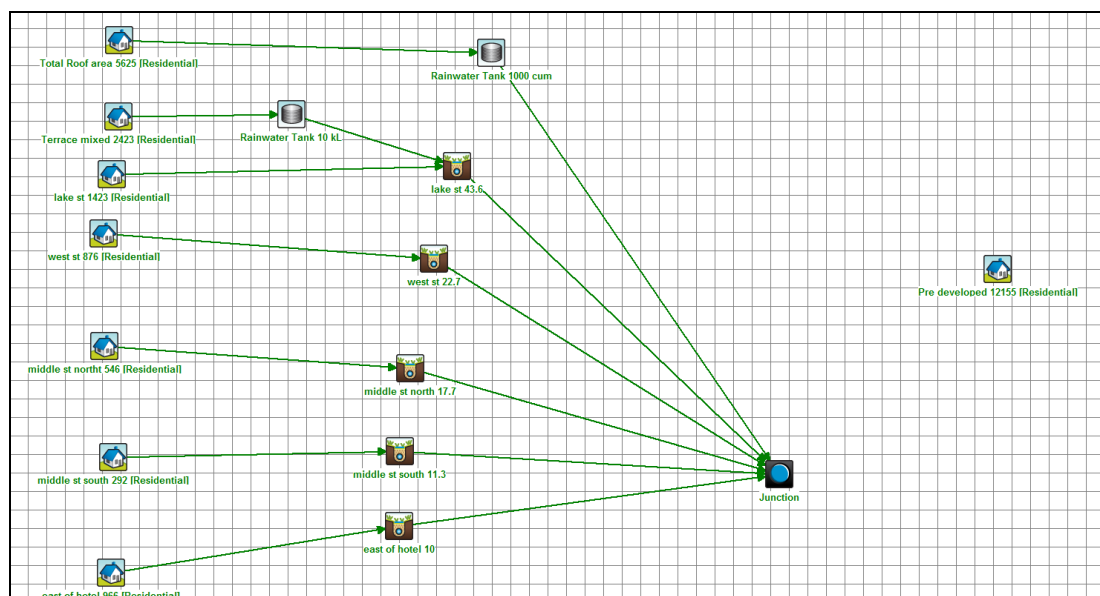
The treatment nodes are described as follows:

- 1000 m<sup>3</sup> rainwater tank from all roof areas;
- 10 kL rainwater tank for the elevated soft and hard surface areas between buildings A&B;
- 43.6m<sup>2</sup> bioretention areas at the eastern side of the site;
- 22.7m<sup>2</sup> bioretention areas at the West Street side;
- 17.7m<sup>2</sup> bioretention areas at the north side of Middle Street;
- 11.3m<sup>2</sup> bioretention areas near the south west corner of the site; and
- 10.0m<sup>2</sup> bioretention areas near the south east end of the site.

The proposed bioretention areas are contained within the site except at two (2) locations. The first location is at the Lake Street frontage where a small portion of the bioretention areas is located within the road reserve. The constraint for this location is the proximity of the basement footprint to the site frontage and the available space for the bioretention areas considering the overall function of that area. The second area is near the south east side of the development where the constraints are the presence of large trees to be retained.

The proposed street scape treatment areas were generally not used for treating the site runoff. These areas will provide treatment for the surfaces within the road reserve and result in significant further water quality improvement outside of the areas modelled.

The following diagram shows the modelled network:



A digital copy of the model will accompany this report in the submission to the Council. (The MUSIC file name is: 16104 FINAL ISSUE 2 29032017.)

## 7. Effectiveness Assessment of the Stormwater Quality Control Measures

The estimated pollutant loading from the existing site is as follows:

	<b>Outflow</b>
Flow (ML/yr)	3.95
Peak Flow (m3/s)	0.338
Total Suspended Solids (kg/yr)	391
Total Phosphorus (kg/yr)	0.917
Total Nitrogen (kg/yr)	6.92
Gross Pollutants (kg/yr)	0.00

The estimated pollutant loading from the developed site is as follows:

	<b>Outflow</b>
Flow (ML/yr)	5.26
Peak Flow (m3/s)	0.157
Total Suspended Solids (kg/yr)	95.1
Total Phosphorus (kg/yr)	0.736
Total Nitrogen (kg/yr)	4.97
Gross Pollutants (kg/yr)	0.00

The water balance for the main tank receiving all roof areas is as follows:

Flow In	5.97	1121.71	1.50	11.91	149.76
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	0.18	7.56	0.03	0.31	0.00
Weir Out	0.07	4.6	0.01	0.13	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	5.84	90.33	0.78	9.10	0.00
Reuse Requested	17.87	0.00	0.00	0.00	0.00
% Reuse Demand Met	32.69	0.00	0.00	0.00	0.00
% Load Reduction	95.82	98.92	97.31	96.25	100.00

The water balance for the rainwater tank at the community garden is as follows:

Flow In	1.66	278.40	0.46	3.48	44.53
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	1.09	143.68	0.27	2.25	0.00
Weir Out	0.38	63.60	0.10	0.82	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	0.19	7.61	0.03	0.33	0.00
Reuse Requested	0.20	0.00	0.00	0.00	0.00
% Reuse Demand Met	93.22	0.00	0.00	0.00	0.00
% Load Reduction	11.19	25.55	18.57	11.90	100.00

## 8. Summary

The proposed stormwater quality control for this site consists of water reuse and the introduction of bioretention areas.

The MUSIC model results show that the proposed tools will achieve the set pollutant removal targets being neutral or beneficial effect.

The following table shows the effective uses of the stormwater system proposed to the DCP criteria.

Proposed	DCP Requirement	Achievement
Gross Pollutants	90% Reduction	100% Reduction
Total Nitrogen	Neutral or Beneficial Effect	Beneficial effect of 28% reduction of existing load
Total Phosphorus	Neutral or Beneficial Effect	Beneficial effect of 20% reduction of existing load
Total Suspended Solids	Neutral or Beneficial Effect	Beneficial effect of 75% reduction of existing load

The main part of the proposed management tools is the introduction of a large storage tank which will function as a water supply for different parts of the proposed development. As well as assisting in achieving the pollutant removal targets, the water reuse via the tank offers an improvement to the local environment by reducing the demand on the town water supply and “recycles” the rainfall to a good use. Also, the stormwater runoff from the elevated areas will be collected to an above ground tank which will be used for irrigation. This tank and the bioretention area near Lake Street will be used for demonstrating how to manage the quality of the storm water runoff, and effectively provide a working example to the public to view.



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