
Legend
Design 10yr Blockage
Flood Extent
Design 100yr Blockage
Flood Extent
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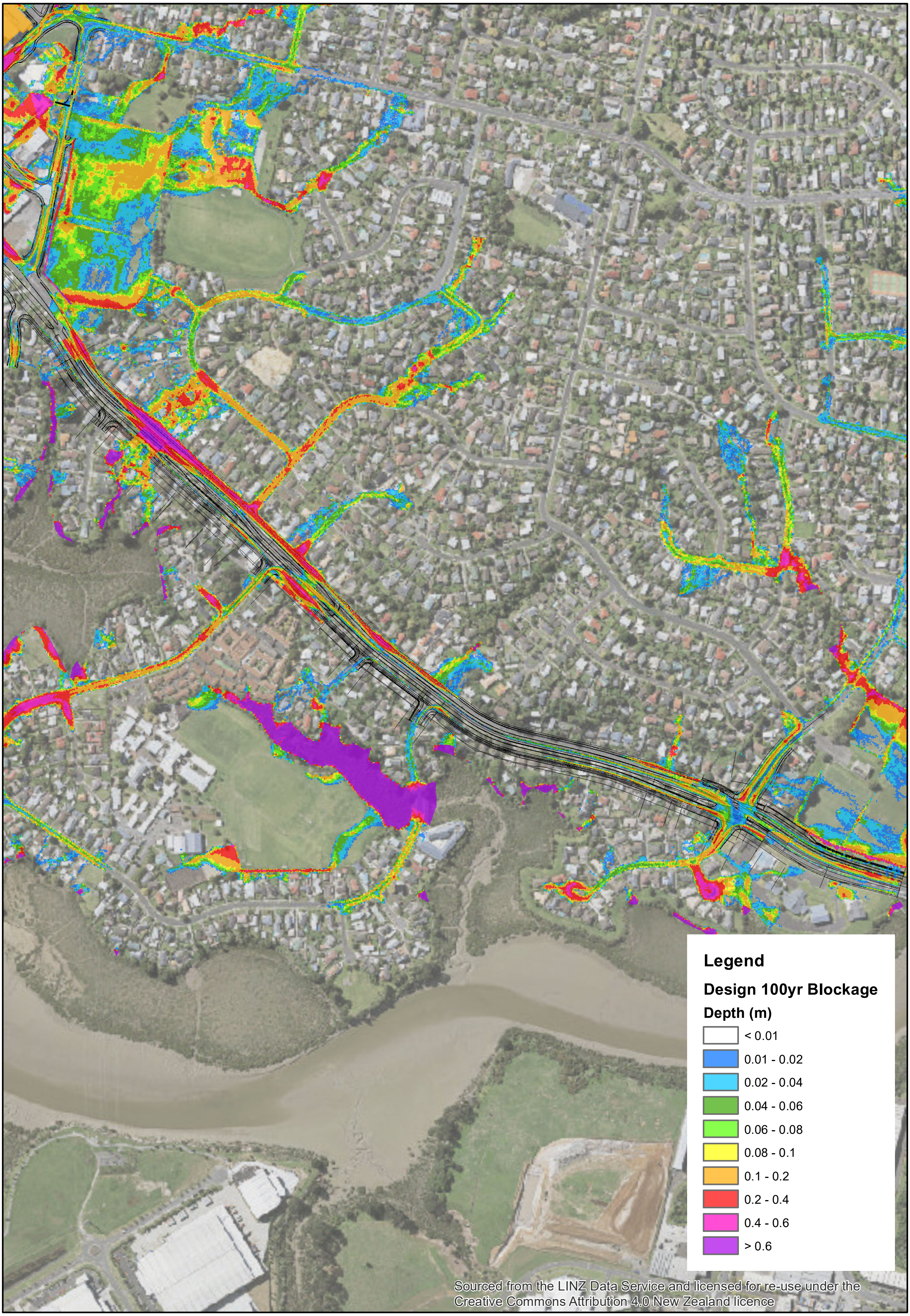
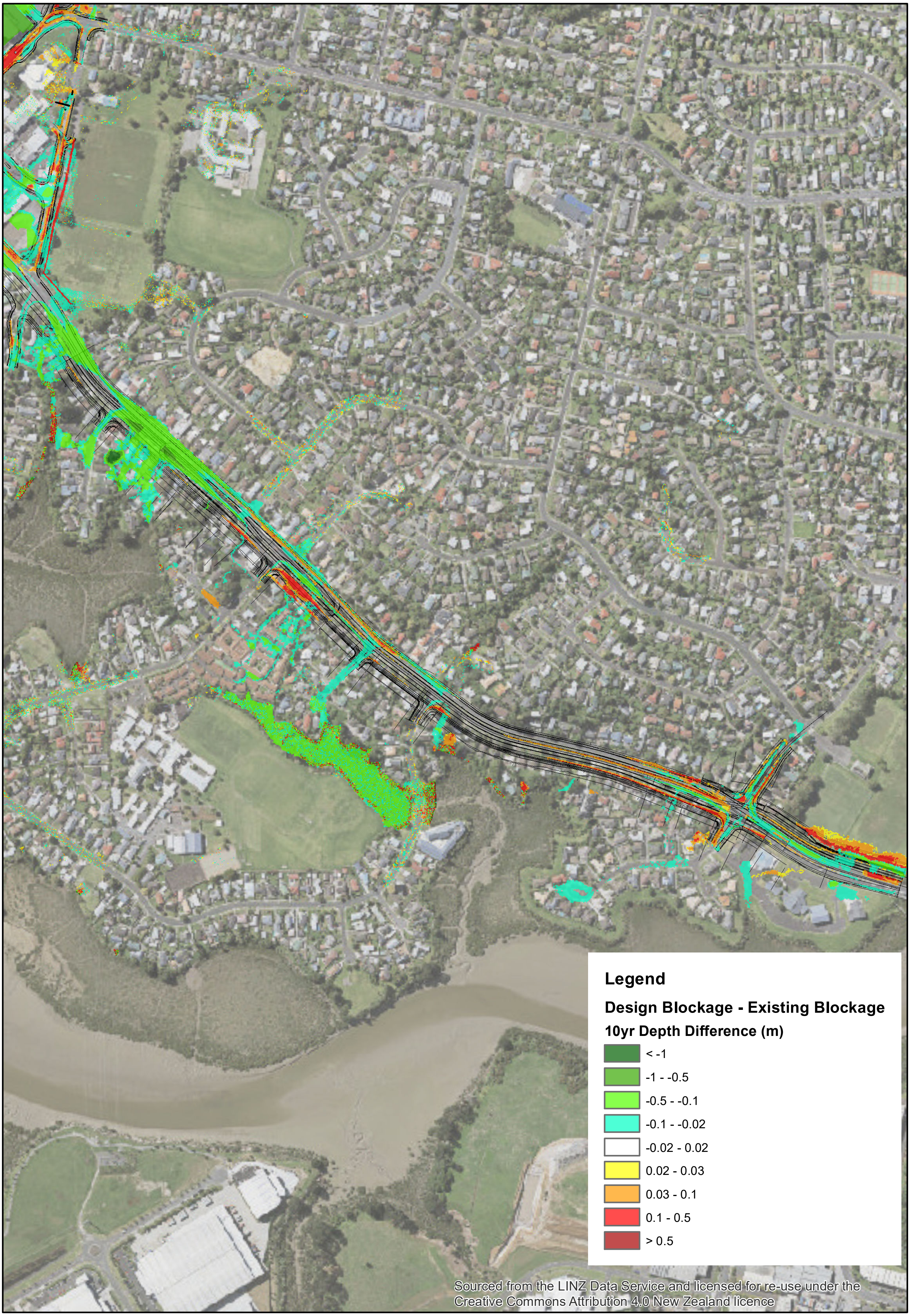
Legend
Design 10yr Blockage
Depth (m)
< 0.01
0.01 - 0.02
0.02 - 0.04
0.04 - 0.06
0.06 - 0.08
0.08 - 0.1
0.1 - 0.2
0.2 - 0.4
0.4 - 0.6
> 0.6



Legend
Design 100yr Blockage
Depth (m)
< 0.01
0.01 - 0.02
0.02 - 0.04
0.04 - 0.06
0.06 - 0.08
0.08 - 0.1
0.1 - 0.2
0.2 - 0.4
0.4 - 0.6
> 0.6


Legend
Design Blockage - Existing Blockage
10yr Depth Difference (m)
< -1
-1 - -0.5
-0.5 - -0.1
-0.1 - -0.02
-0.02 - 0.02
0.02 - 0.03
0.03 - 0.1
0.1 - 0.5
> 0.5
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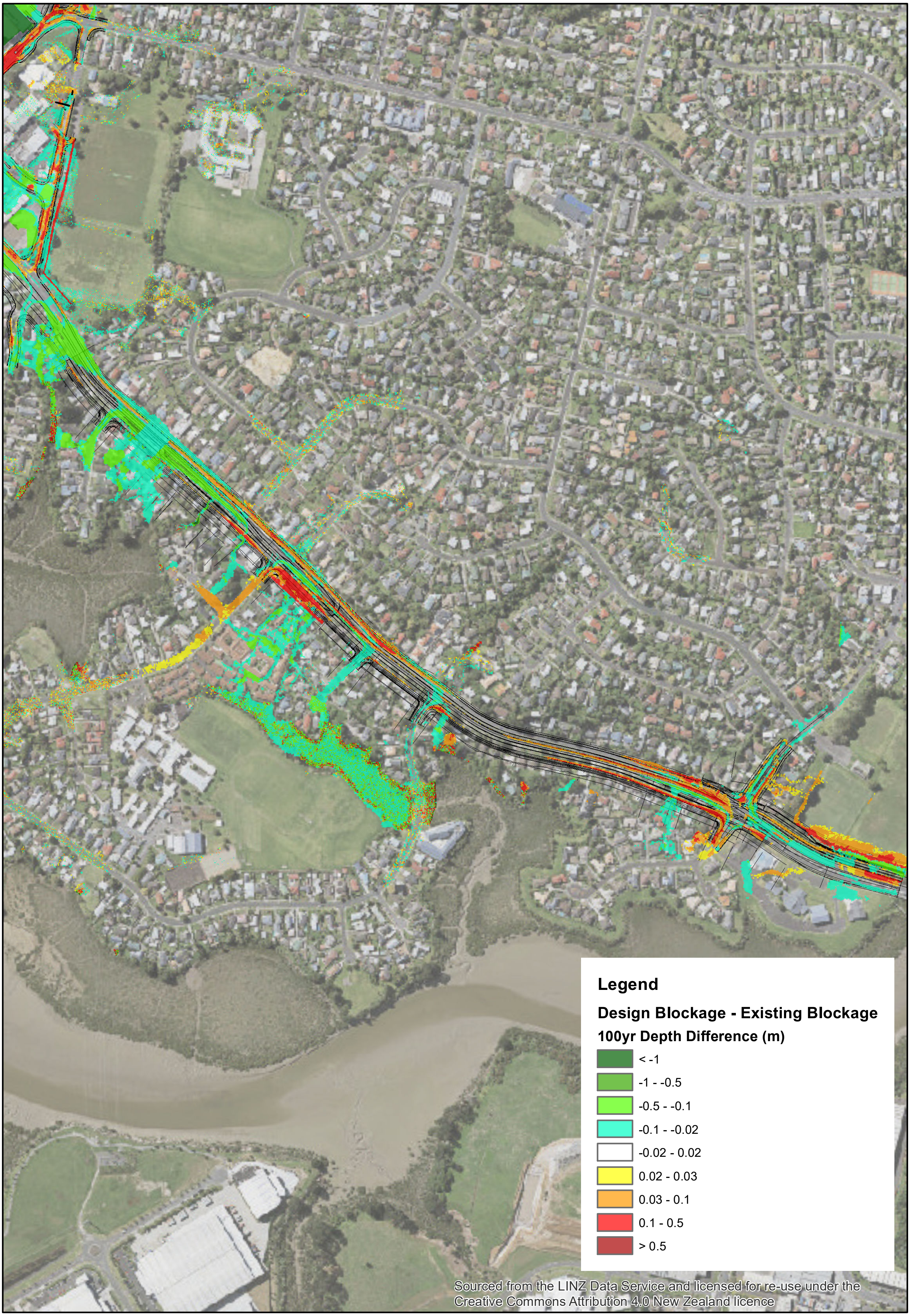

Legend
Design Blockage - Existing Blockage
100yr Depth Difference (m)
< -1
-1 - -0.5
-0.5 - -0.1
-0.1 - -0.02
-0.02 - 0.02
0.02 - 0.03
0.03 - 0.1
0.1 - 0.5
> 0.5

Appendix 8. EB3C overland flow assessment maps

In progress – awaiting public consultation outcomes

Appendix 9. EB4 overland flow assessment maps

In progress – awaiting multicriteria assessment outcomes

Appendix 10. Auckland Council Model Report

3.5 Model Limitations and Assumptions

3.5.1 Limitations

Explicit calibration of the catchment model was not undertaken. The present modelling is limited by the ARC TP108 rainfall-runoff model which is expected to be within ± 25% at a confidence level of 90 percent for 2-year to 100-year ARI storm events (ARC, 1999).

The model accuracy for historical flood events will be dependent on the antecedent ground conditions and spatial rainfall variation. Antecedent ground conditions are variable, depending on the season and the timing of the storm within the sequence of storms. The TP108 runoff model is limited to the average antecedent moisture condition.

3.5.2 Hydraulic Model Assumptions

All sub-catchment runoff was assumed to enter freely into the reticulation system. Catch pit inlet control was modelled as 2D gully type nodes where a maximum of 100 litres per second was allowed, with the excess runoff diverted to the 2D ground model. The model effectively assumes catch pit inlet capacity is equal to or greater than the modelled pipe capacity.

No blockage has been assumed in catch pits, manholes, pipes, culverts and entry points into the stormwater network system.

No sedimentation has been allowed for in the pipes, i.e. all pipes are capable of performing at full capacity

3.6 Initial Model Testing

Two model simulation runs were carried out for the 2-year and 100-year ARI to ensure that the model is performing correctly without mass errors and numerical instabilities. No major instabilities were noticed within the model results. The mass continuity balance is used as a measure of system water volume balance error due to water generated within the model for various situations, such as sharp changes in surface width or cross-section shape or surface area of basins. A mass continuity balance below 5% is considered acceptable. The mass error balance of the Pakuranga Creek catchment model ranged from 0.01% to 0.2%.

3.7 Quality Assurance and Quality Checks

The Pakuranga Creek catchment stormwater drainage network model has been internally quality assured and checked.

3.5 Model Limitations and Assumptions

3.5.1 Limitations

Explicit calibration of the catchment model was not undertaken. The present modelling is limited by the ARC TP108 rainfall-runoff model which is expected to be within ± 25% at a confidence level of 90 percent for 2-year to 100-year ARI storm events (ARC, 1999).

The model accuracy for historical flood events will be dependent on the antecedent ground conditions and spatial rainfall variation. Antecedent ground conditions are variable, depending on the season and the timing of the storm within the sequence of storms. The TP108 runoff model is limited to the average antecedent moisture condition.

3.5.2 Hydraulic Model Assumptions

All sub-catchment runoff was assumed to enter freely into the reticulation system i.e. catch pit inlet control was modelled for stormwater reticulation as 2D gully type nodes where a maximum 100 litres per second was allowed, the excess runoff is diverted to the 2D ground model. The model effectively assumes catch pit inlet capacity is equal to or greater than the modelled pipe capacity.

No blockage has been assumed in catch pits, manholes, pipes, culverts and entry points into the stormwater network system.

No sedimentation has been allowed for in the pipes, i.e. all pipes are capable of performing at full capacity

3.6 Initial Model Testing

Two model simulation runs were carried out for the 2-year and 100-year ARI to ensure that the model is performing correctly without mass errors and numerical instabilities. No major instabilities were noticed within the model results. The mass continuity balance is used as a measure of system water volume balance error due to water generated within the model for various situations e.g. sharp changes in surface width or cross-section shape or surface area of basins with water depth. The mass continuity balance below 5% is considered acceptable. The mass error balance of the Tamaki River Catchment model ranged from 0.01% to 0.2%.

3.7 Quality Assurance and Quality Checks

The Tamaki River Catchment stormwater drainage network model has been internally quality assured and checked.

Appendix 11. Site Visit

MEMO

To:	Paul May
Organisation:	Eastern Busway Alliance
From:	To Newman
Date:	17-05-2021

☐ Urgent

☐ For Review

☐ Please Action

☐ Please Reply

☒ Other – For Information

Re. Overland Flow Path Site Visit

Paul May,

A site visit to Eastern Busway Zones 2 and 4 (EB2 and EB4) was conducted on 14th May 2021. The purpose of this site visit was to review the stormwater overland flow paths and the possibility of obstructions from commercial buildings. During the site visit, catchpits were observed along main overland flow paths.
It was noted during the site visit in EB4, that a large overland flow path was running through the car park at Botany Town Centre. Review of the sub-catchments circled in red shown in Figure 1 shows that the sub-catchments envelope large buildings. These sub-catchments should be split into smaller catchments to re-direct flows to avoid a single large overland flow path.
Figure 2 and Figure 3 show the location of the photos taken during the site visit (see Figure 4 to Figure 25). The photos show building entrances to be discussed in relation to blocking buildings in the flood model. Photos of some of the observed catchpits were also taken.

Additional comments on photos:

- Photos 2 (see Figure 5) and 4 (see Figure 7) show steps down into buildings with raised footpath curbs between the buildings and road
- Photo 6 (Figure 9) shows steps up into the building but also shows and underground carpark
- Photo 9 (Figure 12) shows an entrance into an underground carpark sloping down from the road
- Photos 14 and 15 (see Figure 14 and Figure 15) show a fence that could create an obstruction to the overland flow path
- Photos 17-20 (see Figure 20 to Figure 23) show low spots adjacent to buildings, photos 17-19 show building entrances in the low spots
- Photo 21 (Figure 24) shows where the low spot going through the Botany Town Centre carpark
- Photo 22 (Figure 25) shows a super catchpit approximately 20 m long.

Figure 1: Overland flow path due to sub-catchment sizes circled in red

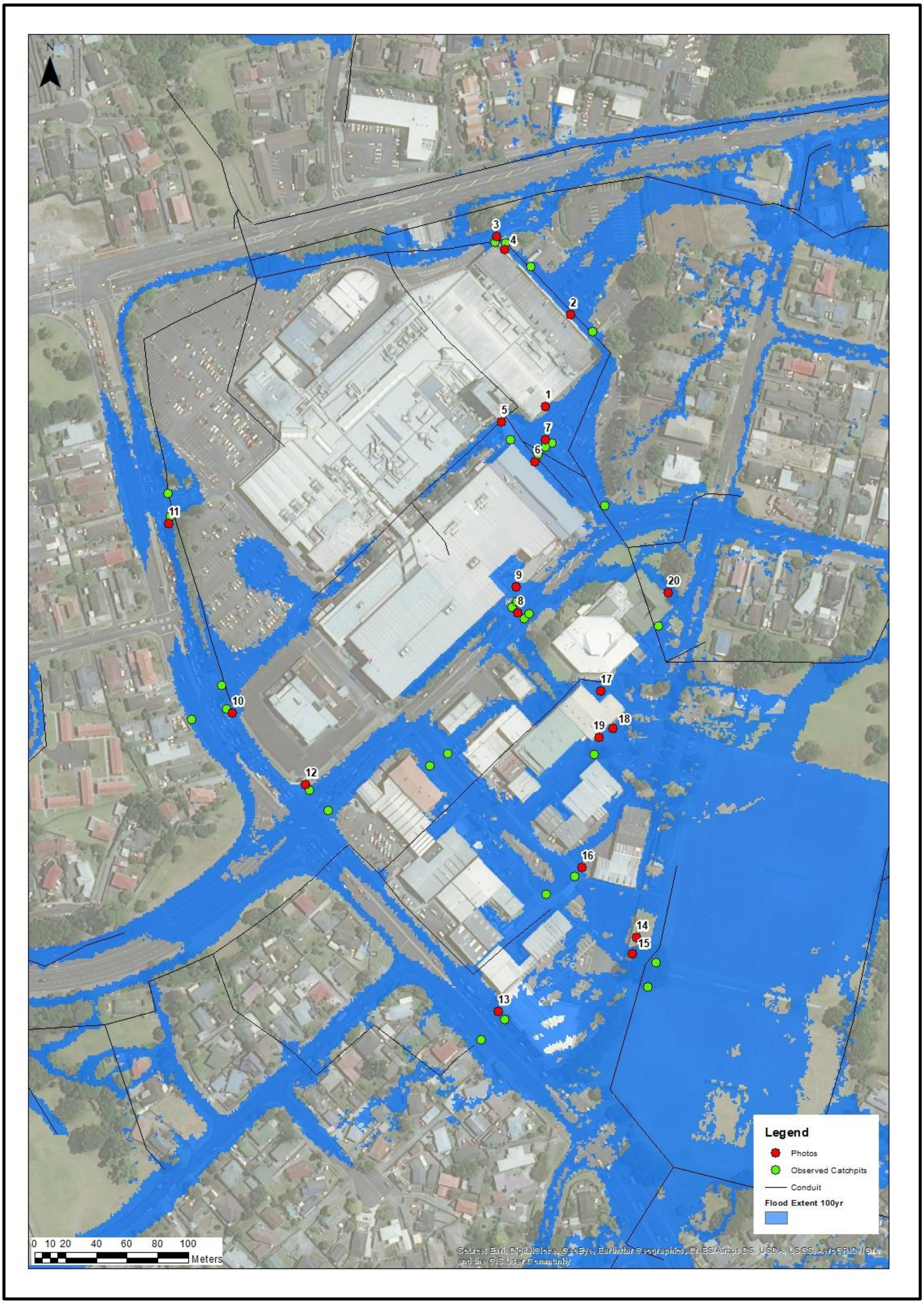

Figure 2: Photo locations and observed catchpits in EB2

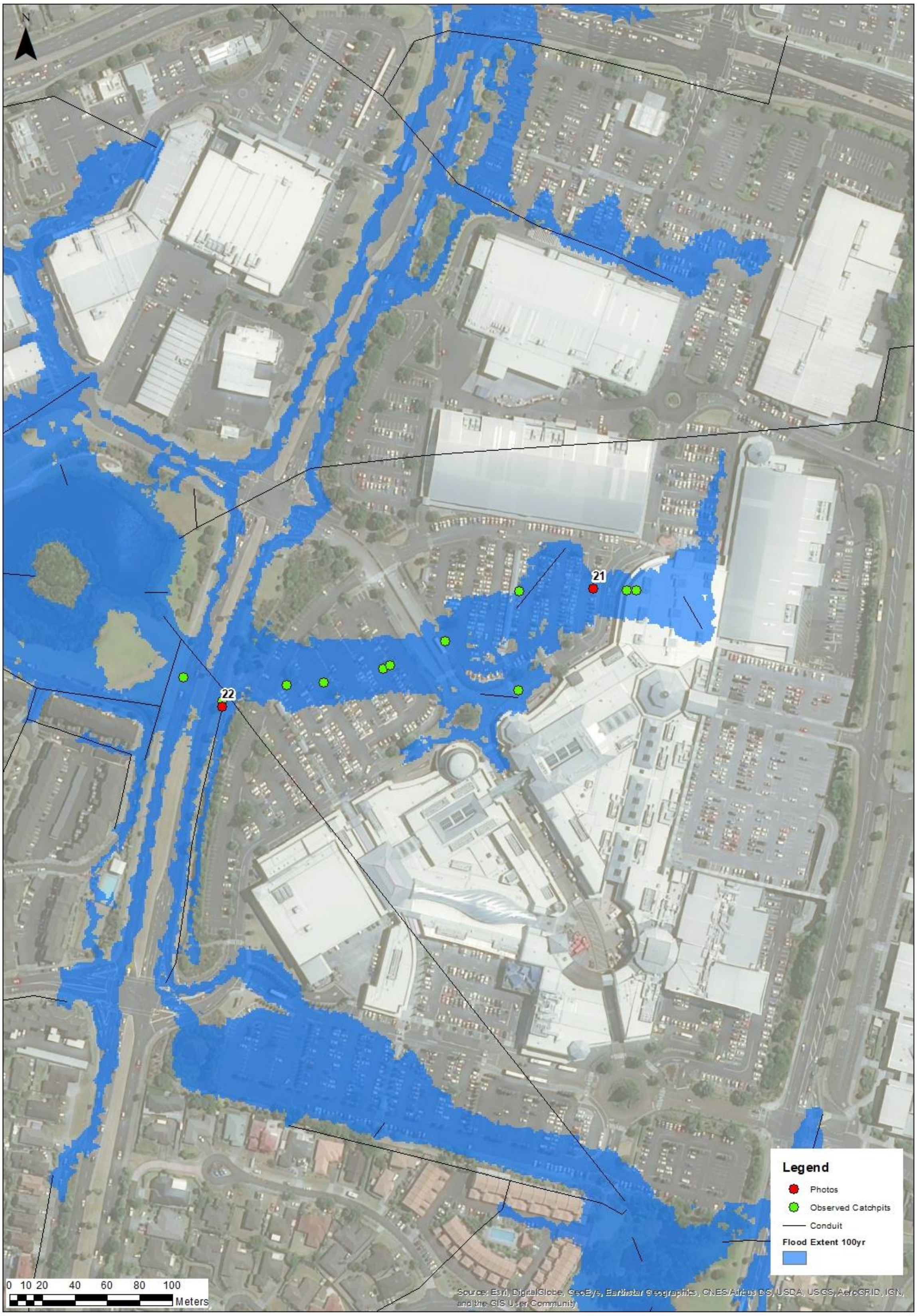

Figure 3: Photo locations and observed catchpits in EB4

Figure 4: Photo 1

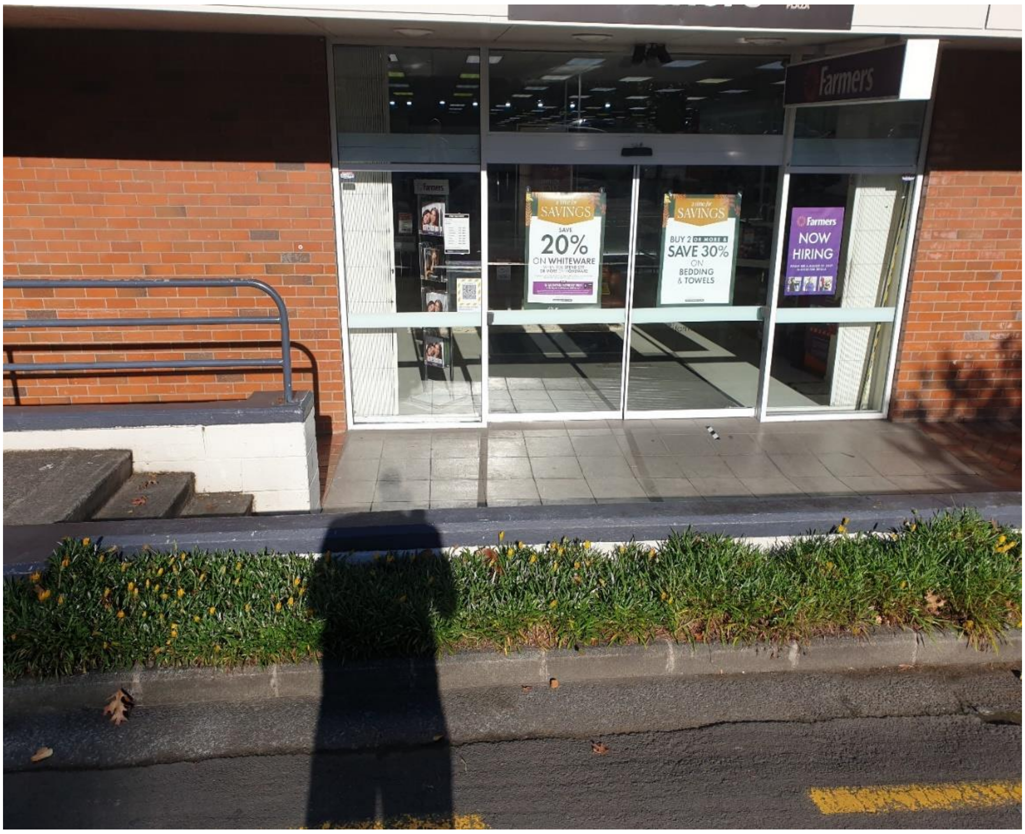

Figure 5: Photo 2

Figure 6: Photo 3

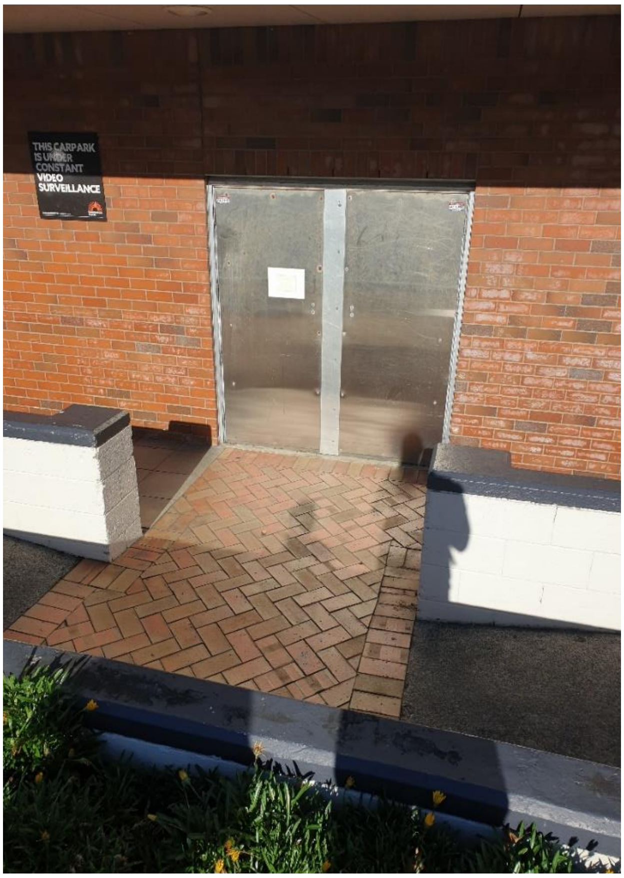

Figure 7: Photo 4

Figure 8: Photo 5

Figure 9: Photo 6

Figure 10: Photo 7

Figure 11: Photo 8

Figure 12: Photo 9

Figure 13: Photo 10

Figure 14: Photo 11

Figure 15: Photo 12

Figure 16: Photo 13

Figure 17: Photo 14

Figure 18: Photo 15

Figure 19: Photo 16

Figure 20: Photo 17

Figure 21: Photo 18

Figure 22: Photo 19

Figure 23: Photo 20

Figure 24: Photo 21

Figure 25: Photo 22

Ngā mihi

Tom Newman
Flood Modeler
Eastern Busway Alliance