

Appendix 7 – Overland Flow Assessment





263-273 & 277-281 PENNANT HILLS ROAD,

CARLINGFORD Overland Flow Assessment

13TH October 2023

KARIMBLA CONSTRUCTION SERVICES

SKY ENGINEERING AND PROJECT MANAGEMENT



| Title | 263-281 Pennant Hills Road Carlingford Design Report |
|----------|--|
| File | SY21-007-R03-01-Overland Flow Assessment |
| Author | Peter McCallum |
| Review | Frank Xie |
| Approved | Peter McCallum |

| Revision | Comments | Date | Author | Review | Approved |
|----------|-------------------|------------|--------|--------|----------|
| 01 | For DA Submission | 13/10/2023 | PM | FX | PM |
| | | | | | |

COPYRIGHT

SKY Engineering and Project Management reserves all copyright of intellectual property in this document. No permission or authority is granted by SKY Engineering and Project Management to any person or organisation to use this document for any purpose without the written consent of SKY Engineering and Project Management.

REPORT DISCLAIMER

This report has been prepared for the client identified within only and cannot be relied on or used by any third party. Any representation, statement, opinion or advice, expressed or implied in this report is made in good faith but on the basis that SKY Engineering and Project Management are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in any respect of any representation, statement, or advice referred to above.



1. CONTENTS

| 1. C | ONTENTS |
|-------|--|
| 1. IN | NTRODUCTION1 |
| 1.1. | SITE LOCATION AND DEVELOPMENT PROPOSAL |
| 2. C | VERLAND FLOW AND FLOODING |
| 2.1. | GENERAL FLOODING |
| 2.2. | EXISTING CONDITIONS |
| 2.3. | PROPOSED CATCHMENTS AND OVERLAND FLOW4 |
| 2.3. | 1. EXTERNAL CATCHMENTS |
| 2.3. | 2. INTERNAL CATCHMENTS |
| 3. C | VERALL STORMWATER MANAGEMENT6 |
| 3.1. | SITE CONTROLS |
| 3.2. | ONSITE DETENTION6 |
| 3.3. | WATER QUALITY MODELING9 |
| 3.4. | RAINWATER TANKS 12 |
| 3.5. | SEDIMENTATION AND EROSION CONTROL13 |
| 3.6. | WATER QUALITY MAINTENANCE MANAGEMENT13 |
| 4. C | ONCLUSION |
| APPE | NDIX |



1. INTRODUCTION

This report has been prepared to inform a Planning Proposal with Parramatta City Council for the proposed development at 263-273 & 277-281 Pennant Hills Road Carlingford.

The purpose of this report is to assess the impacts of the proposed development in the context of the civil infrastructure requirements and has been prepared in accordance with Parramatta City Council's design guidelines and relevant Australian Standards.

In assessing the civil and infrastructure requirements, the report considers, road access requirements, earthworks and stormwater management.

As part of considering the above mentioned elements at the site, this report will consider the following:

- Stormwater Management
 - On Site Detention (OSD)
 - o Piped and Overland Flows
 - Water Sensitive Urban Design (WSUD)
 - o Sedimentation and Erosion Control
- Overland Flows
 - o External Flow and Internal Flows



1.1. SITE LOCATION AND DEVELOPMENT PROPOSAL

The site of the proposed development is described as Lot 1 in DP 1219291, Lot 22 in DP 21386, Lot 2-4 in DP 9614 and Lot 61 & 62 in DP 819136. This site is known as 263-273 & 277-281 Pennant Hills Road Carlingford. The location of the site is shown in Figure 1 below.



Figure 1: Location of Site

The existing site consists of vacant land and existing residential dwellings with a combined area of 27,982m². The site falls generally from east to west with a slope of approximately 9%.

The proposed development consists of a mix of retail space, childcare and residential apartments across 7 buildings and over 2 stages. The drainage strategy is sympathetic toward the two zonings across the site, being R4 High Density and RE1 Public Recreation.

The private access road is accessed at two points via Shirley Street.



2. OVERLAND FLOW AND FLOODING

2.1. GENERAL FLOODING

The subject site is not affected by the 1 in 100 year flood level and all water leaving the subject site is controlled by on-site detention tanks that have been designed in accordance with Council's specifications.

Using the Parramatta flood risk tool, the site is not identified as a risk for flooding.

Council has not provided flood maps for the surrounding areas; however EGIS Consulting engineers has been engaged to model the flood conditions and assess the 5%, 1% AEP and PMF. Please refer to EGIS letter within Appendix.

2.2. EXISTING CONDITIONS

The natural fall of the site grades from east to west from RL126.5 (AHD) to RL103.90 at approximately 8-9% across the site. The demolition of the site began as early as 2014 and completed in early 2023. However, the demolition of the existing buildings does not change the grades through the site.

The site is separated into 4 catchments as shown below in figures 2 and 3. Catchment A drains to west by a 375DN stormwater pipe into Shirley Street. Catchment B drains to Shirley Street via overland flow. Catchment C and D has since been demolished, but the previous drainage was discharged into Pennant Hills Road.

There is a portion of Pennant Hills Road which drains to a kerb inlet pit within the road reserve and discharge through Catchment A and connects to Shirley Street Kerb inlet pit.



Figure 2: Catchment with 2014 Aerial Photo







2.3. PROPOSED CATCHMENTS AND OVERLAND FLOW

2.3.1. EXTERNAL CATCHMENTS

As mentioned in section 2.2, the external catchment (blue hatching from figure 3) from Pennant Hills Road drains to a kerb inlet pit, and the pipe will need to relocate the suit the proposed buildings. DRAINS modelling will be undertaken for the purpose of this realignment to ensure the 375DN pipe is designed to the 5% AEP storm event.



Figure 4: Stormwater pipe diversion (shown in orange)



2.3.2. INTERNAL CATCHMENTS

Catchments within the site will be separated into 3 different catchments. Catchment A – Stage 1 of the project. Catchment B – noted a future stage.

Catchment A - Stage 1 of the project will include the access road entry/exit for the site and Buildings A, B, C, D and G. (purple hatch in figure 5)

Catchment B – Future Stage will be separated into 2 minor catchments, Catchment B1 - RE1 Zone Catchment and B2 – Building and Road Catchment. (orange hatch in figure 5)



Figure 5: Internal Catchments



3. OVERALL STORMWATER MANAGEMENT

The natural fall of the site grades from east to west with a pit and pipe, by way of a drainage easement, discharging to Shirley Street drainage network. The proposed drainage design for the site collects runoff, hardstand area, landscape and flows are conveyed to water quality and detention tanks strategically located to cater for the development.

The proposed roof drainage, hardstand areas and landscaping flows are conveyed to the storm filter chamber of the detention tank(s) and roof water to rainwater tanks, for the purposes of water quality modelling. A nominal rainwater volume is proposed, subject to change as required by BASIX.

The stormwater management strategy prepared for this development considers water quality and quantity, attenuating flows and meeting the requirements of the Parramatta City Council Stormwater Disposal Policy, DCP 2011 Part 3 & Engineering Design Guidelines. The guide stipulates design in accordance with the Upper Parramatta River Catchment Trust's (UPRCT) On-site Stormwater Detention Handbook for the modelling of On-Site Detention (OSD) and Council's DCP for Water Sensitive Urban Design (WSUD) approach.

The following sections look at the design of the On-Site Detention and the Water Sensitive Urban Design to achieve Parramatta City Council's requirements and targets.

3.1. SITE CONTROLS

The following controls will be applied throughout the site:

- All private and public drainage infrastructures need to be design for 5% AEP with 50% blockage in sag pits and 20% blockage in on-grade pits with safe overland flow in 1% AEP with climate change.
- Using UPRCT Spreasheet V9 to control the post development peak flow up to 1% AEP.
- By using OSD tank system, no impact to neighboring properties.
- MUSIC Modelling reduction results in accordance with Parramatta City council DCP.
- Apply tailwater conditions.

3.2. ONSITE DETENTION

Under the requirements identified by Parramatta City Council for On-Site Detention, the OSD has been specified for the project in accordance with UPRCT On-site Stormwater Detention Handbook for the modelling of OSD. For each individual tank, the UPRCT calculation sheet has been used to design the OSD system. The calculation sheets are found in the Appendix of this report.

The OSD catchment requirements of the UPRCT handbook stipulate an OSD storage volume (Site Storage Requirement – SSR) of 455 m³/Ha, for the 1% AEP event or extended detention. The total requirement for the proposed development (all catchments) is $1,274m^3$ of SSR (1% AEP).

The OSD systems have been designed to cater for the 66% AEP and 1% AEP event with each system containing a primary and secondary control, which can be seen on the civil drawings.



To cater for the site requirements, it is necessary to provide 3 x OSD tanks for the ultimate post-development catchments. This is required to manage catchment characteristics and ensure any bypass is minimised.



| Proposed Tank | Caters for Building / Road | Catchment (m²) | Bypass (m²) | Required SSR (m ³) |
|------------------|----------------------------------|-------------------|----------------|-----------------------------------|
| Tank A | Catchment A | 18,509 | 0 | 843 |
| Tank B1 | Catchment B1 | 4,065 | 0 | 185 |
| Basin/Tank B2 | Catchment B2 | 5,404 | 0 | 246 |

The table below identifies the tanks and the buildings / roads that it caters for.

Table 1:OSD Tanks

The figure below identifies the catchments and their location on the site, corresponding to the table above.



Figure 6: OSD Tank Catchment

To attenuate the flows, each OSD tank is fitted with an orifice plate at each control chamber, sized to meet the Site Reference Discharge (SRD) requirement. The SRD required for the 66% AEP and 1% AEP is 40L/s/Ha and 150L/s/Ha, respectively.

The below tables show the attenuation for the tanks below.

| Tank | 66% AEP Discharge (L/s) | 1% AEP Discharge (L/s) |
|---------------|-------------------------|------------------------|
| Tank A | 74 | 277 |
| Tank B1 | 16 | 61 |
| Basin/Tank B2 | 21 | 81 |

Table 2:Site Attenuation Flows



3.3. WATER QUALITY MODELING

Rainfall Station used PARRAMATTA NORTH MASONS DR (66124) 6 minutes data from 1988 to 1998 (10 years). It is also available in MUSIC-Link for MUSIC_X.

The water quality for the site has been designed in accordance with Council's stormwater objectives, as documented in Parramatta City Council's Part 3 of DCP 2011. The table below provides the Target Pollutant Removal Efficiencies as follows:

| Pollutant | % Post Development Reduction in Annual Pollutant Load |
|------------------------------|--|
| Gross Pollutants | 90% reduction of litter and vegetation larger than 5mm |
| Total Suspended Solids (TSS) | 85% reduction of annual pollutant load |
| Total Phosphorous (TP) | 65% reduction of annual pollutant load |
| Total Nitrogen (TN) | 45% reduction of annual pollutant load |

Table 3: Target Pollutant Removal Efficiencies

To determine compliance with this requirement, a full analysis of the water quality of the stormwater discharge leaving the site was undertaken using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software modelling package.

All proprietary product modelled are subject to change to equivalent.

The analysis considered the use of the following devices to provide a treatment train to improve the quality of stormwater discharge leaving the developed site:

Catchment A - Tank A

- 20 x OceanGuard pit inserts collecting road flow.
- OceanProect StormFilter chamber with 8 x Psorb StormFilter in Tank A.

Catchment B1 – Tank B1

- 5 x OceanGuard pit inserts collecting road flow.
- OceanProect StormFilter chamber with 2 x Psorb StormFilter in Tank B1.

Catchment B2 - Basin/Tank B2

• 5 x OceanGuard pit inserts collecting park flow.





Figure 7: WSUD Catchment

Piped and surface runoff will be directed through this treatment train prior to discharging into the council drainage system excluding bypass areas, as identified in the civil drawing catchment plan.

• MUSIC Input Parameters

Input parameters representing urban catchment areas with varying fractions of effective impervious areas have been adopted in accordance with Parramatta City Council's requirements. Rainfall runoff parameters were based on a predominantly clay soil type consistent with the area.

The post development catchments use 3 sub-catchments, which are represented in MUSIC by source nodes with varying pollutant generation properties. The three types of source node sub-catchments modelled are:

- Roof Area Roof area draining rainwater tank and the Stormfilter chamber.
- Landscape Area drains to Stormfilter chamber.
- Driveway & Road Areas drain to the OceanProtect Psorb and Stormfilter chamber.

Table 4 below shows the input values used for the source nodes in the MUSIC model. It is noted that MUSIC-link is utilised for all source nodes in accordance with Council's requirements.

10



| | Source Nodes | | | | | | |
|---------------------------------------|--------------|---------|--------------------|--|--|--|--|
| Data Type | Roof | Mixed | Road / Driveway | | | | |
| Area Parameters | | | | | | | |
| Impervious Area (%) | 100% | various | 100% | | | | |
| Rainfall Runoff Parameters | | | | | | | |
| Rainfall Threshold (mm/day) | 1.0 | 1.4 | 1.4 | | | | |
| Soil Storage Capacity (mm) | 120 | 120 | 120 | | | | |
| Initial Storage (%) | 30 | 30 | 30 | | | | |
| Field Capacity (mm) | 80 | 80 | 80 | | | | |
| Infiltration Capacity Coefficient - a | 200 | 200 | 200 | | | | |
| Infiltration Capacity Exponent - b | 1 | 1 | 1 | | | | |
| Groundwater Properties | | | | | | | |
| Initial Depth (mm) | 10 | 10 | 10 | | | | |
| Daily Recharge Rate (%) | 25 | 25 | 25 | | | | |
| Daily Baseflow Rate (%) | 5 | 5 | 5 | | | | |
| Daily Deep Seepage Rate (%) | 0.0 | 0.0 | 0.0 | | | | |

Table 4:MUSIC Input Parameters

• MUSIC Results

The site has been divided into catchments as shown in the figure below. The engineering drawings prepared by SKY Engineering and Project Management show the water quality measures for the proposed development as well as the catchment plan, consistent with the figure below.

Engineering 🕹 Project Management



Figure 8: MUSIC Model Layout

The below figure is generated from MUSIC and demonstrates compliance with Council's targets.

| | Sources | Residual Load | % Reduction |
|--------------------------------|---------|---------------|-------------|
| Flow (ML/yr) | 16.3 | 14.8 | 9.4 |
| Total Suspended Solids (kg/yr) | 1970 | 223 | 88.7 |
| Total Phosphorus (kg/yr) | 4.65 | 1.62 | 65 |
| Total Nitrogen (kg/yr) | 39.7 | 20.6 | 48.1 |
| Gross Pollutants (kg/yr) | 443 | 0 | 100 |

Figure 9: MUSIC Model Results

The results show that the proposed storm water treatment train for the development is highly effective, reducing all pollutant loadings by more than 51%. The proposed treatment train meets the water quality objectives for the removal of Gross Pollutants, Total Nitrogen, Total Phosphorous and Total Suspended Solids.

3.4. RAINWATER TANKS

Rainwater tanks will be sized in accordance with BASIX requirements, rainwater tanks are not shown in the MUSIC modelling as it is the "worst case scenario". Once rainwater volumes and roof catchments are confirmed, MUSIC model will be updated in detailed design stage.



3.5. SEDIMENTATION AND EROSION CONTROL

A Soil and Water Management Plan (SWMP) has been prepared in accordance with the NSW Department of Housing Publication titled: Managing Urban Stormwater – Soils and Construction (2004) for the whole site.

The key objective of the SWMP is:

- 1. Acknowledging the activities on a construction site which may contribute to erosion, sedimentation and water quality impacts.
- 2. The implementation of industry best management practices to minimise adverse water quality and sedimentation impacts brought about through construction activities on waterbodies surrounding the work; and
- 3. Establishment of processes that effectively manage erosion, sedimentation and water quality practices during the life of the project.

The measures shown on the civil drawings will be utilised during construction to cater for sediment runoff in combination with industry best practise sediment controls and as specified on the design plans.

3.6. WATER QUALITY MAINTENANCE MANAGEMENT

To ensure the system functions efficiently over the long term, it will be necessary to carry out regular maintenance on the stormwater system and the water quality devices.

The maintenance of the on-site detention system will be undertaken during regular inspections. It will be necessary to prepare a maintenance schedule. This schedule sets out the frequency of maintenance inspections and who should undertake them.

In addition, during construction, erosion and sediment control devices will need to be put in place prior to works commencing.



4. CONCLUSION

This report specifies and reviews the proposed road upgrades and stormwater management configuration for the proposed development at 263-273 & 277-281 Pennant Hills Road Carlingford.

The specific findings of the stormwater management plan are:

- The total developable catchment area of 27,982m², will generate a site discharge of 1,273 litres per second (excluding bypass) in the 1% AEP event, attenuating flows.
- By the use of OSD system, limiting the post development flows; the flows from the site will not exceed pre-development conditions.
- Discharge from the site will be conveyed to the storm filter chamber/ onsite detention tank (including other measures) before discharging into Council stormwater kerb inlet pit infrastructure.
- Water quality target objectives will be achieved through the provision of OceanProtect stormsacks, rainwater tanks and an OceanProtect Filter chamber system.

It is expected that if the stormwater management measures discussed in this report are appropriately implemented, they will provide an effective means of controlling the management of stormwater on the site.

| 110,000. | Carlingford Apart | ments - TA | NK 1 | | | | | |
|---|--|---|---|--------------------------------------|-------------------------------|---|--|---|
| Site Address | 263-281 Pennant | Hill Road (| | ord | | | | |
| Job No. | 203-201 Fermant | riii itoau, t | Janningit | <i></i> | | | | |
| | 5121-007 | | | | | | | |
| Designer: | | | | | | | | |
| l elephone: | 0435 144 005 | | 0.14 | Data | | | | |
| | | | 31 | e Dala | | | | |
| OSD Area: | | Upper Parra | amatta Ri | ver Catch | ment | | | |
| L.G.A | | Baulkham I | Hills Shire | e Council | 2 | | | |
| Site Area | | 1.8509 | ha | 18,509 | m 2 | | | |
| I otal Roof Area | | 0.8 | ha | 8,000 | m 2 | | | |
| Area of Site draining to | o USD Storage | 1.6 | ha | 16,000 | m | Satisfactory | | |
| Residual Site Area (Lo | ot Area - Root Area) | 1.051 | ha | | | | | |
| Area Bypassing Stora | ge | 0.2509 | ha | | | O - the face to me | | 000/ 14 |
| Area Bypassing / Res | Idual Site Area | 23.9% | | | | Satisfactory | | 30% Max |
| No. of Dweilings on Si | /te | 1 | | | | Satisfactory | | |
| Site Area per Dweiling | 1 | 1.001 | na | | | | | |
| Rooi Area per Dweilin | g | 0.800 | na | | | | | |
| | | Ba | sic OS | D Parar | neters | | | |
| | | Extended D | etention | | | | Detention | |
| Basic SSR Vols | Ext Detention Storage | 300 | m ³ /ha | | | Total Storage | 455 | m ³ /ha |
| Basic SRDs | Primary Outlet | 40 | L/s/ha | | | Secondary Outlet | 150 | L/s/ha |
| | , | | | | | , | | |
| | | | OSD Ta | ank Byp | ass | | | |
| Residual Lot Capture | in OSD Tank | 76% | _ | | | | | _ |
| Adjusted SRDs | | 33 | L/s/ha | | | | 102 | L/s/ha |
| | | | | alaulati | | | | |
| | | Extended F | | aiculati | 0115 | | Detention | |
| Basia SSB Valuma | Fut Detertion Changes | Extended L | ³ | | | Tatal Changes | PAD 4C | ³ |
| Total Bainwatar Tank | Ext Detention Storage | 0.01 | m ³ | | | Total Storage | 042.10 | ³ |
| Storage Volume | Cledits | 0.01 | 111 | | | | 0.01 | FT 1 |
| Storage volume | | | | | | Total | 0.01 | m 3 |
| Storago Volumo | Ext Detention Storage | EEE 26 | m ³ | | | Total | 0.01 842.15 | m ³ |
| Storage Volume | Ext Detention Storage | 555.26 | m ³ | | | Total Flood Detention Storage | 0.01 842.15 286.89 189.26 | m ³ m ³ |
| Storage Volume OSD Discharges | Ext Detention Storage Primary Outlet | 555.26 60.78 | m ³ L/s | | | Total Flood Detention Storage Secondary Outlet | 0.01 842.15 286.89 189.26 | m ³ m ³ L/s |
| Storage Volume OSD Discharges RL of Top Water Leve | Ext Detention Storage Primary Outlet | 555.26 60.78 105.500 | m ³ L/s | | | Total Flood Detention Storage Secondary Outlet | 0.01 842.15 286.89 189.26 | m m ³ m ³ L/s |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-li | Ext Detention Storage Primary Outlet श of Storage ne | 555.26 60.78 105.500 103.100 | m ³ L/s m | | | Total Flood Detention Storage Secondary Outlet | 0.01 842.15 286.89 189.26 105.500 103.100 | m m ³ L/s m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices | Ext Detention Storage Primary Outlet I of Storage | 555.26 60.78 105.500 103.100 1 | m ³ L/s m m | | | Total Flood Detention Storage Secondary Outlet | 0.01 842.15 286.89 189.26 105.500 103.100 1 | m m ³ m ³ L/s m m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear | Ext Detention Storage Primary Outlet I of Storage ne n Flood Level | 555.26 60.78 105.500 103.100 1 100.00 | m ³ L/s m m T.5 vr AF | RI | | Total Flood Detention Storage Secondary Outlet | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 | m m ³ L/s m m 100 vr ARI |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear Downstream FL - RL of | Ext Detention Storage Primary Outlet I of Storage ne n Flood Level of Orifice Cente-line | 555.26 60.78 105.500 103.100 1 1 100.00 -3.10 | m ³ L/s m m 1.5 yr AR Satisfad | RI Ctory | | Total Flood Detention Storage Secondary Outlet | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 | m m ³ L/s m m TOO yr ARI |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear Downstream FL - RL o Design Head to Orifice | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre | 555.26 60.78 105.500 103.100 1 100.00 -3.10 2.400 | m ³ L/s m m 1.5 yr AR Satisfae m | श ctory | TWL | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 | m m ³ L/s m m Too yr ARI m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lii Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter | 555.26 60.78 105.500 103.100 1 1 100.00 -3.10 2.400 137 | m ³ L/s m m 1.5 yr AR Satisfau m | रा ctory Satisfacto | TWL | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 242 | m m ³ L/s m m 100 yr ARI m m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter | 555.26 60.78 105.500 103.100 1 1 100.00 -3.10 2.400 137 | m ³ L/s m m T.5 yr AR Satisfau m mm | रा ctory Satisfacto | TWL | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory | 0.01 842.15 286.89 189.26 105.500 103.100 1 100.00 -3.10 2.400 242 | m m ³ L/s m m 100 yr ARI m m m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear Downstream FL - RL o Design Head to Orifice Calculated Orifice Dia | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter | 555.26 60.78 105.500 103.100 1 100.00 -3.10 2.400 137 verflow V | m ³ L/s m 1.5 yr AR Satisfad m mm | रा ctory Satisfacto Freeboa | TWL ory rd Calo | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 242 | m m ³ L/s m m 100 yr ARI m m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lit Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia | Ext Detention Storage Primary Outlet el of Storage me m Flood Level of Orifice Cente-line e Centre meter Deter Deter Deter | 555.26 60.78 105.500 103.100 1 100.00 -3.10 2.400 137 verflow V | m ³ L/s m m 1.5 yr AR Satisfac m mm | ctory Satisfacto | TWL pry rd Cale | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | 0.01 842.15 286.89 189.26 105.500 103.100 1 100.00 -3.10 2.400 242 | m m ³ m ³ L/s m m 100 yr ARI m m mm |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia RL of Minimum Habita RL of Minimum Garag | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter ble Floor Level e Floor Level e Floor Level | 555.26 60.78 105.500 103.100 1 100.00 -3.10 2.400 137 verflow V | m ³ L/s m m 1.5 yr AR Satisfac m mm | ctory Satisfacto | TWL ory rd Cale | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 242 242 | m m ³ m ³ L/s m m 100 yr ARI m m mm |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia RL of Minimum Habita RL of Minimum Garag Length of Overflow Wo | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter ble Floor Level e Floor Level eir | 555.26 60.78 105.500 103.100 1 100.00 -3.10 2.400 137 verflow V | m ³ L/s m m 1.5 yr AR Satisfau m mm | Satisfacto | TWL pry rd Cale | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 242 242 106.000 107.950 2.00 | m m ³ m ³ L/s m m 100 yr ARI m m mm |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lin Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia RL of Minimum Habita RL of Minimum Garag Length of Overflow W | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter O able Floor Level e Floor Level e Floor Level e ir | 555.26 60.78 105.500 103.100 1 -3.10 2.400 137 verflow V | m ³ L/s m T.5 yr AR Satisfar m mm | रा ctory Satisfacto Freeboa | TWL ory rd Cale Baul | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 242 242 106.000 107.950 2.00 2.00 | m m ³ m ³ L/s m m 100 yr ARI m m m m m m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lit Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia RL of Minimum Habita RL of Minimum Garag Length of Overflow W Site Runoff Coefficien Storm Intensity (5 min | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter O able Floor Level je Floor Level eir t 100 yr ARI) | 555.26 60.78 105.500 103.100 1 -3.10 2.400 137 verflow V | m ³ L/s m m 1.5 yr AR Satisfac m mm | satisfacto | TWL pry rd Calo Baul | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | 0.01 842.15 286.89 189.26 105.500 103.100 1 100.00 -3.10 2.400 242 242 106.000 107.950 2.00 0.75 239 706 7 | m m ³ m ³ L/s m m 100 yr ARI m mm m m m h |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-lii Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia RL of Minimum Habita RL of Minimum Garag Length of Overflow We Site Runoff Coefficien Storm Intensity (5 min Peak Flow over Weir | Ext Detention Storage Primary Outlet al of Storage ne m Flood Level of Orifice Cente-line e Centre meter O able Floor Level le Floor Level le Floor Level eir t 100 yr ARI) | 555.26 60.78 105.500 103.100 1 100.00 -3.10 2.400 137 verflow V | m ³ L/s m 1.5 yr AR Satisfar m mm | Ri Satisfacto | TWL ory rd Cale Baul | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation kham Hills Shire Council | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 242 242 106.000 107.950 2.00 0.75 239 796.7 | m m ³ m ³ L/s m m 100 yr ARI m m mm m m m m m m m m m |
| Storage Volume OSD Discharges RL of Top Water Leve RL of Orifice Centre-li. Number of Orifices Estimated Downstrear Downstream FL - RL of Design Head to Orifice Calculated Orifice Dia RL of Minimum Habita RL of Minimum Garag Length of Overflow We Site Runoff Coefficien Storm Intensity (5 min Peak Flow over Wei Depth of Flow over Wei | Ext Detention Storage Primary Outlet el of Storage ne m Flood Level of Orifice Cente-line e Centre meter O able Floor Level eir t 100 yr ARI) eir e Floor | 555.26 60.78 105.500 103.100 1 100.00 -3.10 2.400 137 verflow V | m ³ L/s m m 1.5 yr AR Satisfac m mm | Satisfacto | TWL pry rd Cale Baul | Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation kham Hills Shire Council | 0.01 842.15 286.89 189.26 105.500 103.100 1 1 100.00 -3.10 2.400 242 242 106.000 107.950 2.00 0.75 239 796.7 392 108 | m m ³ m ³ L/s m m 100 yr ARI m mm mm m m m m t/s mm mm |

| Project: | Carlingford Apart | monts - TA | | | | | | |
|-------------------------|--|--------------|--------------------------|-----------|----------------|-------------------------------|-----------|--------------------|
| Site Address | 263 281 Bonnant Hill Boad, Carlingford | | | | | | | |
| Job No: | 203-201 Feimant | niii Kudu, v | sannight | Ju | | | | |
| | 5121-007 | | | | | | | |
| Designer: | FX | | | | | | | |
| l elephone: | 0435 144 005 | | 61 | to Doto | | | | |
| | | | 31 | | <u> </u> | | | |
| USD Area: | | Opper Parr | amatta Ri Lillo Shiri | e Council | iment | | | |
| L.G.A | | | hins Shire | | m ² | | | |
| | | 0.4005 | ha | 4,005 | m ² | | | |
| | to OSD Storage | 0.2757 | ha | 2,151 | m ² | Satisfactory | | |
| Residual Site Area (L | ot Area - Roof Area) | 0.4005 | ha | 4,005 | | Satisfactory | | |
| Area Bypassing Store | ol Alea - Rool Alea) | 0.131 | ha | | | | | |
| Area Bypassing Stora | idual Site Area | 0.0% | Па | | | Satisfactory | | 30% Max |
| No. of Dwellings on S | ite | 0.0 % | | | | Satisfactory | | JU /0 WIAX |
| Site Area per Dwelling | | 0.407 | ha | | | Salisiaciony | | |
| Boof Area per Dwellin | | 0.407 | ha | | | | | |
| Roor Area per Dweim | ig | 0.270 | Tid | | | | | |
| | | Ba | sic OS | D Parai | meters | | | |
| | | Extended D | Detention | | | | Detention | |
| Basic SSR Vols | Ext Detention Storage | 300 | m ³ /ha | | | Total Storage | 455 | m ³ /ha |
| Basic SRDs | Primary Outlet | 40 | L/s/ha | | | Secondary Outlet | 150 | L/s/ha |
| | - | | | | | - | | |
| | | | OSD Ta | ank Byp | bass | | | |
| Residual Lot Capture | in OSD Tank | 100% | | | | | | |
| Adjusted SRDs | | 40 | L/s/ha | | | | 150 | L/s/ha |
| | | | | alculati | one | | | |
| | | Extended [| OSD C | alculati | 0113 | | Dotontion | |
| Basic SSP Volume | Ext Dotontion Storage | 121.05 | m ³ | | | Total Storage | 184.96 | m ³ |
| Total Rainwater Tank | Credite | 0.03 | m ³ | | | Total Storage | 0.02 | m ³ |
| Storage Volume | oround | 0.00 | | | | Total | 184 93 | m ³ |
| Storage Volume | Ext Detention Storage | 121 92 | m ³ | | | Flood Detention Storage | 63.01 | m ³ |
| | Primary Outlet | 16.26 | 1/s | | | Secondary Outlet | 60.98 | 1/s |
| COD Discharges | T finally Outer | 10.20 | 2/3 | | | occontaily outer | 00.00 | 2/3 |
| RL of Top Water Leve | el of Storage | 108.200 | m | | | | 108.200 | m |
| RL of Orifice Centre-li | ine | 106.950 | m | | | | 106.950 | m |
| Number of Orifices | | 1 | T | | | | 1 | . |
| Estimated Downstrea | m Flood Level | 100.00 | 1.5 vr AF | રા | | | 100.00 | 100 vr ARI |
| Downstream FL - RL | of Orifice Cente-line | -6.95 | Satisfa | ctory | | Satisfactory | -6.95 | m |
| Design Head to Orific | e Centre | 1,250 | m | | TWI | Ext Detn Storage - RL Orifice | 1,250 | m |
| Calculated Orifice Dia | meter | 83 | mm | Satisfact | orv | Satisfactory | 162 | mm |
| | | | _ | | | ,,,,,,,, | | |
| | 0 | verflow V | Veir & I | Freeboa | ard Calo | culation | | |
| RL of Minimum Habita | able Floor Level | | | | | | 110.050 | m |
| RL of Minimum Garag | ge Floor Level | | | | | | 110.050 | m |
| Length of Overflow W | /eir | | | | | | 2.00 | m |
| Site Runoff Coefficien | nt 100 1 DIX | | | | Baul | kham Hills Shire Council | 0.75 | |
| Storm Intensity (5 min | 100 yr ARI) | | | | | | 239 | mm/h |
| | loir | | | | | | 156 | L/S |
| Freeboard to Habitable | le Floor | | | | | Satisfactory | 1694 | mm |
| Freeboard to Garage | Floor | | | | | Satisfactory | 1694 | mm |
| 9- | | | | | | | | |

| | naford Anartm | onts - TA | | | | | | |
|--|--|---|---|--------------------|---------------------------------|--|--|--|
| Site Address 262 2 | 291 Bonnont H | | NR DZ | rd | | | | |
| Sile Address 203-2 | | ill Roau, C | Jannigio | nu | | | | |
| | -007 | | | | | | | |
| Designer: FX | | | | | | | | |
| Telephone: 0435 | 144 005 | | 0:4 | . Data | | | | |
| | Sile Dala | | | | | | | |
| OSD Area: | L L | Upper Parra | amatta Ri | ver Catch | ment | | | |
| L.G.A | | Baulkham F | Hills Shire | Council | 2 | | | |
| Site Area | | 0.5404 | ha | 5,404 | m 2 | | | |
| Total Root Area | torogo | 0.2926 | na | 2,920 | m m ² | Catiofactory | | |
| Area of Site draining to OSD S | | 0.5404 | na | 5,404 | | Salisfactory | | |
| Area Bypassing Storage | Rooi Alea) | 0.240 | ha | | | | | |
| Area Bypassing Storage | Area | 0.0% | na | | | Satisfactory | | 20% Max |
| Area bypassing / Residual Site | e Area | 0.0% | | | | Satisfactory | | 30% Wax |
| Site Area per Dwelling | | 0.540 | bo | | | Salisfactory | | |
| Boof Area per Dwelling | | 0.340 | ha | | | | | |
| Rooi Alea per Dwelling | | 0.235 | Па | | | | | |
| | | Ba | sic OS | D Parar | neters | | | |
| | | Extended D | Detention | | | | Detention | |
| Basic SSR Vols Ext D | Detention Storage | 300 | m ³ /ha | | | Total Storage | 455 | m ³ /ha |
| Basic SRDs | Primary Outlet | 40 | L/s/ha | | | Secondary Outlet | 150 | L/s/ha |
| | | | | | | | | |
| | | | OSD Ta | ank Byp | ass | | | |
| Residual Lot Capture in OSD T | Tank | 100% | _ | | | | | _ |
| Adjusted SRDs | | 40 | L/s/ha | | | | 150 | L/s/ha |
| | | | | alaulati | 000 | | | |
| OSD Calculations | | | | | | | | |
| | | Extended D | otontion | | | | Detention | |
| Rasic SSP Volume Ext D | I | Extended D | Detention | | | Total Storage | Detention | m ³ |
| Basic SSR Volume Ext D | I Detention Storage | Extended D 162.12 0.01 | Detention m ³ | | | Total Storage | Detention 245.88 | m ³ m ³ |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume | I Detention Storage | Extended D 162.12 0.01 | etention m ³ m ³ | | | Total Storage | Detention 245.88 0.01 245.88 | m ³ m ³ m ³ |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Ext D | Detention Storage | Extended D 162.12 0.01 | Detention m ³ m ³ | | | Total Storage Total | Detention 245.88 0.01 245.88 83.76 | m ³ m ³ m ³ m ³ |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Ext D | Detention Storage Detention Storage Primary Outlet | Extended D 162.12 0.01 162.11 21.62 | m ³ m ³ m ³ | | | Total Storage Total Flood Detention Storage Secondary Outlet | Detention 245.88 0.01 245.88 83.76 81.06 | m ³ m ³ m ³ m ³ |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Ext D OSD Discharges | Detention Storage Detention Storage Primary Outlet | Extended D 162.12 0.01 162.11 21.62 | petention m ³ m ³ m ³ L/s | | | Total Storage Total Flood Detention Storage Secondary Outlet | Detention 245.88 0.01 245.88 83.76 81.06 | m ³ m ³ m ³ L/s |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora | Detention Storage Detention Storage Primary Outlet | Extended D 162.12 0.01 162.11 21.62 114.700 | m ³ m ³ m ³ L/s | | | Total Storage Total Flood Detention Storage Secondary Outlet | Detention 245.88 0.01 245.88 83.76 81.06 114.700 | m ³ m ³ m ³ L/s m |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line | Detention Storage Detention Storage Primary Outlet | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 | m ³ m ³ L/s m m | | | Total Storage Total Flood Detention Storage Secondary Outlet | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 | m ³ m ³ m ³ L/s m m |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices | Detention Storage Detention Storage Primary Outlet age | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 | Detention m ³ m ³ L/s m m m | | | Total Storage Total Flood Detention Storage Secondary Outlet | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 | m ³ m ³ m ³ L/s m m |
| Basic SSR VolumeExt DTotal Rainwater Tank CreditsStorage VolumeStorage VolumeDOSD DischargesRL of Top Water Level of StoraRL of Orifice Centre-lineNumber of OrificesEstimated Downstream Flood I | Detention Storage Detention Storage Primary Outlet age | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 | Detention m ³ m ³ L/s m m m T.5 yr AR | | | Total Storage Total Flood Detention Storage Secondary Outlet | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 1 102.00 | m ³ m ³ m ³ L/s m m T 00 yr ARI |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Storage Volume DOSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice | Detention Storage Detention Storage Primary Outlet age Level | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 | m ³ m ³ L/s m m T.5 yr AR Satisfac | l ctory | | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 1 102.00 -11.10 | m ³ m ³ m ³ L/s m m ▼ 100 yr ARI m |
| Basic SSR VolumeExt DTotal Rainwater Tank CreditsStorage VolumeStorage VolumeStorage VolumeDOSD DischargesRL of Top Water Level of StoraRL of Orifice Centre-lineNumber of OrificesEstimated Downstream Flood IDownstream FL - RL of OrificeDesign Head to Orifice Centre | Detention Storage Detention Storage Primary Outlet age Level | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 | m ³ m ³ L/s m m m T.5 yr AR Satisfac m | :I Story | TWL | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 1 102.00 -11.10 1.600 | m ³ m ³ m ³ L/s m m Too yr ARI m |
| Basic SSR VolumeExt DTotal Rainwater Tank CreditsStorage VolumeStorage VolumeRL of Top Water Level of StoraRL of Orifice Centre-lineNumber of OrificesEstimated Downstream Flood IDownstream FL - RL of OrificeDesign Head to Orifice CentreCalculated Orifice Diameter | Detention Storage Primary Outlet age Level c Cente-line | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 | m ³ m ³ L/s m 1.5 yr AR Satisfac m mm | tory Satisfact | TWL | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 1 102.00 -11.10 1.600 175 | m ³ m ³ m ³ L/s m m 100 yr ARI m m mm |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Storage Volume DOSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Diameter | Detention Storage Detention Storage Primary Outlet age Level c Cente-line | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 | Detention m ³ m ³ L/s m m ▼ 1.5 yr AR Satisfac m mm | tory Satisfact | TWL | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 1 102.00 -11.10 1.600 175 | m ³ m ³ m ³ L/s m m 100 yr ARI m m mm |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Centre Calculated Orifice Diameter | Detention Storage Detention Storage Primary Outlet age Level • Cente-line | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 | m ³ m ³ L/s m m 1.5 yr AR Satisfac m mm | stisfact | TWL ory ard Calc | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory culation | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 1 102.00 -11.10 1.600 175 | m ³ m ³ m ³ L/s m m 100 yr ARI m m |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Diameter Calculated Orifice Diameter | Detention Storage Primary Outlet age Level c Cente-line Ov r Level | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 | m ³ m ³ L/s m m • • 1.5 yr AR Satisfac m mm | stisfact | TWL pry ard Calc | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 102.00 -11.10 1.600 175 | m ³ m ³ m ³ L/s m m 100 yr ARI m m mm |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Centre Calculated Orifice Diameter RL of Minimum Habitable Flood RL of Minimum Garage Floor L | Detention Storage Primary Outlet age Level • Cente-line • Cente-line • Cente-line | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 erflow W | m ³ m ³ L/s m 1.5 yr AR Satisfac m mm | story Satisfact | TWL ory rd Calc | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 102.00 -11.10 1.600 175 119.300 119.300 | m ³ m ³ m ³ L/s 100 yr ARI m m mm |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Centre Calculated Orifice Diameter RL of Minimum Habitable Floor RL of Minimum Garage Floor L Length of Overflow Weir | Detention Storage Primary Outlet age Level Cente-line Ov r Level Level | Extended D 162.12 0.01 162.11 21.62 114.700 1 13.100 1 102.00 -11.10 1.600 90 erflow V | m ³ m ³ L/s m m T.5 yr AR Satisfac m mm | story Satisfact | TWL ory Ird Calc | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 102.00 -11.10 1.600 175 119.300 119.300 2.00 | m ³ m ³ m ³ L/s m m 100 yr ARI m m m m m |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Centre Calculated Orifice Diameter RL of Minimum Habitable Floor RL of Minimum Garage Floor L Length of Overflow Weir Site Runoff Coefficient Storm Interpristry from 100 print | Detention Storage Detention Storage Primary Outlet age Level Cente-line Ov r Level Level | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 | m ³ m ³ L/s m m 1.5 yr AR Satisfac m mm | story Satisfact | TWL ory ard Calc Baull | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 102.00 -11.10 1.600 175 119.300 2.00 2.00 | m ³ m ³ m ³ L/s m m 100 yr ARI m m m m m m |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Centre Calculated Orifice Diameter RL of Minimum Habitable Floor RL of Minimum Garage Floor L Length of Overflow Weir Site Runoff Coefficient Storm Intensity (5 min 100 yr A Peak Elow over Weir | Detention Storage Primary Outlet age Level • Cente-line vr Level _evel | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 | m ³ m ³ L/s m m T.5 yr AR Satisfac m mm | satisfact | TWL ory Ird Calc Baull | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 102.00 -11.10 1.600 175 119.300 2.00 0.75 239 269 1 | m ³ m ³ m ³ L/s m m 100 yr ARI m m m m m m h |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Centre Calculated Orifice Diameter RL of Minimum Habitable Floor RL of Minimum Garage Floor L Length of Overflow Weir Site Runoff Coefficient Storm Intensity (5 min 100 yr A Peak Flow over Weir Denth of Flow over Weir | Detention Storage Primary Outlet age Level c Cente-line Ov r Level _evel | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 erflow V | m ³ m ³ L/s m m T.5 yr AR Satisfac m mm | satisfact | TWL ory Ird Calc Baull | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 1 102.00 -11.10 1.600 175 119.300 119.300 2.00 0.75 239 269.1 189 | m ³ m ³ m ³ L/s m m 100 yr ARI m m m m m m m m m m m m m m m m m m |
| Basic SSR Volume Ext D Total Rainwater Tank Credits Storage Volume Ext D OSD Discharges RL of Top Water Level of Stora RL of Orifice Centre-line Number of Orifices Estimated Downstream Flood I Downstream FL - RL of Orifice Design Head to Orifice Centre Calculated Orifice Diameter RL of Minimum Habitable Floor RL of Minimum Garage Floor L Length of Overflow Weir Site Runoff Coefficient Storm Intensity (5 min 100 yr A Peak Flow over Weir Depth of Flow over Weir Depth of Flow over Weir | Detention Storage Primary Outlet age Level • Cente-line Ov r Level _evel | Extended D 162.12 0.01 162.11 21.62 114.700 113.100 1 102.00 -11.10 1.600 90 erflow W | m ³ m ³ L/s m m T.5 yr AR Satisfac m M Veir & F | satisfact | TWL ory Ird Calc Baull | Total Storage Total Flood Detention Storage Secondary Outlet Satisfactory Ext Detn Storage - RL Orifice Satisfactory Culation Kham Hills Shire Council | Detention 245.88 0.01 245.88 83.76 81.06 114.700 113.100 1 102.00 -11.10 1.600 175 119.300 2.00 0.75 239 269.1 189 | m ³ m ³ m ³ L/s m m TOO yr ARI m m m m m m m m m m m m m m m m m m m |



APPENDIX A Flood Modelling - Response to RFI



Our Ref: 23-000195

12 October 2023

Ashna Aggarwal Meriton Level 11, Meriton Tower 528 Kent Street Sydney 2000

Response to RFI – Flood Modelling 263-273 & 227-281 Pennant Hill Road, Carlingford

Dear Ashna,

This letter is in response to the flooding items within City of Parramatta Council's request for additional information that you have sent us on 9 October 2023. Items relevant to the flood modelling are reiterated below:

- Demonstrate that there is no impact to the neighbouring properties. Storm events to be considered are 5% AEP, 1% AEP, and PMF. Flood impact maps (post-development minus pre-development) should be included.
- Include a map showing existing overland flow paths and proposed flow paths for overland flooding.
- An electronic copy of 2D modelling preferrably TUFLOW needs to be provided to Council with a brief report for review including interaction between Pennant Hills Road and downstream/slope of the site via Shirley Street for :
 - 1% AEP storms including 20% increase in rainfall for climate change.
 - PMF
 - Pre-development (as now)
 - Post-development
 - Post-development with 100% pipe blockage (all overland flow)

Our review of publicly available information in Council and SES websites has identified that previous flood studies have been undertaken that include the subject site:

- Upper Parramatta River Catchment Floodplain Risk Management Study and Plan (Bewsher, 2003)
- Floodplain Risk Management Study for the Carlingford Precinct

It has been noted from Council flood maps that the site is not impacted by existing regional flooding. As part of the development proposal, on-site detention is provided to ensure that the existing peak flows are not aggravated as part of the development to not cause adverse impacts to existing private properties. Pit and pipe network will convey the overland flow though the development. Egis is undertaking the TUFLOW modelling and preparing the flood mapping as required by Council.

Egis will provide a flood impact assessment report which will include GIS flood maps of the study area:

- Pre-development and post-development peak flood depth, level, and hazard for the 5% AEP, 1% AEP, and PMF events
- Post-development peak flood depth, level, and hazard for the 1% AEP climate change scenario



- Post-development peak flood depth, level, and hazard for the 1% AEP with 100% drainage network blockage
- Impact mapping showing change in peak flood levels and flood hazard for the 5% AEP, 1% AEP, and PMF events.

Yours sincerely,

Water Resources Team Lead

Egis Consulting Pty Ltd



APPENDIX B Catchment plans



| | | | | | BAR SCALES |
|-----|---------------------|----|-------|------------|------------------------|
| | | | | | |
| | | | | | |
| | | | | | 0 5 10 15 20 25 30m |
| P2 | PRELIMINARY ISSUE | FX | PM | 10/10/2023 | SCALE 1:500 AT A1 SIZE |
| P1 | ISSUED FOR APPROVAL | FX | PM | 04/10/2023 | |
| REV | DESCRIPTION | BY | APRVD | DATE | |

REVISIONS



263-281 PENNANT HILLS RD CARLINGFORD

| STATUS | |
|--------------|---|
| IS | |
| Drawn | ſ |
| FX | |
| Height Datum | ľ |
| | |

PM

FX

PM

Project No.

Drawing No.

Issue





| | | | | | E / admin@skyeng. | com.au | |
|--|---------|----------|------------|--------------|-------------------|--------|--|
| Designed | Checked | Approved | | | www.skyeng.com.au | | |
| FX | PM | PM | | Project No. | Drawing No. | Issue | |
| Grid | SCALE | | | \mathbf{O} | | | |
| MGA | AS S | SHOWN | AT A1 SIZE | SY21-007 | -C-3301 | P1 | |
| F:\SY21-007 Meriton Carlingford\Drgs\AutoCad\3000 DA Stage 1\SY21-007-C-3301.dwg | | | | | | | |



| CLIENT | PROJECT | TITLE | STATUS | | | | | |
|---|---|-----------------------------------|--------------|--|--|--|--|--|
| KARIMBLA CONSTRUCTION SERVICES (NSW) PTY LIMITED | CARLINGFORD APARTMENTS 263-281 PENNANT HILLS R CARLINGFORD | POST-DEVELOPMENT WATER QUALITY | IS | | | | | |
| Level 11, 528 Kent Street, Sydney NSW 2000 Tel: (02) 9287 2888 Fax: (02) 9287 2777 | | CATCHMENT | Drawn FX | | | | | |
| Email: info@design.meriton.com.au Internet: http://www.meriton.com.au | | | Height Datum | | | | | |