



Upstream Catchment Analysis Report

200709 - 76B St Georges Crescent, Drummoune, NSW

1 CONTENTS

2	DOCUMENT SUMMARY	4
3	INTRODUCTION	5
3.1	Aim	5
3.2	Data sources	5
3.3	Site Description	5
4	HYDROLOGY	6
4.1	Catchment Area	6
4.2	Design Parameters	8
5	RESULTS	9
5.1	Rational Method	9
5.2	Road capacity	9
6	CONCLUSION	10
7	APPENDIX A	11
8	APPENDIX B	12
9	APPENDIX C	13
10	APPENDIX D	15
10.1	Rational Method	16
10.2	Road Sections	16
10.3	Results	18

QUALITY CONTROL REGISTER

This report has been prepared and checked as per below.

	Name	Signature	Date
Report Author:	Ali Akel	Ali Akel	07/12/2021
Checked by:	Scott Sharma		07/12/2021
Authorised by:			

2 Document Summary

Project Number: 200709
Project Name: 76B St Georges Crescent, Drummoyne, NSW
Prepared For: Britely Property
Date Prepared: 07/12/2021
XK Project Director: Feris Chehade

Status	Issue	Date	Prepared By	Approved By
For Review	A	15/11/2021	Ali Akel	Scott Sharma
For Review	B	07/12/2021	Ali Akel	Scott Sharma

3 Introduction

3.1 AIM

Xavier Knight Consulting Engineers has been engaged by Britely Property to undertake an upstream catchment analysis for the proposed development at 76B St Georges Crescent, Drummoyne NSW (Lot 2 DP 11056 and Lot 1 DP 579151). The objective of this report is to analyse the catchment upstream potentially traversing toward the subject development, determine the flow and water level at the site boundary and advise on upgrading the driveway to prevent water ingress into the property.

3.2 DATA SOURCES

The following sources have been used in the preparation of this report:

- Site survey plans conducted by "Sydney Surveyors", REF: 17108/1B dated 13/08/2020.
- 1 metre Digital Elevation Models (DEM) obtained from NSW Government Spatial Services.

3.3 SITE DESCRIPTION

The proposed development is located at 76B St Georges Crescent, Drummoyne and the current works involve the demolition of the existing site structure(s) and the construction of a new 3 Storey residential development with a single level basement.

The site is bounded from the East by the Paramatta river and from the West by St Georges Crescent, which is a two-lane undivided asphalt road. It is bounded from the North and South by other existing residential developments.



Figure 1 - Locality Map (Source : <https://maps.six.nsw.gov.au/> accessed 15/11/2021)

The current Survey contours (See Appendix A) shows the road grade on Albert Street falling from West to East and falling from North to South on St Georges Crescent. The neighbouring property Lot 1, DP11056 (upstream development) driveway has a negative fall back into the property from kerb similar to the subject site, potentially a location where upstream catchment may enter prior to the subject site. Sections through both the neighbouring and subject site driveways are shown as Section A-A and Section B-B in Appendix B.

4 Hydrology

4.1 CATCHMENT AREA

Surface contours have been generated using 1 metre DEM data in GIS as shown in Figure 2 to assess the greater catchment potentially draining to the site. The overall contours show the area traversing overland towards the Paramatta river. As presented below, the majority of the upstream catchment does not flow directly into the proposed development at 76B St Georges Crescent, Drummoyne, as the low point of the greater catchment appears to be directly fronting 68a-70 St Georges Crescent, Drummoyne. Refer to Appendix-D for the supplementary report details runoff generated for this area.

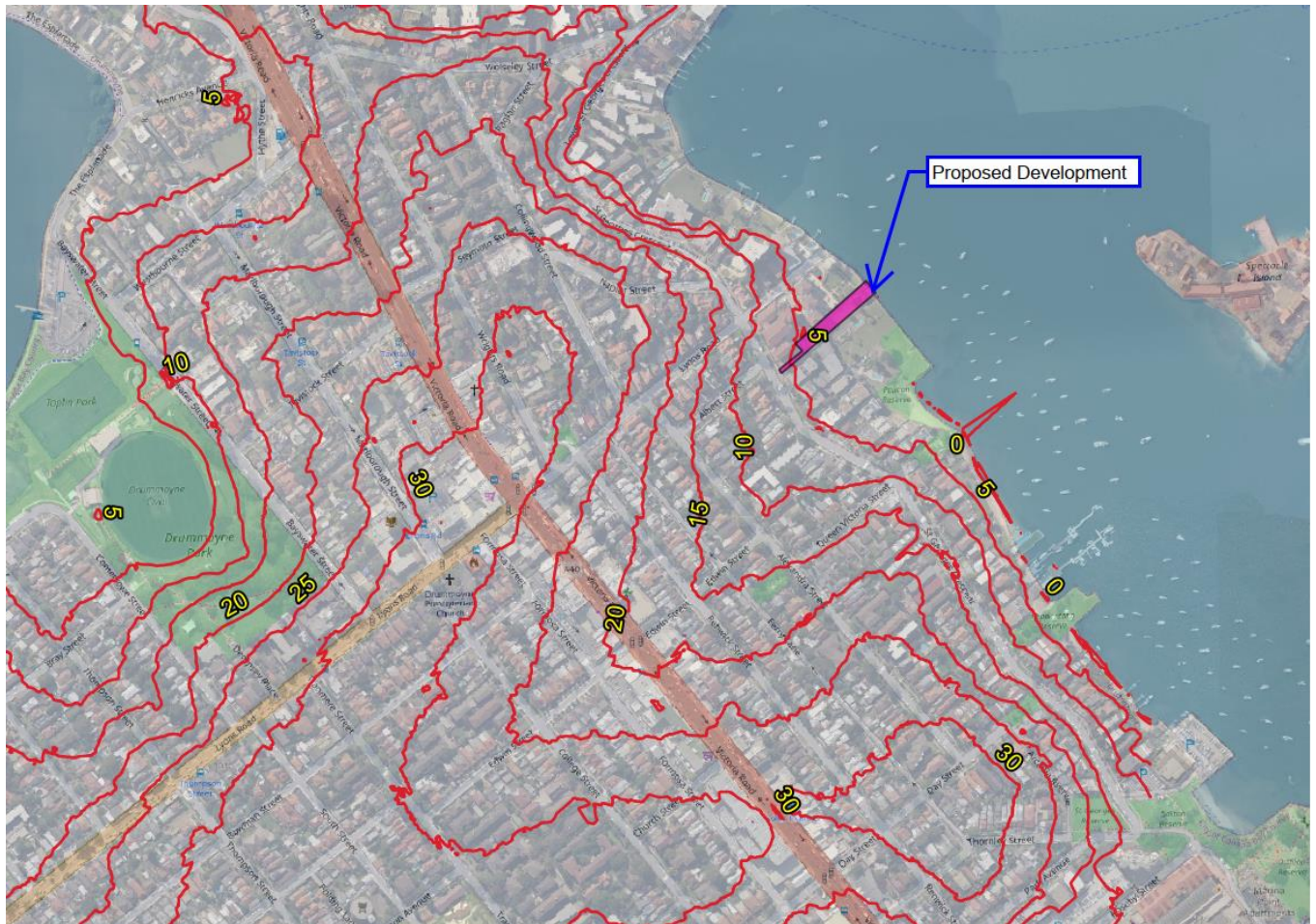


Figure 2 - Overall Contours

The catchment area draining towards the proposed development driveway is shown Figure 3.

The catchment area has been determined to be 2.33 Ha and the flow length, indicated by the dotted line, was found to be 353m. The average slope across the flow path has been calculated to be 6.8%.

Refer to supplementary report following the s34 conference – Appendix D

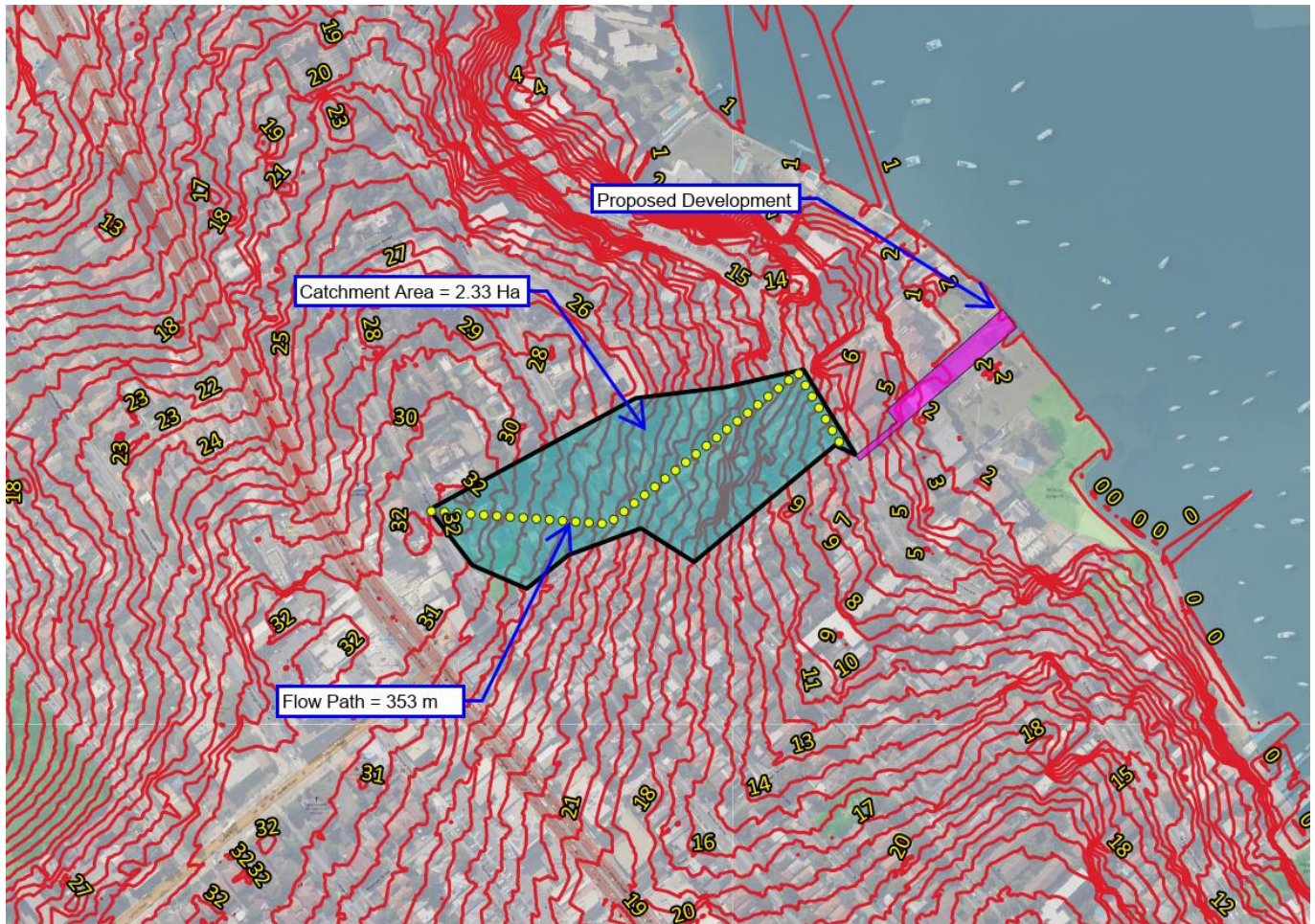


Figure 3 - Catchment Area

4.2 DESIGN PARAMETERS

DRAINS was used to run the rational method for the calculation of the 100-Year Runoff. The catchment was assumed to be 75% impervious with a runoff coefficient $C=0.9$ and 25% pervious with $C=0.65$.

It should be noted that the assessment has been undertaken with a conservative approach, in attempt to reflect a “worst-case scenario”. Specifically:

- All upstream pit and pipe networks have been assumed as 100% blocked, not removing the minor storm runoff from the assessment
- Assumed that the determined catchment area runoff does not exit any other adjoining properties and assessed directly impacting the front of the site. It should be noted that the survey plans indicate it would be likely that any upstream catchment traversing towards the subject site would enter the upstream neighbouring property driveway before reaching the driveway location of the subject site.

5 Results

5.1 RATIONAL METHOD

The result of the rational method calculation is shown below. The 100-year flow $Q=1.19 \text{ m}^3/\text{s}$

1.19

Sub-Catchment Data (Rational Method)

Sub-catchment name: Upstream catch Sub-catchment area (ha): 2.33

Hydrological Model:
☒ Use default
☐ You specify

Use:
☒ abbreviated data
☐ more detailed data

	Impervious	Pervious
Percentage of total area	75	25
Time of Concentration (mins)	10	10

Notes

OK Cancel Help

5.2 ROAD CAPACITY

The flow of $1.19 \text{ m}^3/\text{s}$ was applied to the road section at the northern edge of the driveway of 76B St Georges Crescent (section A-A). To prevent ingress of water into the property through the driveway, a crest must be introduced at the lot boundary.

As shown in catchment area plan (Figure 3) and the survey (Appendix-A), most of the runoff flows into St Georges Crescent from the Southwest, therefore, it has been assumed that the water level at southern half of the road (RHS of Section A-A) needs to overtop the road crown (level 7.00) before flowing in the northern half (LHS of section A-A). The RHS road capacity was determined by Manning's equation to be $0.78 \text{ m}^3/\text{s}$ (See calculation in Appendix-C). Therefore, The LHS section of the road needs to convey $1.19 - 0.78 = 0.41 \text{ m}^3/\text{s}$ to prevent the water from overtopping and entering the proposed development.

Raising the boundary by 60mm was found to achieve the required capacity (See calculation in Appendix-C).

6 Conclusion

The 100-year runoff calculated was $1.19\text{m}^3/\text{s}$, the capacity of the road reserve directly fronting at the subject site driveway is $1.20\text{m}^3/\text{s}$ (refer to Appendix C calculations and proposed section).

Based on the road capacity through introduction of a driveway crest (raising the boundary by 60mm) will provide enough capacity for the road to convey the 100-year runoff without it overtopping the new driveway crest and entering the site. This statement made in conjunction with the conservative approach to the overland flow assessment (refer to section 4.2), it has been deemed that upstream catchment runoff does not impact the subject site.

This report was completed for and on behalf of the Xavier Knight team.
Kind regards,

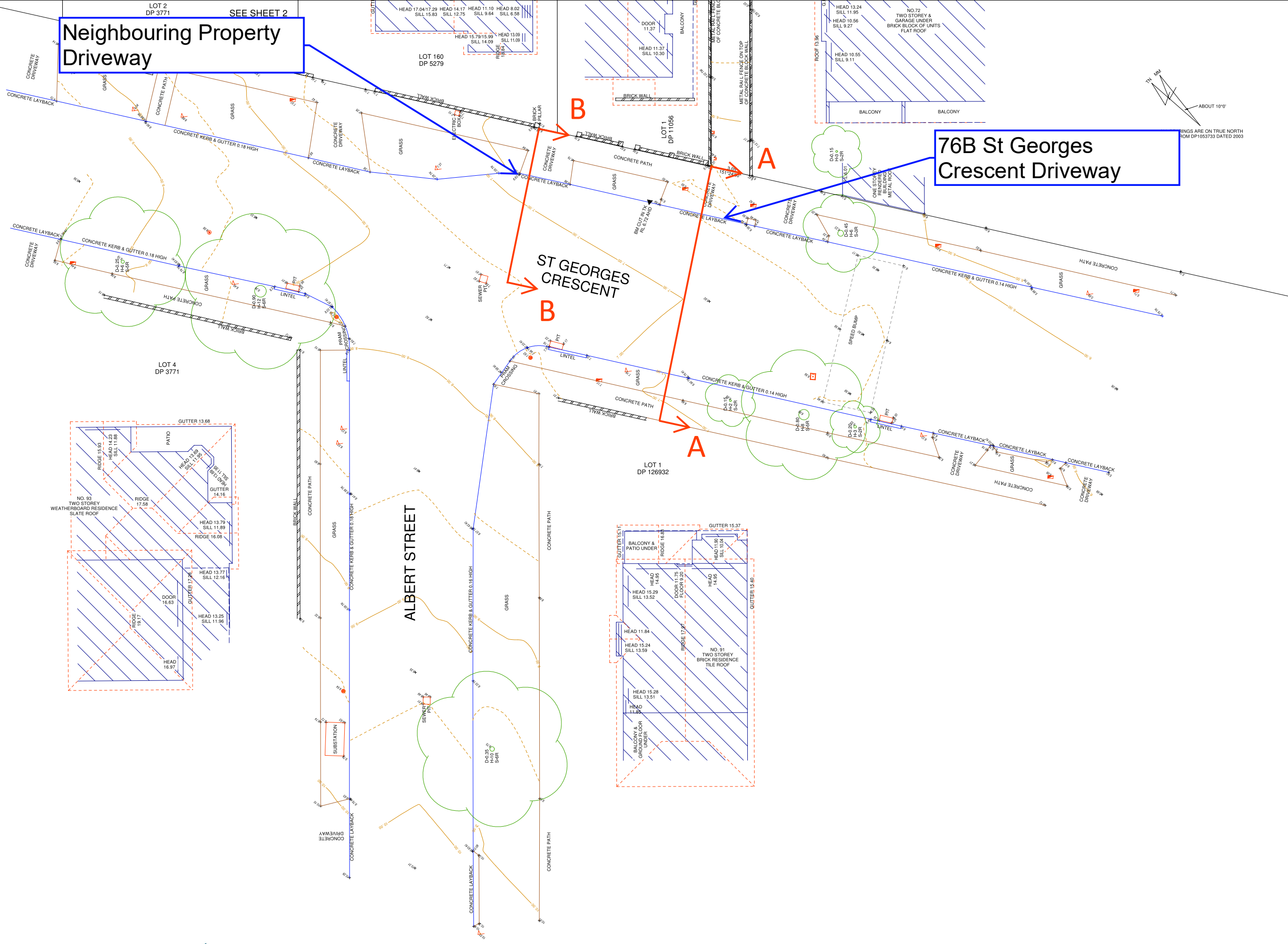
Scott Sharma
Principal Civil Engineer
BE (Civil) / BE (Environmental) Hons MIEAust

7 Appendix A

Survey

Neighbouring Property Driveway

76B St Georges Crescent Driveway



Sydney Surveyors

SUITE 7/14 FRENCH AVENUE, BANKSTOWN
PH: 02 9708 0177 FAX: 02 9708 0255 E: info@sydneyssurveyors.com.au

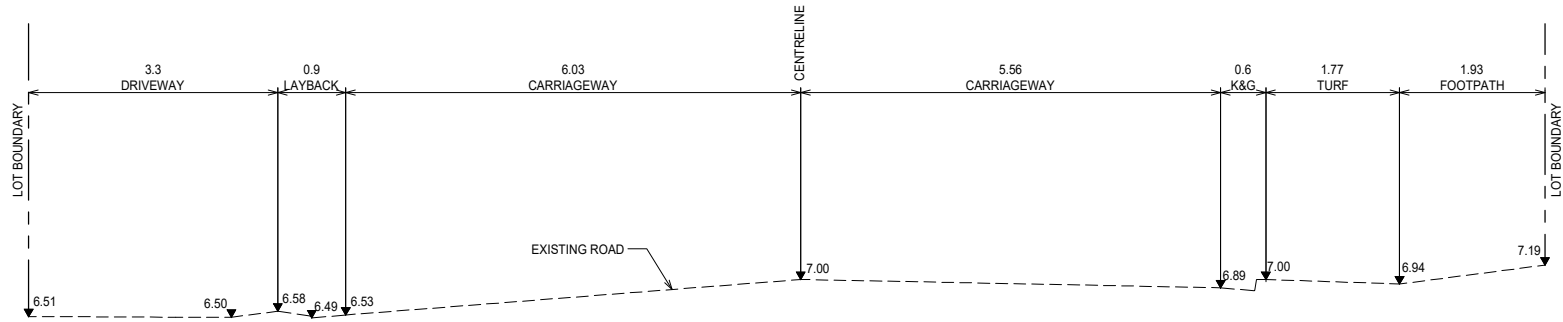
NOTE: BOUNDARIES HAVE BEEN DEFINED FOR PLANNING & DESIGN PURPOSES PROPOSED STRUCTURES ON OR NEAR BOUNDARIES OF THE LAND MUST SET OUT BY A REGISTERED SURVEYOR THE EXACT LOCATION OF UNDERGROUND SERVICES IS UNKNOWN					

SHEET 01 OF 03 REGISTERED SURVEYOR	REF: 17108/18
	SCALE: 1:100 @A0
	GRID:
	DATUM: AHD
	DATE: 13/08/2020

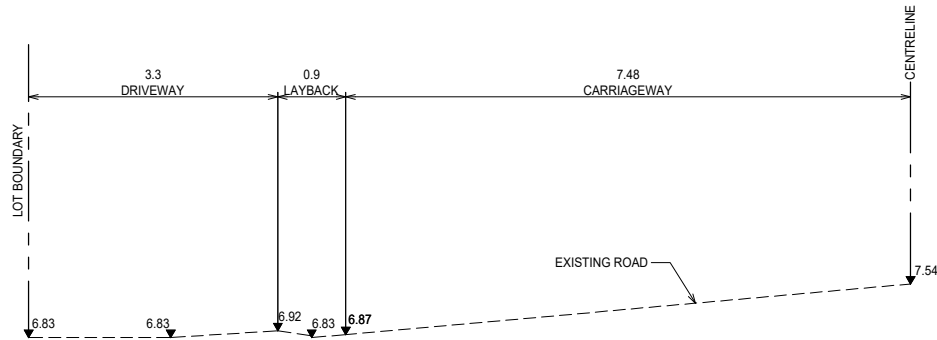
PLAN SHOWING DETAIL AND LEVELS AT
76B ST GEORGES CRESCENT, DRUMMOYNE
LOT 2 IN D.P. 11056

8 Appendix B

Existing Cross Sections



ST GEORGES CRESCENT SECTION A-A



ST GEORGES CRESCENT SECTION B-B

A1 0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

A	ISSUE FOR COORDINATION	AA	AA	14.11.2021
Rev	Description	Eng	Draft	Date

Architect
PBD ARCHITECTS
LEVEL 2, 52 ALBION STREET, SURRY HILLS, NSW 2010

Client
BRITELY PROPERTY
LEVEL 7, 111 ELIZABETH ST, SYDNEY NSW 2000



T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

This drawing is copyright and is the property of XAVIER KNIGHT CONSULTING ENGINEERS Pty. Ltd. and must not be used without authorisation.

North

Project
**PROPOSED RESIDENTIAL 3 STOREY FLAT BUILDING1
76B ST GEORGES CRESCENT, DRUMMOYNE**

Sheet Subject
ST GEORGES CRESCENT CROSS SECTION

Scale at A1

1:50

Drawn

AA

Approved

SS

Job No

200709

Drawing No

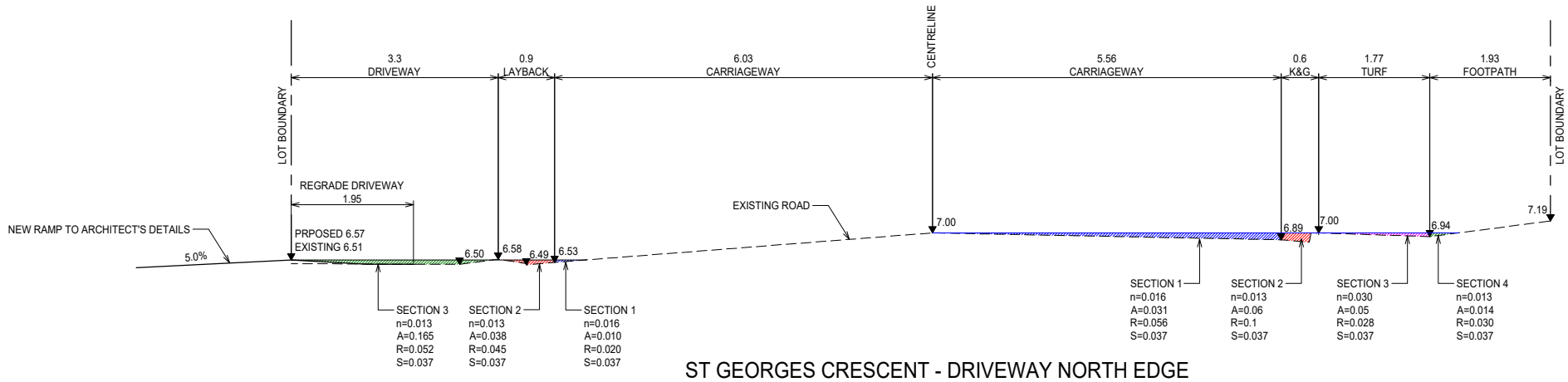
SKETCH-1

Revision

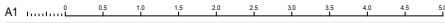
A

9 Appendix C

Proposed Cross Section Capacity



ST GEORGES CRESCENT - DRIVEWAY NORTH EDGE



Architect			
PBD ARCHITECTS			
LEVEL 2, 52 ALBION STREET, SURRY HILLS, NSW 2010			
Client			
BRITELY PROPERTY			
LEVEL 7, 111 ELIZABETH ST, SYDNEY NSW 2000			
XAVIER KNIGHT			
T : 02 8810 5800 E : info@xavierknight.com.au			
A : Level 7, 210 Clarence Street, Sydney NSW 2000			
xavierknight.com.au			
This drawing is copyright and is the property of XAVIER KNIGHT CONSULTING ENGINEERS Pty. Ltd. and must not be used without authorisation.			
North			
Project			
PROPOSED RESIDENTIAL 3 STOREY FLAT BUILDING1			
76B ST GEORGES CRESCENT, DRUMMOYNE			
Sheet Subject			
ST GEORGES CRESCENT CROSS SECTION			
Scale at A1			
1:50			
Drawn			
AA			
Approved			
SS			
Job No			
200709			
Drawing No			
SKETCH-2			
Revision			
A			
A			
ISSUE FOR COORDINATION			
AA			
AA			
14.11.2021			
Rev Description			
Eng Draft Date			

Road Capacity Calculation:

RHS Road capacity:

$$Q=Q_1+Q_2+Q_3+Q_4$$

$$Q = \frac{1}{n} \cdot A \cdot R^{\frac{2}{3}} \sqrt{S}$$

$$Q = 0.54+0.19+0.03+0.02 = 0.78 \text{ m}^3/\text{s}$$

LHS Road Capacity:

$$Q=Q_1+Q_2+Q_3$$

$$Q = \frac{1}{n} \cdot A \cdot R^{\frac{2}{3}} \sqrt{S}$$

$$Q=0.009+0.071+0.34 = 0.42 \text{ m}^3/\text{s}$$

Total road capacity at driveway north = $0.78+0.42 = 1.20 > 1.19 \text{ m}^3/\text{s}$, therefore flow will not overtop driveway crest.

10 Appendix D

Supplementary Report

The overall catchment has been calculated as shown in figure 4. The low point on St. Georges crescent is located about 65m to the south west of the proposed development at 76B St. Georges Crescent. The contributing catchment area for the low point is 36.17 Ha.

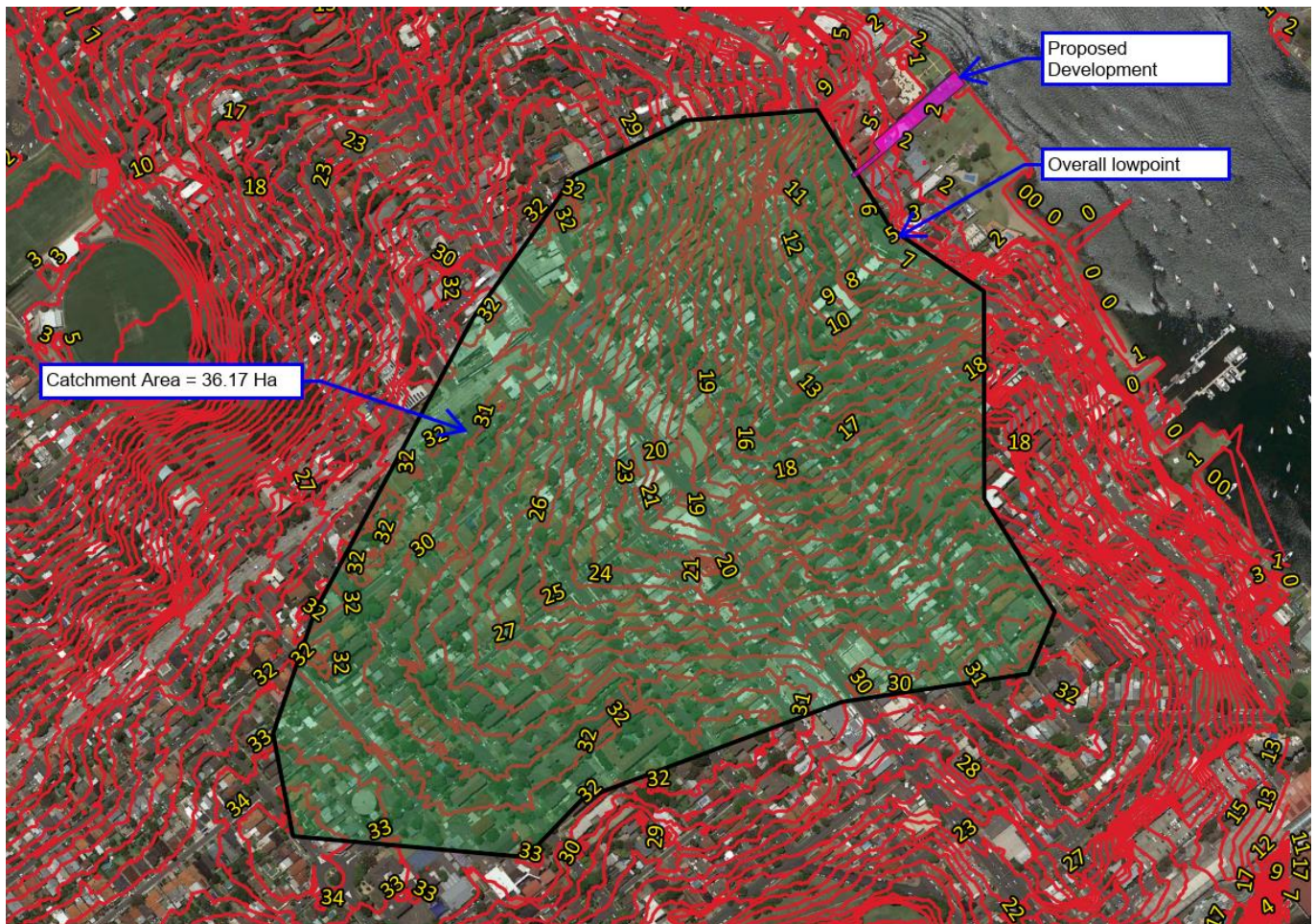
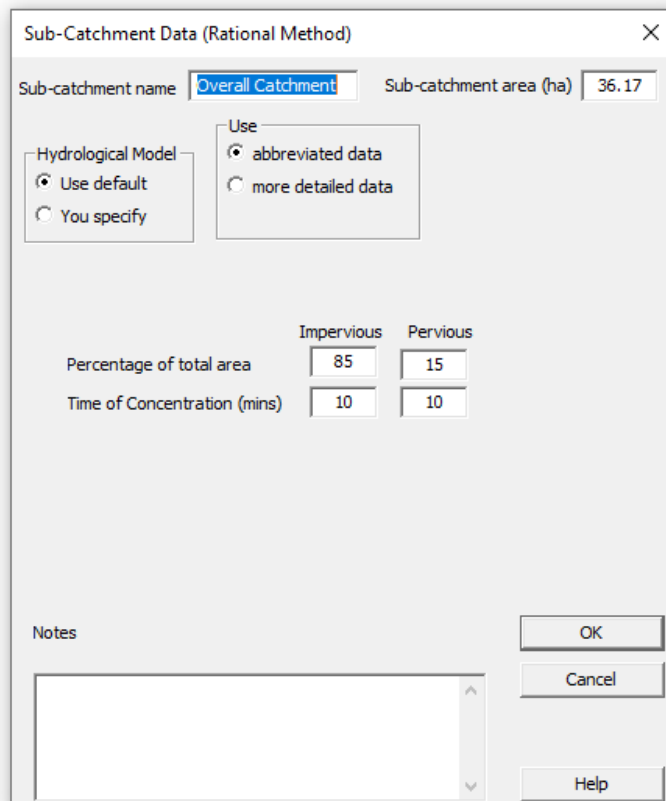


Figure 4 Low Point Catchment Area

DRAINS was used to run the rational method for the calculation of the 100-Year Runoff. The catchment was assumed to be 85% impervious with a runoff coefficient $C=0.9$ and 15% pervious with $C=0.65$. A time of concentration of 10 minutes was used.

10.1 RATIONAL METHOD

The result of the rational method calculation is shown below. The 100-year flow $Q=18.9 \text{ m}^3/\text{s}$



Sub-Catchment Data (Rational Method)

Sub-catchment name: Sub-catchment area (ha):

Hydrological Model:
☒ Use default
☐ You specify

Use:
☒ abbreviated data
☐ more detailed data

	Impervious	Pervious
Percentage of total area	85	15
Time of Concentration (mins)	10	10

Notes

OK Cancel Help

 18.9

10.2 ROAD SECTIONS

QGIS and DEM data was used to generate 3 cross sections along St. Georges Crescent (Left Boundary, Road Centreline and Right Boundary) starting from the proposed driveway (See figure 5)

Elevations along these sections were extracted and were used to generate cross sections in HEC-RAS. A conservative approach was taken in the HEC-RAS model as water was assumed to be completely obstructed where buildings or walls are present. The extent of these ineffective flow areas is shown on figure 5 and an example location is shown on figure 6.

The 100-year flow of $18.9 \text{ m}^3/\text{s}$ was applied to sections and a steady state analysis was performed.



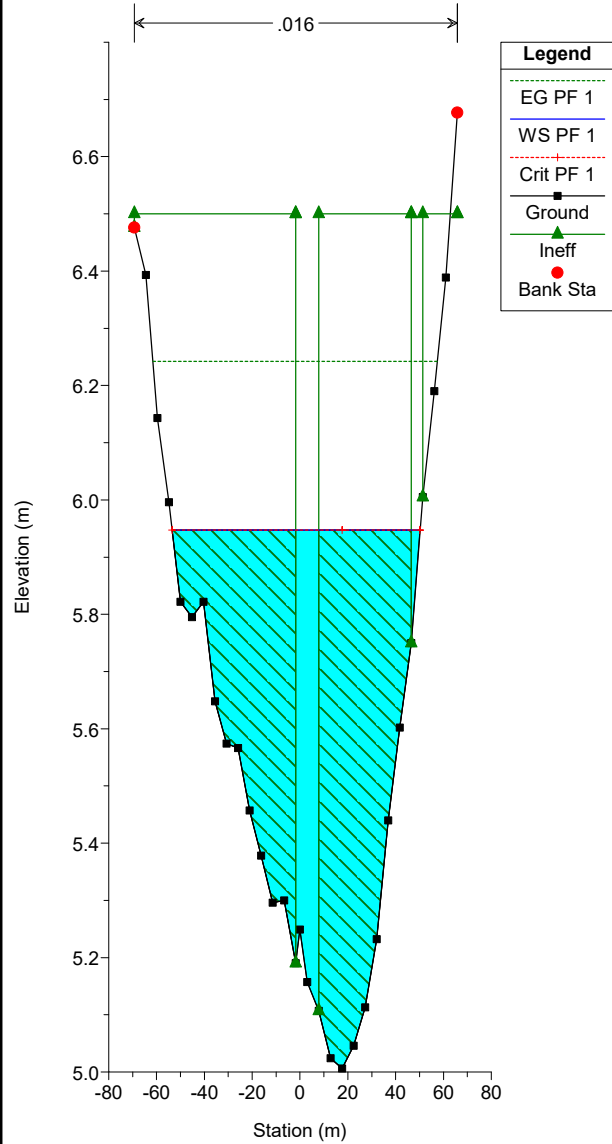
Figure 5 Road Sections



Figure 6 Ineffective Flow Area

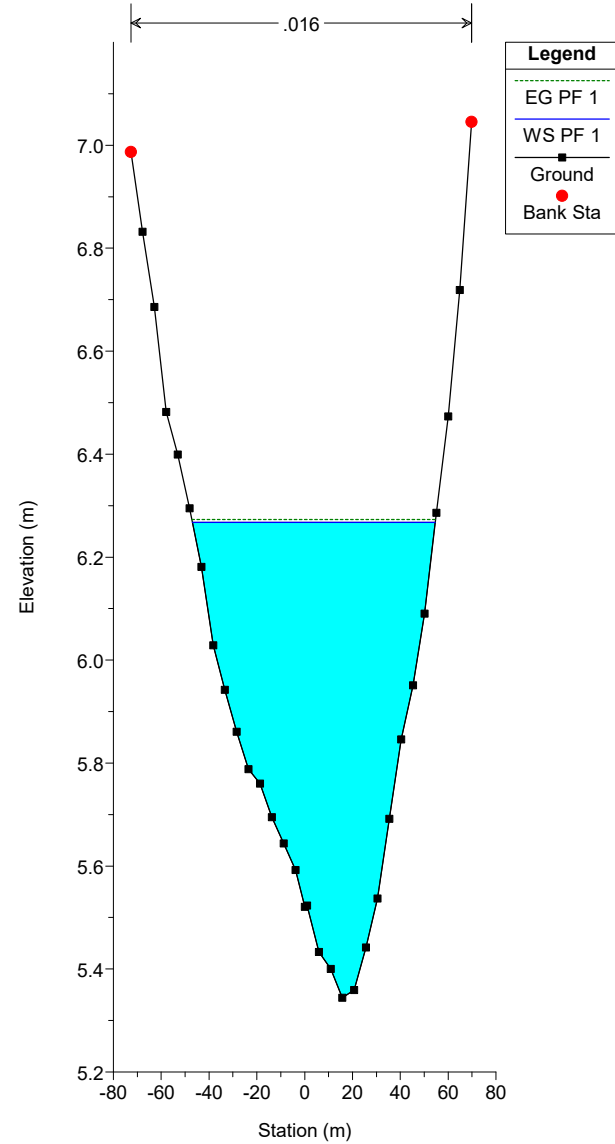
Drummoyne Flood Analysis Plan: steadyrun 6/12/2021

Left Boundary



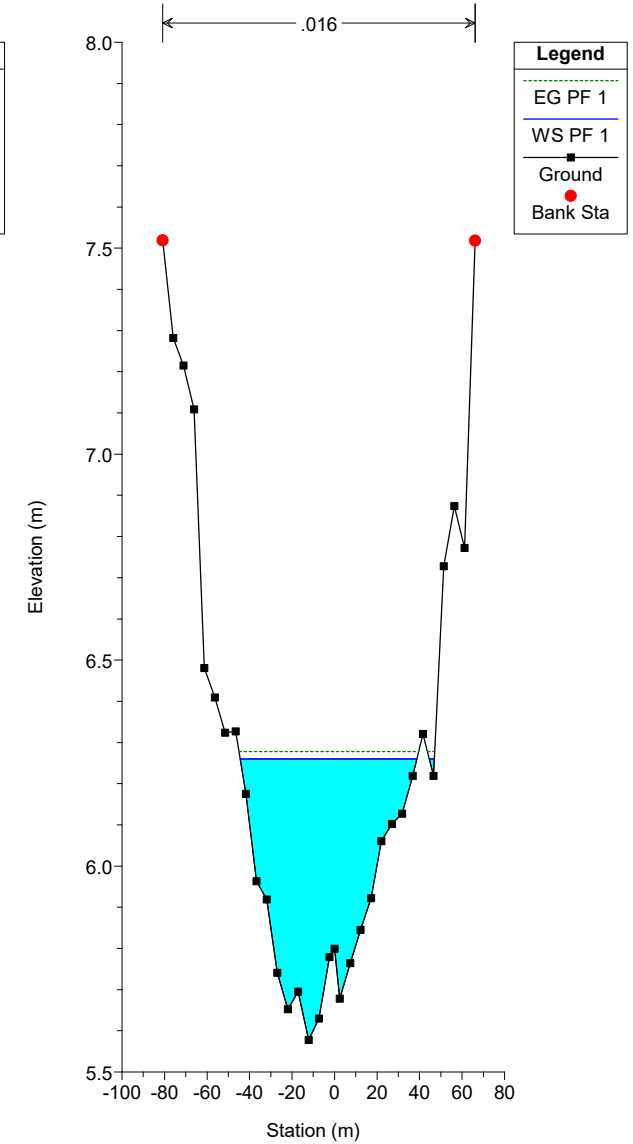
Drummoyne Flood Analysis Plan: steadyrun 6/12/2021

CL



Drummoyne Flood Analysis Plan: steadyrun 6/12/2021

Right Boundary



10.3 RESULTS

The results of the steady state run are shown below. As shown in the Left Boundary cross section, the water surface level during the 100-year storm will be 5.95 m along St. Georges Crescent. The proposed driveway crest at our proposed development on 76B St. Georges Crescent has been designed to be 6.57 m, indicating that the 100-year flow levels sit at $6.57 - 5.95 = 0.62\text{m}$ under the proposed driveway crest.