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Miranda NSW 2228
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Greenview Consulting Pty Ltd
A.B.N 32 600 067 338

SARM Architects

Date
13th June 2025

Job Number
230229

Flood Update for proposed Residential Development for Stage C [Rev#1]
5-9 Alexander St, FAIRY MEADOW NSW

Dear Sir/Madam,
Please find following our flood report update at the above site. The subject site is situated on the eastern side of Alexander St and comprises Lots #125-127 DP 234877 and has an approximate area of 2479m^2. The site is relatively flat, around RL +15.5 mAHD with a slight fall to the southern boundary. The site is currently vacant but was occupied by a number of residential units as recently as late-2021. The site is subject to shallow overland flows in the 1%AEP (100yr ARI) event from a moderately sized upstream catchment.

Greenview have undertaken a site-specific flood model using WBNM for hydrology and TUFLOW (2D) for hydraulics. Our latest flood model and full report is Revision #1 (dated 22nd October 2024) and was based on the SARM Architects drawings Revision D dated 16th October 2024. Subsequent to this report, minor architectural changes have been undertaken; these changes have been reviewed by Greenview and are detailed on the SARM drawings Revision F dated 20th May 2025. We note that the following changes have been made compared to the last iteration of Greenview's flood model:

A. A substation has been added along the front boundary.
B. A fire hydrant booster plinth and wall has been added along the front boundary.
C. Minor changes to the building outline have been made.
D. A motorcycle parking area has been added in the south-east corner.
E. Minor changes to ground levels have been made in the parking area.

We note that the architectural changes are generally minor in nature. It is likely that our results from revision #1 are generally the same with respect to flood behaviour at the subject site; that is, the modelled 1%AEP water levels, depths, velocities and hazards should not significantly deviate from that as modelled and documented in our revision #1 report. It is unlikely that the minor architectural changes will result in significant differences to our calculations, and subsequently cause lowered freeboard for the proposed units, cause adverse flood affectation, or otherwise negatively impact on local flood behaviour.

In order to correctly establish 1%AEP flood levels at the location of the substation, we have added the substation as a solid obstruction and hydrant plinth and wall into our proposed 1%AEP flood model and reproduce the results in **Figures A & B**. We note that the model update was only undertaken for the 1%AEP proposed case.

If further architectural changes are made, we strongly recommend that a full flood model update and report be undertaken. That is, all proposed changes should be incorporated into the model, all events run, and our report updated.

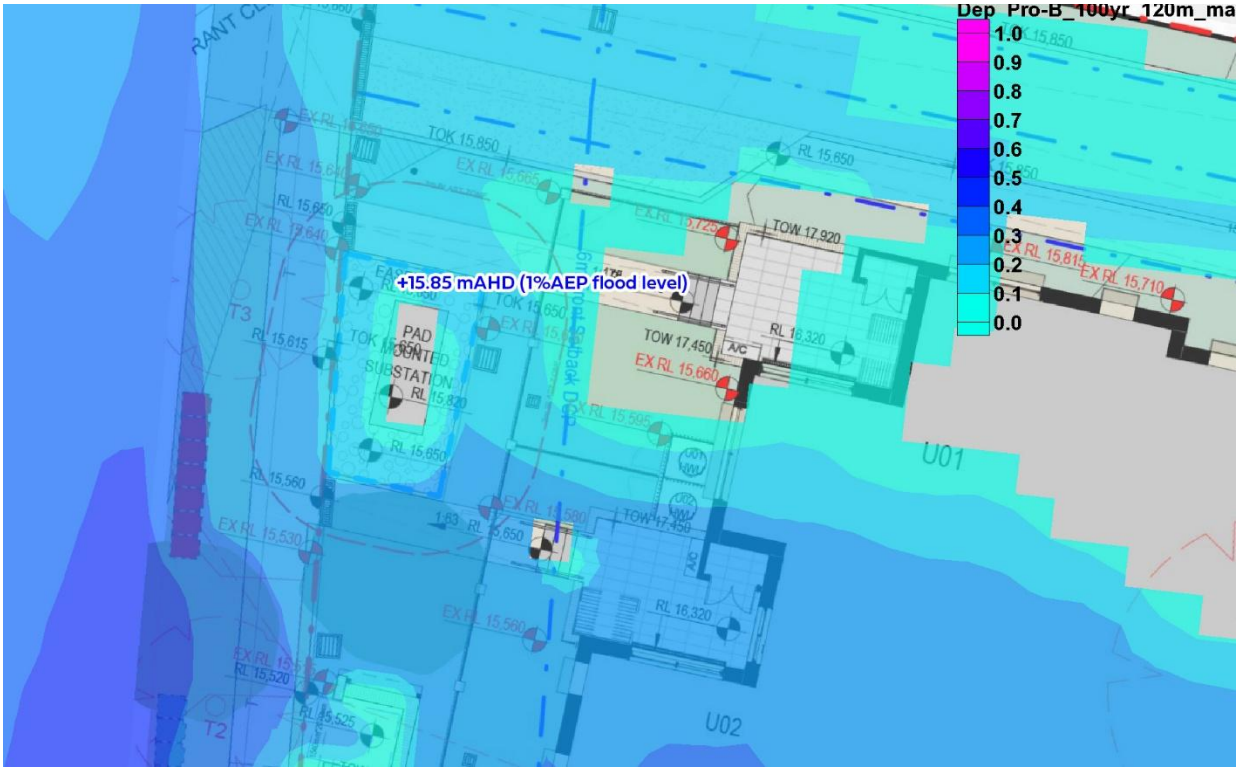


Figure A: Proposed 1%AEP 120min depths [m] and levels [mAHD] – Substation Location

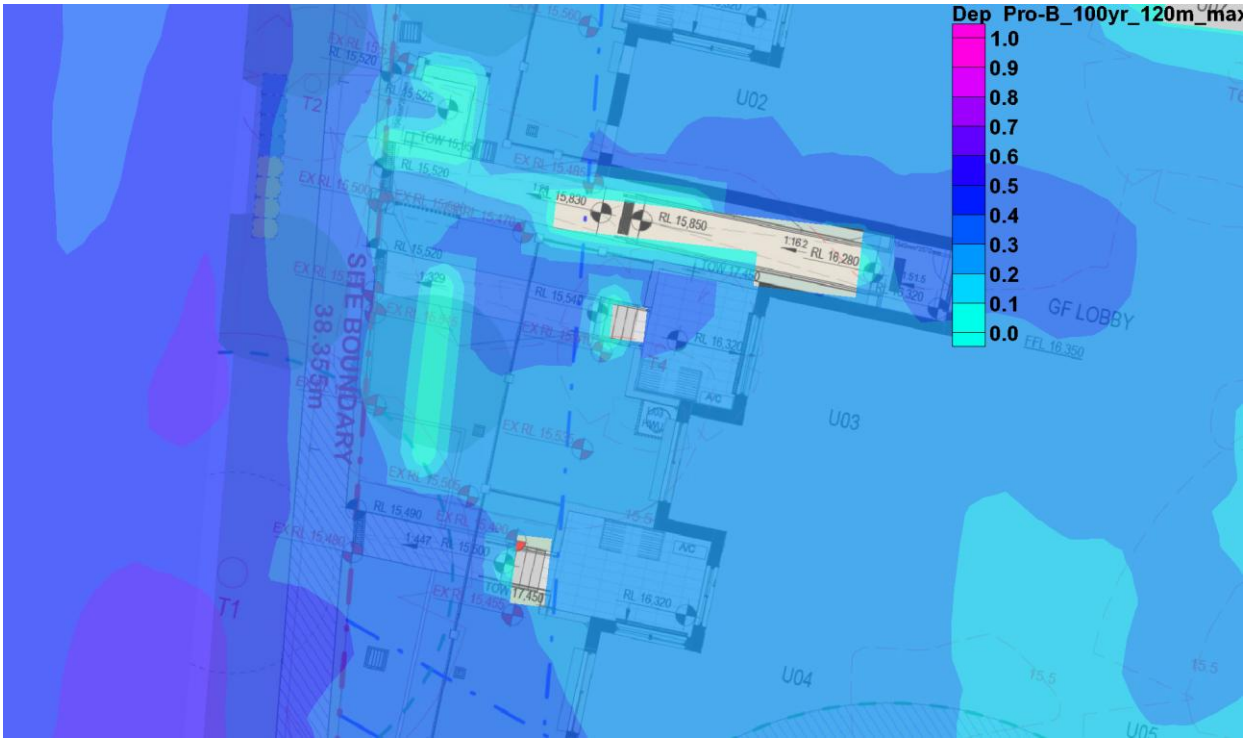


Figure B: Proposed 1%AEP 120min depths [m] and levels [mAHD] – Hydrant Location

We also note that at the time of our initial model building process the most recent adopted flood study for the local catchment was the "Fairy & Cabbage Tree Creek Flood Study" [Advisian 2020], and our hydrology and hydraulics were calibrated to that model. Subsequent to our report issue in October 2024, Wollongong Council have approved and released the updated "Fairy and Cabbage Tree Creeks Floodplain Risk Management Study & Plan" [Advisian, approved April 2025]. We highlight that:

a. Council's hydraulic TUFLOW models (including modelling parameters such as roughness, etc) are generally the same in the 2020 flood study and the 2024 FRMS and were completed by the same consultant (Advisian). The primary changes to the model in the FRMS are in the hydrology (flowrate calculations). The 2020 flood study adopted the ARR1987 procedures for hydrograph simulation which has been Wollongong Councils preferred methodology for decades; the 2024 FRMS used a modified version of the ARR2019 methodology (noting 10 rainfall patterns run per duration, with the average or median value adopted).
b. Our flood model is set up independently and is site specific; calibration checks are done to ensure our site-specific model matches Council parameters where feasible. The Greenview base hydraulic TUFLOW model is still consistent with Council's TUFLOW model.
c. Greenview's hydrology model is based on the Advisian 2020 (ARR1987) methodology and has not been updated at this stage. Based on our experience on similar jobs, ARR2019 methodology typically results in lower peak flowrate estimates; thus, our hydrology model is, in all probability, slightly conservative. That is, our flowrates (and by inference, water levels and depths, etc) using ARR1987 methodology are slightly higher than those generated using ARR2019 methodology.
d. We believe our site-specific model is better suited to providing accurate flood information at the subject site compared to Council's catchment wide study, noting we have adopted a smaller grid resolution and incorporated site specific data.
e. We do not expect there would be changes to the design floor levels should our hydrology model be updated to the FRMS 2024 methodology.

Yours faithfully,

Andrew Wiersma
BE (Hons) MEng MIEAust CPENG (NPER)
Senior Design Engineer
NPER no. 2428975

Alistair McKerron
BE MIEAust CPENG (NPER)
Senior Project Engineer
NPER no. 2220277

FLOOD STUDY

RESIDENTIAL DEVELOPMENT AT 5-9 ALEXANDER ST, FAIRY MEADOW NSW

PREPARED FOR HOMES NSW

IN COORDINATION WITH SARM ARCHITECTS

DATE: 22ND OCTOBER 2024

OUR REFERENCE: 230224

BY: ANDY WIERSMA

Author	**Andy Wiersma**	
Approved by	**Alistair McKerron**	
REVISION	**DATE**	**DESCRIPTION**
A	22nd October 2024	Stage C Issue

TABLE OF CONTENTS

1 INTRODUCTION

1.1 GENERAL

Greenview Consulting has been engaged by the client to undertake a review of flooding at the subject site. This report must be read in conjunction with the other Application documents and other relevant information, including:

- SARM Architectural drawings (October 2024)
- Wollongong Council DCP 2009 Chapter E13 "Floodplain Management"

This purpose of this report is to:

- Undertake hydrologic WBNM modelling to determine flowrates in the local vicinity.
- Undertake hydraulic TUFLOW modelling of the existing and proposed cases in order to demonstrate compliance with Council objectives.

2 EXISTING CONDITIONS & DATASETS

2.1 SITE DESCRIPTION

The subject site is situated on the eastern side of Alexander St, refer **Figure 2.1**. The site comprises Lots #125-127 DP 234877 and has an approximate area of 2479m^2. The site is relatively flat, around RL +15.5 mAHD with a slight fall to the southern boundary. The site is currently vacant but was occupied by a number of residential units as recently as late-2021. The site is subject to shallow overland flows in the 1%AEP (100yr ARI) event from a moderately sized upstream catchment.

Figure 2.1: Site Location

2.2 DATASETS

Hydrologic model inputs and all mapping presented in this report were undertaken using the GIS MapInfo and Global Mapper. These are geographical database systems that allow detailed cadastral, topological and flood data to be displayed and manipulated. Subarea data and other statistics were generated using inbuilt GIS functions and exported directly to the hydraulic model.

The datasets used to construct the models included:

- 1m contours derived from the ALS 2021 dataset.
- Aerial photography (circa June 2024) Metromap.
- Site survey from New Way Surveying (July 2022).
- Aerial Laser Survey (ALS) 1m DEM from LPI (fly date June 2021).
- Pipe sizes from Council's Online maps.

The MGA56 coordinate system was used for datasets wherever possible. We note that pipe sizes were taken from Council's GIS mapping system and will not be as accurate as formal survey; all pipes were assumed to be at 300mm minimum cover with assumed minimum grade of 0.7%.

At the time of writing, no georeferenced survey was available, and we note that the lot boundaries as surveyed do not align well with the digital LPI boundaries. We assume the surveyed boundaries are correct, but since there is no georeferenced survey, we have not utilised a survey TIN for modelling purposes and the proposed architectural plans have been georeferenced approximately only. The modelling in this report can be amended should georeferenced survey become available.

2.3 LIMITATIONS

All data, observations and opinions contained in this report pertain to hydraulic assessment of flood flows at or in the vicinity of the site. This report neither purports to be nor is an investigation into any other aspect of flooding within the site or surrounding catchment.

This report and the results contained within are only as accurate as the survey information provided. Greenview Consulting Pty Ltd takes no responsibility or liability for incorrect survey information. The report is only valid for the development as proposed and detailed in this report and is not valid for any other design, layout or development.

2.4 EXISTING FLOOD STUDIES

The proposed site falls within the extents of Wollongong City Councils Fairy & Cabbage Tree Creek Catchments. The most recent adopted flood study for this catchment is the "*Fairy & Cabbage Tree Creek Flood Study*" [Advisian 2020], and we have adopted similar or identical model parameters to this study (where possible) for the sake of consistency. We note that the main difference is that the Advisian model is configured on a 3m grid, and we have adopted a 1m grid for finer resolution. Model results are very similar between both models.

2.5 REPORT REVISIONS

This is the first version of our report.

2.6 PROPOSED DEVELOPMENT

The proposed development consists of a new housing development for LAHC. In order to manage offsite flood impacts and maintain conveyance, the majority of the ground floor is proposed to be suspended, with flow allowed to pass through the undercroft area.

3 HYDROLOGIC ANALYSIS (WBNM MODEL)

3.1 CATCHMENT DETAILS

The catchment draining towards the subject site is moderate in size and almost entirely residential development. We have adopted a similar subarea delineation to the Advisian 2020 study with simplifications. Sub-catchment delineation is depicted in **Figure 3.1** and **Table 3.1** following.

3.2 CATCHMENT DETAILS AND FLOWRATES

Hydrological Modelling was undertaken using iWBNM 2019, an updated interface to the WBNM hydrological engine. WBNM ('Watershed Bounded Network Model' Boyd et al, 2007) is an advanced storage-routing model developed in conjunction with the University of Wollongong that allows simulation of complex catchment behaviour.

A summary of the adopted modelling parameters is provided below:

- Lag Parameter: 1.40 (as per Advisian 2020)
- Stream Routing: 0.5 (urban flow paths, mostly done in TUFLOW however)
- Initial Loss: 10 [mm] (as per Advisian 2020)
- Continuing Loss Rate: 2.5 [mm/hr] (as per Advisian 2020)
- Raingauges: Fairy Meadow (1 total)

The WBNM hydrographs were then used as inputs for the TUFLOW model.

Australian Rainfall Runoff (ARR) 2019

As far as we are aware, Wollongong City Council currently prefer that ARR1987 methodology be adopted, and hence we have adopted the 1987 methodology for hydrograph simulation, as per the Advisian [2020] flood study.

WBNM Results & Critical Duration

WBNM results are presented in their entirety in the appendices. As a check, the following 1%AEP durations were run in a preliminary hydraulic model: 25 / 90 & 120 minutes. These checks confirmed the 120-minute produced the highest water level near the subject site. We have therefore adopted the 120-minute duration storm for hydraulic modelling for the 1%AEP event and the 15-minute for the PMF event.

Table 3.1: Subarea Statistics

Subarea ID	Downstream Subarea	Area [ha]	Impervious%
S01	S03	6.021	70
S02	S06	3.362	70
S06	S10	1.353	70
S03	S07	7.831	30
S07	S12	2.139	55
S04	S09	0.627	70
S05	S09	0.776	70
S14	S15	1.870	70
S08	S15	3.302	70
S09	S15	0.782	40
S10	S16	0.984	70
S11	S17	1.120	70
S12	S18	1.112	70
S13	S19	0.854	70
S16	S21	0.770	70
S15	S21	1.118	70
S20	S21	0.550	70
S19	S22	0.908	70
S18	S22	1.119	70
S17	S22	1.785	70
S21	Dummy	0.952	70
S22	Dummy	0.608	70

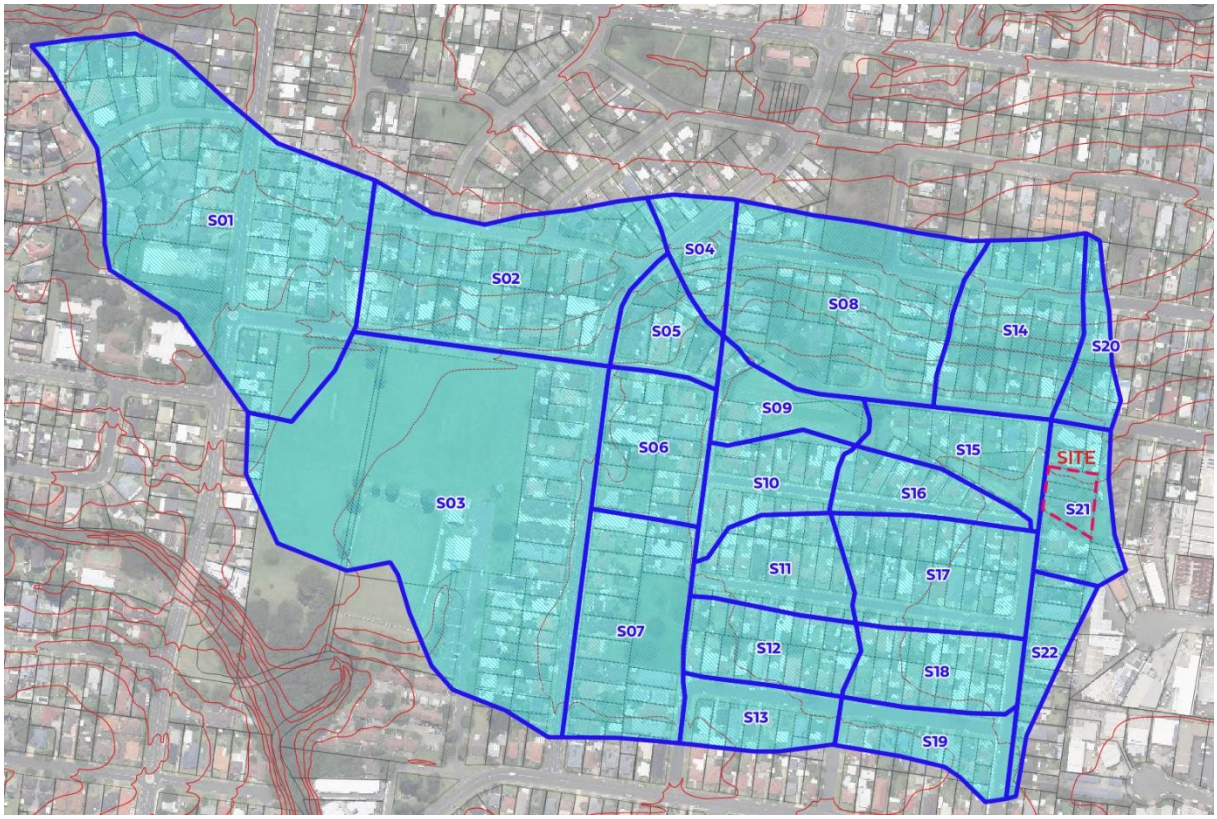


Figure 3.1: Sub-catchment Delineation

4 HYDRAULIC (TUFLOW) ANALYSIS

4.1 MODEL SETUP

TUFLOW is a 1D / 2D grid model that performs hydro-dynamic analysis in river and floodplain systems. TUFLOW allows the user to model a range of structures common in urban environments. The 64-bit double precision version of TUFLOW (2013 AC) was used as the hydraulic model for this report.

TUFLOW model parameters were as follows:

- Grid cell size: 1.0m
- 2D Timestep: 0.4s
- 1D Timestep: 0.5s

Additional parameters were generally left at the recommended default values.

Material zones and roughness values are summarised in **Table 4.1** and were generally identical to the Advisian 2020 study, noting Advisian adopted variable depth Manning's n values. The model extents are depicted in **Figure 4.2** at the end of this chapter. TUFLOW was allowed to calculate the downstream water level at the model boundary.

Table 4.1: Material Zones / Roughness Values

Material	Manning's n
Residential yards (excl. buildings)	D1=0.3m n1 = 0.200, D2 = 1.5m n2 = 0.100
Industrial yard	D1=0.1m n1 = 0.100, D2 = 0.3m n2 = 0.060
Road	D1=0.05m n1 = 0.060, D2 = 0.15m n2 = 0.030
Grass / open space	D1=0.1m n1 = 0.060, D2 = 0.3m n2 = 0.040
Buildings	Solid obstructions

The following scenarios were modelled:

1. Existing.
2. Proposed, including revised building footprint and sections of elevated slabs (refer also Figure 4.3 following).

Pits / Pipes & Blockage Factors

A portion of the pipe network in the local vicinity was modelled as shown in **Figure 4.2**. All pits were modelled with a 50% inlet blockage factor applied; this was slightly more conservative than the Advisian [2020] study which applied 50% blockage to sag pits and 20% blockage to on-grade pits.

The proposed elevated undercroft area was blocked 50% using a layered flow constriction as per the recommendations of DCP 2009 Chapter E13. Allowances were also made for energy losses from the proposed piers in the undercroft area.

4.2 MODEL RESULTS

Full model results are contained in the appendices, and we highlight the following:

- The site itself is subject to shallow inundation during the 1%AEP flood event with typical depths around 120-280mm under existing conditions.
- 1%AEP flow velocities are very low, typically around 0.05-0.15 m/s through the subject site.
- Conveyance impacts are minor as discussed below.
- 1%AEP hazards are low, as discussed below.

4.3 CONVEYANCE IMPACTS

The proposed design has been deliberately designed to convey flow (with an elevated ground floor) and, as such, the offsite impacts on adjacent private lots are less than the allowed +20mm. Thus, overall, the development has a very minor impact on local flood behaviour.

PMF impacts are mapped in the appendices and are typically limited to the site itself. There are no offsite PMF impacts greater than 20mm. We highlight that the impact mapping and results show that:

- There are no additional lots affected by the PMF extents under proposed conditions.
- There is no additional over-floor flooding in the PMF event.
- We cannot see that there will be any impact on flood warning times or flood evacuation routes.

4.4 FLOOD STORAGE IMPACTS

Loss of floodplain storage can affect hydrograph routing such that there is a corresponding loss of flood attenuation. That is, flowrates downstream may increase due to the loss of storage. Hence Council's requirement to demonstrate no loss of storage within the floodplain.

The subject site is only inundated to a shallow depth during the 1%AEP event and we do not believe that flood storage is a significant issue at this site. Flood storage volumes were approximated in Global Mapper as shown below. There is only a minor difference between the existing and proposed cases, due to ramps / stairs and other minor elements removing a negligible amount of storage.

- Volume 1%AEP (existing): 437m^3
- Volume PMF (existing): 1037m^3
- Volume 1%AEP (proposed): 427m^3
- Volume PMF (proposed): 1008m^3

4.5 FLOOD RISK PRECINCTS & HAZARD MAPPING

ARR2019 provides updated Hazard curves as described in Table 6.7.3 and 6.7.4 of ARR2019 Chapter 6. We have provided mapping of the 6 hazard categories, with the definitions as follows:

H1: Generally safe for vehicles, people and buildings.
H2: Unsafe for small vehicles.
H3: Unsafe for vehicles. children and the elderly.
H4: Unsafe for vehicles and people.
H5: Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6: Unsafe for vehicles and people. All building types considered vulnerable to failure.

Under both existing and proposed conditions, the site is almost entirely H1 Hazard category in the 1%AEP event, with some small areas at H2 in the south-west corner. We therefore conclude that the subject site is generally subject to low-hydraulic hazard in the 1%AEP event.

The NSW Flood Risk Management Manual (Department of Planning & Environment, 2023) categorises the floodplain into three groups as noted below:

Floodways areas of the floodplain which generally convey a significant discharge of water during floods and are sensitive to changes that impact flow conveyance. They often align with naturally defined channels or form elsewhere in the floodplain.

Flood Storage Areas of the floodplain that are outside floodways which generally provide for temporary storage of floodwaters during the passage of a flood and where flood behaviour is sensitive to changes that impact on temporary storage of water during a flood.

Flood Fringe That part of the flood extents for the event remaining after the flood function areas of floodway and flood storage areas have been defined.

We highlight that the NSW Flood Risk Management Manual does not provide specific criteria for ascertaining or defining these areas; these are typically determined by the flood modeller / hydraulic consultant based on the specific nature of flooding in the creek or waterway. The Advisian 2020 study mapped the site as entirely Flood Fringe in the 1%AEP event (risk blockage scenario); our flood

modelling shows flood depths to be shallow and hazards low, which is commensurate with the findings of the Advisian 2020 study. Thus, the site is Flood Fringe and does not contain floodway areas.

Wollongong Council's revised DCP 2009 Chapter E13 defines Flood Precincts as follows:

High Risk:

- Areas greater than H3 hazard conditions during a 1% AEP flood
- Land within 10m from the top of a watercourse bank
- Floodways.

Medium Risk: land below the 1% AEP level plus 0.5 m that is not High Risk

Low Risk:

- All other areas within the floodplain (i.e. within the extent of the PMF)
- All areas within the 2100 Coastal Zone Inundation Extent not classified Medium Flood Risk

Given that the site does not contains H4 or higher hazard categories, or a Floodway, or is located near a defined watercourse, the site does not contain High Flood Risk areas. The site is subject to low hydraulic hazard during a 1%AEP event and is thus best classified as Medium Flood Risk.

4.6 PRACTICAL CONSIDERATIONS

Wollongong Council typically require:

a. Habitable floors to be set at the Flood Planning Level (FPL) being the 1%AEP + 500mm level.
b. Garages and other non-habitable internal floors to be at the 1%AEP – 300mm level, or 300mm above finished external ground levels.
c. Outdoor parking areas must be no more than H1 hazard in the 1%AEP event.
d. Basement carparking to be protected via a crest to the 1%AEP + 200mm level.

With respect to the proposed design, we note the following [refer **Figure 4.3** for further details]:

A. The highest adjacent 1%AEP flood level to the proposed building is +15.8 mAHD and therefore the FPL for the development is +16.3 mAHD. The proposed design meets this requirement.
B. The proposed carparking area is entirely H1 hazard in the 1%AEP event and therefore satisfies the requirement as noted above.
C. There are no proposed garages or basement parking areas.
D. The majority of the undercroft area should be open to allow the free passage of floodwaters, as shown in Figure 4.3. Open-style screening should be provided.
E. The lift cores and other ramp areas may be solid / on-ground as required.
F. The highest adjacent PMF flood level to the proposed building is +16.1 mAHD which is below the proposed ground floor level.

Figure 4.1: Material Zones [Existing]
[bright green = urban yard, grey = road reserve, light green = open space, pink = industrial red hatch = buildings]

Figure 4.2: TUFLOW Extents & SA polygons & 1D network
[dashed blue line = 1D pipes / culverts, purple line = model boundary]

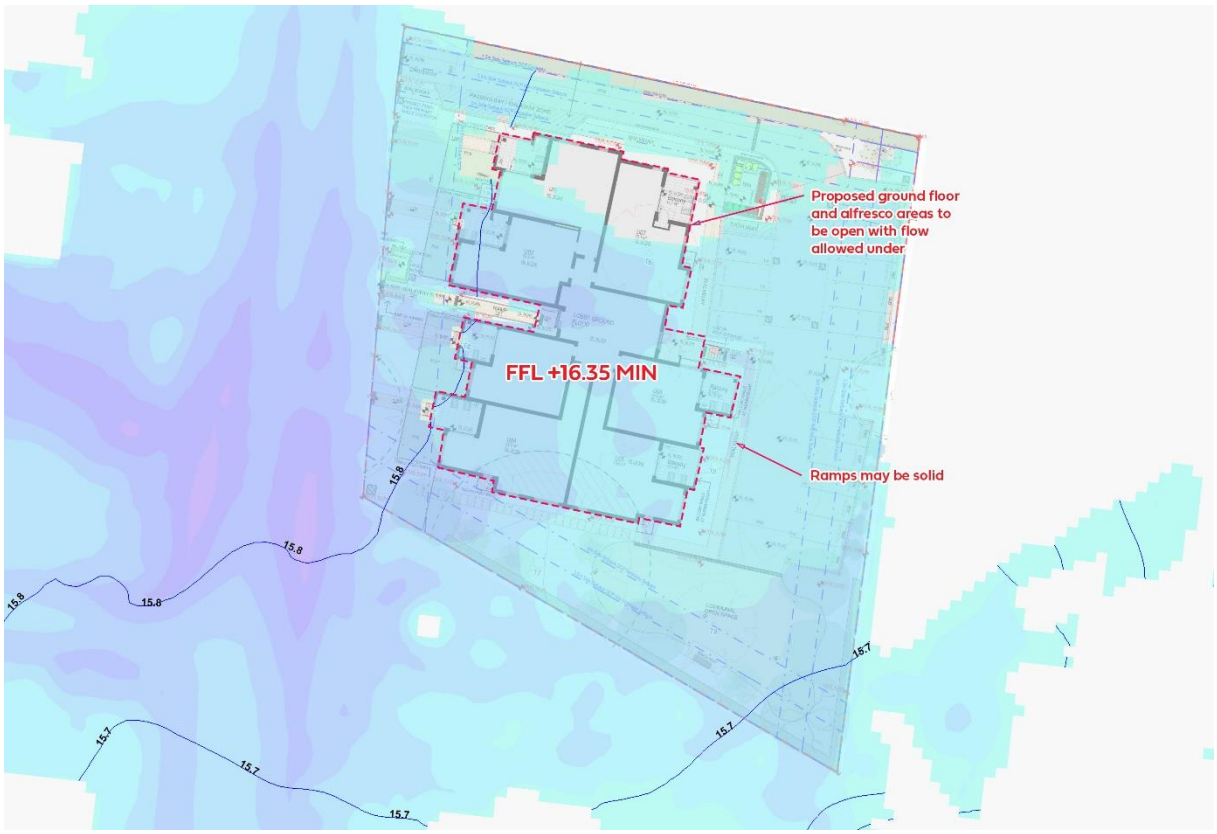


Figure 4.3: Proposed Flood Risk Mitigation Measures

5 ASSESSMENT - DCP 2009 CH.E13

Wollongong Council would typically require any development to be assessed against its DCP 2009 Chapter E13 section. We believe the proposal meets or exceeds the requirements of DCP2009 for a "Residential – Medium Risk" development noting that:

A. **Floor Levels:** refer comments previously, all habitable floors are at least 500mm above the 1%AEP level.
B. **Building Components & Structural Soundness:** all structures will have flood compatible materials below the relevant FPL. We also note that a structural engineer can readily certify at CC stage that the proposed new structures can withstand flood forces such as hydrostatic loading, debris impact and uplift.
C. **Flood Effects:** this report demonstrates that, under proposed conditions:
    a. there are no significant offsite conveyance impacts; and,
    b. there is no loss of flood storage.
D. **Carparking:** the proposed external carparking is no more than H1 hazard during the 1%AEP event, as required.
E. **Evacuation**: all proposed ground floor levels are above the PMF levels; thus, specific evacuation is not required, as all occupants may wait safely within any level during a large storm event.

6 CONCLUSIONS

We conclude that:

- The site is subject to shallow inundation at low velocities during the 1%AEP flood event.
- The development as proposed does not have any impact on the conveyance ability / capacity of the local floodplain or reduce flood storage volumes provided the recommendations of this report are adhered to.
- The site is best classified as Medium Flood Risk.
- The proposal meets the requirements of DCP 2009 Chapter E13 “Floodplain Management”.

Yours faithfully,
For & on behalf of Greenview,

Andrew Wiersma
BE (Hons) MEng MIEAust CPENG (NER)
Senior Design Engineer

Alistair McKerron
BE MIEAust CPENG (NER)
Senior Project Engineer
NPER no. 2220277

APPENDIX A: Supplementary Information

LGA OF WOLLONGONG

LEGEND

AHD	AUSTRALIAN HEIGHT DATUM
BM	BENCH MARK
C	EDGE OF CONCRETE
GUT	TOP OF GUTTER
4/0.2	TREE SPREAD/TRUNK DIAMETER
NS	NATURAL SURFACE
INV	INVERT
RL	REDUCED LEVEL
SMH	SEWER MANHOLE
TK	TOP OF KERB
VC	VEHICLE CROSSING
PP	POWER POLE
TEL	TELSTRA
OL	OUTLET
BB	BOTTOM OF BANK
TB	TOP OF BANK
ELP	ELECTRIC POWER POLE
	CONCRETE HARD AREA
— —	APPROXIMATE GUTTER LINE
— —	APPROXIMATE RIDGE LINE

ALEXANDER STREET

BM NAIL IN TK
R.L. 15.62 (A.H.D.)

TKPIT 15.25
INV 13.92

CONC.

KERB

TREE

FENCED

7°24'30"

5.59

50"

37'

38.355

NOT 4°

FENCE

M.G.A.
DP 1233939

PM 17058

118
DP 829508

127
DP 234877

126
DP 234877

125
DP 234877

123
DP 234877

124
DP 234877

2479m² (TOTAL)

(VACANT)

SINGLE STOREY
BRICK
RESIDENCE
(TILE ROOF)
No:11

SINGLE STOREY
BRICK & CLAD
RESIDENCE
(METAL ROOF)
No:3

METAL GARAGE

METAL SHED

AWNING

PALING FENCE

METAL SHED

WEATHERBOARD BUILDING

ELEVATION SEE 1

HEAD 18.98
SILL 17.17

ROAD

BRUCE

SP 19796

TWO STOREY
BRICK
UNITS
(TILE ROOF)

AWNING

AWN.

59.62

20'

187°

ON

BRICK

00°

WALL

ELEVATION SEE 2

METAL FENCE

METAL

NOTE:

- THE TITLE BOUNDARY DIMENSIONS AND AREAS SHOWN HEREON ARE DETERMINED BY TITLE DEED ONLY AND ARE SUBJECT TO FINAL SURVEY
- ADJOINING BUILDINGS, RIDGES AND GUTTER POSITIONS ARE APPROXIMATE ONLY
- ONLY VISIBLE SERVICES WERE LOCATED AT TIME OF SURVEY IT IS RECOMMENDED THAT ALL RELEVANT AUTHORITIES BE NOTIFIED PRIOR TO ANY WORKS BEING COMMENCED ON SITE. WE STRONGLY SUGGEST THAT YOU DIAL 1100 BEFORE YOU DIG
- TREE SPREAD AND TRUNK DIAMETERS SHOWN IN THIS PLAN ARE INDICITIVE ONLY
- CONTOURS HAVE BEEN INTERPOLATED FROM SPOT HEIGHTS TAKEN AND ARE INDICITIVE ONLY
- DO NOT SCALE OF THIS PLAN. WHERE CLEARANCES ARE CRITICAL THEY SHOULD BE CONFIRMED BY A FURTHER BOUNDARY SURVEY
- COPYRIGHT OF THIS MATERIAL SHOWN HEREON AND IN THE ACCOMPANYING CAD FILES BELONGS TO NEW WAY SURVEYING PTY. LTD. NO ALTERATIONS ARE TO BE MADE TO THE DATA WITHOUT THE WRITTEN CONSENT OF NEW WAY SURVEYING PTY. LTD. IF THESE CONDITIONS HAVE BEEN BREACHED NEW WAY SURVEYING PTY. LTD. REMOVES ALL REPONSIBILITIES
- THIS NOTE IS AN INTEGRAL PART OF THIS PLAN

No.	DATE	NOTATION/AMENDMENT

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL: 0.5m

DATUM: A.H.D.

ORIGIN OF DATUM: PM 17058

SCIMS (15/03/2022)

100 YEAR FLOOD RL:

RECOMMENDED MINIMUM FLOOR RL:

SOURCE OF FLOOD INFO:

LEGEND OF COMMONLY USED SYMBOLS

WATER, SEWER, ELECTRICITY, TELECOM, GAS, DRAINAGE

BENCH MARK SURVEY CONTROL MARK PM SSM

REDUCTION RATIO 1 : 150 (A1)

0

LAND TITLE INFORMATION

LOTS: 125, 126, 127

PLAN NOs : DP 234877

OTHER:

AREA: 2479m²

DATE OF SURVEY: 26 / 07 /2022

SURVEY CONSULTANT:

NEW WAY SURVEYING
NWS
MOB:0430 851342

SURVEYORS REF : 22135

Registered Surveyor

NSW Land & Housing Corporation
Division of the Department of Family & Community Services

DRAWING TITLE

DETAIL AND CONTOUR PLAN

LOCATION: FAIRY MEADOW

STREET ADDRESS: 5 ALEXANDER STREET, FAIRY MEADOW

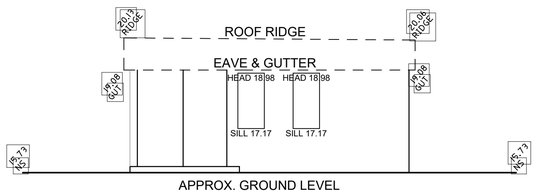
TYPE: S

SITE LAYOUT JOB / /

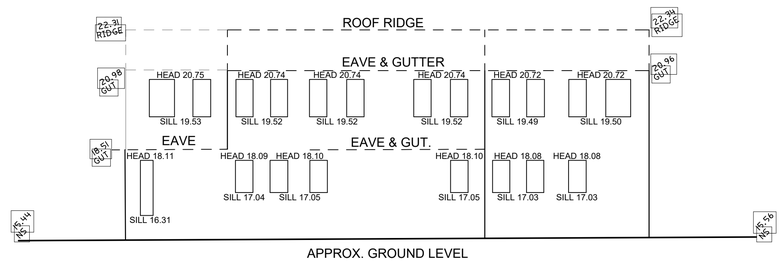
SHT. 1 OF 2

LGA OF WOLLONGONG

ELEVATION 1



ELEVATION 2



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CONTOUR INTERVAL: 0.5m

DATUM: A.H.D.

ORIGIN OF DATUM: PM 17058

SCIMS (15/03/2022)

100 YEAR FLOOD RL:

RECOMMENDED MINIMUM FLOOR RL:

SOURCE OF FLOOD INFO:

LEGEND OF COMMONLY USED SYMBOLS

WATER — W — H — W — SV — W

SEWER — S — 157.29 MH 157.14 — S — LH — S

ELECTRICITY — O/H U/G E — PP — Street Light — E — Consumer Connection Box — E

TELECOM — O/H U/G T — PP — Joint Pit — T — Distribution Pillar — T

GAS — G — Valve — G — Identification Plate — G

DRAINAGE — Common — 750 dia — D — Junction — D

Main — 525 dia

BENCH MARK △ SURVEY CONTROL MARK ◘ PM SSM

W — H — W — SV — W

REDUCTION RATIO 1 : 150 (A1)

0

LAND TITLE INFORMATION

LOTS: 125, 126, 127

PLAN NOs : DP 234877

OTHER:

AREA: 2479m²

DATE OF SURVEY: 26 / 07 /2022

SURVEY CONSULTANT:

NEW WAY SURVEYING

NWS

MOB:0430 051242

SURVEYORS REF : 22125...

Registered Surveyor

NSW Land & Housing Corporation

Division of the Department of **Family & Community Services**

DRAWING TITLE

DETAIL AND CONTOUR PLAN

LOCATION

FAIRY MEADOW

STREET ADDRESS

5 ALEXANDER STREET, FAIRY MEADOW

TYPE

S

SITE LAYOUT JOB

SHT. 2

/ /

OF 2

WBNM QA results

```
#####START_QA_SUMMARY_FILE################################################

D:\Projects\GV 2024 Projects\Fairy - Alex [Flood]\WBNM\100yr_Spec.wbn
Program run at 13:18 on  29  8 2024  (ddmmyy)

 Your Organisation
 Organisations Specialisation
 Street Address
 City Address
 State Address
 Country
 Zipcode
 Phone Number
 Fax Number
 Your email address
 Default user name
 IFD_in_runfile

 out_metafile= T
 out_culverts= F
 out_scourable= F
 sum_catchments= T
 sum_volumes= T
 sum_outlet_structures= T
 sum_local_structures= T
 sum_subareas= F
 sum_depths= F
 sum_Qpeaks= T
 sum_Tpeaks= T
 sum_multiStorms= F
 dbg_run= F
 dbg_echo= F
 dbg_edit= F
 dbg_ifd= F
 trig_flowmin= 5

#####START_PREAMBLE_BLOCK##########|###########|###########|###########|
Project Number: Comment:
Project Description: Comment:
Comment:
RUNFILE: D:\Projects\GV 2024 Projects\Fairy - Alex [Flood]\WBNM\100yr_Spec.wbn
DES Storm ARI (Env ARI):     100()      100()      100()      100()      100()      100()
100()
DES Burst Dura (Env Dura):   15()       25()       30()       45()       60()       90()
120()
Constructed using iWBNM_2012
Max 8 lines of text
#####END_PREAMBLE_BLOCK############|###########|###########|###########|


#####START_STATUS_BLOCK############|###########|###########|###########|

last edited on 29/08/2024 1:18:27 PM
by Andy
2012_000
#####END_STATUS_BLOCK##############|###########|###########|###########|


#####START_DISPLAY_BLOCK###########|###########|###########|###########|
         0.0         0.0         0.0         0.0
         none
         0.0         0.0         0.0         0.0         0.0         0.0
#####END_DISPLAY_BLOCK#############|###########|###########|###########|


#####START_TOPOLOGY_BLOCK##########|###########|###########|###########|
          23
S01                  0.0         0.0         0.0         0.0 S03
S02                  0.0         0.0         0.0         0.0 S06
S06                  0.0         0.0         0.0         0.0 S10
S03                  0.0         0.0         0.0         0.0 S07
S07                  0.0         0.0         0.0         0.0 S12
S04                  0.0         0.0         0.0         0.0 S09
```

```
S05                  0.0         0.0         0.0         0.0 S09
S14                  0.0         0.0         0.0         0.0 S15
S08                  0.0         0.0         0.0         0.0 S15
S09                  0.0         0.0         0.0         0.0 S15
S10                  0.0         0.0         0.0         0.0 S16
S11                  0.0         0.0         0.0         0.0 S17
S12                  0.0         0.0         0.0         0.0 S18
S13                  0.0         0.0         0.0         0.0 S19
S16                  0.0         0.0         0.0         0.0 S21
S15                  0.0         0.0         0.0         0.0 S21
S20                  0.0         0.0         0.0         0.0 S21
S19                  0.0         0.0         0.0         0.0 S22
S18                  0.0         0.0         0.0         0.0 S22
S17                  0.0         0.0         0.0         0.0 S22
S21                  0.0         0.0         0.0         0.0 Dummy
S22                  0.0         0.0         0.0         0.0 Dummy
Dummy                0.0         0.0         0.0         0.0 SINK
#####END_TOPOLOGY_BLOCK############|###########|###########|###########|


#####START_SURFACES_BLOCKS##########|###########|###########|###########|
        0.77
      -99.90
S01                 6.02        70.0        1.40        0.10
S02                 3.36        70.0        1.40        0.10
S06                 1.35        70.0        1.40        0.10
S03                 7.83        30.0        1.40        0.10
S07                 2.14        55.0        1.40        0.10
S04                 0.63        70.0        1.40        0.10
S05                 0.78        70.0        1.40        0.10
S14                 1.87        70.0        1.40        0.10
S08                 3.30        70.0        1.40        0.10
S09                 0.78        40.0        1.40        0.10
S10                 0.98        70.0        1.40        0.10
S11                 1.12        70.0        1.40        0.10
S12                 1.11        70.0        1.40        0.10
S13                 0.85        70.0        1.40        0.10
S16                 0.77        70.0        1.40        0.10
S15                 1.12        70.0        1.40        0.10
S20                 0.55        70.0        1.40        0.10
S19                 0.91        70.0        1.40        0.10
S18                 1.12        70.0        1.40        0.10
S17                 1.78        70.0        1.40        0.10
S21                 0.95        70.0        1.40        0.10
S22                 0.61        70.0        1.40        0.10
Dummy               0.00         0.0        1.40        0.10
#####END_SURFACES_BLOCK############|###########|###########|###########|


#####START_FLOWPATHS_BLOCK#########|###########|###########|###########|
          23
S01
#####ROUTING
        0.65
S02
#####ROUTING
        0.65
S06
#####ROUTING
        0.65
S03
#####ROUTING
        0.65
S07
#####ROUTING
        0.65
S04
#####ROUTING
        0.65
S05
#####ROUTING
        0.65
S14
#####ROUTING
        0.65
```

```
S08
#####ROUTING
        0.65
S09
#####ROUTING
        0.65
S10
#####ROUTING
        0.65
S11
#####ROUTING
        0.65
S12
#####ROUTING
        0.65
S13
#####ROUTING
        0.65
S16
#####ROUTING
        0.65
S15
#####ROUTING
        0.65
S20
#####ROUTING
        0.65
S19
#####ROUTING
        0.65
S18
#####ROUTING
        0.65
S17
#####ROUTING
        0.65
S21
#####ROUTING
        0.65
S22
#####ROUTING
        0.65
Dummy
#####ROUTING
        0.65
#####END_FLOWPATHS_BLOCK############|############|############|############|


#####START_LOCAL_STRUCTURES_BLOCK##|############|############|############|
           0
#####END_LOCAL_STRUCTURES_BLOCK####|############|############|############|


#####START_OUTLET_STRUCTURES_BLOCK#|############|############|############|
           0
#####END_OUTLET_STRUCTURES_BLOCK###|############|############|############|


#####START_STORM_BLOCK##############|############|############|############|
           7
#####START_STORM#1
100 Year ARI 15 Mins Duration DESIGN STORM
        1.00
        1.00
#####START_DESIGN_RAIN
         100          15        1.00
IFD_COEFFS_IN_THIS_FILE
           1
BALGOWNIE#1            1         xxx   304671.00  6191436.00       80.00       49.05       11.30
4.01      109.64       28.61        9.51        4.28       15.81        0.00     1400.00
100        0.67 Design 34.400S 150.875E
#####END_DESIGN_RAIN
#####START_CALC_RAINGAUGE_WEIGHTS
#####END_CALC_RAINGAUGE_WEIGHTS
#####START_LOSS_RATES
```

```
S01                10.00        2.50        0.00
S02                10.00        2.50        0.00
S06                10.00        2.50        0.00
S03                10.00        2.50        0.00
S07                10.00        2.50        0.00
S04                10.00        2.50        0.00
S05                10.00        2.50        0.00
S14                10.00        2.50        0.00
S08                10.00        2.50        0.00
S09                10.00        2.50        0.00
S10                10.00        2.50        0.00
S11                10.00        2.50        0.00
S12                10.00        2.50        0.00
S13                10.00        2.50        0.00
S16                10.00        2.50        0.00
S15                10.00        2.50        0.00
S20                10.00        2.50        0.00
S19                10.00        2.50        0.00
S18                10.00        2.50        0.00
S17                10.00        2.50        0.00
S21                10.00        2.50        0.00
S22                10.00        2.50        0.00
Dummy              10.00        2.50        0.00
#####END_LOSS_RATES
#####START_RECORDED_HYDROGRAPHS
           0
#####END_RECORDED_HYDROGRAPHS
#####START_IMPORTED_HYDROGRAPHS
           0
#####END_IMPORTED_HYDROGRAPHS
#####END_STORM#1

#####START_RESULTS_STORM_1



#####START_CATCHMENT_SUMMARY################################################
Catchment area   (hectares) =        39.94
Impervious percent      (%) =        60.77
Rainfall depth         (mm) =        54.44
Excess rainfall        (mm) =        50.31
Calc. runoff depth     (mm) =        50.18  - from bottom subarea
Recd. runoff depth     (mm) =         0.00  - from bottom subarea
Calc. peak discharge (m3/s) =        18.626 - from bottom subarea
Recd. peak discharge (m3/s) =         0.000 - from bottom subarea
#####END_CATCHMENT_SUMMARY##################################################


#####START_VOLUME_SUMMARY#############################################################################
SUBAREA DIRECTED IMPORTED      LOCAL       LOCAL    DIRECTED    IMPORTED     OUTFLOW     BALANCE
          TO TOP   TO TOP   PERVIOUS  IMPERVIOUS   TO BOTTOM   TO BOTTOM
        (Volumes in thousands m3)
S01
       0.000       0.000       0.792       2.294       0.000       0.000       3.086       0.000
S02
       0.000       0.000       0.442       1.281       0.000       0.000       1.723       0.000
S06
       1.723       0.000       0.177       0.516       0.000       0.000       2.415       0.000
S03
       3.086       0.000       2.393       1.279       0.000       0.000       6.756       0.001
S07
       6.756       0.000       0.421       0.640       0.000       0.000       7.814       0.004
S04
       0.000       0.000       0.082       0.239       0.000       0.000       0.321       0.000
S05
       0.000       0.000       0.102       0.296       0.000       0.000       0.397       0.000
S14
       0.000       0.000       0.245       0.713       0.000       0.000       0.958       0.000
S08
       0.000       0.000       0.434       1.258       0.000       0.000       1.692       0.000
S09
       0.718       0.000       0.205       0.170       0.000       0.000       1.093       0.001
S10
       2.415       0.000       0.129       0.375       0.000       0.000       2.919       0.000
S11
```

```
       0.000       0.000       0.147       0.427       0.000       0.000       0.573       0.000
S12
       7.814       0.000       0.146       0.424       0.000       0.000       8.380       0.003
S13
       0.000       0.000       0.112       0.325       0.000       0.000       0.437       0.000
S16
       2.919       0.000       0.101       0.293       0.000       0.000       3.312       0.000
S15
       3.742       0.000       0.146       0.426       0.000       0.000       4.314       0.000
S20
       0.000       0.000       0.072       0.210       0.000       0.000       0.281       0.000
S19
       0.437       0.000       0.119       0.346       0.000       0.000       0.901       0.001
S18
       8.380       0.000       0.147       0.426       0.000       0.000       8.950       0.004
S17
       0.573       0.000       0.234       0.680       0.000       0.000       1.487       0.001
S21
       7.908       0.000       0.125       0.363       0.000       0.000       8.396       0.000
S22
      11.338       0.000       0.079       0.232       0.000       0.000      11.647       0.002
Dummy
      20.043       0.000       0.000       0.000       0.000       0.000      20.043       0.000
#####END_VOLUME_SUMMARY#########################################################################


#####START_PEAK_SUMMARY#########################################################################
SUBAREA OUT_STR     STREAM    STREAM     LOCAL     LOCAL    DIRECTED  OUTLET_STRUCTURE
        1=exist        TOP    BOTTOM  PERVIOUS IMPERVIOUS  TO BOTTOM  INFLOW   OUTFLOW
                  including                               including
                imported to                           imported to
                       TOP                                  BOTTOM
                                                                (Discharges in m3/s)
S01          0       0.000     0.000     0.814     3.130     0.000     3.944     3.944
S02          0       0.000     0.000     0.530     1.812     0.000     2.342     2.342
S06          0       2.342     2.073     0.260     0.761     0.000     2.999     2.999
S03          0       3.944     2.770     1.825     1.809     0.000     5.800     5.800
S07          0       5.800     5.614     0.511     0.937     0.000     6.537     6.537
S04          0       0.000     0.000     0.136     0.361     0.000     0.497     0.497
S05          0       0.000     0.000     0.163     0.445     0.000     0.608     0.608
S14          0       0.000     0.000     0.337     1.038     0.000     1.375     1.375
S08          0       0.000     0.000     0.523     1.782     0.000     2.304     2.304
S09          0       1.105     0.997     0.292     0.260     0.000     1.545     1.545
S10          0       2.999     2.805     0.199     0.560     0.000     3.382     3.382
S11          0       0.000     0.000     0.222     0.634     0.000     0.857     0.857
S12          0       6.537     6.447     0.221     0.630     0.000     6.921     6.921
S13          0       0.000     0.000     0.177     0.488     0.000     0.665     0.665
S16          0       3.382     3.270     0.162     0.441     0.000     3.670     3.670
S15          0       5.224     4.807     0.222     0.633     0.000     5.521     5.521
S20          0       0.000     0.000     0.121     0.318     0.000     0.439     0.439
S19          0       0.665     0.584     0.186     0.518     0.000     1.274     1.274
S18          0       6.921     6.766     0.222     0.634     0.000     7.163     7.163
S17          0       0.857     0.693     0.324     0.993     0.000     1.970     1.970
S21          0       9.455     9.164     0.194     0.542     0.000     9.688     9.688
S22          0       9.333     9.247     0.132     0.351     0.000     9.497     9.497
Dummy        0      18.626    18.626     0.000     0.000     0.000    18.626    18.626
#####END_PEAK_SUMMARY##########################################################################


#####START_TIME_SUMMARY#########################################################################
SUBAREA OUT_STR   STREAM   STREAM    LOCAL    LOCAL   DIRECTED  OUTLET_STRUCTURE
        1=exist      TOP   BOTTOM PERVIOUS IMPERVIOUS TO BOTTOM INFLOW   OUTFLOW
                (Times in minutes)
S01          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S02          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S06          0       10.0     11.0     10.0     10.0      0.0     10.0     10.0
S03          0       10.0     14.0     15.0     10.0      0.0     12.0     12.0
S07          0       12.0     15.0     10.0     10.0      0.0     14.0     14.0
S04          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S05          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S14          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S08          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S09          0       10.0     11.0     10.0     10.0      0.0     10.0     10.0
S10          0       10.0     12.0     10.0     10.0      0.0     11.0     11.0
S11          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
```

```
S12          0       14.0     15.0     10.0     10.0      0.0     15.0     15.0
S13          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S16          0       11.0     13.0     10.0     10.0      0.0     12.0     12.0
S15          0       10.0     11.0     10.0     10.0      0.0     11.0     11.0
S20          0        0.0      0.0     10.0     10.0      0.0     10.0     10.0
S19          0       10.0     11.0     10.0     10.0      0.0     10.0     10.0
S18          0       15.0     16.0     10.0     10.0      0.0     15.0     15.0
S17          0       10.0     11.0     10.0     10.0      0.0     10.0     10.0
S21          0       11.0     12.0     10.0     10.0      0.0     12.0     12.0
S22          0       15.0     15.0     10.0     10.0      0.0     15.0     15.0
Dummy        0       13.0     13.0      0.0      0.0      0.0     13.0     13.0
#####END_TIME_SUMMARY#########################################################


#####START_OUTLET_STRUCTURE_SUMMARY#########################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                           STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_OUTLET_STRUCTURE_SUMMARY###########################################


#####START_LOCAL_STRUCTURE_SUMMARY##########################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                           STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_LOCAL_STRUCTURE_SUMMARY############################################

#####END_RESULTS_STORM_1

#####START_STORM#2
100 Year ARI 25 Mins Duration DESIGN STORM
        1.00
        1.00
#####START_DESIGN_RAIN
         100          25        1.00
IFD_COEFFS_IN_THIS_FILE
           1
BALGOWNIE#1            1         xxx   304671.00  6191436.00       80.00       49.05       11.30
4.01      109.64       28.61        9.51        4.28       15.81        0.00     1400.00
100        0.67 Design 34.400S 150.875E
#####END_DESIGN_RAIN
#####START_CALC_RAINGAUGE_WEIGHTS
#####END_CALC_RAINGAUGE_WEIGHTS
#####START_LOSS_RATES
S01                10.00        2.50        0.00
S02                10.00        2.50        0.00
S06                10.00        2.50        0.00
S03                10.00        2.50        0.00
S07                10.00        2.50        0.00
S04                10.00        2.50        0.00
S05                10.00        2.50        0.00
S14                10.00        2.50        0.00
S08                10.00        2.50        0.00
S09                10.00        2.50        0.00
S10                10.00        2.50        0.00
S11                10.00        2.50        0.00
S12                10.00        2.50        0.00
S13                10.00        2.50        0.00
S16                10.00        2.50        0.00
S15                10.00        2.50        0.00
S20                10.00        2.50        0.00
S19                10.00        2.50        0.00
S18                10.00        2.50        0.00
```

```
S17                10.00        2.50        0.00
S21                10.00        2.50        0.00
S22                10.00        2.50        0.00
Dummy              10.00        2.50        0.00
#####END_LOSS_RATES
#####START_RECORDED_HYDROGRAPHS
           0
#####END_RECORDED_HYDROGRAPHS
#####START_IMPORTED_HYDROGRAPHS
           0
#####END_IMPORTED_HYDROGRAPHS
#####END_STORM#2

#####START_RESULTS_STORM_2


#####START_CATCHMENT_SUMMARY##############################################
Catchment area   (hectares) =        39.94
Impervious percent      (%) =        60.77
Rainfall depth         (mm) =        74.82
Excess rainfall        (mm) =        70.53
Calc. runoff depth     (mm) =        70.41  - from bottom subarea
Recd. runoff depth     (mm) =         0.00  - from bottom subarea
Calc. peak discharge (m3/s) =        22.503 - from bottom subarea
Recd. peak discharge (m3/s) =         0.000 - from bottom subarea
#####END_CATCHMENT_SUMMARY################################################


#####START_VOLUME_SUMMARY#################################################################################
SUBAREA DIRECTED IMPORTED      LOCAL       LOCAL    DIRECTED    IMPORTED     OUTFLOW     BALANCE
          TO TOP   TO TOP   PERVIOUS  IMPERVIOUS   TO BOTTOM   TO BOTTOM
        (Volumes in thousands m3)
S01
       0.000       0.000       1.153       3.153       0.000       0.000       4.306       0.000
S02
       0.000       0.000       0.643       1.761       0.000       0.000       2.404       0.000
S06
       2.404       0.000       0.258       0.708       0.000       0.000       3.370       0.001
S03
       4.306       0.000       3.492       1.758       0.000       0.000       9.555       0.000
S07
       9.555       0.000       0.614       0.880       0.000       0.000      11.045       0.004
S04
       0.000       0.000       0.120       0.328       0.000       0.000       0.448       0.000
S05
       0.000       0.000       0.148       0.406       0.000       0.000       0.554       0.000
S14
       0.000       0.000       0.357       0.979       0.000       0.000       1.337       0.000
S08
       0.000       0.000       0.632       1.729       0.000       0.000       2.361       0.000
S09
       1.002       0.000       0.299       0.234       0.000       0.000       1.534       0.001
S10
       3.370       0.000       0.188       0.515       0.000       0.000       4.073       0.000
S11
       0.000       0.000       0.214       0.586       0.000       0.000       0.800       0.000
S12
      11.045       0.000       0.212       0.582       0.000       0.000      11.837       0.003
S13
       0.000       0.000       0.163       0.447       0.000       0.000       0.610       0.000
S16
       4.073       0.000       0.147       0.403       0.000       0.000       4.623       0.000
S15
       5.232       0.000       0.213       0.585       0.000       0.000       6.030       0.000
S20
       0.000       0.000       0.105       0.288       0.000       0.000       0.393       0.000
S19
       0.610       0.000       0.173       0.475       0.000       0.000       1.258       0.001
S18
      11.837       0.000       0.214       0.586       0.000       0.000      12.633       0.004
S17
       0.800       0.000       0.341       0.935       0.000       0.000       2.075       0.001
S21
      11.046       0.000       0.182       0.499       0.000       0.000      11.726       0.000
S22
```

	15.967	0.000	0.116	0.318	0.000	0.000	16.399	0.002
Dummy	28.125	0.000	0.000	0.000	0.000	0.000	28.125	0.000

#####END_VOLUME_SUMMARY#####

#####START_PEAK_SUMMARY#####

SUBAREA	OUT_STR 1=exist	STREAM TOP including imported to TOP	STREAM BOTTOM	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM including imported to BOTTOM	OUTLET_STRUCTURE INFLOW	OUTLET_STRUCTURE OUTFLOW
							(Discharges in m3/s)	
S01	0	0.000	0.000	1.065	3.331	0.000	4.396	4.396
S02	0	0.000	0.000	0.665	1.907	0.000	2.572	2.572
S06	0	2.572	2.346	0.304	0.791	0.000	3.422	3.422
S03	0	4.396	3.317	2.462	1.904	0.000	7.408	7.408
S07	0	7.408	6.824	0.640	0.976	0.000	7.994	7.994
S04	0	0.000	0.000	0.151	0.373	0.000	0.524	0.524
S05	0	0.000	0.000	0.184	0.459	0.000	0.643	0.643
S14	0	0.000	0.000	0.404	1.083	0.000	1.487	1.487
S08	0	0.000	0.000	0.655	1.875	0.000	2.530	2.530
S09	0	1.167	1.098	0.346	0.267	0.000	1.711	1.711
S10	0	3.422	3.225	0.229	0.580	0.000	3.924	3.924
S11	0	0.000	0.000	0.257	0.658	0.000	0.915	0.915
S12	0	7.994	7.832	0.255	0.653	0.000	8.337	8.337
S13	0	0.000	0.000	0.201	0.505	0.000	0.706	0.706
S16	0	3.924	3.768	0.183	0.456	0.000	4.262	4.262
S15	0	5.728	5.353	0.257	0.657	0.000	6.266	6.266
S20	0	0.000	0.000	0.134	0.328	0.000	0.461	0.461
S19	0	0.706	0.646	0.212	0.536	0.000	1.394	1.394
S18	0	8.337	8.212	0.257	0.657	0.000	8.660	8.660
S17	0	0.915	0.795	0.388	1.035	0.000	2.207	2.207
S21	0	10.951	10.582	0.222	0.561	0.000	11.196	11.196
S22	0	11.231	11.161	0.147	0.362	0.000	11.468	11.468
Dummy	0	22.503	22.503	0.000	0.000	0.000	22.503	22.503

#####END_PEAK_SUMMARY#####

#####START_TIME_SUMMARY#####

SUBAREA	OUT_STR 1=exist	STREAM TOP	STREAM BOTTOM	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM	OUTLET_STRUCTURE INFLOW	OUTLET_STRUCTURE OUTFLOW
		(Times in minutes)						
S01	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S02	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S06	0	15.0	16.0	15.0	15.0	0.0	15.0	15.0
S03	0	15.0	17.0	15.0	15.0	0.0	15.0	15.0
S07	0	15.0	17.0	15.0	15.0	0.0	16.0	16.0
S04	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S05	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S14	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S08	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S09	0	15.0	15.0	15.0	15.0	0.0	15.0	15.0
S10	0	15.0	16.0	15.0	15.0	0.0	15.0	15.0
S11	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S12	0	16.0	18.0	15.0	15.0	0.0	18.0	18.0
S13	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S16	0	15.0	16.0	15.0	15.0	0.0	16.0	16.0
S15	0	15.0	15.0	15.0	15.0	0.0	15.0	15.0
S20	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S19	0	15.0	15.0	15.0	15.0	0.0	15.0	15.0
S18	0	18.0	19.0	15.0	15.0	0.0	19.0	19.0
S17	0	15.0	16.0	15.0	15.0	0.0	15.0	15.0
S21	0	15.0	16.0	15.0	15.0	0.0	16.0	16.0
S22	0	17.0	18.0	15.0	15.0	0.0	17.0	17.0
Dummy	0	16.0	16.0	0.0	0.0	0.0	16.0	16.0

#####END_TIME_SUMMARY#####

#####START_OUTLET_STRUCTURE_SUMMARY#####

SUBAREA	INITIAL STORAGE	INFLOW	OUTFLOW	FINAL STORAGE	BALANCE
	(Volumes in thousands m3)				

```
SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_OUTLET_STRUCTURE_SUMMARY##########################################


#####START_LOCAL_STRUCTURE_SUMMARY#########################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                            STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_LOCAL_STRUCTURE_SUMMARY###########################################

#####END_RESULTS_STORM_2

#####START_STORM#3
100 Year ARI 30 Mins Duration DESIGN STORM
        1.00
        1.00
#####START_DESIGN_RAIN
         100          30        1.00
IFD_COEFFS_IN_THIS_FILE
           1
BALGOWNIE#1            1         xxx   304671.00  6191436.00       80.00       49.05       11.30
4.01      109.64       28.61        9.51        4.28       15.81        0.00     1400.00
100        0.67 Design 34.400S 150.875E
#####END_DESIGN_RAIN
#####START_CALC_RAINGAUGE_WEIGHTS
#####END_CALC_RAINGAUGE_WEIGHTS
#####START_LOSS_RATES
S01                10.00        2.50        0.00
S02                10.00        2.50        0.00
S06                10.00        2.50        0.00
S03                10.00        2.50        0.00
S07                10.00        2.50        0.00
S04                10.00        2.50        0.00
S05                10.00        2.50        0.00
S14                10.00        2.50        0.00
S08                10.00        2.50        0.00
S09                10.00        2.50        0.00
S10                10.00        2.50        0.00
S11                10.00        2.50        0.00
S12                10.00        2.50        0.00
S13                10.00        2.50        0.00
S16                10.00        2.50        0.00
S15                10.00        2.50        0.00
S20                10.00        2.50        0.00
S19                10.00        2.50        0.00
S18                10.00        2.50        0.00
S17                10.00        2.50        0.00
S21                10.00        2.50        0.00
S22                10.00        2.50        0.00
Dummy              10.00        2.50        0.00
#####END_LOSS_RATES
#####START_RECORDED_HYDROGRAPHS
           0
#####END_RECORDED_HYDROGRAPHS
#####START_IMPORTED_HYDROGRAPHS
           0
#####END_IMPORTED_HYDROGRAPHS
#####END_STORM#3

#####START_RESULTS_STORM_3



#####START_CATCHMENT_SUMMARY###############################################
Catchment area   (hectares) =        39.94
Impervious percent      (%) =        60.77
```

```
Rainfall depth         (mm) =        83.40
Excess rainfall        (mm) =        79.03
Calc. runoff depth     (mm) =        78.93  - from bottom subarea
Recd. runoff depth     (mm) =         0.00  - from bottom subarea
Calc. peak discharge (m3/s) =        22.052 - from bottom subarea
Recd. peak discharge (m3/s) =         0.000 - from bottom subarea
#####END_CATCHMENT_SUMMARY##############################################
```

#####START_VOLUME_SUMMARY#####

SUBAREA	DIRECTED TO TOP	IMPORTED TO TOP	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM	IMPORTED TO BOTTOM	OUTFLOW	BALANCE
	(Volumes in thousands m3)							
S01	0.000	0.000	1.304	3.515	0.000	0.000	4.819	0.000
S02	0.000	0.000	0.728	1.963	0.000	0.000	2.690	0.000
S06	2.690	0.000	0.292	0.790	0.000	0.000	3.772	0.000
S03	4.819	0.000	3.951	1.959	0.000	0.000	10.730	-0.001
S07	10.730	0.000	0.694	0.981	0.000	0.000	12.402	0.004
S04	0.000	0.000	0.135	0.366	0.000	0.000	0.501	0.000
S05	0.000	0.000	0.168	0.453	0.000	0.000	0.620	0.000
S14	0.000	0.000	0.404	1.092	0.000	0.000	1.496	0.000
S08	0.000	0.000	0.715	1.928	0.000	0.000	2.642	0.000
S09	1.122	0.000	0.338	0.261	0.000	0.000	1.720	0.000
S10	3.772	0.000	0.213	0.574	0.000	0.000	4.559	0.000
S11	0.000	0.000	0.242	0.654	0.000	0.000	0.896	0.000
S12	12.402	0.000	0.240	0.649	0.000	0.000	13.288	0.003
S13	0.000	0.000	0.184	0.498	0.000	0.000	0.683	0.000
S16	4.559	0.000	0.166	0.449	0.000	0.000	5.175	0.000
S15	5.859	0.000	0.242	0.653	0.000	0.000	6.753	0.000
S20	0.000	0.000	0.119	0.321	0.000	0.000	0.440	0.000
S19	0.683	0.000	0.196	0.530	0.000	0.000	1.408	0.001
S18	13.288	0.000	0.242	0.653	0.000	0.000	14.180	0.004
S17	0.896	0.000	0.386	1.042	0.000	0.000	2.323	0.001
S21	12.368	0.000	0.206	0.556	0.000	0.000	13.130	-0.001
S22	17.911	0.000	0.131	0.355	0.000	0.000	18.395	0.002
Dummy	31.525	0.000	0.000	0.000	0.000	0.000	31.525	0.000

#####END_VOLUME_SUMMARY#####

#####START_PEAK_SUMMARY#####

SUBAREA	OUT_STR 1=exist	STREAM TOP including imported to TOP	STREAM BOTTOM	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM including imported to BOTTOM	OUTLET_STRUCTURE INFLOW	OUTLET_STRUCTURE OUTFLOW
							(Discharges in m3/s)	
S01	0	0.000	0.000	1.035	3.225	0.000	4.260	4.260
S02	0	0.000	0.000	0.645	1.843	0.000	2.488	2.488
S06	0	2.488	2.284	0.294	0.761	0.000	3.329	3.329
S03	0	4.260	3.256	2.400	1.840	0.000	7.245	7.245
S07	0	7.245	6.695	0.620	0.941	0.000	7.841	7.841
S04	0	0.000	0.000	0.145	0.358	0.000	0.504	0.504

S05	0	0.000	0.000	0.177	0.442	0.000	0.619	0.619
S14	0	0.000	0.000	0.391	1.044	0.000	1.435	1.435
S08	0	0.000	0.000	0.635	1.811	0.000	2.446	2.446
S09	0	1.122	1.065	0.334	0.256	0.000	1.656	1.656
S10	0	3.329	3.150	0.221	0.557	0.000	3.837	3.837
S11	0	0.000	0.000	0.248	0.633	0.000	0.881	0.881
S12	0	7.841	7.687	0.246	0.628	0.000	8.184	8.184
S13	0	0.000	0.000	0.194	0.485	0.000	0.679	0.679
S16	0	3.837	3.694	0.176	0.438	0.000	4.173	4.173
S15	0	5.537	5.215	0.248	0.632	0.000	6.095	6.095
S20	0	0.000	0.000	0.129	0.315	0.000	0.443	0.443
S19	0	0.679	0.628	0.205	0.515	0.000	1.349	1.349
S18	0	8.184	8.066	0.248	0.632	0.000	8.509	8.509
S17	0	0.881	0.774	0.376	0.997	0.000	2.140	2.140
S21	0	10.688	10.346	0.214	0.540	0.000	10.942	10.942
S22	0	11.026	10.960	0.141	0.347	0.000	11.261	11.261
Dummy	0	22.052	22.052	0.000	0.000	0.000	22.052	22.052

#####END_PEAK_SUMMARY##

#####START_TIME_SUMMARY###
SUBAREA	OUT_STR 1=exist	STREAM TOP	STREAM BOTTOM	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM	OUTLET_STRUCTURE INFLOW	OUTFLOW
		(Times in minutes)						
S01	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S02	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S06	0	15.0	16.0	15.0	15.0	0.0	15.0	15.0
S03	0	15.0	17.0	15.0	15.0	0.0	15.0	15.0
S07	0	15.0	17.0	15.0	15.0	0.0	16.0	16.0
S04	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S05	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S14	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S08	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S09	0	15.0	15.0	15.0	15.0	0.0	15.0	15.0
S10	0	15.0	16.0	15.0	15.0	0.0	15.0	15.0
S11	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S12	0	16.0	18.0	15.0	15.0	0.0	18.0	18.0
S13	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S16	0	15.0	16.0	15.0	15.0	0.0	16.0	16.0
S15	0	15.0	15.0	15.0	15.0	0.0	15.0	15.0
S20	0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
S19	0	15.0	15.0	15.0	15.0	0.0	15.0	15.0
S18	0	18.0	19.0	15.0	15.0	0.0	19.0	19.0
S17	0	15.0	16.0	15.0	15.0	0.0	15.0	15.0
S21	0	15.0	16.0	15.0	15.0	0.0	16.0	16.0
S22	0	17.0	18.0	15.0	15.0	0.0	17.0	17.0
Dummy	0	16.0	16.0	0.0	0.0	0.0	16.0	16.0

#####END_TIME_SUMMARY##

#####START_OUTLET_STRUCTURE_SUMMARY###
SUBAREA	INITIAL STORAGE	INFLOW	OUTFLOW	FINAL STORAGE	BALANCE
	(Volumes in thousands m3)				

SUBAREA	INFLOW PEAK (m3/s)	OUTFLOW PEAK (m3/s)	INFLOW VOLUME (m3 E3)	MAX.VOL STORED (m3 E3)	MAX.WATER ELEVATION (metres)

#####END_OUTLET_STRUCTURE_SUMMARY###

#####START_LOCAL_STRUCTURE_SUMMARY##
SUBAREA	INITIAL STORAGE	INFLOW	OUTFLOW	FINAL STORAGE	BALANCE
	(Volumes in thousands m3)				

SUBAREA	INFLOW PEAK (m3/s)	OUTFLOW PEAK (m3/s)	INFLOW VOLUME (m3 E3)	MAX.VOL STORED (m3 E3)	MAX.WATER ELEVATION (metres)

#####END_LOCAL_STRUCTURE_SUMMARY##

```
#####END_RESULTS_STORM_3

#####START_STORM#4
100 Year ARI 45 Mins Duration DESIGN STORM
        1.00
        1.00
#####START_DESIGN_RAIN
         100          45        1.00
IFD_COEFFS_IN_THIS_FILE
          1
BALGOWNIE#1            1         xxx   304671.00  6191436.00       80.00       49.05       11.30
4.01      109.64       28.61        9.51        4.28       15.81        0.00     1400.00
100        0.67 Design 34.400S 150.875E
#####END_DESIGN_RAIN
#####START_CALC_RAINGAUGE_WEIGHTS
#####END_CALC_RAINGAUGE_WEIGHTS
#####START_LOSS_RATES
S01                10.00        2.50        0.00
S02                10.00        2.50        0.00
S06                10.00        2.50        0.00
S03                10.00        2.50        0.00
S07                10.00        2.50        0.00
S04                10.00        2.50        0.00
S05                10.00        2.50        0.00
S14                10.00        2.50        0.00
S08                10.00        2.50        0.00
S09                10.00        2.50        0.00
S10                10.00        2.50        0.00
S11                10.00        2.50        0.00
S12                10.00        2.50        0.00
S13                10.00        2.50        0.00
S16                10.00        2.50        0.00
S15                10.00        2.50        0.00
S20                10.00        2.50        0.00
S19                10.00        2.50        0.00
S18                10.00        2.50        0.00
S17                10.00        2.50        0.00
S21                10.00        2.50        0.00
S22                10.00        2.50        0.00
Dummy              10.00        2.50        0.00
#####END_LOSS_RATES
#####START_RECORDED_HYDROGRAPHS
          0
#####END_RECORDED_HYDROGRAPHS
#####START_IMPORTED_HYDROGRAPHS
          0
#####END_IMPORTED_HYDROGRAPHS
#####END_STORM#4

#####START_RESULTS_STORM_4


#####START_CATCHMENT_SUMMARY##############################################
Catchment area   (hectares) =        39.94
Impervious percent      (%) =        60.77
Rainfall depth         (mm) =       105.47
Excess rainfall        (mm) =       100.91
Calc. runoff depth     (mm) =       100.79  - from bottom subarea
Recd. runoff depth     (mm) =         0.00  - from bottom subarea
Calc. peak discharge (m3/s) =        21.733 - from bottom subarea
Recd. peak discharge (m3/s) =         0.000 - from bottom subarea
#####END_CATCHMENT_SUMMARY################################################


#####START_VOLUME_SUMMARY#########################################################################
SUBAREA DIRECTED IMPORTED      LOCAL       LOCAL    DIRECTED    IMPORTED     OUTFLOW     BALANCE
          TO TOP   TO TOP   PERVIOUS  IMPERVIOUS   TO BOTTOM   TO BOTTOM
        (Volumes in thousands m3)
S01
       0.000       0.000       1.695       4.445       0.000       0.000       6.140       0.000
S02
       0.000       0.000       0.946       2.482       0.000       0.000       3.428       0.000
S06
       3.428       0.000       0.380       0.999       0.000       0.000       4.807       0.000
S03
```

```
       6.140       0.000       5.127       2.478       0.000       0.000      13.745       0.001
S07
      13.745       0.000       0.903       1.241       0.000       0.000      15.883       0.005
S04
       0.000       0.000       0.176       0.463       0.000       0.000       0.639       0.000
S05
       0.000       0.000       0.218       0.573       0.000       0.000       0.791       0.000
S14
       0.000       0.000       0.526       1.381       0.000       0.000       1.906       0.000
S08
       0.000       0.000       0.929       2.438       0.000       0.000       3.367       0.000
S09
       1.429       0.000       0.440       0.330       0.000       0.000       2.199       0.000
S10
       4.807       0.000       0.276       0.726       0.000       0.000       5.810       0.000
S11
       0.000       0.000       0.315       0.827       0.000       0.000       1.141       0.000
S12
      15.883       0.000       0.312       0.821       0.000       0.000      17.012       0.004
S13
       0.000       0.000       0.240       0.630       0.000       0.000       0.870       0.000
S16
       5.810       0.000       0.216       0.568       0.000       0.000       6.595       0.000
S15
       7.471       0.000       0.314       0.825       0.000       0.000       8.612      -0.001
S20
       0.000       0.000       0.154       0.406       0.000       0.000       0.560       0.000
S19
       0.870       0.000       0.255       0.670       0.000       0.000       1.795       0.000
S18
      17.012       0.000       0.314       0.826       0.000       0.000      18.148       0.005
S17
       1.141       0.000       0.502       1.318       0.000       0.000       2.960       0.000
S21
      15.768       0.000       0.267       0.703       0.000       0.000      16.740      -0.002
S22
      22.904       0.000       0.171       0.449       0.000       0.000      23.521       0.003
Dummy
      40.260       0.000       0.000       0.000       0.000       0.000      40.260       0.000
#####END_VOLUME_SUMMARY#########################################################################


#####START_PEAK_SUMMARY#########################################################################
SUBAREA OUT_STR     STREAM    STREAM     LOCAL     LOCAL    DIRECTED  OUTLET_STRUCTURE
        1=exist        TOP    BOTTOM  PERVIOUS IMPERVIOUS  TO BOTTOM  INFLOW   OUTFLOW
                 including                                 including
               imported to                               imported to
                      TOP                                    BOTTOM
                                                                (Discharges in m3/s)
S01          0       0.000     0.000     0.972     2.975     0.000     3.794     3.794
S02          0       0.000     0.000     0.584     1.722     0.000     2.251     2.251
S06          0       2.251     2.122     0.256     0.724     0.000     3.003     3.003
S03          0       3.794     3.254     2.390     1.719     0.000     7.098     7.098
S07          0       7.098     6.791     0.560     0.891     0.000     7.932     7.932
S04          0       0.000     0.000     0.132     0.345     0.000     0.477     0.477
S05          0       0.000     0.000     0.160     0.424     0.000     0.583     0.583
S14          0       0.000     0.000     0.341     0.987     0.000     1.320     1.320
S08          0       0.000     0.000     0.575     1.693     0.000     2.215     2.215
S09          0       1.060     0.986     0.289     0.248     0.000     1.500     1.500
S10          0       3.003     2.974     0.196     0.533     0.000     3.600     3.600
S11          0       0.000     0.000     0.218     0.604     0.000     0.822     0.822
S12          0       7.932     7.816     0.217     0.600     0.000     8.355     8.355
S13          0       0.000     0.000     0.173     0.465     0.000     0.638     0.638
S16          0       3.600     3.566     0.158     0.420     0.000     4.056     4.056
S15          0       5.020     4.816     0.218     0.603     0.000     5.568     5.568
S20          0       0.000     0.000     0.118     0.303     0.000     0.421     0.421
S19          0       0.638     0.581     0.183     0.493     0.000     1.221     1.221
S18          0       8.355     8.261     0.218     0.603     0.000     8.756     8.756
S17          0       0.822     0.722     0.327     0.944     0.000     1.899     1.899
S21          0       9.862     9.818     0.190     0.516     0.000    10.424    10.424
S22          0      11.291    11.234     0.129     0.334     0.000    11.518    11.518
Dummy        0      21.733    21.733     0.000     0.000     0.000    21.733    21.733
#####END_PEAK_SUMMARY###########################################################################
```

```
#####START_TIME_SUMMARY#################################################################
SUBAREA OUT_STR   STREAM   STREAM    LOCAL    LOCAL   DIRECTED  OUTLET_STRUCTURE
        1=exist      TOP   BOTTOM PERVIOUS IMPERVIOUS TO BOTTOM INFLOW   OUTFLOW
                  (Times in minutes)
S01           0        0.0      0.0     20.0     15.0      0.0     15.0     15.0
S02           0        0.0      0.0     20.0     15.0      0.0     15.0     15.0
S06           0       15.0     19.0     15.0     15.0      0.0     17.0     17.0
S03           0       15.0     21.0     20.0     15.0      0.0     20.0     20.0
S07           0       20.0     22.0     20.0     15.0      0.0     21.0     21.0
S04           0        0.0      0.0     15.0     15.0      0.0     15.0     15.0
S05           0        0.0      0.0     15.0     15.0      0.0     15.0     15.0
S14           0        0.0      0.0     20.0     15.0      0.0     15.0     15.0
S08           0        0.0      0.0     20.0     15.0      0.0     15.0     15.0
S09           0       15.0     16.0     20.0     15.0      0.0     16.0     16.0
S10           0       17.0     20.0     15.0     15.0      0.0     20.0     20.0
S11           0        0.0      0.0     15.0     15.0      0.0     15.0     15.0
S12           0       21.0     22.0     15.0     15.0      0.0     22.0     22.0
S13           0        0.0      0.0     15.0     15.0      0.0     15.0     15.0
S16           0       20.0     20.0     15.0     15.0      0.0     20.0     20.0
S15           0       15.0     17.0     15.0     15.0      0.0     17.0     17.0
S20           0        0.0      0.0     15.0     15.0      0.0     15.0     15.0
S19           0       15.0     17.0     15.0     15.0      0.0     15.0     15.0
S18           0       22.0     23.0     15.0     15.0      0.0     23.0     23.0
S17           0       15.0     19.0     20.0     15.0      0.0     16.0     16.0
S21           0       19.0     20.0     15.0     15.0      0.0     20.0     20.0
S22           0       21.0     22.0     15.0     15.0      0.0     22.0     22.0
Dummy         0       21.0     21.0      0.0      0.0      0.0     21.0     21.0
#####END_TIME_SUMMARY###################################################################


#####START_OUTLET_STRUCTURE_SUMMARY#######################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                           STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_OUTLET_STRUCTURE_SUMMARY#########################################


#####START_LOCAL_STRUCTURE_SUMMARY########################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                           STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_LOCAL_STRUCTURE_SUMMARY##########################################

#####END_RESULTS_STORM_4

#####START_STORM#5
100 Year ARI 60 Mins Duration DESIGN STORM
        1.00
        1.00
#####START_DESIGN_RAIN
         100          60        1.00
IFD_COEFFS_IN_THIS_FILE
           1
BALGOWNIE#1            1         xxx   304671.00  6191436.00       80.00       49.05       11.30
4.01      109.64       28.61        9.51        4.28       15.81        0.00     1400.00
100        0.67 Design 34.400S 150.875E
#####END_DESIGN_RAIN
#####START_CALC_RAINGAUGE_WEIGHTS
#####END_CALC_RAINGAUGE_WEIGHTS
#####START_LOSS_RATES
S01               10.00        2.50        0.00
S02               10.00        2.50        0.00
S06               10.00        2.50        0.00
```

```
S03                10.00        2.50        0.00
S07                10.00        2.50        0.00
S04                10.00        2.50        0.00
S05                10.00        2.50        0.00
S14                10.00        2.50        0.00
S08                10.00        2.50        0.00
S09                10.00        2.50        0.00
S10                10.00        2.50        0.00
S11                10.00        2.50        0.00
S12                10.00        2.50        0.00
S13                10.00        2.50        0.00
S16                10.00        2.50        0.00
S15                10.00        2.50        0.00
S20                10.00        2.50        0.00
S19                10.00        2.50        0.00
S18                10.00        2.50        0.00
S17                10.00        2.50        0.00
S21                10.00        2.50        0.00
S22                10.00        2.50        0.00
Dummy              10.00        2.50        0.00
#####END_LOSS_RATES
#####START_RECORDED_HYDROGRAPHS
           0
#####END_RECORDED_HYDROGRAPHS
#####START_IMPORTED_HYDROGRAPHS
           0
#####END_IMPORTED_HYDROGRAPHS
#####END_STORM#5

#####START_RESULTS_STORM_5



#####START_CATCHMENT_SUMMARY##################################################
Catchment area   (hectares) =        39.94
Impervious percent      (%) =        60.77
Rainfall depth         (mm) =       123.98
Excess rainfall        (mm) =       119.19
Calc. runoff depth     (mm) =       119.06  - from bottom subarea
Recd. runoff depth     (mm) =         0.00  - from bottom subarea
Calc. peak discharge (m3/s) =        24.583 - from bottom subarea
Recd. peak discharge (m3/s) =         0.000 - from bottom subarea
#####END_CATCHMENT_SUMMARY####################################################


#####START_VOLUME_SUMMARY#############################################################################
SUBAREA DIRECTED IMPORTED      LOCAL       LOCAL    DIRECTED    IMPORTED     OUTFLOW     BALANCE
          TO TOP   TO TOP   PERVIOUS  IMPERVIOUS   TO BOTTOM   TO BOTTOM
        (Volumes in thousands m3)
S01
       0.000       0.000       2.019       5.225       0.000       0.000       7.244       0.000
S02
       0.000       0.000       1.127       2.917       0.000       0.000       4.044       0.000
S06
       4.044       0.000       0.453       1.174       0.000       0.000       5.672      -0.001
S03
       7.244       0.000       6.109       2.912       0.000       0.000      16.265       0.000
S07
      16.265       0.000       1.075       1.458       0.000       0.000      18.793       0.006
S04
       0.000       0.000       0.210       0.544       0.000       0.000       0.754       0.000
S05
       0.000       0.000       0.260       0.673       0.000       0.000       0.933       0.000
S14
       0.000       0.000       0.626       1.623       0.000       0.000       2.249       0.000
S08
       0.000       0.000       1.106       2.865       0.000       0.000       3.972       0.000
S09
       1.687       0.000       0.524       0.388       0.000       0.000       2.598       0.000
S10
       5.672       0.000       0.329       0.854       0.000       0.000       6.856      -0.001
S11
       0.000       0.000       0.375       0.972       0.000       0.000       1.347       0.000
S12
      18.793       0.000       0.372       0.965       0.000       0.000      20.125       0.005
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S13
       0.000       0.000       0.286       0.741       0.000       0.000       1.027       0.000
S16
       6.856       0.000       0.258       0.668       0.000       0.000       7.782       0.000
S15
       8.818       0.000       0.374       0.970       0.000       0.000      10.164      -0.002
S20
       0.000       0.000       0.184       0.477       0.000       0.000       0.661       0.000
S19
       1.027       0.000       0.304       0.788       0.000       0.000       2.118       0.000
S18
      20.125       0.000       0.375       0.971       0.000       0.000      21.465       0.006
S17
       1.347       0.000       0.598       1.549       0.000       0.000       3.493       0.000
S21
      18.607       0.000       0.319       0.826       0.000       0.000      19.753      -0.002
S22
      27.076       0.000       0.203       0.528       0.000       0.000      27.803       0.005
Dummy
      47.556       0.000       0.000       0.000       0.000       0.000      47.556       0.000
#####END_VOLUME_SUMMARY#########################################################################


#####START_PEAK_SUMMARY#########################################################################
SUBAREA OUT_STR     STREAM    STREAM     LOCAL     LOCAL    DIRECTED  OUTLET_STRUCTURE
        1=exist        TOP    BOTTOM  PERVIOUS IMPERVIOUS  TO BOTTOM  INFLOW   OUTFLOW
                  including                                 including
                imported to                               imported to
                       TOP                                    BOTTOM
                                                                   (Discharges in m3/s)
S01           0       0.000     0.000     1.184     3.333     0.000     4.518     4.518
S02           0       0.000     0.000     0.716     1.909     0.000     2.625     2.625
S06           0       2.625     2.410     0.315     0.795     0.000     3.471     3.471
S03           0       4.518     3.657     2.926     1.906     0.000     8.245     8.245
S07           0       8.245     7.818     0.687     0.980     0.000     9.122     9.122
S04           0       0.000     0.000     0.154     0.377     0.000     0.531     0.531
S05           0       0.000     0.000     0.188     0.464     0.000     0.652     0.652
S14           0       0.000     0.000     0.424     1.086     0.000     1.510     1.510
S08           0       0.000     0.000     0.705     1.876     0.000     2.581     2.581
S09           0       1.182     1.091     0.360     0.271     0.000     1.721     1.721
S10           0       3.471     3.295     0.235     0.584     0.000     3.981     3.981
S11           0       0.000     0.000     0.265     0.662     0.000     0.927     0.927
S12           0       9.122     9.007     0.263     0.657     0.000     9.618     9.618
S13           0       0.000     0.000     0.206     0.509     0.000     0.715     0.715
S16           0       3.981     3.897     0.187     0.460     0.000     4.392     4.392
S15           0       5.812     5.448     0.264     0.661     0.000     6.303     6.303
S20           0       0.000     0.000     0.136     0.332     0.000     0.468     0.468
S19           0       0.715     0.647     0.218     0.540     0.000     1.400     1.400
S18           0       9.618     9.523     0.265     0.661     0.000    10.092    10.092
S17           0       0.927     0.811     0.406     1.038     0.000     2.235     2.235
S21           0      11.088    10.791     0.228     0.565     0.000    11.455    11.455
S22           0      12.942    12.894     0.150     0.366     0.000    13.228    13.228
Dummy         0      24.583    24.583     0.000     0.000     0.000    24.583    24.583
#####END_PEAK_SUMMARY##########################################################################


#####START_TIME_SUMMARY#########################################################################
SUBAREA OUT_STR   STREAM    STREAM    LOCAL    LOCAL   DIRECTED  OUTLET_STRUCTURE
        1=exist      TOP    BOTTOM PERVIOUS IMPERVIOUS TO BOTTOM INFLOW   OUTFLOW
                (Times in minutes)
S01           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S02           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S06           0      25.0      26.0      25.0      25.0       0.0      25.0      25.0
S03           0      25.0      27.0      25.0      25.0       0.0      25.0      25.0
S07           0      25.0      28.0      25.0      25.0       0.0      27.0      27.0
S04           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S05           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S14           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S08           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S09           0      25.0      25.0      25.0      25.0       0.0      25.0      25.0
S10           0      25.0      26.0      25.0      25.0       0.0      25.0      25.0
S11           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S12           0      27.0      28.0      25.0      25.0       0.0      28.0      28.0
S13           0       0.0       0.0      25.0      25.0       0.0      25.0      25.0
S16           0      25.0      27.0      25.0      25.0       0.0      26.0      26.0
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S15          0       25.0     26.0     25.0     25.0      0.0     25.0     25.0
S20          0        0.0      0.0     25.0     25.0      0.0     25.0     25.0
S19          0       25.0     26.0     25.0     25.0      0.0     25.0     25.0
S18          0       28.0     29.0     25.0     25.0      0.0     29.0     29.0
S17          0       25.0     26.0     25.0     25.0      0.0     25.0     25.0
S21          0       25.0     26.0     25.0     25.0      0.0     26.0     26.0
S22          0       27.0     28.0     25.0     25.0      0.0     27.0     27.0
Dummy        0       27.0     27.0      0.0      0.0      0.0     27.0     27.0
#####END_TIME_SUMMARY#########################################################


#####START_OUTLET_STRUCTURE_SUMMARY#######################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                           STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_OUTLET_STRUCTURE_SUMMARY#########################################


#####START_LOCAL_STRUCTURE_SUMMARY########################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                           STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_LOCAL_STRUCTURE_SUMMARY##########################################

#####END_RESULTS_STORM_5

#####START_STORM#6
100 Year ARI 90 Mins Duration DESIGN STORM
        1.00
        1.00
#####START_DESIGN_RAIN
         100          90        1.00
IFD_COEFFS_IN_THIS_FILE
           1
BALGOWNIE#1            1         xxx   304671.00  6191436.00       80.00       49.05       11.30
4.01      109.64       28.61        9.51        4.28       15.81        0.00     1400.00
100        0.67 Design 34.400S 150.875E
#####END_DESIGN_RAIN
#####START_CALC_RAINGAUGE_WEIGHTS
#####END_CALC_RAINGAUGE_WEIGHTS
#####START_LOSS_RATES
S01                10.00        2.50        0.00
S02                10.00        2.50        0.00
S06                10.00        2.50        0.00
S03                10.00        2.50        0.00
S07                10.00        2.50        0.00
S04                10.00        2.50        0.00
S05                10.00        2.50        0.00
S14                10.00        2.50        0.00
S08                10.00        2.50        0.00
S09                10.00        2.50        0.00
S10                10.00        2.50        0.00
S11                10.00        2.50        0.00
S12                10.00        2.50        0.00
S13                10.00        2.50        0.00
S16                10.00        2.50        0.00
S15                10.00        2.50        0.00
S20                10.00        2.50        0.00
S19                10.00        2.50        0.00
S18                10.00        2.50        0.00
S17                10.00        2.50        0.00
S21                10.00        2.50        0.00
S22                10.00        2.50        0.00
```

```
Dummy              10.00        2.50        0.00
#####END_LOSS_RATES
#####START_RECORDED_HYDROGRAPHS
           0
#####END_RECORDED_HYDROGRAPHS
#####START_IMPORTED_HYDROGRAPHS
           0
#####END_IMPORTED_HYDROGRAPHS
#####END_STORM#6

#####START_RESULTS_STORM_6



#####START_CATCHMENT_SUMMARY##################################################
Catchment area   (hectares) =        39.94
Impervious percent      (%) =        60.77
Rainfall depth         (mm) =       150.59
Excess rainfall        (mm) =       145.31
Calc. runoff depth     (mm) =       145.01  - from bottom subarea
Recd. runoff depth     (mm) =         0.00  - from bottom subarea
Calc. peak discharge (m3/s) =        26.254 - from bottom subarea
Recd. peak discharge (m3/s) =         0.000 - from bottom subarea
#####END_CATCHMENT_SUMMARY####################################################


#####START_VOLUME_SUMMARY#############################################################################
SUBAREA DIRECTED IMPORTED      LOCAL       LOCAL    DIRECTED    IMPORTED      OUTFLOW      BALANCE
          TO TOP   TO TOP   PERVIOUS  IMPERVIOUS   TO BOTTOM   TO BOTTOM
        (Volumes in thousands m3)
S01
       0.000       0.000       2.474       6.347       0.000       0.000       8.820       0.000
S02
       0.000       0.000       1.382       3.544       0.000       0.000       4.926       0.000
S06
       4.926       0.000       0.556       1.426       0.000       0.000       6.908       0.000
S03
       8.820       0.000       7.476       3.538       0.000       0.000      19.827       0.007
S07
      19.827       0.000       1.319       1.772       0.000       0.000      22.903       0.015
S04
       0.000       0.000       0.257       0.661       0.000       0.000       0.918       0.000
S05
       0.000       0.000       0.319       0.818       0.000       0.000       1.137       0.000
S14
       0.000       0.000       0.768       1.971       0.000       0.000       2.740       0.000
S08
       0.000       0.000       1.358       3.481       0.000       0.000       4.838       0.000
S09
       2.055       0.000       0.643       0.471       0.000       0.000       3.168       0.000
S10
       6.908       0.000       0.404       1.037       0.000       0.000       8.349       0.000
S11
       0.000       0.000       0.460       1.181       0.000       0.000       1.641       0.000
S12
      22.903       0.000       0.457       1.172       0.000       0.000      24.520       0.012
S13
       0.000       0.000       0.351       0.900       0.000       0.000       1.251       0.000
S16
       8.349       0.000       0.316       0.812       0.000       0.000       9.477       0.000
S15
      10.746       0.000       0.459       1.178       0.000       0.000      12.384       0.000
S20
       0.000       0.000       0.226       0.580       0.000       0.000       0.805       0.000
S19
       1.251       0.000       0.373       0.957       0.000       0.000       2.581       0.000
S18
      24.520       0.000       0.460       1.180       0.000       0.000      26.145       0.014
S17
       1.641       0.000       0.734       1.882       0.000       0.000       4.255       0.000
S21
      22.666       0.000       0.391       1.003       0.000       0.000      24.061       0.000
S22
      32.981       0.000       0.250       0.641       0.000       0.000      33.860       0.011
Dummy
```

```
      57.921       0.000       0.000       0.000       0.000       0.000      57.921       0.000
#####END_VOLUME_SUMMARY#########################################################################
```

#####START_PEAK_SUMMARY###

SUBAREA	OUT_STR 1=exist	STREAM TOP including imported to TOP	STREAM BOTTOM	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM including imported to BOTTOM	OUTLET_STRUCTURE INFLOW	OUTLET_STRUCTURE OUTFLOW
							(Discharges in m3/s)	
S01	0	0.000	0.000	1.301	3.573	0.000	4.874	4.874
S02	0	0.000	0.000	0.778	2.055	0.000	2.833	2.833
S06	0	2.833	2.554	0.341	0.860	0.000	3.717	3.717
S03	0	4.874	3.859	3.316	2.051	0.000	9.032	9.032
S07	0	9.032	8.387	0.747	1.059	0.000	9.836	9.836
S04	0	0.000	0.000	0.167	0.409	0.000	0.576	0.576
S05	0	0.000	0.000	0.204	0.503	0.000	0.707	0.707
S14	0	0.000	0.000	0.458	1.174	0.000	1.632	1.632
S08	0	0.000	0.000	0.766	2.020	0.000	2.786	2.786
S09	0	1.284	1.173	0.389	0.295	0.000	1.857	1.857
S10	0	3.717	3.485	0.254	0.633	0.000	4.226	4.226
S11	0	0.000	0.000	0.286	0.717	0.000	1.004	1.004
S12	0	9.836	9.622	0.285	0.712	0.000	10.257	10.257
S13	0	0.000	0.000	0.223	0.552	0.000	0.775	0.775
S16	0	4.226	4.065	0.202	0.500	0.000	4.594	4.594
S15	0	6.275	5.783	0.286	0.716	0.000	6.755	6.755
S20	0	0.000	0.000	0.148	0.361	0.000	0.508	0.508
S19	0	0.775	0.686	0.236	0.586	0.000	1.508	1.508
S18	0	10.257	10.102	0.286	0.717	0.000	10.646	10.646
S17	0	1.004	0.856	0.439	1.122	0.000	2.399	2.399
S21	0	11.808	11.395	0.246	0.613	0.000	12.062	12.062
S22	0	13.959	13.773	0.162	0.397	0.000	14.192	14.192
Dummy	0	26.254	26.254	0.000	0.000	0.000	26.254	26.254

#####END_PEAK_SUMMARY###

#####START_TIME_SUMMARY###

SUBAREA	OUT_STR 1=exist	STREAM TOP	STREAM BOTTOM	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM	OUTLET_STRUCTURE INFLOW	OUTLET_STRUCTURE OUTFLOW
		(Times in minutes)						
S01	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S02	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S06	0	30.0	31.0	30.0	30.0	0.0	30.0	30.0
S03	0	30.0	32.0	30.0	30.0	0.0	30.0	30.0
S07	0	30.0	32.0	30.0	30.0	0.0	31.0	31.0
S04	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S05	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S14	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S08	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S09	0	30.0	30.0	30.0	30.0	0.0	30.0	30.0
S10	0	30.0	31.0	30.0	30.0	0.0	30.0	30.0
S11	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S12	0	31.0	32.0	30.0	30.0	0.0	32.0	32.0
S13	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S16	0	30.0	32.0	30.0	30.0	0.0	31.0	31.0
S15	0	30.0	31.0	30.0	30.0	0.0	30.0	30.0
S20	0	0.0	0.0	30.0	30.0	0.0	30.0	30.0
S19	0	30.0	30.0	30.0	30.0	0.0	30.0	30.0
S18	0	32.0	33.0	30.0	30.0	0.0	32.0	32.0
S17	0	30.0	31.0	30.0	30.0	0.0	30.0	30.0
S21	0	30.0	31.0	30.0	30.0	0.0	31.0	31.0
S22	0	30.0	31.0	30.0	30.0	0.0	31.0	31.0
Dummy	0	31.0	31.0	0.0	0.0	0.0	31.0	31.0

#####END_TIME_SUMMARY###

#####START_OUTLET_STRUCTURE_SUMMARY###

SUBAREA	INITIAL STORAGE	INFLOW	OUTFLOW	FINAL STORAGE	BALANCE
	(Volumes in thousands m3)				

SUBAREA	INFLOW PEAK	OUTFLOW PEAK	INFLOW VOLUME	MAX.VOL STORED	MAX.WATER ELEVATION

```
                        (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_OUTLET_STRUCTURE_SUMMARY##########################################


#####START_LOCAL_STRUCTURE_SUMMARY#########################################
SUBAREA               INITIAL     INFLOW    OUTFLOW      FINAL    BALANCE
                      STORAGE                            STORAGE
                      (Volumes in thousands m3)


SUBAREA                INFLOW    OUTFLOW     INFLOW    MAX.VOL  MAX.WATER
                         PEAK       PEAK     VOLUME     STORED  ELEVATION
                       (m3/s)     (m3/s)    (m3 E3)    (m3 E3)   (metres)

#####END_LOCAL_STRUCTURE_SUMMARY###########################################

#####END_RESULTS_STORM_6

#####START_STORM#7
100 Year ARI 120 Mins Duration DESIGN STORM
        1.00
        1.00
#####START_DESIGN_RAIN
         100         120        1.00
IFD_COEFFS_IN_THIS_FILE
           1
BALGOWNIE#1            1         xxx   304671.00  6191436.00       80.00       49.05       11.30
4.01      109.64       28.61        9.51        4.28       15.81        0.00     1400.00
100        0.67 Design 34.400S 150.875E
#####END_DESIGN_RAIN
#####START_CALC_RAINGAUGE_WEIGHTS
#####END_CALC_RAINGAUGE_WEIGHTS
#####START_LOSS_RATES
S01                10.00        2.50        0.00
S02                10.00        2.50        0.00
S06                10.00        2.50        0.00
S03                10.00        2.50        0.00
S07                10.00        2.50        0.00
S04                10.00        2.50        0.00
S05                10.00        2.50        0.00
S14                10.00        2.50        0.00
S08                10.00        2.50        0.00
S09                10.00        2.50        0.00
S10                10.00        2.50        0.00
S11                10.00        2.50        0.00
S12                10.00        2.50        0.00
S13                10.00        2.50        0.00
S16                10.00        2.50        0.00
S15                10.00        2.50        0.00
S20                10.00        2.50        0.00
S19                10.00        2.50        0.00
S18                10.00        2.50        0.00
S17                10.00        2.50        0.00
S21                10.00        2.50        0.00
S22                10.00        2.50        0.00
Dummy              10.00        2.50        0.00
#####END_LOSS_RATES
#####START_RECORDED_HYDROGRAPHS
           0
#####END_RECORDED_HYDROGRAPHS
#####START_IMPORTED_HYDROGRAPHS
           0
#####END_IMPORTED_HYDROGRAPHS
#####END_STORM#7

#####START_RESULTS_STORM_7



#####START_CATCHMENT_SUMMARY###############################################
Catchment area   (hectares) =        39.94
Impervious percent      (%) =        60.77
Rainfall depth         (mm) =       172.37
Excess rainfall        (mm) =       166.62
```

```
Calc. runoff depth     (mm) =       165.70  - from bottom subarea
Recd. runoff depth     (mm) =         0.00  - from bottom subarea
Calc. peak discharge (m3/s) =        26.419 - from bottom subarea
Recd. peak discharge (m3/s) =         0.000 - from bottom subarea
#####END_CATCHMENT_SUMMARY##########################################################
```

```
#####START_VOLUME_SUMMARY#########################################################################
SUBAREA DIRECTED IMPORTED      LOCAL       LOCAL    DIRECTED    IMPORTED     OUTFLOW     BALANCE
          TO TOP   TO TOP   PERVIOUS  IMPERVIOUS   TO BOTTOM   TO BOTTOM
        (Volumes in thousands m3)
S01
       0.000       0.000       2.834       7.265       0.000       0.000      10.099       0.000
S02
       0.000       0.000       1.586       4.057       0.000       0.000       5.643       0.000
S06
       5.643       0.000       0.639       1.632       0.000       0.000       7.911       0.004
S03
      10.099       0.000       8.534       4.049       0.000       0.000      22.647       0.035
S07
      22.647       0.000       1.514       2.028       0.000       0.000      26.145       0.044
S04
       0.000       0.000       0.296       0.756       0.000       0.000       1.053       0.000
S05
       0.000       0.000       0.366       0.936       0.000       0.000       1.303       0.000
S14
       0.000       0.000       0.883       2.256       0.000       0.000       3.140       0.000
S08
       0.000       0.000       1.558       3.984       0.000       0.000       5.542       0.000
S09
       2.355       0.000       0.739       0.539       0.000       0.000       3.633       0.000
S10
       7.911       0.000       0.465       1.187       0.000       0.000       9.558       0.004
S11
       0.000       0.000       0.529       1.351       0.000       0.000       1.880       0.000
S12
      26.145       0.000       0.525       1.342       0.000       0.000      27.978       0.035
S13
       0.000       0.000       0.403       1.030       0.000       0.000       1.434       0.000
S16
       9.558       0.000       0.364       0.929       0.000       0.000      10.846       0.005
S15
      12.315       0.000       0.528       1.349       0.000       0.000      14.187       0.005
S20
       0.000       0.000       0.260       0.664       0.000       0.000       0.923       0.000
S19
       1.434       0.000       0.429       1.096       0.000       0.000       2.958       0.001
S18
      27.978       0.000       0.529       1.350       0.000       0.000      29.817       0.040
S17
       1.880       0.000       0.843       2.154       0.000       0.000       4.876       0.002
S21
      25.956       0.000       0.450       1.149       0.000       0.000      27.544       0.010
S22
      37.650       0.000       0.287       0.734       0.000       0.000      38.640       0.031
Dummy
      66.184       0.000       0.000       0.000       0.000       0.000      66.184       0.000
#####END_VOLUME_SUMMARY###########################################################################
```

```
#####START_PEAK_SUMMARY#############################################################
SUBAREA OUT_STR     STREAM    STREAM     LOCAL     LOCAL    DIRECTED  OUTLET_STRUCTURE
        1=exist        TOP    BOTTOM  PERVIOUS IMPERVIOUS  TO BOTTOM  INFLOW   OUTFLOW
                 including                                 including
               imported to                               imported to
                      TOP                                    BOTTOM
                                                                (Discharges in m3/s)
S01          0       0.000     0.000     1.196     3.348     0.000     4.515     4.515
S02          0       0.000     0.000     0.708     1.941     0.000     2.649     2.649
S06          0       2.649     2.458     0.317     0.822     0.000     3.481     3.481
S03          0       4.515     3.917     3.228     1.937     0.000     8.814     8.814
S07          0       8.814     8.557     0.680     1.009     0.000    10.014    10.014
S04          0       0.000     0.000     0.158     0.394     0.000     0.552     0.552
S05          0       0.000     0.000     0.192     0.484     0.000     0.676     0.676
S14          0       0.000     0.000     0.423     1.117     0.000     1.540     1.540
```

S08	0	0.000	0.000	0.697	1.908	0.000	2.605	2.605
S09	0	1.228	1.128	0.361	0.285	0.000	1.735	1.735
S10	0	3.481	3.421	0.238	0.607	0.000	4.131	4.131
S11	0	0.000	0.000	0.267	0.687	0.000	0.954	0.954
S12	0	10.014	9.855	0.266	0.682	0.000	10.536	10.536
S13	0	0.000	0.000	0.209	0.530	0.000	0.739	0.739
S16	0	4.131	4.103	0.190	0.480	0.000	4.647	4.647
S15	0	5.870	5.580	0.267	0.686	0.000	6.431	6.431
S20	0	0.000	0.000	0.140	0.348	0.000	0.488	0.488
S19	0	0.739	0.664	0.221	0.562	0.000	1.406	1.406
S18	0	10.536	10.398	0.267	0.686	0.000	11.037	11.037
S17	0	0.954	0.828	0.406	1.069	0.000	2.218	2.218
S21	0	11.339	11.261	0.231	0.588	0.000	11.945	11.945
S22	0	14.319	14.146	0.153	0.383	0.000	14.508	14.508
Dummy	0	26.419	26.419	0.000	0.000	0.000	26.419	26.419

#####END_PEAK_SUMMARY##

#####START_TIME_SUMMARY###
SUBAREA	OUT_STR 1=exist	STREAM TOP	STREAM BOTTOM	LOCAL PERVIOUS	LOCAL IMPERVIOUS	DIRECTED TO BOTTOM	OUTLET_STRUCTURE INFLOW	OUTFLOW
		(Times in minutes)						
S01	0	0.0	0.0	40.0	35.0	0.0	35.0	35.0
S02	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S06	0	35.0	38.0	35.0	35.0	0.0	37.0	37.0
S03	0	35.0	41.0	40.0	35.0	0.0	40.0	40.0
S07	0	40.0	41.0	35.0	35.0	0.0	40.0	40.0
S04	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S05	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S14	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S08	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S09	0	35.0	36.0	35.0	35.0	0.0	36.0	36.0
S10	0	37.0	39.0	35.0	35.0	0.0	38.0	38.0
S11	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S12	0	40.0	41.0	35.0	35.0	0.0	40.0	40.0
S13	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S16	0	38.0	40.0	35.0	35.0	0.0	40.0	40.0
S15	0	35.0	37.0	35.0	35.0	0.0	37.0	37.0
S20	0	0.0	0.0	35.0	35.0	0.0	35.0	35.0
S19	0	35.0	37.0	35.0	35.0	0.0	35.0	35.0
S18	0	40.0	42.0	35.0	35.0	0.0	41.0	41.0
S17	0	35.0	38.0	35.0	35.0	0.0	35.0	35.0
S21	0	38.0	39.0	35.0	35.0	0.0	39.0	39.0
S22	0	40.0	41.0	35.0	35.0	0.0	40.0	40.0
Dummy	0	40.0	40.0	0.0	0.0	0.0	40.0	40.0

#####END_TIME_SUMMARY##

#####START_OUTLET_STRUCTURE_SUMMARY###
SUBAREA	INITIAL STORAGE (Volumes in thousands m3)	INFLOW	OUTFLOW	FINAL STORAGE	BALANCE

SUBAREA	INFLOW PEAK (m3/s)	OUTFLOW PEAK (m3/s)	INFLOW VOLUME (m3 E3)	MAX.VOL STORED (m3 E3)	MAX.WATER ELEVATION (metres)

#####END_OUTLET_STRUCTURE_SUMMARY###

#####START_LOCAL_STRUCTURE_SUMMARY###
SUBAREA	INITIAL STORAGE (Volumes in thousands m3)	INFLOW	OUTFLOW	FINAL STORAGE	BALANCE

SUBAREA	INFLOW PEAK (m3/s)	OUTFLOW PEAK (m3/s)	INFLOW VOLUME (m3 E3)	MAX.VOL STORED (m3 E3)	MAX.WATER ELEVATION (metres)

#####END_LOCAL_STRUCTURE_SUMMARY###

#####END_RESULTS_STORM_7

#####END_QA_SUMMARY_FILE###

APPENDIX B: TUFLOW Results

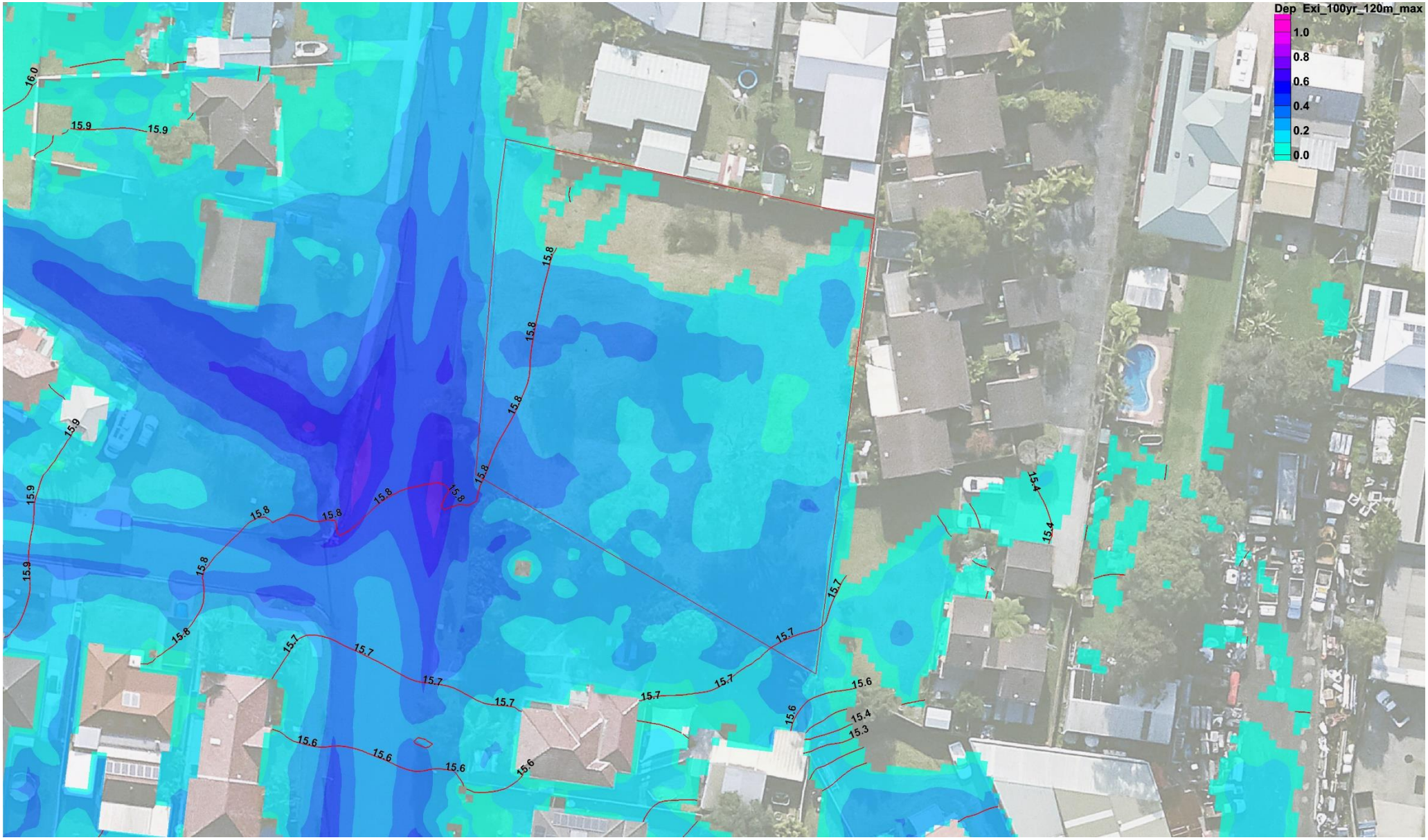

Figure A01: Existing 100yr 120min Depths [m] & Levels [mAHD]

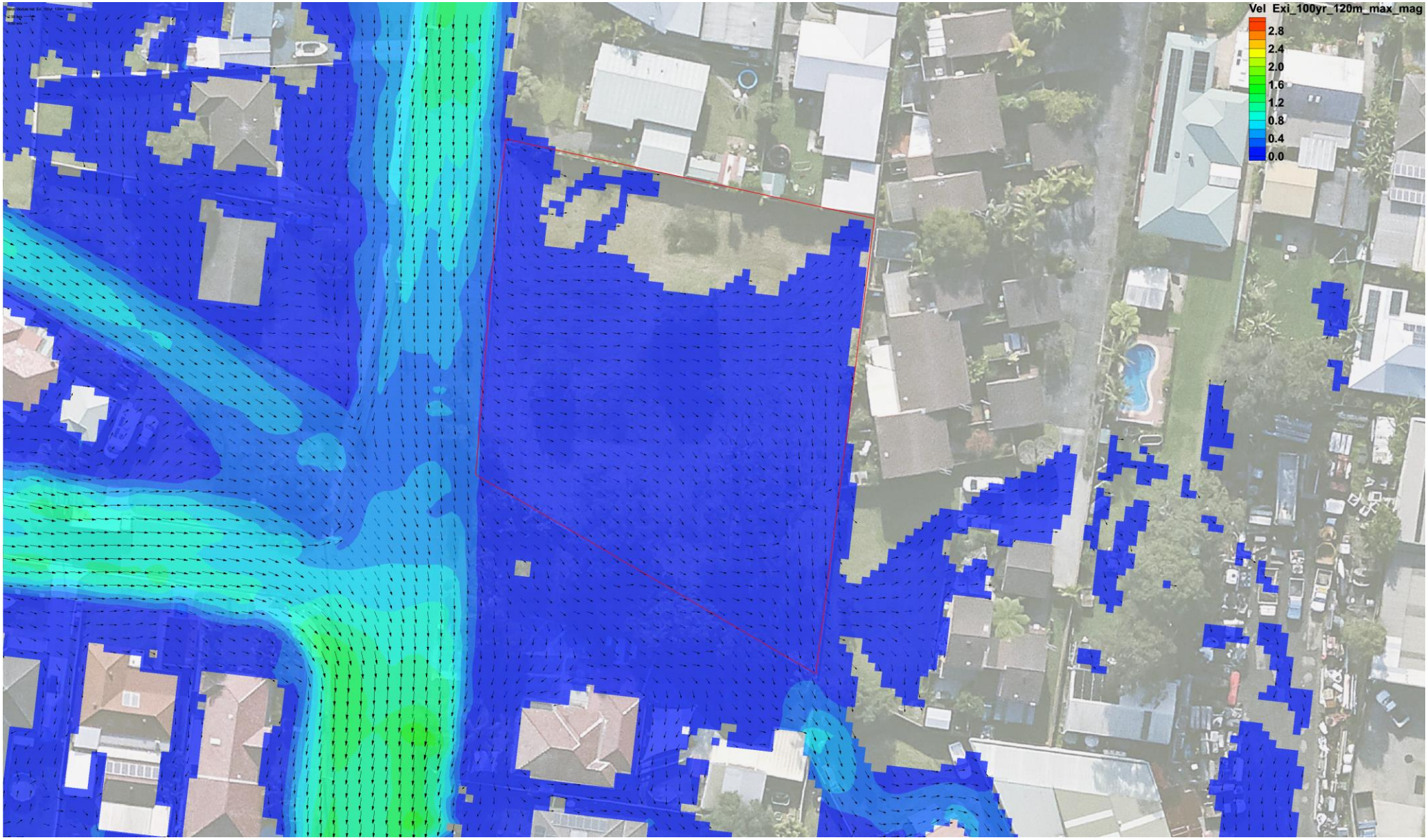

Figure A02: Existing 100yr 120min Velocities [m/s]

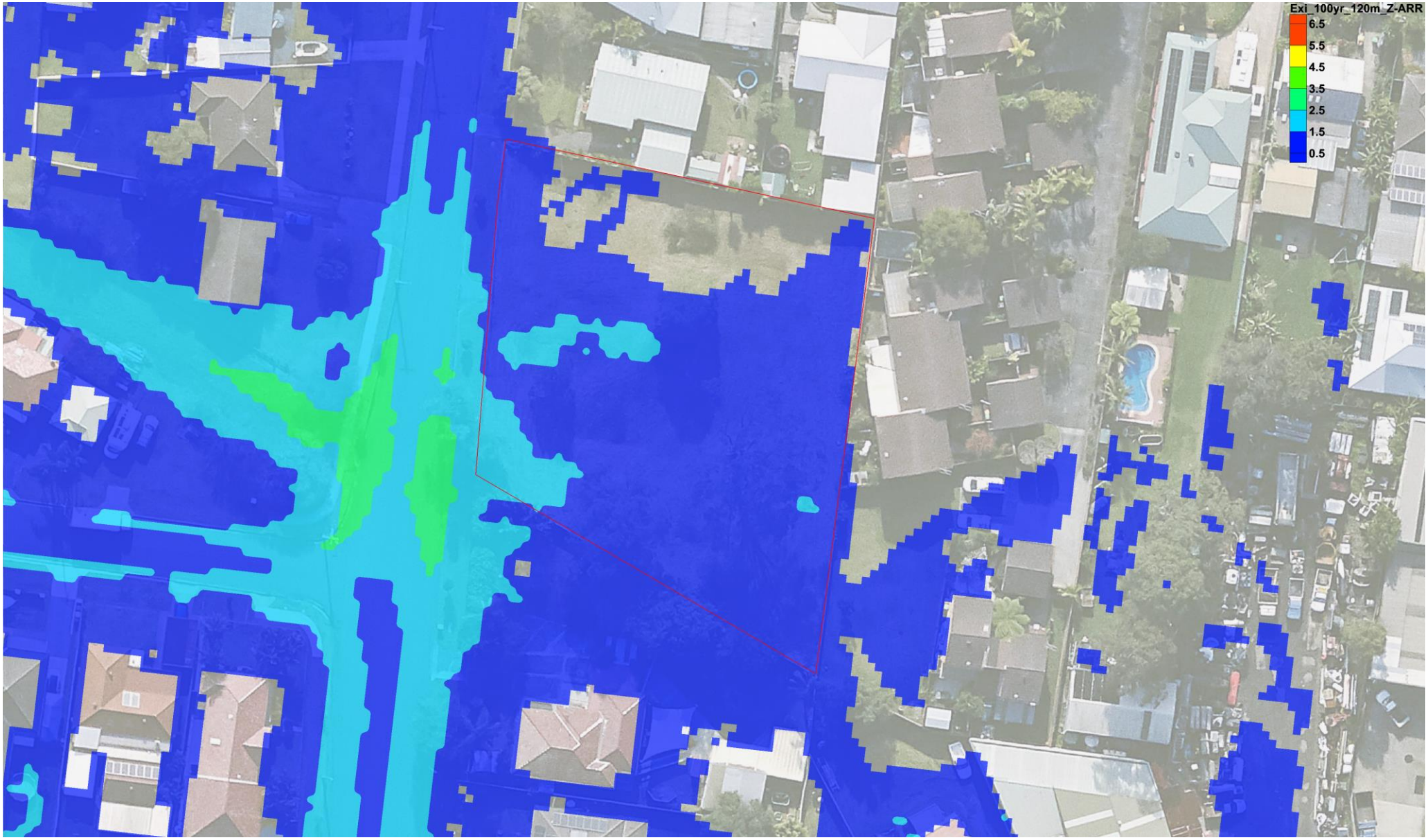

Figure A03: Existing 100yr 120min ARR2019 Hazard

H1-H6 blue-red gradient

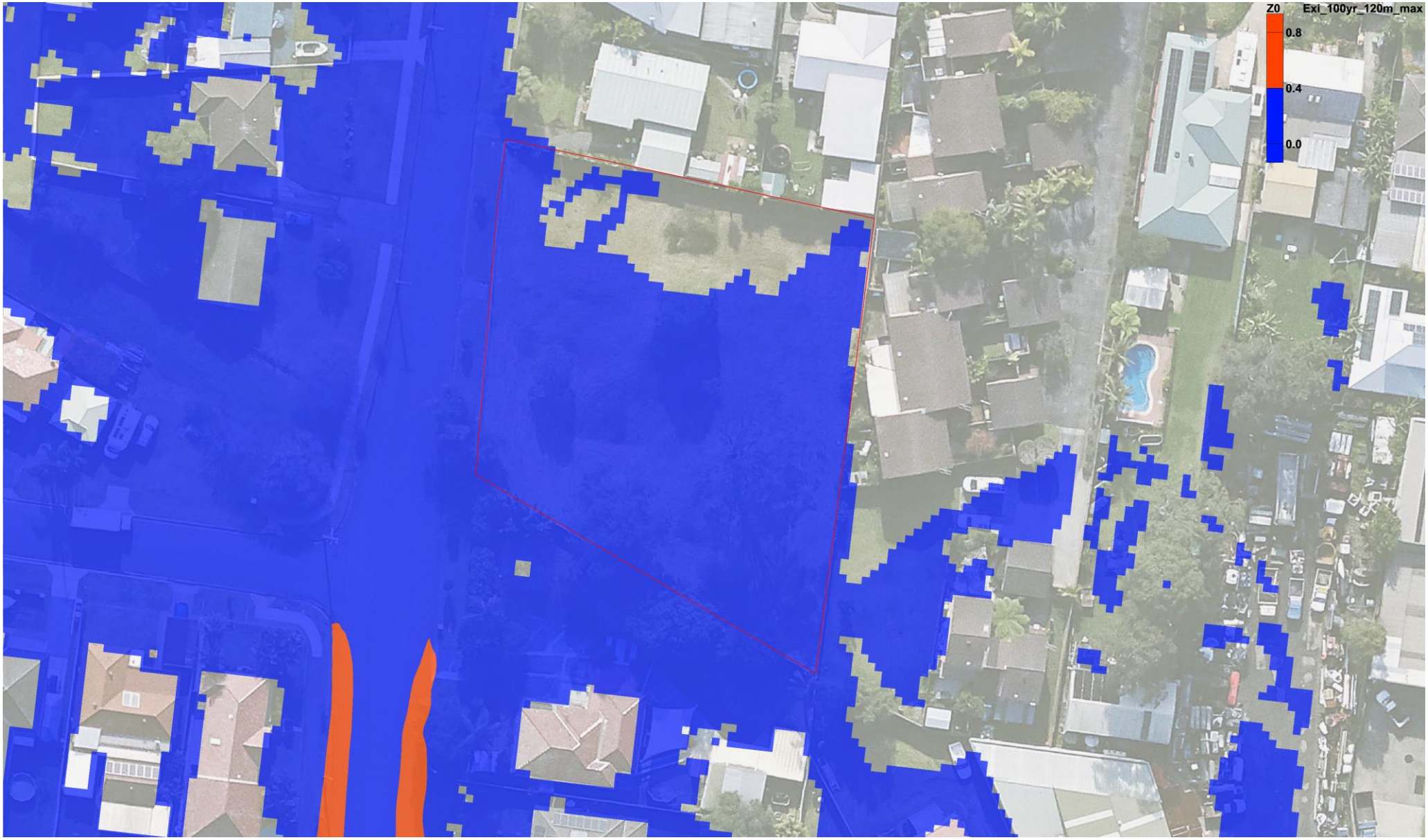

Figure A04: Existing 100yr 120min V*D > 0.4

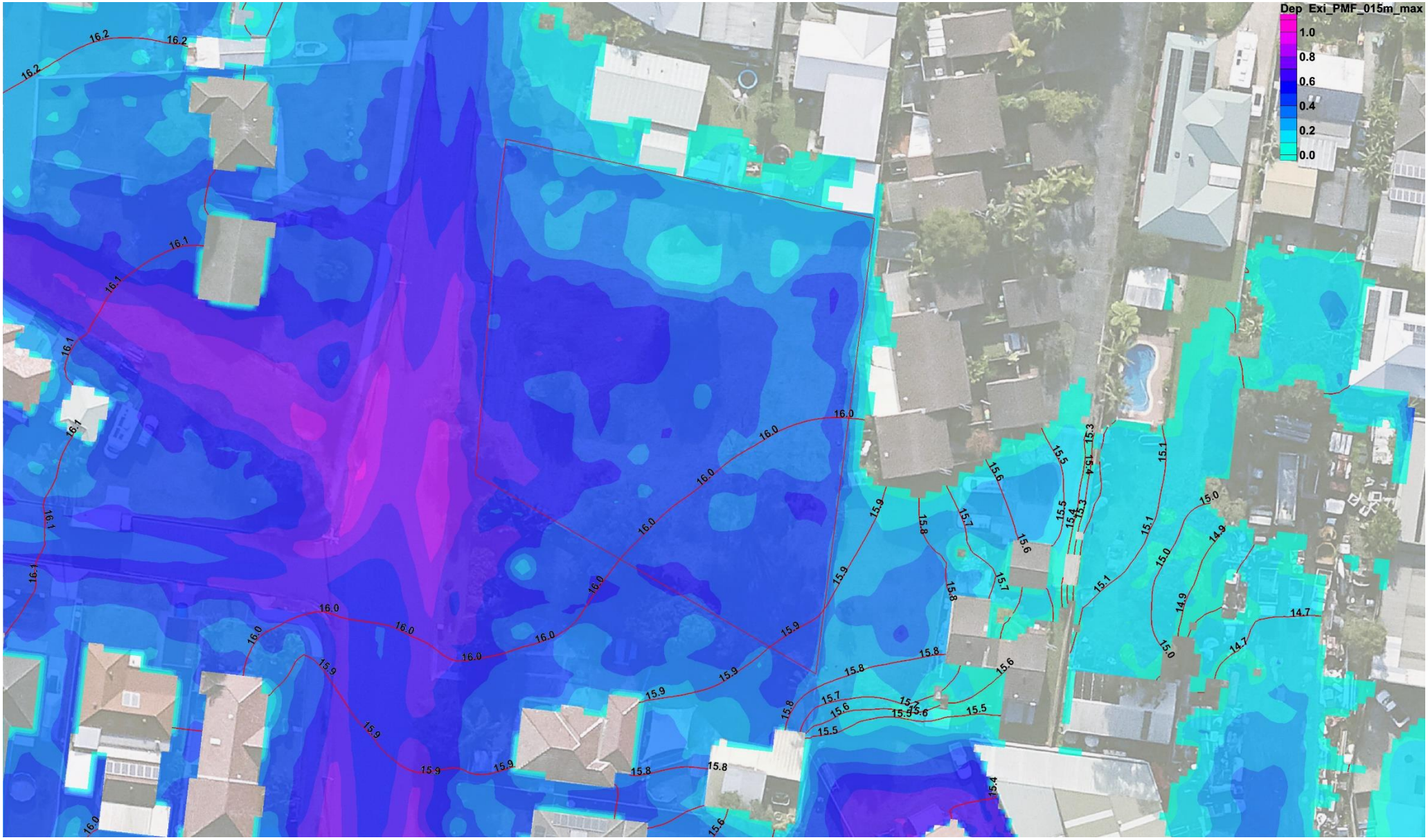

Figure A05: Existing PMF 15min Depths [m] & Levels [mAHD]

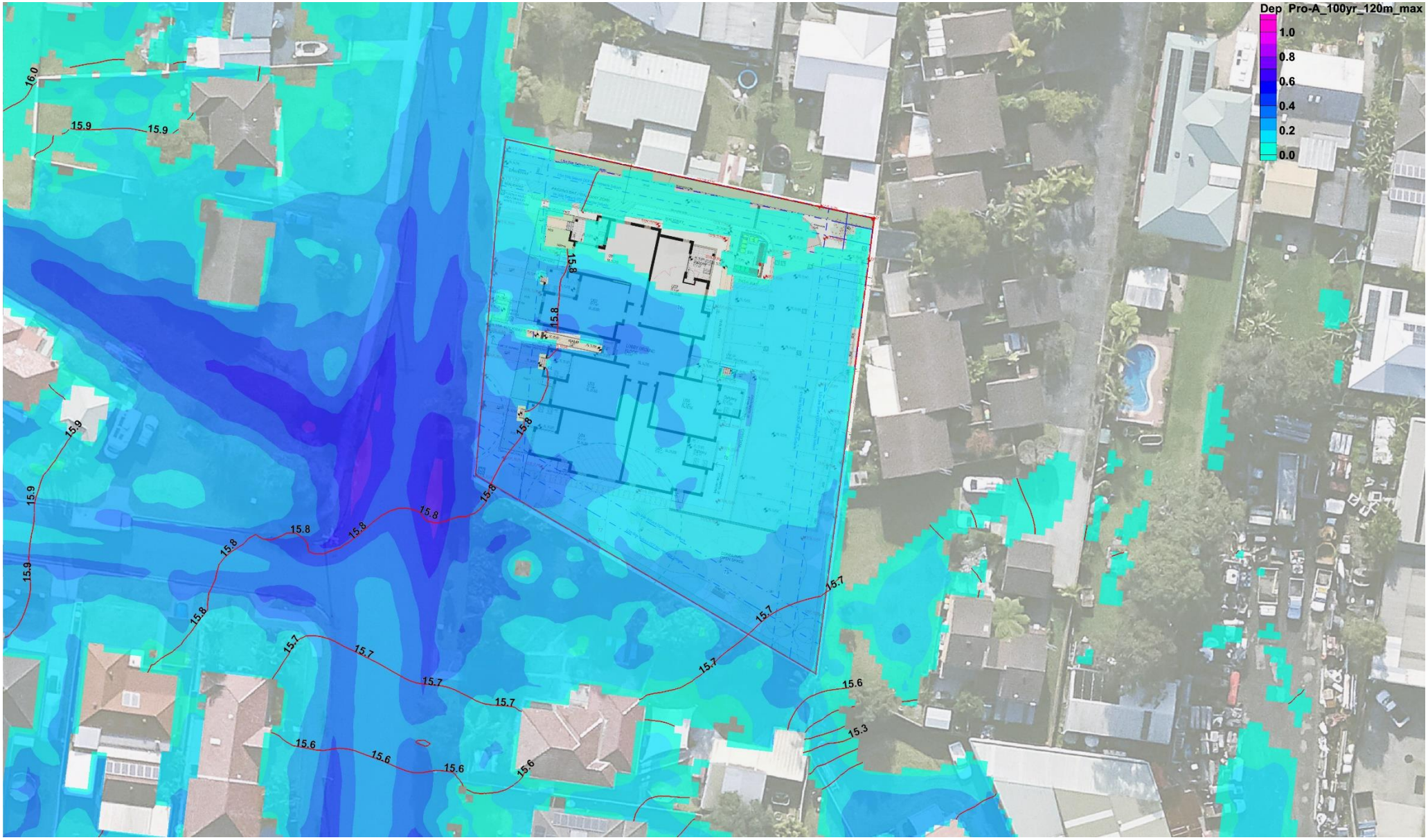

Figure B01: Proposed 100yr 120min Depths [m] & Levels [mAHD]

greenview CONSULTING

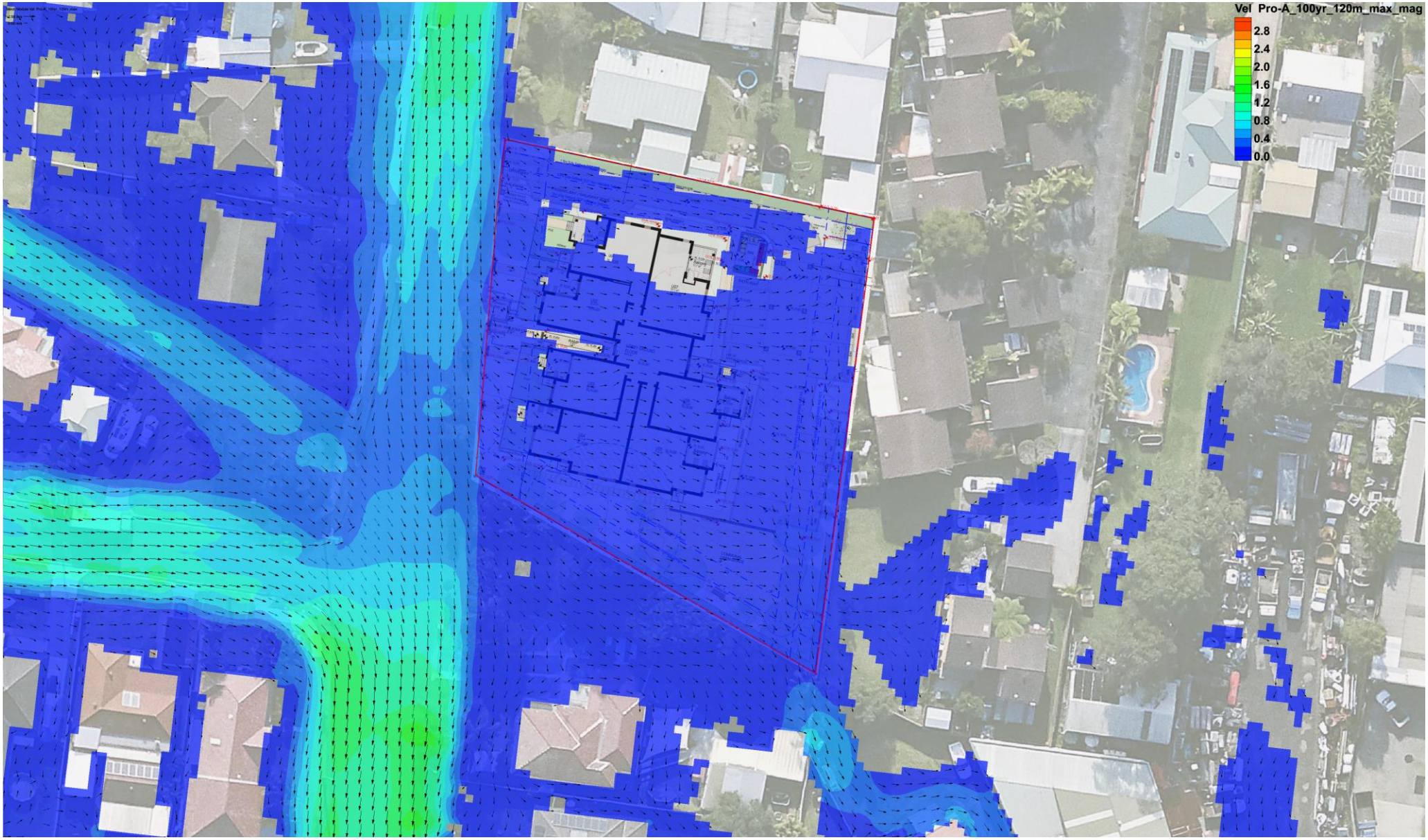

Figure B02: Proposed 100yr 120min Velocities [m/s]

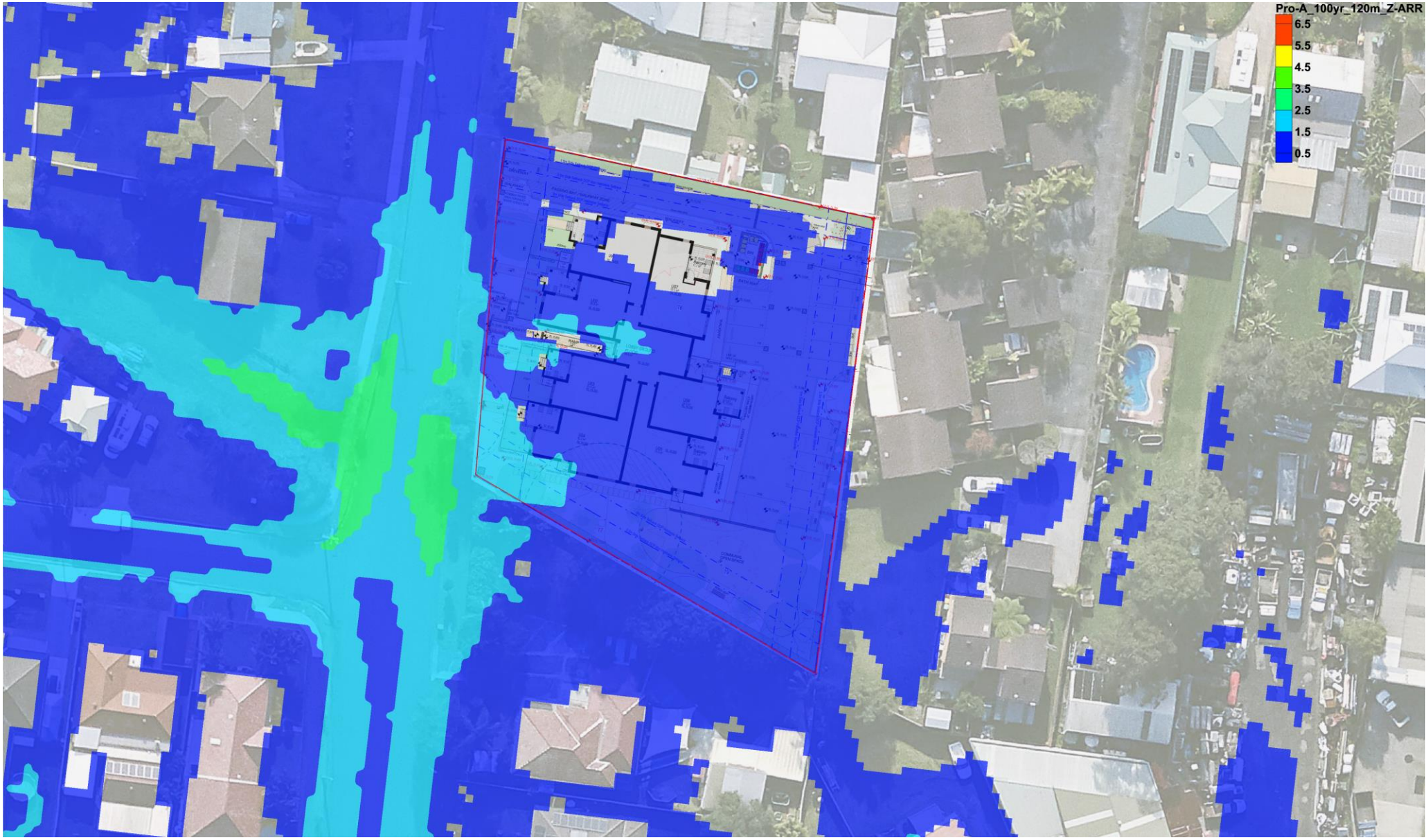

Figure B03: Proposed 100yr 120min ARR2019 Hazard

H1-H6 blue-red gradient

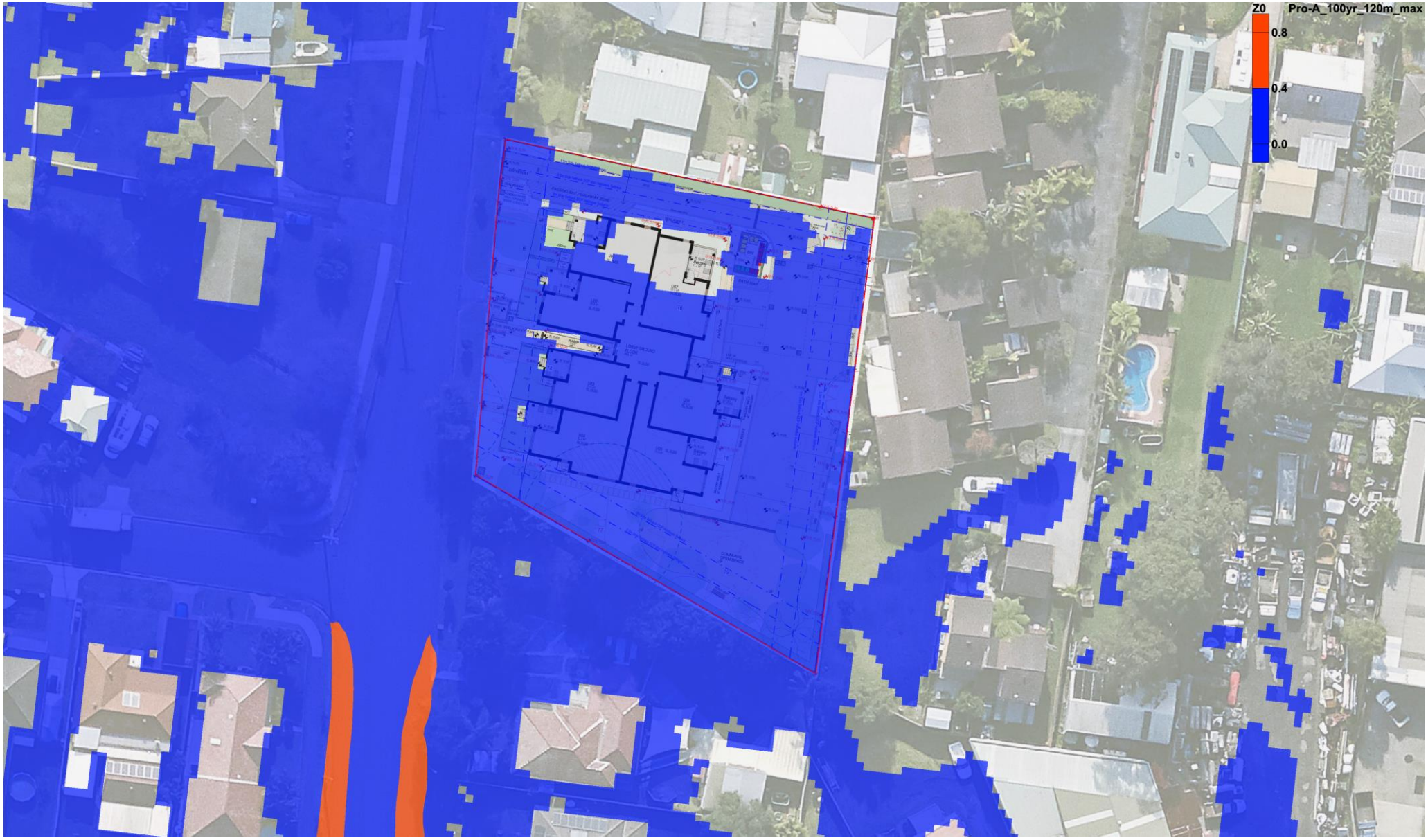

Figure B04: Proposed 100yr 120min V*D > 0.4

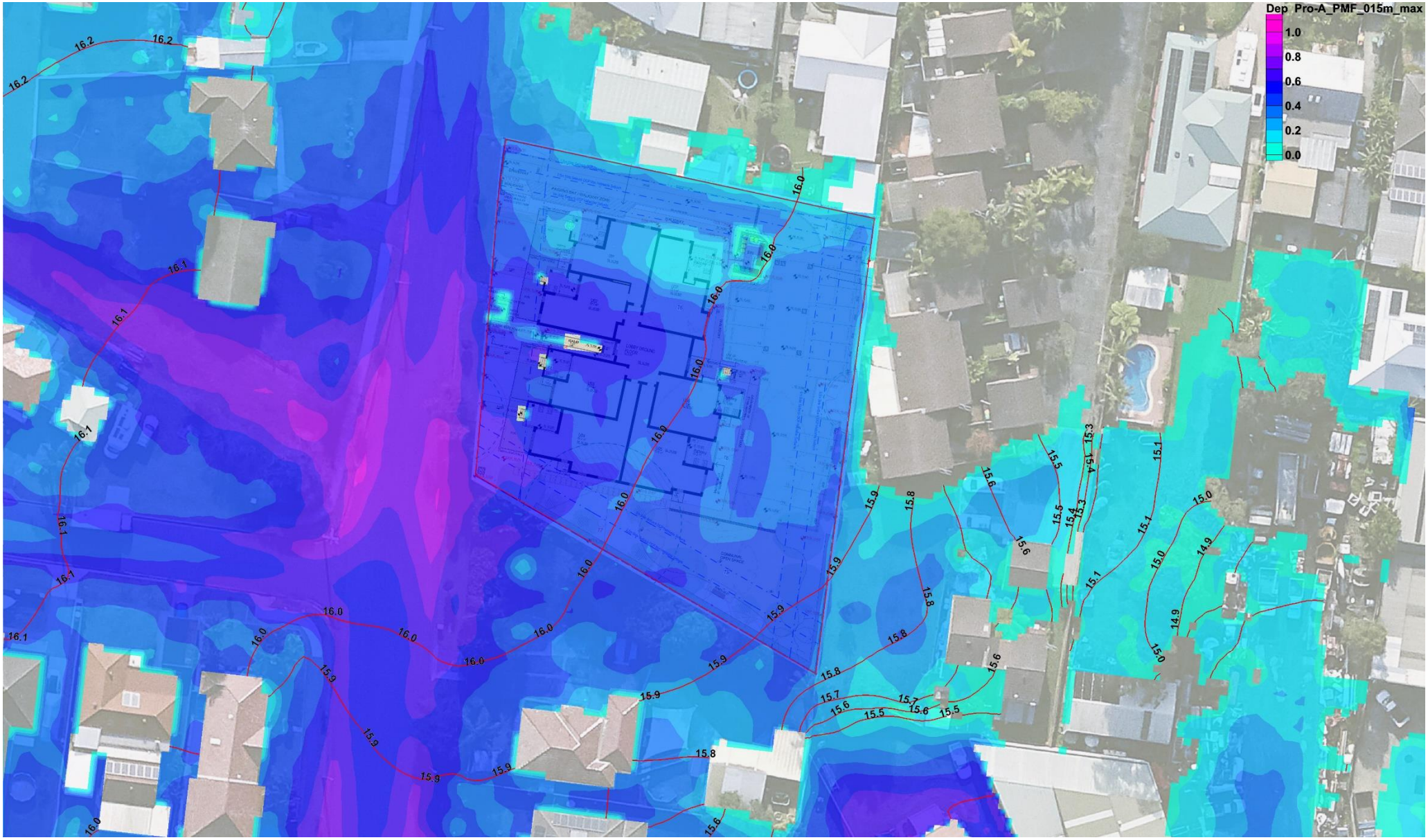

Figure B05: Proposed PMF 15min Depths [m] & Levels [mAHD]

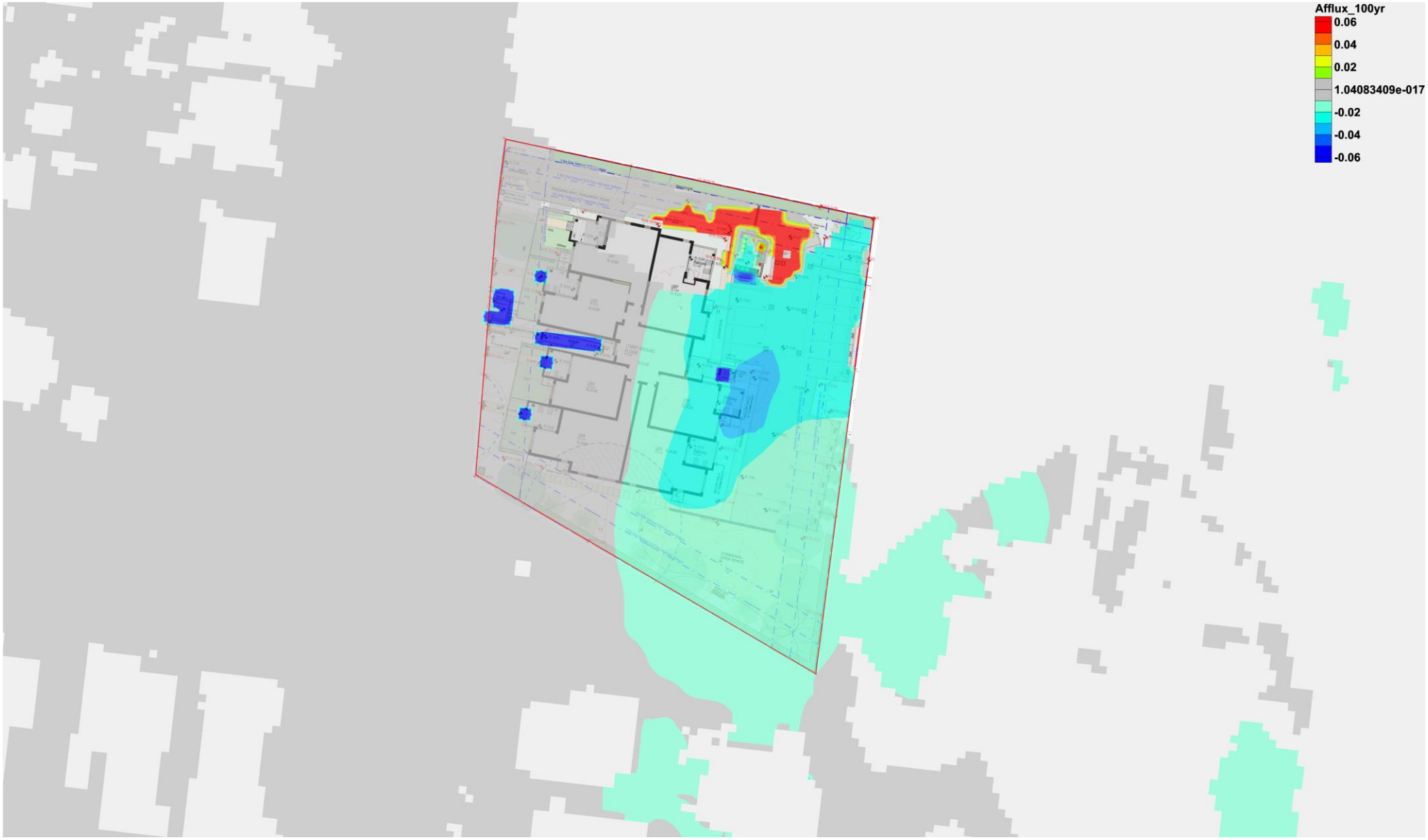

Figure B06: Proposed 100yr 120min Afflux

Proposed – Existing Surfaces

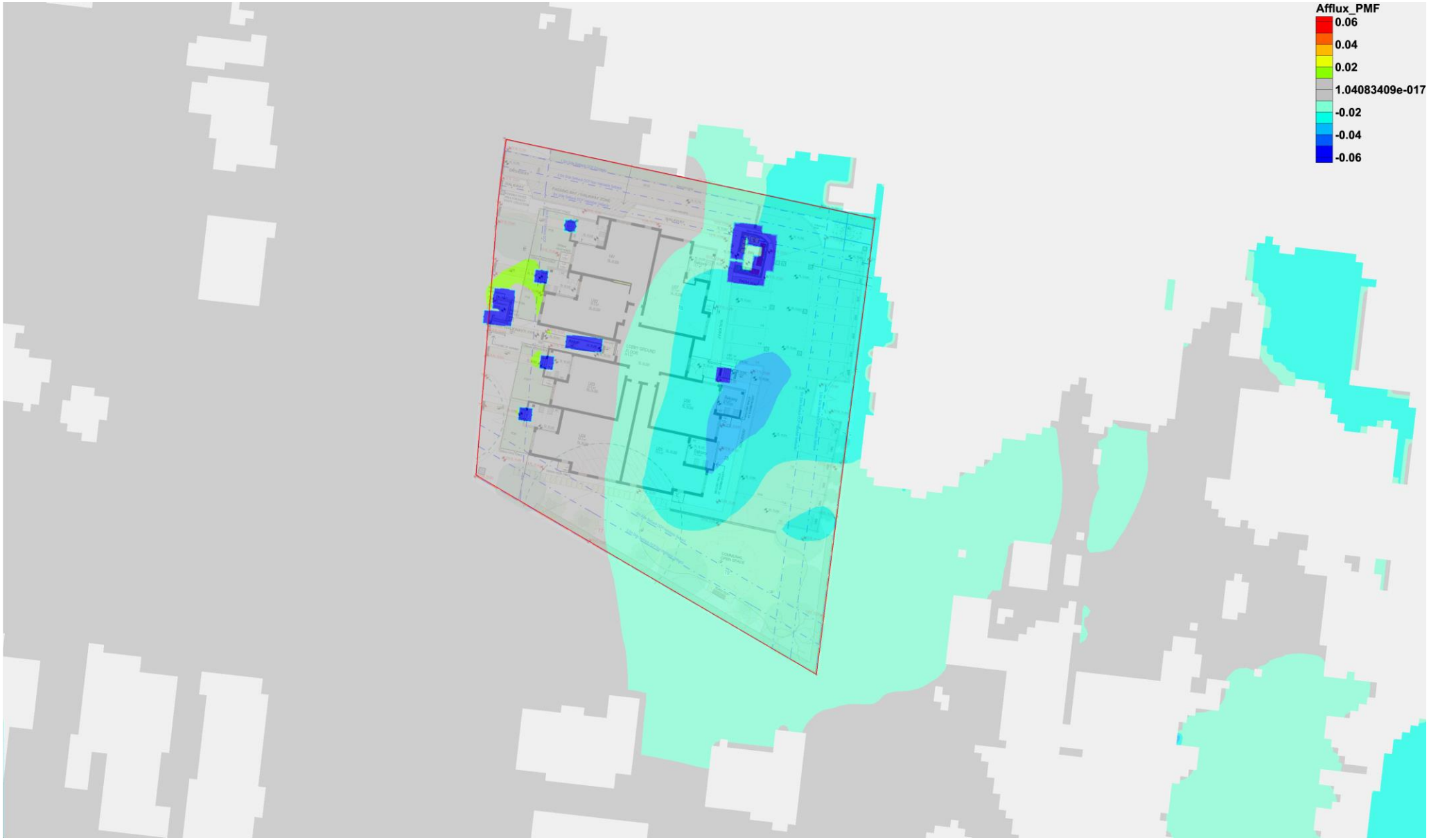

Figure B07: Proposed PMF 15min Afflux

Proposed – Existing Surfaces