MIDCOAST council

APPENDIX 17

January 2026

Wingham Urban Release Area 1

CONCEPT STORMWATER STRATEGY

DESIGN REPORT

PROJECT LOCATION
Lot 92 DP 1285477, Wingham Road, Wingham

CLIENT NAME
Hampstead Property

DRB PROJECT NUMBER
233307

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DISCLAIMER

Project Number: 233307

Client: Hampstead Property

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Report Amendments

Revision	Date	Description	Author	Reviewer	Approver
A	03/06/24	ISSUED FOR PLANNING PROPOSAL	FM	CS	CS
B	05/06/24	REISSUED FOR PLANNING PROPOSAL	FM	CS	CS
C	06/06/24	REISSUED FOR PLANNING PROPOSAL	FM	CS	CS

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1 INTRODUCTION

The Conceptual Stormwater Strategy (water quantity and quality) outlined within this report has been prepared to support a proposed residential subdivision at Wingham Road, Wingham in consideration of the Planning Proposal Pre-Lodgement Meeting response provided by MidCoast Council (MCC) dated September 2023.

All design works completed as part of this report have been undertaken in accordance with the requirements of Greater Taree City Council (GTCC) Development Control Plan (specifically Part C – Subdivisions) and Councils Site Stormwater guidelines.

This report has also been prepared in accordance with MCC's Planning Proposal – Study Specifications dated October 2023, with the potential water quality and quantity provisions noted within this report complying with the requirements of the specification.

This report shows that by adopting a combination of on-lot and end-of-line stormwater management controls the:

- Neutral or Beneficial Effect (NorBE) water quality requirements can be achieved, and
- Any increase in runoff from the site will be mitigated by the end of line detention basins.

In summary, this report demonstrates that the potential post development stormwater discharge from the site can achieve a lower pollutant load than the existing undeveloped site, thus improving the quality of stormwater entering downstream waterways. It also demonstrates that peak flows from the post developed site can be managed such that site discharge rates are also lower than pre-development levels. These provisions thus demonstrate that the potential development and associated stormwater infrastructure can result in a positive impact on downstream receiving waters when compared to the existing undeveloped site.

1.1 SITE DESCRIPTION

The subject site is located to the northwest of Wingham Road in the direction of Taree from Wingham. The site covers and are of approximately 61.36ha, however the proposed development will be limited to approximately 29.73ha, incorporating batter zones, new roads, residential lots, and stormwater management areas. The development area excluding the stormwater management areas and surrounding batters associated with the potential development is 28.56ha. The site falls from Wingham Road towards Cedar Party Creek in all directions at grades varying from 1% to 30%. Cedar Party Creek is adjacent to the boundary of the site and falls from the northeastern corner of the site to along the boundary to pass beneath the train bridge at the southwestern corner of the subject site. In general, multiple discharge locations draining towards Cedar Party Creek will be the proposed discharge direction for the development as this is representative of the existing site conditions. The site is currently zoned as RU1 Primary Production and is located within the MCC LGA. Figures 1 and 2 below show the location and context of the subject site.

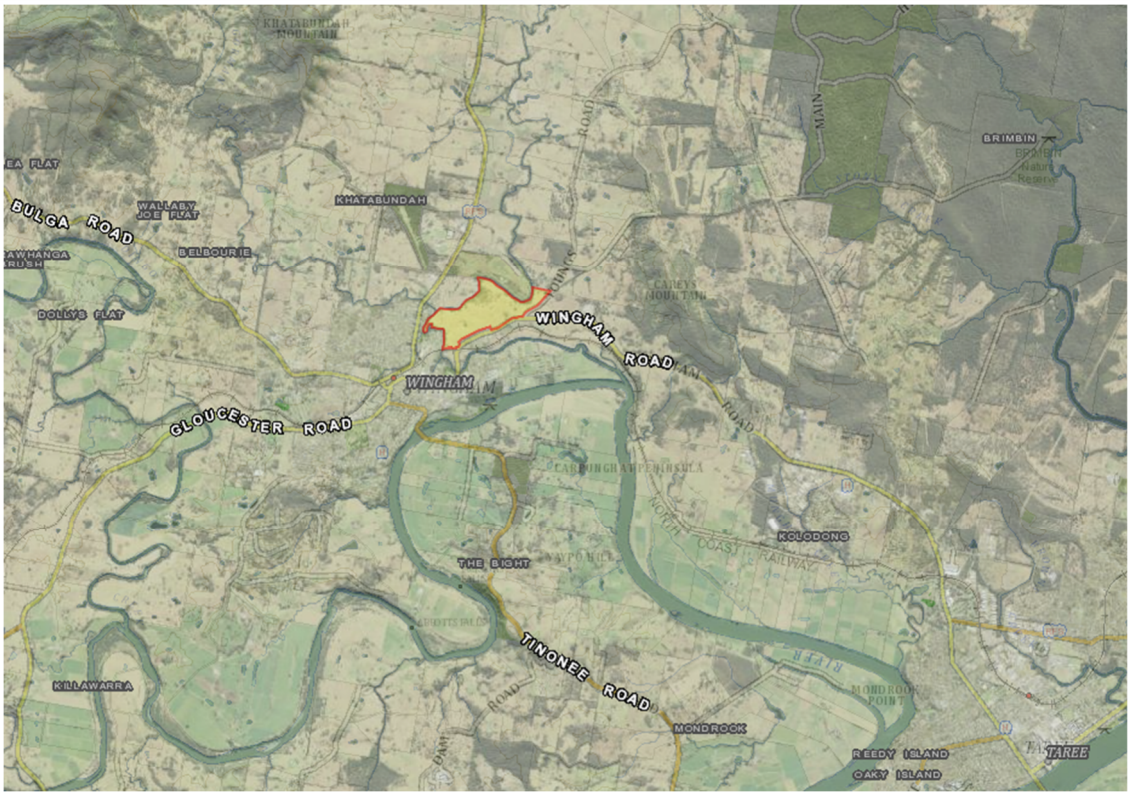


Figure 1 - Locality Plan

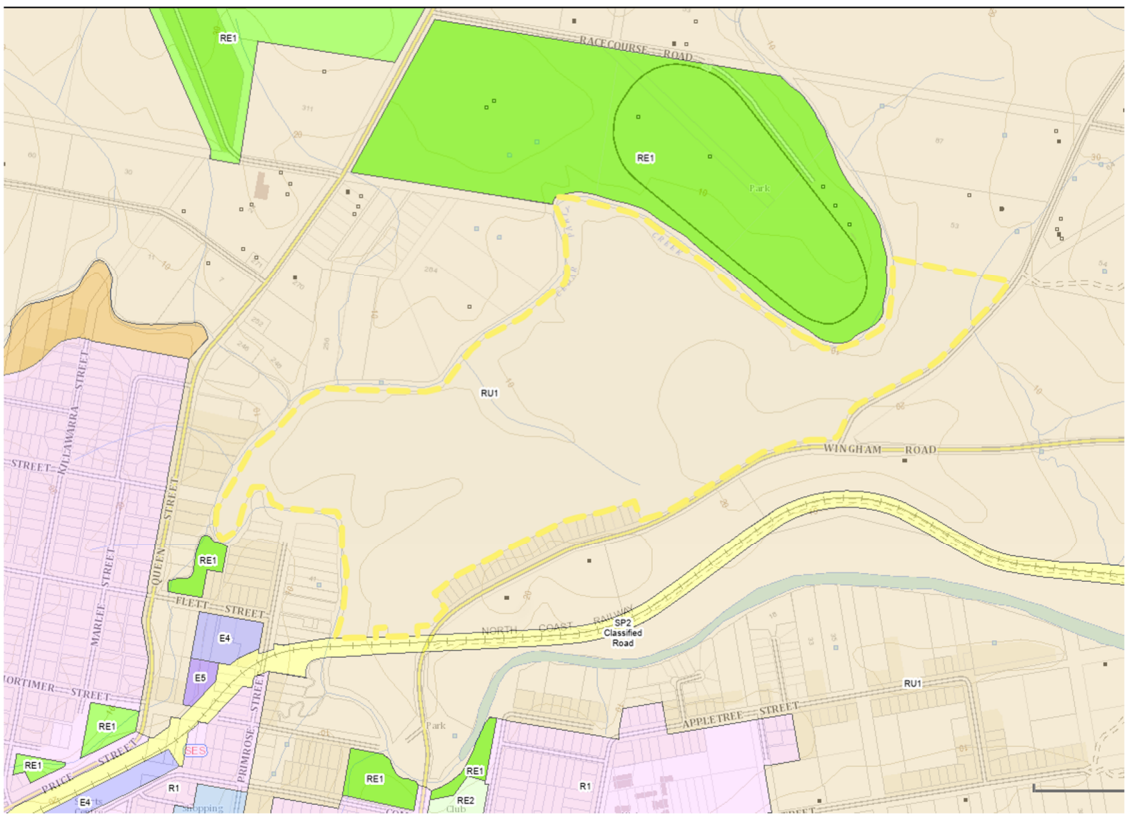


Figure 2 - Planning Map

1.1.1 POTENTIAL DEVELOPMENT

The draft Precinct Plan includes the construction of approximately 4.65km of new local road with associated verges and subdivision of the remaining land to create approximately 294 new residential lots. To accommodate this potential development, the conceptual stormwater drainage strategy includes the provision of 6 new biofiltration basins with detention above them to capture, treat and safely convey the runoff the new lots and roads towards Cedar Party Creek.

The proposed stormwater drainage infrastructure collecting runoff from the proposed residential development and roads will convey stormwater to the basins via a combination of in-ground stormwater pipes, overland flow in the road and grass lined swales cut into the proposed fill batters. Outlets from proposed basins will be discharged towards Cedar Party Creek.

The proposed concept drainage strategy seeks to satisfy MCC's Site Stormwater Guidelines by incorporating Water Sensitive Urban Design (WSUD) measures into the overarching drainage for the potential subdivision. In this regard the design adopts the following provisions:

- Proprietary stormwater treatment devices were excluded from the design as we understand they are not accepted by MCC for WSUD purposes.
- Biofiltration basins have been assumed as the primary treatment mechanism, as per Councils preferred treatment measure as noted in the pre-lodgement minutes.
- Grass lined swales are to be incorporated into the design where practical. It is noted that water quality improvement by swale flows was not considered in the MUSICX modelling to provide a conservative estimate for water quality treatment effectiveness.
- Provision of detention basins in conjunction with proposed biofiltration basins to mitigate post-development flow rates for the potential subdivision to that of the pre-development flow rates.

The potential subdivision and site layout along with and preliminary site grading can be seen on civil drawing 233307 - CIV-021, submitted with this report.

2 DESIGN CONSIDERATIONS

Council stormwater drainage design requirements considered and addressed as part of the proposed concept stormwater management plan are outlined below.

2.1 PLANNING PROPOSAL STUDY SPECIFICATIONS & PRE-LODGEMENT MEETING MINUTE REQUIREMENTS

1. *Confirmation of the overarching water sensitive urban design principles to guide water management in future stages of design including the vision for water quality management specific to the site;*

   The overarching water sensitive design has been summarised in Section 3 of this report, including the anticipated treatment measures for potential future development. The concept design illustrated on drawing CIV-021 attached to this report also considers splitting the site into several drainage catchment areas, demonstrating that sufficient provision is provided at key locations around the site to facilitate future delivery of the site across multiple stages.

2. *Documentation of environmental conditions and constraints including sub-catchments, soils, topography, ecology, groundwater, flooding, riparian zones and sensitivities of the receiving waterways;*

   Planning boundaries have been considered in the design, including ensuring all proposed stormwater works are located beyond a 50m buffer to existing Cedar Party Creek, and above the 1% AEP flood level. Site sub-catchments, soils and topography are noted in Sections 3 & 4 of this report. Regarding downstream receiving water sensitivity, the concept design adopts a Neutral or Beneficial Effect criteria meaning that the potential water quality running offsite following development will be equal to or better than the runoff from the existing undeveloped site. As such the potential provisions are expected to provide an overall improvement to the downstream receiving waters.

3. *Suitable water quality treatment measures taking into consideration identified site conditions and constraints. For the removal of fine particulates and dissolved pollutants biological systems such as bioretention are the preferred treatment approach;*

   Water quality treatment measures, as modelled within MUSICX are outlined within Section 3 of this report, including details of biofiltration basins that have been included as the primary and preferred mechanism for water quality improvement across the site. We note that the proposal does not include provision of proprietary treatment devices, as per Councils advice in the Pre-Lodgement meeting minutes dated September 2023.

4. *Indicative treatment areas and location required to achieve Councils water quality targets including a plan showing estimated footprint of treatment measures and typical sections. Developments should generally drain to a common or centralised facility. Site constraints may determine that more than one common treatment area may be required in the development to accommodate stormwater catchments flows; and*

Indicative treatment areas for both water quality and detention facilities are discussed in Sections 3 & 4 of this report, with estimated footprints and locations illustrated on drawing CIV-021. Site topography determined that the most appropriate method of managing runoff would be to split the site into several sub catchments each with its own treatment area, this has been reflected on the concept plans provided.

5. *MUSIC model accompanied by a summary of the key assumptions the model input parameters are based on e.g. the assumed pre and post development site configuration.*

   MUSIC modelling has been provided with tis report, with key assumptions and model input parameters summarised in Section 3 below.

6. *The Planning Proposal should demonstrate, early in the process, that there is enough space to accommodate water sensitive design features and achieve water quality outcomes across the site.*

   The Concept Stormwater management strategy demonstrates that there is sufficient space to accommodate water sensitive design features, including providing several water treatment areas spread around the downstream perimeter of the site. Potential treatment measures that could be included in future development proposals are outlined in Section 3 of this report and illustrated on drawing CIV-021

7. *Greenfield sites provide a good opportunity to incorporate water sensitive design measures as a development feature.*

   The proposed development seeks to retain substantial undeveloped areas adjacent to Cedar Party Creek. This provides a unique opportunity to incorporate potential biofiltration areas into the existing environment as part of future design works. The concept stormwater drainage strategy illustrates that there is sufficient land available below the potential development footprint allowing these areas to be explored during future design phases.

8. *Stormwater draining to Cedar Party Creek could be a problem given the erosion of the soils. This needs to be considered in the Concept Water Management Strategy.*

   Comments responding to potential erosion issues have been provided in Section 4.3 of this report.

DRB confirm that each of the items requested by Council to be addressed in their Pre-Lodgement Meeting Minutes and Planning Proposal Study Specifications as listed above have been discussed and addressed as part of this report, demonstrating that the proposal is fully compliant with the requirements of GTCC DCP and Councils Site Stormwater Guidelines.

3 WATER QUALITY DESIGN

Stormwater quality treatment analysis was undertaken using the MUSICX software package to show the proposed development could adequately achieve MCC's NorBE requirement. NorBE has been selected as the appropriate treatment target for the site, in line with Table 1 of MCC's stormwater assessment criteria guideline. As the polishing requirements for the site were specified as NorBE, only the development area has been considered within the MUSIC modelling (28.560ha). The site has been assumed to fall within the soil hydrologic group D based on a review of available information within the eSpade database and the limited geotechnical report by DRB Consulting Engineer`s. The proposed subdivision was modelled using MCC's mccrainfall.mlb file and the MUSICX file has been provided with this submission for review by MCC. Predevelopment site conditions were considered as rural residential in accordance with MCC's Guidelines for Water Sensitive Design Strategies where the existing site conditions presented as cleared rural land with minimal trees within the development area. The rural residential data was then used to calculate the estimated predevelopment pollutant loads from the undeveloped site. These predevelopment annual loads are noted below.

Total Suspended Solids	TSS	=	14176.468 kg/yr
Total Phosphorus	TP	=	31.373 kg/yr
Total Nitrogen	TN	=	271.255 kg/yr
Gross Pollutants	GP	=	0 kg/yr

3.1 MODELLING ASSUMPTIONS

The MUSICX model utilised assumed parameters for future residential subdivision lots. There were four separate catchment areas modelled in the pre-development and post-development scenarios, being, the existing site conditions, the proposed roof area of individual residential lots, the remaining area of individual residential lots, and the proposed road reserve. The parameters, source nodes and assumptions associated with each area have been based on parameters outlined in MCC's Water Sensitive Urban Design Guidelines Table 4-2, and summarised in Table 1 below.

LAND USE	SOURCE NODE	TOTAL AREA	% IMPERVIOUS	% PERVIOUS
PRE DEV	Urban – Rural Residential	28.560 ha	0 %	100 %
ROOFWATER	Urban – Roof	8.148 ha	100 %	0 %
RES. LOTS	Urban – Rural Residential	12.222 ha	33.33 %	66.67 %
ROADWAY	Urban - Sealed Road	8.190 ha	60 %	40 %

Table 1 - MUSICX Source Nodes

As the proposed catchment is covered by areas that exhibit a combination of high, slow and very slow infiltration, soil parameters were assumed based on the slow infiltration values in the Midcoast Council WSUD guidelines. The soil parameters used within the MUSICX model are outlined below.

SOIL PARAMETER	VALUE
IMPERVIOUS AREA PROPERTIES	
Rainfall threshold (mm/day)	1.50 (0.5 Roof)
PERVIOUS AREA PROPERTIES	
Soil Storage Capacity (mm)	90
Initial Storage (% of Capacity)	25
Field Capacity (mm)	65
Infiltration Capacity Coefficient – a	135
Infiltration Capacity Exponent – b	4
GROUNDWATER PROPERTIES	
INITIAL DEPTH (MM)	10
Daily Recharge Rate (%)	10
Daily Baseflow Rate (%)	10
Daily Deep Seepage Rate (%)	0

Table 2 - Soil Parameters

3.1.1 TREATMENT TRAIN MEASURES

The stormwater quality treatment train for the proposed subdivision consists of the following elements:

- Roofwater from residential dwellings to be directed to a 4,000L above ground rainwater tank which is expected to be required on all future developments within the proposed subdivision. The rainwater tanks will be reused for toilet flushing, laundry and external irrigation. Reuse demand has been assumed based on MCC's standard requirements outlined below:

  Internal Toilet Flushing = 55 L/day/Lot

  Washing Machine = 95 L/day/Lot

  External Irrigation = 36 kL/yr/Lot

- Runoff from each of the residential lots, rainwater tank overflows and road drainage will be directed to a biofiltration basin at the end of each catchment area to achieve the NorBE requirements for the subdivision. Runoff from the residential lots will pass through primary treatment (rainwater tank) overflows/bypass will then be conveyed to the new road drainage network, which will convey runoff towards the end of line treatment measures. The end of line treatment measures have been split based on the total contributing catchment. This is shown on drawing CIV-021. The parameters assumed for the residential lots and the end of line treatment measures are outlined below.

RAINWATER TANKS (PER LOT DATA)	
Volume (m^3)	4
Depth above overflow (m)	0.2
Surface Area (m^2)	1.8
Initial Volume (m^3)	1.5
Annual Reuse Demand (kL/yr)	36
Daily Reuse Demand (L/day)	150 (95 + 55)

Table 3 - Rainwater Tank Parameters

BIOFILTRATION BASINS (COMBINED DATA)	
Extended Detention Depth (m)	0.3
Surface Area (m^2)	2600
Filter Area (m^2)	2500
Saturated Hydraulic Conductivity (mm/hr)	100
Filter Depth (m)	0.4
TN Content of Filter Media (mg/kg)	400
Orthophosphate Content of Filter Media (mg/kg)	40
Exfiltration Rate (mm/hr)	15
Is the basin lined	NO
Vegetated with Effective Nutrient Removal Plans	NO
Underdrain Present	NO
Submerged Zone	NO

Table 4 - Biofiltration Basin Parameters

The subdivision was separated into 6 catchments based on the preliminary site grading and the filter area needed for each of these catchments was determined based on the percentage of area directed to the basin. The filter areas required for each of the catchment can be found on drawing CIV-021.

3.1.2 MUSICX RESULTS

The results of the music model can be seen in the table below. These results show compliance with MCC's NorBE requirements.

	PRE-DEVELOPMENT	POST-DEVELOPMENT	RESIDUAL LOAD	ACHIEVED
TSS (kg/yr)	14176.468	35138.176	5989.487	YES
TP (kg/yr)	31.373	75.357	25.588	YES
TN (kg/yr)	271.255	543.503	249.799	YES
GP (kg/yr)	0	5311.205	0	YES

Table 5 - MUSICX Results

4 WATER QUANTITY DESIGN

Stormwater quantity management design has been undertaken using the DRAINS software package to show how the proposed development could adequately achieve no negative impact pre to post runoff requirements for new major developments of this nature. The DRAINs model was developed to determine the pre-development and post-development peak flow rates. The model used the ARR 2019 Initial loss - Continuing loss (IL-CL) hydrological model and 2016 IFD data.

4.1 PRE-DEVELOPMENT PEAK FLOWS

The characteristics of the pre-development catchment area can be seen below. This catchment is a simplified version of the predevelopment conditions that are currently discharging towards Cedar Party Creek.

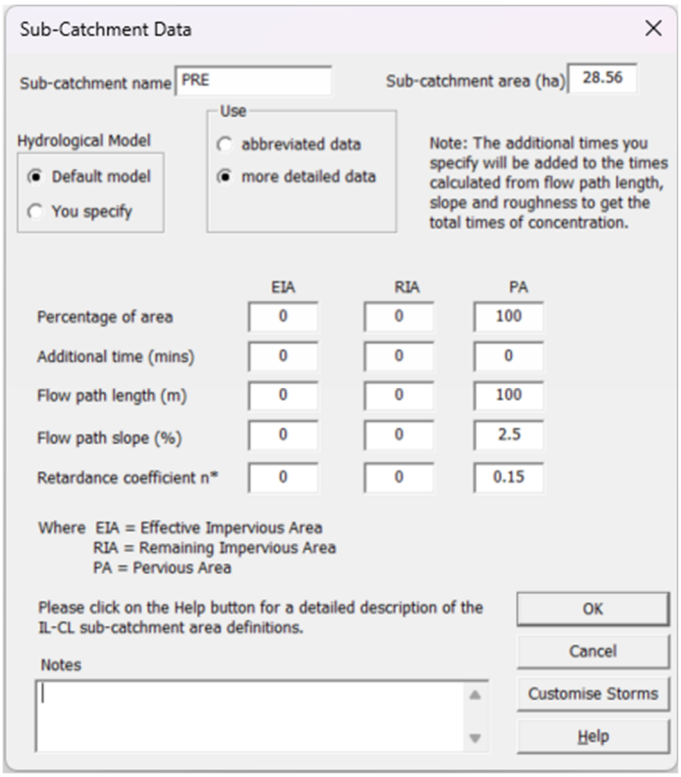


Figure 3 - Drains Pre-Development Node

The model was assessed in the 1EY, 20%, 10%, 5% and 1% AEP (Annual Exceedance Probability) events and considered the following storm bursts.

5 minutes	25 minutes	1.5 hours	6 hours
10 minutes	30 minutes	2 hours	9 hours
15 minutes	45 minutes	3 hours	12 hours
20 minutes	1 hour	4.5 hours	24 hours

The Pre-Development DRAINs model results are outlined below.

- Q_{1EY} = 1.57 m^3/s
- $Q_{20\%}$ = 5.47 m^3/s
- $Q_{10\%}$ = 7.35 m^3/s
- $Q_{5\%}$ = 9.22 m^3/s
- $Q_{1\%}$ = 14.3 m^3/s

4.2 POST-DEVELOPMENT PEAK FLOWS

Due to the conceptual nature of this report, the post-developed site conditions have been idealised based on the combined proposed land use. Roadways and residential lots have been adopted as shown below. The values used represent average values considering the various surfaces and ground coverings. It is noted that the fraction impervious assumption for this development style matches that of the road reserve at 60%.

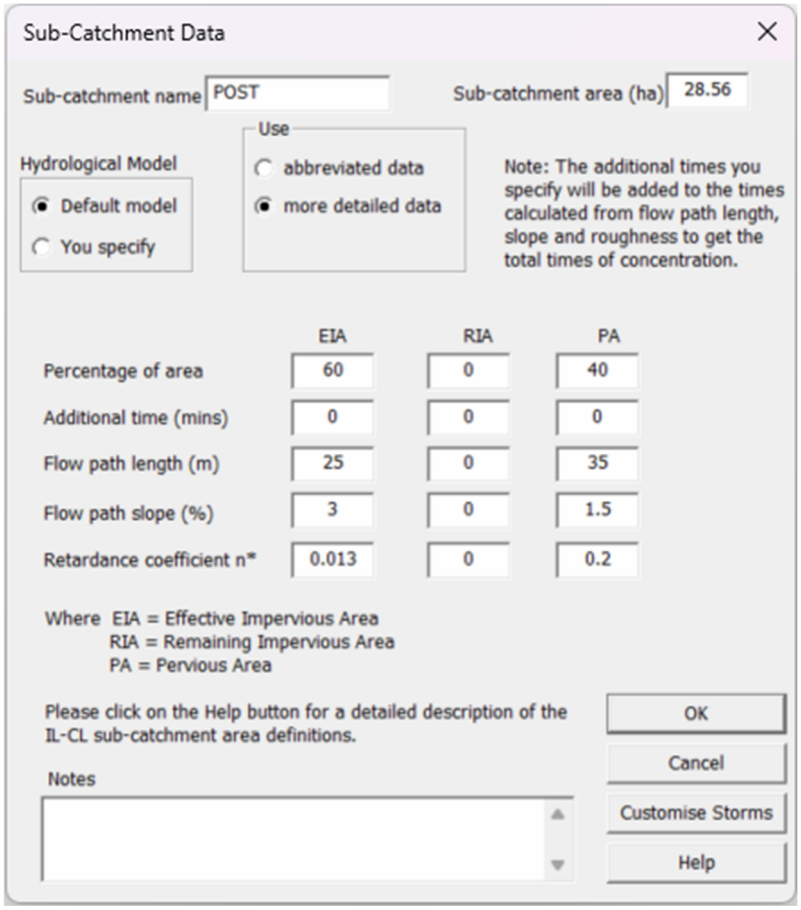


Figure 4 - Drains Post-Development Node

The Post-Development DRAINs model results are outlined below.

- Q_{1EY} = 1.15 m^3/s
- $Q_{20\%}$ = 4.08 m^3/s
- $Q_{10\%}$ = 6.66 m^3/s
- $Q_{5\%}$ = 8.83 m^3/s
- $Q_{1\%}$ = 13.7 m^3/s

Typical management of peak runoff from the site was assessed to understand the potential impacts of the proposed subdivision on downstream properties. In order to idealise detention for the entire development, the review included the design of a large end-of-line detention basin to limit post-development flows to that of the pre-development scenario. It was found that the provision of a detention basin did mitigate the flows to that of the pre-developed site to ensure no increase in flow rate from the subdivision is achieved.

The combined detention basin was modelled with a surface area of 5000m^2 for a depth of 1.5m, giving a detention volume of 7500m^3. The outlet and overflow from this detention was modelled to ensure that for all storm events the post-development flows rates were mitigated to the pre-development flow rates. The subdivision was separated into 6 catchments with the area percentage of these catchments being applied to the total detention volume to determine the volume required at each end of line detention basin. These volumes can be seen on drawing CIV-021.

4.3 OUTLET CONTROL AND EROSION PROTECTION

Geotechnical investigations undertaken for the development indicate that shallow soils across the site may be prone to erosion. In order to manage potential erosion, the following measures could be implemented within the design for future development:

- Maximum earthworks batters of 1:5 have been adopted generally across the site. This approach of 'gentle' batter construction will aid in vegetation establishment across new batters and provide long term natural erosion protection.
- Earthworks are predominantly proposed to be constructed above the 1%AEP flood level. Keeping earthworks batters outside of areas that are subject to regular inundation will help reduce erosion potential around proposed batter toes.
- The earthworks strategy for the site requires large volumes of imported fill material to support the potential development. The detailed earthworks strategy for the site should include site management requirements where imported, less erosion material is placed within the lower reaches of the site and any areas that may have a higher risk of erosion potential (for example swales installed along fill batters).
- In areas prone to more frequent inundation, soils should be treated with Gypsum during bulk earthworks activities (in accordance with geotechnical recommendations for the site) in order to reduce soil dispersivity and erosion potential.
- All high stormwater flow areas (e.g. swales and basin overflow weirs) are to be further stabilised using proprietary stabilisation mats and stone rip rap as appropriate to reduce stormwater velocities and associated soil erosion potential.

It is considered that the above measures when implemented through the detailed design phase of the project will effectively manage erosion risk across the site.

5 CONCLUSION

DRB Consulting Engineers has prepared this conceptual Design Report to outline the proposed drainage strategy proposed for the site. The Concept Water Sensitive Design provided in this report and the associated drawings achieves MCC's's water quality requirements using combination of on-lot rainwater tanks and 6 end of line biofiltration basins to satisfy NorBE for the potential development.

The Concept Water Management Design uses the assumption that throughout the potential subdivision the stormwater system will be designed to safely convey all storms up to the 100-year storm event to the 6 separate end of line biofiltration/detention basins. The detention basins will then mitigate post-development flow rates to the pre-development flows for all storms up to the 100-year storm event and discharge towards Cedar Park Creek.

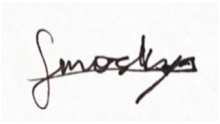
The locations of and estimated sizes of these biofiltration/detention basins can be seen within the drawing set 2024 06 03 - 233307 - CIV – PP - Subdivision. The drawings show the location and estimated size of the potential biofiltration/detention basins, the potential lot layout of the subdivision and the cut and fill for the total subdivision.

In summary, this report demonstrates that the potential water quantity and quality measures considered for the development could improve the quality of stormwater runoff leaving the site when compared to the existing undeveloped scenario thus resulting in a positive beneficial impact on downstream receiving waters.

Should you require any further advice or clarification of any of the above, please do not hesitate to contact us.

Yours faithfully

DRB CONSULTING ENGINEERS PTY LIMITED



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6 APPENDICES

APPENDIX A – DESIGN DRAWINGS

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council