Penrith City Council - Stormwater Report

Prepared for Andrew Wild

171562 Stormwater Report

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Structural
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Traffic
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Consulting
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Contents

1.0 Executive Summary

This report has been prepared on behalf of **Andrew Wild** for the development at 40 Christie Street, St Marys.

The purpose of this report is to provide engineering assessment of the proposed stormwater modification for the new construction to meet Council's Development Control Plan (DCP).

The proposed works include the construction of a new weigh bridge within vehicle loading area, as well as the addition of new car parking areas. The additional parking works include new pavement, kerbing, and stormwater.

2.0 Site

2.1 Current Site

Currently, located on the site is a steel frame factory with chemical waste storage and treatment facilities.

There are two vehicle areas on site. Area A is for staff and visitor parking, whereas area B is for staff parking and vehicle loading/service area.

The site can be seen in **figure 2**.

Figure 1 –Site Extent

3.0 Council Requirements

3.1 Onsite Stormwater Detention (OSD)

The additional parking area will increase the hard stand surfaces, leading to an increasing stormwater runoff. As per the requirements of the DCP, runoff from the site must not be increased, therefore OSD is required.

In addition, the following items from council's DCP are relevant:

a) Adequate stormwater systems shall be designed and constructed to ensure that, for all rainwater events up to and including the 1:100 Average Recurrence Interval (ARI) event, new developments and redevelopments do not increase stormwater peak flows in any downstream areas.

b) On-site stormwater detention systems must release water after any rainfall event to maximise future capacity and, therefore, cannot include rainwater tanks, water retention basins or dams.

c) Detention storage is to be located at a level that is above the 1:5 ARI flood level.

d) On-site detention systems are to be designed using a catchment wide approach. Advice should be sought from Council's Engineering Services Unit in this regard.

e) On-site stormwater detention mechanisms should have a maintenance program in place.

f) On-site stormwater detention mechanisms should be placed on the title of the relevant allotment/property to ensure their retention and maintenance.

3.2 Stormwater Quality Assessment Requirements

Stormwater quality treatment is required prior to discharge.

The site currently has pollution control mechanism in place, which included a stormwater shut off valve to prevent contaminants leaving the site.

3.3 Hydraulics

The following council DCP requirements are included in the stormwater design.

a) Any new piped drainage system shall be designed to control minor stormwater flows under normal operating conditions for an ARI of 5 years.

b) Any new drainage system shall be designed to control major stormwater flows under normal operating conditions for an ARI of 100 years.

Included in **Appendix C** is a DRAINS model output.

4.0 Drainage Design

The following items outline the drainage design approach undertaken.

4.1 Hydrology

This design complies with Australian Rainfall and Runoff (ARR) 2016 procedures.

The rainfall intensities shown in **figure 2 and figure 3** have been sourced from the Bureau of Meteorology website.

Australian Government
Bureau of Meteorology

Location

Label: 40 Christie St

Latitude: -33.747776 [Nearest grid cell: 33.7375 (S)]

Longitude: 150.770796 [Nearest grid cell: 150.7625 (E)]

IFD Design Rainfall Depth (mm)

Issued: 08 August 2017

Rainfall depth for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).
FAQ for New ARR probability terminology

	Annual Exceedance Probability (AEP)						
Duration	**63.2%**	**50%#**	**20%***	**10%**	**5%**	**2%**	**1%**
1 min	1.99	2.28	3.18	3.81	4.44	5.29	5.95
2 min	3.26	3.67	5.01	5.96	6.90	8.20	9.24
3 min	4.53	5.12	7.02	8.35	9.69	11.5	13.0
4 min	5.70	6.46	8.92	10.6	12.4	14.7	16.6
5 min	6.76	7.68	10.7	12.7	14.8	17.6	19.8
10 min	10.7	12.3	17.3	20.7	24.2	28.8	32.4
15 min	13.4	15.4	21.6	26.0	30.3	36.1	40.6
30 min	18.2	20.7	29.0	34.8	40.5	48.2	54.2
1 hour	23.1	26.2	36.1	43.1	50.0	59.6	67.1
2 hour	28.9	32.4	44.0	52.2	60.6	72.4	81.8
3 hour	33.0	36.9	49.8	59.1	68.7	82.1	92.9
6 hour	42.3	47.3	63.8	75.9	88.5	106	120
12 hour	55.6	62.6	85.7	103	120	145	164
24 hour	73.4	83.7	118	143	168	202	229
48 hour	94.1	109	157	193	229	275	310
72 hour	106	123	180	221	263	315	354
96 hour	113	131	193	237	283	337	378
120 hour	117	137	200	245	293	348	390
144 hour	121	140	203	249	297	352	395
168 hour	123	142	204	250	298	353	395

Note:
The 50% AEP IFD **does not** correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.44 ARI.
* The 20% AEP IFD **does not** correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.48 ARI.

This page was created at **11:03 on Tuesday 08 August 2017 (AEST)**

Figure 2- Intensity Frequency Duration Table (BOM)

Requested coordinate Latitude: -33.7478 Longitude: 150.7708
Nearest grid cell Latitude: 33.7375 (S) Longitude: 150.7625 (E)

IFD Design Rainfall Depth (mm)

Issued: 08 August 2017

Rainfall depth in millimetres for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).

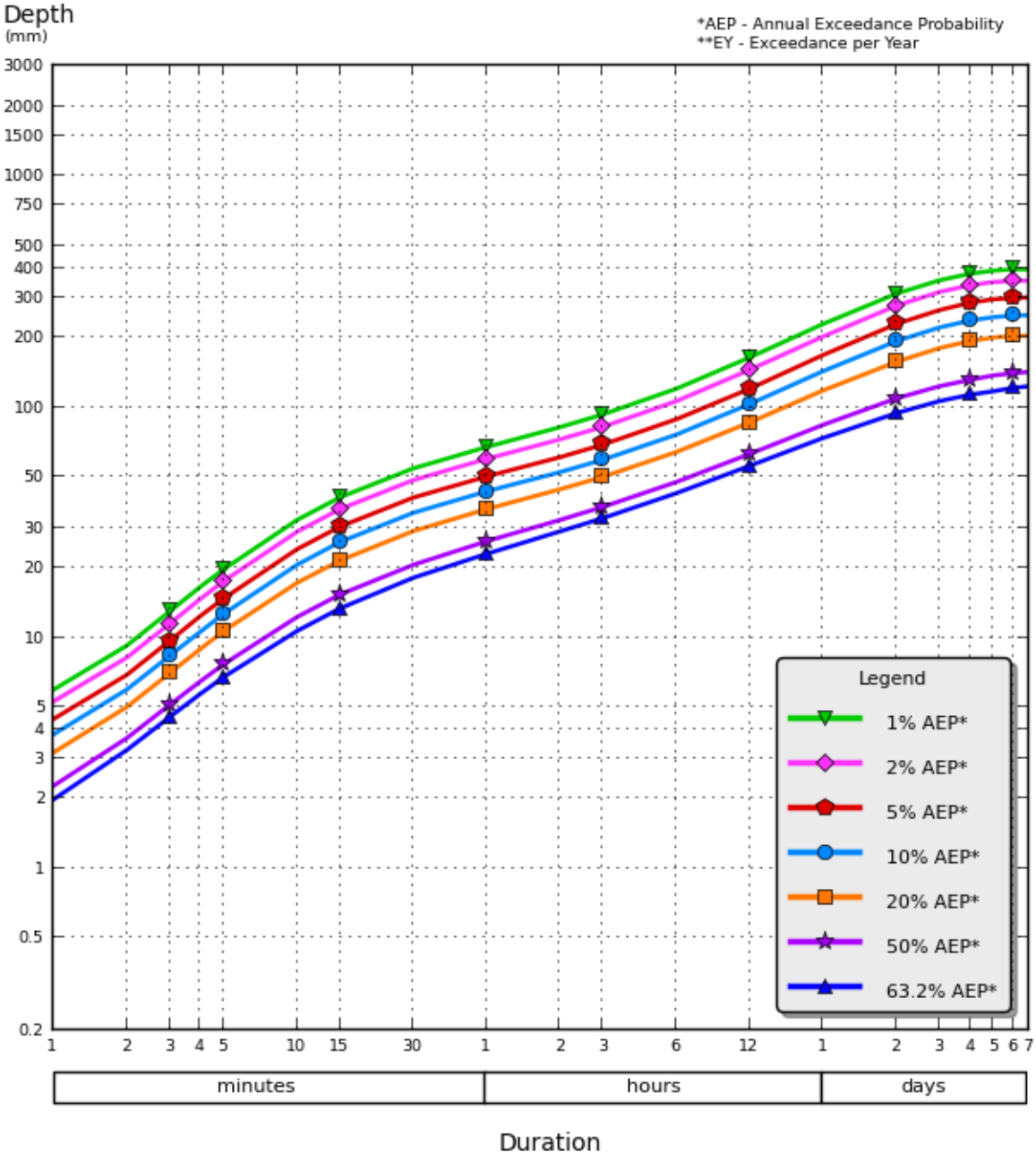

Figure 3: Design Rainfall Intensity Chart (BOM)

4.2 Hydraulics

The stormwater pipes have been modelled using DRAINs software in accordance with the City of Penrith's requirements. The requirements include that the pipes are designed. So that 1% AEP post development storm flows are attemcated to the pre-development 20% AEP storm flow water.

Included in **Appendix C** is a DRAINS model output.

4.3 Onsite Stormwater Detention (OSD)

Additional runoff is attenuated by using oversized pipes with flow control.

As per following tables:

Partial site analysis:

Area A	Pre(L/s)	Post(L/s)	Post with OSD(L/s)
Q100yr:	4	5	5
Q50yr:	4	4	4
Q20yr:	3	4	4
Q5yr:	2	3	3
Area B	Pre(L/s)	Post(L/s)	Post with OSD(L/s)
Q100yr:	16	17	13
Q50yr:	14	15	12
Q20yr:	12	12	10
Q5yr:	9	9	7

Area A & B	Pre(L/s)	Post(L/s)	Post with OSD(L/s)
Q100yr:	20	22	18
Q50yr:	18	19	16
Q20yr:	15	16	14
Q5yr:	11	12	10

Complete site analysis (basic catchment analysis):

ARI	PRE-DEVELOPMET ENTIRE AREA (L/s)	POST-DEVELOPMET ENTIRE AREA WITHOUT OSD (L/s)	POST-DEVELOPMET ENTIRE AREA WITH OSD (L/s)
Q100yr:	494	509	486
Q50yr:	439	453	430
Q20yr:	369	381	359
Q5yr:	264	272	253

Figure 4: Detention summary

As shown in the above, the post development flow are higher compared to the pre-development flow, therefore OSD is required.

It is proposed to provide OSD within the pits and pipes.

The approximate additional volume provided is 5 m^3**.** Flow discharge will be by orifice control.

	Volume (m^3)
Pipe 1	0.5
Pipe 2	1
Pipe 3	1.3
Total	2.8

Figure 5: Each proposed pipe detention summary

5.0 Conclusion

In addition, OSD will be provided and flows with attenuated to suit Council requirements.

There is a valve to prevent spill.

Prepared by
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Kelvin Holey
Chartered Civil & Environmental Engineer
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Appendix A

Proposed Stormwater Plan

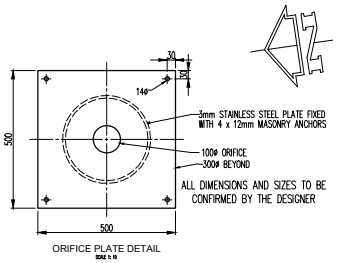
THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING C01

ARI	PRE-DEVELOPMET ENTIRE AREA (L/s)	POST-DEVELOPMET ENTIRE AREA WITHOUT OSD (L/s)	POST-DEVELOPMET ENTIRE AREA WITH OSD (L/s)
Q100yr:	494	509	486
Q50yr:	439	453	430
Q20yr:	369	381	359
Q5yr:	264	272	253

LEGEND

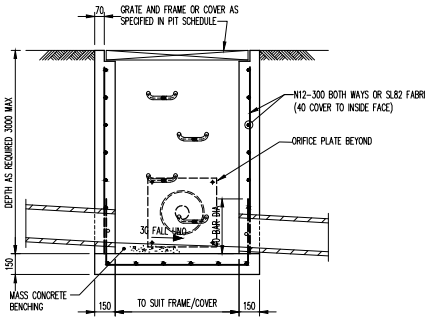
PROPOSED CAR PARK
PROPOSED STORMWATER PIT
SW — EXISTING STORMWATER PIPE
PROPOSED STORMWATER PIPE
EXISTING STORMWATER PIT

	Volume (m³)
Pipe 1	0.5
Pipe 2	1
Pipe 3	1.3
Total	2.8



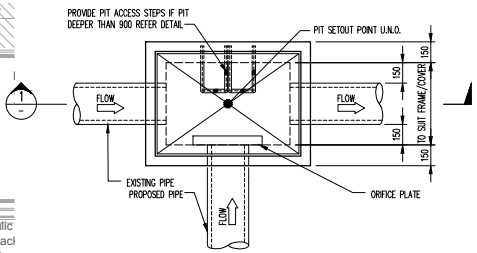
ORIFICE PLATE DETAIL
SCALE 1:10

Area A	Pre(L/s)	Post(L/s)	Post with OSD(L/s)
Q100yr:	4	5	5
Q50yr:	4	4	4
Q20yr:	3	4	4
Q5yr:	2	3	3
Area B	**Pre(L/s)**	**Post(L/s)**	**Post with OSD(L/s)**
Q100yr:	16	17	13
Q50yr:	14	15	12
Q20yr:	12	12	10
Q5yr:	9	9	7



SECTION 1
SCALE 1:20

NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS



PLAN
SCALE 1: 20

PIT TYPE FLOW CONTROL PIT

Rev	Description	Eng	Draft	Date
P5	ISSUE FOR APPROVAL	KH	RG	27.10.17
P4	ISSUE FOR APPROVAL	KH	RG	13.10.17
P3	ISSUE FOR APPROVAL	KH	RG	09.10.17
P2	ISSUE FOR APPROVAL	KH	RG	04.09.17
P1	ISSUE FOR APPROVAL	KH	RG	10.08.17

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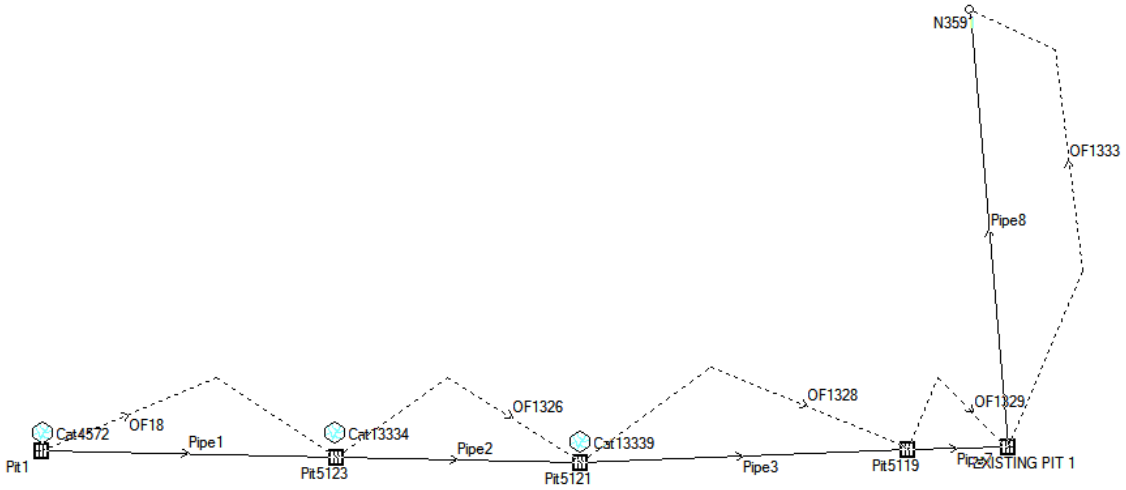
Project
40 Christie Street, ST Marys

Sheet Subject
SITE WORKS PLAN SHEET 1

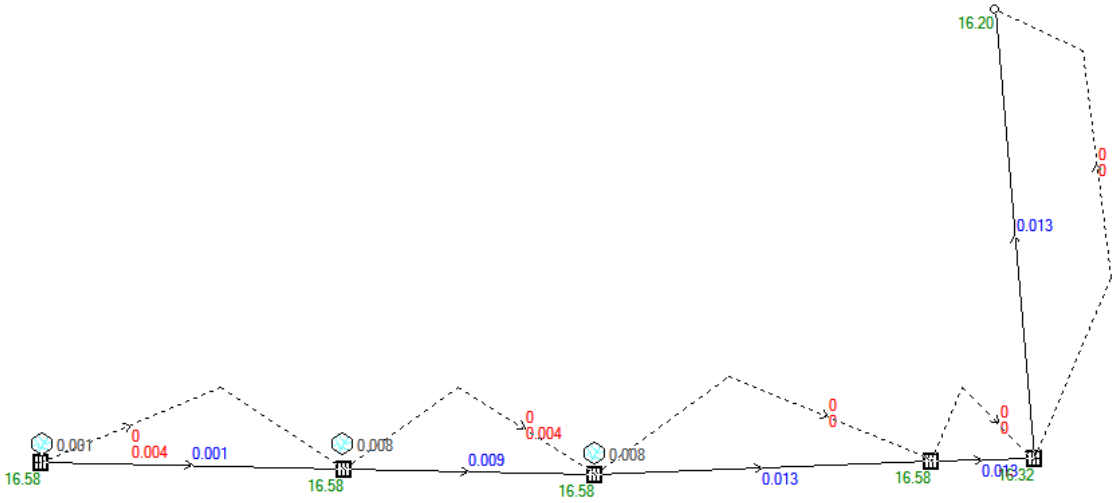
Scale : A1 1:200
Drawn RG
Authorised
Job No 171562
Drawing No C02
Revision P5
Plot File Created: Oct 27, 2017 - 10:47am

Appendix B

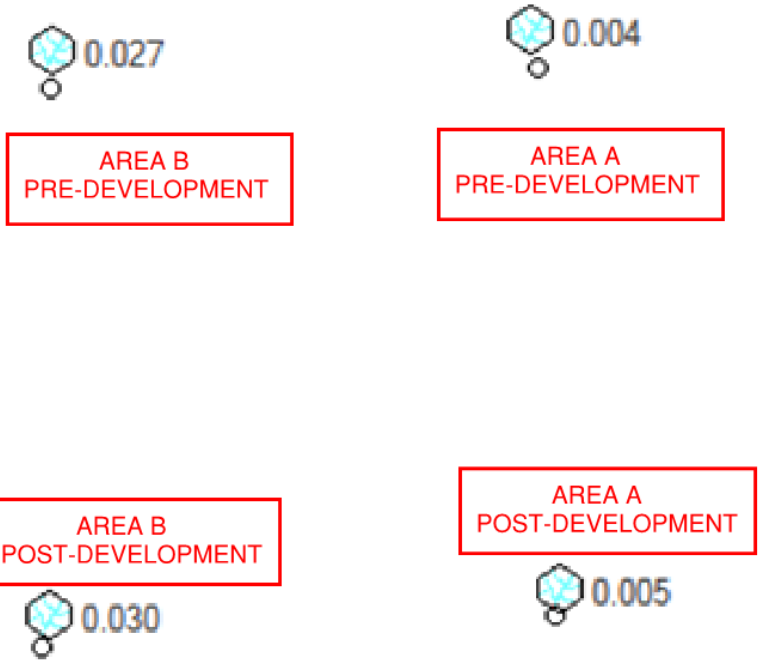
DRAINs model data



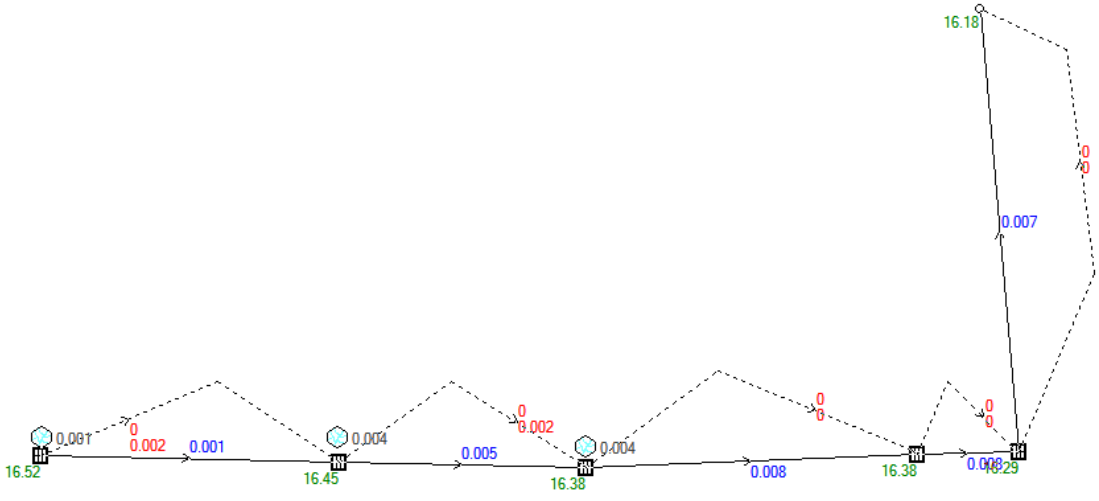
DRAINs model summary



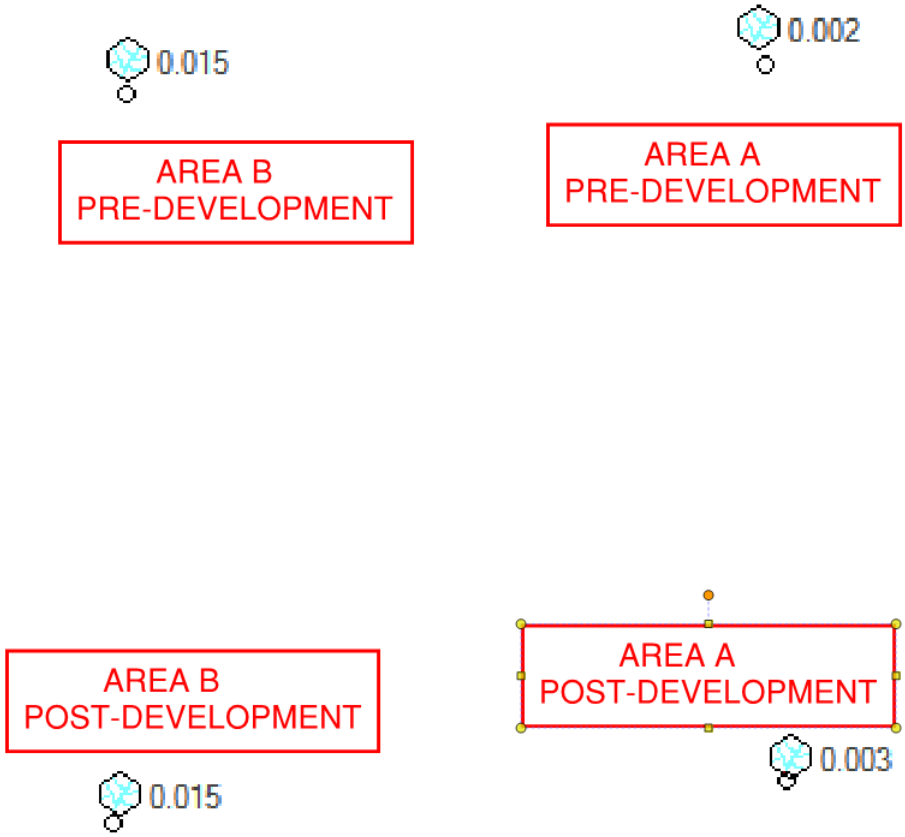
1% AEP storm applied to proposed car park (Area B with OSD)



1% AEP storm applied to pre-development and post development areas



20% AEP storm applied to proposed car park (Area B with OSD)



20% AEP storm applied to pre-development and post development areas