

North Eveleigh Affordable Housing Stormwater Management Plan

Prepared for: **SMDA**
By: **Enstruct Group**
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ISSUE AUTHORISATION

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Executive Summary

This report has been provided by enstruct group in support of development approval for the affordable housing project by CityWest in North Eveleigh.

This report should be read in conjunction with the stormwater management plan for the entire North Eveleigh development by AECOM. This report is referenced throughout the report and included as an Appendix of this report.

The site addresses stormwater drainage, overland flows, control of discharge from the site, on site detention, water quality, rainwater harvesting and sediment and erosion control for the development.

The stormwater drainage system for the site has been designed to meet requirements set by AECOM's report in regards to permissible site discharge (for 20YR and 100YR storm events) and on site detention storage requirements.

The site will also include Water Sensitive Urban Design (WSUD) techniques to meet requirements set by AECOM's stormwater management plan.

Concept plans for the civil design of the site and for the proposed sediment and erosion control during construction have been prepared and are included in the Appendix of this report.

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Rainfall Table – North Eveleigh

North Eveleigh Affordable Housing Project: Stormwater Management
Plan for SMDA 05th March 2013

Drawings

Enstruct Drawings

4554-C-301 *General Arrangement Plan Sheet 1*
4554-C-300 *General Arrangement Plan Sheet 2*
4554-C-400 *Catchment Plan*
4554-C-300 *Sediment & Erosion Control Plan*

AECOM Drawing

60238089-DRG-C1512 Rev A

1.0 Introduction

Enstruct have been engaged by CityWest Housing to complete the detailed civil engineering design works for a building lot (D4 in AECOM's report) in the North Eveleigh Affordable Housing Project.

This Stormwater Management Plan discusses the proposed stormwater drainage design for the site including the on-site detention requirements, stormwater discharge from the site and stormwater treatment. The report also discusses sediment and erosion control for the site during construction works.

2.0 Site Description

The site described in this report is part of the new development undertaken by Sydney Metropolitan Development Authority in North Eveleigh which includes 4 housing lots, associated roads, public spaces and infrastructure.

The housing plot is 0.256 hectares in area with both roof, road and landscaping within the catchment. The lot is D4 in AECOM's report.

The site is currently cleared as part of the infrastructure works for the entire development. After completion of the infrastructure works the site can be assumed to be 100% pervious.

3.0 Stormwater Drainage

3.1 Rainfall Data

The chart provided in the Appendix is from Bureau of Meteorology, and based on accumulated rainfall data for the exact area of North Eveleigh. This rainfall data has been used in the design of the stormwater drainage on this project.

3.2 Catchments & Runoff

The proposed development of this lot is roof area, road area and landscaping.

The areas and runoff locations are as follows:

Roof Catchment: (0.1459 hectares) Roof water will be draining into retention tank, with overflows running into OSD tank.

Bypass Catchment: (0.0422 hectares) Areas between the building face and boundary will drain overland to road, or be caught by landscaping, and run directly into external drainage via subsoil into the existing stub connections.

Landscaping Catchment: (0.0681 hectares) Landscaping will drain overland to the above ground OSD, and then to the OSD tank and out to the external drainage

3.3 Existing Infrastructure

As part of the infrastructure works to be completed there will be a new stormwater network designed for both the new roads and the 4 lots to connect. This network is to the north and west of the D4 lot. Currently AECOM's infrastructure drawings show two stub connections to the north of the site. This new stormwater network and overland flows drain to the 'Holdsworth Street low point' as referenced in AECOM's report. There is also some existing stormwater network to east of the site which drains to the 'Traverser 2 low point'.

3.4 Point of Discharge

As discussed above as part of the new stormwater network, 2 stub connections have been provided as part of AECOM's design.

Due to the position of the building footprint which matches the initial masterplan, and the high water surface levels in these pipes during 100yr ARI events it is problematic to connect to these stubs. In addition the level of the existing ground of the adjoining block to the south is approximately RL22.30 and the design level of the stubs the lot is supposed to connect to are at a higher RL22.35.. The 100yr for pit A13.2 is 22.10 so the effect of backwater will be smaller.

Enstruct believes therefore the connection to pit A13.2 on AECOM's drawings (to avoid surcharging of the lots stormwater network including the OSD) is required. As part of AECOM's work an additional stub will need to be provided to the inside of the boundary at 1% grade to allow for connection to the OSD tank.

Enstruct believes there will be no negative impact from this redirecting of flows as currently in the DRAINS model output in AECOM's report shows the designed network surcharging and running toward A13.2 which is the low point of the road.

In addition to the OSD connection to Pit A13.2 landscaping to be provided between the boundary and the building to the north and north northwest are proposed to connect to the 2 stub connections provided in AECOM's design. These areas will bypass the OSD, and hence allowance will be made for these areas in achieving Permissible Site Discharge (PSD) and orifice sizing of the OSD to compensate.

AECOM has provided via email sent on the 20/03/2013 to Phillip Baker (UDGC) provides Q20 and Q100 water surface levels for Pit 13.2 are 24.27 & 23.10. These values have been used as outlet conditions in the DRAINS model.

3.5 Roof Drainage

The roof drainage from the building will travel to a retention tank, that will have a high level bypass to the OSD when full of water.

The roof drainage system will be designed to convey the 100 year design flows created by the building roof catchment to the retention tank. Any flows in excess of the design flows will discharge onto the surrounding ground and run as overland flow towards the discharge point for the site.

3.6 Surface Drainage

The in ground drainage system to the south for the site in the landscape zone will be sized to convey the 20 year design flows from the surface area to the OSD tank.

Flows in excess of the 20 year event surcharge the below ground OSD tank into the above ground OSD which fills with water up to a maximum height of 300mm. In events greater than 100 ARI storm event water will surcharge the above ground OSD and flow as overland flow to the south east, discharging to the existing road

3.7 On-Site Detention

The on-site detention requirements for the lot have been provided by AECOM's Stormwater Management Plan which is included in the Appendix.

The minimum storage requirement for D4 is 51m³ for a lot area of 0.2562 hectares as per Table 7 in the plan. The OSD will have an orifice plate to limit flows in the Q20 and Q100 ARI storms (56l/s and 77l/s) taking into account any bypass flows not draining to the OSD tank.

Modelling of the internal stormwater with the high surface water level in the external stormwater network in events greater than Q20 events was completed using Watercom DRAINS. There is a need for both a below ground OSD tank (for events up to and including 20 year ARI storms) and above ground storage (for events between 20 year and 100 year events). A description of what happens in different storm events is as follows.

Up to 20 year ARI Storm

Both the landscaping and roof catchment discharge into OSD tank via the in ground stormwater network in the landscaping area and retention tank from the roof. There is a 20yr orifice inside the tank that limits the flow down to the required PSD taking into account flow from the bypass catchment. In these events the invert of the orifice sits higher than the water surface level of the external system.

The OSD tank size is 72m³ with the internal water surface level remaining lower than the 25.15 level in the landscape area, resulting in no ponding in the landscaped area as a result of OSD.

Up to and over 100yr ARI Storm

In events greater than the 20yr storm event the water surface level increases to a point where there is ponding at the pit A13.2 in the 100yr ARI event. To achieve the 100yr PSD there is a need to provide both non-return valves and above ground OSD as well as a 100yr orifice in the OSD tank. A description of how the system works between the 20 year and 100 year events is as follows

As the storm starts water will run into the OSD tank and discharge out to the external drainage. As the water surface level increases in pit A13.2 the non-return valve initiates and water runs into the OSD tank from the D4 catchment, without discharging, until the water surface level in the OSD tank is higher than water surface level inside the tank.

As water continues to run into the tank, water will start to run over the 20 year weir into a chamber with a 100yr orifice. From this point the OSD tank is discharging out at 100 year PSD. As the tank fills, the tank will surcharge via a surcharge pit into the above ground storage. The above ground storage fills while still discharging water through the internal drainage network. This above ground storage is sized at 27m³ to achieve the 100yr PSD. In events greater than 100yr event water will surcharge the above ground storage and run overland to the west via the path and then on to the road.

3.8 Water Quality

As part of the approval for the entire North Eveleigh development there is a requirement (set by Statement of Commitments) to provide a deduction in average annual loads of pollutants as follows

- Total Suspended Solids (TSS) by 80%
- Total Phosphorous (TP) by 45%
- Total Nitrogen (TN) by 45%
- In addition, the water quality control are to remove visible oil or grease, litter >50mm and sediments > 0.125mm

To achieve these reductions enstruct propose to provide enviropod (or equivalent) on the stormwater sump pit, and a trash rack in the OSD to remove gross pollutants. To remove TSS, TP & TN we propose to provide (Cartridge Stormfilter systems) within the OSD tank to clean first flush flows to the existing stormwater network.

4.0 Sediment & Erosion Control

4.1 During Construction

An Erosion and Sedimentation Control Plan has been prepared, and is included in the Appendix to this report. The plan includes measures such as sediment fences at the downstream edges of all disturbed areas, filters at all existing pits collecting stormwater runoff from disturbed areas, and a truck shaker tray at each point of access to the work area. A sedimentation basin has been provided, sized in accordance with the guidelines in the “Blue Book” - Managing Urban Stormwater - Soils and Construction (NSW Department of Housing 1998).

Final details of Erosion and Sediment Control measures will be documented in the drawings to be prepared for the Construction Certificate. The final drawings will take into account the site works staging including the preferred site access points, site shed locations and temporary stockpile locations. These details will be prepared in conjunction with the selected builder, to ensure that the selected measures are practical and will be well maintained.

Appendix

Intensity-Frequency-Duration Table

Location: 33.900S 151.200E NEAR.. North Eveleigh Issued: 28/2/2013

Rainfall intensity in mm/h for various durations and Average Recurrence Interval

Average Recurrence Interval

Duration	1 YEAR	2 YEARS	5 YEARS	10 YEARS	20 YEARS	50 YEARS	100 YEARS
5Mins	103	131	165	185	211	244	270
6Mins	96.0	123	155	173	197	229	253
10Mins	78.7	101	128	144	165	192	212
20Mins	57.8	74.5	96.1	109	125	147	163
30Mins	47.1	60.8	79.2	89.9	104	123	137
1Hr	31.8	41.3	54.2	61.8	71.8	84.9	95.0
2Hrs	20.6	26.7	35.1	40.1	46.6	55.2	61.8
3Hrs	15.7	20.4	26.8	30.6	35.6	42.1	47.1
6Hrs	9.90	12.8	16.8	19.1	22.2	26.2	29.2
12Hrs	6.30	8.15	10.6	12.1	14.0	16.5	18.4
24Hrs	4.08	5.28	6.89	7.83	9.07	10.7	11.9
48Hrs	2.62	3.40	4.43	5.04	5.84	6.88	7.68
72Hrs	1.96	2.53	3.29	3.75	4.33	5.10	5.69

(Raw data: 41.65, 8.13, 2.53, 88.56, 16.48, 5.11, skew=0.00, F2=4.29, F50=15.86)

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