BEKKER

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suite 1/6-7 gurrigal st, Mosman 2088
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email address **bekker@spin.net.au**

Project No.: 63280
December 14, 2017

STRUCTURAL
CIVIL
AND
WATERPROOFING
ENGINEERS

Drainage Concept Proposal

For

Residential Development

28-32 Evan Street,

Penrith

December 14, 2017

This document has been prepared as part of the Development Application submission to Council.
The document and attached drawings do not form part of the Construction Certificate documentation

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CONTENTS

BEKKER

1- Drainage Concept Proposal

BEKKER

Project No.: 63280

December 14, 2017

DRAINAGE CONCEPT PROPOSAL
RESIDENTIAL DEVELOPMENT
28 – 32 EVAN STREET
PENRITH

EXISTING:

The proposed development site is located on the eastern side of Evan Street, Penrith with a total site area of 1632m^2. The survey confirms that the site quite flat with a small slope approx 3.4% southerly and 0.5% easterly towards site boundaries.

The Council stormwater drainage map has confirmed the street drainage around the site flows towards the corner of Evan Street and Lethbridge Street with gully pits existing on Evan Street and Lethbridge Street. The site currently drains to these existing gully pits at this intersection from which the stormwater drains into the Council drainage system heading downstream south along Evan Street.

Currently the site is partially pervious but will be fully developed with impervious coverage of 100%.

The design Criteria for this development is obtained from the Stormwater Drainage Policy document from Penrith City Council **"Stormwater Drainage Specification for Building Developments".** Item 4.3.5 confirms the Permissible Site Discharge (PSD) of 120l/s/Ha and an On-site Detention (OSD) requirement of 240m^3/Ha for the site.

Flood investigations

We also refer to the Councils **'Penrith CBD Detailed Overland Flow Flood Study'** which shows the extent of the overland flooding for the 100yrARI in the South Penrith locality. The Flood Study confirms that 100yrARI flooding is possible around 400m distant from the proposed development site along Lethbridge Street

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The 100yrARI Flood Level is given by Council as RL 35.9AHD.

Fortunately the proposed development site at 28-32 Evans Street is elevated above this with an average RL of 37.0 AHD which is more than 1.0m above the100yrARI Flood Level. The ground floor of the development will be above this again.

Accordingly the proposed development on the site will not be affected by overland flow or inundation flooding in the 100 year ARI storm and Councils **"Penrith Development Control Plan2014 Sect C3.5 Flood Planning** will not apply.

Proposed Development

It is proposed to demolish the existing buildings on the site and redevelop the site with a new 5 storey residential building complex comprising 16 new apartments units over 3 undercroft car park basement levels.

For the Stormwater Management System (SMS) we propose to provide a concrete On-Site Detention (OSD) storage system constructed below ground level adjoining the front site boundary.

The total stormwater discharge from the OSD will be restricted by a slow release orifice plate in the tank which will drain to a Boundary Pollution Control Pit at the site boundary adjoining Evan Street. From there the stormwater will drain directly into the existing gully pit located in Evan Street.

The Boundary Pollution Control Pit will contain a trash screen and a silt trap

New Onsite-Detention (OSD) system

We confirm that an OSD system is required for the development at this property as determined by Councils 'Appendix D – On-site Detention Area – Penrith CBD of Stormwater Drainage Specification for Building Developments – Penrith Council'.

Calculation shows that Councils minimum requirements will be a 39.2m³ storage volume OSD tank designed with discharge set to 19.59 l/s.

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Our DRAINS stormwater flow modeling confirms a storage requirement of 38.0m³ at this same discharge rate.

It is proposed to install the OSD tank below ground level at the site boundary close to Evan Street as shown on the drainage drawing plans.

This OSD tank location allows to collect all rainwater from roofs, pervious & paved area plus courtyards. This inflow would be collected by the OSD tank and slowly released to the Council drainage system by gravity at the allocated controlled rate.

The OSD tank will be built in an irregular shape of concrete walls with average approx. dimensions of 22m L x 2.5m W x 0.6m depth of water providing 40m³ of storage with a minimum of two 600 x 600 access openings located in the top of the tank to provide maintenance access for the internals of the tank.

Discharge from the OSD tank will be controlled via the use of a machined orifice plate of 100mm dia installed over the 150mm dia discharge pipe draining by gravity directly to the new Pollution Control Pit at the boundary. The location of the new Pollution Control Pit is shown on the drainage plan. Internally of the tank the orifice plate will be protected by a trash screen of Lysaght's Maximesh RH3030 or similar.

All OSD tank construction details will need to comply with Penrith Council OSD tank construction policy

Should an unexpected blockage of the OSD tank system occur the emergency overflow from the detention tank will drain through two 100mm dia emergency overflow pipes into the new Pollution Control Pit at the boundary.

The new Pollution Control Pit at the boundary will drain via a 225mm dia pipe directly into the existing Council drainage pit located in the kerb directly adjacent to the boundary pit.

If a blockage surcharge were to occur at Pollution Control Pit the surcharge will drain over the footpath into the street kerb and gutter.

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Basement seepage waters will be collected by a series of AG lines and in-ground pipes and pumped from the lowest basement up into this boundary drainage pit.

OSD Bypass rainwater from other pervious areas will also drain directly to the new boundary Pollution Control Pit.

Penrith Council Requirements

We confirm that the stormwater concept design has been carried out to comply with 'Stormwater Drainage Policy' requirements.

Summary

Our calculation show that the total developed site discharge for post development storm will be 19.59l/s and the storage capacity of OSD is 39.2m^3, which does not exceed the Permissible Site Discharge and OSD requirements stated by Penrith Council Engineering Specification.

Yours faithfully,
BEKKER ENGINEERING DESIGN BURO PTY LTD

Paul Bekker BE. M IEAust. CP Eng. M ACEA

2. Penrith City Council information

Flood Study
a - existing Council stormwater drains
b – Council DCP extracts

Stormwater Drainage
a - existing Council stormwater drains
b – Council DCP extracts
c – Council Contacts

PENRITH

Our reference: ECM 7490777
Contact: Ratnam Thilliyar
Telephone: 4732 7988

18 January 2017

Mr Sergiy Jiriaev
11/44 Bridge Street
SYDNEY NSW 2000

Dear Sir

Flood Level Enquiry
Lot 1 DP 510281 No. 32 Evan Street Penrith

Please find enclosed Flood Level information for the above property.

Should you require any further information please do not hesitate to contact me on 4732 7988.

Yours sincerely

Ratnam Thilliyar
Engineering Stormwater Supervisor

Penrith City Council
PO Box 60, Penrith
NSW 2751 Australia
T 4732 7777
F 4732 7958
penrithcity.nsw.gov.au

PENRITH
CITY COUNCIL

PENRITH

Flood Information
Lot 1 DP 510281 No. 32 Evan Street Penrith

Date of issue: 18 January 2017

The 1% AEP local overland flow flood level in the vicinity of the above property is estimated to be RL35.9m AHD

Property less than 0.5m above the 1% AEP flood level is subject to Penrith Development Control Plan 2014 Section C3.5 Flood Planning. The Penrith Development Control Plan 2014 is available from Council's website www.penrithcity.nsw.gov.au.

Definitions

AEP – *Annual Exceedance Probability* – the chance of a flood of this size occurring in any one year.

AHD – *Australian Height Datum* – A standard level datum used throughout Australia, approximately equivalent to mean sea level.

Legend

	Extent of 1% AEP local catchment overland flow path. Generally depths less than 150mm is not shown.

Notes:

1. The contours shown above in yellow numbering are at 0.5m intervals and are based on Aerial Laser Scanning (ALS) Survey undertaken in 2002. The contour levels are approximate and for general information only. Accurate ground levels should be obtained by a Registered Surveyor.
2. The flood level is based on current information available to Council at the date of issue. The flood level may change in the future if new information becomes available. The 1% AEP flood is the flood adopted by Council for planning controls. Rarer and more extreme flood events will have a greater effect on the property.
3. Council's studies are reflected in flood mapping for the City which show properties potentially affected by overland flows in excess of 150mm.
4. This property is shown on Council's flood mapping as potentially so affected.
5. Council imposes flood related development controls where, in its opinion, such controls are justified. Such controls may or may not be imposed with respect to this property in the event of an application for development consent.
6. If a development proposal is submitted with respect to this property, Council will consider the possibility of flood or overland flow in the context of the application. Council may impose a requirement that the applicant for development consent carry out a detailed assessment of the possible overland water flows affecting the property (a flood study) and/or may impose other controls on any development designed to ameliorate flood risk.
7. You are strongly advised if you propose to carry out development upon the property, that you retain the assistance of an experienced flooding engineer and have carried out a detailed investigation.
8. Council accepts no liability for the accuracy of the flood levels (or any other data) contained in this certificate, having regard to the information disclosed in Notes "1" to "4". As such you should carry out and rely upon your own investigations.

Penrith City Council
PO Box 60, Penrith
NSW 2751 Australia
T 4732 7777
F 4732 7958
penrithcity.nsw.gov.au

Ratnam Thilliyar
Engineering Stormwater Supervisor

PENRITH
CITY COUNCIL

Maggie Mai

From: "Kexin Ran" <Kexin.Ran@penrith.city>
Date: Monday, 20 November 2017 11:40 AM
To: "Maggie Mai" <bekker@spin.net.au>
Attach: map7.PNG
Subject: RE: 28-32 Evan Street, Penrith

Hi Maggie

As requested, please find attached map.

Note: all information in attached map is indicative only.

Regards

Kexin Ran
Development Engineer

E Kran@penrithcity.nsw.gov.au
T (02) 4732 8192 | F (02) 4732 7958
PO Box 60, PENRITH NSW 2751
www.penrithishere.com.au
www.penrithcity.nsw.gov.au

From: Maggie Mai [mailto:bekker@spin.net.au]
Sent: Monday, 20 November 2017 11:35 AM
To: Kexin Ran <Kexin.Ran@penrith.city>
Subject: 28-32 Evan Street, Penrith

Hi Sir,

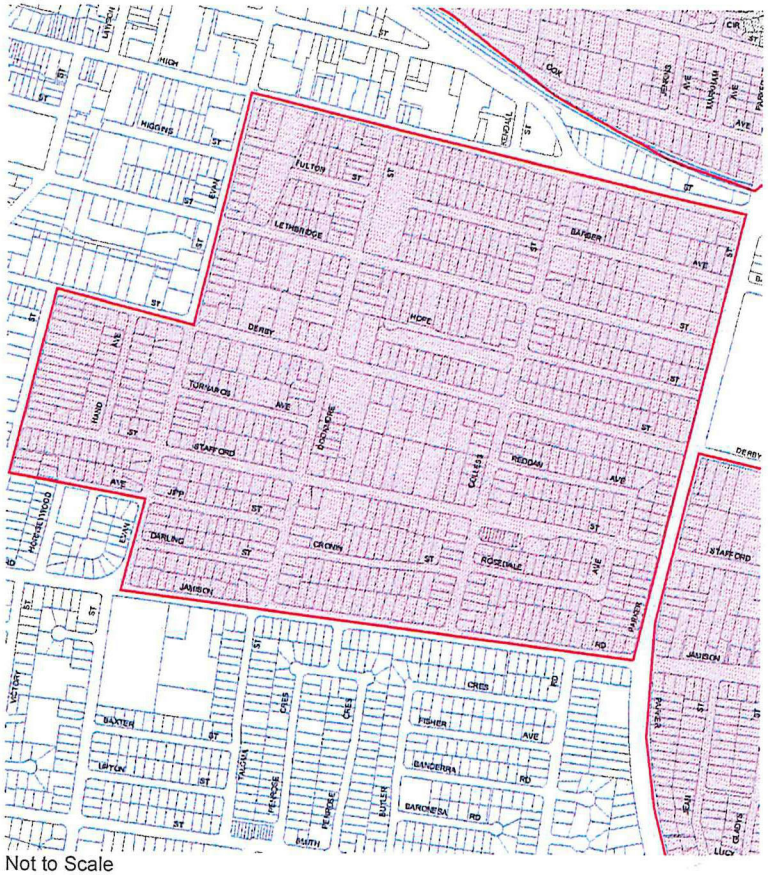
Nice to talk to you over the phone, as discussed, would you please send us the drainage map show the existing pipes and pits around the property so that we can prepare a drainage concept report for DA lodgement, thank you very much.

Regards,
Maggie, Mai

Bekker Engineering Design Buro Pty Ltd
1/6 gurrigal street mosman nsw 2088
t: 9960 6944 f: 9960 6911
www.paulbekkerengineering.com.au

APPENDIX D

ON-SITE DETENTION AREA - PENRITH CBD



Not to Scale

3. DESIGN REQUIREMENTS

3.1 COUNCIL STANDARDS

3.1.1 DESIGN ANNUAL EXCEEDANCE PROBABILITY (AEP)

The following design AEPs shall be applied to the following components of the stormwater system:

Table 3 Design AEP for Stormwater Design Element

Stormwater Design Element	Design Annual Exceedance Probability (AEP)	
	Residential	*Others*
Internal Roof and Surface Drainage Systems	5%(1)	5%(1)
Inter-allotment Piped Drainage Systems	20%(2)	5%(2)
Overland Flow Paths	1%	
OSD systems	1%	

Notes:
(1) Must be increased to 1% AEP for OSD systems where surface drainage is not directed to the system.
(2) Must be increased to 1% AEP where no overland flow path is provided.

Council may require the adoption of a higher design AEP in circumstances where danger to persons or risk of significant property damage warrants such an approach.

3.1.2 DESIGN FREEBOARDS

In order to provide reasonable certainty avoiding the risk exposure of flooding and stormwater to the building, freeboard - a factor of safety - is required to set the floor levels, levee crest levels etc. In general, the following minimum freeboard requirements measured from the 1% AEP flood / top surface level shall be complied with:

Table 4 Minimum Freeboard Requirements

Description	Minimum Freeboard (mm)	
	Overland Flow Flooding:(1)	*OSD Systems:*
Residential, Industrial or Commercial floor levels	500	300
Garages and non-habitable floor levels	100	100(2)
Crest of driveway ramps, pedestrian entry points and any openings to the basement (e.g. vents)	300	300

Notes:
(1) Properties affected by mainstream flooding must meet the requirements of Penrith City Council's Development Control Plan Section C3.5.
(2) This minimum freeboard requirement also applies to the enclosed basement garages adjacent to the pump-out system.

For emergency response facilities (e.g. police stations, hospitals), critical infrastructures and other types of developments that required special evacuation needs (e.g. schools, aged care facilities, disabled and child care facilities), adoption of design storm events larger than 1% AEP design storm events and higher freeboard requirements and may be necessary.

e) The design must consider the practical operation of the system as well as maintenance considerations such as location and size of access pits;

f) Internal flow paths through private courtyards should be minimised;

g) Site levels shall be designed to direct all surface flows into the OSD system. This will ensure that in the storm events larger than 1% AEP or the event of a failure of the roof and piped system that flows are still directed to the storage area so as not to adversely affect adjoining properties and to maintain the integrity of the OSD system;

h) Driveway and parking areas shall be shaped to direct flows into the OSD system. The use of grated drains for this purpose should be avoided wherever possible;

i) The OSD system, including storage, shall be wholly located within the property boundary; and

j) Site stormwater runoff shall be collected and conveyed to the OSD system and WSUD measures.

4.3.2 HYDRAULIC CONTROLS

The following hydraulic controls shall be applied to the design of OSD systems:

- All pits connected to an OSD system shall be minimum 100mm above the top water level to ensure there is not surcharge due to tail water levels in the storage area;
- The outlet pipe diameter from the OSD system shall be a minimum of 1.5 x the orifice pipe; and
- The outlet control for the OSD system shall be above the following levels, whichever is the greatest:
    - Council's adopted tail water level (Section 3.1.3); or
    - 1% AEP flood level at the discharge point; or
    - Hydraulic grade line level of the connection to street or piped drainage system.

    Note: Submerged OSD outlet is not acceptable

4.3.3 ORIFICE OUTLET

The OSD system outlet shall generally be controlled by an orifice. However, Council may consider staged-outlet orifice design to control site runoff from a range of storm events, subject to assessment and approval from Council's Engineers. The following requirements apply to the design of orifice outlet:

- The orifice shall have an absolute minimum diameter of 25mm;
- Orifice plate shall be manufactured from minimum 3mm thick stainless steel plate (6mm where orifice diameter exceeds 150mm), with circular hole machines to 0.5mm accuracy and sharp-edged;
- The centreline of the orifice shall be installed to align with the centre line of the outlet;

- Orifice plate shall be fixed to the wall of the control pit by four (4) stainless steel 'dyna bolts' or equivalent, at each corner, with epoxy seal around the edges of plate to prevent entrance of water; and
- The orifice discharge equation is:

$$Q = C\,A\,(2gh)^{1/2}$$

where Q is the discharge in m^3/s

C is the coefficient of discharge

A is the orifice area in m^2

g is the acceleration due to gravity (m/s^2)

h is the depth of water above the centre of the orifice (m).

This equation relies on a circular sharp-edged orifice and free discharge from the orifice.

4.3.4 DISCHARGE CONTROL PIT

The minimum size of the discharge control pit shall be:

- 600mm x 600mm for pits up to 900mm depth.
- 900mm x 900mm for pits greater than 900mm depth.

The discharge control pit shall:

- Minimise the risk of becoming blocked by debris;
- Be located in a suitable position;
- Be readily inspected;
- Be fitted with hinged galvanised mild steel grate and trash screen (Lysaght Maximesh RH3030 or equivalent) with a minimum area of 50 times the orifice area;
- Be provided with galvanised step irons if the internal depth of the pit is greater than 1.0m;
- Be accessed readily for cleaning; and
- Have a minimal risk of being tampered with.

Refer to Appendix H for the standard drawings of the typical OSD Discharge Control Pit and typical OSD designs in developments.

4.3.5 SIZING OF OSD SYSTEM

For site areas up to $5000m^2$ (0.5 hectares), Council has adopted a simplified method in determining Site Storage Requirement (SSR) and Permissible Site Discharge (PSD) of the OSD system as set out below.

Table 7 PSD and SSR

Land Use	PSD (L/s/ha)	SSR (m3/ha)
Multi-Unit Housing	120	240
Residential Flat Building / Apartment / Industrial / Commercial and Others	120	280

The design of aboveground tanks must consider appearance and urban design issues. Aboveground tanks shall comply with the same engineering criteria as belowground tanks. Particular attention should be given to access for inspection and maintenance.

4.3.7 OSD BELOW GROUND STORAGE

The following design criteria must be met for below ground storage tanks:

a) Storage tanks are not permitted under habitable floors or any building slabs;

b) For dual use tanks any permanent water storage volumes will not count as part of the OSD required storage;

c) Storage tanks shall not be penetrated by any site services such as water, sewer, electricity and gas etc.;

d) The tank shall have a minimum depth of 900mm to facilitate access for maintenance and cleaning. Consideration may be given to reduce the depth of the tank up to 750mm subject to the assessment and approval from Council's Engineer;

e) A minimum of two grated access points (900mm x 900mm) shall be provided on opposite sides of the tank to facilitate ventilation, one shall be located over the discharge control pit / screen for maintenance and cleaning;

f) Larger tanks may require additional grates to provide adequate ventilation;

g) The spacing between each access grates shall comply with AS2865;

h) All access points shall be fitted with a minimum of 900mm x 900mm removable or hinged heavy duty grate;

i) Step irons shall be provided to all access points at 300mm centres to allow for comfortable access;

j) Grates should be fitted with appropriate locking mechanisms to prevent ingress by children or non-authorised persons;

k) For safety, all maintenance access to pits must conform to current Australian Standards and regulations for confined spaces. It is the responsibility of the designer to ensure compliance with these requirements and other requirements associated with Occupational Health and Safety;

l) The location of the tank and inspection access should also consider safety of persons undertaking maintenance and inspections. Access points should be located away from driveways or heavily trafficked areas wherever possible;

m) The floor of the storage tank shall be graded at a minimum of 1% longitudinally and laterally to the outlet to ensure free and complete dewatering of the system;

n) The tank shall be reinforced concrete or masonry; and

o) The tank shall be certified by an appropriately qualified and experienced engineer for structural adequacy against appropriate live and dead loads, earth loads, traffic, internal hydrostatic loads as well as external hydrostatic loads (buoyancy).

4.3.8 FREEBOARD

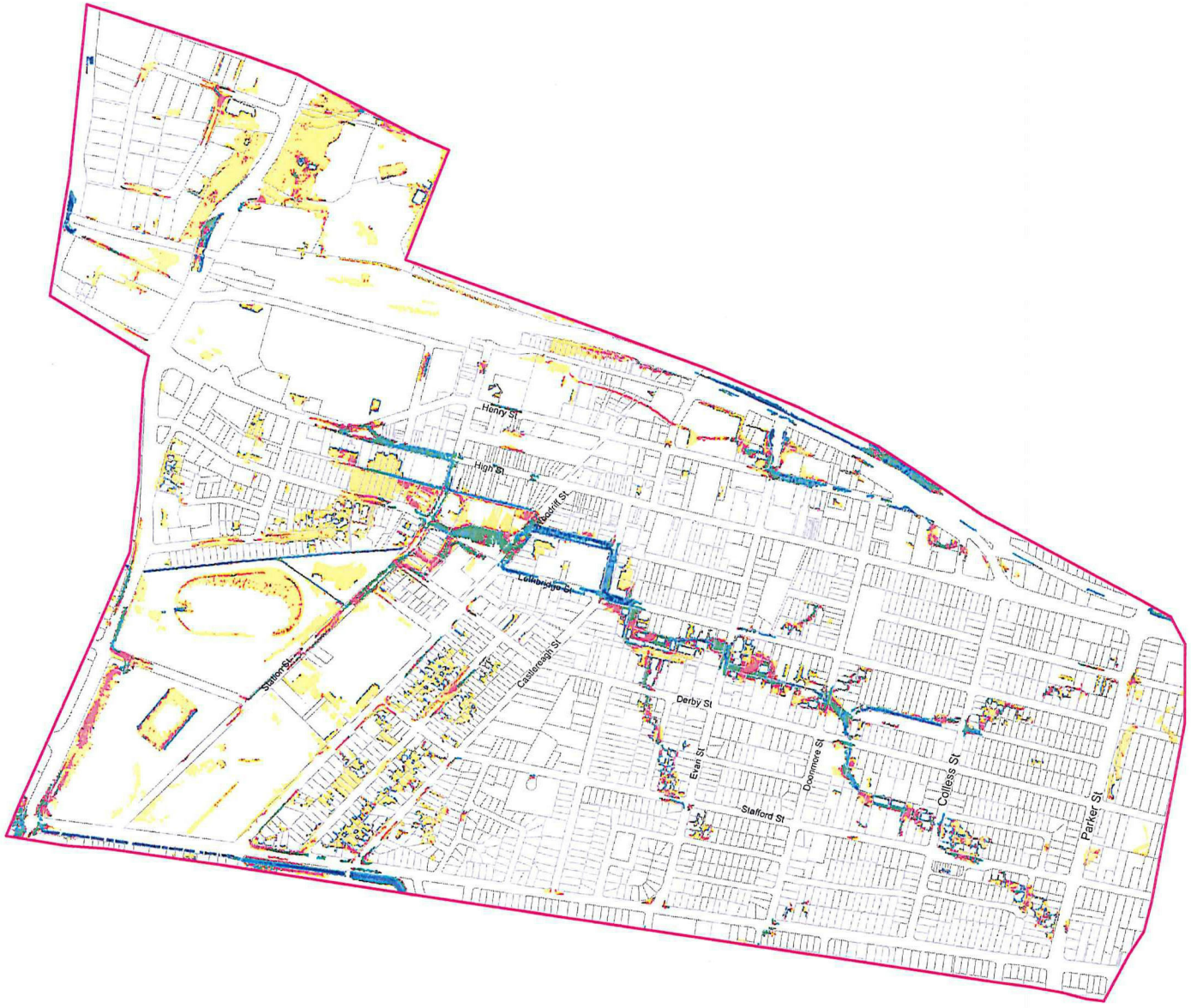
Refer to Section 3.1.2 for the freeboard requirements of the OSD system.

Cardno

W4735
July 2015

Penrith CBD Detailed Overland Flow Flood Study

FIGURE 8.3
FLOOD EXTENT- 100 YEAR ARI



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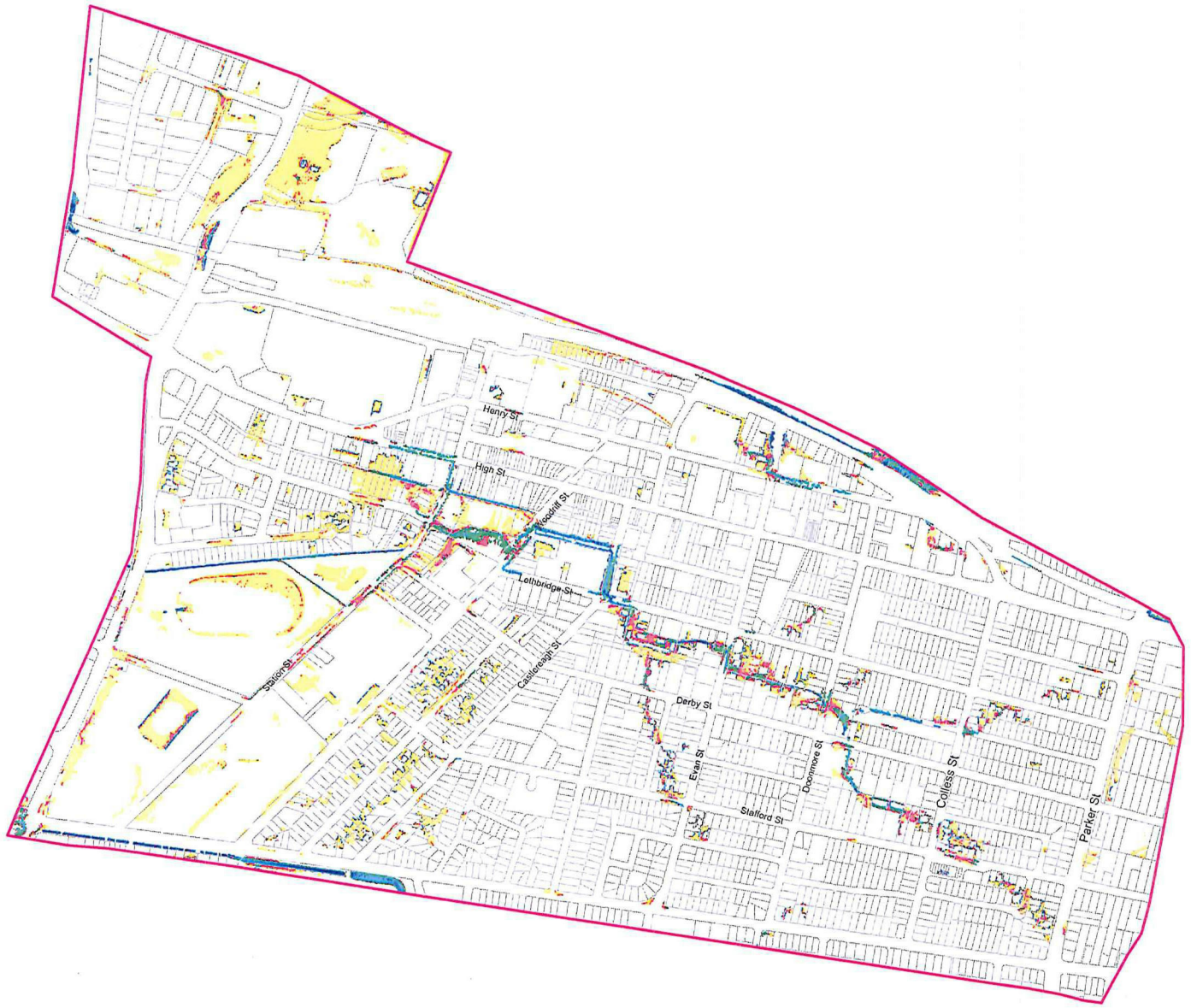
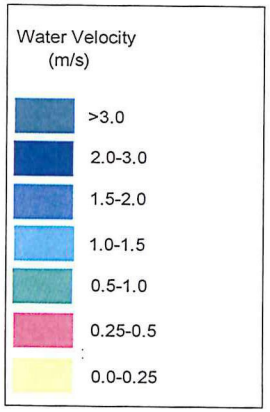
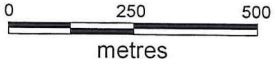
July 2015

Penrith CBD Detailed Overland Flow Flood Study

FIGURE 8.32
100 YEAR ARI PEAK FLOOD VELOCITY







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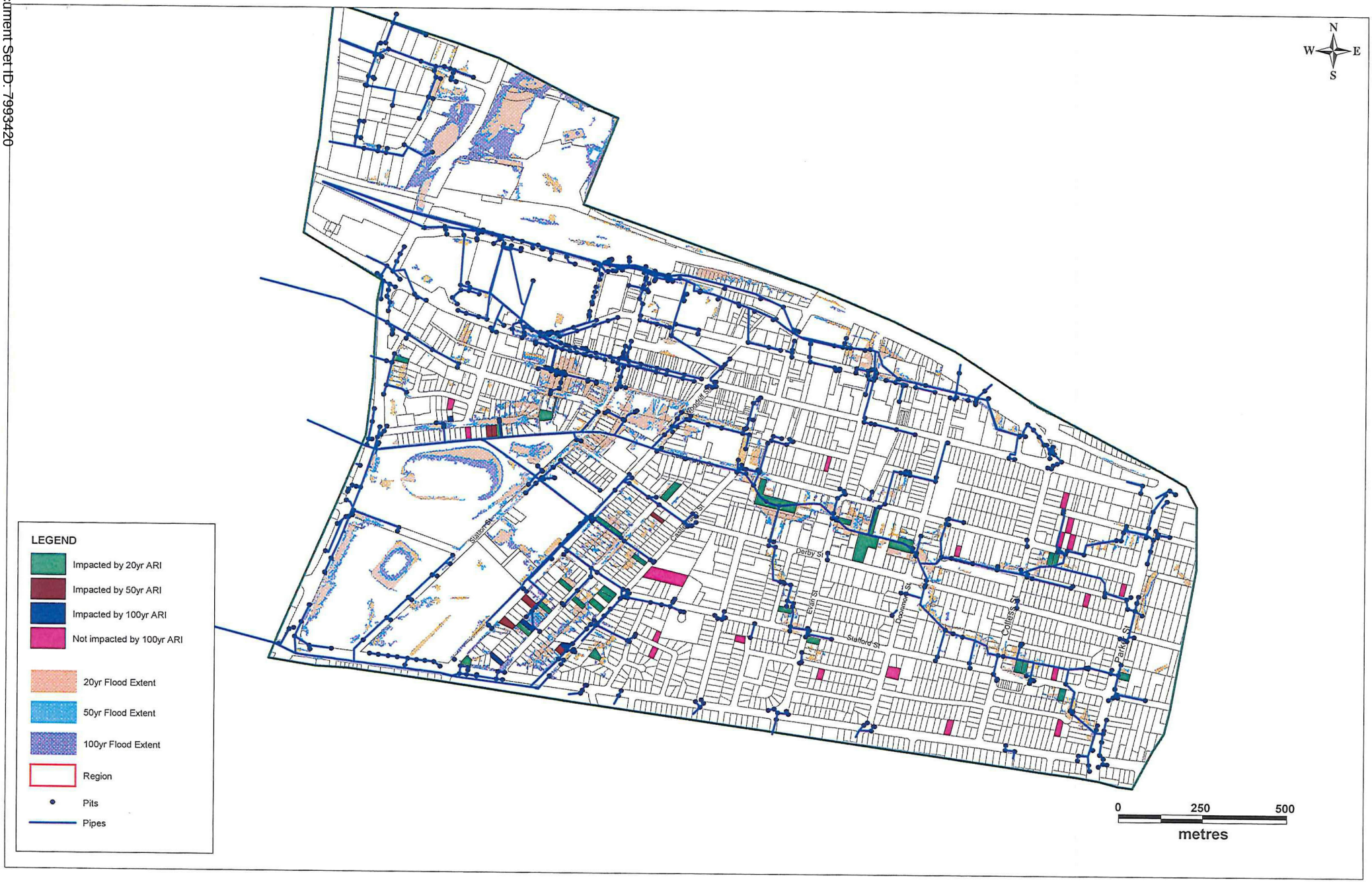
July 2015

Penrith CBD Detailed Overland Flow Flood Study

FIGURE 8.34
20 YEAR ARI PEAK FLOOD VELOCITY



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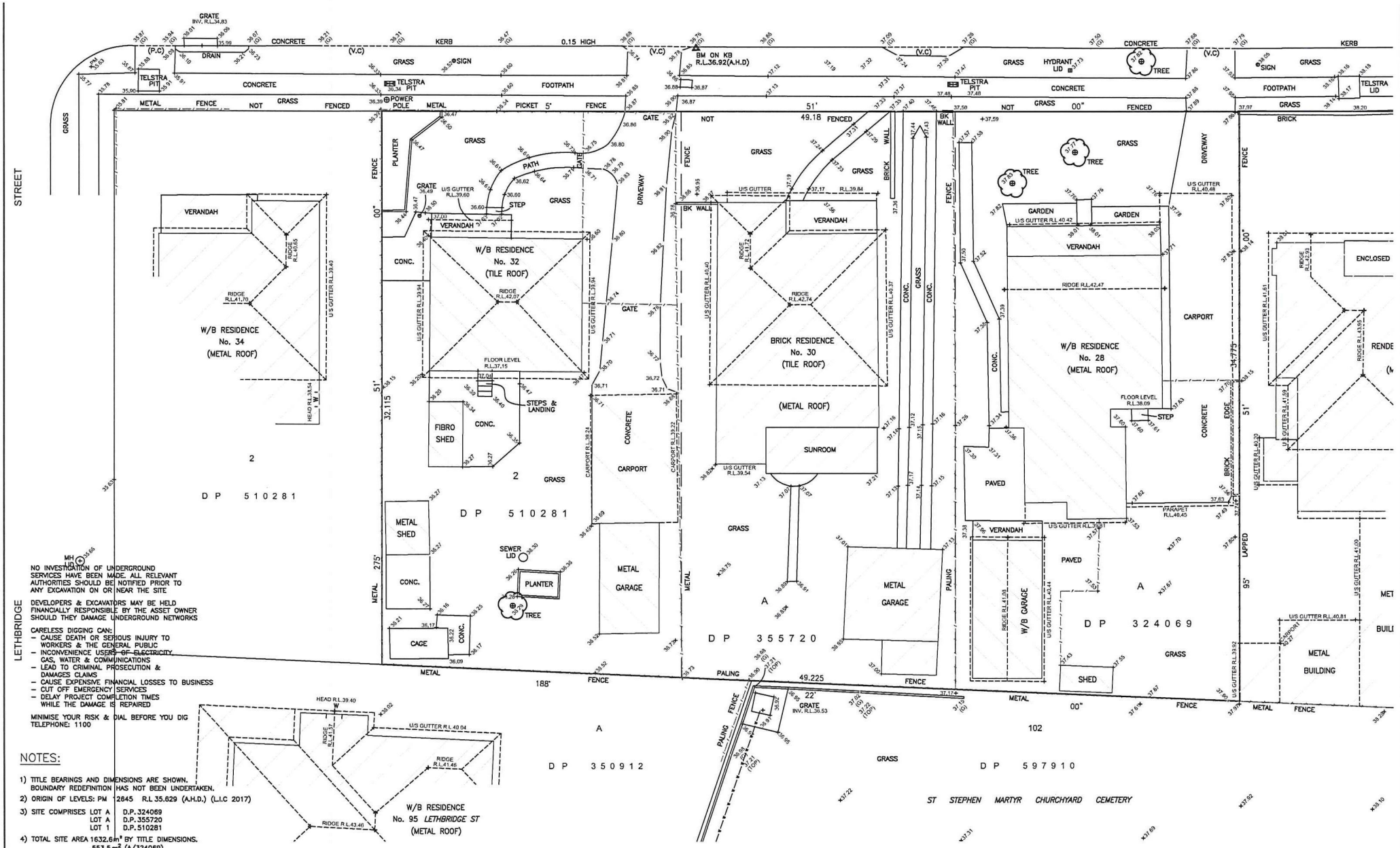
W4735
July 2015

Penrith CBD Detailed Overland Flow Flood Study

FIGURE 7.1
VALIDATION RESULTS

3 – Survey Details



NO INVESTIGATION OF UNDERGROUND SERVICES HAVE BEEN MADE. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE

DEVELOPERS & EXCAVATORS MAY BE HELD FINANCIALLY RESPONSIBLE BY THE ASSET OWNER SHOULD THEY DAMAGE UNDERGROUND NETWORKS

CARELESS DIGGING CAN:
- CAUSE DEATH OR SERIOUS INJURY TO WORKERS & THE GENERAL PUBLIC
- INCONVENIENCE USERS OF ELECTRICITY, GAS, WATER & COMMUNICATIONS
- LEAD TO CRIMINAL PROSECUTION & DAMAGES CLAIMS
- CAUSE EXPENSIVE FINANCIAL LOSSES TO BUSINESS
- CUT OFF EMERGENCY SERVICES
- DELAY PROJECT COMPLETION TIMES WHILE THE DAMAGE IS REPAIRED

MINIMISE YOUR RISK & DIAL BEFORE YOU DIG TELEPHONE: 1100

NOTES:

1) TITLE BEARINGS AND DIMENSIONS ARE SHOWN. BOUNDARY REDEFINITION HAS NOT BEEN UNDERTAKEN.
2) ORIGIN OF LEVELS: PM 12645 R.L 35.829 (A.H.D.) (L.I.C 2017)
3) SITE COMPRISES LOT A D.P. 324069
   LOT A D.P. 355720
   LOT 1 D.P. 510281
4) TOTAL SITE AREA 1632.6m² BY TITLE DIMENSIONS.
   553.5m² (A/324069)
   521.5m² (A/355720)
   557.6m² (1/510281)
5) UNDERGROUND SERVICES HAVE NOT BEEN INVESTIGATED.
6) (G) DENOTES GUTTER LEVEL.
7) TREE NAMES SHOWN CONSTITUTE OUR OPINION ONLY. IF TREE SPECIES IDENTIFICATION IS IMPORTANT FOR DESIGN OR HERITAGE REASONS THEY SHOULD BE DETERMINED BY A QUALIFIED ARBORIST.
8) CAUTION: SHOULD ANY DEVELOPMENT OR CONSTRUCTION BE PLANNED ON OR NEAR THE BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE
9) CONTOUR INTERVALS: MAJORS 1.0m
   MINORS 0.1m
10) —▾—▾— DENOTES WATER MAINS LINE (APPROXIMATE POSITION)

ISSUE	DATE	AMENDMENT

TITLE: PLAN SHOWING SELECTED DETAIL & LEVELS OVER No.28-32 EVAN STREET, PENRITH

LGA: PENRITH		REFERENCE: 30307	
CLIENT: MARCHESE PARTNERS		DATE: 02-03-17	SHEET 1
SCALE (AT A1) 1:200	DATUM: AHD	SURVEYOR: RH	

Higgins Surveyors
PROPERTY & DEVELOPMENTS CONSULTANTS
A.B.N. 39 003 853 094
LEVEL 3, SUITE 3.05
26 RIDGE STREET NORTH SYDNEY
PO BOX 1269
QVB SYDNEY 1230
PH +61 2 9264 8044
FAX +61 2 9267 5468
admin@higginssurveyors.com.au

4 – Stormwater Drainage Calculation

DRAINS Model Results
JOB: 63280 - 28 - 32 Evan Street, Penrith
DATE: 24 November 2017

ONSITE DETENTION TANK CALCULATION

Site Discharge Calculation

Penrith Council – Stormwater Drainage Specification for Building Developments

Site upto 5000 m2 - Simplified Method

Section 4.3.5 - SIZING OF OSD SYSTEM

From Table 7: PSD & SSR

For Multi - unit Housing Permissible Site Discharge (PSD) 120 L/s/ha

Site area = 1632.6 m2

Site Discharge = 120 x 0.16326 = 19.59 l/s

Site Discharge = 19.59 l/s

OSD Volume Calculation

For Multi - unit Housing Site Storage Reauirement (SSR) 240 m3/ha

Site area = 1632.6 m2

OSD Storage Volume = 240 x 0.16326 = 39.2 m3

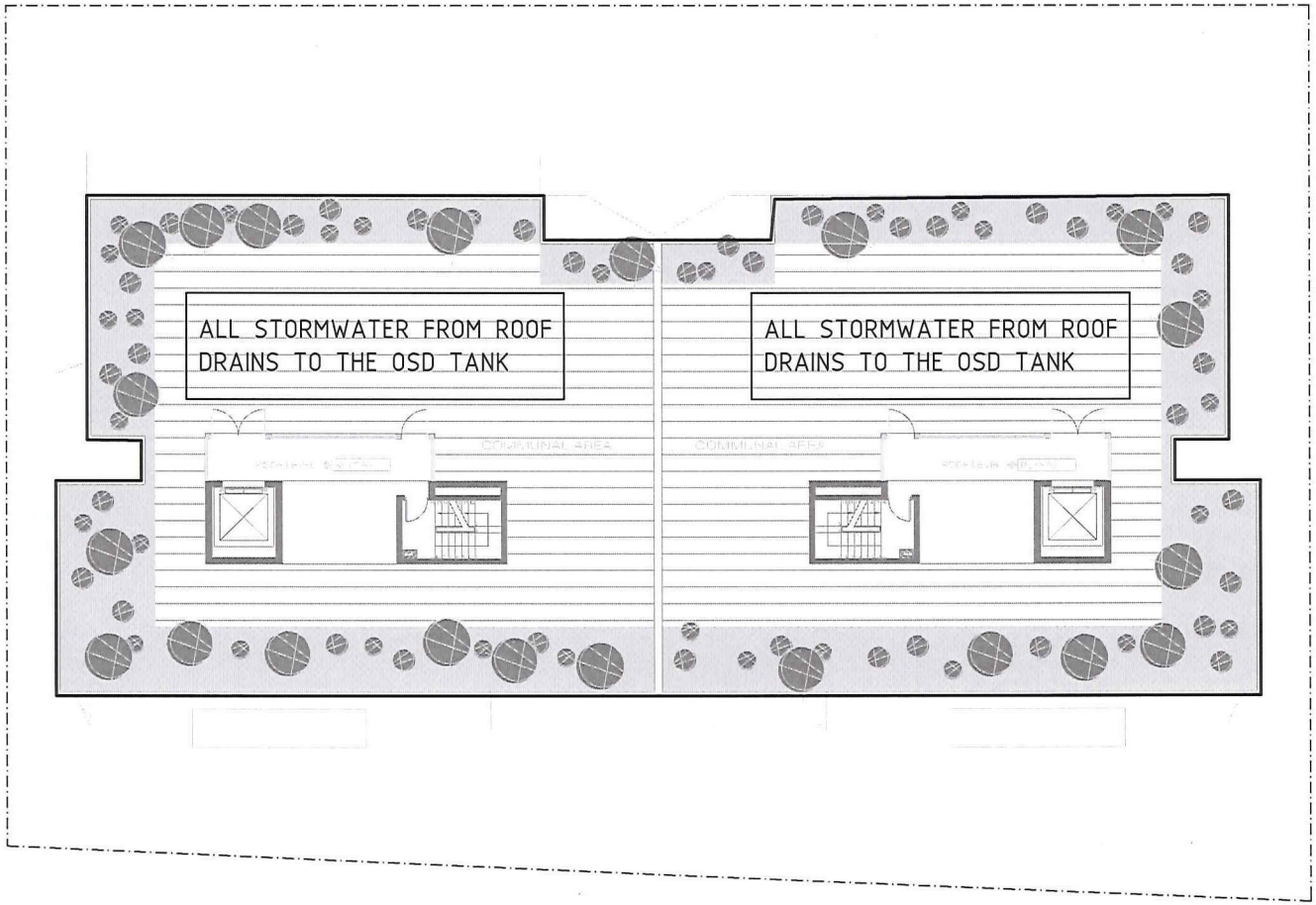
OSD Storage Volume = 39.2 m3

OSD Tank Depth

Section 4.3. 7 - OSD BELOW GROUND STORAGE

Section (d) - Tank Minimum Depth is 900 mm provided

5 – Stormwater Drainage Drawings



NORTH

DRAINAGE CONCEPT PROPOSAL
ROOF PLAN

NOTES

- ALL ROOF STORMWATER DRAINS TO THE ON SITE DETENTION TANK,
- ALL PIPES TO CATER FOR THE 100 YEAR ARI.

REV	DATE	DESCRIPTION
A	14.12.17	FOR DA SUBMISSION

ARCHITECT
marchese + partners architects
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north sydney nsw 2060
ph: (02) 9922 4375
fax: (02) 9929 5786
email: info@marchesepartners.com.au
web: www.marchesepartners.com.au
ABN 20 098 552 15

PROJECT
PROPOSED DEVELOPMENT
28-32 EVAN STREET
PENRITH

DRG
STORMWATER DRAINAGE
CONCEPT PROPOSAL

BEKKER
bekker engineering design buro pty ltd
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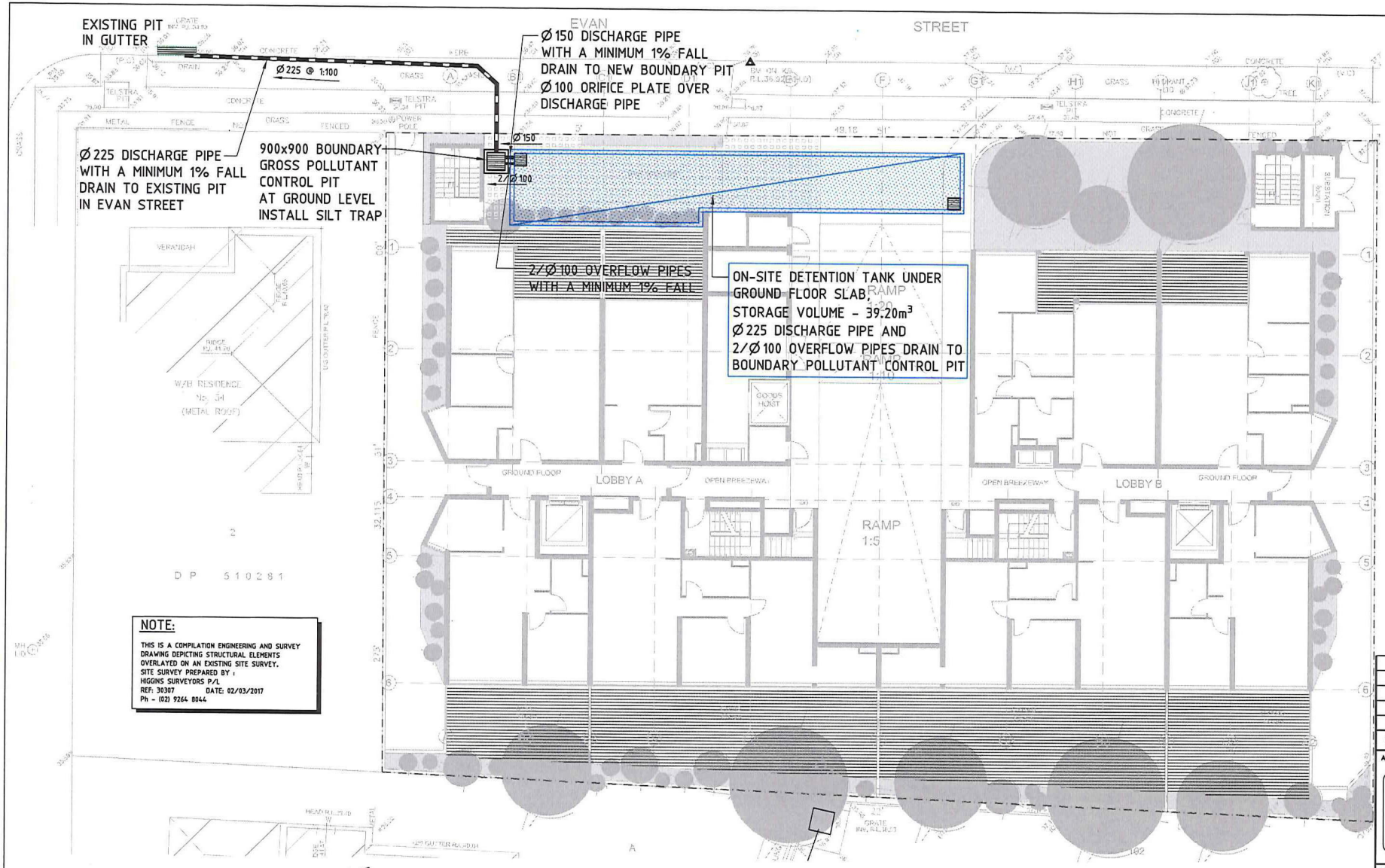
phone: (02) 9960 6944 fax: (02) 9960 6911
postal address: po box 591 northbridge, nsw 1560
abn 79 159 165 563
email: bekker@optusnet.au
CONSULT AUSTRALIA MEMBER

DESIGNED

SCALE	DATE	DRG No.	REV
1:100	NOV. 2017	63280 DCP1	A



DRAINAGE CONCEPT PROPOSAL
GROUND FLOOR PLAN

LEGEND

- DIRECTION OF FALLS FOR DRAINAGE LINES
- NEW Ø150 U.P.V.C. SEWER CLASS DISCHARGE DRAINAGE LINE WITH A MINIMUM FALL OF 1.0 % UNLESS NOTED OTHERWISE

ON-SITE DETENTION CALCULATIONS

• TOTAL SITE AREA	1632.60m²
• AREA TO OSD	1513.90m²
• BYPASS AREA TO THE BOUNDARY PIT	
• ALLOWABLE PSD	19.59 l/s
• CALCULATED STORAGE VOLUME REQUIRED	39.2 m³
• STORAGE VOLUME PROVIDED	39.2 m³
• OSD TANK ORIFICE PLATE DIAMETER	100 mm

ALL DETAILS OF OSD TANKS ARE TO COMPLY WITH COUNCILS STANDARD, DETAILS & REQUIREMENTS
ALL ASPECTS OF DRAINAGE SYSTEMS TO BE INSTALLED TO AS3500 REQUIREMENTS

NOTES

ALL ROOF, PAVED & PERVIOUS STORMWATER DRAINS TO THE ON-SITE DETENTION TANK, AND DISCHARGES TO THE NEW BOUNDARY POLLUTANT CONTROL PIT.
ALL OPEN BALCONIES & LANDSCAPE AREAS WATER FROM L1-L5 DRAINS TO THE BOUNDARY GROSS POLLUTANT CONTROL PIT.
ALL WATER FROM THE GROUND FLOOR CAR PARK AND LANDSCAPING AREAS DRAINS TO THE BOUNDARY GROSS POLLUTANT CONTROL PIT.
ALL PIPES TO CATER FOR THE 100 YEAR ARI.
BUILDER TO PROVIDE ALL DRAINAGE REQUIREMENTS TO COMPLY WITH AS3500 & COUNCIL REQUIREMENTS.

REV	DATE	DESCRIPTION
A	14.12.17	FOR DA SUBMISSION

ARCHITECT
marchese + partners architects
Level 1, 53 Walker Street
north sydney nsw 2060
ph: (02) 9922 4375
fax: (02) 9929 5786
email: info@marchesepartners.com.au
web: www.marchesepartners.com.au
ABN 20 098 552 15

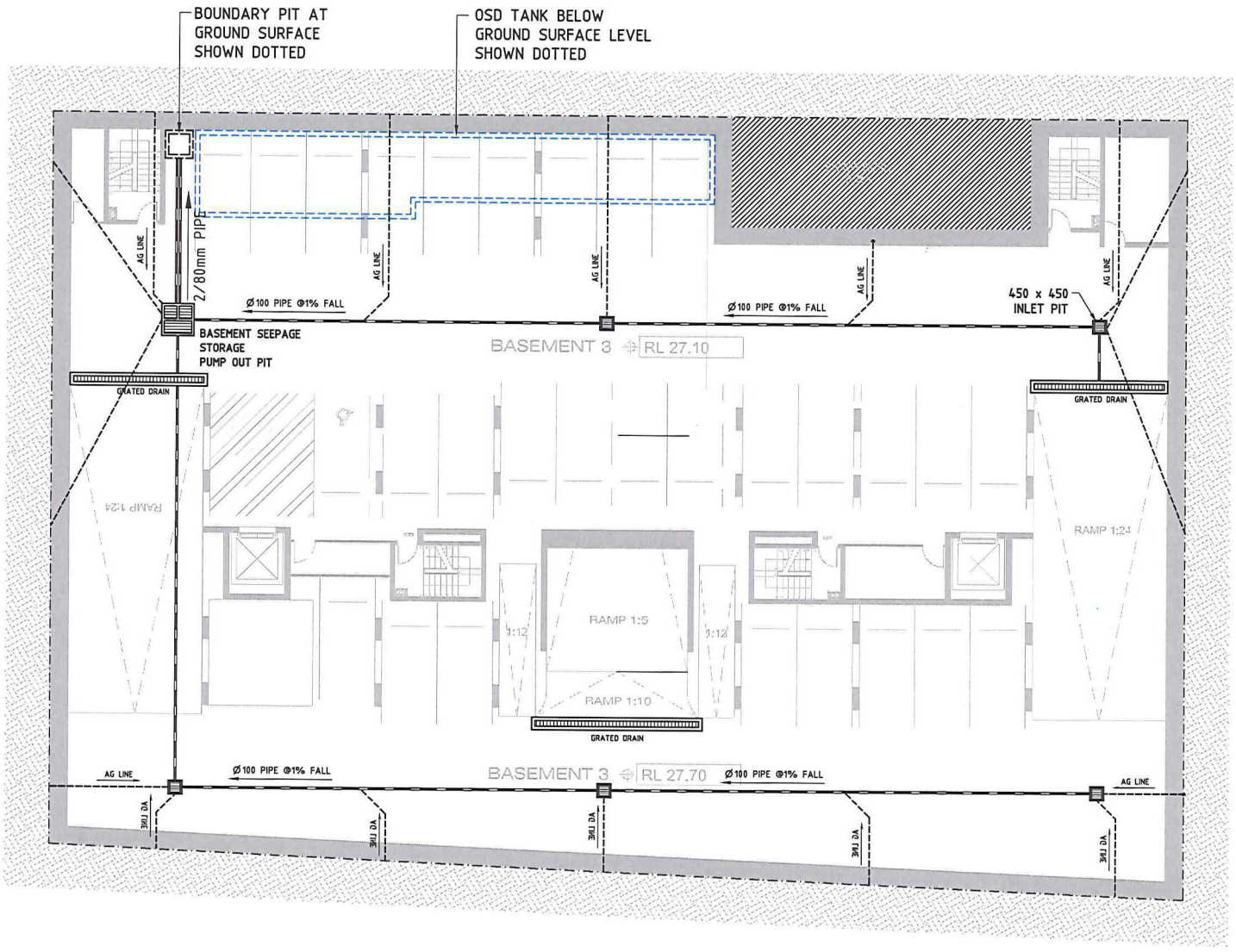
PROJECT
PROPOSED DEVELOPMENT
28-32 EVAN STREET
PENRITH

DRG
STORMWATER DRAINAGE CONCEPT PROPOSAL

BEKKER
bekker engineering design buro pty ltd
CONSULT AUSTRALIA MEMBER
suite 1 / 6-7 quntgal street, mosman nsw 2088 abn 79 159 165 563
phone: (02) 9960 6044 fax: (02) 9960 6911 email: bekker@spin.net.au
postal address: po box 591 northbridge, nsw 1560

DESIGNED

SCALE	DATE	DRG No.	REV
1:100	NOV. 2017	63280 DCP2	A



NORTH

DRAINAGE CONCEPT PROPOSAL
BASEMENT PLAN

LEGEND

- DIRECTION OF FALLS FOR DRAINAGE LINES
- NEW Ø150 U.P.V.C. SEWER CLASS DISCHARGE DRAINAGE LINE WITH A MINIMUM FALL OF 1.0 % UNLESS NOTED OTHERWISE
- 90mm Ø AG PIPE IN BED OF SCREENINGS
- STORMWATER PIT

BASEMENT SEEPAGE STORAGE PIT AND PUMP DETAILS TO COUNCIL CONSTRUCTION REQUIREMENTS.

SEEPAGE STORAGE PIT VOLUME CALCULATIONS
2.0m L x 2.0m W x 1.0m D
= VOLUME OF 4.0M³ MINIMUM

PROVIDE 2/NP2200 SUBMERSIBLE PUMPS TO DISCHARGE INTO PIT AT GROUND LEVEL NEAR ENTRY DRIVEWAY BY NOSSITER PUMP SERVICES P/L
Phone: (02) 9807 3077 Fax: (02) 9807 6945

REV	DATE	DESCRIPTION
A	14.12.17	FOR DA SUBMISSION

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Level 1, 53 Walker Street
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ABN 20 098 552 15

PROJECT
PROPOSED DEVELOPMENT
28-32 EVAN STREET
PENRITH

DRG
STORMWATER DRAINAGE CONCEPT PROPOSAL

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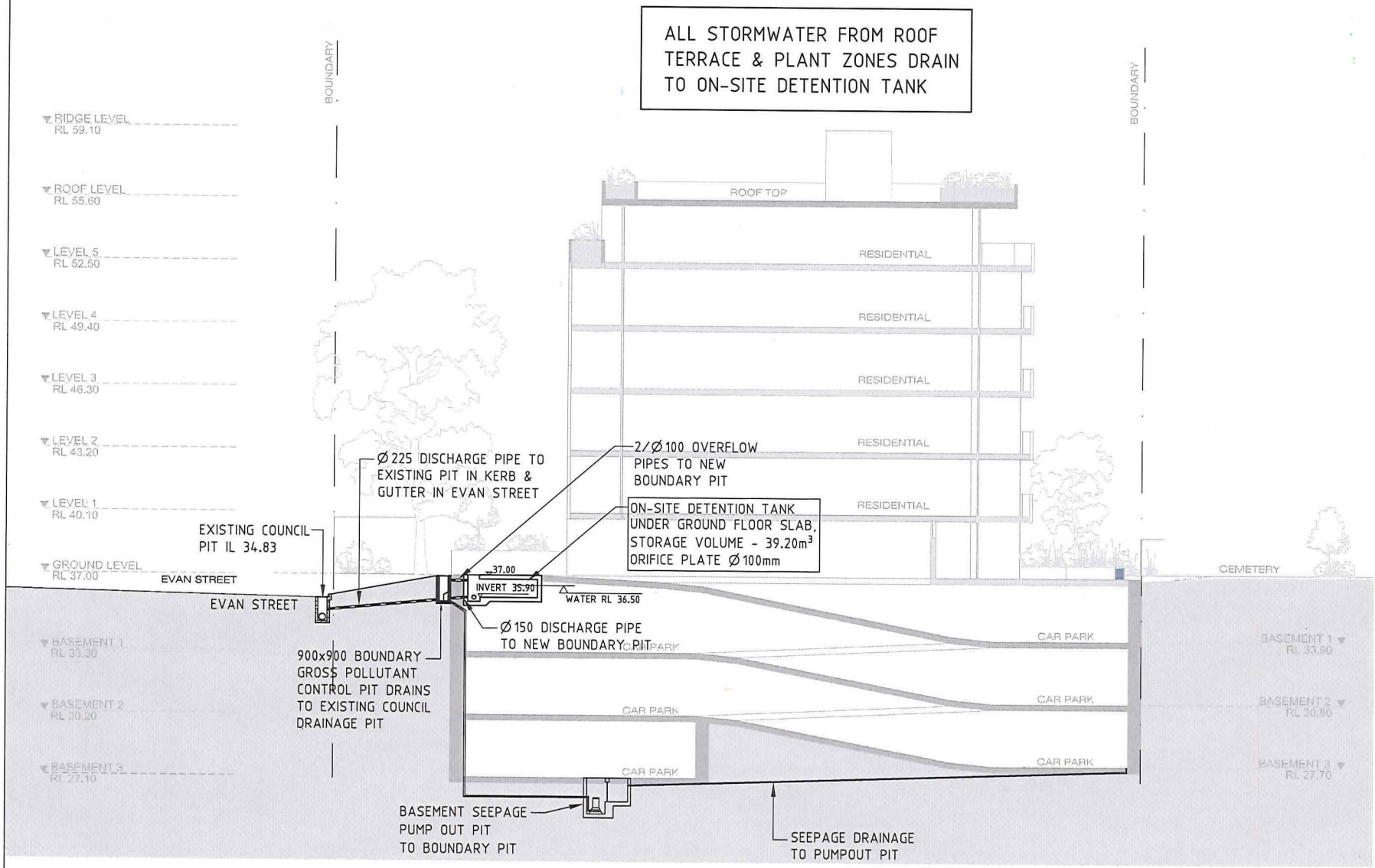
CONSULT AUSTRALIA MEMBER

DESIGNED

SCALE	DATE	DRG No.	REV
1:100	NOV. 2017	63280 DCP3	A

ALL STORMWATER FROM ROOF TERRACE & PLANT ZONES DRAIN TO ON-SITE DETENTION TANK



NORTH

DRAINAGE CONCEPT TYPICAL SECTIONB

LEGEND

DIRECTION OF FALLS FOR DRAINAGE LINES.

150mm Ø U.P.V.C. SEWER CLASS DRAINAGE LINE WITH A MINIMUM FALL OF 1.0 % UNLESS NOTED OTHERWISE.

REV	DATE	DESCRIPTION
A	14.12.17	FOR DA SUBMISSION

ARCHITECT
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PROJECT
PROPOSED DEVELOPMENT
28-32 EVAN STREET
PENRITH

DRG
STORMWATER DRAINAGE CONCEPT PROPOSAL

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DESIGNED

SCALE	DATE	DRG No.	REV
1:100	NOV. 2017	63280 DCP4	A