2405019

WATER CYCLE MANAGEMENT PLAN

CENTRAL COAST COUNCIL DCP CHAPTER 3.11 – WATER CYCLE MANAGEMENT
ON SITE DETENTION AND NUTRIENT CONTROL
OPERATION AND MAINTENANCE

PLAN PREPARED FOR:
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This plan has been prepared to address the requirements of GCC DCP Chapter 6.7 Water Cycle Management for the development project at 14 Springwood St Blackwall

PURPOSE

GCC DCP Chapter 6.7, Water Cycle Management aims to facilitate the application of water sensitive urban design to manage and restore the water balance, reduce risk to life and damage due to flooding, reduce potable water use and protect and enhance natural water systems.

The development at 14 Springwood St Blackwall is a proposed residential flat building and is required to address the following components of the DCP.

- Water conservation
- Retention
- Stormwater Quality
- On site detention
- Local Overland drainage
- Flooding

The development area of the site is less than 2000 square metres and therefore the deemed to comply solutions may be used.

The following information is provided to support compliance with the above requirements.

WATER CONSERVATION

The water conservation aspects of this development is covered by Basix requirements.

WATER RETENTION

The intent of the water retention target is to mimic the natural catchment hydrology form development sites in terms of Quantity (Volume), Rate (Peak flow) and Response (time it takes for rain to run off the site).

Using the deemed to comply requirements of DCP Chapter 6.7 the required retention volume is estimated as follows:

$V = 0.01A(0.02F)^2 = 0.01x715(0.02x76)^2$

Retention required using this method is 16.5 cubic metres.

Rainwater Reuse.

The proposed development is a residential development therefore the guidelines in the DCP can be used to estimate rainwater reuse.

Rainwater reuse based on the deemed to comply formula is as follows:

Reuse for toilet, laundry and landscape watering yields 50% of the 35l/sq metre weekly use rate.

Reuse volume weekly is 35x0.5x385.5 = 6746 litres
Rainwater tanks totaling a minimum of 9000 litres are proposed for the site.

The rainwater reuse is not sufficient to meet the total retention required on the site and an infiltration trench is required. The required retention in an infiltration trench is (16.5 – 6.7) = 8.2 cubic meters using the deemed to comply method

An infiltration trench is proposed in the front landscaping to provide the required on site detention. This trench has a storage capacity of 6.5 cubic metres with a 30 minute infiltration volume estimated to be 7.9 cubic metres. This exceeds the total site retention required under DCP 6.7 deemed to comply calculations.

STORMWATER QUALITY TARGET

All stormwater from the proposed development area will pass through either the rainwater tank or the infiltration trench apart from 4.5 square meters of driveway. The site discharge index is therefore 0.06 which complies with Councils maximum allowable SDI= 0.1

Flows from the rainwater tank system will overflow to infiltration trenches.

ON SITE DETENTION

In accordance with CCC DCP On site detention (OSD) is required to be provided in conjunction with this development.

The usual requirements for OSD relate to storms of 5 year to 100 year average recurrence interval.

The site located within the Woy Woy rainfall area. Although the site previously contained a residence, outbuildings and pavements under the requirements of the DCP runoff post development is required not to exceed the undeveloped (grassed) runoff.

In accordance with the DCP requirement it is proposed to provide on-site detention of stormwater to limit post development peak flows from the site to the pre development peak flows for storm events up to and including the 1% AEP storm event.

The proposed detention system has been modelled using a runoff routing model, “Drains”. Woy Woy rainfall data (1987 ARR) with a soil type of 1 and antecedent moisture content of 3 was used for modelling purposes.

The onsite detention system has been modelled as a tank system including the credit from the rainwater tanks and the infiltration storage. Infiltration rates through the trench are modelled using a small diameter orifice. These flows are not included in the reported flow rates because the water is retained on site and does not flow to Councils stormwater system.

This model predicts that stormwater flow to the drainage system will be less than or equal to the predeveloped flows for peak storms of recurrence intervals from 5 to 100 years.

ON-SITE DETENTION STORAGE CALCULATIONS

Site Area 715 sq metres

Pre-Development Parameters

The site has variable cross falls. Flow path 17 m with 0.75m fall, t_c of the order of 7 minutes.

Post-Development
Total 524 square metres (65% impervious)

Detention Storage
Rainwater Tank - Minimum 9 cubic metres provided 4.5 cum credit claimed
Infiltration trench Storage - 6.5 cubic metres
Surface storage inclusive of pits 9.5 cubic metres

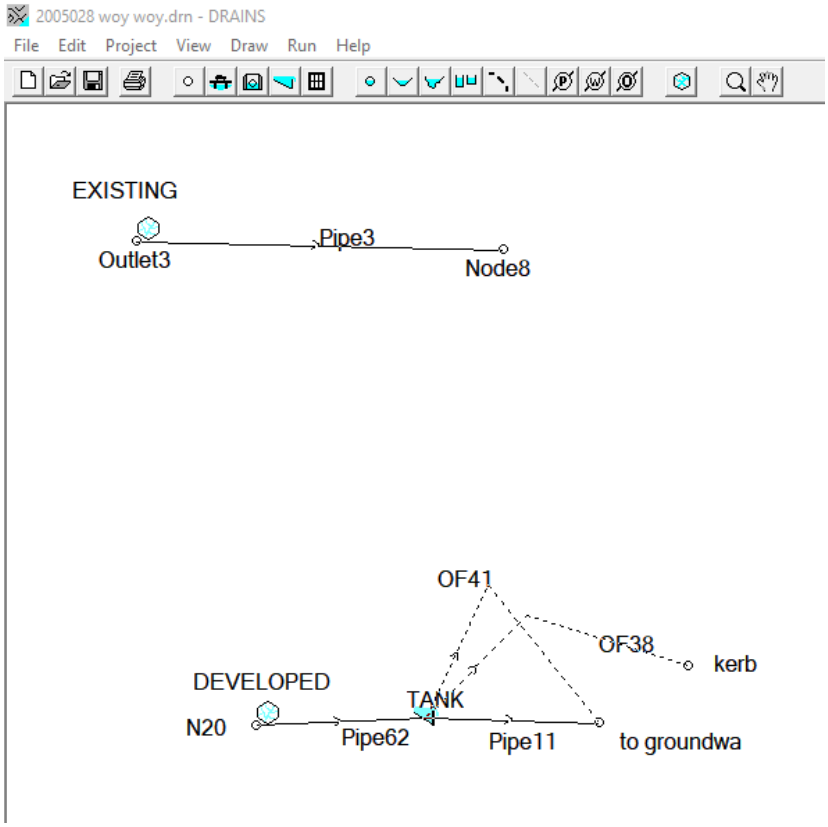
Total Detention Storage - 20.5 cubic metres inclusive of pits

Total storage on site 25 cubic metres

Model Results

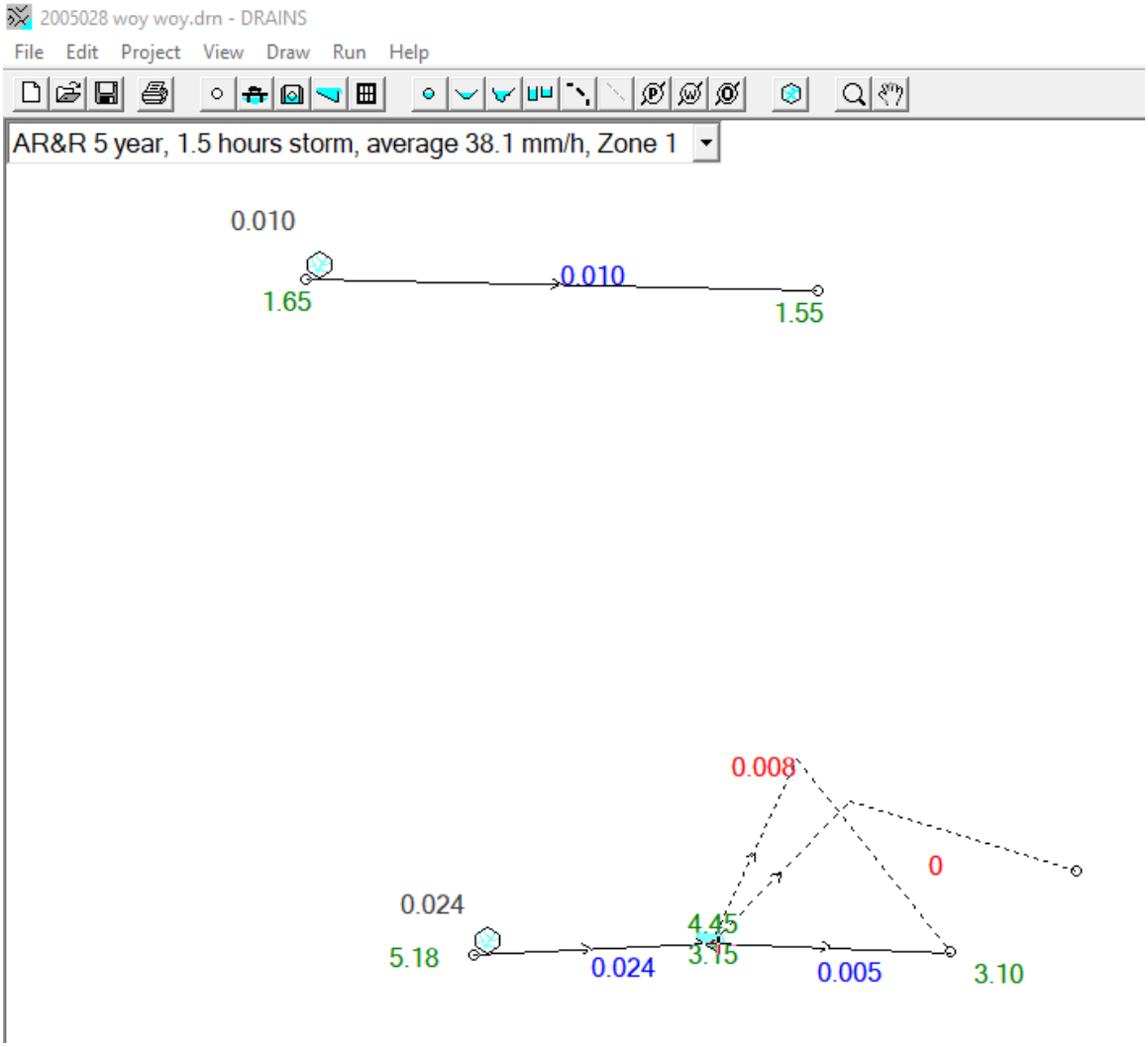
The existing and proposed system has been modelled using run off routing software (Drains) based on an Ilsax model (ARR1987 method and rainfall used). Storms for each recurrence interval of durations ranging from 5 minutes to 2 hours were modelled.

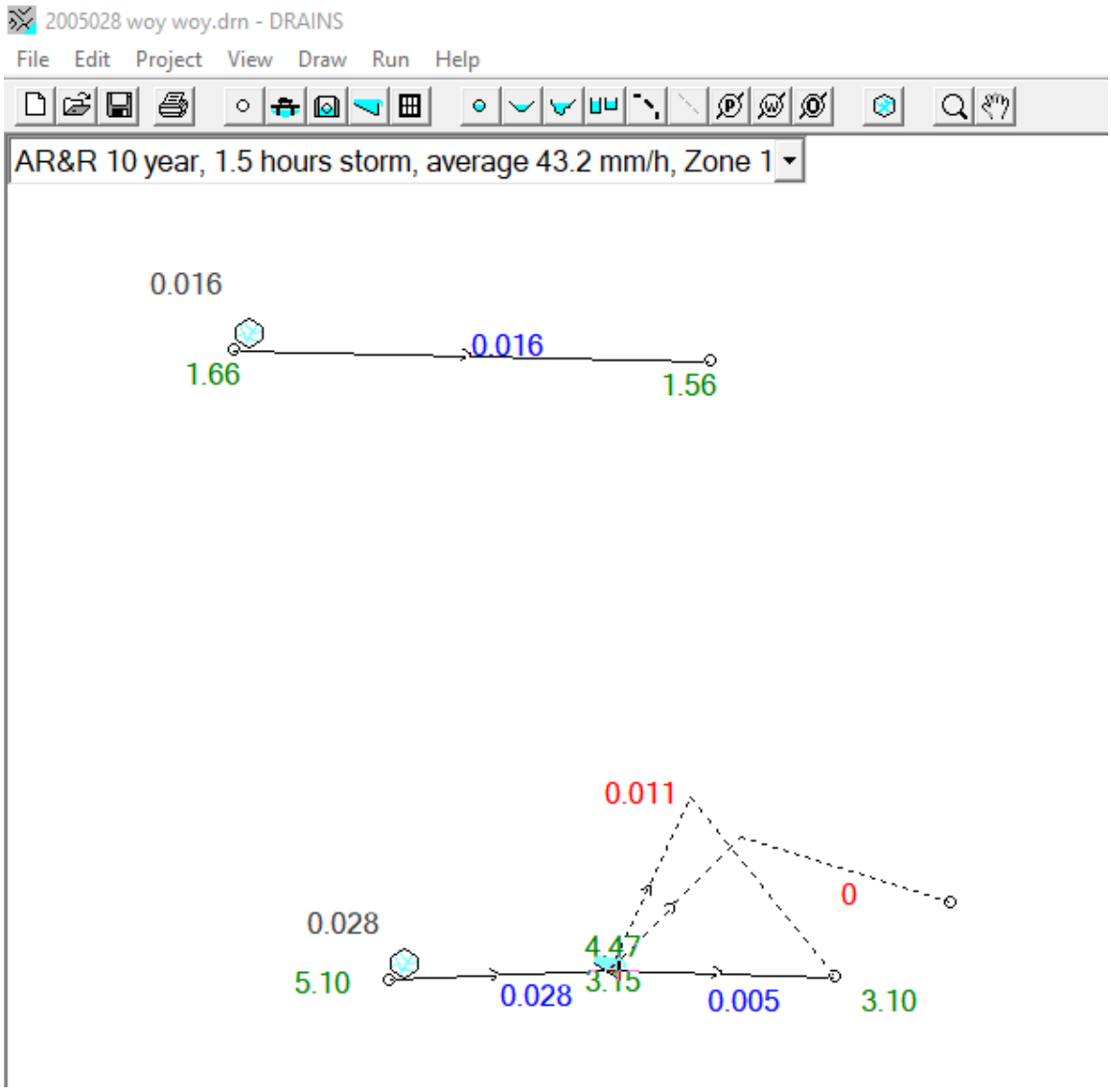
Drains outputs are appended to this document. The model used is represented below:

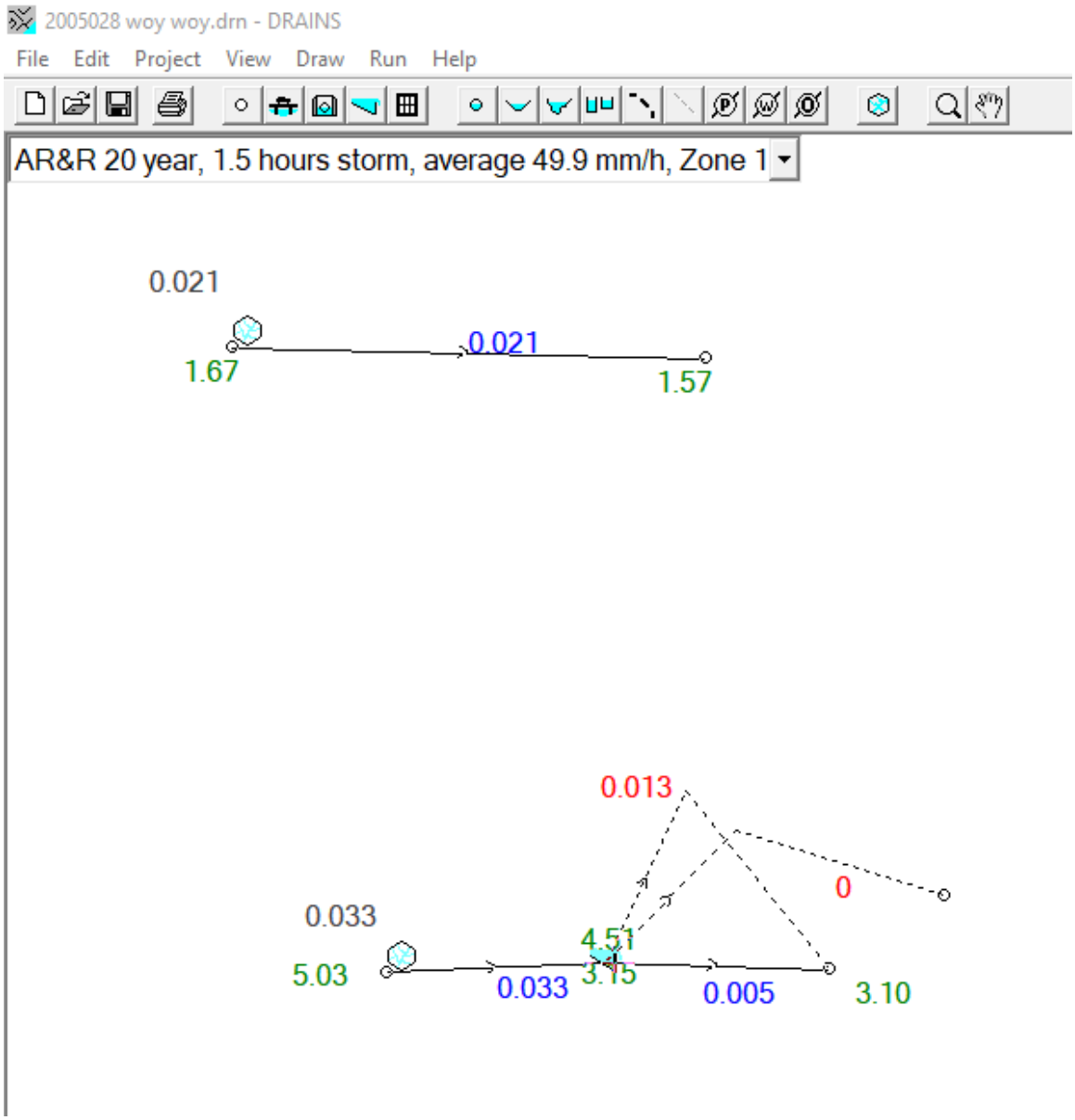


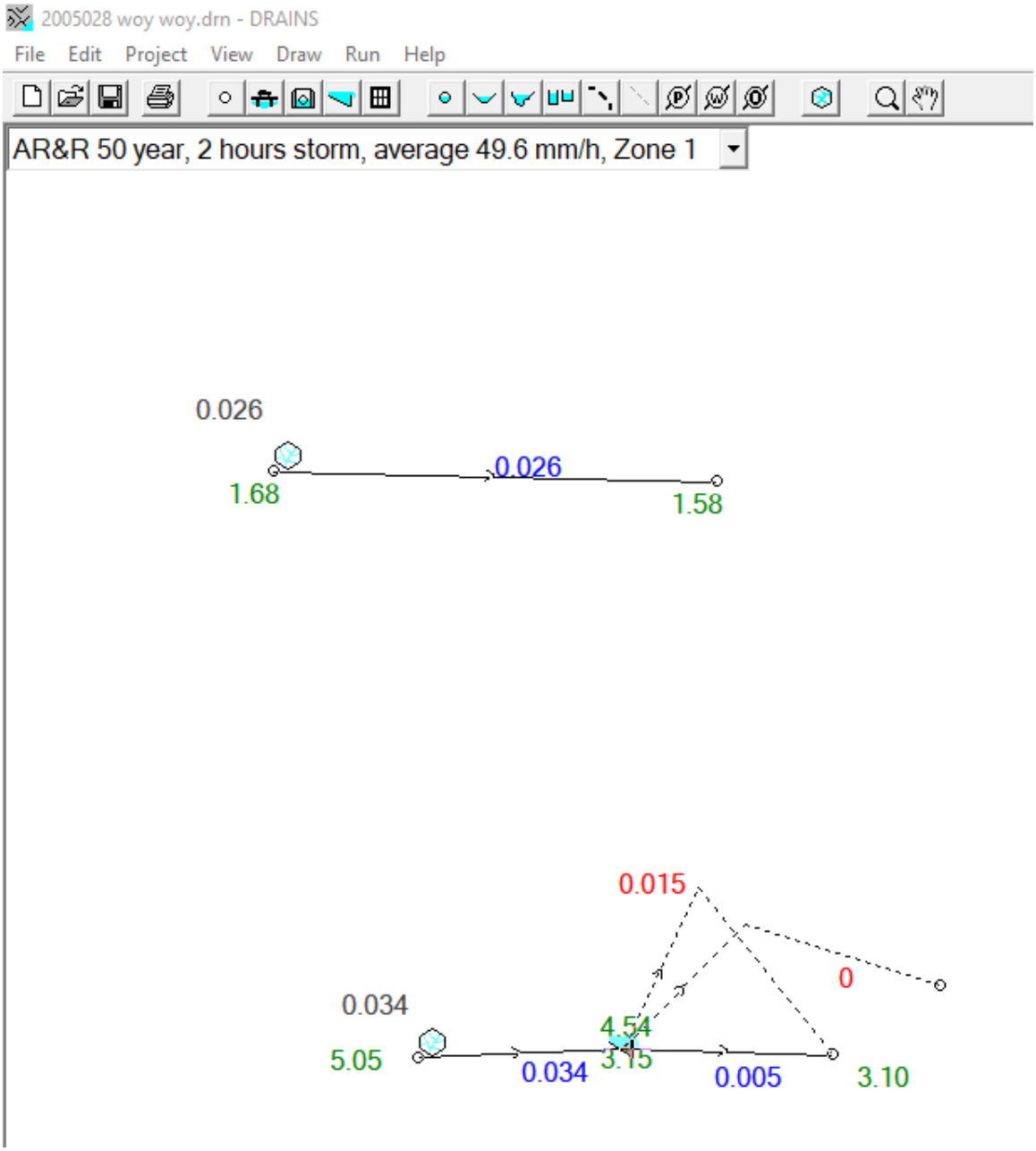
The modeled system achieves peak flows for each recurrence interval which do not exceed the natural site peak flows.

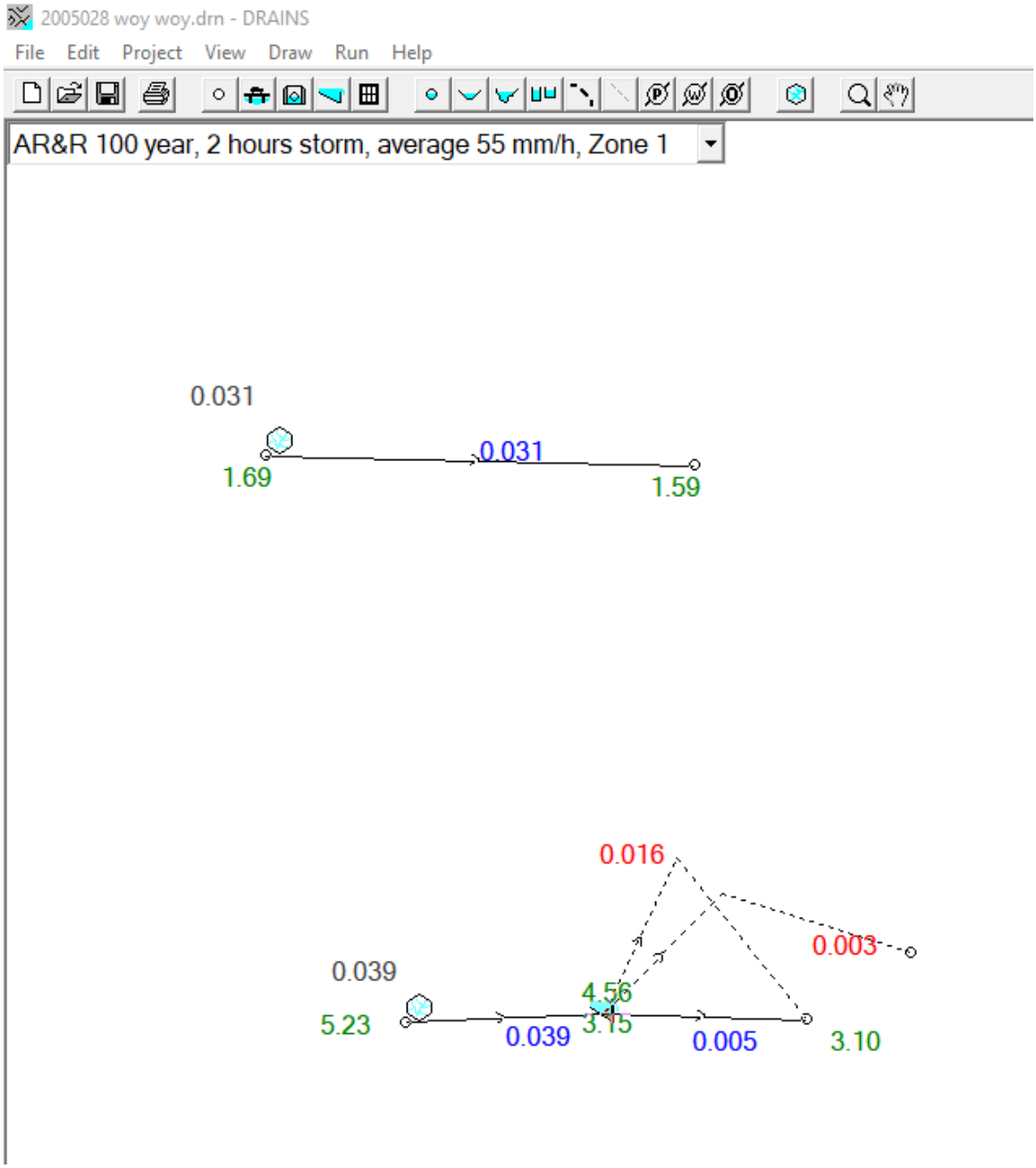
Drains outputs for the system as modeled are shown below.


2005028 woy woy.drn - DRAINS
File Edit Project View Draw Run Help
AR&R 5 year, 1.5 hours storm, average 38.1 mm/h, Zone 1
0.010
1.65
0.010
1.55
0.008
0
0.024
5.18
4.45
3.15
0.024
0.005
3.10


2005028 woy woy.drn - DRAINS
File Edit Project View Draw Run Help
AR&R 10 year, 1.5 hours storm, average 43.2 mm/h, Zone 1
0.016
0.016
1.66
1.56
0.011
0
0.028
4.47
5.10
0.028
3.15
0.005
3.10


2005028 woy woy.drn - DRAINS
File Edit Project View Draw Run Help
AR&R 20 year, 1.5 hours storm, average 49.9 mm/h, Zone 1
0.021
0.021
1.67
1.57
0.013
0
0.033
4.51
5.03
3.15
0.033
0.005
3.10


2005028 woy woy.drn - DRAINS
File Edit Project View Draw Run Help
AR&R 50 year, 2 hours storm, average 49.6 mm/h, Zone 1
0.026
0.026
1.68
1.58
0.015
0
0.034
4.54
5.05
0.034
3.15
0.005
3.10


2005028 woy woy.drn - DRAINS
File Edit Project View Draw Run Help
AR&R 100 year, 2 hours storm, average 55 mm/h, Zone 1
0.031
0.031
1.69
1.59
0.016
0.003
0.039
4.56
5.23
0.039
3.15
0.005
3.10

SUMMARY OF DRAINS FLOWS

Storm	Predevelopment flow l/s	Post development flow with retention l/s
5 yr 5 min	1	0
10 minute	3	0
25 minute	9	6
30 minute	7	5
1 hour	7	7
1.5 hour	10	8
2 hour	10	8
10 yr 5 min	4	0
10 minute	7	0
25 minute	13	8
30 minute	11	7
1 hour	13	9
1.5 hours	16	11
2 hours	15	11
20 yr 5 min	8	0
10 minute	12	4
25 minute	20	11
30 minute	19	10
1 hour	18	12
1.5 hour	21	13
2 hour	21	13
50 yr 5 min	12	0
10 minute	19	7
25 minute	24	12
30 minute	23	12
1 hour	22	14
1.5 hours	25	15
2 hours	26	15
100 yr 5 min	15	0
10 minute	23	9
25 minute	33	16
30 minute	27	14
1 hour	26	15
1.5 hours	29	17
2 hours	31	19

OVERLAND FLOW REQUIREMENTS

The site is not in a designated flow path. A retaining wall is proposed to be constructed on the Northern boundary to achieve required site levels for drainage. Water currently flows off the site in this direction. Following development stormwater will be directed to on site systems with overflow to the street.

FLOODING REQUIREMENT

The site is shown on Councils on line Flooding Maps as flood affected in the 1% AEP event. The flood information certificate issued by council on 11th December 2023 has nominated a minimum habitable floor level of 5.88m AHD. A floor level of 5.90m is nominated on the engineering plans which complies with this requirement. The flood information certificate indicates that none of the exclusionary categories for complying development apply therefore no further flooding considerations have been taken into account.

ON SITE DETENTION AND NUTRIENT CONTROL.

OPERATION AND MAINTENANCE REQUIREMENTS

This site contains a number of stormwater treatment and control devices. Ongoing performance of these devices is essential to ensure the correct functioning of the stormwater system and protection of the building and its occupants.

The devices present on this site include the following:

- Rainwater tanks
- Eaves guttering
- Stormwater surface inlet pits
- Infiltration tanks

Rainwater Tanks

Rainwater tanks are provided on site for non potable uses (toilet flushing and landscape irrigation). Tanks should be fitted with first flush devices to remove the initial roof runoff prior to entry to the tank.

The first flush device should be regularly maintained (recommended each 3 months minimum) in accordance with the manufacturer's directions.

Inlets and overflows should be screen to prevent entry of mosquitos. Leaf screens located as rain heads on downpipes serving tanks are easier to maintain than high level gutter guard and can assist to prevent leaves from accumulating on the inlet screen to the tank. These can be located at levels which are more accessible from the ground rather than being at roof level for safer maintenance and inspection purposes.

Regular reuse of water is the best way to ensure that stored water does not become stagnant. The tank should be periodically desludged to remove accumulated sediment from the base of the tank.

Pumps serving the tank must be kept in good working order to ensure their continued operation and compliance with noise requirements. Proprietary diversion devices should be maintained in accordance with the manufacturer's directions.

All taps served by the rainwater system must be signposted as rainwater, not suitable for drinking. Signs should be inspected periodically and replaced if they become damaged or illegible.

Eaves Gutter

Correctly installed eaves gutter should be safe for failure by overflow over the face of the gutter on to the pavement below. Should overflow be noted as occurring on a frequent basis the gutter should be checked for any blockages at downpipes and cleaned as required. Note, raised gutter inserts and gutter falls are designed to achieve basix compliance. If gutter inserts and correct falls are not used a charged system will be required. Downpipes which are discontinuous with screened rainheads can reduce blockage at the guttering and make maintenance safer and easier to achieve. Working at heights precautions should be observed whenever carrying out roof or gutter maintenance.

Surface inlet pits

Debris such as leaves and litter should be removed from inlet grates and the sumps of stormwater inlet pits on a regular basis. Frequent maintenance of surface inlet pits and the use of brooms or blower/vac to keep pavements in a clean state will greatly reduce the maintenance requirements for both the infiltration trench. Sediment sumps if fitted should be cleaned at 3 monthly intervals or more frequently if sediment is found to build up. The driveway surface acts as a temporary storage area and ponding on the surface is normal during a rainfall event. This should be limited to the hatched area on the drawings and dissipate quickly after rainfall ceases. Overflow in the event of blockage or extreme weather is over the crest at the crossover end of the driveway towards the roadway.

Infiltration tank

On site detention and nutrient control for this project is provided via a below ground modular infiltration system. Maintenance of the inlet controls for this system will be required to prevent entry of sediment and decaying vegetation into the modular system.

The leaf screen should be cleaned on a regular basis by hand or using garden vacuum (suitable for wet areas). Sediment sump should also be cleaned periodically.

If water is found standing in the junction pit for an extended period after rainfall the sediment sump and any drainage holes should be cleaned. If this does not correct the problem additional drainage holes may be drilled. If standing water persists a licensed plumber should be engaged to inspect the trench using camera equipment. Modular cells may require excavation after a number of years of use. Sand bedding and geotextile wrap should be removed and replaced. Modular cells may be pressure cleaned and reused if they are still in sound condition.

Trees and plants with invasive roots should not be planted over or close to a modular system to prevent intrusion of roots into the cells.

Concrete pavement must not be placed over trenches.