FLOOD HAZARD OVERLAY CODE ASSESSMENT REPORT

59 SOLOMON AVENUE, LOGANHOLME

29 April 2022

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Job No: J8843 v1.0

Job Name: 59 Solomon Avenue, Loganholme

Report Name	Date	Report No.
Flood Hazard Overlay Code Assessment Report	29 April 2022	J8843 v1.0

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Table of Contents

1.0 INTRODUCTION

Storm Water Consulting Pty Ltd was commissioned by Ron Herholdt to complete a Flood Hazard Overlay Code Assessment Report for the proposed development on 59 Solomon Avenue, Loganholme.

This report has been prepared to identify the 1% AEP overland flow extent affecting the existing property. The minimum floor level requirements and the potential impacts of the development are also assessed in this report. This report provides a response to the Flood Hazard Overlay Code in Appendix F.

2.0 SITE CONDITIONS

2.1 Existing Site

A dwelling house is located on the property. The property is bound by Solomon Avenue to the west and by residential properties in all other directions. Photographs of the existing site condition are presented in Appendix B. A locality plan is presented in Figure 2.1 below. The Flood Hazard Overlay across the property is presented in Figure 2.2 below.

Figure 2.1 – Locality Plan

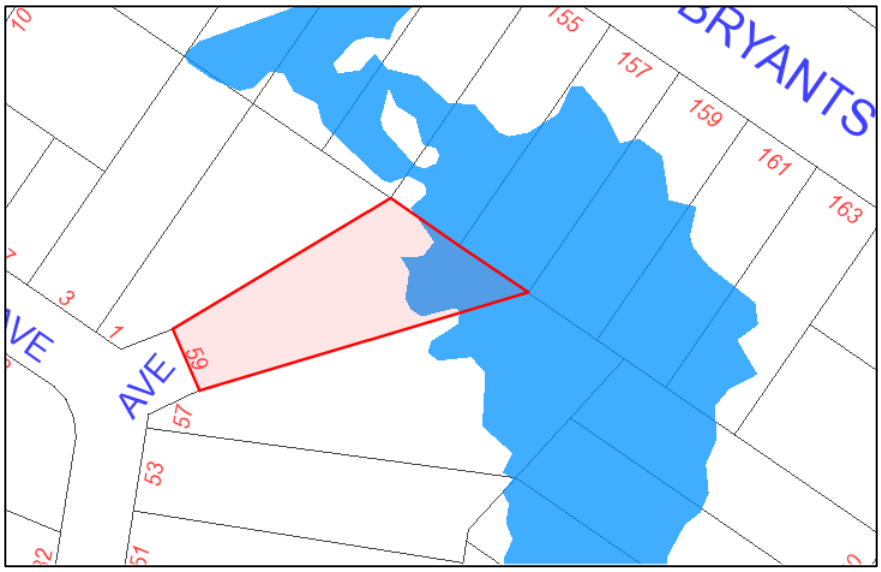

Figure 2.2 – Flood Hazard Overlay

2.2 Developed Site

The existing house is proposed to be demolished and a multi-unit development is proposed to be constructed on the property. Development plans are presented in Appendix A. The eastern-most two units (Units 11 and 12) will be constructed on a suspended floor, whilst the remaining units will be constructed slab-on-fill. The backyards of Units 7 to 12 will remain at the existing surface levels.

3.0 HYDROLOGIC MODELLING

The property is affected by overland flow from a 3.19-hectare catchment. A catchment plan is presented below.

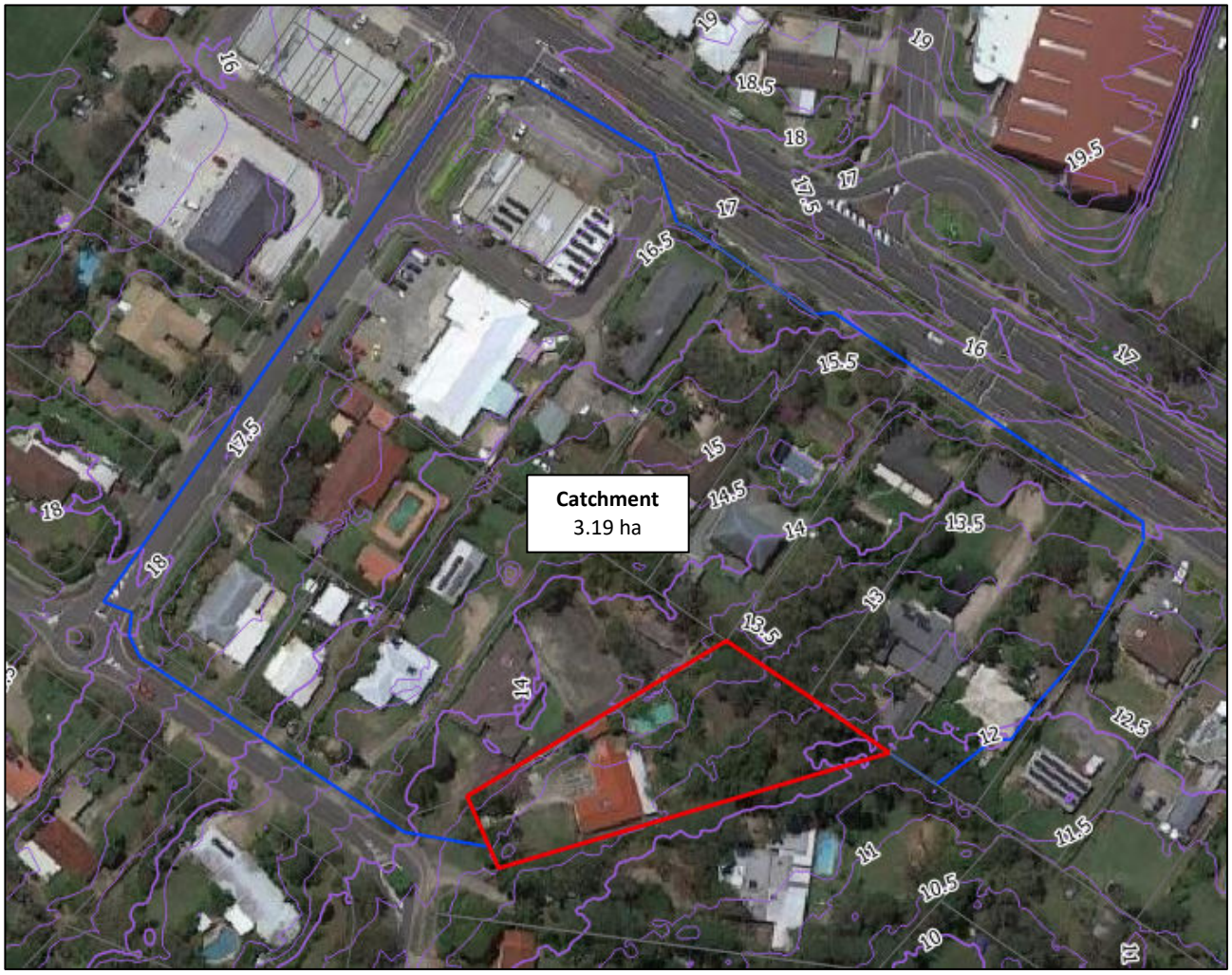

Figure 3.1 – Catchment Plan

Rational Method calculations were undertaken for the catchment (in accordance with QUDM 2016). A summary of the total catchment flow is presented in Table 3.1. Detailed Rational Method calculations are presented in Appendix C.

Table 3.1 – Total Catchment Flow

AEP	Flow
%	m^3/s
18%	1.08
10%	1.34
5%	1.62
2%	2.08
1%	2.39

URBS hydrologic modelling was undertaken to produce an inflow hydrograph for input into the TUFLOW hydrodynamic model. A schematic representation of the URBS model is presented below. URBS data files are presented in Appendix D. A summary of the adopted URBS parameters is presented in Table 3.2 below.

Figure 3.2 – URBS Schematic Layout

Table 3.2 – Catchment URBS Model Parameters

AEP	Storage Coefficient	Non-Linearity Index	Initial Rainfall Loss	Continuing Rainfall Loss
%	α	β	mm	mm/hr
1	1.2	0.8	15	2.5

The URBS model peak 1% AEP catchment runoff, adopting the above model parameters, was modelled to give 2.44 m^3/s. This flow compares favourably with the Rational Method calculated flow of 2.39 m^3/s.

A 525 mm diameter stormwater pipe is located under the northern neighbouring property. This pipe is capable of conveying a portion of the catchment runoff. Table 3.3 below presents a summary of the pipe details and the adopted capacity for the pipe. Stormwater pipe plans are presented in Appendix E.

Table 3.3 – Existing Pipe Capacity Calculation

Pipe Diameter	Slope	On-grade Velocity	Adopted Capacity
mm	1 in	m/s	m^3/s
1 / 525	300	1.20	**0.25**

The above pipe capacity was subtracted from the hydrograph. The critical storm duration is the 30-minute storm. The inflow hydrograph for TUFLOW is presented below. The peak 1% AEP overland flow is 2.19 m^3/s.

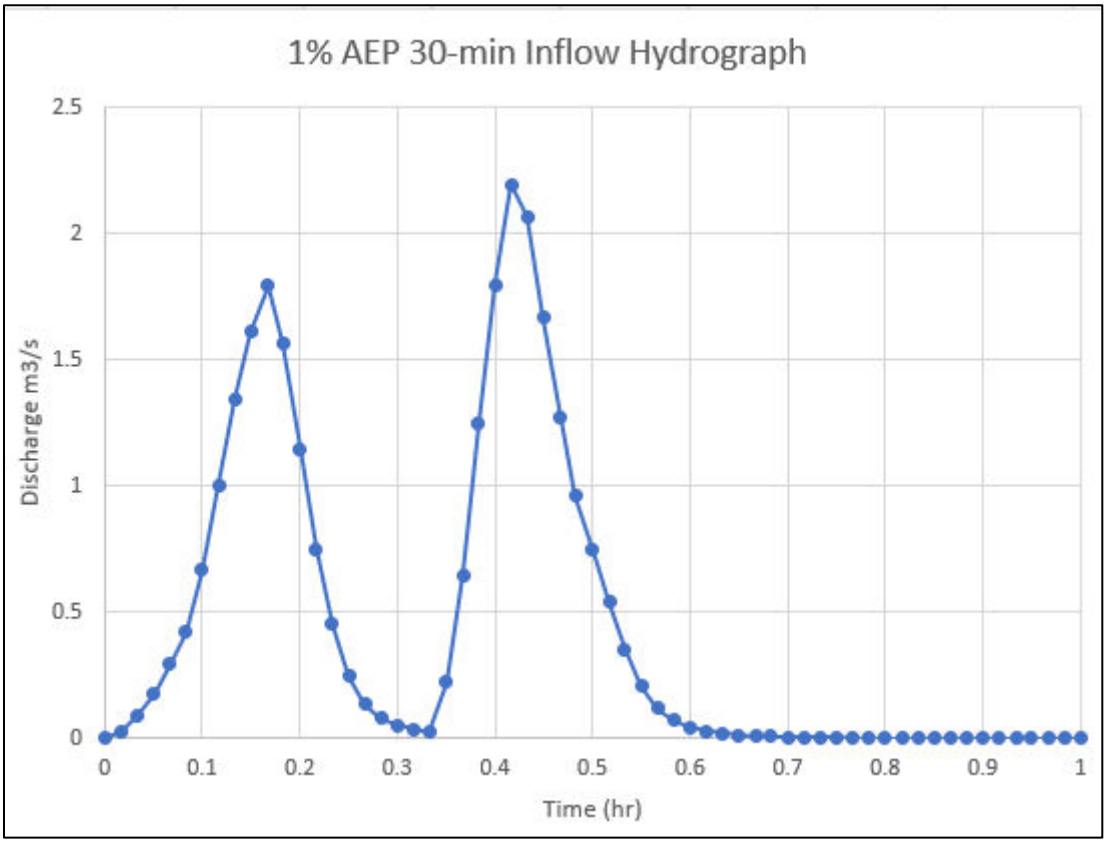

Figure 3.3 – Inflow Hydrograph for TUFLOW

4.0 HYDRODYNAMIC MODELLING

TUFLOW hydrodynamic modelling was undertaken to establish the existing flow characteristics, assess the potential impacts of the proposed works and to set minimum floor levels.

4.1 TUFLOW Model Setup – Existing

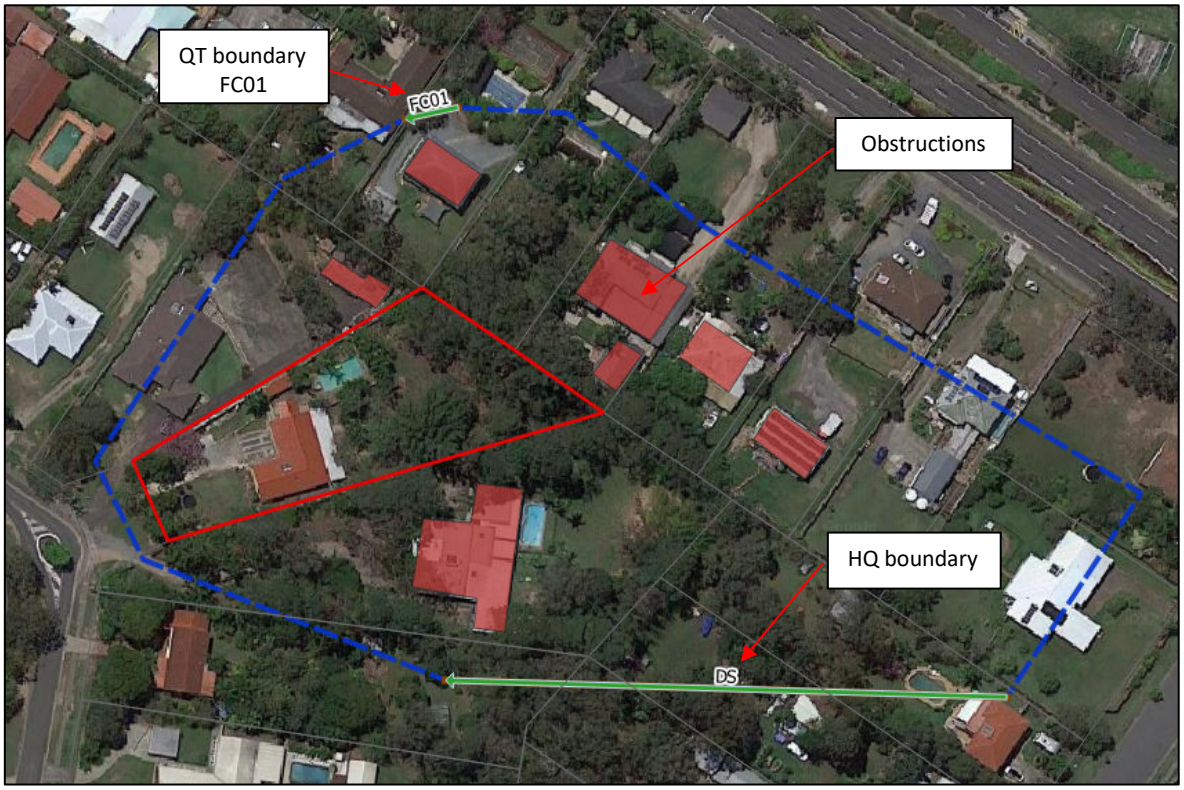

Figure 4.1 – Existing Model Extents

The Digital Elevation Model (DEM) was based on ALS survey data obtained from the Queensland State Government. The grid consists of 1 metre cell sizes, orientated to align with the general direction of flow. A uniform Manning's roughness coefficient of n = 0.10 was adopted throughout the model.

The inflow hydrograph presented in Figure 3.3 was input as a discharge-time (QT) inflow at the top end of the model. The downstream boundary condition was set as a height-discharge (HQ) boundary with a nominal flood slope based on the existing surface slope. The existing model was run with a timestep of 0.2 seconds for a period of 1 hour. The results of the existing TUFLOW model are presented in the following section.

The model results show that the 1% AEP inundation extents closely resemble the Flood Hazard Overlay on the property (refer Figure 2.2). As such, it is considered that the TUFLOW model is suitable for assessing the potential hydraulic impacts of the proposed works.

4.2 TUFLOW Model Results – Existing

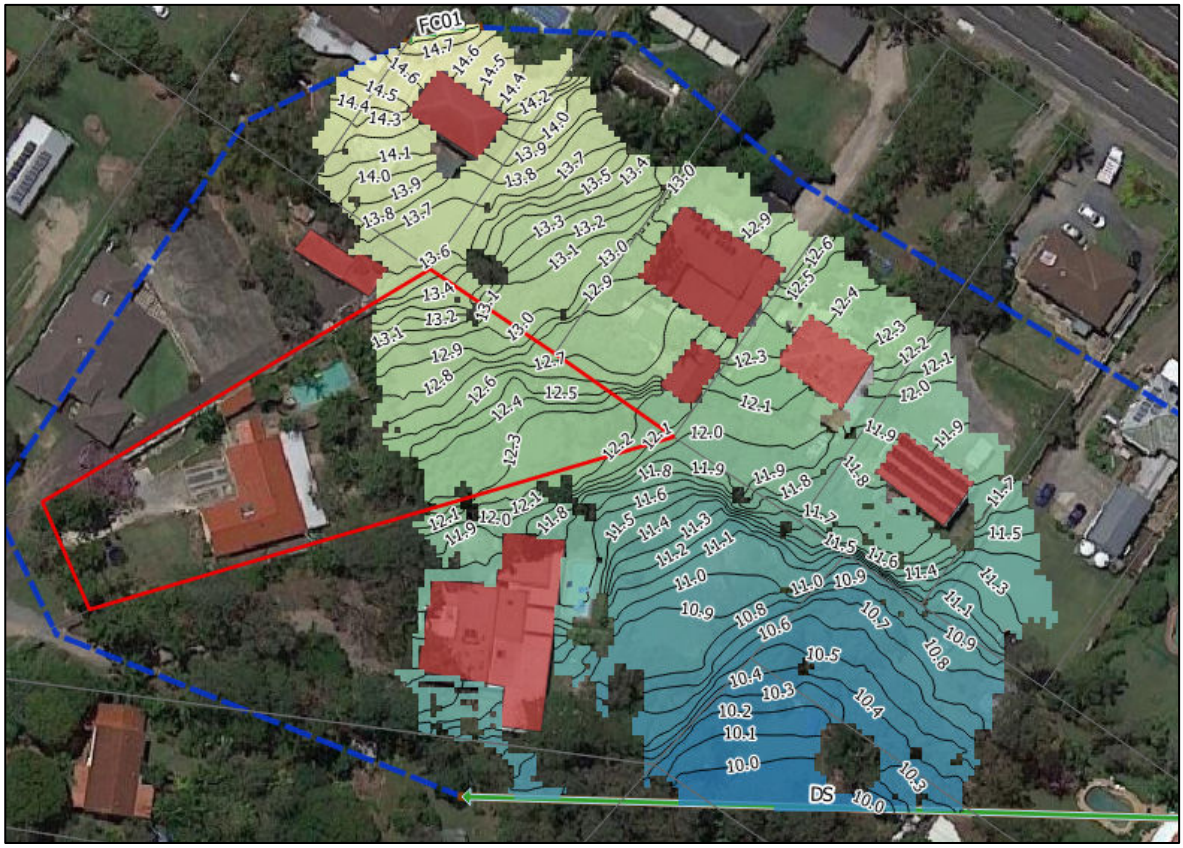

Figure 4.2 – Existing 1% AEP Inundation Levels (metres AHD)

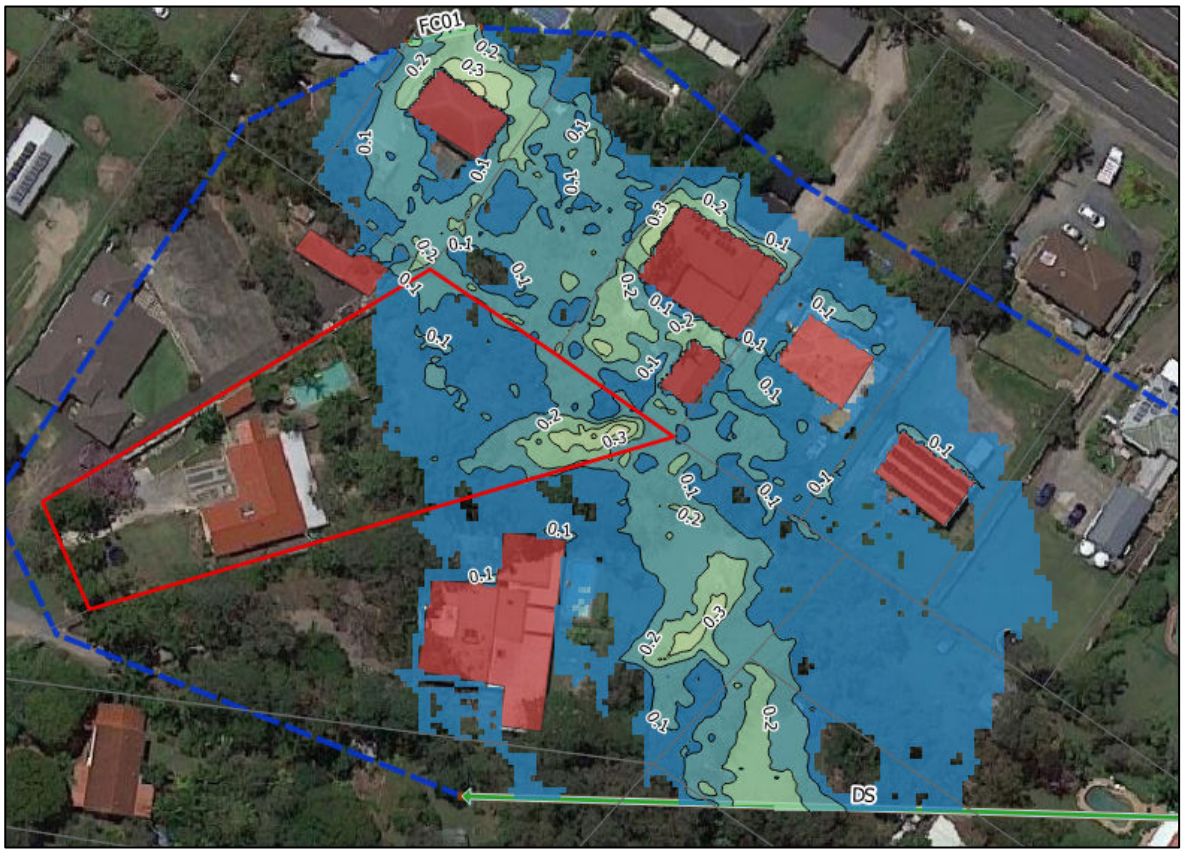

Figure 4.3 – Existing 1% AEP Inundation Depths (metres)

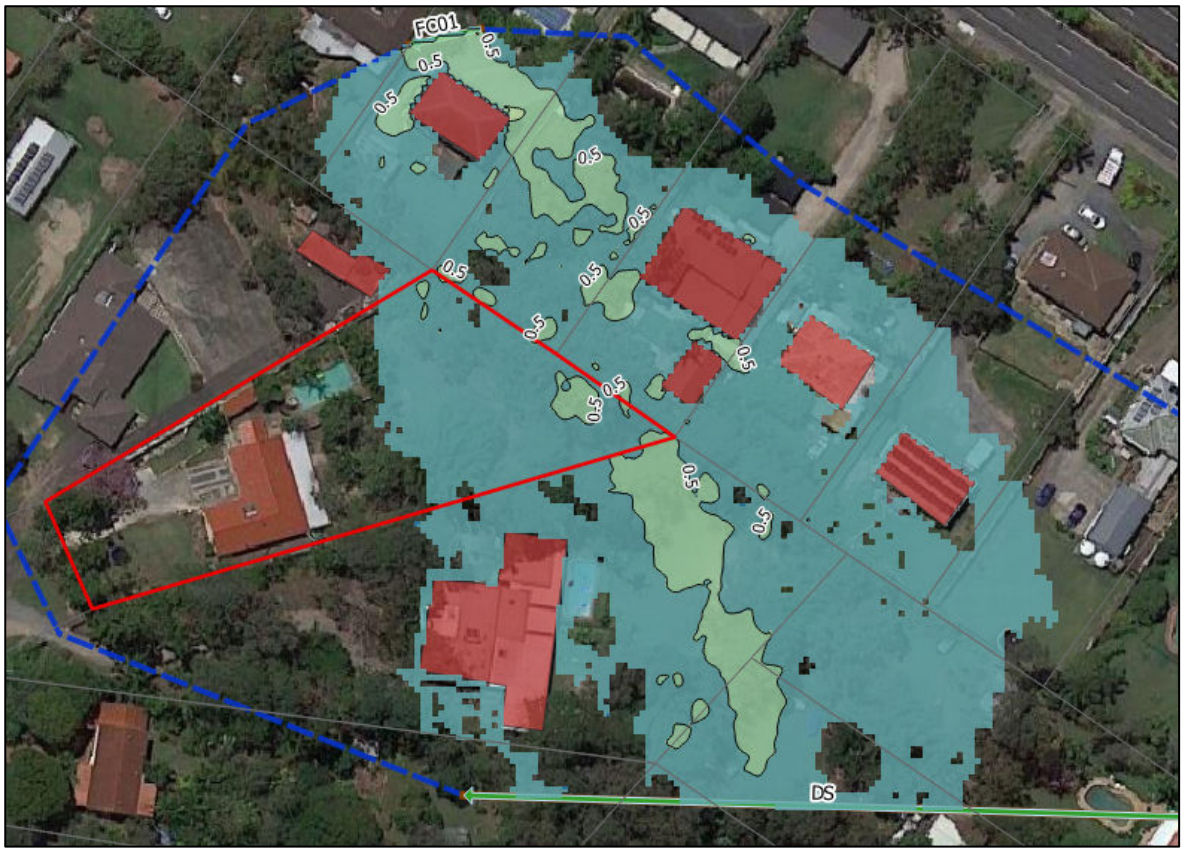

Figure 4.4 – Existing 1% AEP Velocities (m/s)

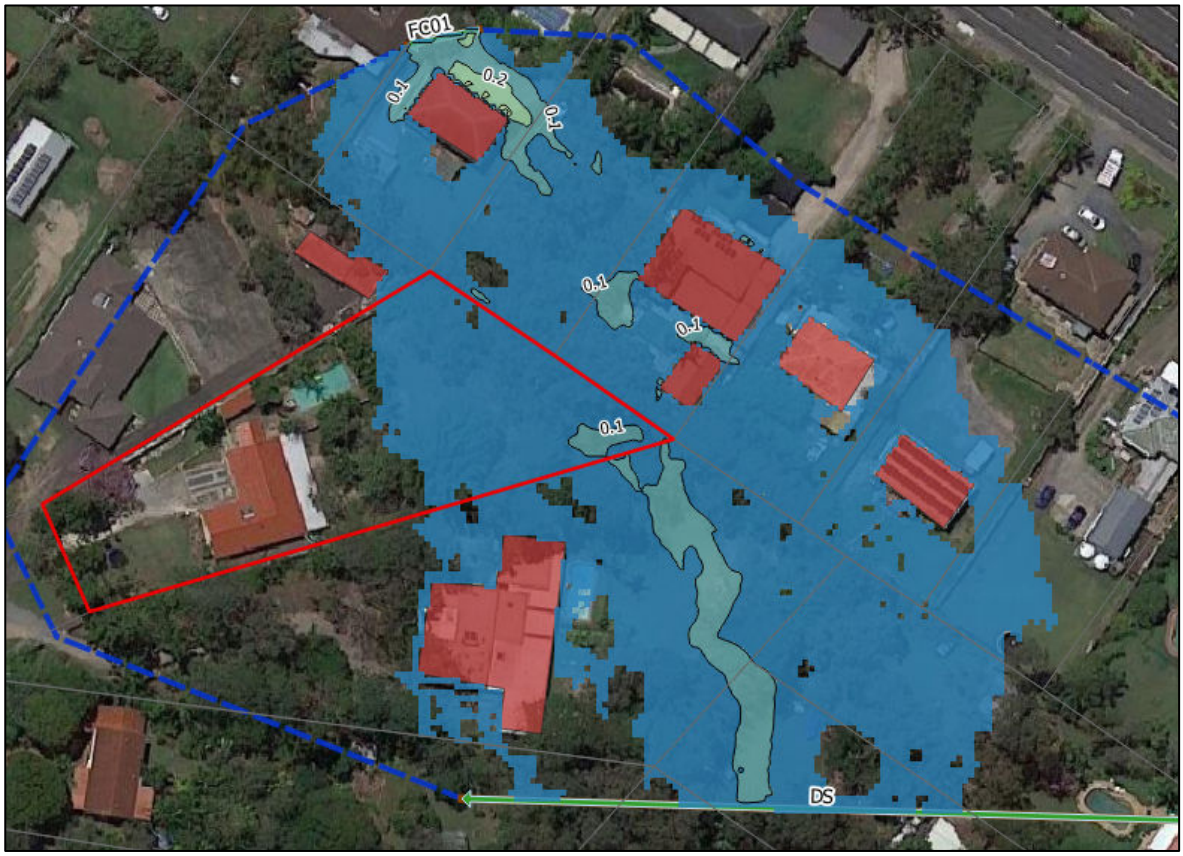

Figure 4.5 – Existing 1% AEP Velocity-Depth Products (m^2/s)

4.3 TUFLOW Model Setup – Developed

Figure 4.6 – Developed Model Modifications

The existing TUFLOW model was modified to include the portion of the proposed development which would partially obstruct the overland flow. Figure 4.6 above presents the extents of the modelled obstruction. The eastern-most two units will be constructed on a suspended floor and was thus not included as part of the development obstruction.

All other model inputs and parameters remain the same as the existing model. The developed model was run with a timestep of 0.2 seconds for a period of 1 hour. The results of the developed TUFLOW model are presented in the following section.

4.4 TUFLOW Model Results – Developed

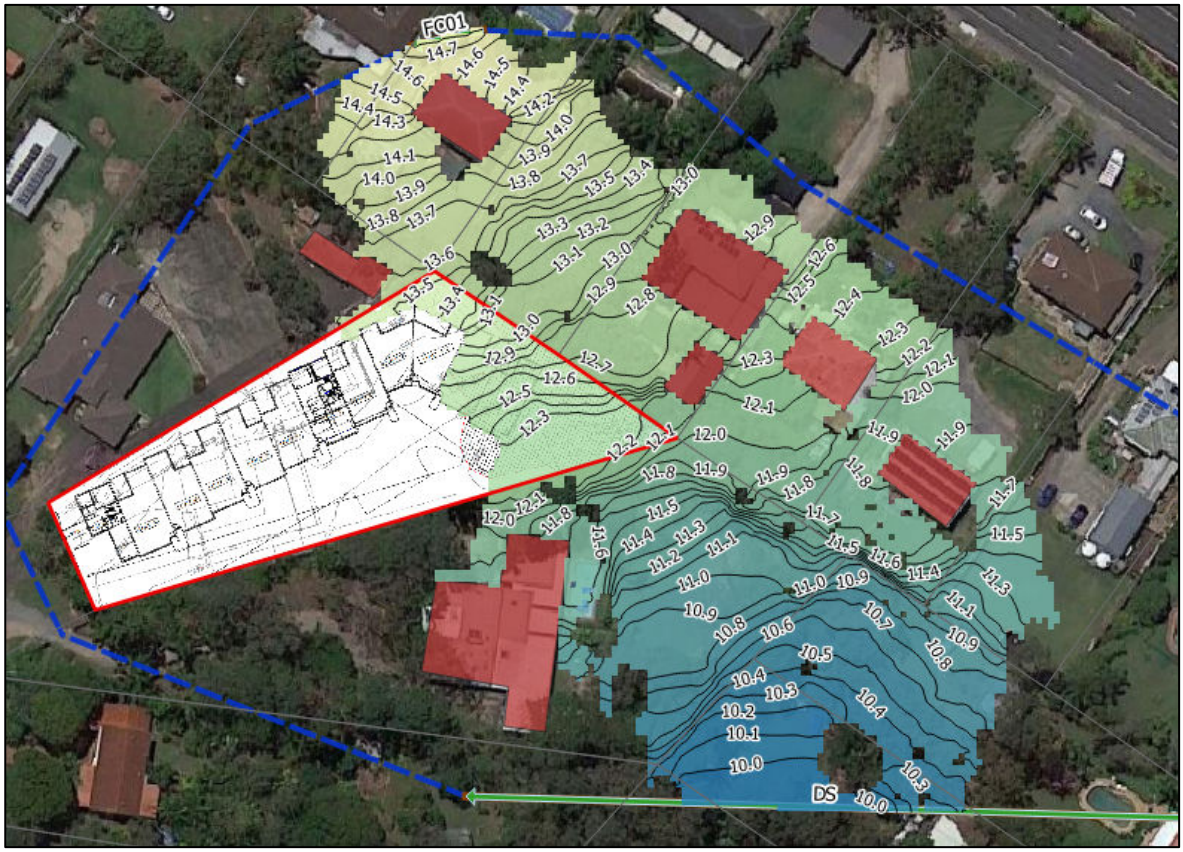

Figure 4.7 – Developed 1% AEP Inundation Levels (metres AHD)

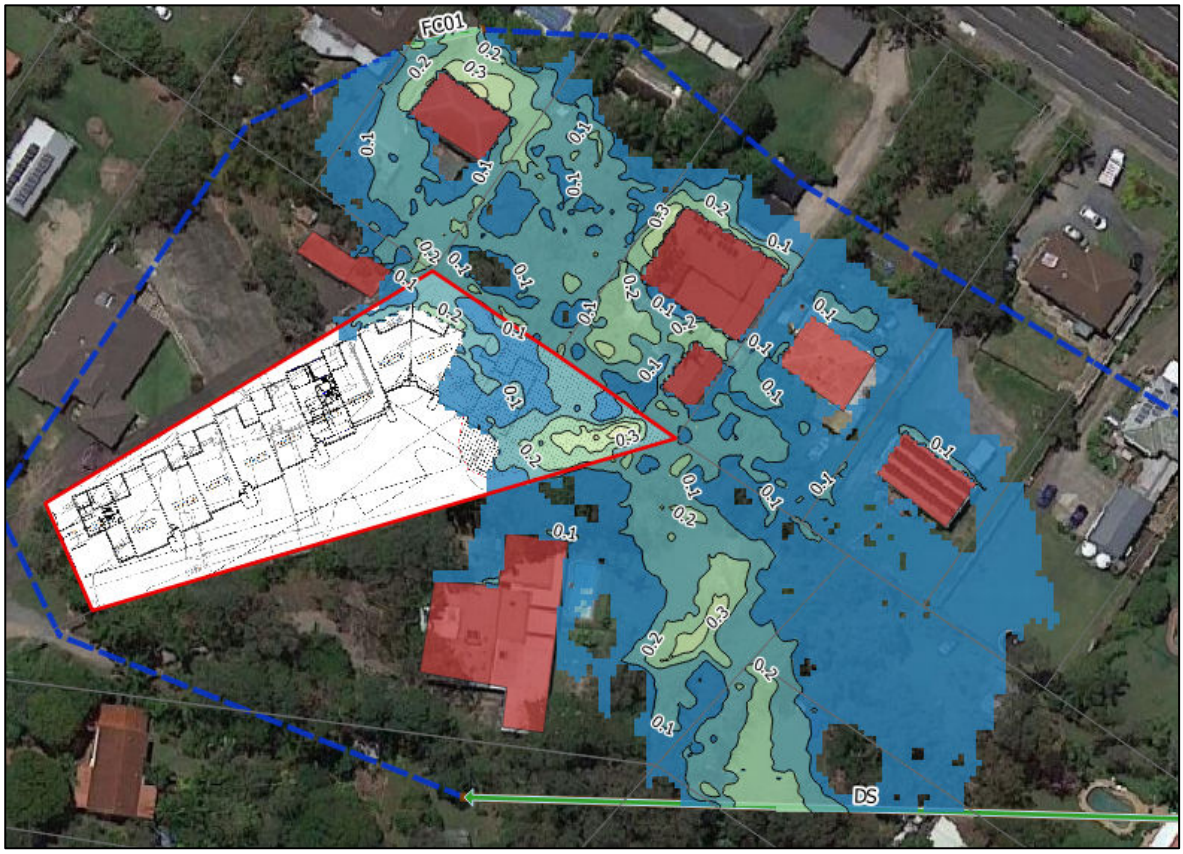

Figure 4.8 – Developed 1% AEP Inundation Depths (metres)

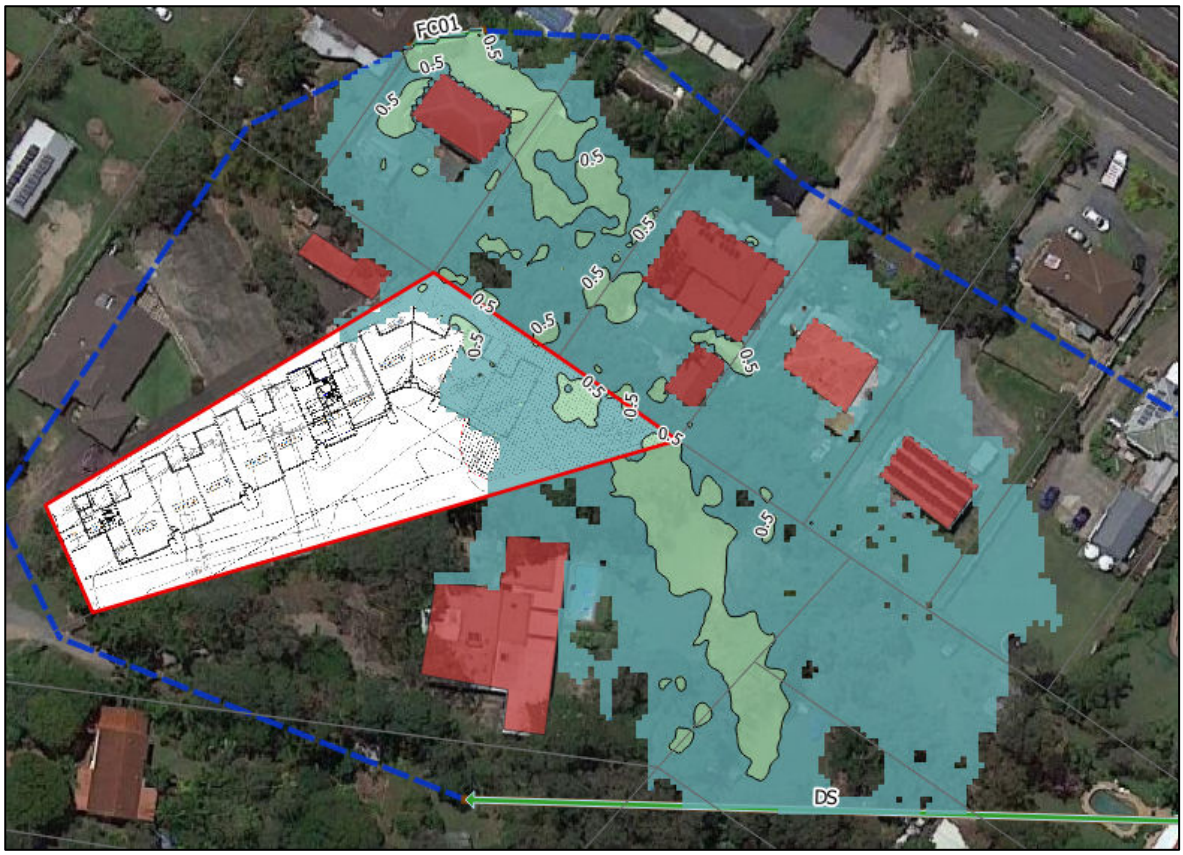

Figure 4.9 – Developed 1% AEP Velocities (m/s)

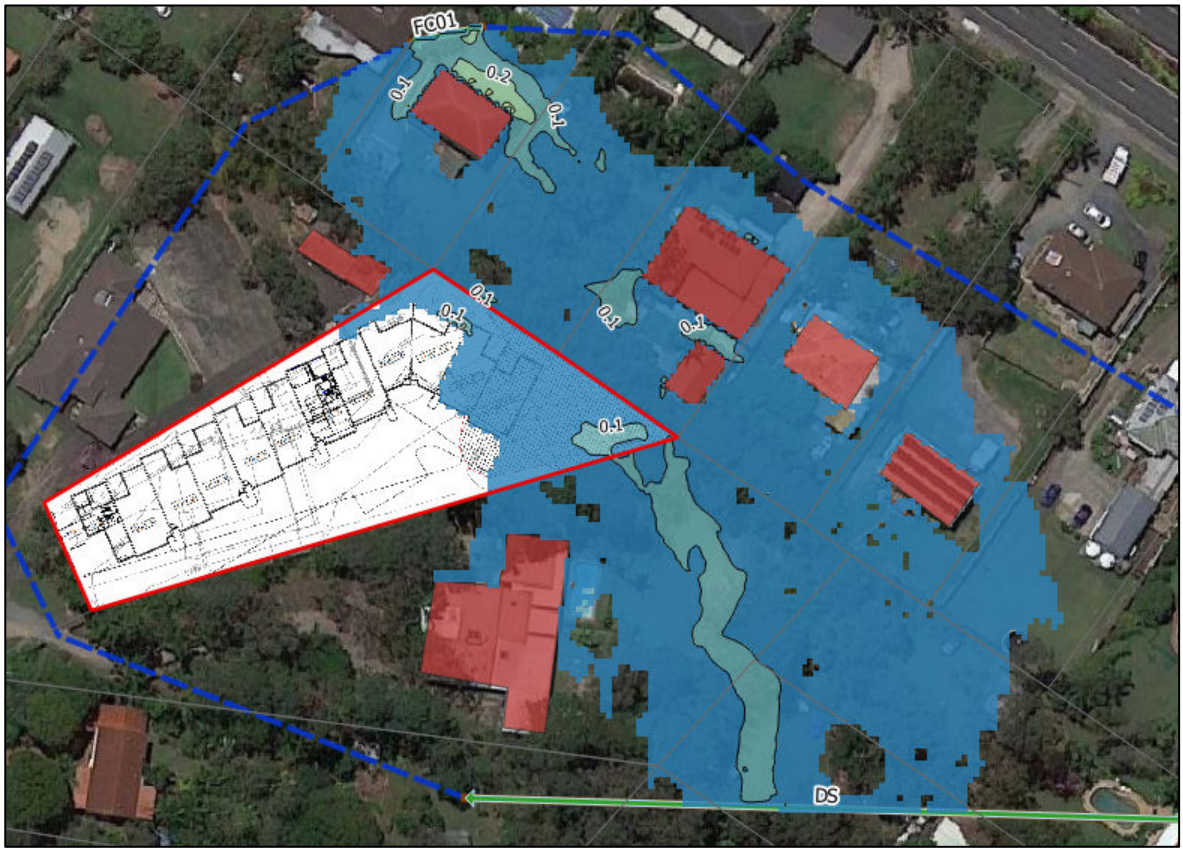

Figure 4.10 – Developed 1% AEP Velocity-Depth Products (m^2/s)

4.5 Discussion of Results

A comparison between the existing inundation levels and the developed inundation levels is presented in the afflux impact plot below.

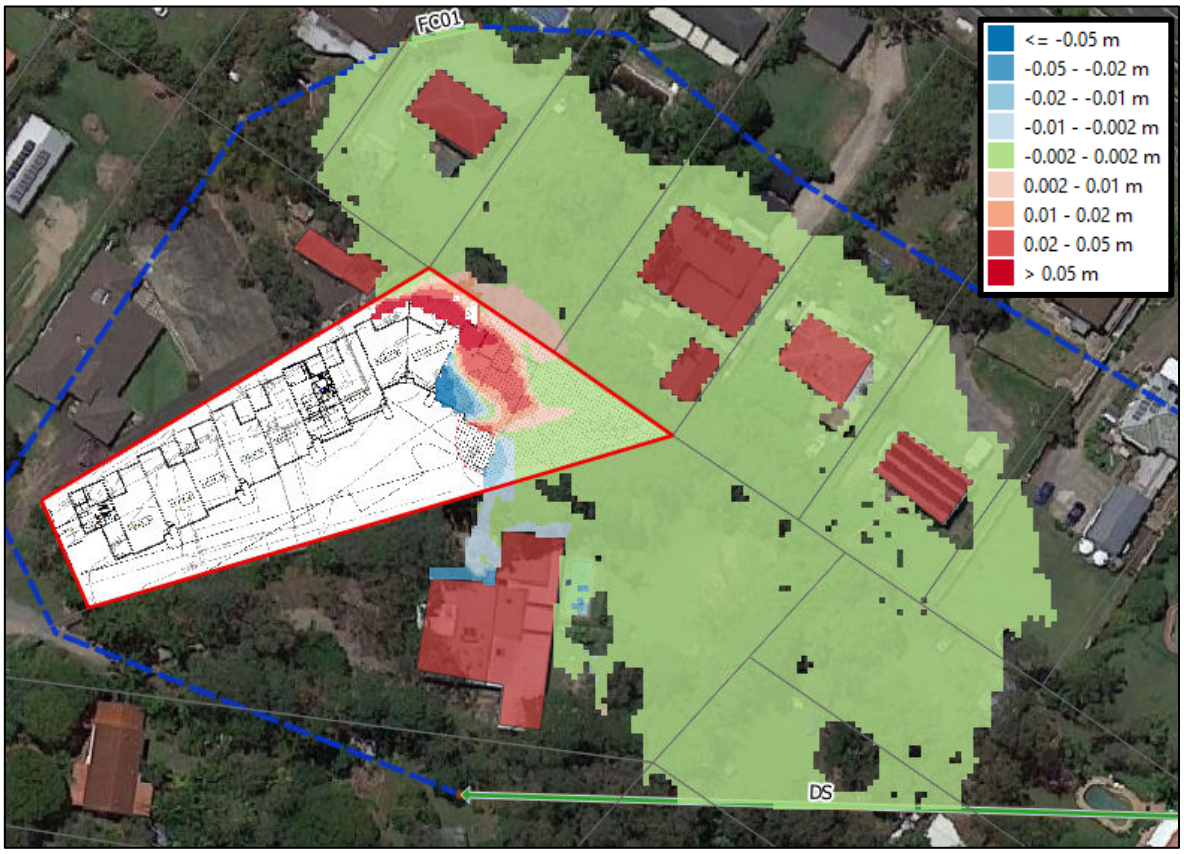

Figure 4.11 – Afflux Impact Plot

The above results show that the majority of the hydraulic impacts created by the proposed development would be located within the property boundaries. Minor localised hydraulic impacts are observed along the rear of the north-eastern adjoining properties. These minor impacts are located well away from any existing buildings or structures. The proposed development is therefore not anticipated to create any material worsening on adjoining properties.

The maximum flow velocity is less than 1.5 m/s. The development would need to be adequately designed to withstand the hydrostatic and hydrodynamic forces associated with a maximum flow depth of 0.2 m and a maximum flow velocity of 1 m/s in order to satisfy the Queensland Development Code MP 3.5.

4.6 Minimum Floor Levels

The Flood Hazard Overlay Code requires building floor levels to achieve 500 mm of freeboard above the adjoining maximum 1% AEP overland flow. Units 7 to 12 are the only units potentially affected by the modelled 1% AEP overland flow and would therefore need to meet the requirements of the Flood Hazard Overlay Code. Units 1 to 6 would not need to meet the minimum floor level criteria in the Flood Hazard Overlay Code, but need to ensure that the floor levels are at least 150 mm above the higher of the levels of the internal driveway at the front of each unit, or the levels of the backyard of each unit (to prevent the intrusion of surface sheet flow). A summary of the minimum floor level requirements for each unit is presented below.

Table 4.1 – Recommended Minimum Floor Levels

Unit	Requirement	Minimum Floor Level
#	---	m AHD
1 to 6	NCC Requirement: At least 150 mm above the higher of the levels of the internal driveway at the front of each unit, or the levels of the backyard of each unit	---
7 to 10	1% AEP + 500 mm	14.0
11	1% AEP + 500 mm	13.8
12	1% AEP + 500 mm	13.5

The ground levels of the backyards of Units 7 to 12 will need to remain at the existing surface levels to prevent the diversion of surface runoff toward Units 1 to 6.

5.0 CONCLUSIONS

This Flood Hazard Overlay Code Assessment Report was prepared to assess the 1% AEP overland flow extent affecting the proposed development on 59 Solomon Avenue, Loganholme.

TUFLOW models were set up of the existing and developed site conditions. The model results show that the majority of the hydraulic impacts created by the proposed development would be located within the property boundaries. Minor localised hydraulic impacts are observed along the rear of the north-eastern adjoining properties. These minor impacts are located well away from any existing buildings or structures. The proposed development is therefore not anticipated to create any material worsening on adjoining properties.

The Flood Hazard Overlay Code requires building floor levels to achieve 500 mm of freeboard above the adjoining maximum 1% AEP overland flow. A summary of the minimum floor level requirements for each unit is presented in Table 4.1. The ground levels of the backyards of Units 7 to 12 will need to remain at the existing surface levels to prevent the diversion of surface runoff toward Units 1 to 6.

The maximum flow velocity is less than 1.5 m/s. The development would need to be adequately designed to withstand the hydrostatic and hydrodynamic forces associated with a maximum flow depth of 0.2 m and a maximum flow velocity of 1 m/s in order to satisfy the Queensland Development Code MP 3.5.

A response to the Flood Hazard Overlay Code is presented in Appendix F.

Darren Rogers
BE Civil (Hons), MIE Aust, RPEQ 5016
Director

LIST OF APPENDICIES

APPENDIX A

Development Plan

NEW DWELLING AT

NO 59. SOLOMON AVE. LOGANHOLME

FOR

R. HERHOLDT

DESIGN STAGE

DA ISSUE

DESIGNER

KOSCAD BUILDING DESIGN

KOSCAD AUSTRALIA PTY LTD
47. REUBEN ST.
CORNUBIA 4130.
P: 07 3806 0800
M: 0409 740 340
E: otto@koscad.com.au
W: www.koscad.com.au

ABN . 62 529 626 536
BSA LIC. No: 657045

DATE: 11/04/2022 3:48:58 PM

DRAWN: OK CHECKED: OK

PROJ No.: 766PR59S

ISSUE/ DETAILS	DATE
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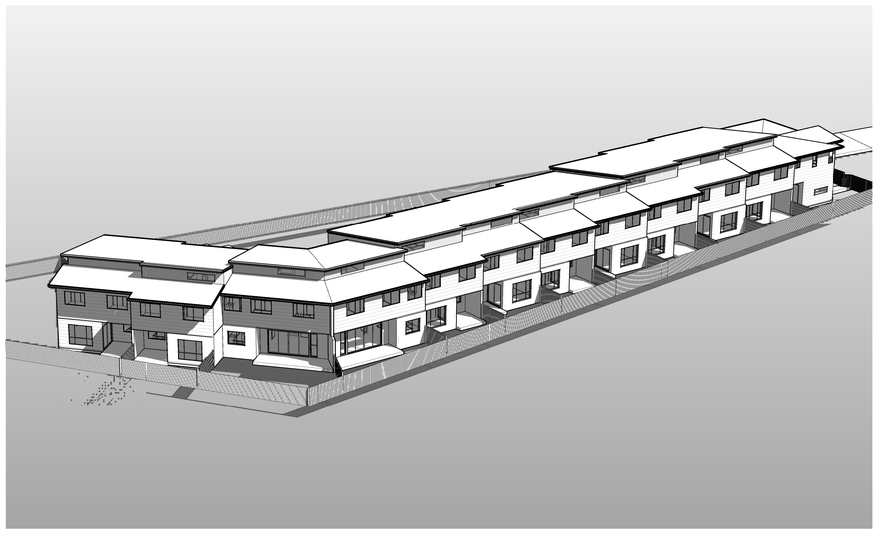
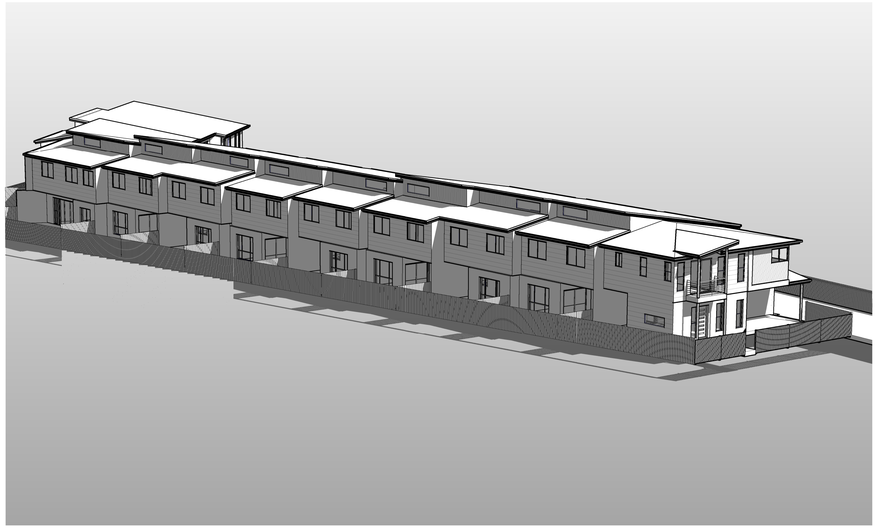
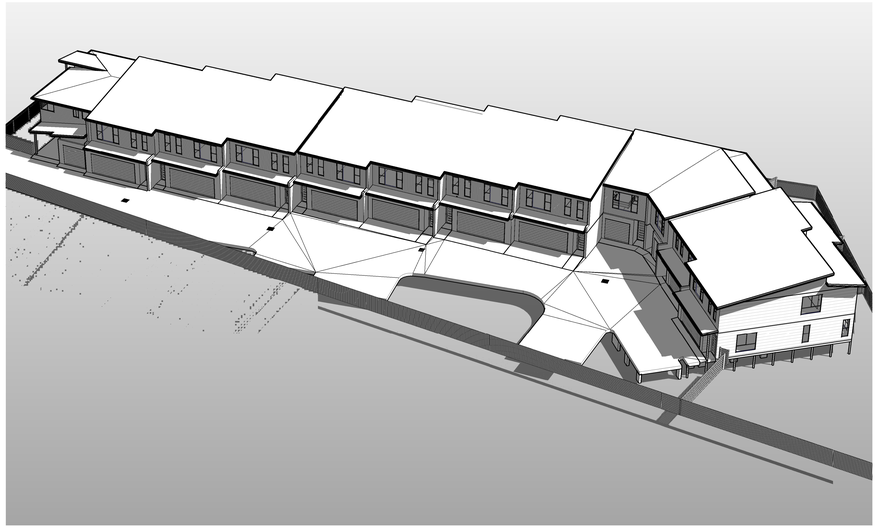
B / FOI ISSUE	24/09/21
C / AMEND. DA ISSUE	11/04/22





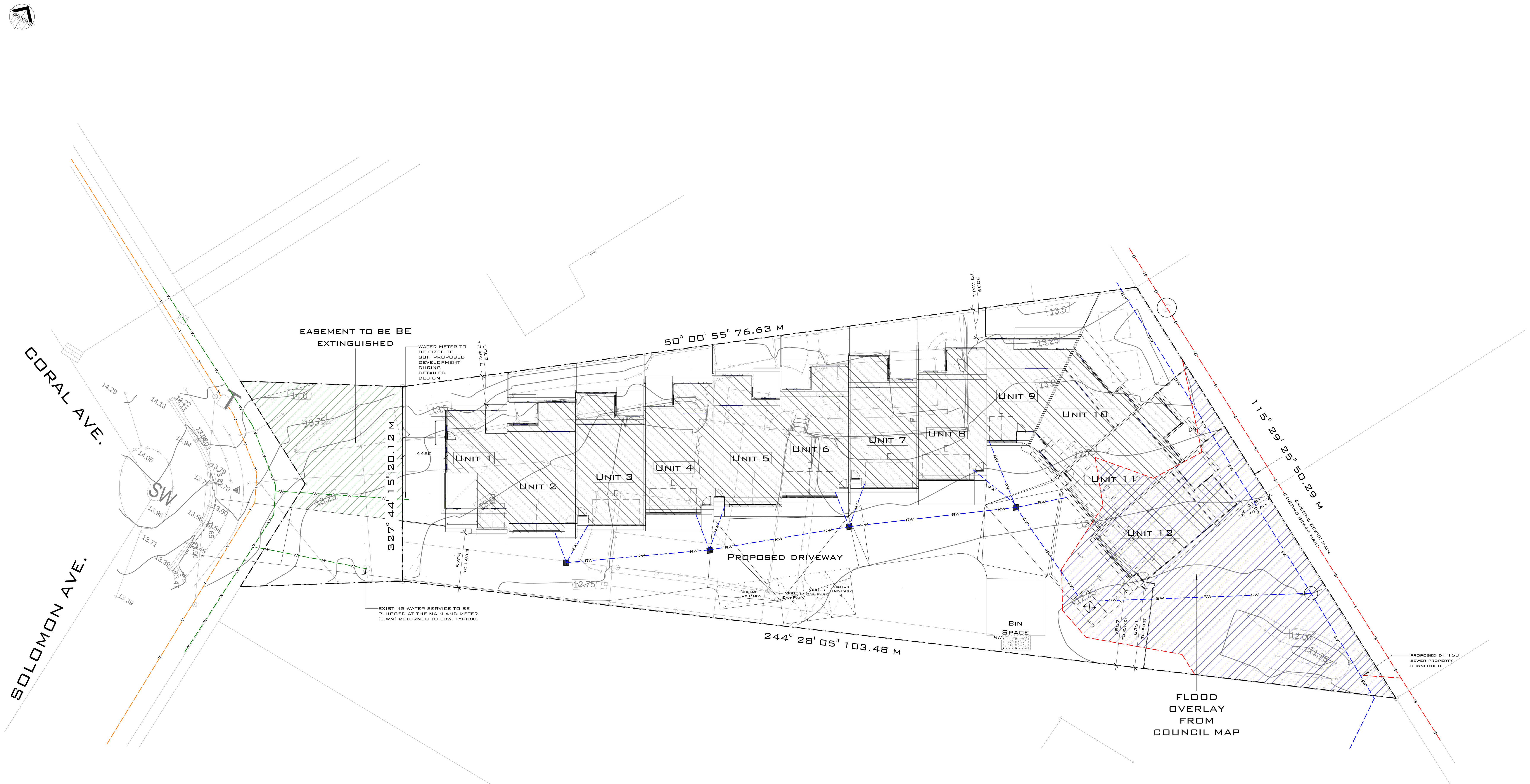


Area Schedule

UNIT 1 - LIVING (G.F)	55.7 m²
UNIT 1 - ALFRESCO	7.0 m²
UNIT 1 - PORCH	2.6 m²
UNIT 1 - CAR PORT	17.3 m²
UNIT 1 - LIVING (F.F.)	66.2 m²
UNIT 1 - DECK (F.F.)	2.6 m²
UNIT 2 - LIVING (G.F)	88.9 m²
UNIT 2 - ALFRESCO	8.6 m²
UNIT 2 - PORCH	1.2 m²
UNIT 2 - LIVING (F.F.)	89.3 m²
UNIT 3 - LIVING (G.F)	89.1 m²
UNIT 3 - ALFRESCO	8.7 m²
UNIT 3 - LIVING (F.F.)	89.1 m²
UNIT 3 - PORCH	1.2 m²
UNIT 4 - LIVING (G.F)	88.9 m²
UNIT 4 - ALFRESCO	8.6 m²
UNIT 4 - PORCH	1.2 m²
UNIT 4 - LIVING (F.F.)	89.1 m²
UNIT 5 - LIVING (G.F)	89.1 m²
UNIT 5 - ALFRESCO	8.7 m²
UNIT 5 - PORCH	1.2 m²
UNIT 5 - LIVING (F.F.)	88.9 m²
UNIT 6 - LIVING (G.F)	88.9 m²
UNIT 6 - ALFRESCO	8.6 m²
UNIT 6 - PORCH	1.2 m²
UNIT 6 - LIVING (F.F.)	89.1 m²

Area Schedule

UNIT 7 - LIVING (G.F)	89.1 m²
UNIT 7 - ALFRESCO	8.7 m²
UNIT 7 - PORCH	1.2 m²
UNIT 7 - LIVING (F.F.)	89.1 m²
UNIT 8 - LIVING (G.F)	89.2 m²
UNIT 8 - ALFRESCO	8.6 m²
UNIT 8 - PORCH	1.3 m²
UNIT 8 - LIVING (F.F.)	89.3 m²
UNIT 9 - LIVING (G.F)	68.7 m²
UNIT 9 - ALFRESCO	14.1 m²
UNIT 9 - PORCH	1.9 m²
UNIT 9 - LIVING (F.F.)	75.5 m²
UNIT 10 - LIVING (G.F)	68.6 m²
UNIT 10 - ALFRESCO	14.1 m²
UNIT 10 - PORCH	1.9 m²
UNIT 10 - LIVING (F.F.)	75.4 m²
UNIT 11 - LIVING (G.F)	89.1 m²
UNIT 11 - ALFRESCO	8.6 m²
UNIT 11 - PORCH	1.8 m²
UNIT 11 - LIVING (F.F.)	89.3 m²
UNIT 12 - LIVING (G.F)	87.2 m²
UNIT 12 - ALFRESCO	9.6 m²
UNIT 12 - PORCH	1.2 m²
UNIT 12 - LIVING (F.F.)	88.7 m²
Grand total	2163.1 m²



1 SITE PLAN
1 : 200

SITE INFORMATION:

R.P.D.:

Lot No.:	10
Plan No.:	R.P. 116425
Area:	2786m²

STORMWATER:

Roof water to flow to street to join existing council system via 100 dia U.P.V.C. stormwater lines at 1:100 minimum fall.

WIND CLASSIFICATION: N2

SITE COVER:

Site Cover: 1106.4M² OR 40%

FLOOR R.L.:

Main Pad R.L.	Approx. 12.7
Main Floor R.L.	Approx. 13.0

USE FIGURED DIMENSIONS. DO NOT SCALE FROM THE DRAWINGS. CONFIRM ALL DIMENSIONS ON SITE PRIOR TO FABRICATION OR CONSTRUCTION. IT REMAINS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE COMPLIANCE WITH RELEVANT CODES AND REGULATIONS IS MAINTAINED AT ALL TIMES

DATE	ISSUE / AMENDMENT
31/08/21	A / FOR PRE-LODGEMENT
24/03/22	B / DA ISSUE
11/04/22	C / AMEND. DA ISSUE

DESIGNER
KOSCAD BUILDING DESIGN
KOSCAD AUSTRALIA PTY LTD
47. REUBEN ST.
CORNUBIA 4130.
P: 07 3806 0800
M: 0409 740 340
E: ottok@koscad.com.au
W: www.koscad.com.au
ABN 62 529 626 536
BSA LIC. No: 657045

WIND LOADING : N2

PROJECT: NO 59. SOLOMON AVE. LOGANHOLME

CLIENT: R. HERHOLDT

TITLE: SITE PLAN

DATE: 11/04/2022 3:48:58 PM

SCALE: 1 : 200 @A0

DRAWN: OK CHECKED: OK

PROJ No.: 766PR59S

DWG No.: A002 ISSUE C

SITE AREA CALCULATIONS

Site Area =	2786m²

SITE COVERAGE

Required =	1671.6m² (60%)
Provided =	1106.4m² (39.7%)

LANDSCAPING

In accordance with Multiple Dwelling Code P6

Required =	417.9m² (15%)
Provided =	
(hatched)	Landscaping (Incl. permeable paved areas) 435.714m² (15.6%)
(green)	Private oepn spaces 812.1m² (29.1%)
(grey)	Communal open spaces 73.6m² (2.6%)
Total:	1049.8 (37.7%)

1 AREA PLAN
1 : 100

USE FIGURED DIMENSIONS. DO NOT SCALE FROM THE DRAWINGS. CONFIRM ALL DIMENSIONS ON SITE PRIOR TO FABRICATION OR CONSTRUCTION. IT REMAINS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE COMPLIANCE WITH RELEVANT CODES AND REGULATIONS IS MAINTAINED AT ALL TIMES

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W: www.koscad.com.au
ABN 62 529 626 536
BSA LIC. No: 657045

WIND LOADING : N2

PROJECT: NO 59. SOLOMON AVE. LOGANHOLME

CLIENT: R. HERHOLDT

TITLE: AREA PLAN

DATE: 11/04/2022 3:49:00 PM

SCALE: 1 : 100 @A0

DRAWN: OK CHECKED: OK

PROJ No.: 766PR59S

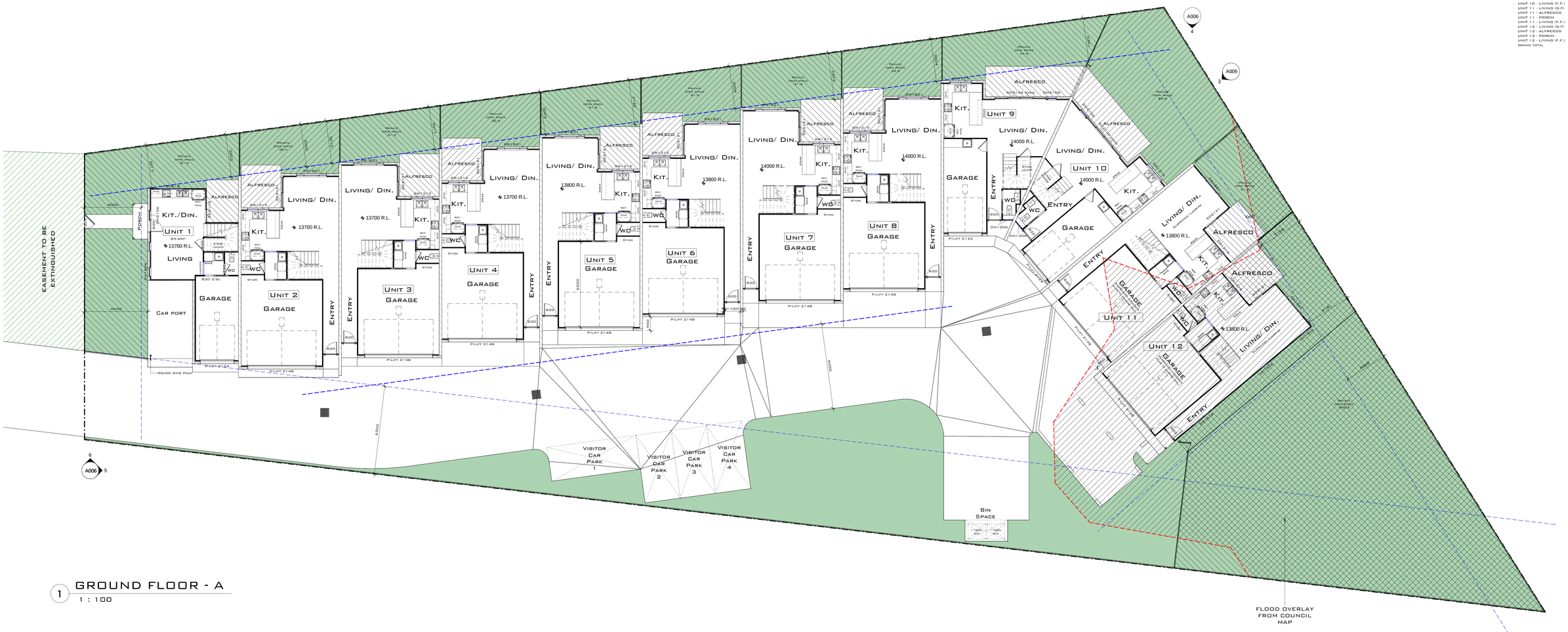
DWG No.: A003 ISSUE C

LEGEND:

- Taps
- Shower Rose
- Taps + Shower Rose

NOTE:

- 3740 G.F. Ceiling Height
- 2400 G.F. External Joinery Height
- 2745 F.F. Ceiling Height
- All windows on First and Second floors that have openings below 1700mm sill height must be protected with a fall prevention device or restricted to a max. opening of 125mm as per BCA requirements.



1 GROUND FLOOR - A

1 : 100

Area Schedule

UNIT 1 - LIVING (G.F)	55.7 m²
UNIT 1 - ALFRESCO	7.0 m²
UNIT 1 - PORCH	2.4 m²
UNIT 1 - CAR PORT	17.3 m²
UNIT 1 - LIVING (F.F.)	65.2 m²
UNIT 1 - DECK (F.F.)	2.4 m²
UNIT 2 - LIVING (G.F)	88.9 m²
UNIT 2 - ALFRESCO	8.4 m²
UNIT 2 - PORCH	1.2 m²
UNIT 2 - LIVING (F.F.)	89.3 m²
UNIT 3 - LIVING (G.F)	89.1 m²
UNIT 3 - ALFRESCO	8.7 m²
UNIT 3 - LIVING (F.F.)	89.1 m²
UNIT 3 - PORCH	1.2 m²
UNIT 4 - LIVING (G.F)	88.9 m²
UNIT 4 - ALFRESCO	8.4 m²
UNIT 4 - PORCH	1.2 m²
UNIT 4 - LIVING (F.F.)	89.1 m²
UNIT 5 - LIVING (G.F)	89.1 m²
UNIT 5 - ALFRESCO	8.7 m²
UNIT 5 - PORCH	1.2 m²
UNIT 5 - LIVING (F.F.)	88.9 m²
UNIT 6 - LIVING (G.F)	88.9 m²
UNIT 6 - ALFRESCO	8.4 m²
UNIT 6 - PORCH	1.2 m²
UNIT 6 - LIVING (F.F.)	89.1 m²
UNIT 7 - LIVING (G.F)	89.1 m²
UNIT 7 - ALFRESCO	8.7 m²
UNIT 7 - PORCH	1.2 m²
UNIT 7 - LIVING (F.F.)	89.1 m²
UNIT 8 - LIVING (G.F)	89.2 m²
UNIT 8 - ALFRESCO	8.4 m²
UNIT 8 - PORCH	1.3 m²
UNIT 8 - LIVING (F.F.)	89.3 m²
UNIT 9 - LIVING (G.F)	68.7 m²
UNIT 9 - ALFRESCO	14.1 m²
UNIT 9 - PORCH	1.9 m²
UNIT 9 - LIVING (F.F.)	75.5 m²
UNIT 10 - LIVING (G.F)	68.6 m²
UNIT 10 - ALFRESCO	14.1 m²
UNIT 10 - PORCH	1.9 m²
UNIT 10 - LIVING (F.F.)	75.4 m²
UNIT 11 - LIVING (G.F)	89.1 m²
UNIT 11 - ALFRESCO	8.4 m²
UNIT 11 - PORCH	1.8 m²
UNIT 11 - LIVING (F.F.)	89.3 m²
UNIT 12 - LIVING (G.F)	87.2 m²
UNIT 12 - ALFRESCO	9.4 m²
UNIT 12 - PORCH	1.2 m²
UNIT 12 - LIVING (F.F.)	88.7 m²
Grand Total	2163.1 m²

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31/08/21	A / FOR PRE-LODGEMENT
24/03/22	B / DA ISSUE
11/04/22	C / AMEND. DA ISSUE

DESIGNER

KOSCAD BUILDING DESIGN

KOSCAD AUSTRALIA PTY LTD
47 REUBEN ST.
CORNUBIA 4130.
P: 07 3806 0800
M: 0409 740 340
E: info@koscad.com.au
W: www.koscad.com.au

ABN 62 529 626 536
BSA LIC. No. 657045

WIND LOADING : N2

PROJECT: NO 59. SOLOMON AVE. LOGANHOLME

CLIENT: R. HERHOLDT

TITLE: GROUND FLOOR

DATE: 11/04/2022 3:48:03 PM

SCALE: 1 : 100 @A0

DRAWN: OK CHECKED: OK

PROJ No.: 766PR59S

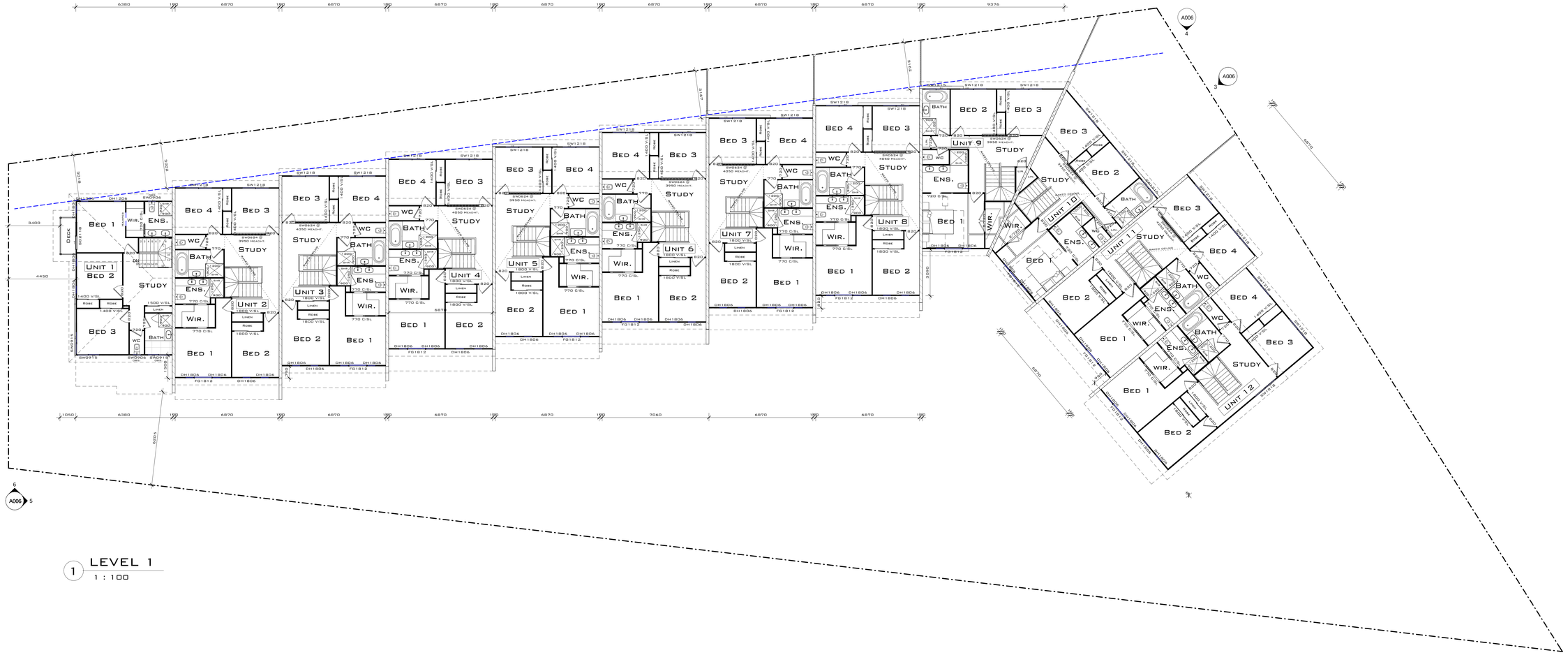
DWG No.: A004 ISSUE: C

LEGEND:

- TAPS
- SHOWER ROSE
- TAPS + SHOWER ROSE

NOTE:

-2740 G.F. CEILING HEIGHT
-2400 G.F. EXTERNAL JOINERY HEIGHT
-2340 G.F. INTERNAL DOOR HEIGHT
-ALL WINDOWS ON FIRST AND SECOND FLOORS THAT HAVE OPENINGS BELOW 1700mm ABOVE FLOOR LEVEL ARE PROTECTED WITH A FALL PREVENTION DEVICE OR RESTRICTED TO A MAX. OPENING OF 125mm AS PER BCA REQUIREMENTS.



1 LEVEL 1
1 : 100

USE FIGURED DIMENSIONS. DO NOT SCALE FROM THE DRAWINGS. CONFIRM ALL DIMENSIONS ON SITE PRIOR TO FABRICATION OR CONSTRUCTION. IT REMAINS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE COMPLIANCE WITH BUILDING CODES AND REGULATIONS IS MAINTAINED AT ALL TIMES.

DATE	ISSUE / AMENDMENT
31/08/21	A / FOR PRE-LODGEMENT
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ABN: 62 529 626 536
BSA LIC. No: 657045

WIND LOADING : N2

PROJECT:
NO 59. SOLOMON AVE.
LOGANHOLME

CLIENT: R. HERHOLDT

TITLE: FIRST FLOOR

DATE: 11/04/2022 3:49:04 PM

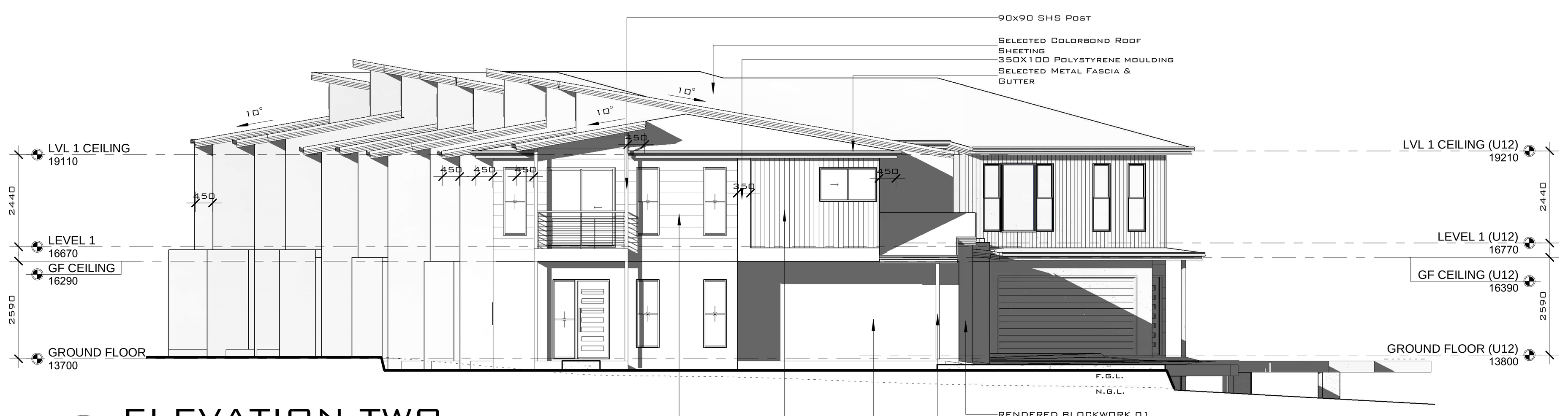
SCALE: 1 : 100 @A0

DRAWN: OK CHECKED: OK

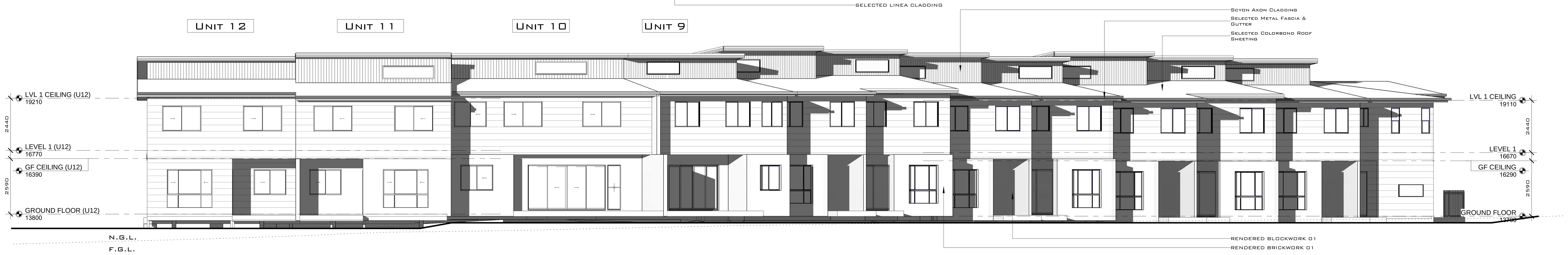
PROJ NO.: 766PR59S

DWG No.: A005 ISSUE: C

1 ELEVATION ONE
1 : 100

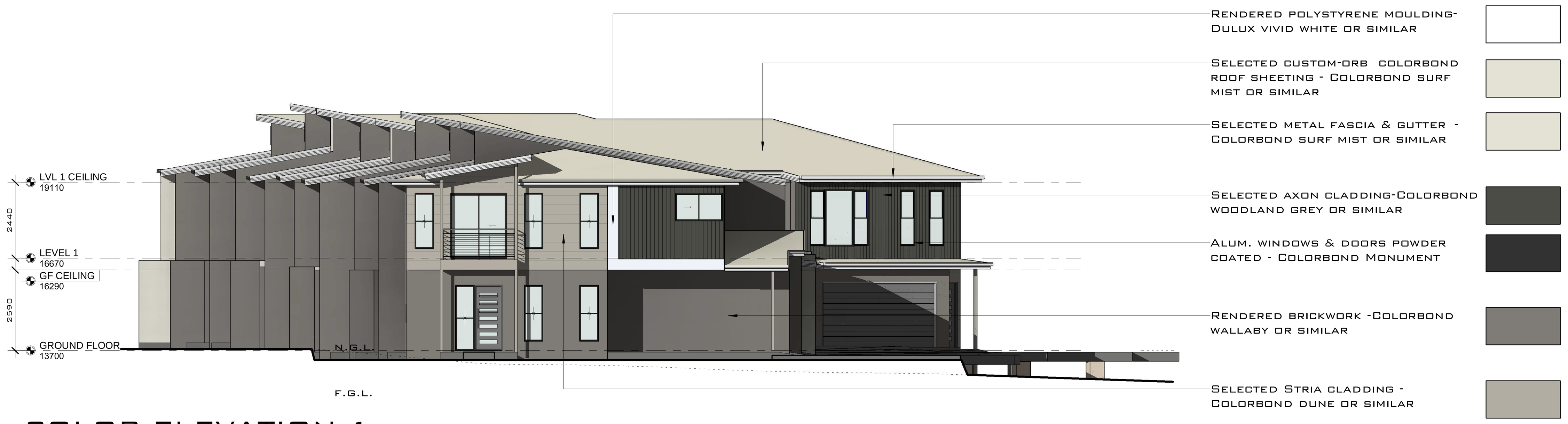


2 ELEVATION TWO
1 : 100



3 ELEVATION THREE
1 : 100

4 ELEVATION FOUR
1 : 100



5 COLOR ELEVATION 1
1 : 100

6 COLOR ELEVATION 2
1 : 100

USE FIGURED DIMENSIONS. DO NOT SCALE FROM THE DRAWINGS. CONFIRM ALL DIMENSIONS ON SITE PRIOR TO FABRICATION OR CONSTRUCTION. IT REMAINS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE COMPLIANCE WITH RELEVANT CODES AND REGULATIONS IS MAINTAINED AT ALL TIMES

DATE	ISSUE / AMENDMENT
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W: www.koscad.com.au
ABN 62 529 626 536
BSA LIC. No: 657045

WIND LOADING : N2

PROJECT: NO 59. SOLOMON AVE. LOGANHOLME

CLIENT: R. HERHOLDT

TITLE: ELEVATIONS

DATE: 11/04/2022 3:49:46 PM

SCALE: 1 : 100 @A0

DRAWN: OK CHECKED: OK

PROJ No.: 766PR59S

DWG No.: A006 ISSUE C

APPENDIX B

Photographs

Photograph 1 – Existing house

Photograph 2 – Front of existing property

APPENDIX C

Rational Method Calculations

RATIONAL METHOD CALCULATIONS

Table C 1 a

Project: Solomon Ave — **J8843**

Location: Point 1 - Total Flow - DS

Comments: Existing Site / Developed Catchment

Time of Concentration		
Hardstand		
Standard Inlet Time	5	min
Travel Length	190	metres
Fall	5	metres
Travel Time (Argue)	2	min
Delta for	1.0	
Time of Concentration	**7.0**	**min**

Rainfall Data:
Rainfall Intensity Frequency Duration data for LOGAN

Sub-Areas and Runoff Coefficients

	Area	C10		Areas included in Calculations				Separate c100 > 1.0 and c100 < 1.0					
	ha	Exist	Dev	Condition	Area	C10	C10 x A	C10	C10	C10 x A	C10 x A	Area	Area
	3.19	0.84	0.84	**Developed**	**3.19**	**0.84**	**2.68**		0.84		2.68		3.19
					3.19		Sum			0.00	2.68	0.00	3.19
							Total		0.840		2.676		3.186
							Individual	0.000	0.840	0.000	2.676	0.000	3.186

Discharge Calculations

tc				**7.0**
C100>1		Average	c10	**0.840**
			Area (ha)	**3.19**
C100<1	**c10 - 2**	Average		**0.000**
			Area (ha)	**0.00**

Total Catchment
3.19 ha

Depth	ARI	Fy	Runoff Coefficients		Rainfall	Discharge m^3/s		
mm	years		C100>1	C100<1	(mm/hr)	1	2	Total
11	**1**	0.80	0.67	0.00	97.69	0.58	0.00	**0.58**
13	**2**	0.85	0.71	0.00	111.31	0.70	0.00	**0.70**
18	**5**	0.95	0.80	0.00	152.70	1.08	0.00	**1.08**
21	**10**	1.00	0.84	0.00	180.09	1.34	0.00	**1.34**
24	**20**	1.05	0.88	0.00	207.47	1.62	0.00	**1.62**
28	**50**	1.15	0.97	0.00	242.83	2.08	0.00	**2.08**
31	**100**	1.20	1.00	0.00	269.66	2.39	0.00	**2.39**
35	**200**	1.20	1.00	0.00	303.46	2.69	0.00	**2.69**
41	**500**	1.20	1.00	0.00	353.82	3.13	0.00	**3.13**

Frequent ARI's	Discharge m^3/s	% of Q_1
1mth	0.145	25%
2mth	0.232	40%
3mth	0.291	50%
4mth	0.349	60%
6mth	0.436	75%
9mth	0.523	90%
12mth	0.581	100%

APPENDIX D

URBS Model Files

8843_Dev.DAT – Catchment Parameters

```
"Index","Area","UM","UL","I"
#1,0.00374,1.00,0.00,0.70
#2,0.00171,1.00,0.00,0.70
#3,0.00477,1.00,0.00,0.70
#4,0.00439,1.00,0.00,0.70
#5,0.00396,1.00,0.00,0.70
#6,0.00294,1.00,0.00,0.70
#11,0.00030,1.00,0.00,0.90
#12,0.00031,1.00,0.00,0.90
#13,0.00032,1.00,0.00,0.90
#14,0.00038,1.00,0.00,0.90
#15,0.00021,1.00,0.00,0.90
#16,0.00030,1.00,0.00,0.90
#21,0.00007,1.00,0.00,0.70
#22,0.00006,1.00,0.00,0.50
#23,0.00007,1.00,0.00,0.50
#24,0.00015,1.00,0.00,0.50
#25,0.00035,1.00,0.00,0.05
#26,0.00013,1.00,0.00,0.50
#27,0.00011,1.00,0.00,0.90
#31,0.00086,1.00,0.00,0.70
#32,0.00162,1.00,0.00,0.70
#33,0.00058,1.00,0.00,0.70
#34,0.00160,1.00,0.00,0.70
#35,0.00083,1.00,0.00,0.70
#36,0.00058,1.00,0.00,0.70
```

8843_Dev.U – Routing

```
59 Solomon Ave, Loganholme - Development
MODEL: Basic
USES: L, U
Default Parameters: alpha=1.20 m=0.8
Catchment File=8843_Dev.dat

Rain    #1      L=0.038
Route thru      #2      L=0.018
Add Rain        #2      L=0.036
Route thru      #4      L=0.041
Store.
Rain    #3      L=0.037
Route thru      #4      L=0.037
Add Rain        #4      L=0.021
Store.
Rain    #5      L=0.029
Route thru      #6      L=0.029
Add Rain        #6      L=0.029
Route thru      #4      L=0.037
Get.
Get.
Loss C=0.25 F= Q= BYPASS=525DIA
Print. FC01
Route thru      #4      L=0.050
Store.
Rain    #31     L=0.013
Route thru      #32     L=0.021
Add Rain        #32     L=0.022
Route thru      #33     L=0.013
Add Rain        #33     L=0.027
Store.
Rain    #34     L=0.018
Route thru      #35     L=0.013
Add Rain        #35     L=0.012
Route thru      #36     L=0.012
Add Rain        #36     L=0.017
Get.
Print. FC03
Store.
Rain    #11     L=0.007
Route thru      #12     L=0.007
Add Rain        #12     L=0.007
Route thru      #13     L=0.007
Add Rain        #13     L=0.007
Route thru      #14     L=0.007
Add Rain        #14     L=0.008
Route thru      #15     L=0.007
Add Rain        #15     L=0.006
Route thru      #16     L=0.007
```

```
Add Rain       #16     L=0.007
Route thru     #25     L=0.009
Store.
Rain    #21    L=0.009
Route thru     #22     L=0.015
Add Rain       #22     L=0.013
Route thru     #23     L=0.014
Add Rain       #23     L=0.014
Route thru     #24     L=0.019
Add Rain       #24     L=0.017
Route thru     #25     L=0.012
Store.
Rain    #27    L=0.011
Route thru     #26     L=0.013
Add Rain       #26     L=0.011
Route thru     #25     L=0.015
Get.
Get.
Add Rain       #25     L=0.018
Print. FC02
Get.
Get.
Print. POINT-1
Input. 525DIA
Print. TOTAL
end of catchment details.
```

APPENDIX E

Stormwater Pipe Plans


1500 mm
375 mm
1500 mm
450 mm
450 mm
525 mm
525 mm
675 mm

APPENDIX F

Flood Hazard Overlay Code Response

8.2.5 Flood hazard overlay code

8.2.5.1 Application

1. This code applies to accepted development (subject to requirements) and assessable development for which the Flood hazard overlay code is identified in the 'assessment benchmarks for assessable development and requirements for accepted development' column in Table 5.10.5.1 - Flood hazard overlay map OM-05.00 in Part 5 - Tables of assessment.
2. When using this code, reference should be made to section 5.3.2 - Determining the criteria of development and category of assessment and, where applicable, section 5.3.3 - Determining the requirements for accepted development and assessment benchmarks and other matters for assessable development located in Part 5 - Tables of assessment.

Editor's Note - This overlay deals with inundation as a result of waterways overtopping their banks. It does not address localised stormwater runoff making its way into a waterway.
Note - Pursuant to section 32(a) of the *Building Act 1975* and section 13(1)(a) of the *Building Regulation 2006*, land identified as a Flooding and inundation area on Flood hazard overlay map OM-05.00 is designated as a 'natural hazard management area (flood)'.
Note - Floods larger than the DFE can occur, which may cause development at the margins of the natural hazard management area (flood) to be indirectly affected by flooding and therefore may not be able to serve their critical function. Particular attention should be paid to community infrastructure and the State Planning Policy requirements for their respective flood immunities.

8.2.5.2 Purpose

1. The purpose of the Flood hazard overlay code is to ensure development:
    a. is compatible with the nature of the natural flood hazard;
    b. does not cause injury, loss of life or damage to premises and property due to flooding or storm tide inundation;
    c. does not increase the emergency management burden on neighbours, the community or the local government.
2. The purpose of the code will be achieved through the following overall outcomes:
    a. Development:
        i. does not result in people and premises being at an unacceptable risk during a defined flood event;
        ii. protects the flood storage and discharge capacity of the flood plain;
        iii. does not exacerbate the extent or severity of flooding or flood risk;
        iv. protects and enhances the flood resilience (safety) of the community, including properties, infrastructure and amenities;
        v. does not adversely affect public safety and the environment from the impact of flooding on hazardous materials;
        vi. does not add to the emergency management or evacuation burden during and after a flood event.

8.2.5.3 Assessment benchmarks for assessment development and requirements for accepted development

Part A - Requirements for accepted development (subject to requirements) and assessment benchmarks for assessable development

Table 8.2.5.3.1 - Flood hazard overlay code: accepted development (subject to requirements) and assessable development

Performance outcomes	Acceptable outcomes	**Comments**
For accepted development (subject to requirements) and assessable development		
Risk to people and premises		
PO1 A building floor level of a habitable room has adequate allowance for the hydraulic gradient above the main floodway.	**AO1** A building has a finished habitable floor level a minimum of 500mm above the defined flood event.	Recommended levels comply with AO1.
PO2 Development must not increase the level of risk of injury to life or risk of damage to property or adversely affect flood evacuation procedures.	**AO2** Development: a. does not result in any of the following: i. an increase in the number of people at risk from flooding up to and including the defined flood event; or ii. an increase in the number of people that need evacuation up to and including the defined flood event; or iii. an increase in the number of premises or infrastructure at risk from flooding up to and including the defined flood event; or	**Development:** **a. does not result in any of the following:** **i. an increase in the number of people at risk from flooding up to and including the defined flood event; or** **ii. an increase in the number of people that need evacuation up to and including the defined flood event; or** **iii. an increase in the number of premises or infrastructure at risk from flooding up to and including the defined flood event; or**

	iv. existing flood warning times being reduced for flood events up to and including the defined flood event; or v. an adverse impact on the ability of traffic to use evacuation routes or unreasonably increase traffic volumes on evacuation routes; or b. is located entirely within a development envelope area approved by an earlier development approval.	iv. **existing flood warning times being reduced for flood events up to and including the defined flood event; or** v. **an adverse impact on the ability of traffic to use evacuation routes or unreasonably increase traffic volumes on evacuation routes**
For assessable development		
Risk to people and premises		
PO3 Development provides a development envelope area that is above the flood level during the defined flood event.	**AO3** Development provides a development envelope area above the flood level during the defined flood event with a minimum size and dimension specified in Table 8.2.5.3.2 - Development envelope area.	**Development provides a development envelope area above the flood level during the defined flood event with a minimum size and dimension specified in Table 8.2.5.3.2 - Development envelope area.**
PO4 Public safety and the environment are not adversely affected by floodwater by: a. locating a Medium impact industry or High impact industry to be able to function safely during and immediately after flood events; b. safely storing hazardous materials.	**AO4** Development: a. for a Medium impact industry or High impact industry is above the flood level specified in column 2 of Table 8.2.5.3.3 - Minimum flood levels; b. involving the storage, sale or use of hazardous materials is located above the flood level during the defined flood event.	**NA**
PO5 A car park other than a Parking station is only located below the flood level during the defined	**AO5** No acceptable outcome provided.	**NA**

flood event where there is no increase in risk to: a. pedestrian and vehicular safety; b. a building or other structure. Note - Section 4.1 - Guidelines for satisfying flood hazard overlay code in Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.		
PO6 Development for any of the uses identified in column 1 of Table 8.2.5.3.3 - Minimum flood levels, are able to function effectively during and immediately after flood events. Note - Compliance with this performance outcome is to be demonstrated by a flood study report prepared in accordance with section 2.5.1 of Planning scheme policy 5 - Infrastructure Note - Section 4.1 - Guidelines for satisfying flood hazard overlay of Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.	**AO6** Development for any of the uses identified in column 1 of Table 8.2.5.3.3 - Minimum flood levels is located above the flood level specified in column 2 of Table 8.2.5.3.3 - Minimum flood levels.	**NA**
Flood storage and discharge capacity		
PO7 An existing floodway is protected and maintained to ensure there are no losses of conveyance capacity of waterways and storage so as not to adversely affect other premises, infrastructure and the environment. Note - Compliance with this performance outcome is to be demonstrated by a flood study report prepared in accordance with section 2.5.1 of Planning scheme policy 5 - Infrastructure Note - Section 4.1 - Guidelines for satisfying flood hazard overlay of Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.	**AO7** No acceptable outcome provided.	**The proposed development is not anticipated to create any material worsening on adjoining properties.**

PO8 The natural conveyance of flood waters and natural overland flow paths are protected and maintained without adversely affecting adjoining premises. Note - Section 4.1 - Guidelines for satisfying flood hazard overlay of Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.	**AO8** No acceptable outcome provided.	**The natural conveyance of flood waters and natural overland flow paths are protected and maintained without adversely affecting adjoining premises.**
PO9 Development (or development in combination with other development) for all flood events up to and including the defined flood event does not do any of the following: a. cause or have the potential to cause damage; or b. cause ponding of flood water; or c. adversely affect the flood discharge capacity of the floodplain; or d. decrease the flood resilience of properties and infrastructure; or e. cause a cumulative increase in flood levels external to the premises. Note - Compliance with this performance outcome is to be demonstrated by a flood study report prepared in accordance with section 2.5.1 of Planning scheme policy 5 - Infrastructure Note - Section 4.1 - Guidelines for satisfying flood hazard overlay of Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.	**AO9** No acceptable outcome provided.	**Development does not do any of the following:** **a. cause or have the potential to cause damage; or** **b. cause ponding of flood water; or** **c. adversely affect the flood discharge capacity of the floodplain; or** **d. decrease the flood resilience of properties and infrastructure; or** **e. cause a cumulative increase in flood levels external to the premises.**
PO10 Any loss of floodplain storage is compensated with compensatory storage or excavation that:	**AO10** No acceptable outcome provided.	**NA – not located within a floodplain.**

a. is of equal volume, creating a balance of cut to fill; b. is free draining; c. is located within the premises; d. does not adversely affect the hydraulic conveyance capacity of the flood channel or floodplain; e. is provided to the corresponding flood level; f. is landscaped to provide visual amenity and erosion control; g. is solely for the purpose of compensatory storage. Note - Compliance with this performance outcome is to be demonstrated by a flood study report prepared in accordance with section 2.5.1 of Planning scheme policy 5 - Infrastructure Note - Section 4.1 - Guidelines for satisfying flood hazard overlay of Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.		
PO11 Development does not adversely change the following flood characteristics for all flood events up to and including the defined flood event: a. peak flow; b. flow of any part of the flood before the peak; c. flood flow velocity; d. level of flooding; e. flood time to peak. Note - Compliance with this performance outcome is to be demonstrated by a flood study report prepared in	**AO11** No acceptable outcome provided.	**Development does not adversely change the following flood characteristics for all flood events up to and including the defined flood event:** **a. peak flow;** **b. flow of any part of the flood before the peak;** **c. flood flow velocity;** **d. level of flooding;** **e. flood time to peak.**

accordance with section 2.5.1 of Planning scheme policy 5 - Infrastructure Note - Section 4.1 - Guidelines for satisfying flood hazard overlay of Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.		
PO12 A stormwater quality improvement device is located to retain existing flood plain storage capacity and ensure functionality of the stormwater quality improvement device.	**AO12** A stormwater quality improvement high flow outlet device is located: a. above the five percent AEP flood event caused by local flooding; b. above the two percent AEP flood event caused by regional flooding.	**Refer to assessment undertaken by the project civil engineer.**
PO13 A stormwater quantity management device is located to retain existing flood plain storage capacity and ensure functionality of the stormwater quantity management device.	**AO13** A stormwater quantity management high flow outlet device is located above the two percent AEP flood event.	**Refer to assessment undertaken by the project civil engineer.**
Filling and excavation		
PO14 Filling and excavation is carried out above the flood level of the 10 percent AEP event to protect in stream and banks of a waterway and wetland. Note - Section 4.1 - Guidelines for satisfying flood hazard overlay code in Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.	**AO14.1** Earthworks are limited to areas where: a. flooding is predominately due to backflow; b. the peak depth average velocity is less than the maximum permissible velocity for considerable bare earth channels (typically 0.5m/sec) in accordance with Table 9.0.5.3 of the Queensland Urban Drainage Manual; c. the cut/fill batter is not steeper than 1V:4H and the exposed earth surface is landscaped with erosion resistant vegetation cover.	NA

	AO14.2 A filling and excavation plan is provided in accordance with section 2.2.2 of Planning scheme policy 5 - Infrastructure**.**	
Access		
PO15 Development provides vehicular access to a road network that is sufficient to enable safe access and egress. Note - Section 4.1 - Guidelines for satisfying flood hazard overlay code in Planning scheme policy 5 - Infrastructure provides guidance to achieve this outcome.	**AO15** Development provides vehicular access to a road that is: a. above the flood level during the defined flood event; or b. below the flood level during the defined flood event where the road: i. has a low flood hazard; ii. remains trafficable until another road access to the development becomes trafficable; iii. directly connects to a road that is above the defined flood event that provides access to the road network.	**Development provides vehicular access to a road that is above the flood level during the defined flood event.**
PO16 Development provides an access area to a building or fill area on which a building is to be constructed where the access is located on land classified as a low flood hazard in the defined flood event.	**AO16** Development provides access to a building or fill area that has: a. a maximum depth of inundation of 300 mm during all flood events up to and including the defined flood event; b. a maximum distance of inundation of 200 metres during all flood events up to and including the defined flood event; c. a depth multiplied velocity product of less than or equal to $0.4m^2/s$.	**Development provides access to a building or fill area that has:** **a. a maximum depth of inundation of 300 mm during all flood events up to and including the defined flood event;** **b. a maximum distance of inundation of 200 metres during all flood events up to and including the defined flood event;** **c. a depth multiplied velocity product of less than or equal to $0.4m^2/s$.**

	Note - Velocity in flood waters is measured as the average velocity over a column of water.	

Table 8.2.5.3.2 - Development envelope area

Zone or precinct	Development envelope area specification	
	Minimum area	Minimum dimension
Rural zone	4,000m^2	50m
Rural residential zone	4,000m^2	50m
Environmental management and conservation zone - Environmental management precinct	2,000m^2	30m
Environmental management and conservation zone - Rural environmental management precinct	4,000m^2	50m
All other zones	The entire lot	-

Table 8.2.5.3.3 - Minimum flood levels

Column 1 Development for a material change of use	Column 2 Land is to be above the following minimum flood level
Emergency services not specified elsewhere in this table	The 0.2% AEP flood level
Hospital	The 0.2% AEP flood level

Major electricity infrastructure	The 0.2% AEP flood level
Detention facility	The 0.2% AEP flood level
Utility installation, being a power station	The 0.2% AEP flood level
Residential care facility or Retirement facility	The 0. 2% AEP flood level
Emergency services, being police facilities and emergency shelters	The 0.5% AEP flood level
Substation	The 0.5% AEP flood level
Utility installation, being a sewage treatment plant or water treatment plant	The 0.5% AEP flood level
Stores of valuable records or items of historic or cultural significance (eg galleries and libraries)	The 0.5% AEP flood level
An industry activity, involving the manufacture or storage of noxious or hazardous materials (e.g. a regional fuel storage facility)	The 0.5% AEP flood level
Warehouse, being a food storage warehouse	The 0.5% AEP flood level
Development involving the use of Class 5, 6, 7(b), 8 or 9(b) buildings other than specified above	The 1% AEP flood level