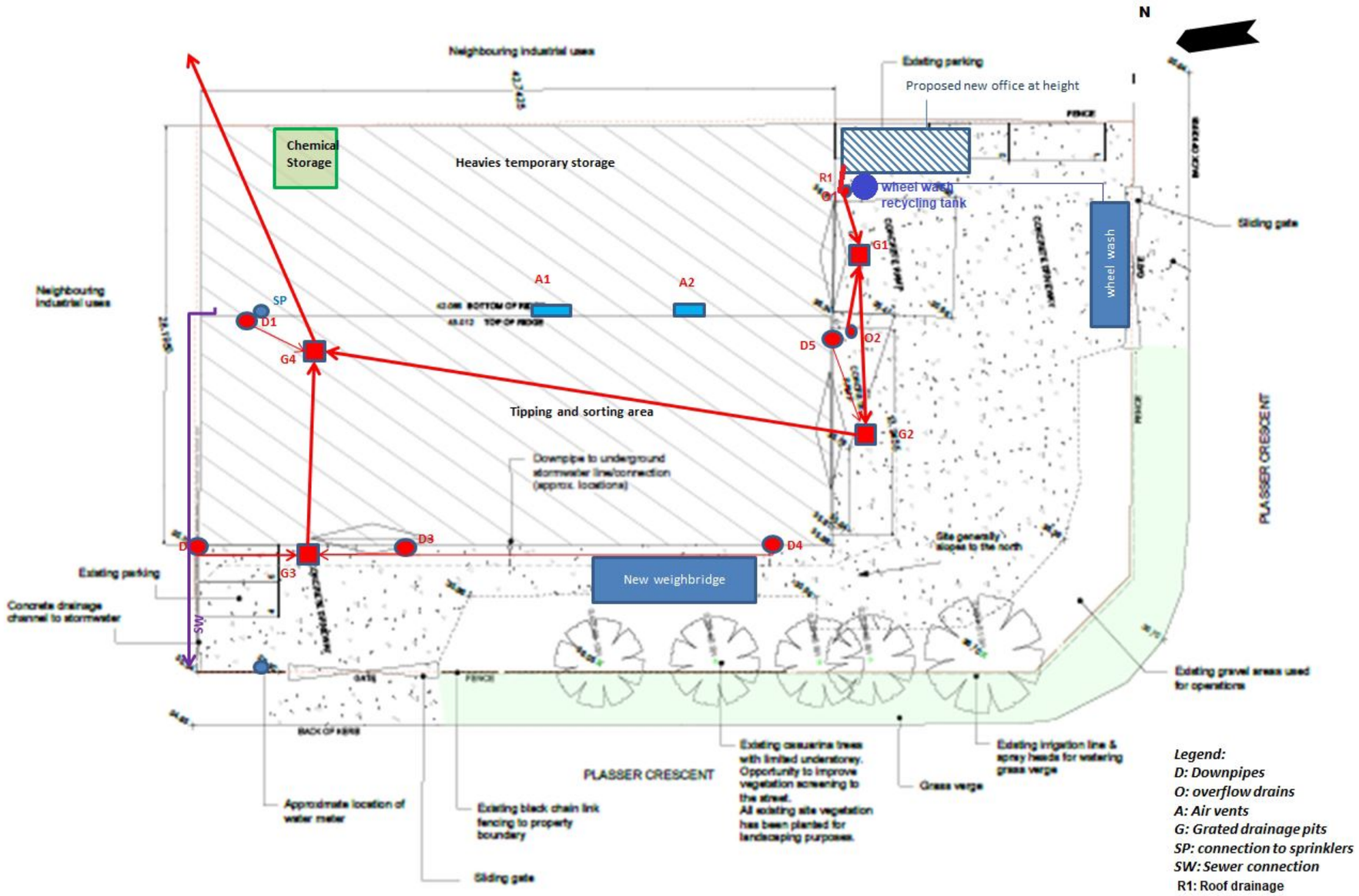


Memo

To: **Macleans Waste Management**

From: **pitt&sherry**

Date: **19-12-2017**

RE: **SY17065 33-37 Plasser Crescent – Stormwater concept plan - DA17/1089**

1. Situation

Macleans Waste Management has commissioned **pitt&sherry** to provide professional services in relation to its development application DA17/1089 for its site at 33-37 Plasser Crescent, North St Marys. The proposed works include the construction of additional office space at an elevated level, with a roof area of 27 m². A site plan is attached below as Figure 1.

Penrith City Council has advised that a Stormwater Concept Plan (SCP) is needed to support the Development Application.

2. Stormwater concept plan

The additional office space is constructed over an area of existing hardstand, so there is no net increase in impervious area. The existing stormwater drainage network, indicated in the stormwater drainage plan, has proven to be adequate to manage the site's requirements. No changes are proposed at the site that would require changes to the existing network.

It is proposed to connect the roofwater from the proposed office to the overflow drain O1, as shown in Figure 1.

The size of the downpipe is estimated in Section 3.

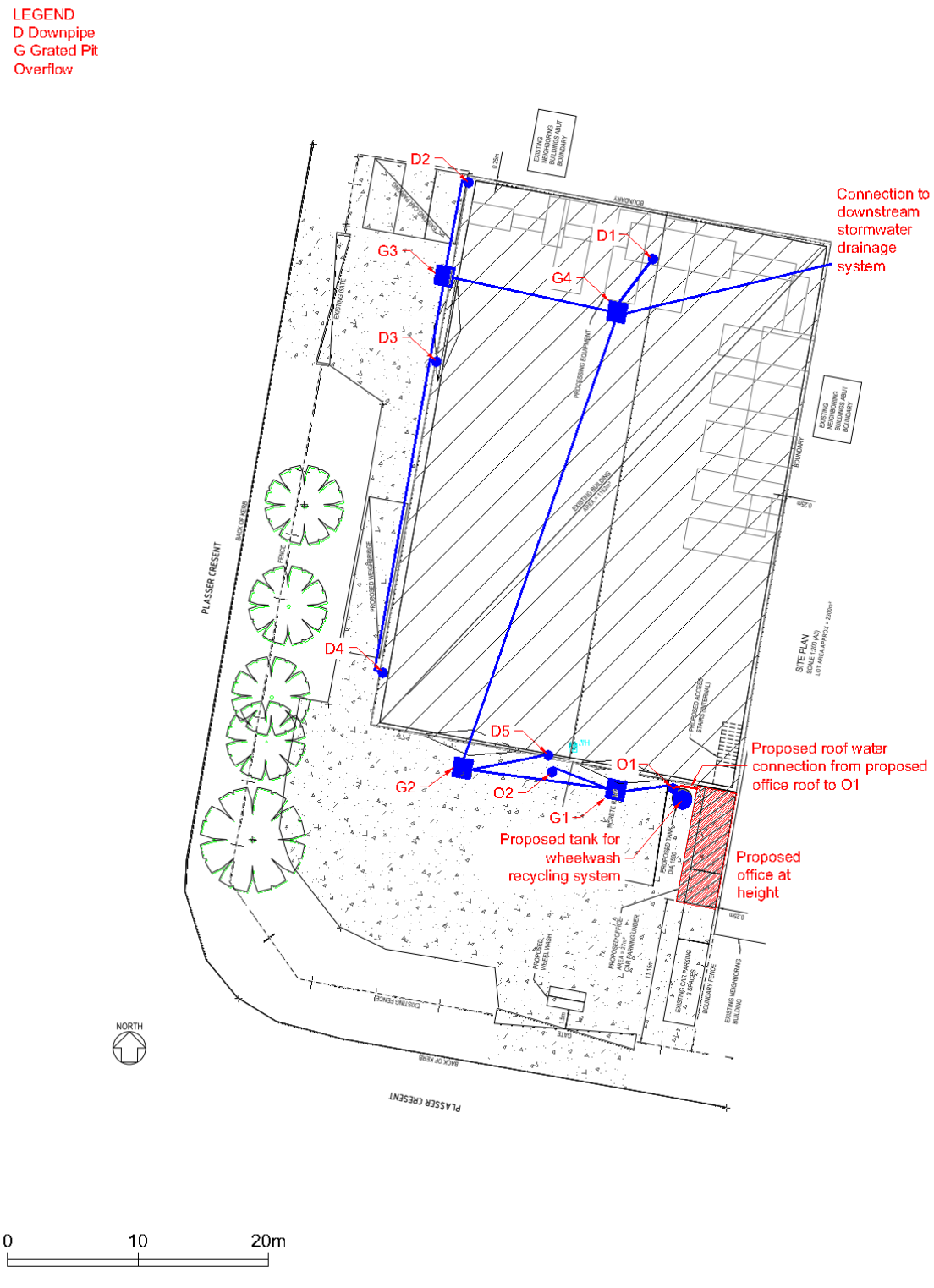


Figure 1 Roof Area to be drained and preliminary plan of gutters and downpipes

3. Design of roof drainage

3.1 Design conditions

3.1.1 Codes and standards

- NCC 2016 Building Code of Australia - Volume Two, Section 3.5.2.
    - Designed on 5min rainfall intensities
    - Eaves gutter overflow measures 5%AEP
    - Initial guidance in Tables 3.5.2.1 (but refer to updated BOM IFD)
    - Table 3.5.2.2 and 3.5.2.3

3.2 Design solutions

3.2.1 Locations of gutters and downpipes

The locations of gutters and downpipes are shown in red in Figure 1.

Downpipes have been placed so that they service no more than 12m of gutter, in accordance with NCC 2016 Building Code of Australia - Volume Two Clause 3.5.2.5(a). As the proposed office has a length of about 9 m, only one downpipe is required.

3.2.2 Design rainfall

NCC 2016 Building Code of Australia - Volume Two Table 3.5.2.1 provides rainfall intensities for 5 minute storms at Penrith. These are compared with the rainfall intensities acquired from the Bureau of Meteorology on-line 2016 IFD data for the site in Table 1.

An allowance for climate change of +20% has been applied.

The BoM 2016 IFD including Climate Change data are used for the purposes of the roof drainage design.

Table 1 Comparison of design rainfall intensities

ARI (years)	NCC 2016 Building Code of Australia - Volume Two Clause 3.5.2.5(a)	BoM IFD 2016 for the site	BoM IFD 2016 for the site including 20% allowance for Climate Change
20	180	177.6	213.1
100	244	238.8	286.6

3.2.3 Roof area per downpipe

With one downstream downpipes, as shown in Figure 1, the roof area per downpipe is 27 m².

3.2.4 Design flow per downpipe

Design flows were estimated by multiplying design rainfall intensities with the roof area, using the Rational Method equation with a runoff coefficient of 1.0.

The gutters were treated as eaves gutters, in accordance with NCC 2016 Building Code of Australia - Volume Two Clause 3.5.2.3(b) and (c). Design flows were therefore estimated from the 20 year ARI rainfall, as follows

Q = CIA/360

Where

Q = design flow (m^3/s)

C = runoff coefficient

I = rainfall intensity (mm/hr)

A = roof area (ha)

Therefore

Q = 1.0 * 180 * 0.0027 / 360 = 0.0013 m^3/s or 1.3 litres per second.

3.2.5 Design calculations

On-line tool – Downpipe and Eaves Gutter Calculator

https://www.roof-gutter-design.com.au/Downp/applet.php

Table 2 Roof Gutter Design Inputs

Parameter	Value
Catchment area (m^2)	27
Roof slope (degrees)	10
Is gutter slope steeper than 1:500	No
Rainfall intensity (mm/hr)	180

The on-line calculator suggests a 90mm diameter downpipe, as illustrated in Figure 2.

Enter Details

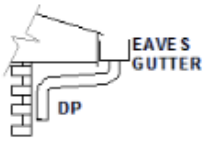
Roof Catchment (Plan) Area (sq.m) *(info)* 27

Roof 'Average' Slope (degrees) *(Learn about the average slope)* 10

Rainfall:Either choose a Location I prefer to enter a known intensity

or enter known intensity (mm/hr) 180

Tick if gutter slope is steeper than 1:500 (ie 1:200) ☐



How to find the Intensity for other places.

Unit Conversions.

Calculate

Warning! A lot of gutters have fronts higher than the back, and buildings are being designed without eaves. This can be a recipe for disaster.
There are three main things that can go wrong. Design, construction, and maintenance. Best not to be in the firing line for the design.
Read about *overflow provisions* for some extra design protection.
Also it doesn't hurt to get a copy of the calculations with all the necessary Plumbing Code references for your records.
View a typical project
Read about the calculation PDF file. *Watch the online presentation.*
Purchase unlimited Calculation files for your records. Plus activate the Extra Features on as many devices as you wish.

Buy/Activate Now

By the way this note disappears on activation. So that's one good thing.

You will require one of the following DP options :- (dimensions in mm)
(Assuming approximately equal catchment areas)

Flow (L/s) 1.47

Results:

	Number Req'd	Number Used	*Gutter Area?*	Gutter Width	*Gutter Depth?*	
90 Dia:	0.7	1	6384	110	60	○
100 Dia:	0.55	1	6384	110	60	○
150 Dia:	0.22	1	6384	110	60	○
225 Dia:	0.09	1	6384	110	60	○
300 Dia:	0.05	1	6384	110	60	○

Figure 2 Results of gutter calculator

4. Appendix A Checklist for Stormwater Concept Plan (SCP)

7. APPENDICES

APPENDIX A

CHECKLIST FOR STORMWATER CONCEPT PLAN (SCP)

Survey Information	Yes	No	NA
1. Site boundaries	☑	☐	☐
2. North point	☑	☐	☐
3. Services within the public footway	☐	☐	☑
4. Site features, including tree, structures, depressions	☑	☐	☐
5. Contours at 0.1m for flat sites ranging to 0.5m for steep sites and extending 10m into adjoining properties	☐	☐	☑
6. Top of kerb levels	☐	☐	☑
7. Boundary levels	☐	☐	☑
8. Benchmarks	☐	☐	☑
9. Levels to AHD where site is affected by overland flow, flooding or where works on Council's drainage network are required	☐	☐	☑
General	**Yes**	**No**	**NA**
1. Plans to scale of 1:100 or 1:200	☐	☐	☑
2. Designer's name, qualifications, contact details provided	☑	☐	☐
3. Design report, including details of any variations provided	☑	☐	☐
4. Plan number and date of issue shown	☐	☐	☑
5. Consistency between stormwater, architectural and landscape plans	☑	☐	☐
6. 1% AEP overland flow extents shown	☐	☐	☑
7. Development layout, building envelope and proposed driveway locations shown	☑	☐	☐
8. Drainage calculations to support the proposed design submitted	☑	☐	☐
9. Proposed finished floor, garage and ground surface levels shown	☐	☐	☑

10. Compliance with freeboard requirements	☐	☐	☑
11. Location and level of proposed retaining walls indicated	☐	☐	☑
12. Appropriate tail water selected	☐	☐	☑
13. No adverse impact on other properties or the stormwater network	☑	☐	☐
14. Mainstream flood / local overland flow flood report (if any)	☐	☐	☑
Drainage Layout	**Yes**	**No**	**NA**
1. Pipe size, grade and invert level indicated	☐	☐	☑
2. Pit location, size, invert level and surface level indicated	☑	☐	☐
3. Proposed connection point to Council's stormwater system	☑	☐	☐
OSD	**Yes**	**No**	**NA**
1. A catchment plan showing areas draining to the OSD system.	☐	☐	☑
2. Location and size of OSD system and WSUD measures shown	☐	☐	☑
3. Location and level of OSD discharge points shown	☐	☐	☑
4. Compliance with detention volume required	☐	☐	☑
5. Compliance with less than 15% of site area bypassing OSD system	☐	☐	☑
6. Compliance with the Permissible Site Discharge (PSD) requirements	☐	☐	☑
7. Compliance with OSD storage depths	☐	☐	☑
8. Overland flows clear from the OSD system	☐	☐	☑
9. OSD storage located within common areas, clear of private courtyards and accessible from the street	☐	☐	☑
10. Overflow weir provided and shown	☐	☐	☑
11. Details of discharge control pit shown	☐	☐	☑
12. Orifice details and calculations shown	☐	☐	☑
13. Typical sections of OSD storage, including basin invert level, centreline level of outlet orifice, top water level, finished surface levels provided	☐	☐	☑
14. Provision of design certification of the OSD system in accordance with this policy	☐	☐	☑

Others	Yes	No	NA
1. Location of Council's drainage easements, private inter-allotment easements shown (if any)	☐	☐	☑
2. Location and details of basement pump-out system provided (if any)	☐	☐	☑
3. Location and details of overland flow path shown (if any)	☐	☐	☑