Our Ref: 59916092:BK
Contact: Bala Kilaparty

14 September 2020

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Camden Council
70 Central Avenue
Oran Park NSW 2570

Attention: Maria Pinto

Dear Maria,

187-203 TURNER ROAD, CURRANS HILL - FLOOD IMPACT ASSESSMENT

1 Introduction

A flood impact assessment (FIA) was undertaken in order to determine the potential flood impacts, if any, of the proposed development on 187-203 Turner Road, Currans Hill. The assessment was undertaken using a 1D/2D TUFLOW model that was developed to simulate overland flooding in the Narellan Creek catchment as part of Nepean River FRMSP (Cardno, 2020). The potential impact of the development was assessed under the 20% AEP, 1% AEP and PMF events. This report summarises the methodology and findings of the FIA.

The site location is shown in **Figure 1-1**.

Figure 1-1 Subject Site (Aerial Imagery sourced from Nearmap)

2 Objectives

The objective of the study was to assess the flood impact of the proposed development, if any, within and near the subject site and to assess the compliance or otherwise of the proposed development works with Council's Policy.

The key tasks included:

- Running the Narellan Creek Floodplain model to estimate flooding under pre and post development conditions in the 20% AEP, 1% AEP and PMF events;
- Assessing any impacts on flood levels, velocities and/or hazards upstream and downstream of the development; and
- Assessing if 1% AEP floodwaters are contained within the proposed channel works within the site.

3 Available Data

Cardno is preparing the Nepean River Floodplain Risk Management Study and Plan (FRMS&P) for Camden Council. The study utilises TUFLOW 1D/2D floodplain models to define flood behaviour in the Upper Nepean River and Narellan Creek located within the Camden LGA. The Narellan Creek model domain includes the subject site (187-203 Turner Road, Currans Hills).

The following data was used for this assessment:

- The model assembled for the Narellan Creek Overland Flood Study (Cardno, 2020)
- Survey of Existing Conditions for the subject site – Provided by JMD Development Consultants on 14/08/2020
- The proposed design layout and surface levels – Provided also by JMD Development Consultants on 14/08/2020

4 Pre-Development Conditions

The pre-development scenario which was adopted was the benchmark overland hydraulic modelling performed as part of the Nepean River Floodplain Risk Management Study and Plan (Cardno, 2020). A combined 1D/2D TUFLOW model was used with the latest site survey data incorporated across the site.

The floodwaters drain from an upstream catchment along a drainage line through the site with shallow depths ranging between 0.15 - 0.7m in the 1% AEP event. High hazard zones are generally confined to the drainage line and the extent of flooding is minor outside the channel banks.

As floodwaters approach the downstream end of the site, these floodwaters overtop Turner Road. A secondary flow path is also observed in the South East corner of the site, however its extent within the site is minimal.

The hydraulic model was run for the 20% AEP, 1% AEP and PMF events. Flood results for pre-development conditions are mapped in **Figures 1 to 15** in **Appendix B.**

5 Post-Development Conditions

The proposed development works include constructing a channel through the site, creating 69 lots and constructing a detention basin within the site. The proposed development layout is shown in **Figure 5-1**. The proposed site layout and grading plan provided by JMD Development Consultants is attached in **Appendix A.**

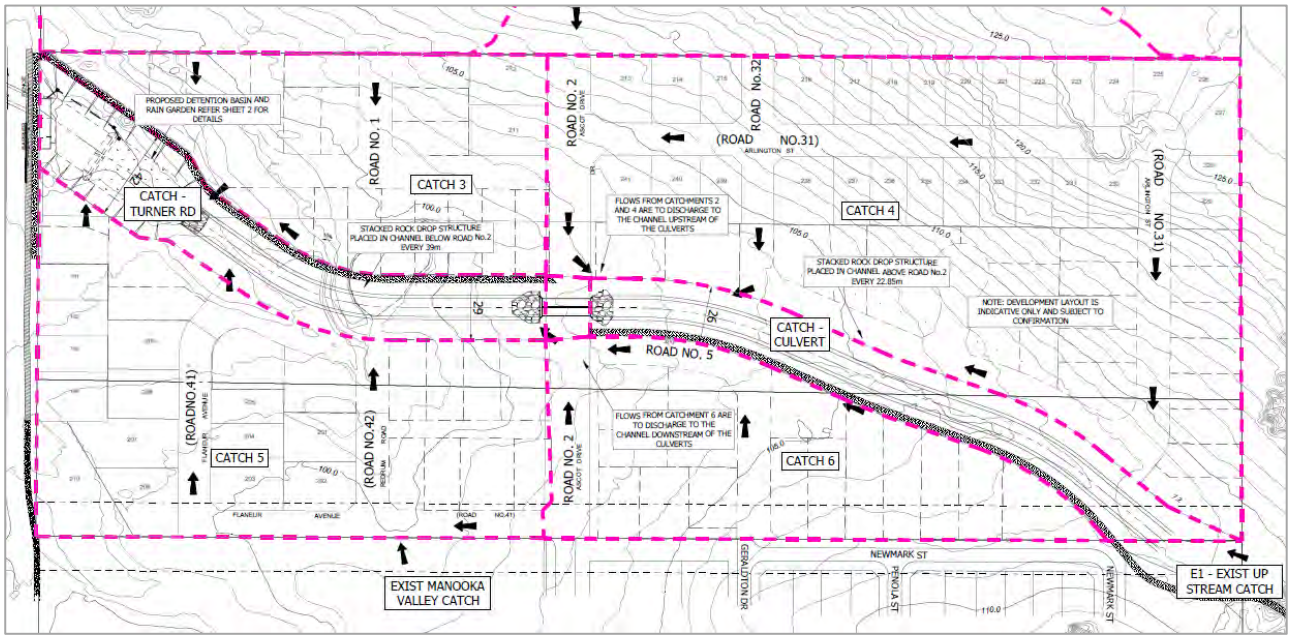

Figure 5-1 Concept Layout Plan (Source: JMD Development Consultants)

The design consists of earthworks, access roads and a proposed channel through the site. Design inputs were incorporated into the hydraulic model and the 20% AEP, 1% AEP and PMF storms were run to estimate flow behaviour under the post-development conditions. At one location, the floodwaters pass through twin culverts under a proposed road. The Manning roughness values were adjusted in accordance with the benchmark model to simulate the post-development conditions.

The flood maps generally show that floodwaters are further confined to the drainage line corridor with minor reduction to the flood extent. Flood depths up to 2m are observed towards the downstream end of the proposed channel in the 1% AEP event. Flood hazard and velocity changes are negligible within the site relative to the pre-development conditions. Floodwaters still overtop Turner Road however the hazard on the road is reduced.

6 Flood Impact Assessment

The water level difference plots (see **Figures 21, 27** and **33 in Appendix B**) map the changes in flood levels due to the proposed works. No changes in flood behaviour are observed on the northern or western areas outside of the site. Due to the earthworks and proposed channel works, conveyance within the site has general improved. Floodwaters drain more efficiently and a reduction in levels is seen in the channel and on Turner Road. Reductions up to 0.06 m are observed on Turner Road in the 1% AEP event and continue further downstream along the creek reserve.

Minor increases of up to 0.02 m are observed towards the eastern boundary of the site on Newmarket Street in the 1% AEP event. The minor increases are confined to the road only and do not impact any properties.

Additionally flood depths on the street are less than 150mm (which is Council's adopted depth filter criteria) and it is expected that the overland flows will be collected by local drainage or confined by the kerb. It is expected these minor increases could be mitigated by the stormwater design during the detailed design stage.

Similar increases are also observed on the south eastern corner of the site. Results have been mapped in **Appendix B.**

7 Conclusions

Flood modelling has been undertaken to estimate the flood behaviour on Turner Road, Currans Hill. under the Pre and Post-development conditions.

It is concluded that:

- There is an overall decrease in flood levels as a result of the proposed works along the drainage line.
- The channel is able to contain the 1% AEP floodwaters within its banks.
- While minor increases in flood levels of up to 0.02 m were estimated on Newmarket St, largely within the road corridor, there are no measurable increases in hazard and no adverse impacts on any properties.
- On balance these impacts are therefore considered to be minor
- It is expected these minor increases could be mitigated by the stormwater design during the detailed design stage.

Yours sincerely,

Bala Kilaparty
Experienced Engineer
for Cardno (NSW/ACT) Pty Ltd
Phone: +61 2 9496 7765

Email: bala.kilaparty@cardno.com.au

Enc: Appendix A - Proposed Design
Appendix B - Flood Model Results

APPENDIX

A

PROPOSED DESIGN

DIAL 1100 BEFORE YOU DIG
WWW.1100.com.au

EXISTING CULVERTS TO BE REPLACED BY CAMDEN COUNCIL IN THE FUTURE

PROPOSED MAINTENANCE ACCESS TO BIORETENTION BASIN 2

FUTURE DEVELOPMENT BY OTHERS

351 DP809159

352 DP809159

FUTURE DEVELOPMENT SUBJECT TO FUTURE DEVELOPMENT CONSENT - WILL DRAIN TO CHANNEL CH100

CATCHMENT 2 DISCHARGES TO BIORETENTION BASIN 2

BIORETENTION BASIN 2 AREA = 570m²

PROPOSED RETAINING WALL TO CREATE OSD BASIN. REFER TON 14194E8 PLANS PREPARED BY JMD

LOW FLOW OUTLET DISCHARGE INTO BIORETENTION BASIN 2

SPEL ECOCEPTOR OR EQUIVALENT

PROPOSED MAINTENANCE ACCESS TO BIORETENTION BASIN 4

SPILTTER PIT 2A

SPILTTER PIT 4C

SPEL ECOCEPTOR OR EQUIVALENT

SHARED CONCRETE PATH TO BE EXTENDED FROM TURNER ROAD TO GREGORY HILLS. SHARED PATH LOCATED IN THE OUTER ZONE OF THE RIPARIAN CHANNEL AND IS TO BE RETAINED USED SANDSTONE BLOCKS.

EXTENT OF EXISTING KERB, EXTEND KERB AND EXISTING 2.5m SHARED CYCLEWAY TO BOUNDARY

HIGH FLOW OUTLET INTO CHANNEL

STACKED ROCK DROP STRUCTURE PLACED AS DETAILED (TYP)

BIORETENTION BASIN 4C AREA = 220m²

BIORETENTION BASIN 4B AREA = 123m²

SPEL ECOCEPTOR OR EQUIVALENT

SPILTTER PIT 4B

BIORETENTION BASIN 4A AREA = 39m²

OUTLET PIT

ECOSOL GPT OR EQUIVALENT

SPILTTER PIT 4A

BIORETENTION BASIN 3B AREA = 123m²

BIORETENTION BASIN 3A AREA = 119m²

PROPOSED BASIN 3 ACCESS

OUTLET PIT

ECOSOL GPT OR EQUIVALENT

CATCHMENT 4 DISCHARGES TO BIORETENTION BASINS 3B, 4A, 4B & 4C

FUTURE DEVELOPMENT LAND SUBJECT TO FUTURE DEVELOPMENT CONSENT

EXISTING CULVERTS TO BE RETAINED

EXISTING DRAINAGE FROM MANOOKA VALLEY CONNECTED TO NEW ROAD DRAINAGE INSTALLED UNDER DA525/2017.

PER AGREEMENT WITH COUNCIL THE STORMWATER DISCHARGE FROM THE OSD BASIN IN MANOOKA VALLEY IS TO EQUAL 3.54Ha OF UNDEVELOPED (PERVIOUS) LAND. THIS IS BASED ON THE ORIGINAL CATCHMENT AREA DISCHARGING INTO THIS CHANNEL

PROPOSED MAINTENANCE ACCESS TO BIORETENTION BASIN 1

BIORETENTION BASIN 1B AREA = 119m²

SPLITTER PIT 1

ECOSOL GPT OR EQUIVALENT

LOW FLOW OUTLET

BIORETENTION BASIN 1A AREA = 121m²

SPLITTER PIT 3 SEPARATING LOW FLOWS & HIGH FLOWS

PROPOSED BOX CULVERTS TWIN 3.6m x 1.2m

HIGH FLOW OUTLET

FUTURE DEVELOPMENT SUBJECT TO FUTURE DEVELOPMENT CONSENT

CATCHMENT 3 DISCHARGES TO BIORETENTION BASIN 3A

ARLINGTON STREET

FILLY STREET

WOODBRIDGE ROAD

COACH CRESCENT

FLANEUR AVENUE

NEWMARK STREET

CONTINUED ON SHEET 2

LEGEND

DENOTES 900mm x 900mm DISCHARGE CONTROL PIT & Ø300 OUTLET

DENOTES ECOSOL GPT 4200 SERIES OR SPEL ECOCEPTOR 1500 SERIES

DENOTES CONCRETE HEADWALL

DENOTES 1200mm x 900mm SPLITTER PIT

SCALE :- 1 : 500 Metres

Issue	App	Date	Description

DRAFT

Client: TURNER ROAD DEVELOPMENT

Designed by : S.G.

Date of Drawing : 23-06-2020

Ratio (A1) : 1:500

Datum : AHD

Origin of Levels : PM46777 - RL103.276

Date of Survey : 23-09-2016

JMD Development Consultants

John M. Daly & Associates PTY LTD
A.B.N. 88051977989
Surveying
Engineering
Project Management
Licensed Water Service Co ordinators
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CAMPBELLTOWN N.S.W. 2560
PH. (02) 4625 5055
FAX (02) 4628 2013
email: admin@jmd.com.au

Project : 187 - 203 TURNER ROAD, CURRANS HILL
LOT 36 in DP 28024 & LOT 105 in DP1210084

Sheet 1 of 3 sheets

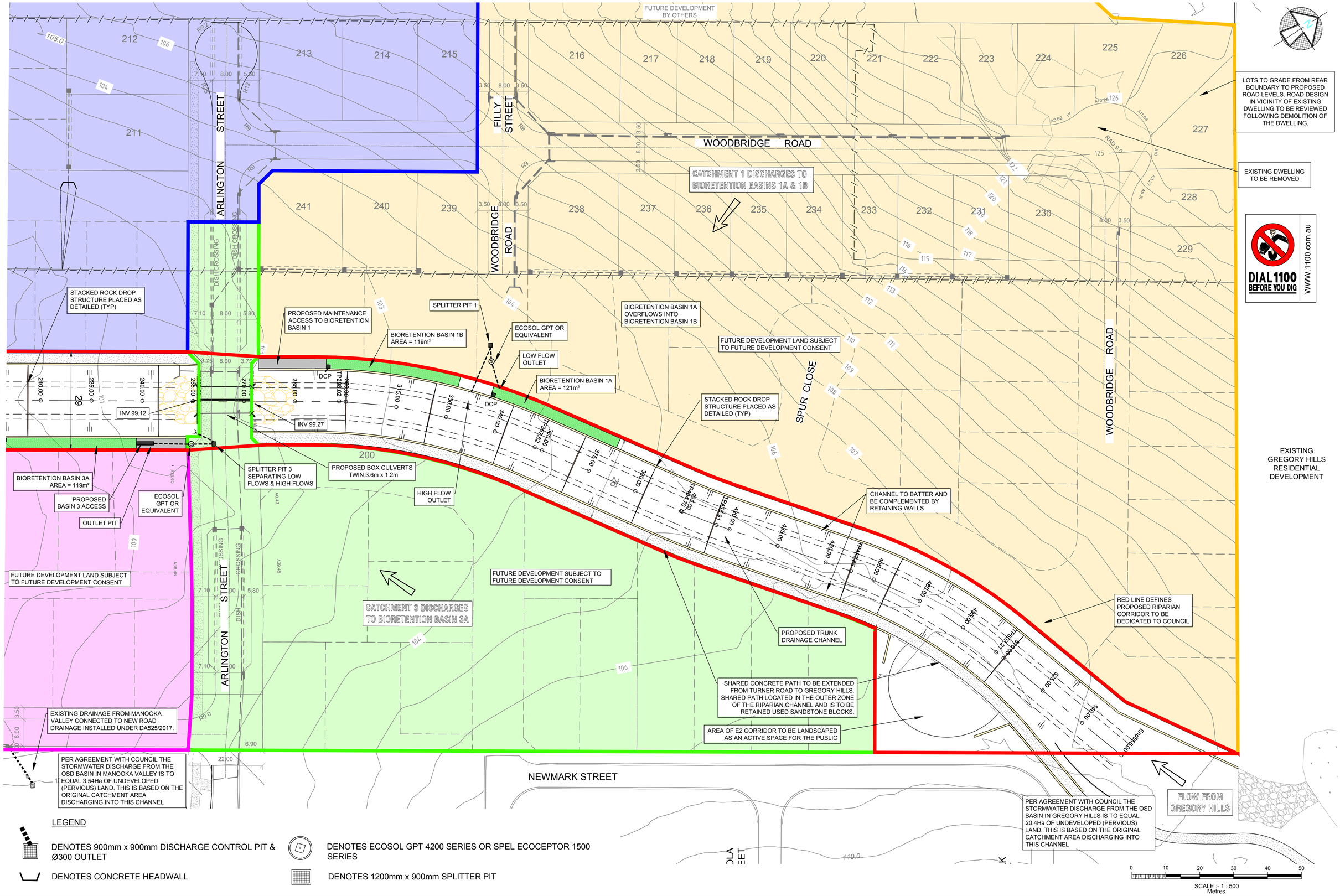
CONCEPT CIVIL PLAN
ULTIMATE DRAINAGE CONCEPT PART A

Ref: 14194E16

Locality : CURRANS HILL

L.G.A. : CAMDEN

CAD Ref: S:\JOBS\TURNER RD\14194 TURNER RD DEV\EMW\ENG\CAD\E16 - ULTIMATE RAINGARDEN\14194E16-RAINGARDENS



Issue	App	Date	Description
A	S.G.	23.06.2020	ISSUED FOR DA

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Date of Survey : 23-09-2016

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Engineering
Project Management
Licensed Water Service Co ordinators
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email: admin@jmd.com.au

Project : 187 - 203 TURNER ROAD, CURRANS HILL
LOT 36 in DP 28024 & LOT 105 in DP1210084

Sheet 2 of 3 sheets

CONCEPT CIVIL PLAN
ULTIMATE DRAINAGE CONCEPT PART B

Ref: 14194E16

Locality : CURRANS HILL

L.G.A. : CAMDEN

CAD Ref: S:\JOBS\TURNER RD\14194 TURNER RD DEV\ENG\CAD\E16 - ULTIMATE RAINGARDEN\14194E16-RAINGARDENS

APPENDIX

B

FLOOD MODEL RESULTS

Figure	Scenario	Title
1	Pre-Development	20% AEP Depth
2	Pre-Development	20% AEP Water Level
3	Pre-Development	20% AEP Velocity
4	Pre-Development	20% AEP General Hazard
5	Pre-Development	20% AEP Provisional Hazard
6	Pre-Development	1% AEP Depth
7	Pre-Development	1% AEP Water Level
8	Pre-Development	1% AEP Velocity
9	Pre-Development	1% AEP General Hazard
10	Pre-Development	1% AEP Provisional Hazard
11	Pre-Development	PMF Depth
12	Pre-Development	PMF Water Level
13	Pre-Development	PMF Velocity
14	Pre-Development	PMF General Hazard
15	Pre-Development	PMF Provisional Hazard
16	Post-Development	20% AEP Depth
17	Post-Development	20% AEP Water Level
18	Post-Development	20% AEP Velocity
19	Post-Development	20% AEP General Hazard
20	Post-Development	20% AEP Provisional Hazard
21	Post Less Pre-Development	20% AEP Water Level Difference
22	Post-Development	1% AEP Depth
23	Post-Development	1% AEP Water Level
24	Post-Development	1% AEP Velocity
25	Post-Development	1% AEP General Hazard
26	Post-Development	1% AEP Provisional Hazard
27	Post Less Pre-Development	1% AEP Water Level Difference
28	Post-Development	PMF Depth
29	Post-Development	PMF Water Level
30	Post-Development	PMF Velocity
31	Post-Development	PMF General Hazard
32	Post-Development	PMF Provisional Hazard
33	Post Less Pre-Development	PMF Water Level Difference

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development 20% AEP Depth

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
FURLONG DRIVE
MANOOKA ROAD
PIMLICO AVENUE

Legend

- Subject Site
- Cadastre

Pre-Development 20% AEP Depth (m)

- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 01

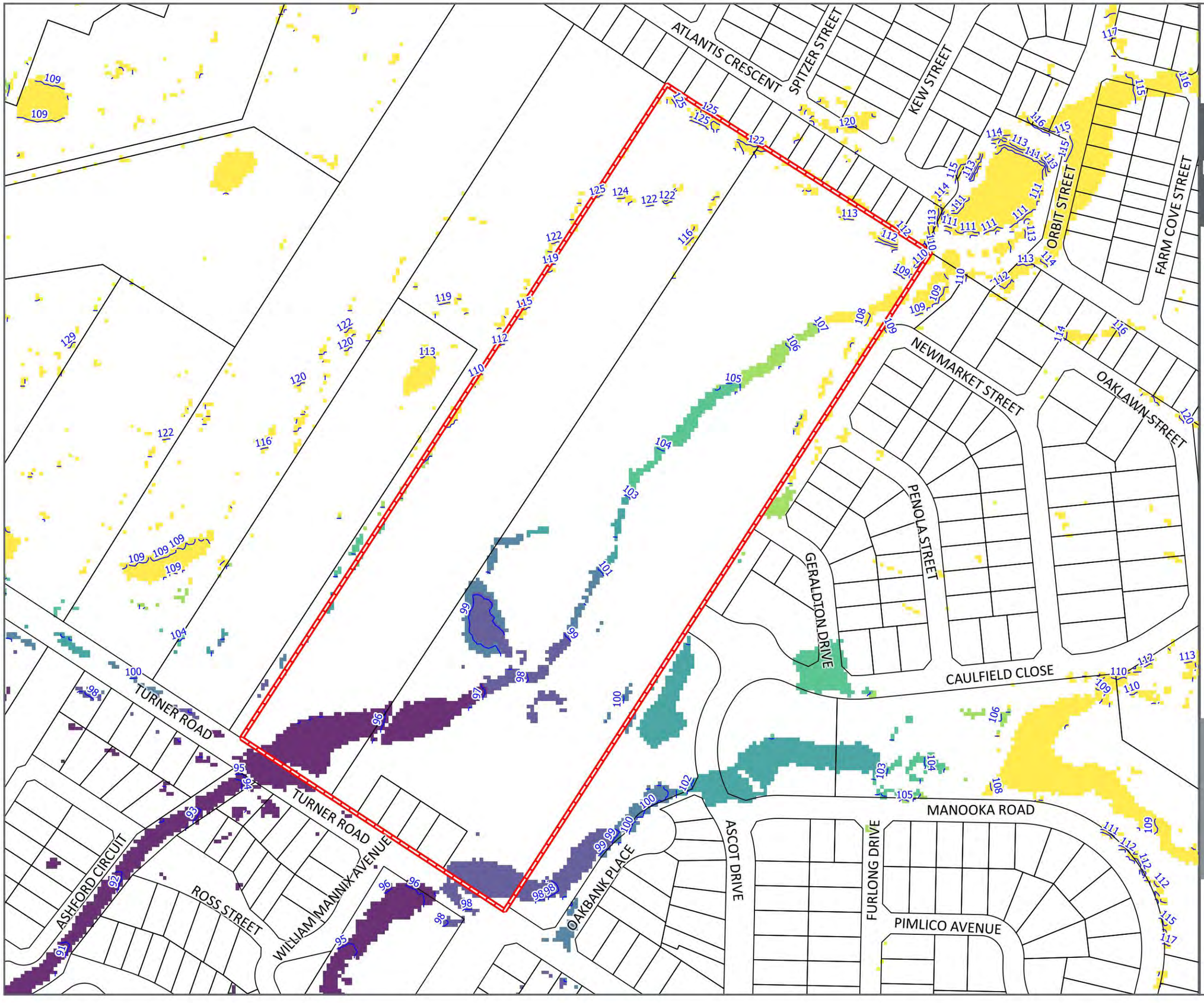
1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
20% AEP Water Level

Legend

- Subject Site
- Cadastre
- Pre-Development 20% AEP Water Level Contours (m AHD)

Pre-Development 20% AEP Water Level (m AHD)

- <= 97
- 97 - 99
- 99 - 101
- 101 - 103
- 103 - 105
- 105 - 107
- > 107

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 02

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

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Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
20% AEP Velocity

Legend

- Subject Site
- Cadastre

Pre-Development 20% AEP Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- > 3.00

Maps only show inundation in areas where depths are greater than 0.15m

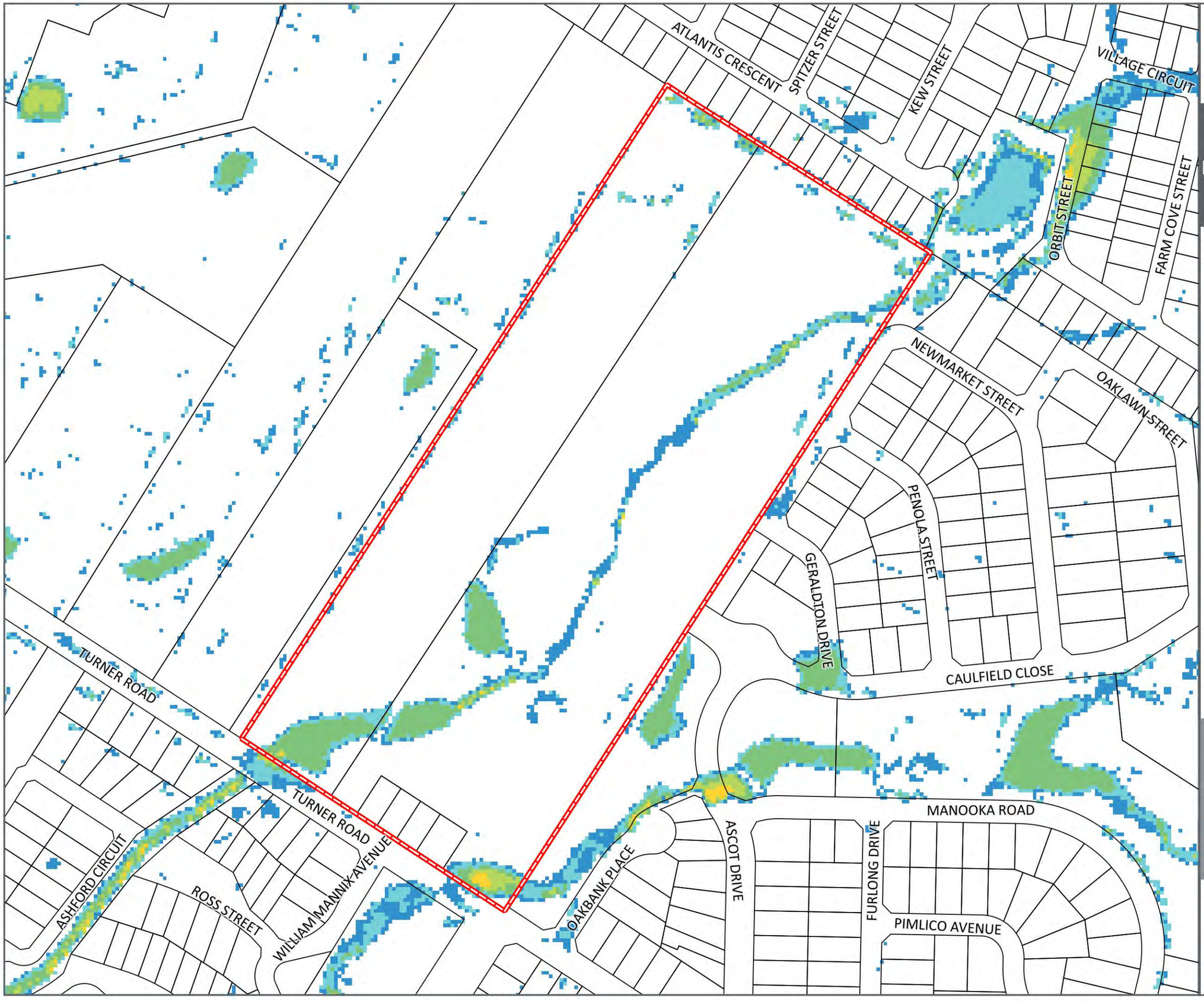
FIGURE 03

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
20% AEP General Hazard

Legend

- Subject Site
- Cadastre

Pre-Development 20% AEP General Hazard

- 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.

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 04

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
20% AEP Provisional Hazard

Legend

- Subject Site
- Cadastre

Pre-Development 20% AEP Provisional Hazard

- Low
- Transitional
- High

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 05

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
MANOOKA ROAD
FURLONG DRIVE
PIMLICO AVENUE

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
1% AEP Depth

Legend

- Subject Site
- Cadastre

Pre-Development 1% AEP Depth (m)

- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 06

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
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Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
1% AEP Water Level

Legend

- Subject Site
- Cadastre
- Pre-Development 1% AEP Water Level Contours (m AHD)

Pre-Development 1% AEP Water Level (m AHD)

- <= 97
- 97 - 99
- 99 - 101
- 101 - 103
- 103 - 105
- 105 - 107
- > 107

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 07

1:2,500 Scale at A3

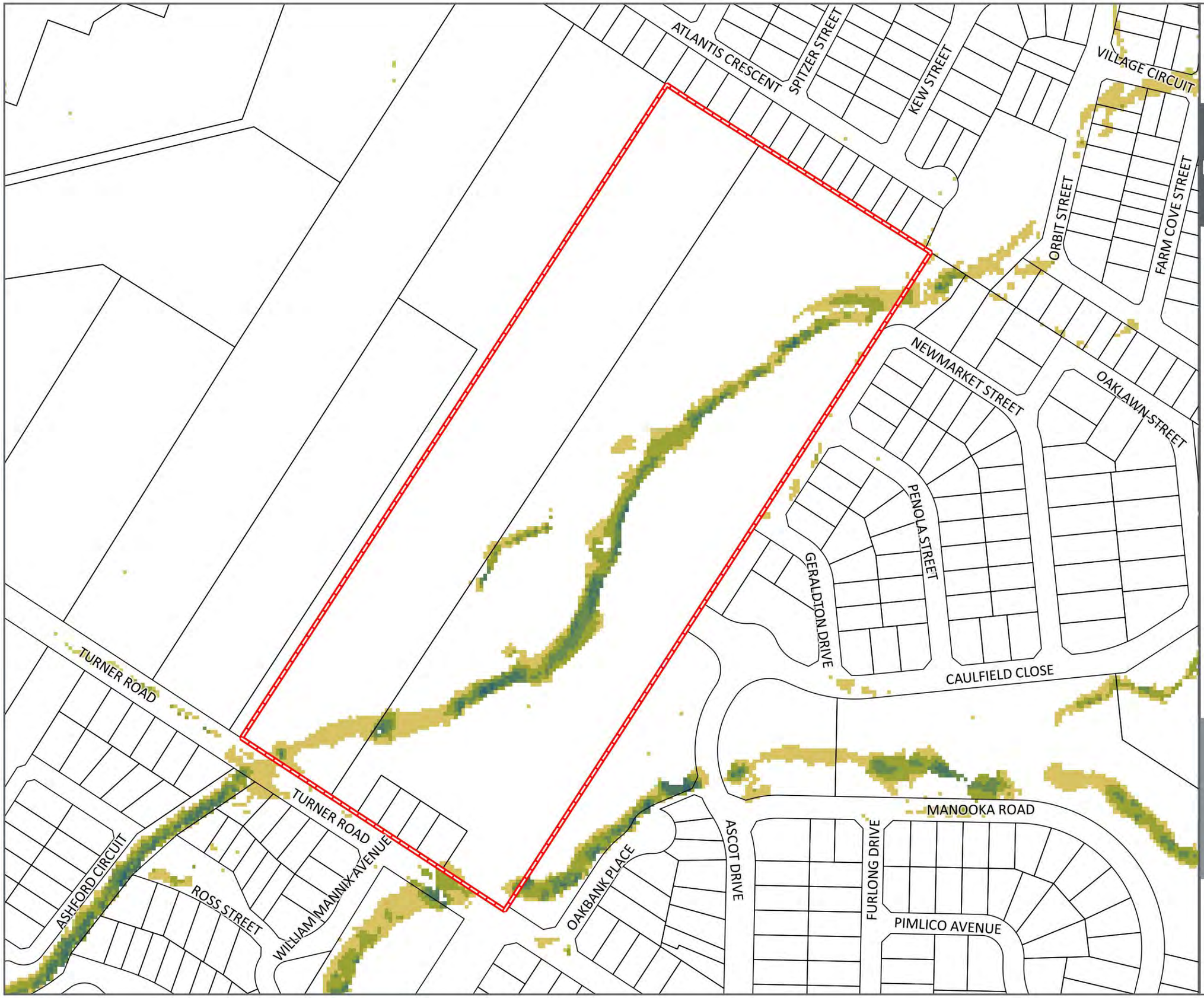
0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
1% AEP Velocity



Legend

- Subject Site
- Cadastre

Pre-Development 1% AEP Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- > 3.00

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 08

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
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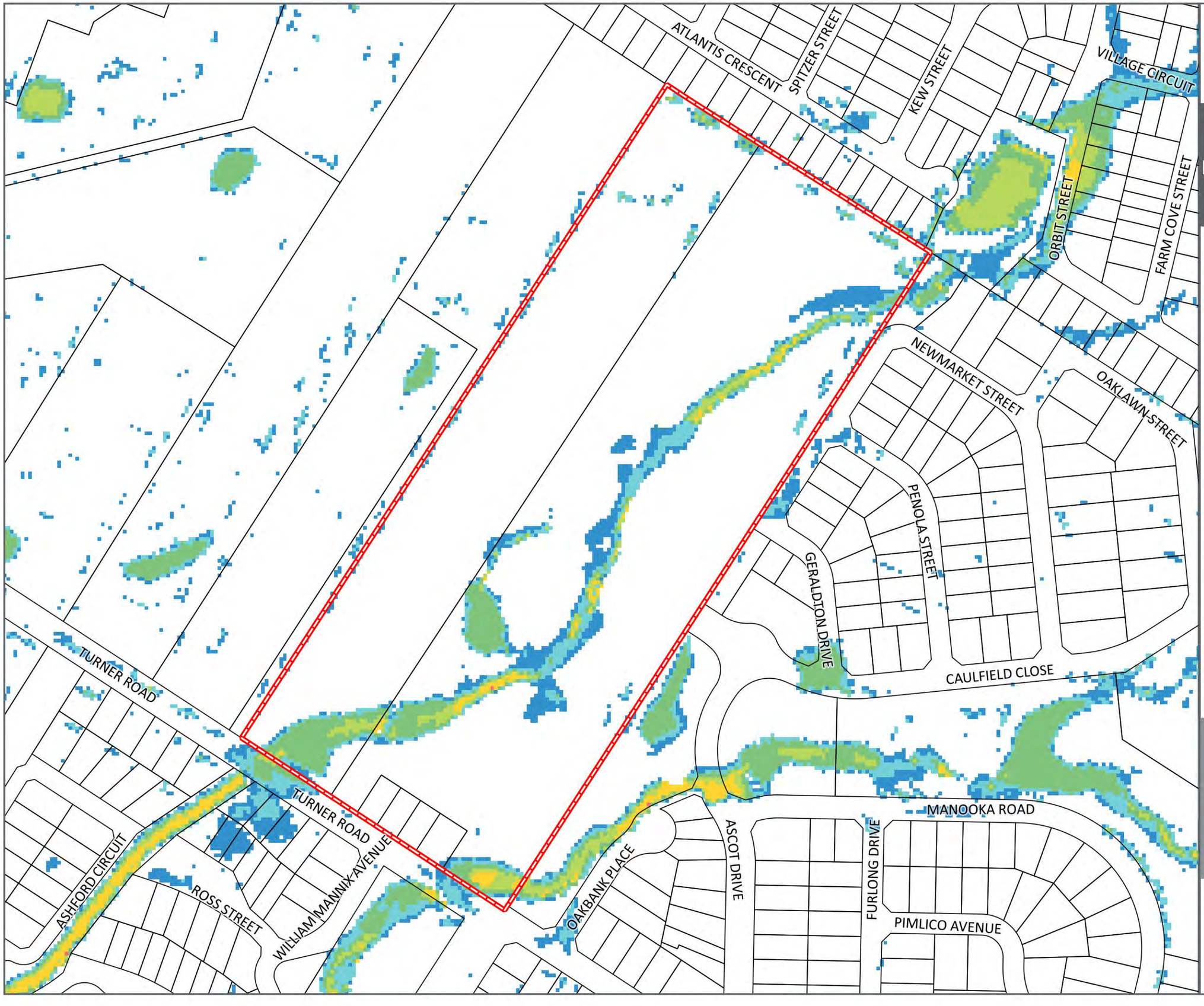
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
1% AEP General Hazard

Legend

- Subject Site
- Cadastre

Pre-Development 1% AEP General Hazard

- 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.

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 09

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
1% AEP Provisional Hazard

Legend

- Subject Site
- Cadastre

Pre-Development 1% AEP Provisional Hazard

- Low
- Transitional
- High

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 10

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development PMF Depth

Legend

- Subject Site
- Cadastre

Pre-Development PMF Depth (m)

- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 11

1:2,500 Scale at A3

0 20 40 60 80 100 m

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development PMF Water Level

Legend

- Subject Site
- Cadastre
- Pre-Development PMF Water Level Contours (m AHD)

Pre-Development PMF Water Level (m AHD)

- <= 97
- 97 - 99
- 99 - 101
- 101 - 103
- 103 - 105
- 105 - 107
- > 107

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 12

1:2,500 Scale at A3

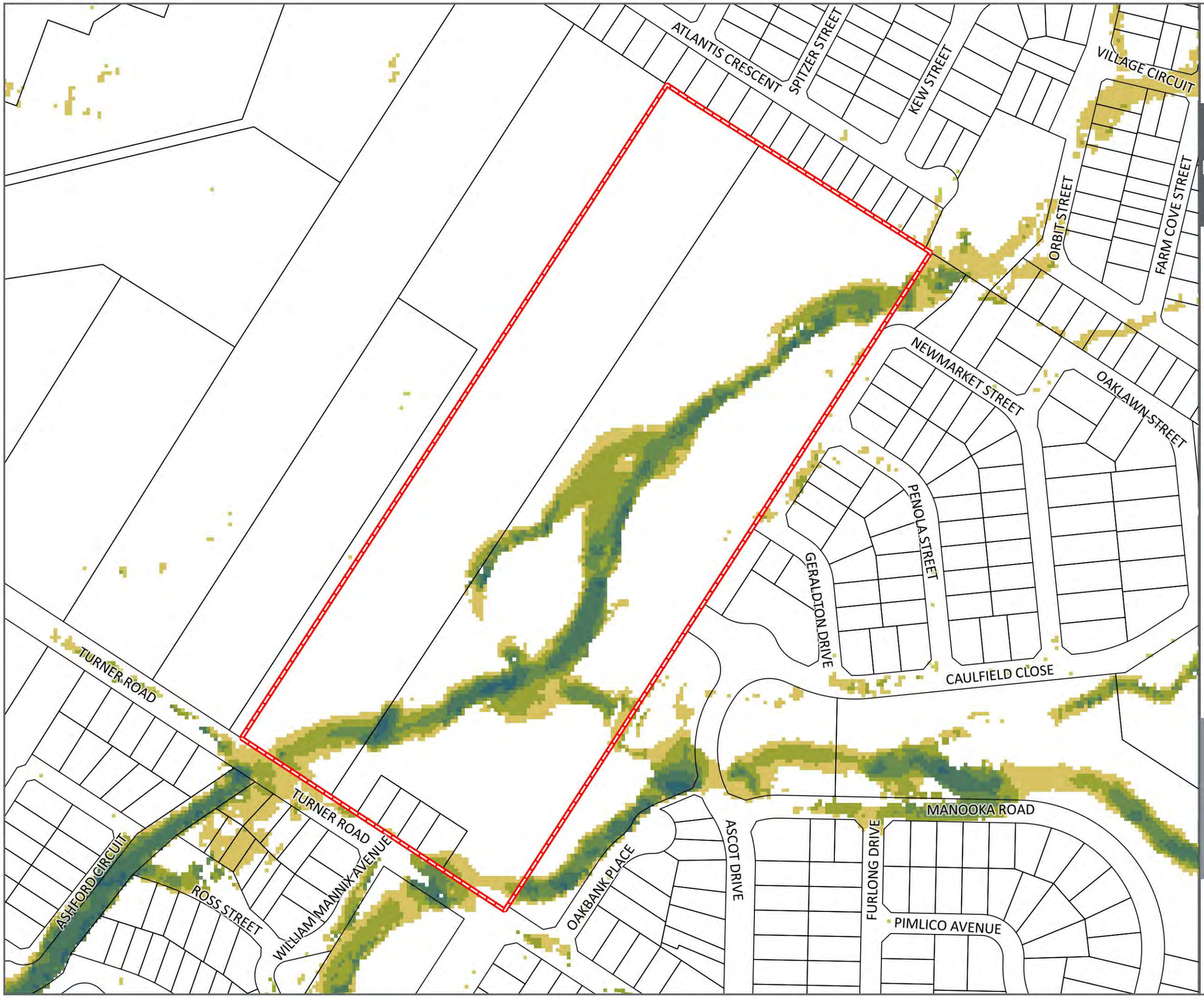
0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development PMF Velocity



Legend

- Subject Site
- Cadastre

Pre-Development PMF Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- > 3.00

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 13

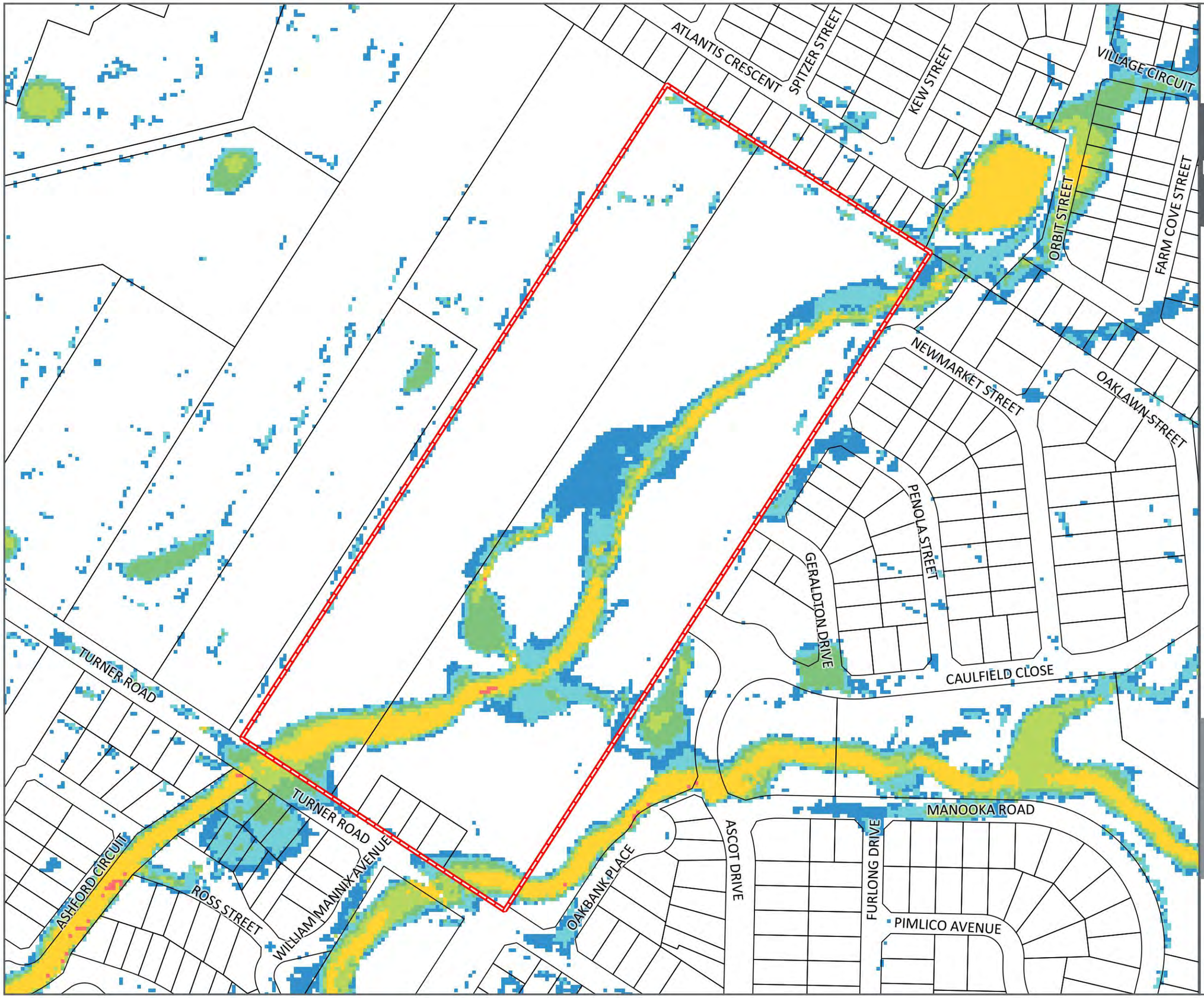
1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
PMF General Hazard

Legend

- Subject Site
- Cadastre

Pre-Development PMF General Hazard

- 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.

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 14

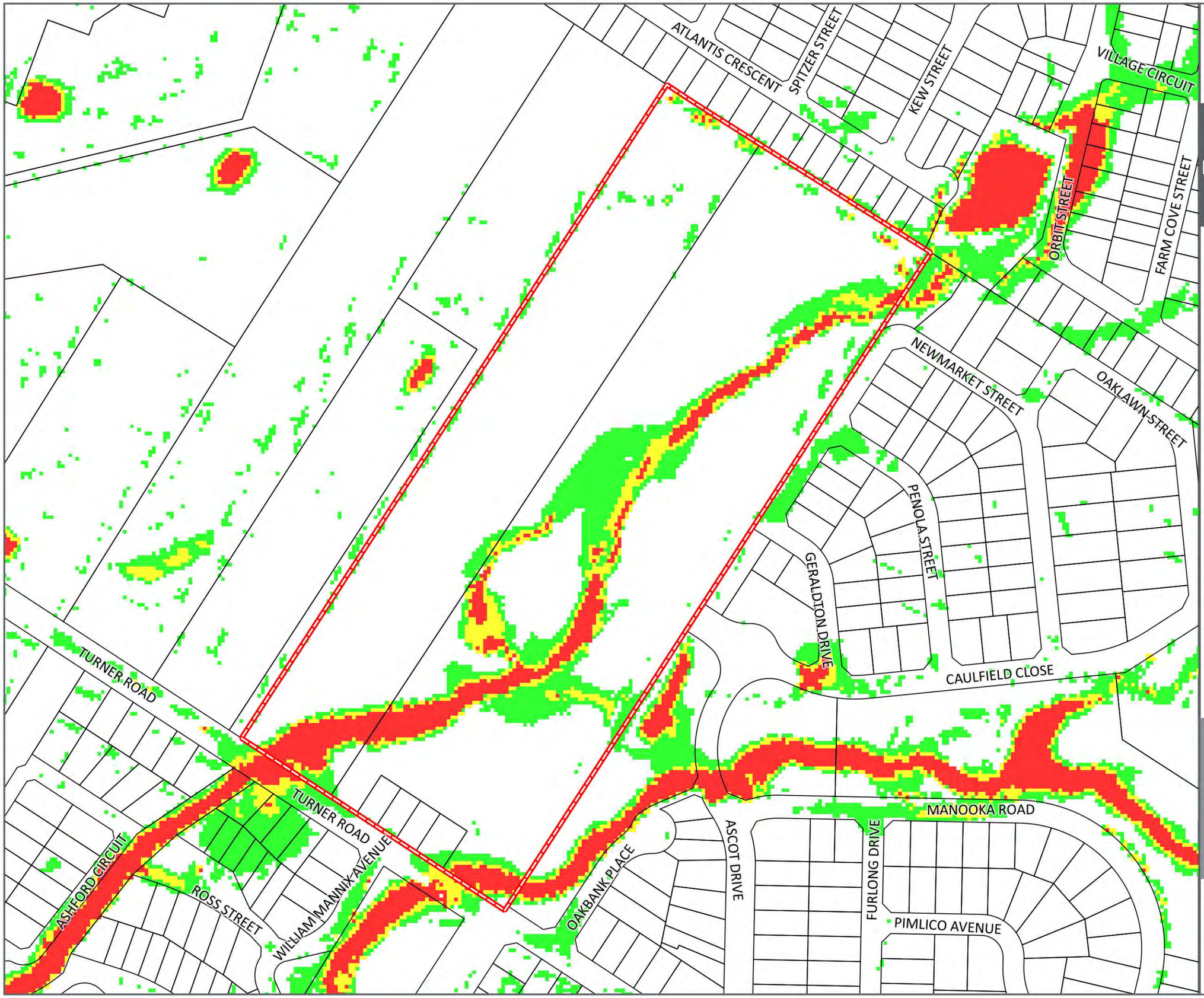
1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Pre-Development
PMF Provisional Hazard

Legend

- Subject Site
- Cadastre

Pre-Development PMF Provisional Hazard

- Low
- Transitional
- High

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 15

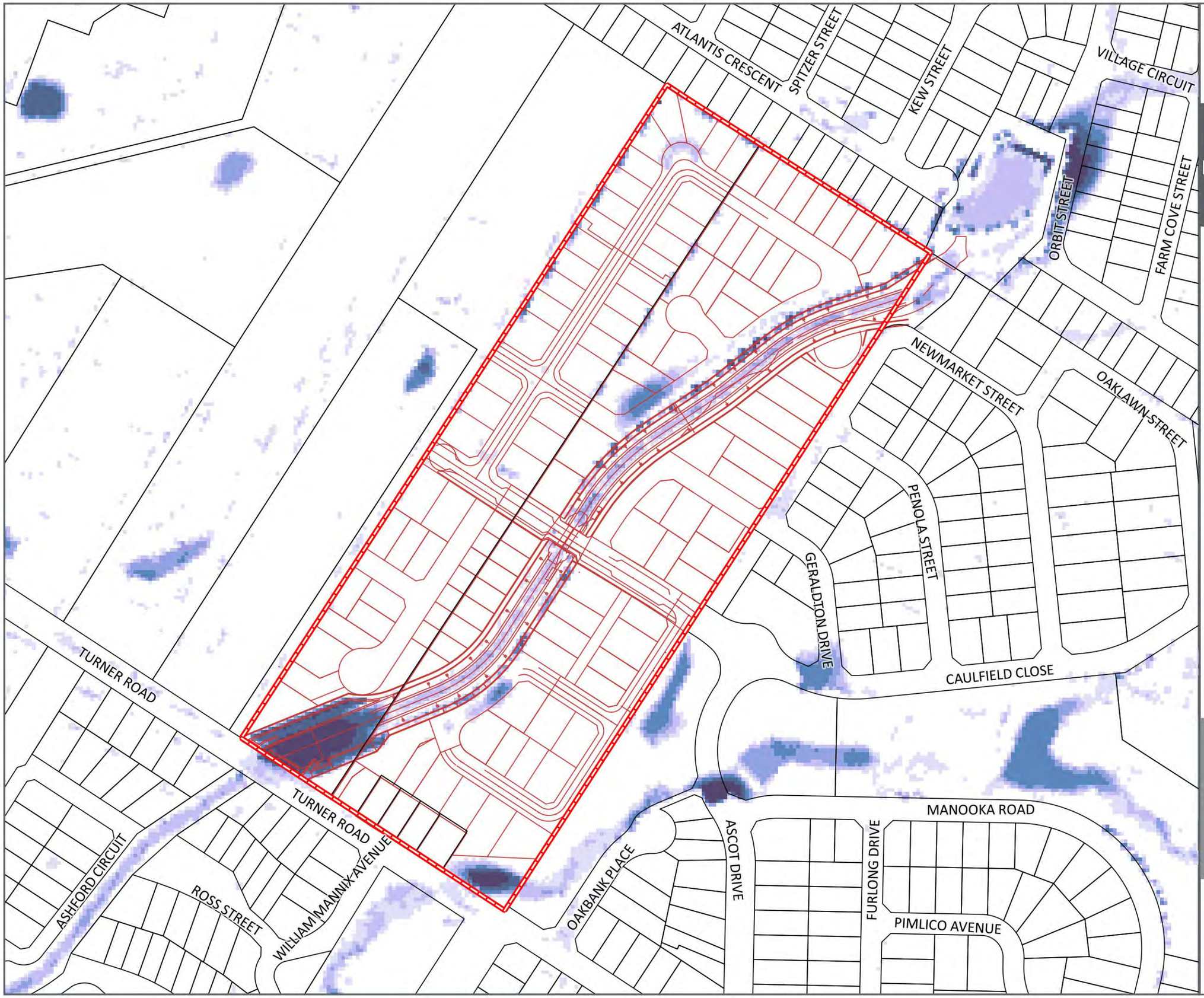
1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development 20% AEP Depth

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 20% AEP Depth (m)

- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 16

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
20% AEP Water Level

Legend

- Proposed Layout
- Subject Site
- Cadastre
- Post-Development 20% AEP Water Level Contours (m AHD)

Post-Development 20% AEP Water Level (m AHD)

- <= 97
- 97 - 99
- 99 - 101
- 101 - 103
- 103 - 105
- 105 - 107
- > 107

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 17

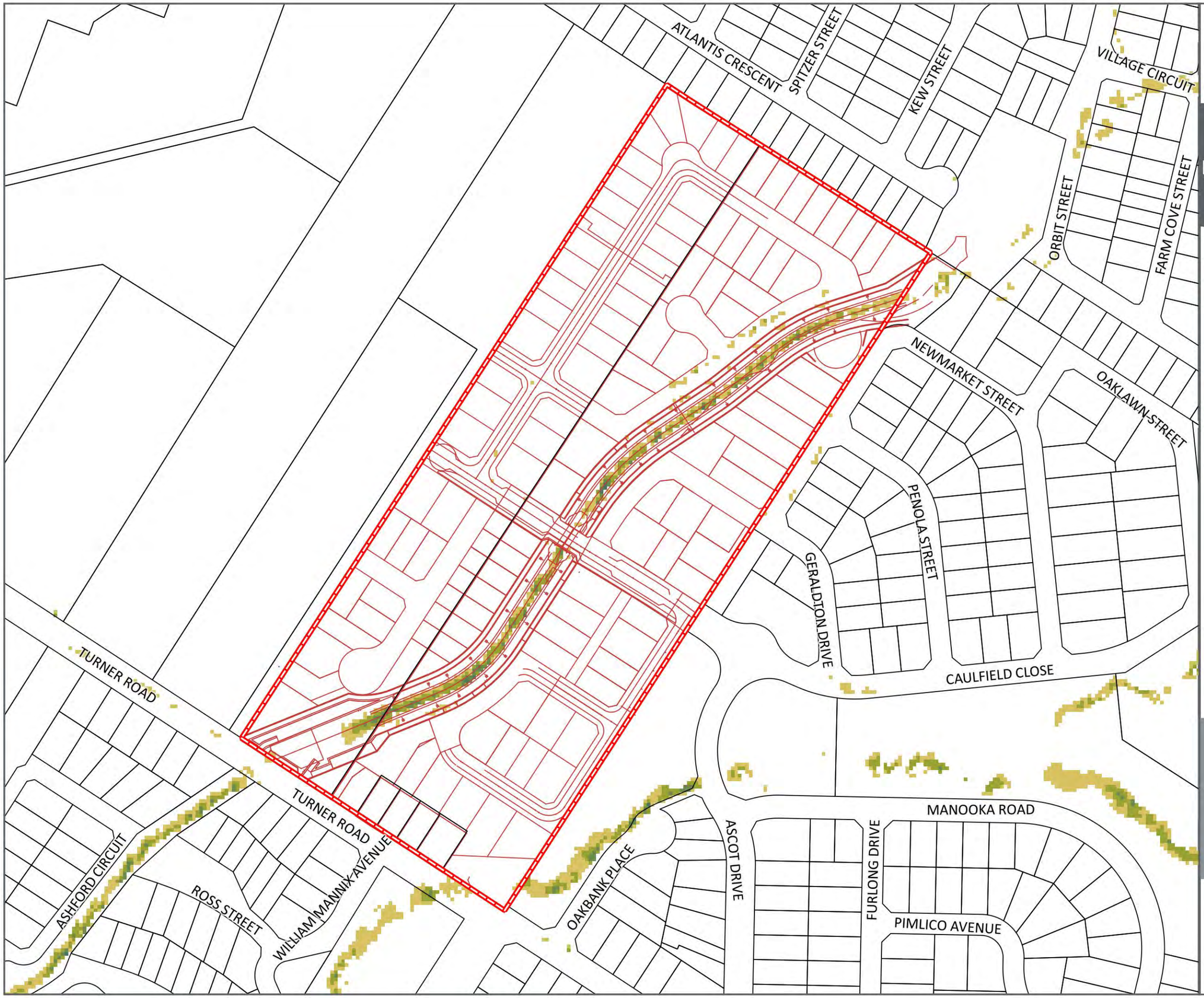
1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
MANOOKA ROAD
ASCOT DRIVE
FURLONG DRIVE
PIMLICO AVENUE
OAKBANK PLACE
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
20% AEP Velocity

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 20% AEP Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- > 3.00

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 18

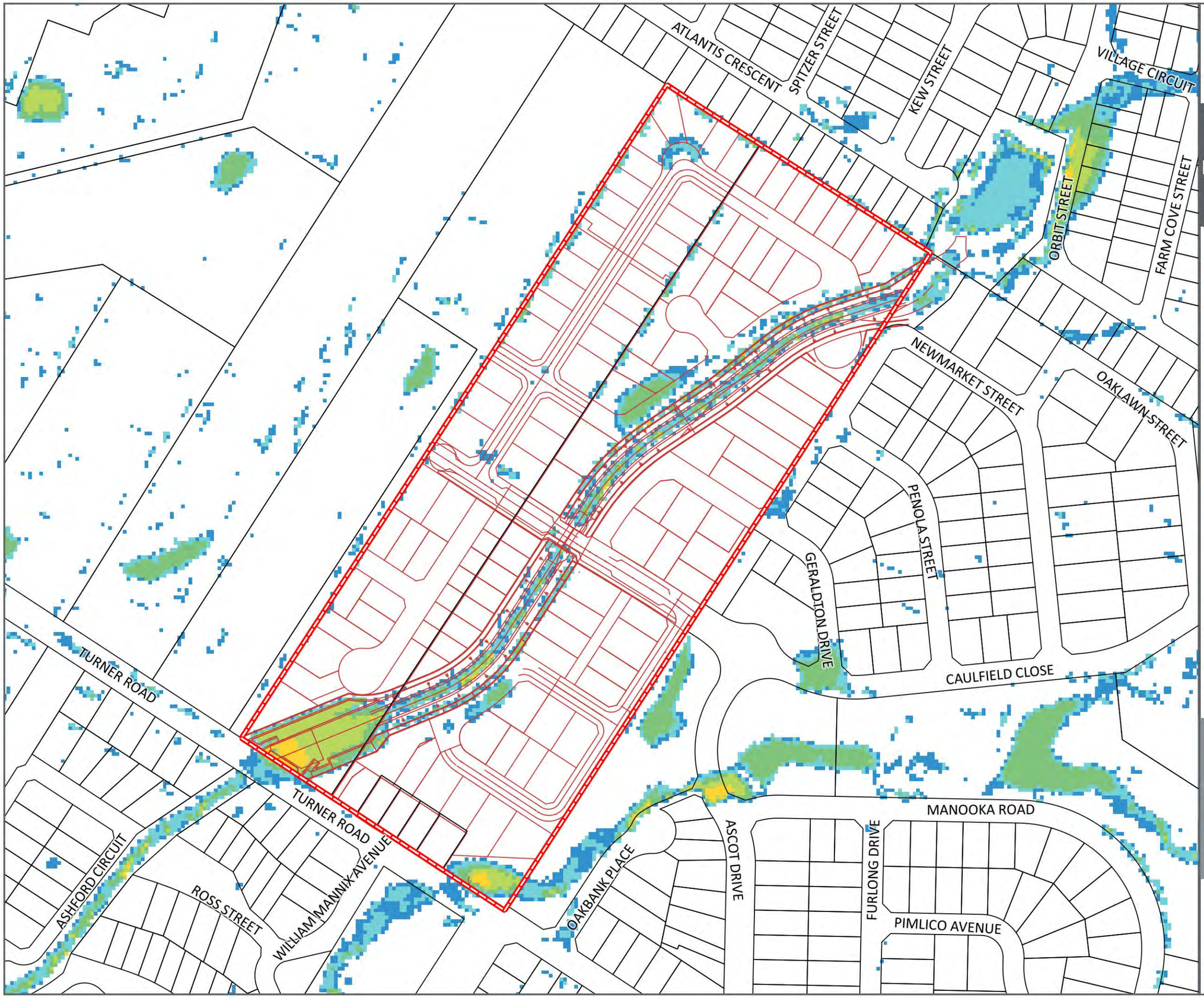
1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
20% AEP General Hazard

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 20% AEP General Hazard

- 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.

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 19

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
20% AEP Provisional Hazard

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
FURLONG DRIVE
MANOOKA ROAD
PIMLICO AVENUE

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 20% AEP Provisional Hazard

- Low
- Transitional
- High

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 20

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
20% AEP Water Level Difference

Legend

- Proposed Layout
- Proposed Works
- Subject Site
- Cadastre

20% AEP Water Level Difference (m)

- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
FURLONG DRIVE
MANOOKA ROAD
PIMLICO AVENUE

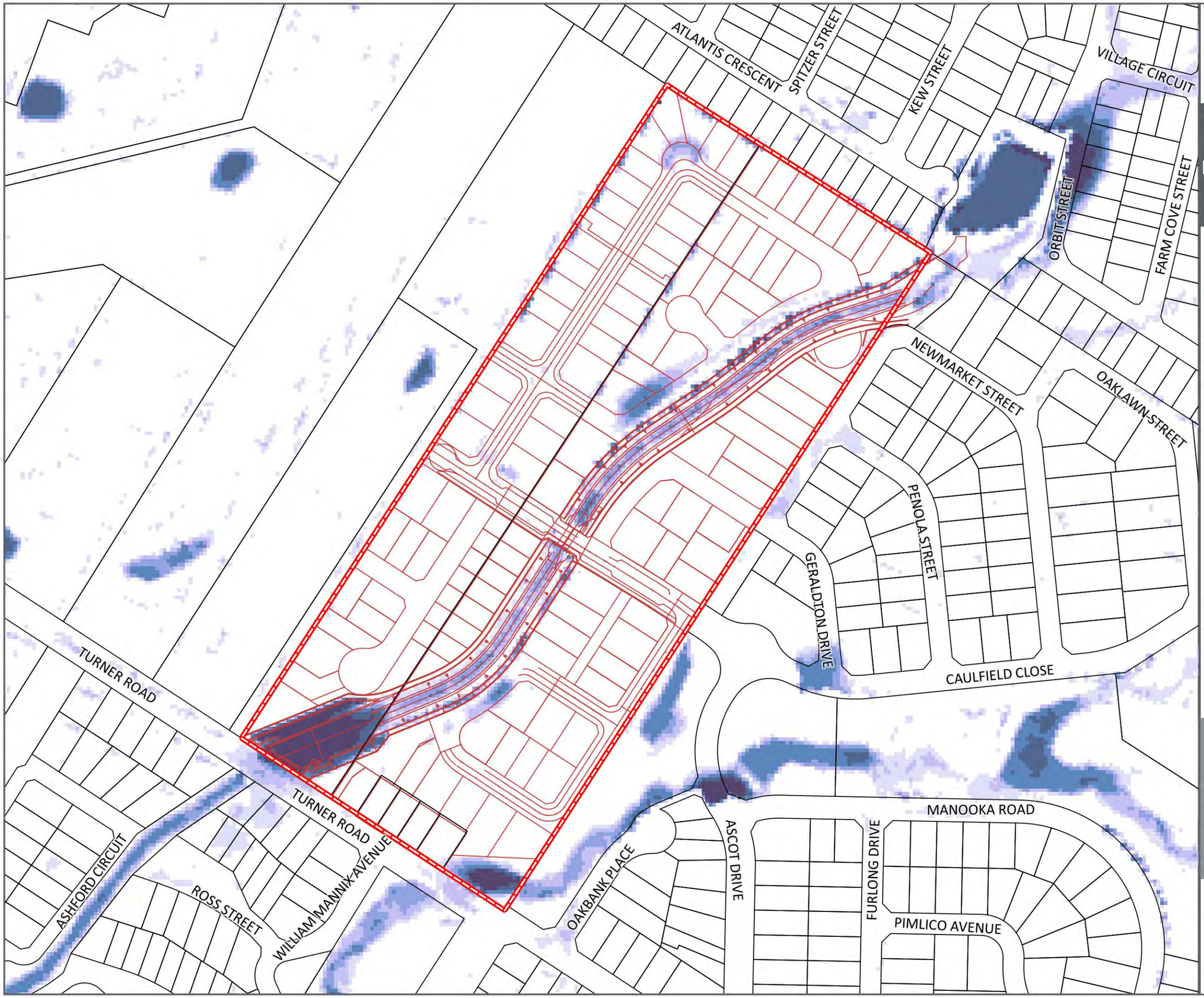
FIGURE 21

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
1% AEP Depth

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 1% AEP Depth (m)

- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 22

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
1% AEP Water Level

Legend

- Proposed Layout
- Subject Site
- Cadastre
- Post-Development 1% AEP Water Level Contours (m AHD)

Post-Development 1% AEP Water Level (m AHD)

- <= 97
- 97 - 99
- 99 - 101
- 101 - 103
- 103 - 105
- 105 - 107
- > 107

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 23

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
FURLONG DRIVE
PIMLICO AVENUE
MANOOKA ROAD

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
1% AEP Velocity

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
FURLONG DRIVE
MANOOKA ROAD
PIMLICO AVENUE

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 1% AEP Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- > 3.00

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 24

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
1% AEP General Hazard

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
FURLONG DRIVE
MANOOKA ROAD
PIMLICO AVENUE

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 1% AEP General Hazard

- 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.

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 25

1:2,500 Scale at A3

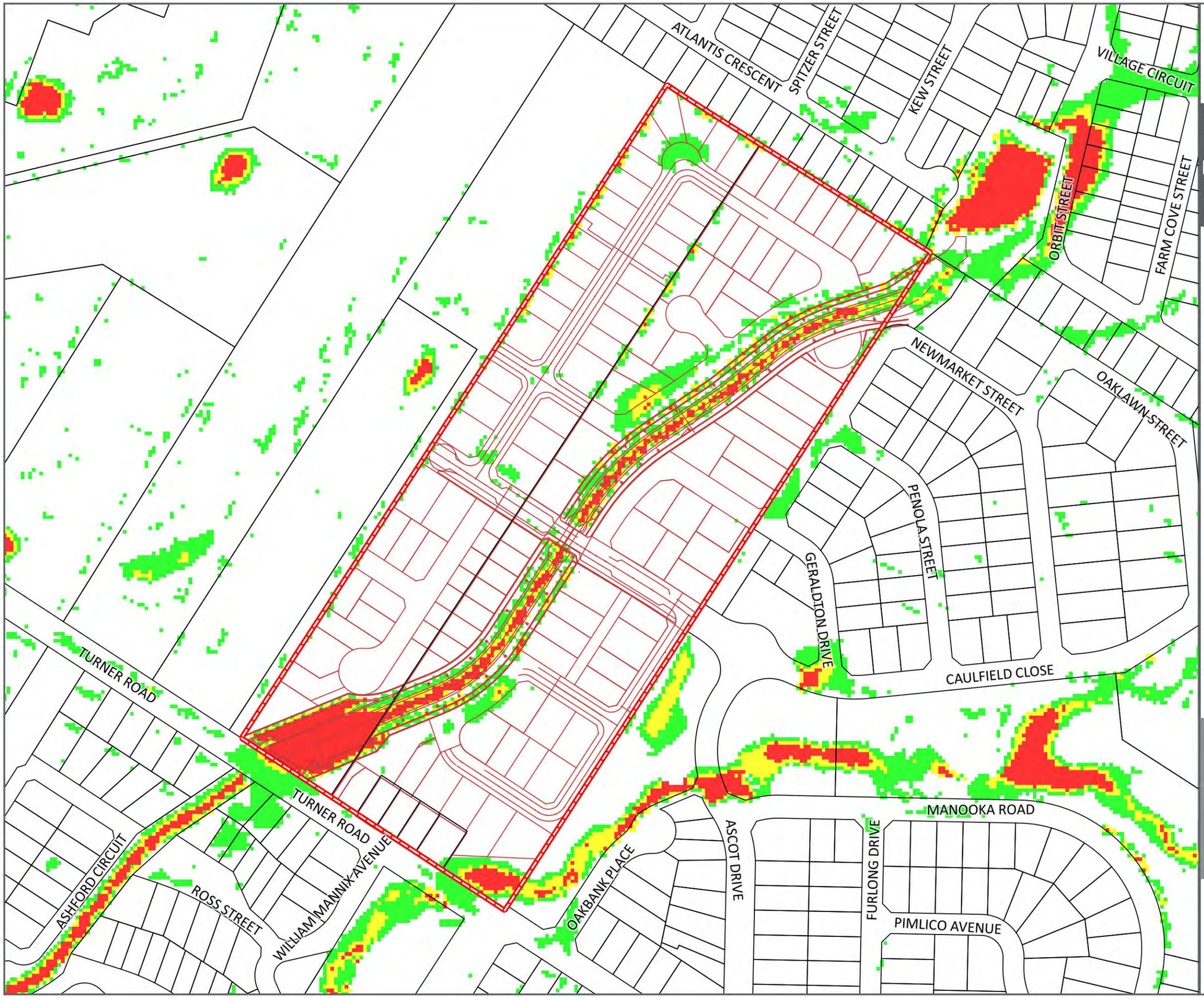
0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
1% AEP Provisional Hazard



Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development 1% AEP Provisional Hazard

- Low
- Transitional
- High

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 26

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
1% AEP Water Level Difference

ATLANTIS CRESCENT
SPITZER STREET
KEW STREET
VILLAGE CIRCUIT
ORBIT STREET
FARM COVE STREET
NEWMARKET STREET
OAKLAWN STREET
PENOLA STREET
GERALDTON DRIVE
CAULFIELD CLOSE
TURNER ROAD
ASHFORD CIRCUIT
ROSS STREET
WILLIAM MANNIX AVENUE
OAKBANK PLACE
ASCOT DRIVE
FURLONG DRIVE
MANOOKA ROAD
PIMLICO AVENUE

Legend

- Proposed Layout
- Proposed Works
- Subject Site
- Cadastre

1% AEP Water Level Difference (m)

- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

FIGURE 27

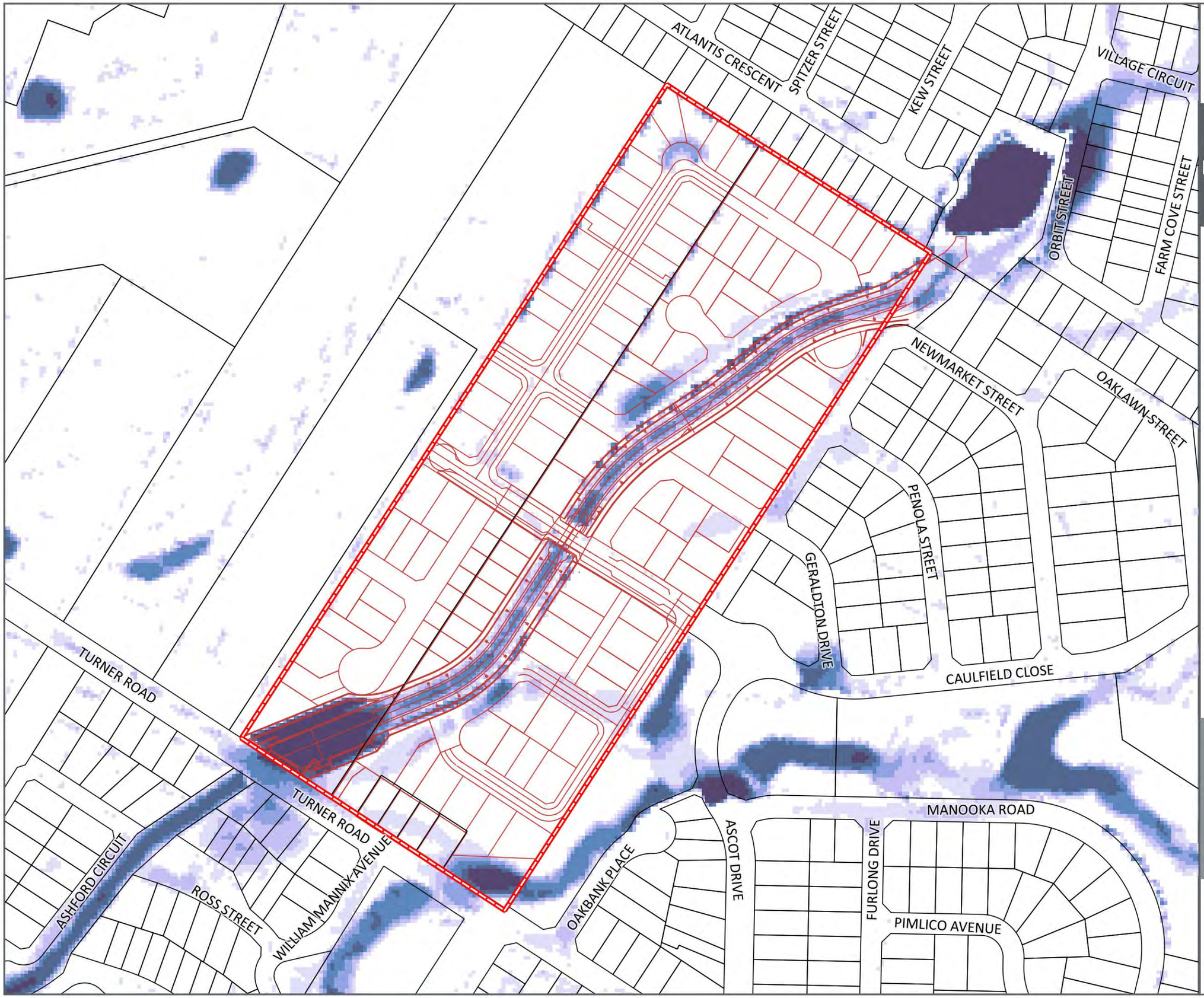
1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development PMF Depth

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development PMF Depth (m)

- 0.15 to 0.30
- 0.30 to 0.50
- 0.50 to 0.70
- 0.70 to 1.00
- 1.00 to 1.50
- > 1.50

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 28

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development PMF Water Level

Legend

- Proposed Layout
- Subject Site
- Cadastre
- Post-Development PMF Water Level (m AHD)

Post-Development PMF Water Level (m AHD)

- <= 97
- 97 - 99
- 99 - 101
- 101 - 103
- 103 - 105
- 105 - 107
- > 107

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 29

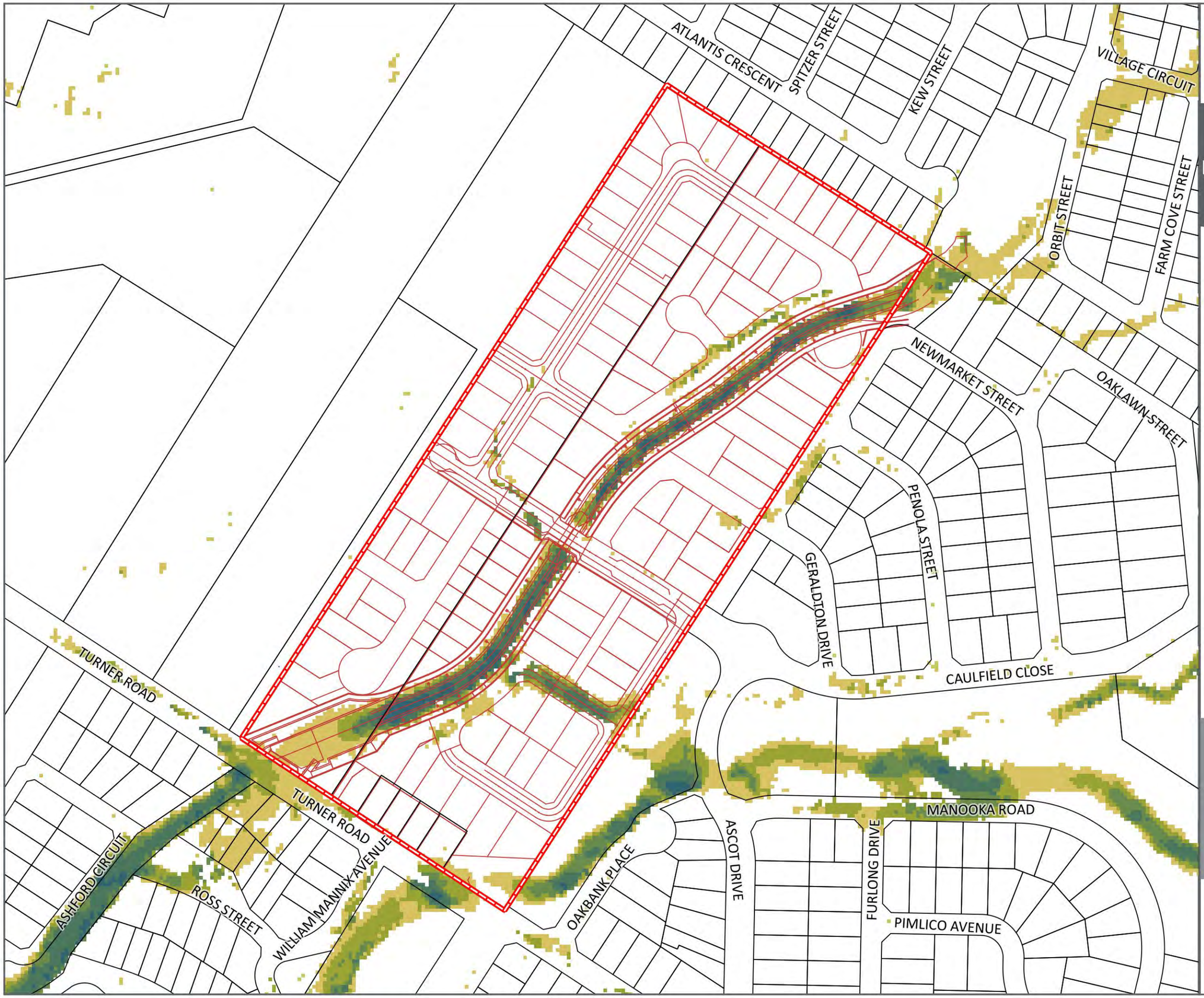
1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development PMF Velocity

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development PMF Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 3.00
- > 3.00

Maps only show inundation in areas where depths are greater than 0.15m

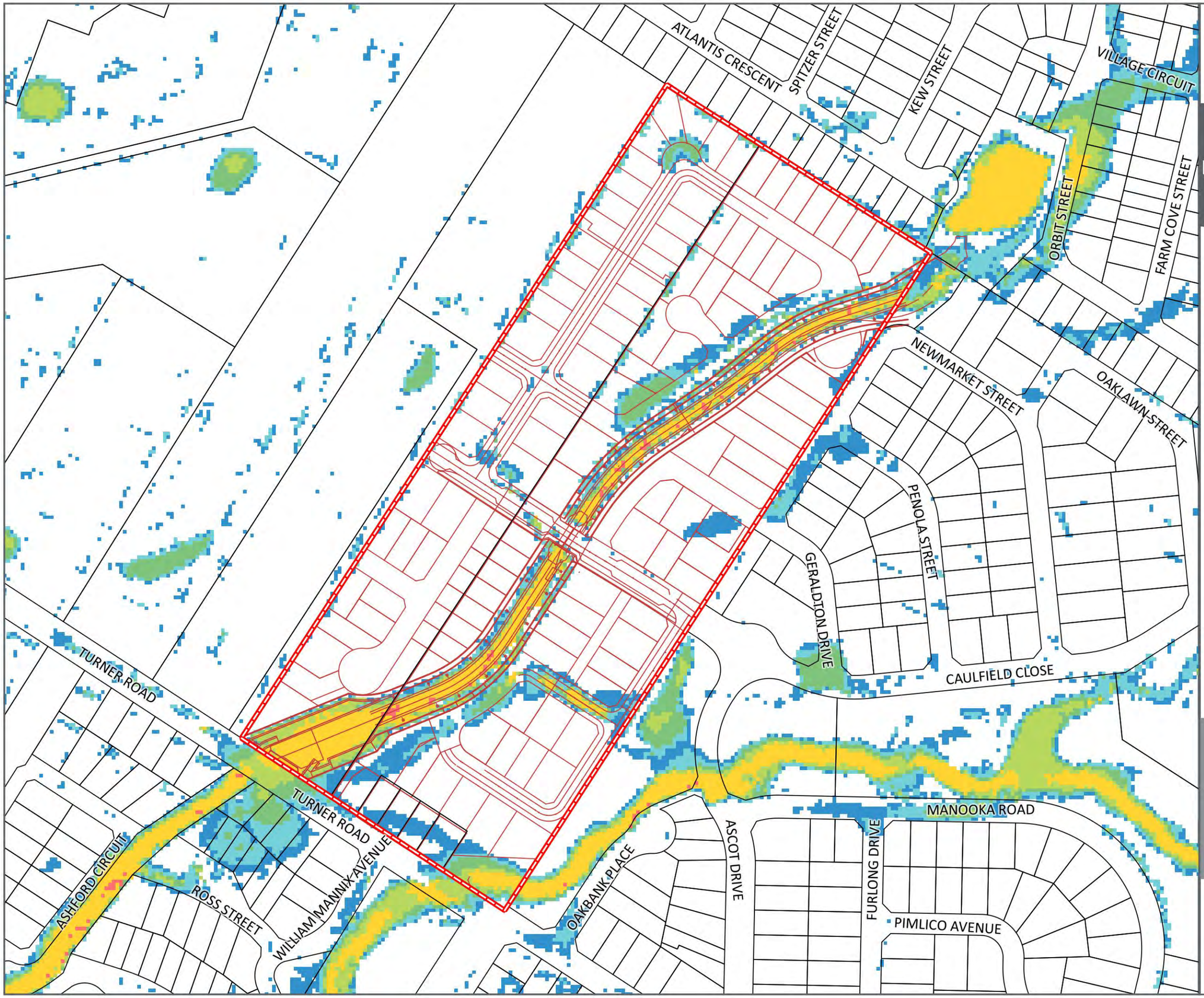
FIGURE 30

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
PMF General Hazard

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development PMF General Hazard

- 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.

Maps only show inundation in areas where depths are greater than 0.15m

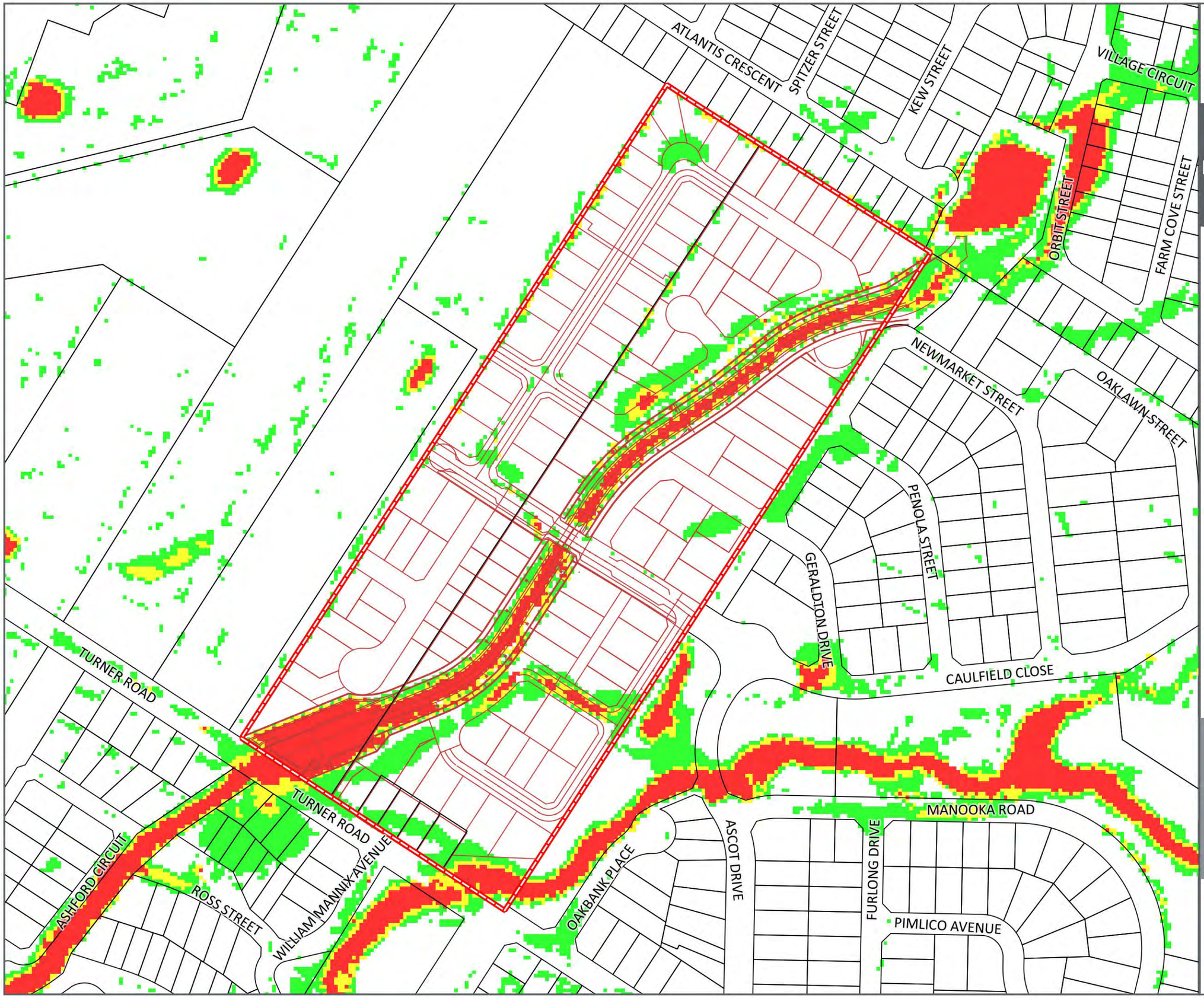
FIGURE 31

1:2,500 Scale at A3

0 20 40 60 80 100 m

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz



187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
PMF Provisional Hazard

Legend

- Proposed Layout
- Subject Site
- Cadastre

Post-Development PMF Provisional Hazard

- Low
- Transitional
- High

Maps only show inundation in areas where depths are greater than 0.15m

FIGURE 32

1:2,500 Scale at A3

0 20 40 60 80 100 m

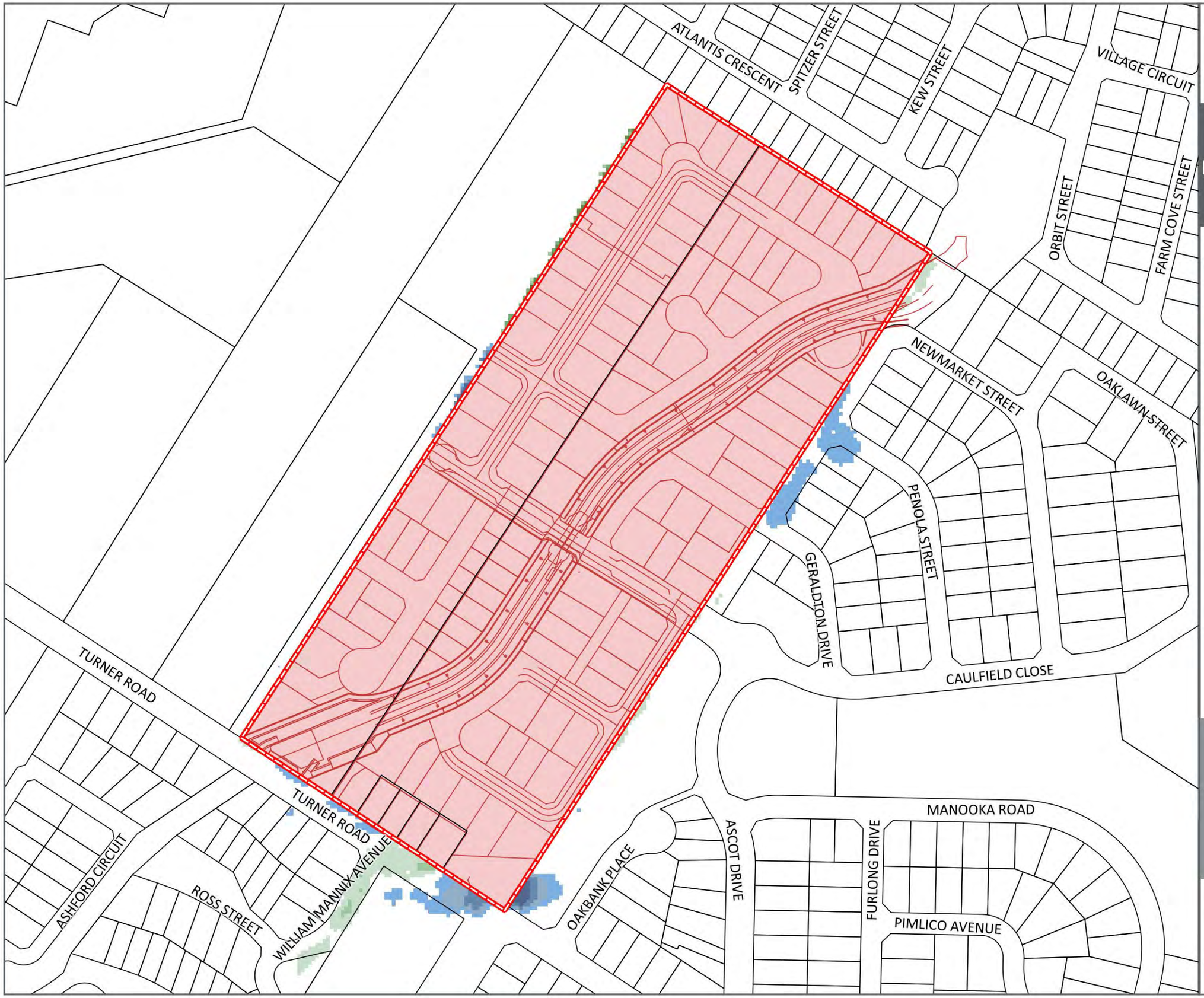
N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz

187-203 Turner Road, Currans Hill
Flood Impact Assessment

Post-Development
PMF Water Level Difference



Legend

- Proposed Layout
- Proposed Works
- Subject Site
- Cadastre

PMF Water Level Difference (m)

- < -0.50
- -0.50 to -0.20
- -0.20 to -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.20
- 0.20 to 0.50
- > 0.50

FIGURE 33

1:2,500 Scale at A3

0 20 40 60 80 100 m

N

Cardno

Map Produced by St Leonards Water (AWE)
Date: 2020-8-31| Project: 59916092
Coordinate System: MGA Zone 56
Map: Turner Road Figures.qgz