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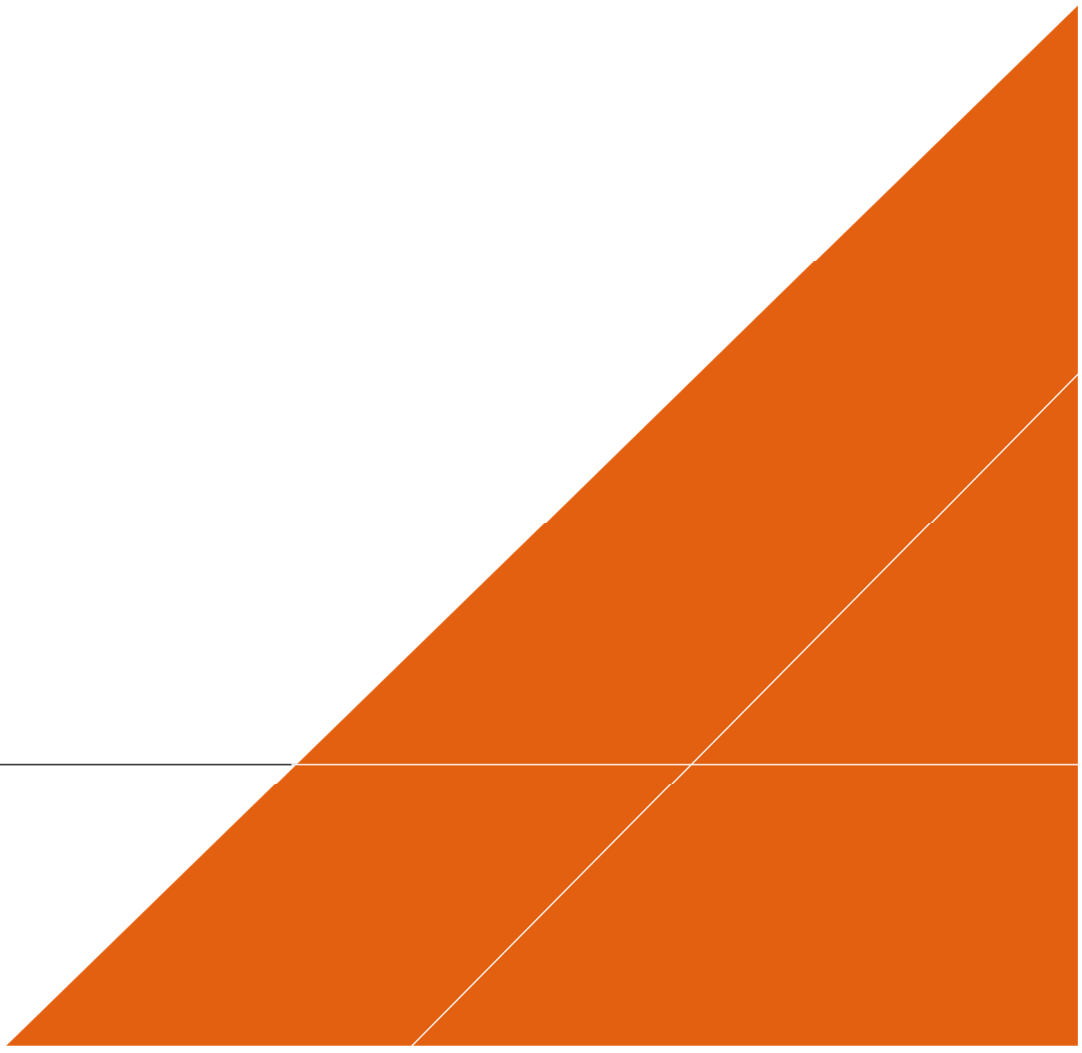
MACQUARIE PARK COMMERCE CENTRE

Stormwater & Flooding – Section 75W Report

20 DECEMBER 2017



Incorporating Hyder

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FRASERS PROPERTY AUSTRALIA MACQUARIE PARK COMMERCE CENTRE

Stormwater Management – Section 75W Report

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1 INTRODUCTION

Frasers Property Australia (Frasers) and Winten Property Group (Winten) are proposing a new development at 396 Lane Cove Road and 2 Coolinga Street, Macquarie Park. Concept Approval for the development was obtained in 2012 and Frasers and Winten are applying to modify this approval under Section 75W of the Environmental Planning and Assessment Act (EP&A Act).

Arcadis has been engaged by Frasers to prepare this *Stormwater Management – Section 75W Report* to support the modification application to the Department of Planning and Environment (DPE).

2 OBJECTIVES AND REQUIREMENTS

The Concept Approval was informed by the *Stormwater Management and Water Recycling* (Hyder Consulting, 2010). Key requirements adopted for the approval were in accordance with City of Ryde Development Control Plan 2010 (Ryde DCP 2010) and are still generally consistent with City of Ryde Development Control Plan 2014 (Ryde DCP 2014). The key requirements include:

- Water Sensitive Urban Design (WSUD):
  - Stormwater Quality: targets are summarised in **Table 1** below.
  - Water Conservation: rainwater tanks and water conservation measures must be used.
  - Recycled Water: connection to a centralised Sydney Water recycled water scheme for Macquarie Park must be considered, should the scheme proceed.
- Stormwater Quantity – peak stormwater discharge for 5 year and 100 year Average Recurrence Interval (ARI) events are to be limited to pre-development (ie. 'state of nature') rates.

Table 1: Stormwater Quality Targets

Parameter	Target Reduction*
Gross Pollutants (GP)	90%
Total Suspended Solids (TSS)	85%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%

** Target Reduction is relative to the post development pollutant load without any treatment measures*

In relation to flood planning, additional advice has been obtained from City of Ryde Council which states that habitable floor levels are to include freeboard above the 100 year ARI flood level of 300 mm for low risk areas and 500 mm for medium to high risk areas. Non-habitable areas require a freeboard of 150mm.

3 WATER SENSITIVE URBAN DESIGN

A Water Sensitive Urban Design (WSUD) philosophy has been adopted when developing the stormwater management strategy for this development.

3.1 Strategy Summary

Measures that are proposed to be included in the development include:

- A rainwater tank
- Proprietary filtration devices (eg; StormFilters)

This strategy is consistent with the previous Concept Approval, however proprietary filtration devices are proposed to be used in place of raingardens. Consideration was also given when preparing the Concept Plan for a potential regional recycled water supply to be provided by Sydney Water, however this has not eventuated and therefore is not considered further.

The rainwater tank is proposed to be approximately 700 m^3 and capture all roof runoff for non-potable reuse, such as irrigation. The proprietary devices are proposed to treat all surface runoff as well as any overflow from the rainwater tank.

3.2 Assessment

An assessment of the performance of the proposed WSUD measures has been undertaken using MUSIC (v 6.3.0) and in accordance with Ryde DCP 2014 and City of Ryde MUSIC Modelling Guidelines (EDAW, 2009).

MUSIC Modelling Parameters

Key parameters used to establish the MUSIC model have been adopted from City of Ryde MUISC Modelling Guidelines (EDAW, 2009) and are summarised below.

Climate Data

- Rainfall Gauge: 066037 Sydney Airport AMO
- Period: 1988 to 1998 (Average Annual Rainfall = 1087 mm)
- Time Step: 6 minute
- Average Sydney PET data

Soil Properties

- Impervious Surfaces
  - Rainfall Threshold = 1.4 mm
- Pervious Surfaces
  - Soil Capacity = 170 mm
  - Initial Storage = 30%
  - Field Capacity = 70 mm
  - Infiltration Capacity Coefficient a = 210
  - Infiltration Capacity Coefficient b = 4.7
  - Groundwater
    - Initial Depth = 10 mm
    - Daily Recharge = 50%

- Daily Baseflow = 4%
- Deep Seepage = 0%

Pollutant Generation (General Urban)

- Log_{10} TSS (mg/L)
  - Storm Flow: Mean = 2.15, SD = 0.32
  - Base Flow: Mean = 1.20, SD = 0.17
- Log_{10} TP (mg/L)
  - Storm Flow: Mean = -0.60, SD = 0.25
  - Base Flow: Mean = -0.85, SD = 0.19
- Log_{10} TN (mg/L)
  - Storm Flow: Mean = 0.30, SD = 0.19
  - Base Flow: Mean = 0.19, SD = 0.12

Results

Results from the MUSIC model are summarised in **Table 2** and demonstrate that the proposed strategy is able to meet the required targets.

Table 2: Stormwater Quality Results

Parameter	Reduction Achieved	Target Reduction
Gross Pollutants (GP)	97%	90%
Total Suspended Solids (TSS)	85%	85%
Total Phosphorus (TP)	61%	60%
Total Nitrogen (TN)	60%	45%

4 ON-SITE DETENTION

On-site detention (OSD) is proposed to be provided in accordance with the Concept Approval (design standards have not changed and the development maintains a similar level of imperviousness). Approximately 650 m^3 of detention is proposed to be provided to ensure post development peak flows are less than or equal to 'state of nature' peak flows, as required by Ryde DCP 2014.

5 FLOODING

Flooding advice was obtained from City of Ryde Council (refer **Appendix A**). This advice was based on the Macquarie Park Flood Study (Bewsher, 2010) and identifies flooding in the 100 year ARI event in Coolinga Street. The flooding has been categorised as low to medium risk precincts (refer **Figure 1**)(Light blue = low risk, Dark blue = medium risk).

There is no overland flow path through the site itself and hence the proposed development is not expected to have any significant impact on flood behaviour external to the site.

Figure 1: Flood Risk Precincts (from Council flood information, provided 23/11/2017)

Flood levels at the locations shown in Figure 1 are provided in the table below (from Council flood information, provided 23/11/2017, refer **Appendix A**)

Flood Level Data Table

Location	20 Year ARI Flood (m AHD)	100 Year ARI Flood (m AHD)	Probable Maximum Flood (m AHD)
A	56.97	57.00	57.18
B	56.50	56.54	56.73
C	56.06	56.10	56.26
D	55.75	55.80	56.15

6 CONCLUSION

The proposed stormwater management strategy is generally consistent with the previously approved strategy and achieves the relevant stormwater detention and water quality objectives.

Updated flooding advice has also been obtained from Ryde Council and incorporated into the design.

APPENDIX A COUNCIL FLOODING ADVICE

City of Ryde

Lifestyle and opportunity @ your doorstep

Mr David Stone
Level 16, 580 George Street
SYDNEY NSW 2000

13 November 2017 Our ref: D17/150569

Dear Mr David Stone ,

RE: Request for Flood Information – 2 Coolinga Avenue Macquarie Park

Reference is made to your application received on 02 November 2017 seeking flood level information pertaining to the above-mentioned address.

Please find attached flood level data sheet providing flood levels for the 20 year and 100 year ARI (Average Recurrence Interval) flood events as well as the PMF (Probable Maximum Flood) event.

Please be advised that flood models only approximate in flood behaviour. Care and expertise is required in the interpretation of these flood levels. In addition, this flood information does not take into account any local overland flow issues.

Any person or organisation who acts on the information provided does so at his / her / its own risk. To the extent permitted by law, the City of Ryde accepts no responsibility and excludes all liability whatsoever in respect of any use of or reliance upon this information.

Should you require any further information, please feel free to contact Stormwater & Asset Integration Section on (02) 9952 8222.

Yours sincerely,

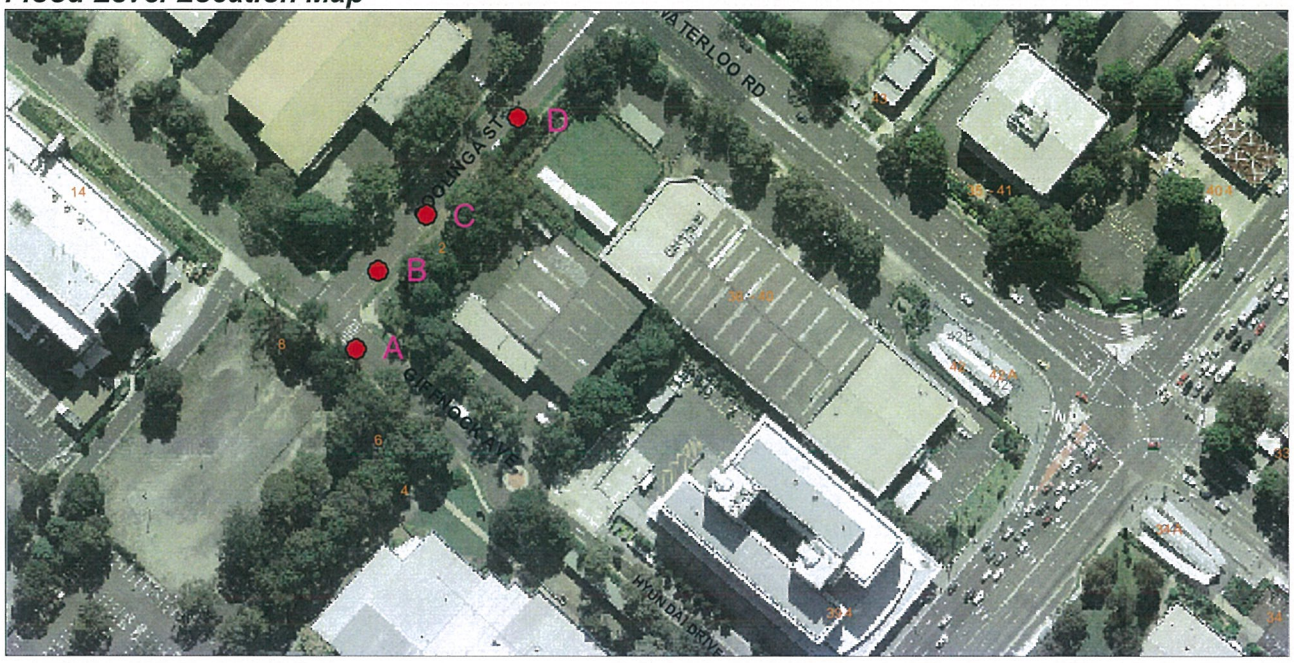
Guna Veerasingham
Stormwater coordinator
Asset Systems

City of Ryde

FLOOD INFORMATION REQUEST

Property Address: 2 Coolinga Avenue, Macquarie Park
Issue Date: 13 November 2017
Flood Study Reference: Macquarie Park Flood Study Report (April 2010)
Flood Model Reference: TUFLOW Model (July 2010)

Flood Level Location Map



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City of Ryde

Notes:

- All levels are based on Australian Height Datum (AHD).
- Flood levels are indicative only.
- The flood levels were derived using Areal Laser Survey (ALS) data which is considered as approximate.
- This flood level information is for existing site conditions only.
- For any new development proposal with different footprint, concept plans are required.
- The floor levels of the proposed habitable floor area should be set with a free board of 300 mm (Low Risk) and 500 mm (Medium Risk and High Risk) to the 100 year ARI flood level. A free board of 150 mm is applicable for non habitable floor areas. Refer City of Ryde Development Control Plan 2014.
- A site specific flood study / risk assessment may be required for any future development. Engage a suitably qualified engineer to assist you in this matter. Any study or assessment shall be in accordance with the NSW Government's Floodplain Development Manual 2005 and the City of Ryde Development Control Plan 2014.
- Site specific ground and building survey levels should be used to relate flood levels and to assess the impact of flooding.

Flood Risk: Coolinga Avenue Low to Medium. The site is not affected by overland Flow Path