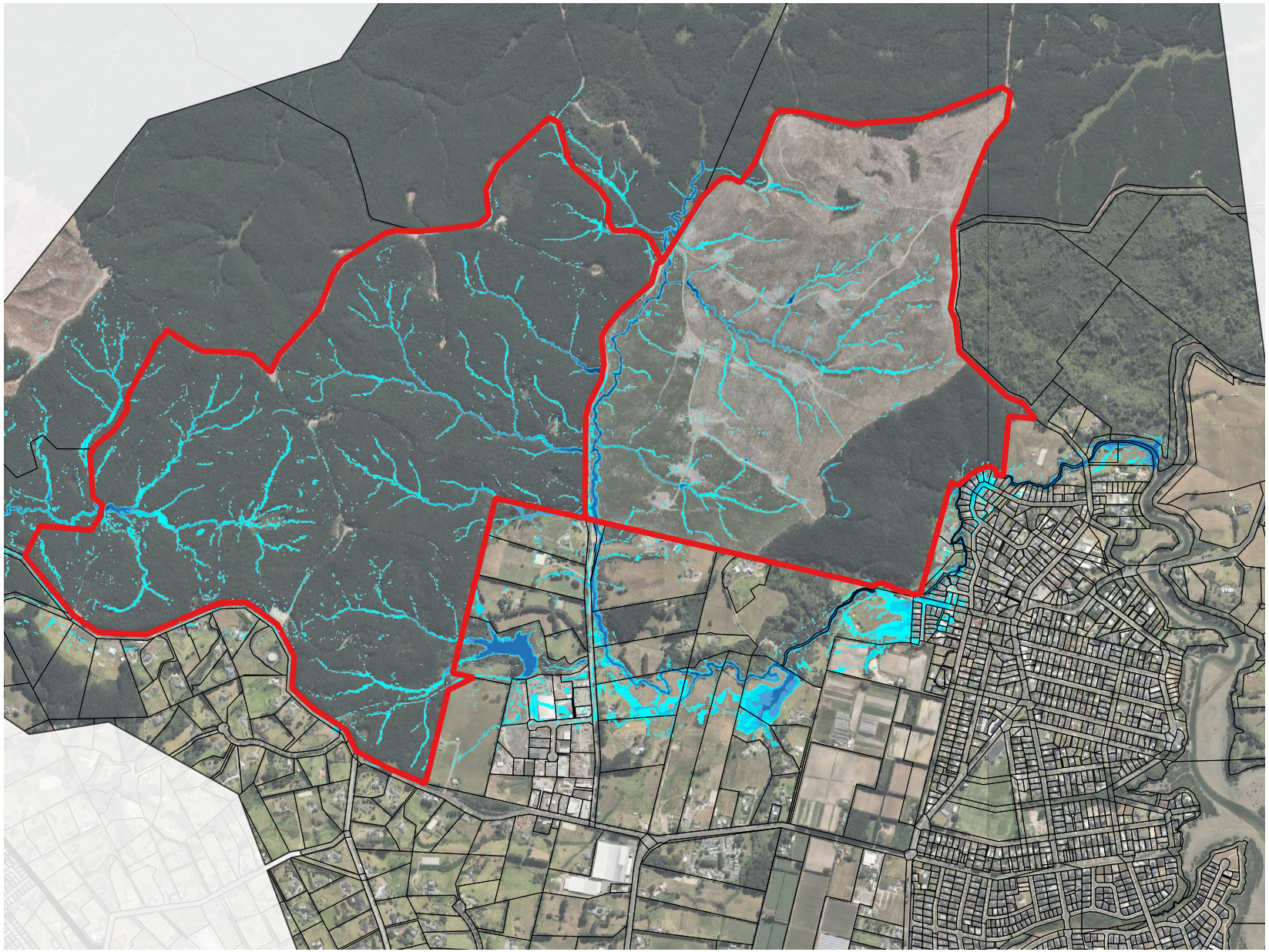
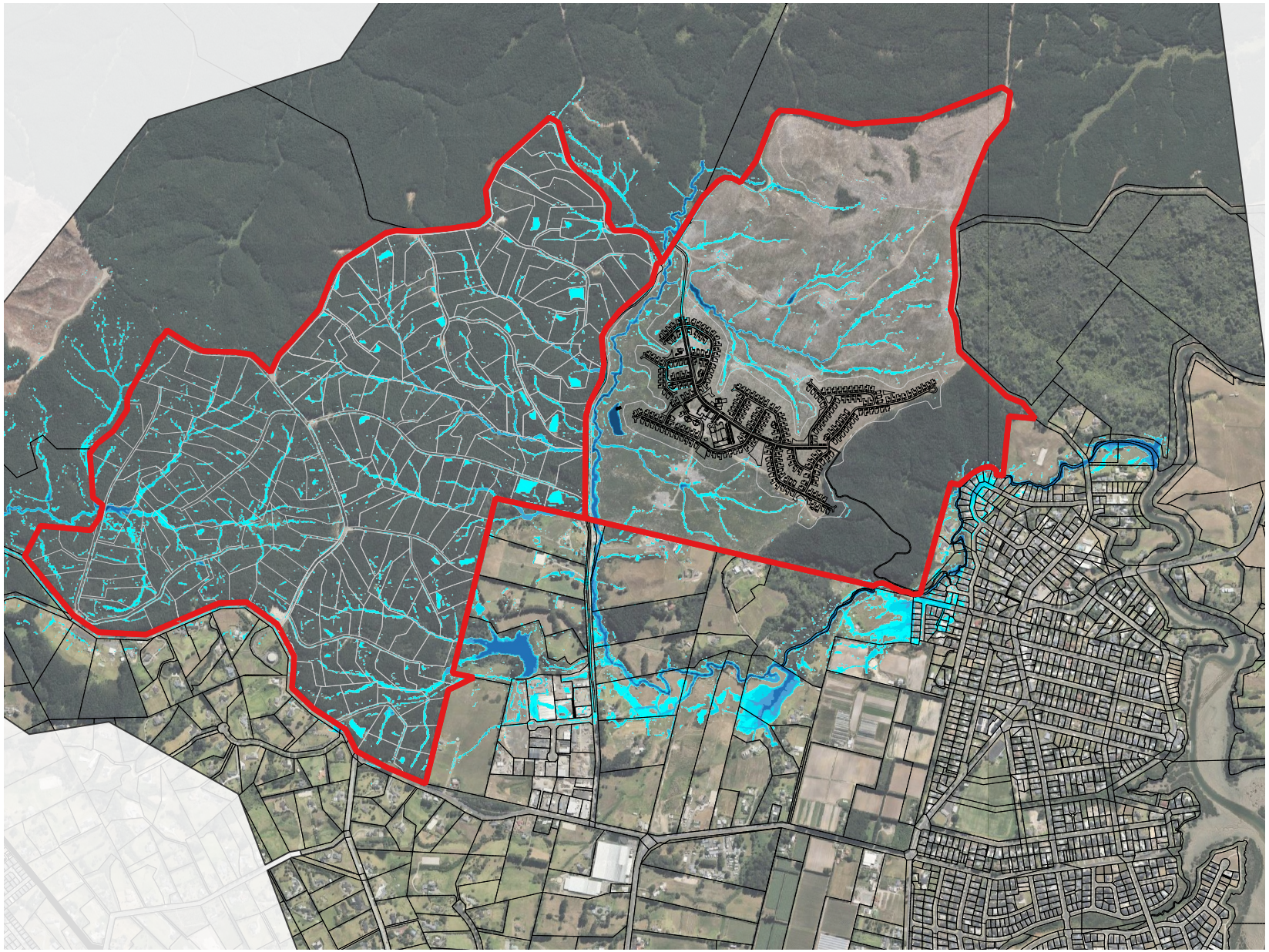
APPENDIX C – RESULTS FLOOD MAPS

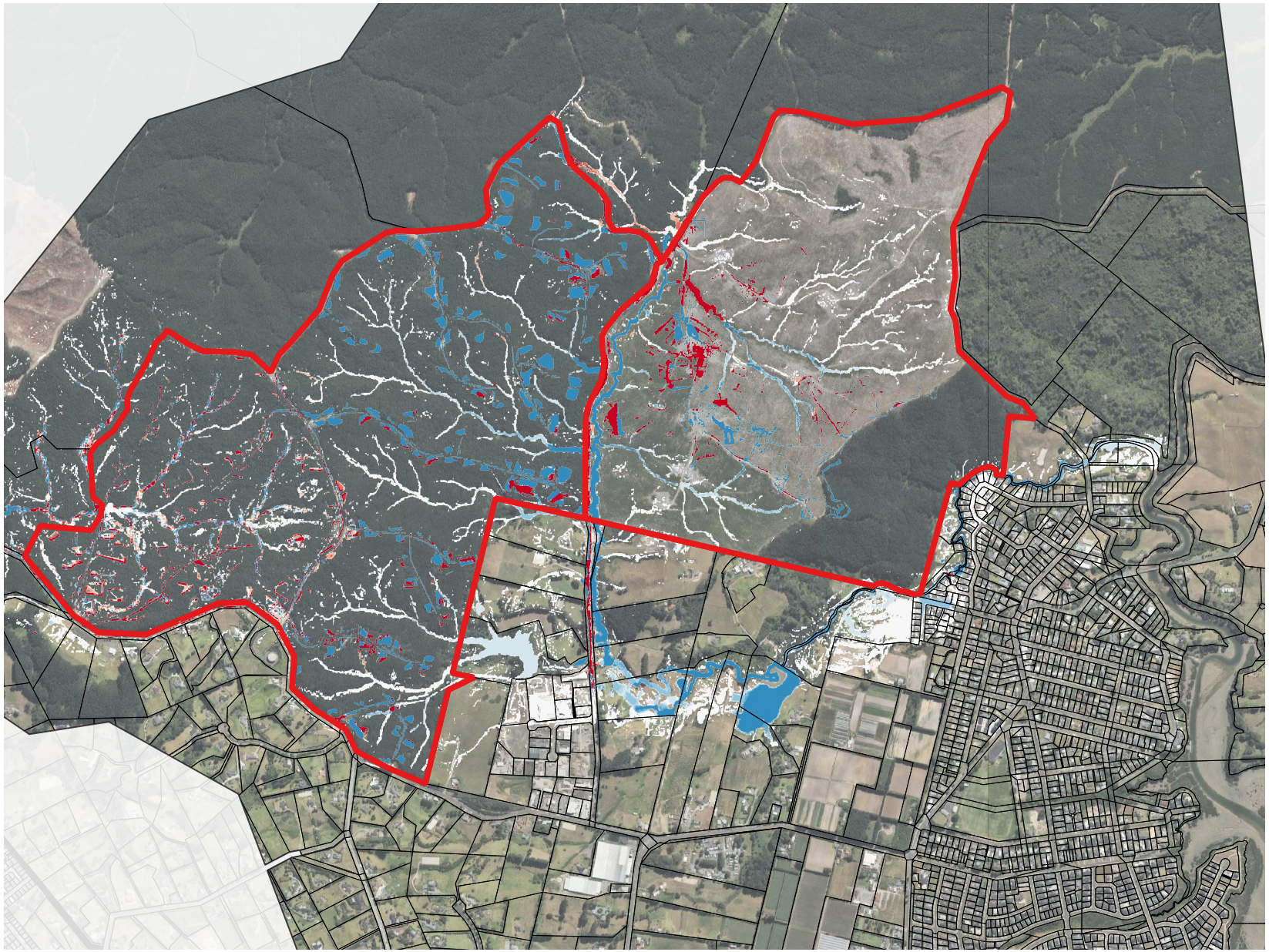
50%AEP Storm with (2.1 degree Climate Change) Depths Predevelopment



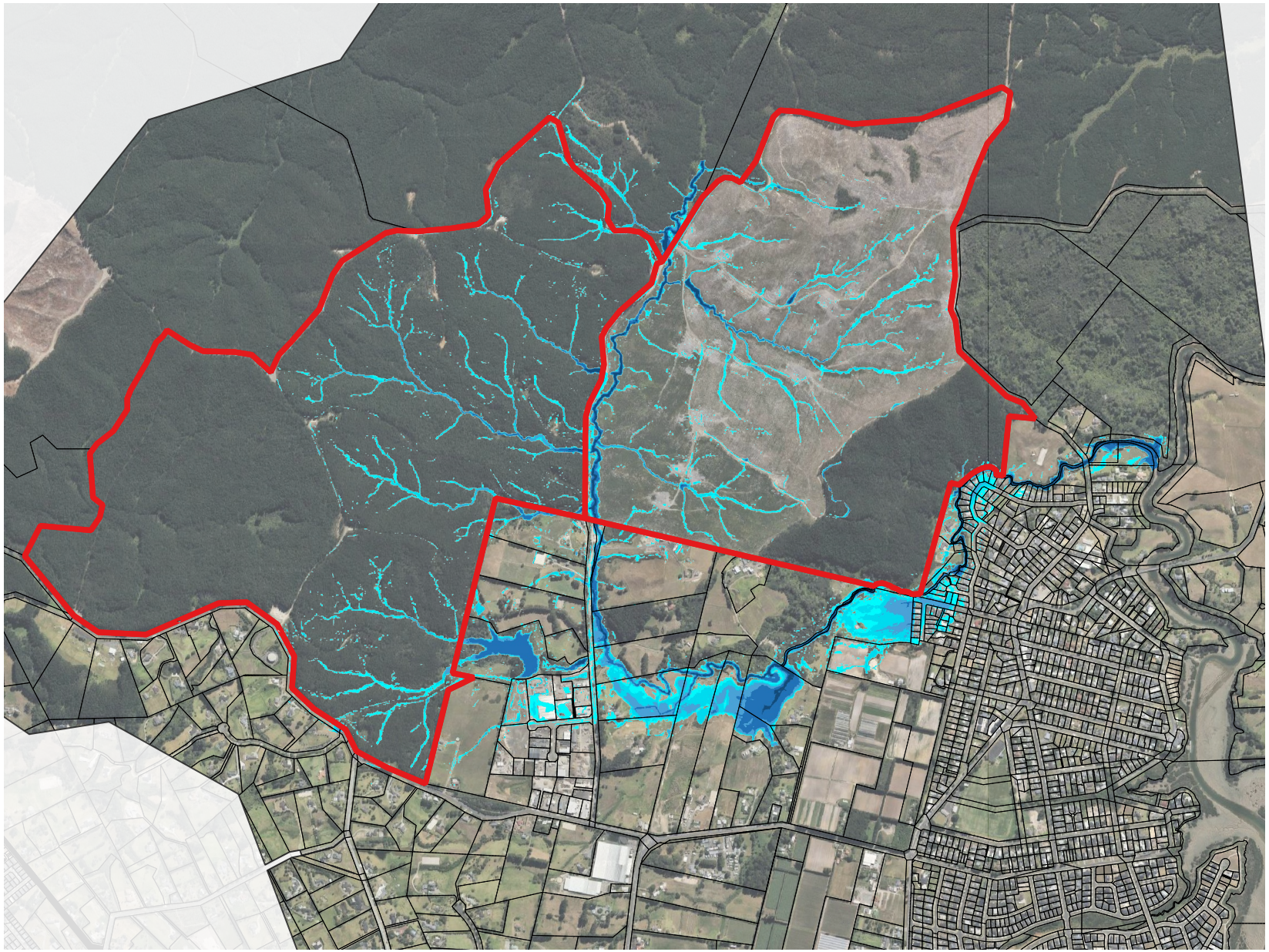
50%AEP Storm with (2.1 degree Climate Change) Depths Postdevelopment



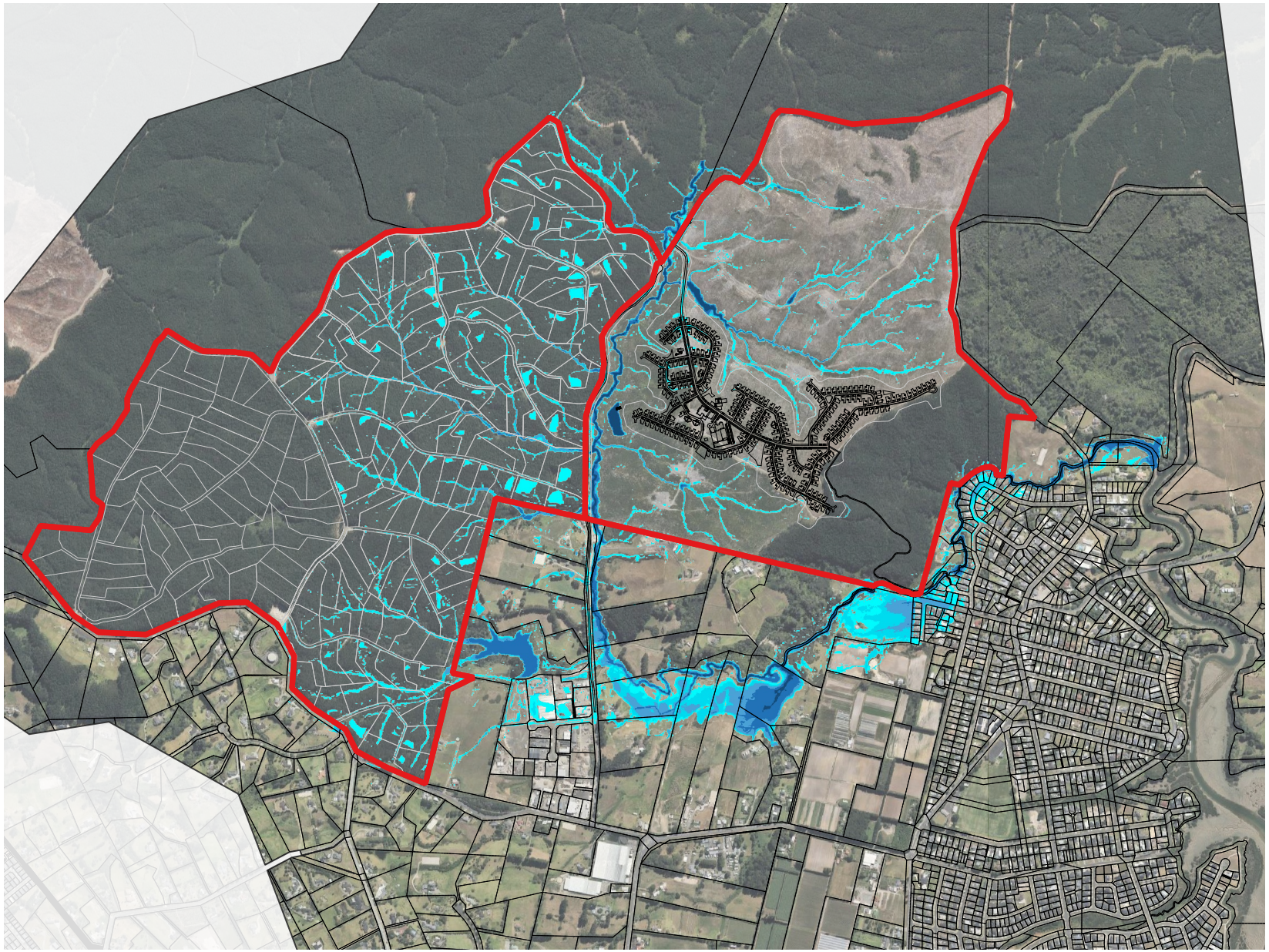
50%AEP Storm with (2.1 degree Climate Change)
Comparison of Water Surface Elevation for 2yrCC Post vs Pre



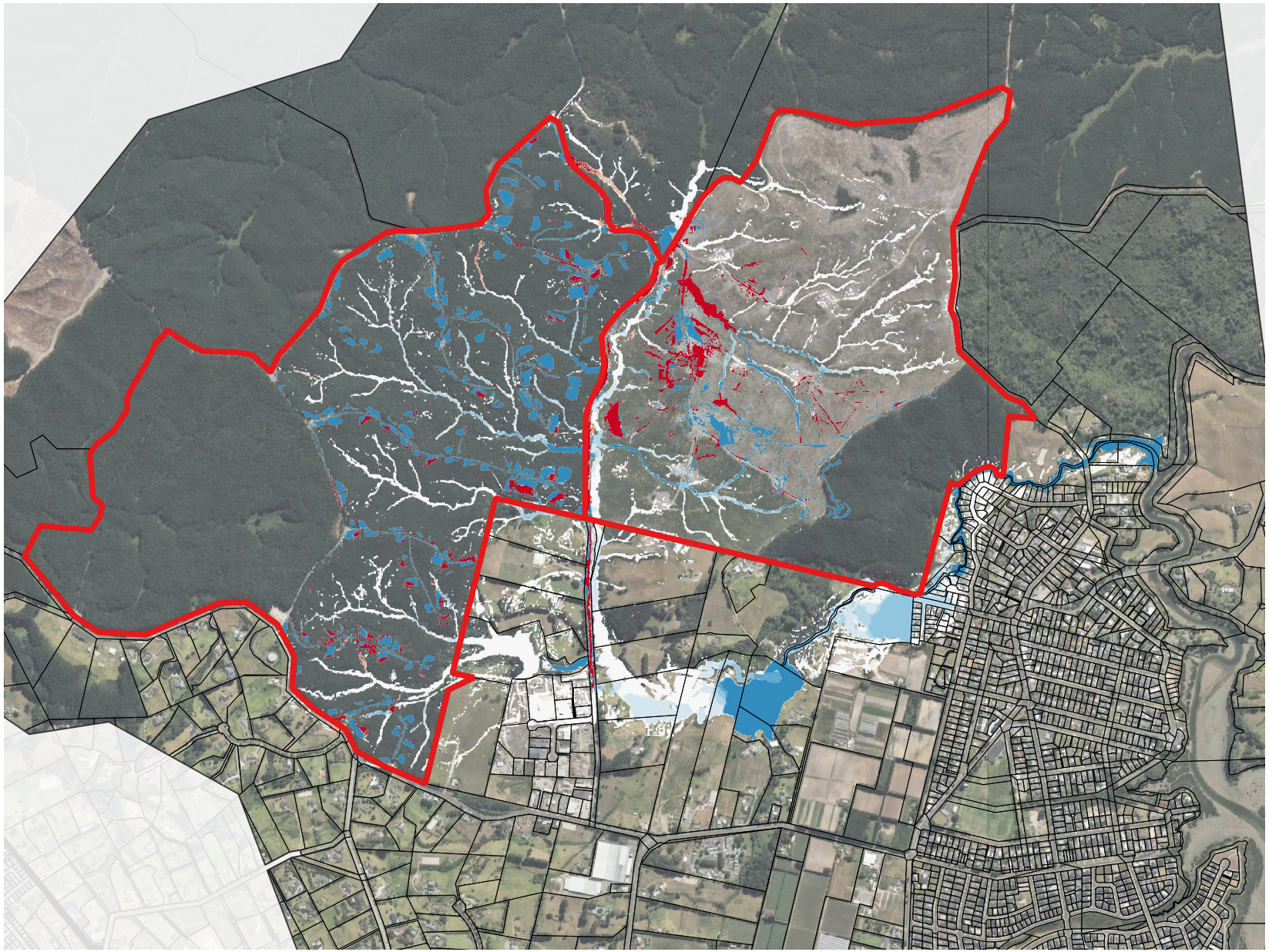
20%AEP Storm with (2.1 degree Climate Change) Depths Predevelopment



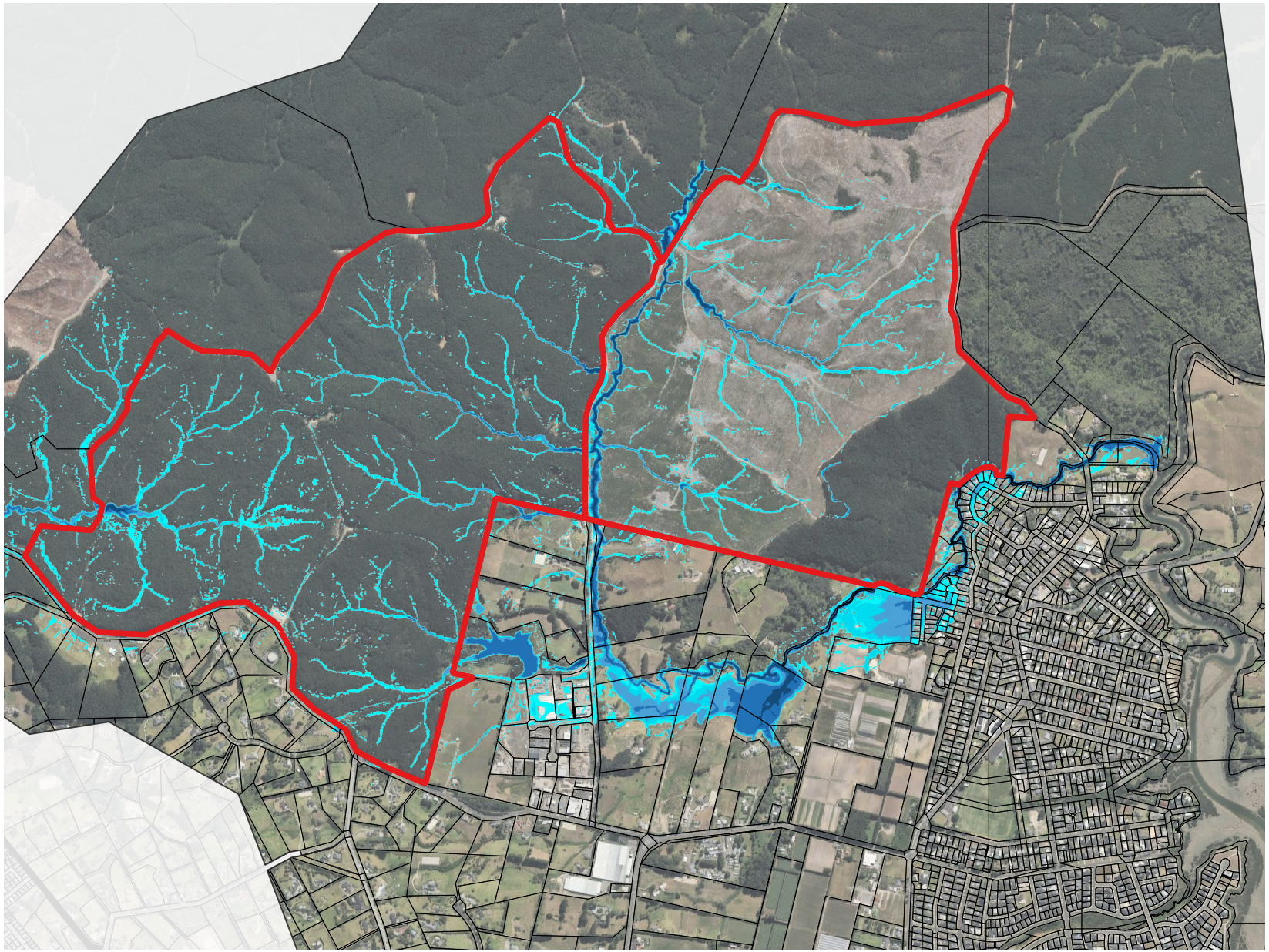
20%AEP Storm with (2.1 degree Climate Change) Depths Postdevelopment



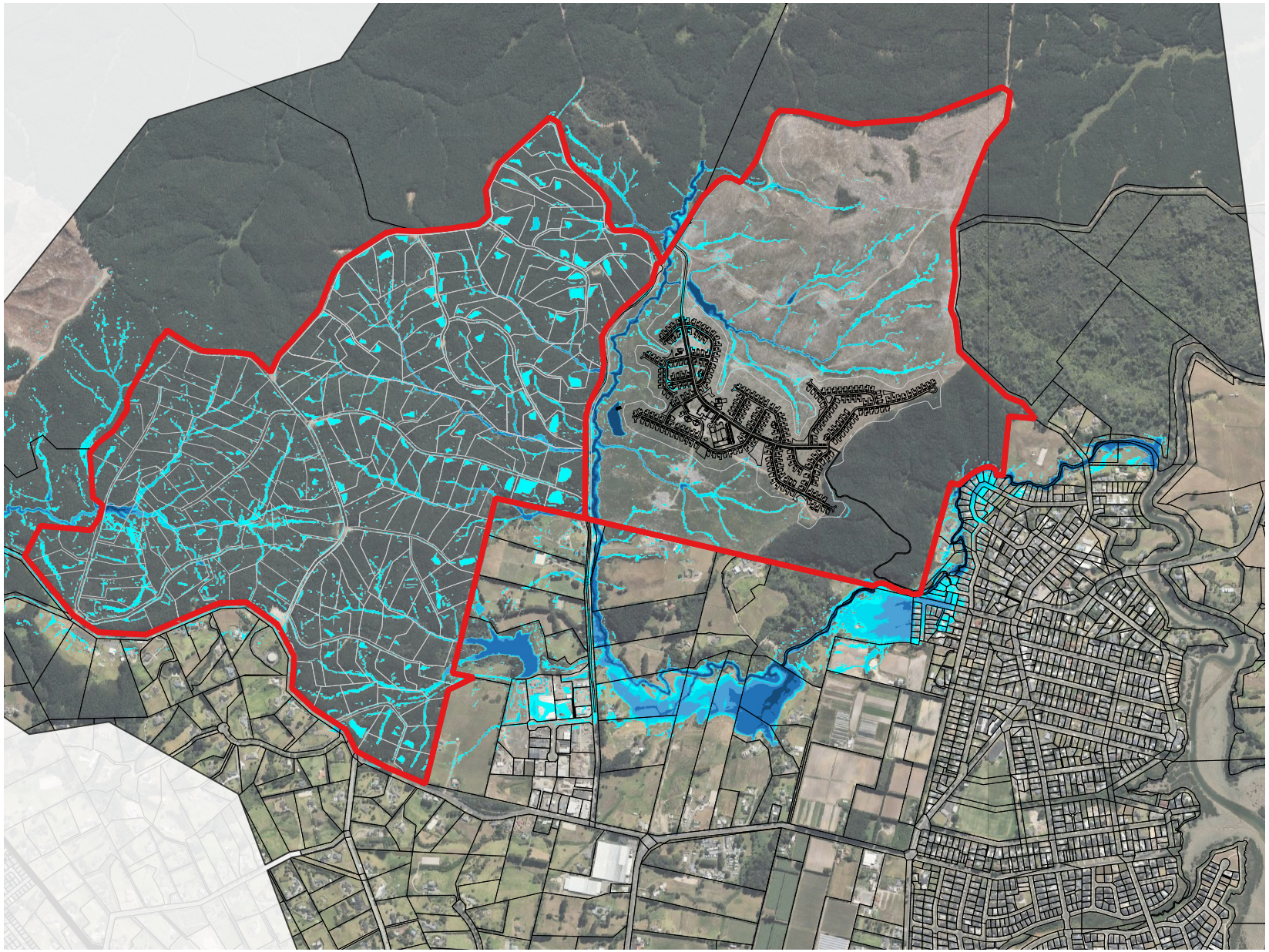
20%AEP Storm with (2.1 degree Climate Change)
Comparison of Water Surface Elevation for 5yrCC Post vs Pre



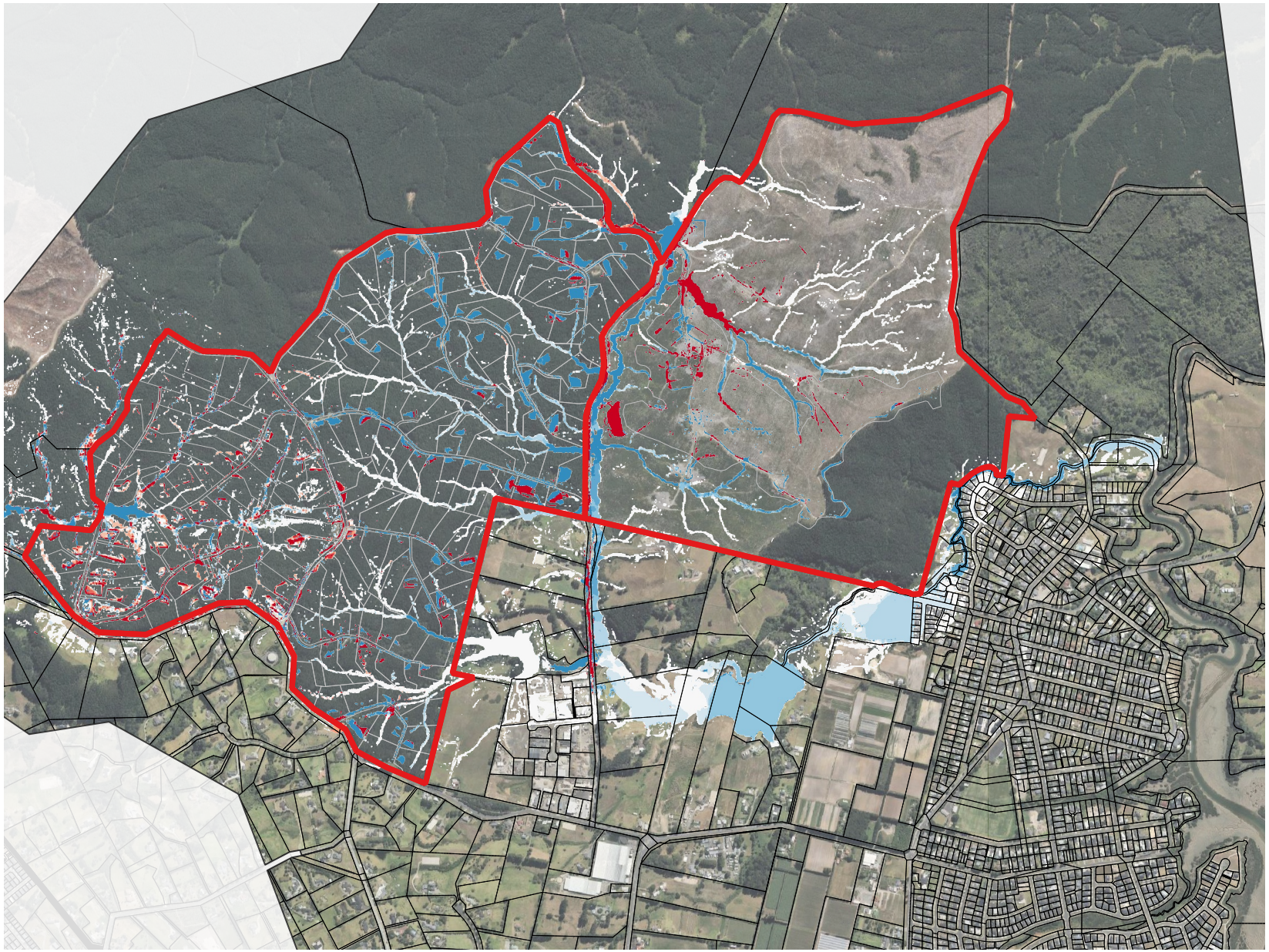
10%AEP Storm with (2.1 degree Climate Change) Depths Predevelopment



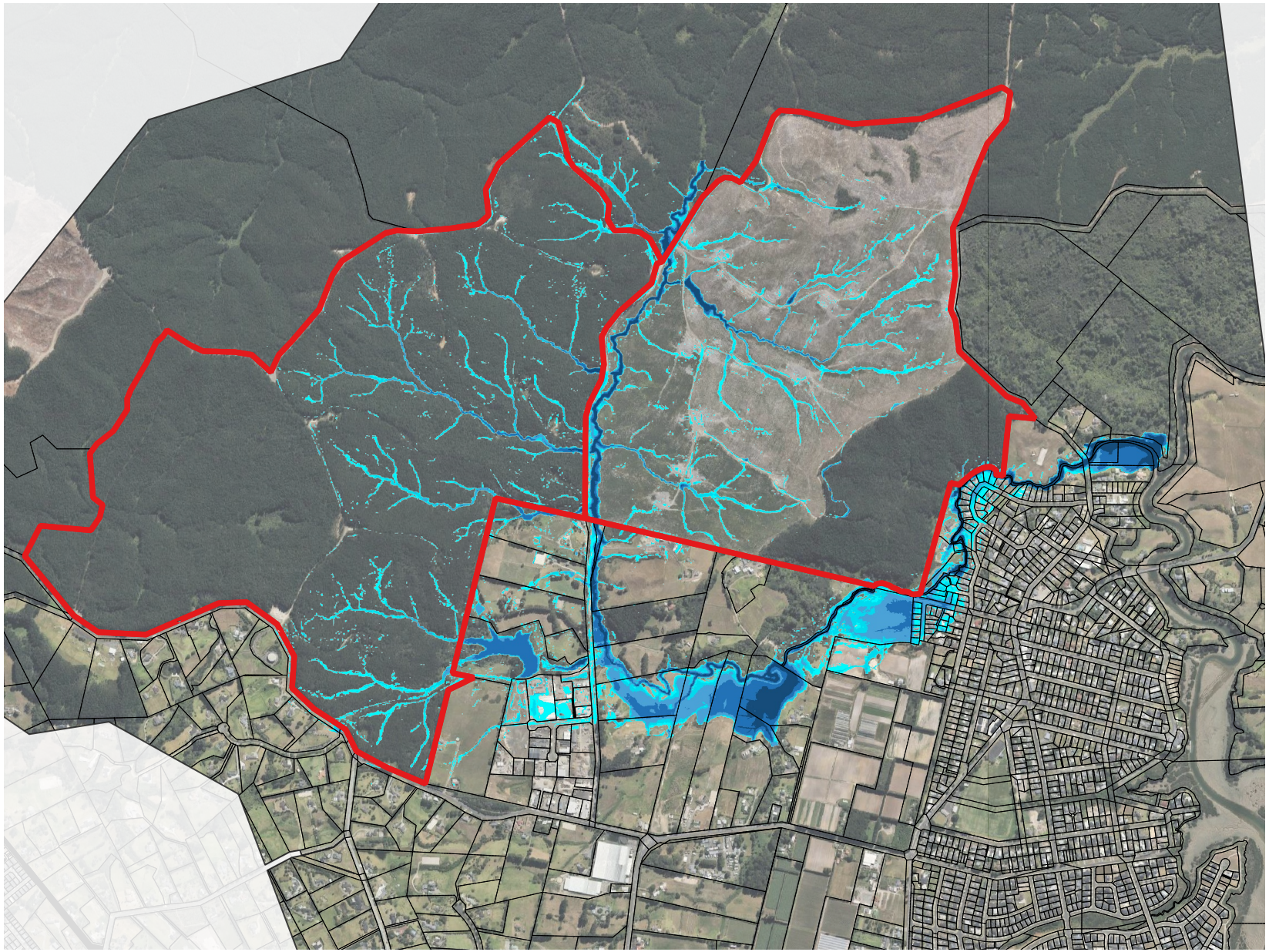
10%AEP Storm with (2.1 degree Climate Change) Depths Postdevelopment



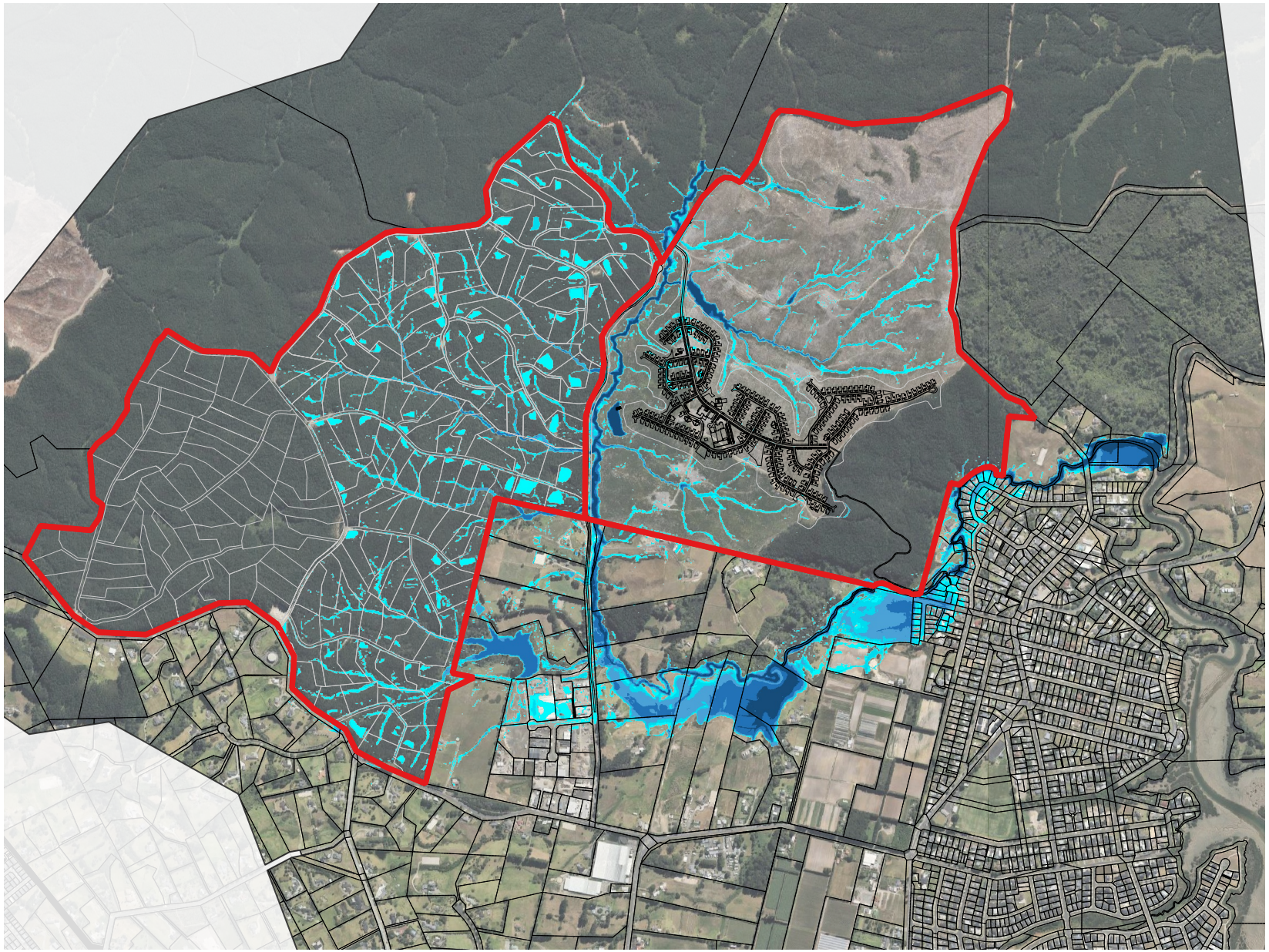
10%AEP Storm with (2.1 degree Climate Change)
Comparison of Water Surface Elevation for 10yrCC Post vs Pre



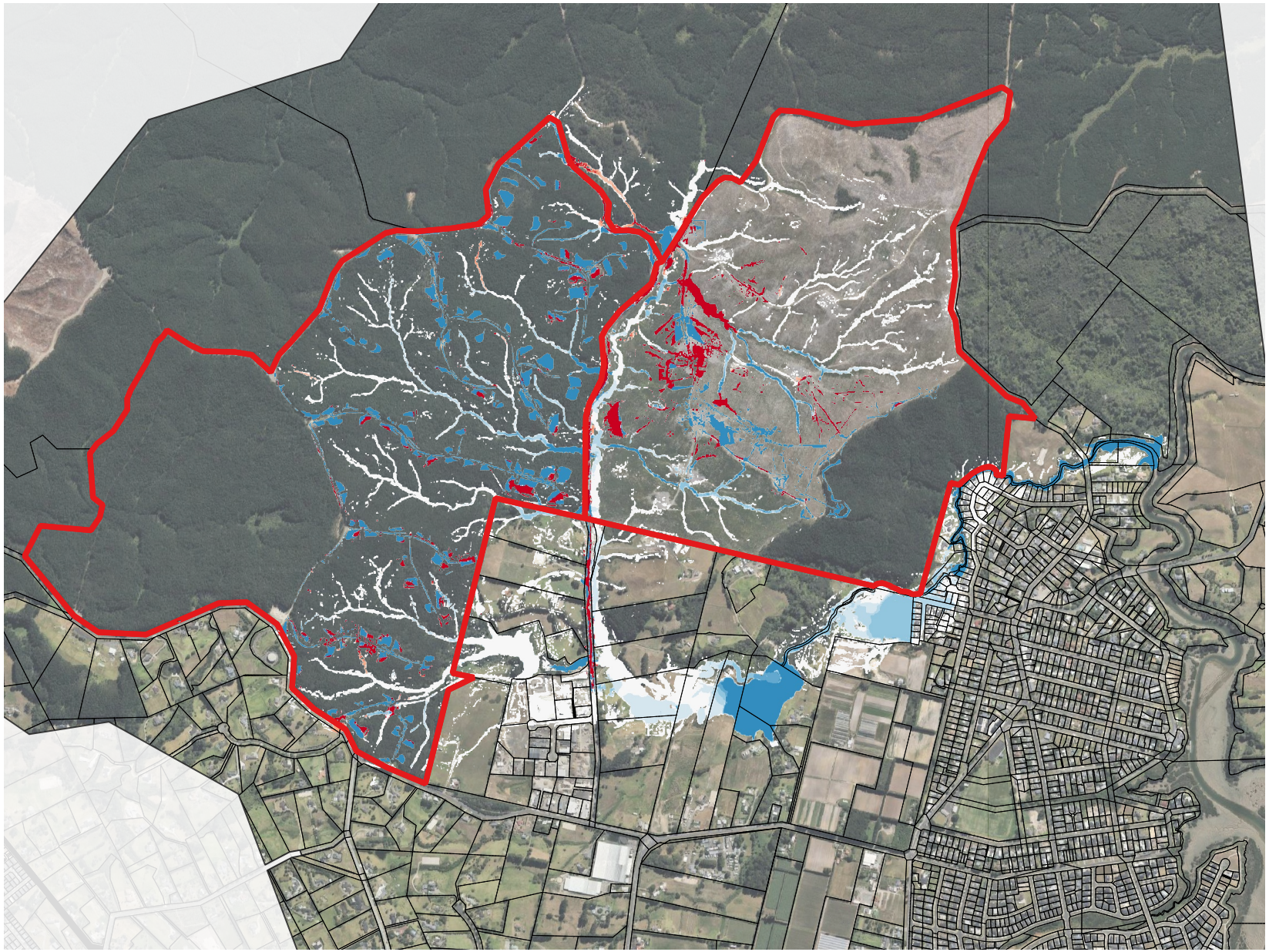
5%AEP Storm with (2.1 degree Climate Change) Depths Predevelopment



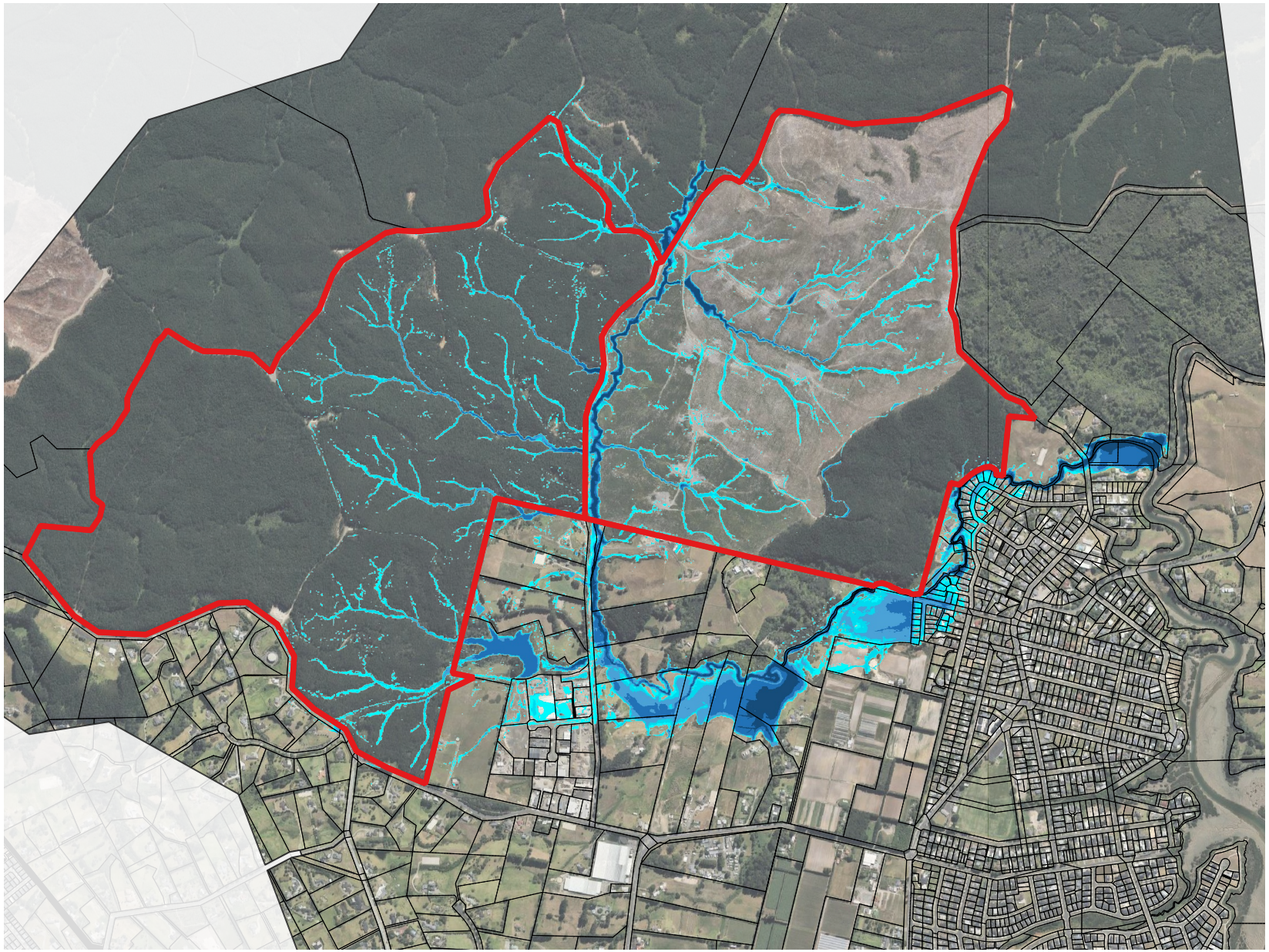
5%AEP Storm with (2.1 degree Climate Change) Depths Postdevelopment



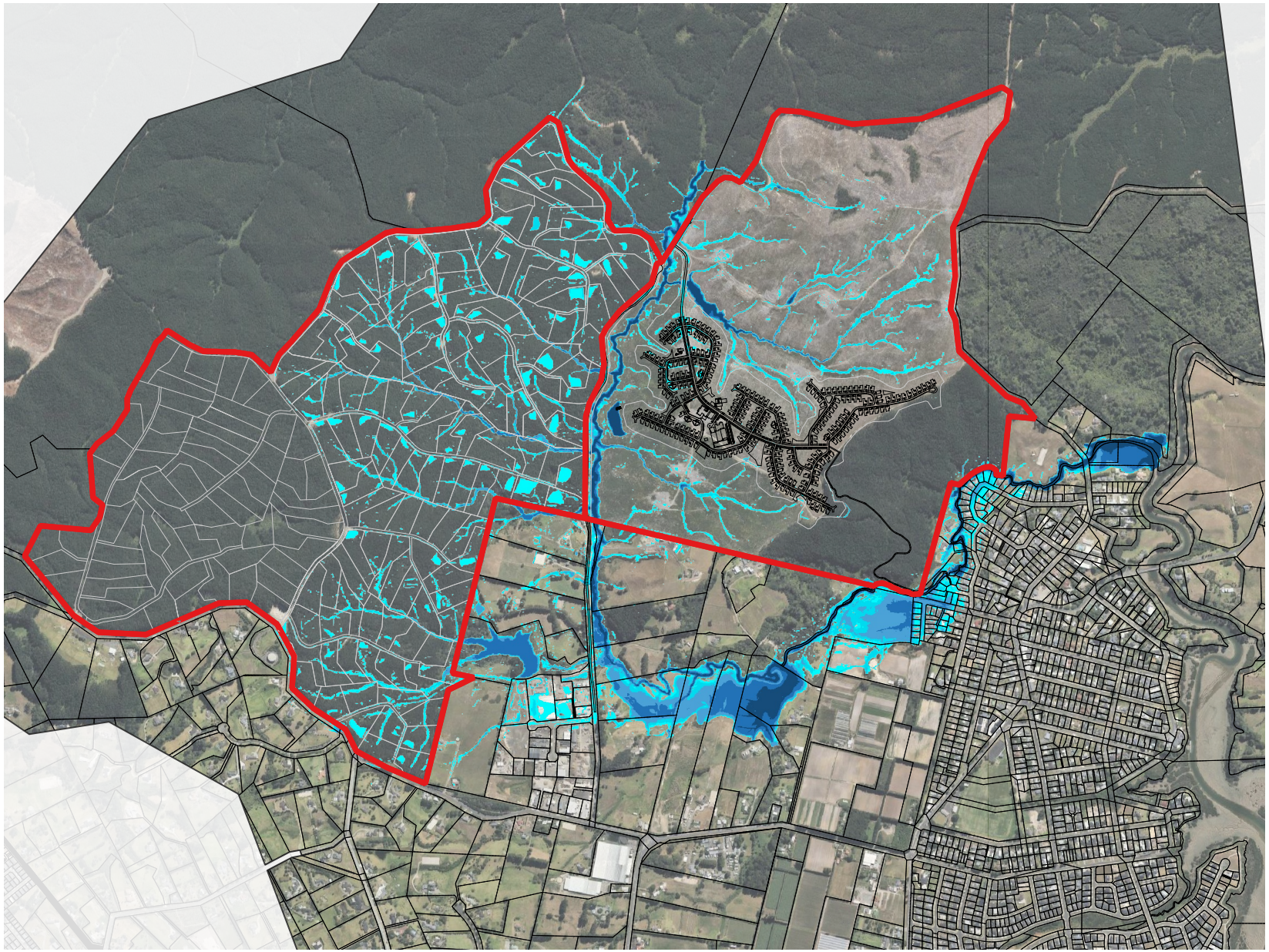
5%AEP Storm with (2.1 degree Climate Change)
Comparison of Water Surface Elevation for 5yrCC Post vs Pre



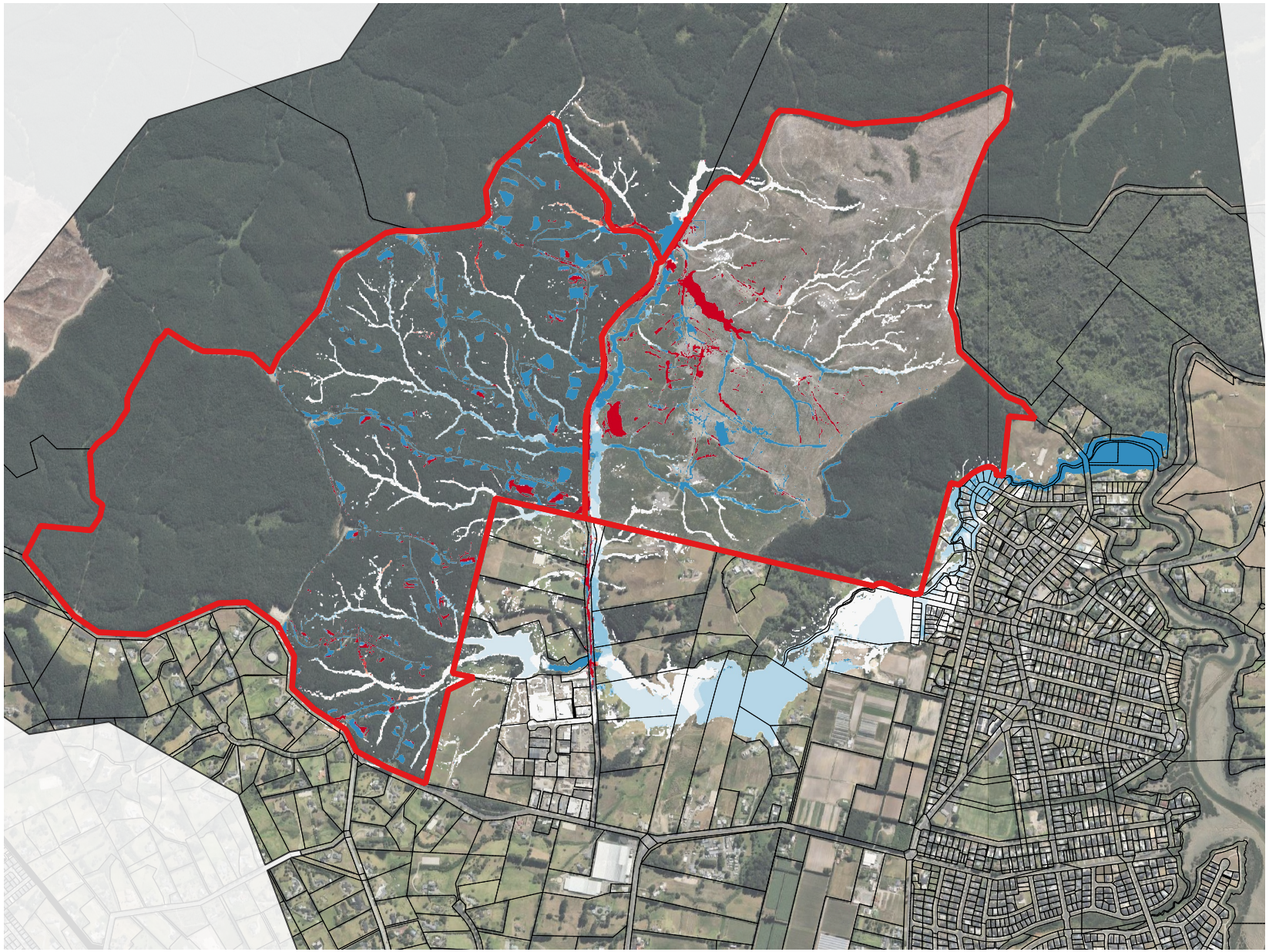
2%AEP Storm with (2.1 degree Climate Change) Depths Predevelopment



2%AEP Storm with (2.1 degree Climate Change) Depths Postdevelopment



2%AEP Storm with (2.1 degree Climate Change)
Comparison of Water Surface Elevation for 5yrCC Post vs Pre



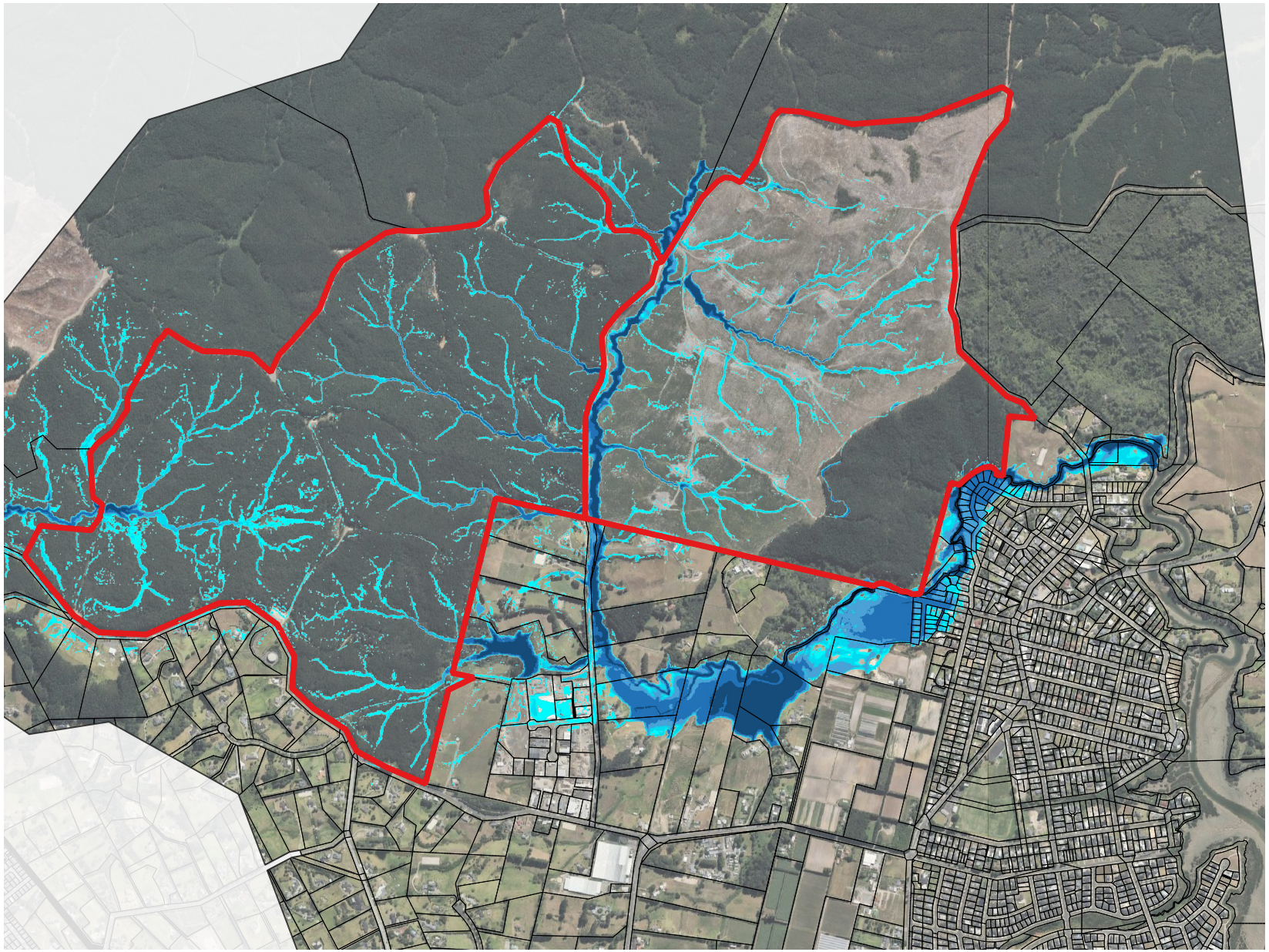
LEGEND

- Site Boundary
- Existing Boundaries

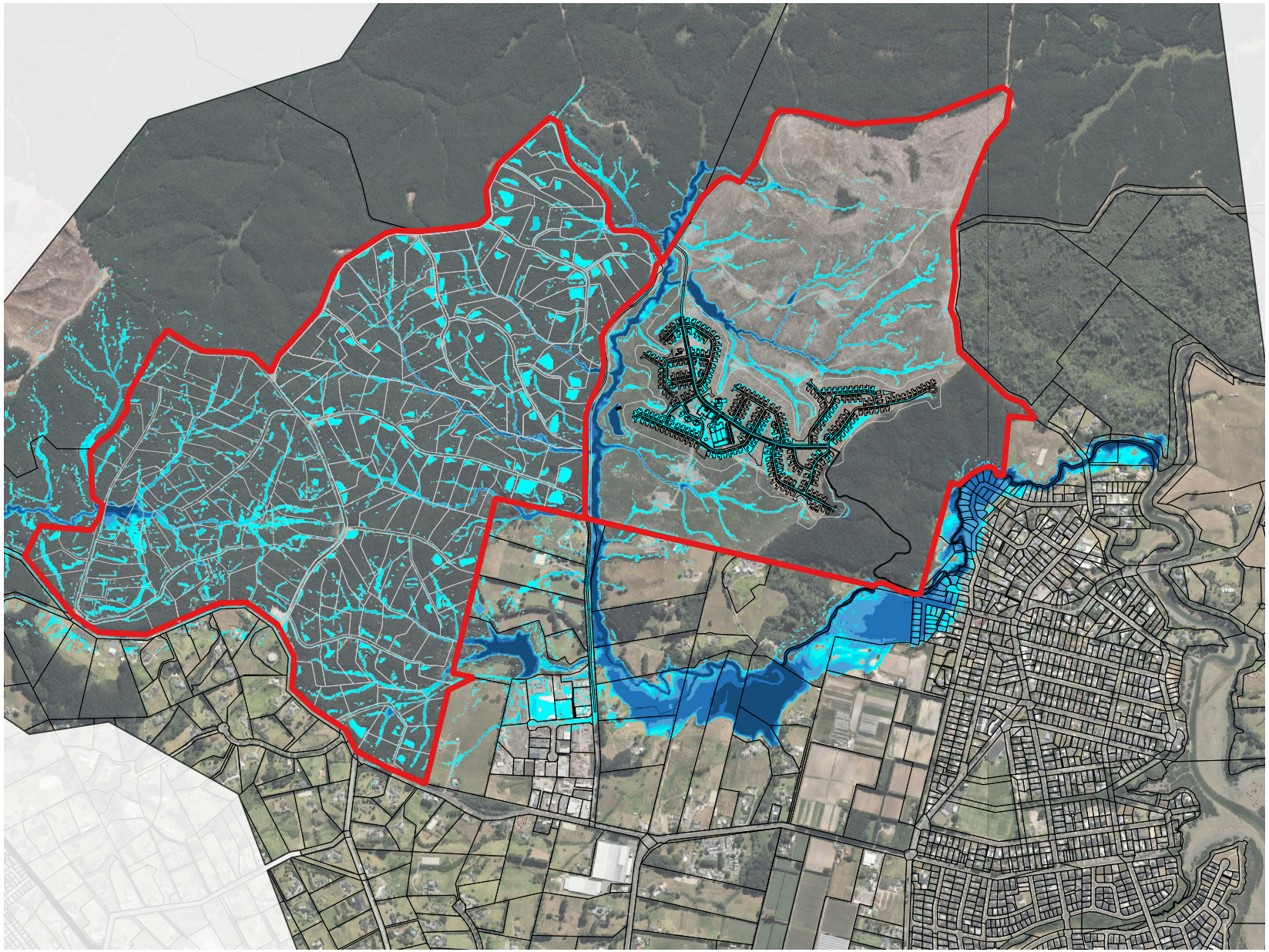
CompareWater Surface Elevation for 50yrCC Post vs Pre

- Decrease > 50mm
- Decrease 40mm - 50mm
- Decrease 30mm - 40mm
- Decrease 20mm - 30mm
- Decrease 10mm - 20mm
- Decrease 0mm - 10mm
- Increase 0mm - 10mm
- Increase 10mm - 20mm
- Increase 20mm - 30mm
- Increase 30mm - 40mm
- Increase 40mm - 50mm
- Increase > 50mm

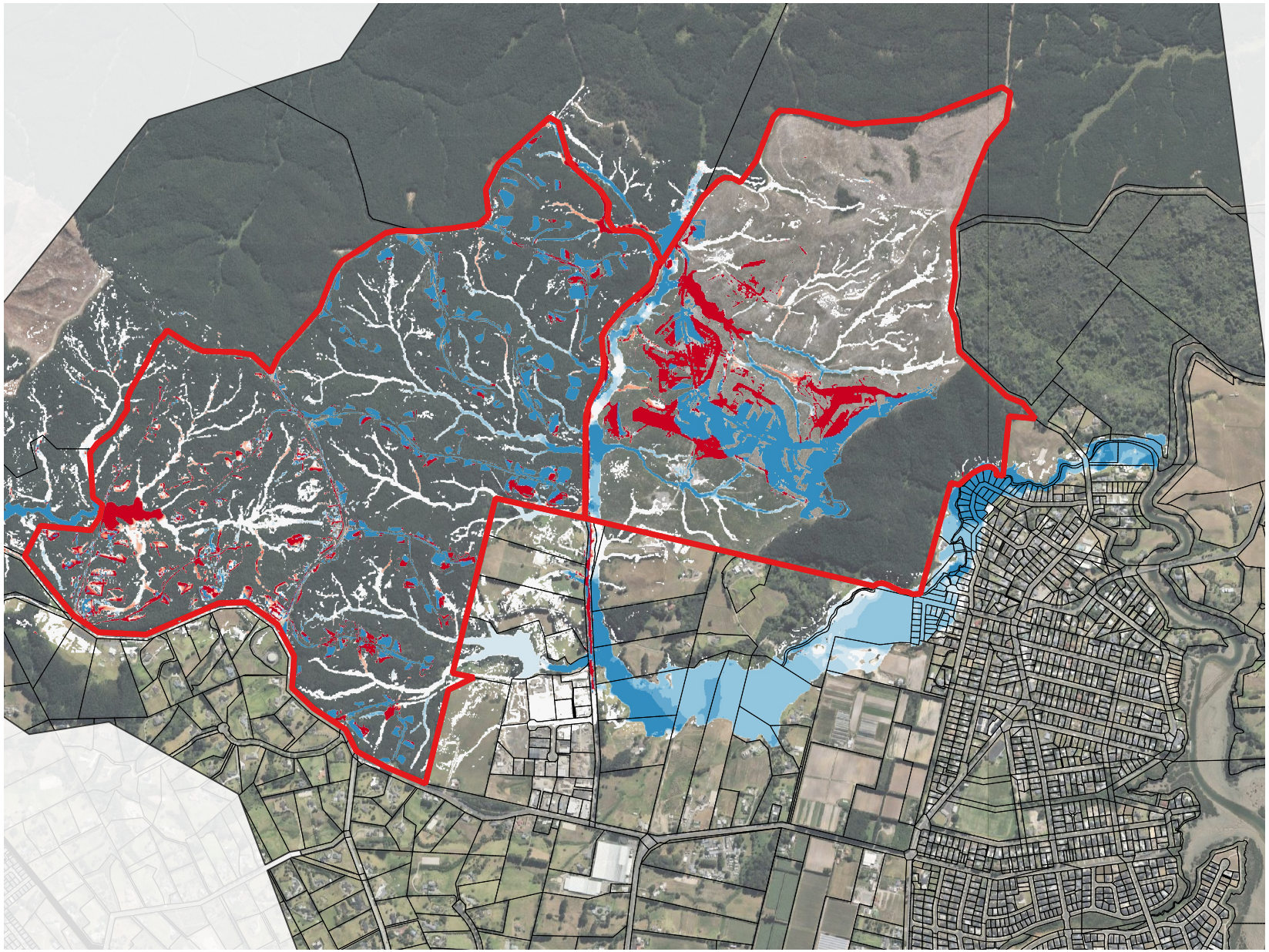
1%AEP Storm with (3.8 degree Climate Change) Depths Predevelopment



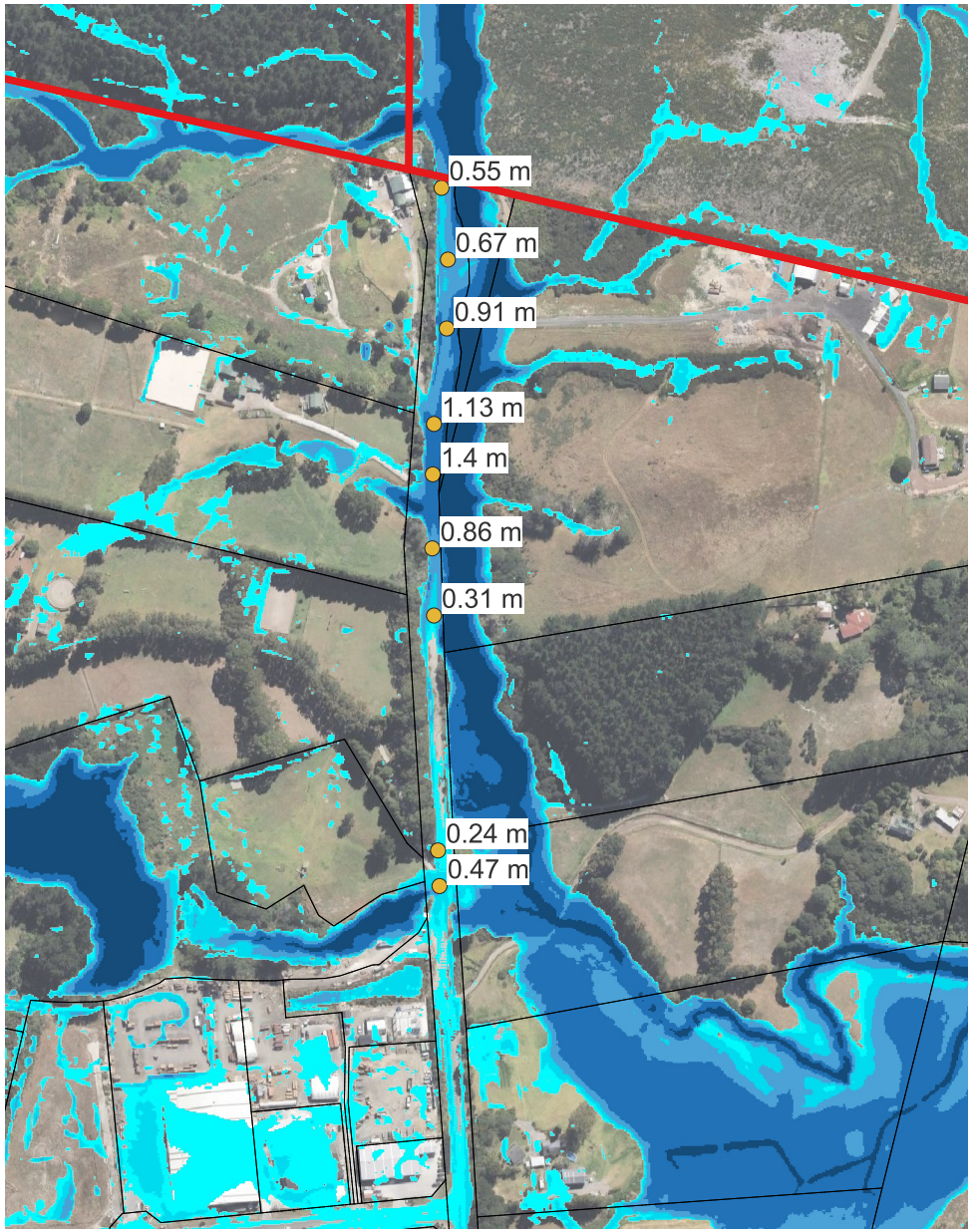
1%AEP Storm with (3.8 degree Climate Change) Depths Postdevelopment



1%AEP Storm with (3.8 degree Climate Change)
Comparison of Water Surface Elevation for 100yrCC Post vs Pre



1%AEP (ie 100yr) CC Depths Predevelopment (Forestry Road)



LEGEND

Site Boundary

Existing Boundaries

1%AEP (ie 100yr) CC
Flood Depths Predevelopment

200mm or less

200mm to 500mm

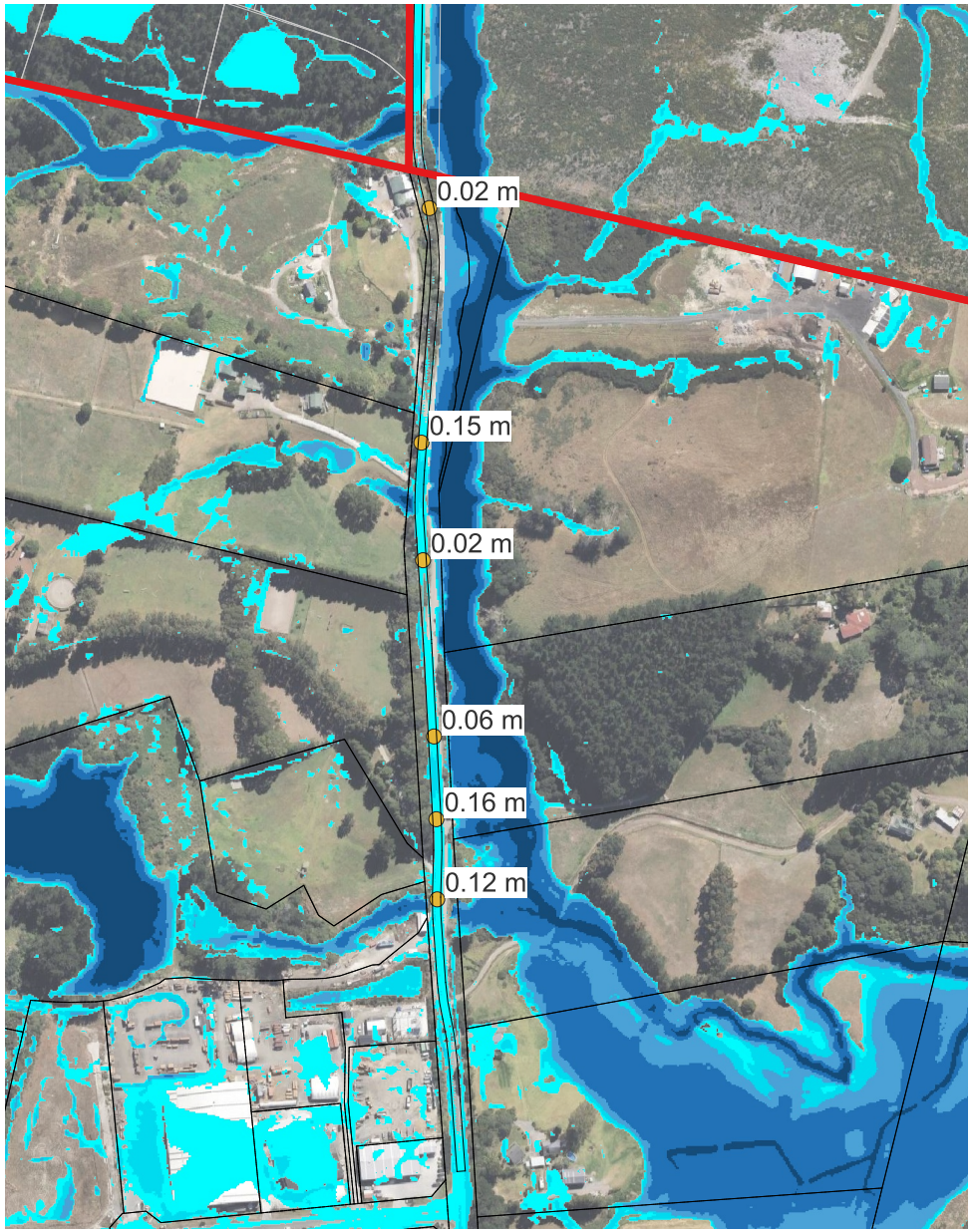
500mm to 1000mm

1000mm to 2000mm

2000mm or greater

100yrCC Predev Spot Depth

1%AEP (ie 100yr) CC Depths Postdevelopment (Forestry Road)



LEGEND

Site Boundary

Existing Boundaries

1%AEP (ie 100yr)CC
Flood Depths Postdevelopment

200mm or less

200mm to 500mm

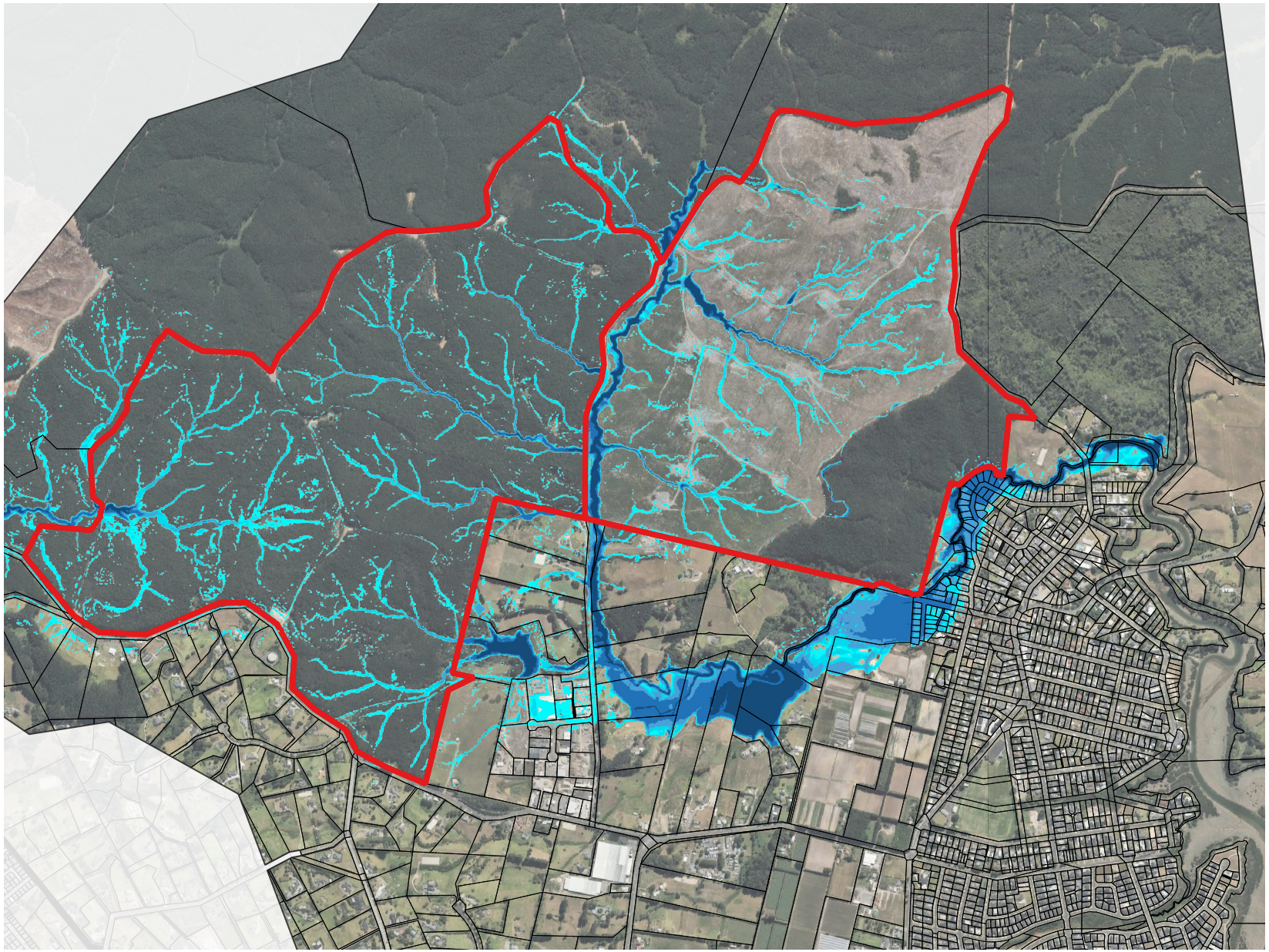
500mm to 1000mm

1000mm to 2000mm

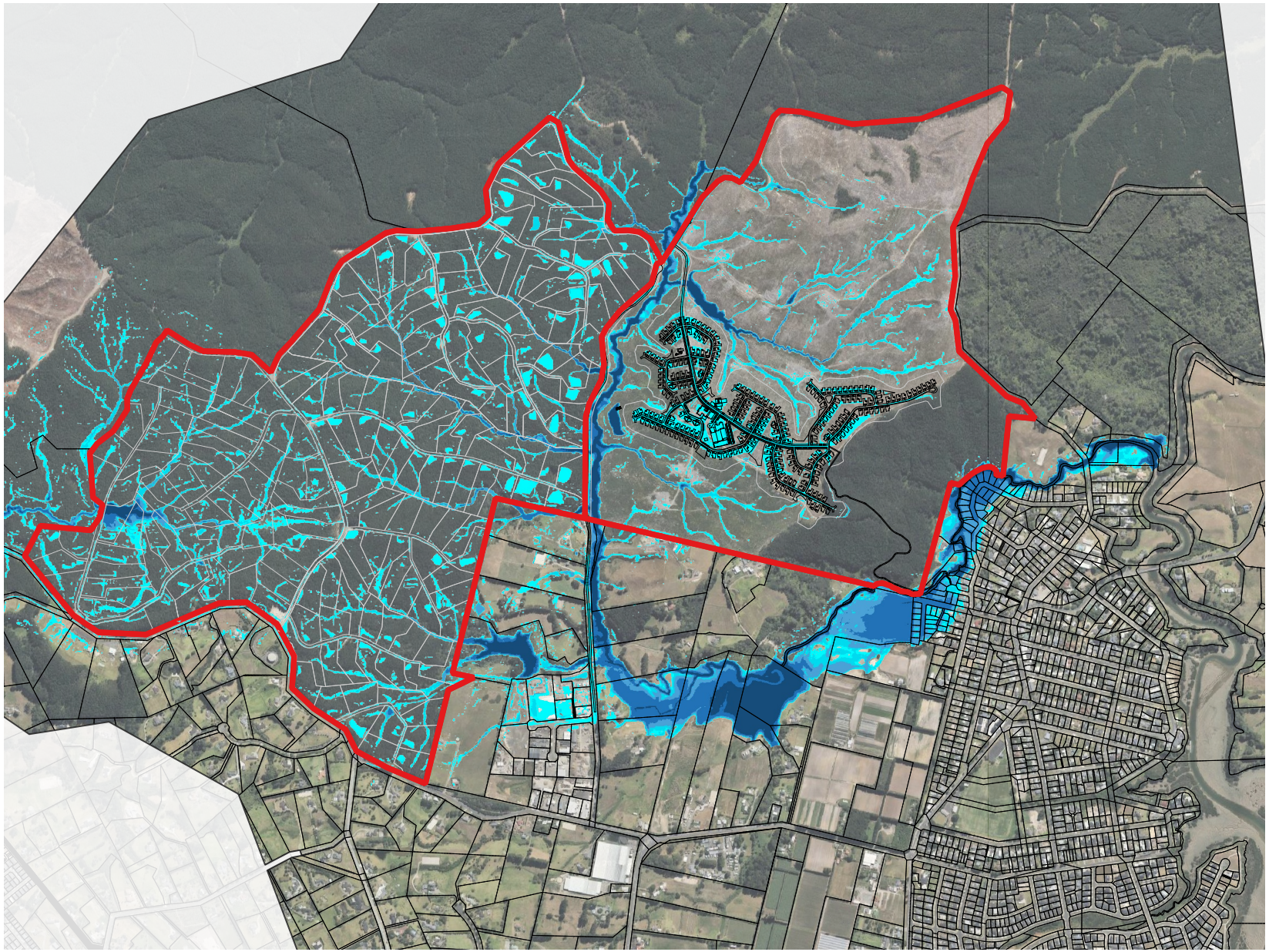
2000mm or greater

100yrCC Postdev Spot Depth

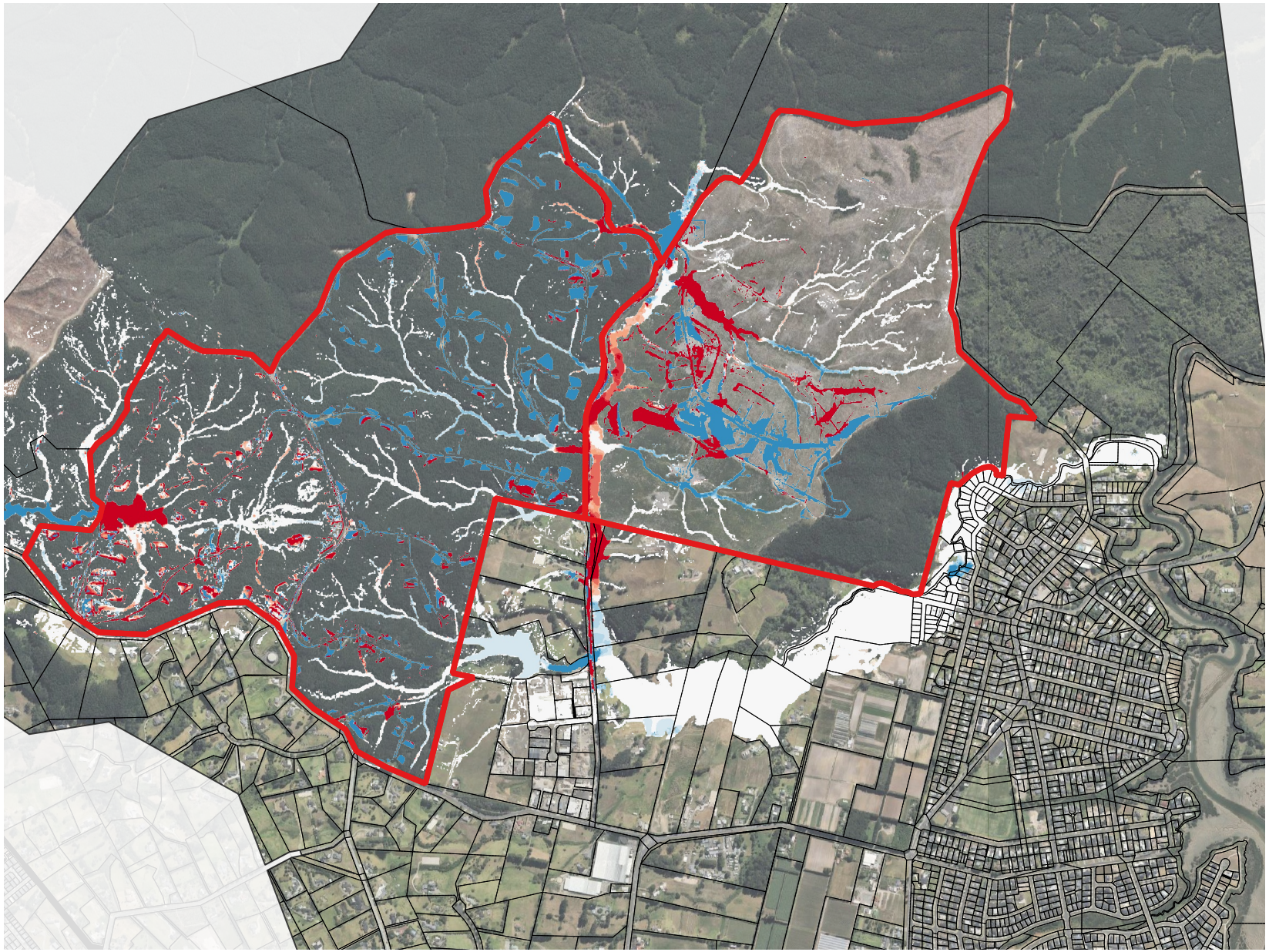
1%AEP Storm with (3.8 degree Climate Change) Depths Predevelopment (50%Blockage)



1%AEP Storm with (3.8 degree Climate Change) Depths Postdevelopment (50%Blockage)



1%AEP Storm with (3.8 degree Climate Change) (50%Blocked)
Comparison of Water Surface Elevation for 100yrCC Post vs Pre



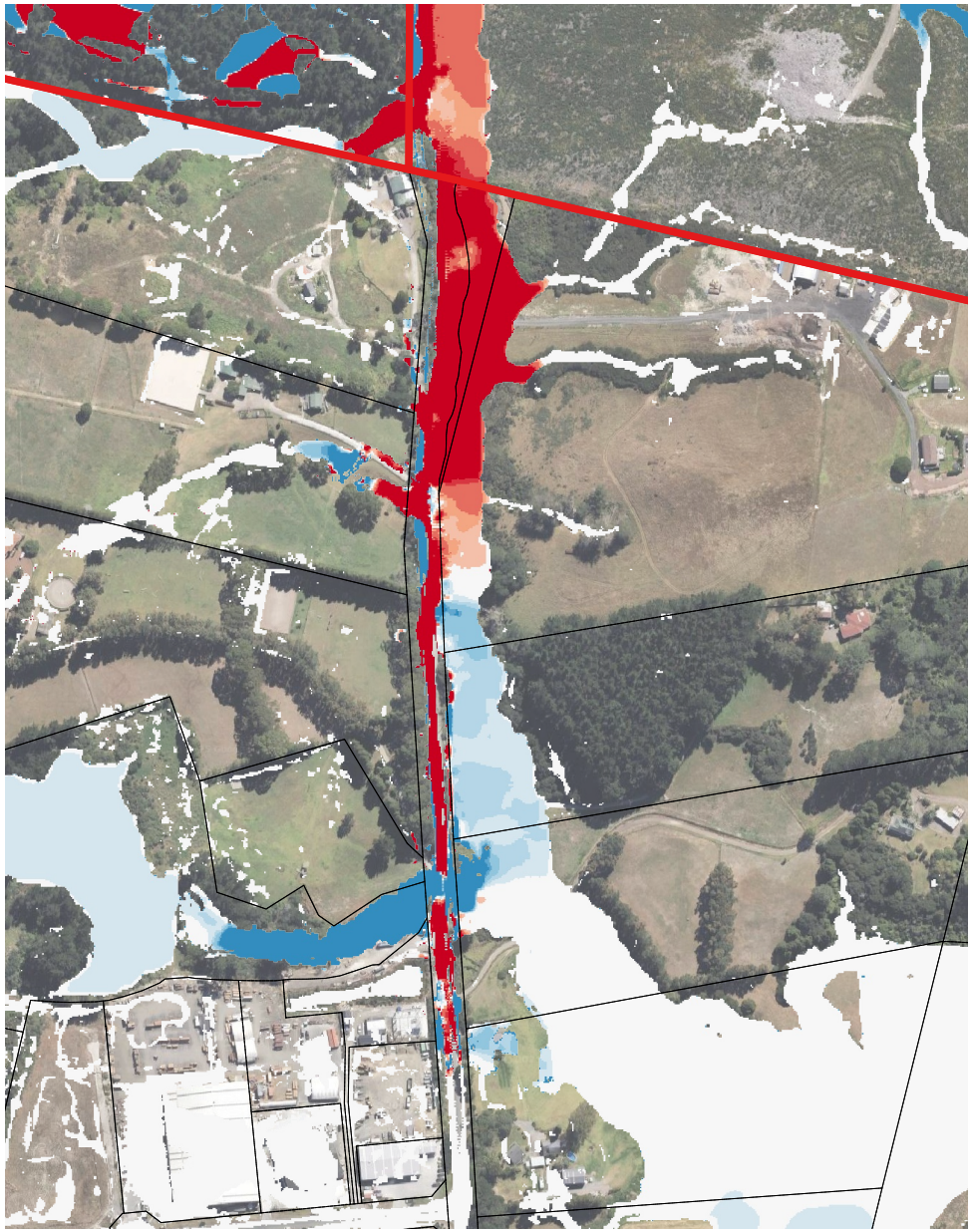
LEGEND

- Site Boundary
- Existing Boundaries

CompareWater Surface Elevation for 1%AEP (ie 100yr) CC Post vs Pre (50%Blocked)

- Decrease > 50mm
- Decrease 40mm - 50mm
- Decrease 30mm - 40mm
- Decrease 20mm - 30mm
- Decrease 10mm - 20mm
- Decrease 0mm - 10mm
- Increase 0mm - 10mm
- Increase 10mm - 20mm
- Increase 20mm - 30mm
- Increase 30mm - 40mm
- Increase 40mm - 50mm
- Increase > 50mm

1%AEP Storm with (3.8 degree Climate Change) (50%Blocked)
Comparison of Water Surface Elevation for 100yrCC Post vs Pre(Forestry Road)



LEGEND

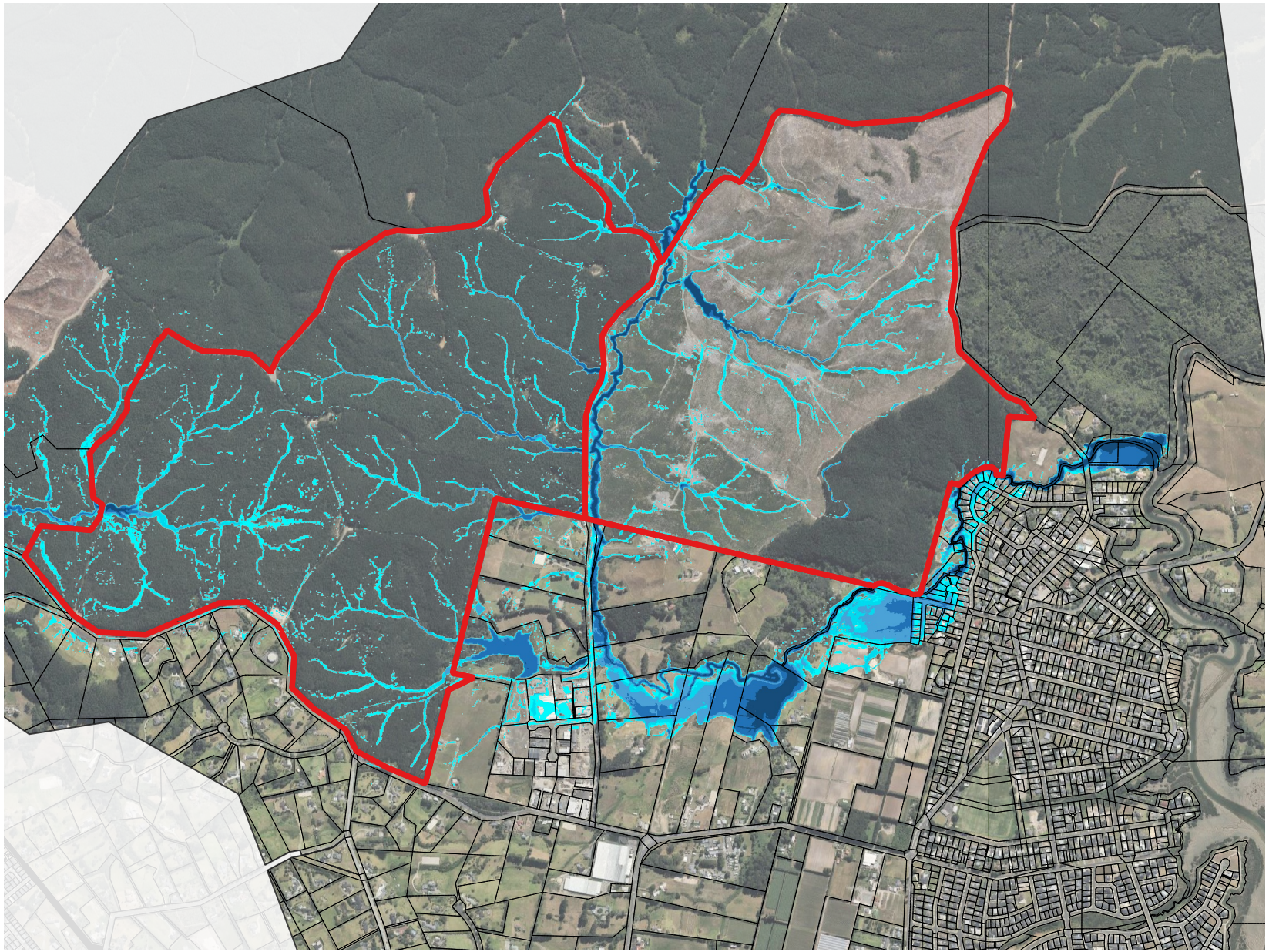
Site Boundary

Existing Boundaries

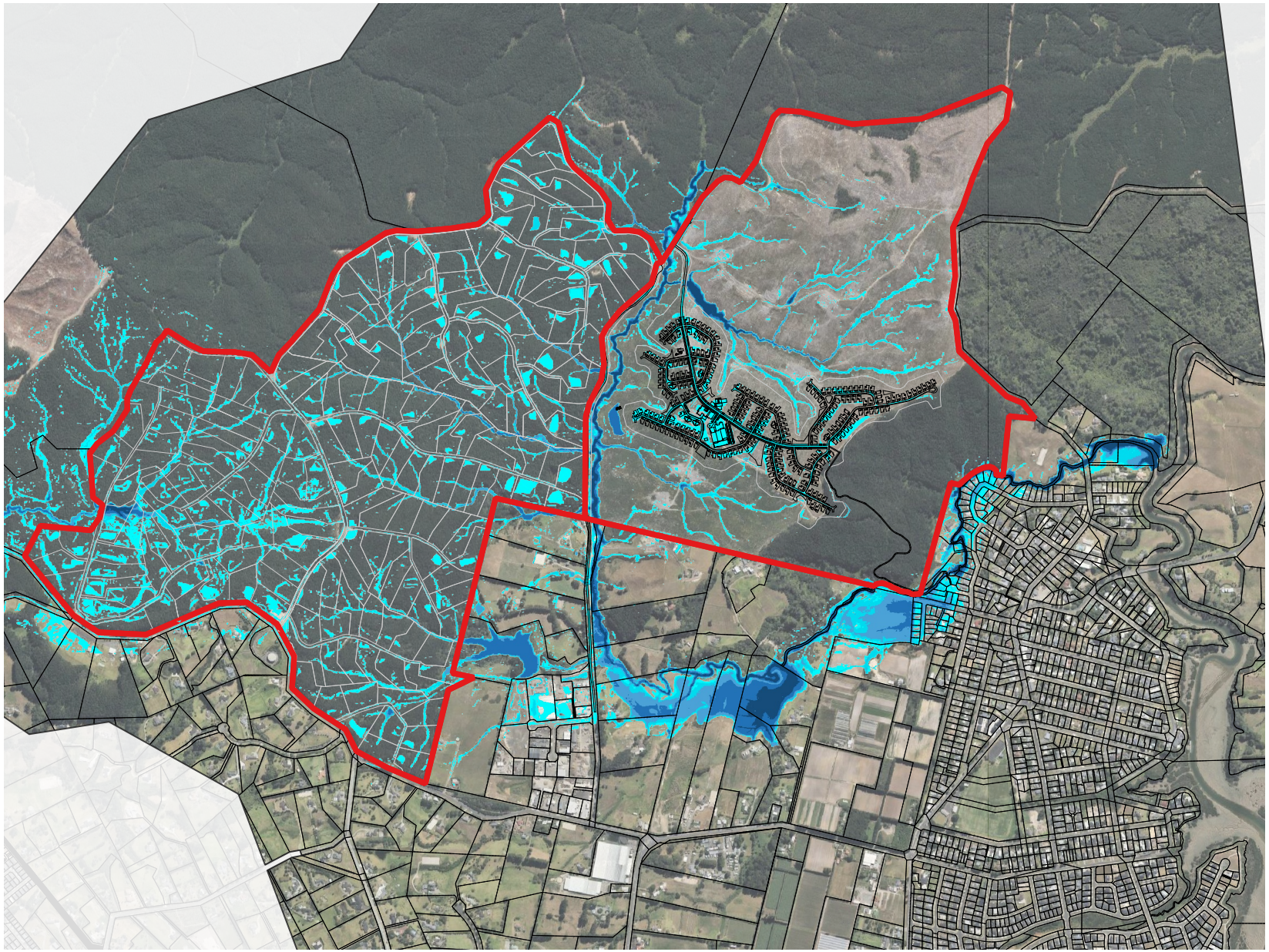
CompareWater Surface Elevation for 1%AEP (ie 100yr) CC Post vs Pre (50%Blocked)

- Decrease > 50mm
- Decrease 40mm - 50mm
- Decrease 30mm - 40mm
- Decrease 20mm - 30mm
- Decrease 10mm - 20mm
- Decrease 0mm - 10mm
- Increase 0mm - 10mm
- Increase 10mm - 20mm
- Increase 20mm - 30mm
- Increase 30mm - 40mm
- Increase 40mm - 50mm
- Increase > 50mm

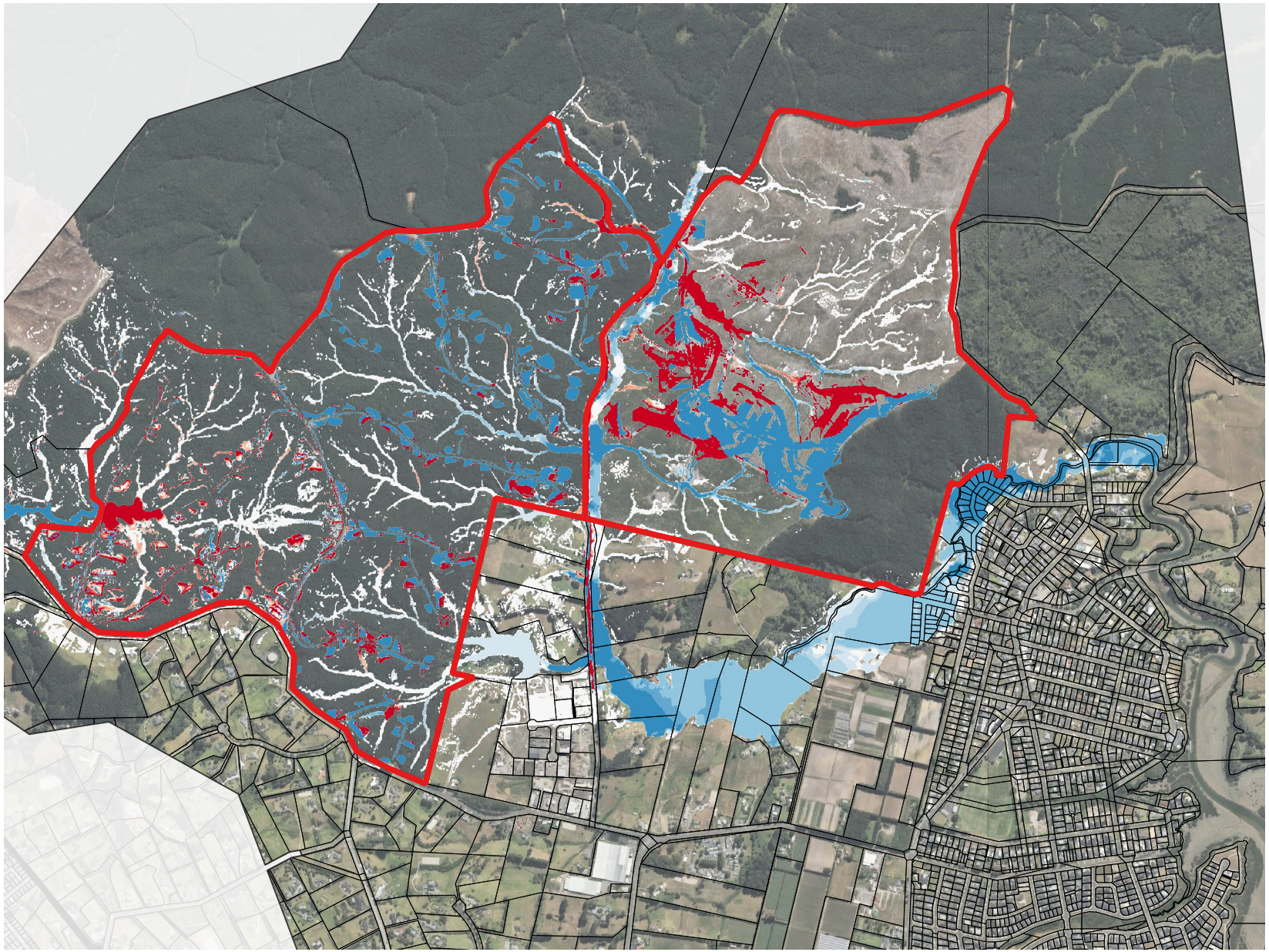
1%AEP Storm with (no Climate Change) Depths Predevelopment



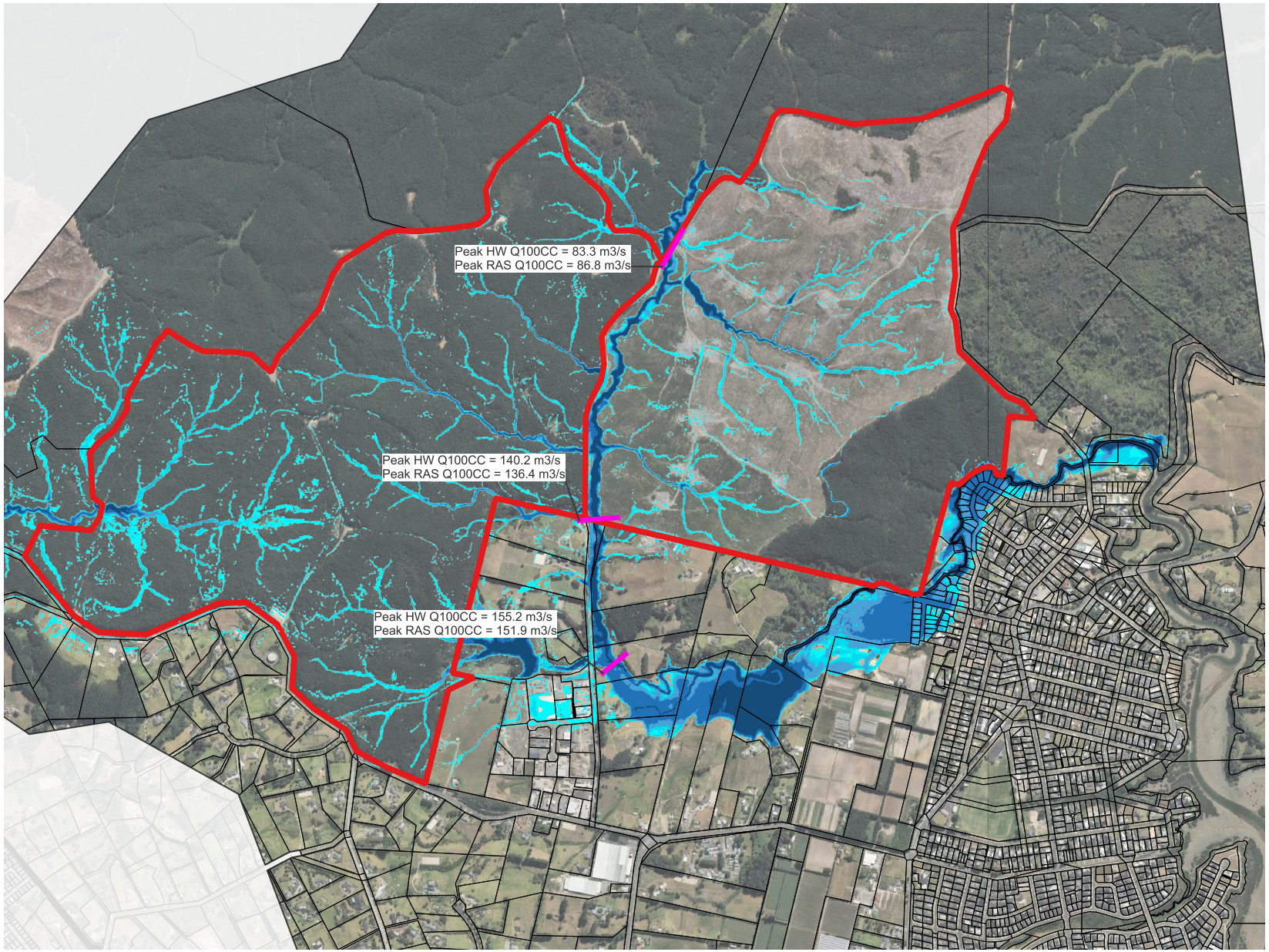
1%AEP Storm with (no Climate Change) Depths Postdevelopment



1%AEP Storm with (3.8 degree Climate Change)
Comparison of Water Surface Elevation for 100yrCC Post vs Pre



Peak Flow comparison (HW flow vs Maven flow) MPD 100yrCC

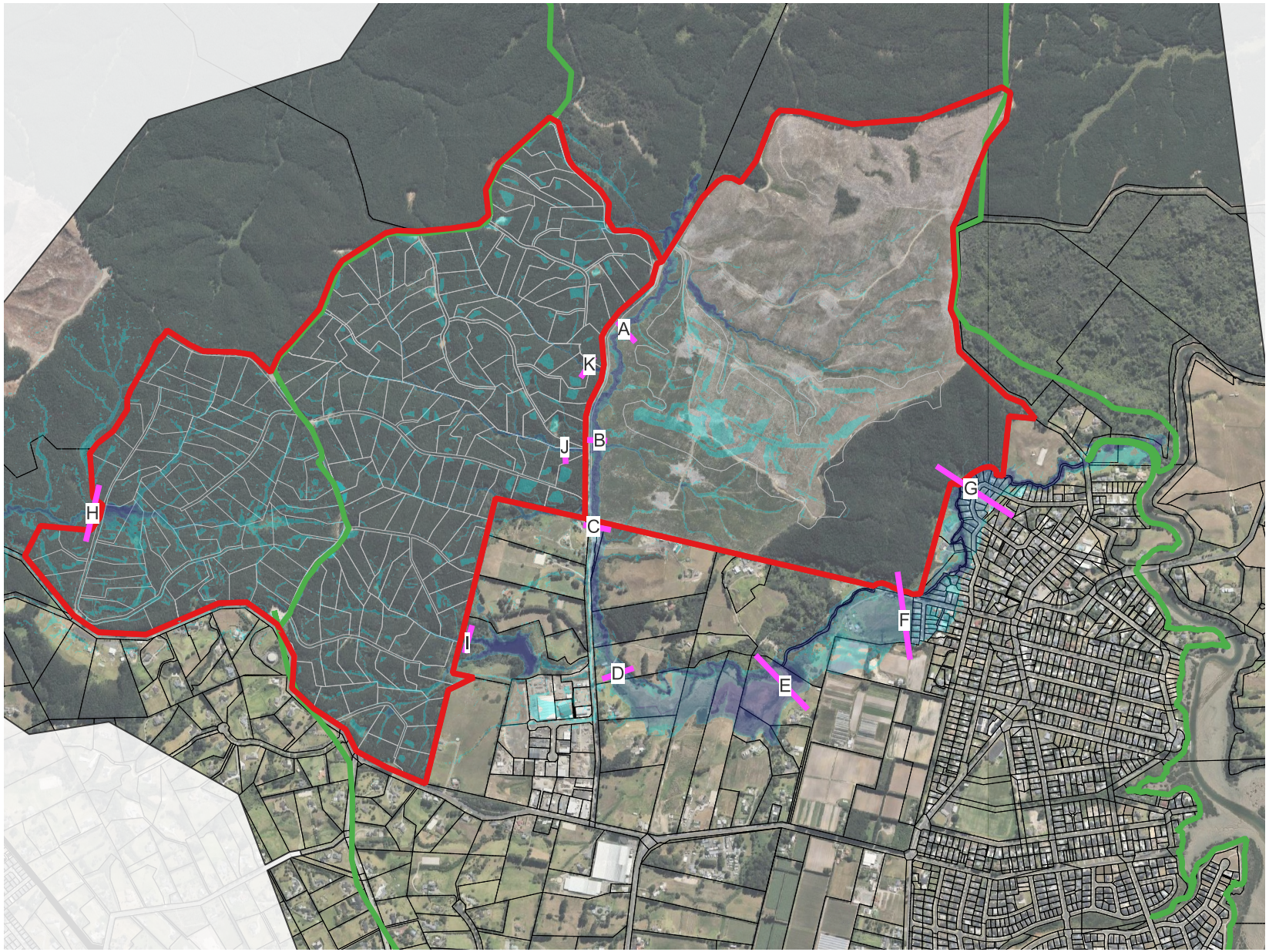


LEGEND

- Site Boundary
- Existing Boundaries
- HW XS

APPENDIX D – RESULTS – CRITICAL CROSS SECTIONS

Critical Sections



LEGEND

- Site Boundary
- Existing Boundaries

100yrCC Flood Depths
(for reference)

- Less than 200mm
- 200mm to 500mm
- 500mm to 1000mm
- 1000mm to 2000mm
- Greater than 2000mm

Cross section A

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	14.29	27.642
2	2yrCC	Post	12.97	27.556
3	10yrCC	Pre	39.12	28.906
4	10yrCC	Post	37.22	28.801
5	100yrCC	Pre	103.27	30.724
6	100yrCC	Post	94.19	30.670
7	100yrCC	Pre (50% Blocked)	103.44	30.726
8	100yrCC	Post (50% Blocked)	102.72	30.747
9	100yr	Pre	52.68	29.388
10	100yr	Post	49.44	29.307
11	5yrCC	Pre	29.70	28.422
12	5yrCC	Post	29.09	28.415
13	20yrCC	Pre	53.99	29.390
14	20yrCC	Post	50.63	29.274
15	50rCC	Pre	55.55	29.447
16	50rCC	Post	52.14	29.341

Cross section B

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	15.30	25.398
2	2yrCC	Post	14.03	25.317
3	10yrCC	Pre	42.94	26.435
4	10yrCC	Post	40.40	26.360
5	100yrCC	Pre	105.12	27.799
6	100yrCC	Post	106.34	27.723
7	100yrCC	Pre (50% Blocked)	105.69	27.805
8	100yrCC	Post (50% Blocked)	109.19	27.811
9	100yr	Pre	53.20	26.715
10	100yr	Post	51.62	26.655
11	5yrCC	Pre	31.10	26.087
12	5yrCC	Post	31.14	26.064
13	20yrCC	Pre	55.76	26.805
14	20yrCC	Post	53.27	26.731
15	50rCC	Pre	59.08	26.890
16	50rCC	Post	58.10	26.854

Cross section C

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	17.32	24.530
2	2yrCC	Post	15.59	24.465
3	10yrCC	Pre	49.69	25.330
4	10yrCC	Post	47.39	25.292
5	100yrCC	Pre	132.39	26.155
6	100yrCC	Post	126.93	26.157
7	100yrCC	Pre (50% Blocked)	133.81	26.159
8	100yrCC	Post (50% Blocked)	132.55	26.219
9	100yr	Pre	61.09	25.486
10	100yr	Post	59.16	25.469
11	5yrCC	Pre	36.09	25.075
12	5yrCC	Post	35.33	25.066
13	20yrCC	Pre	65.19	25.572
14	20yrCC	Post	62.49	25.535
15	50rCC	Pre	71.58	25.631
16	50rCC	Post	69.78	25.621

Cross section D

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	17.90	20.483
2	2yrCC	Post	16.34	20.463
3	10yrCC	Pre	49.52	21.114
4	10yrCC	Post	49.02	21.097
5	100yrCC	Pre	149.96	22.043
6	100yrCC	Post	142.52	21.989
7	100yrCC	Pre (50% Blocked)	150.32	22.048
8	100yrCC	Post (50% Blocked)	152.21	22.043
9	100yr	Pre	67.04	21.504
10	100yr	Post	64.21	21.494
11	5yrCC	Pre	37.61	20.908
12	5yrCC	Post	37.07	20.898
13	20yrCC	Pre	73.10	21.369
14	20yrCC	Post	69.98	21.337
15	50rCC	Pre	80.33	21.453
16	50rCC	Post	79.00	21.437

Cross section E

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	20.89	17.138
2	2yrCC	Post	19.63	17.075
3	10yrCC	Pre	54.77	18.153
4	10yrCC	Post	53.19	18.114
5	100yrCC	Pre	162.37	19.509
6	100yrCC	Post	155.73	19.467
7	100yrCC	Pre (50% Blocked)	162.91	19.512
8	100yrCC	Post (50% Blocked)	162.08	19.508
9	100yr	Pre	75.90	18.632
10	100yr	Post	73.92	18.591
11	5yrCC	Pre	42.15	17.829
12	5yrCC	Post	40.40	17.781
13	20yrCC	Pre	75.99	18.634
14	20yrCC	Post	73.87	18.593
15	50rCC	Pre	85.57	18.801
16	50rCC	Post	83.77	18.775

Cross section F

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	21.52	13.428
2	2yrCC	Post	20.31	13.390
3	10yrCC	Pre	56.12	14.063
4	10yrCC	Post	54.25	14.038
5	100yrCC	Pre	163.36	14.804
6	100yrCC	Post	158.80	14.775
7	100yrCC	Pre (50% Blocked)	163.73	14.807
8	100yrCC	Post (50% Blocked)	164.14	14.803
9	100yr	Pre	77.92	14.301
10	100yr	Post	75.85	14.282
11	5yrCC	Pre	42.75	13.859
12	5yrCC	Post	40.73	13.826
13	20yrCC	Pre	77.51	14.298
14	20yrCC	Post	75.49	14.281
15	50rCC	Pre	87.24	14.377
16	50rCC	Post	85.43	14.365

Cross section G

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	22.29	5.502
2	2yrCC	Post	21.10	5.446
3	10yrCC	Pre	57.21	6.736
4	10yrCC	Post	55.66	6.685
5	100yrCC	Pre	159.39	8.617
6	100yrCC	Post	155.53	8.558
7	100yrCC	Pre (50% Blocked)	159.82	8.622
8	100yrCC	Post (50% Blocked)	160.01	8.613
9	100yr	Pre	79.88	7.361
10	100yr	Post	77.97	7.281
11	5yrCC	Pre	43.60	6.308
12	5yrCC	Post	41.80	6.243
13	20yrCC	Pre	78.16	7.349
14	20yrCC	Post	76.26	7.301
15	50rCC	Pre	88.09	7.561
16	50rCC	Post	86.60	7.529

Cross section H

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yr	Pre	2.43	56.72
2	2yr	Post	2.30	56.72
3	10yr	Pre	7.69	57.55
4	10yr	Post	7.75	57.40
5	100yrCC	Pre	32.56	57.82
7	100yrCC	Post	27.94	58.62
8	100yrCC	Pre (50% Blocked)	20.20	57.82
9	100yrCC	Post (50% Blocked)	11.19	59.24
10	100yr	Pre	20.70	57.69
11	100yr	Post	17.44	57.60

Cross section I

Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	1.30	32.482
2	2yrCC	Post	1.18	32.465
3	10yrCC	Pre	4.93	33.002
4	10yrCC	Post	3.28	32.996
5	100yrCC	Pre	8.13	33.442
6	100yrCC	Post	7.83	33.427
7	100yrCC	Pre (50% Blocked)	8.13	33.442
8	100yrCC	Post (50% Blocked)	7.83	33.427
9	100yr	Pre	4.46	33.183
10	100yr	Post	4.24	33.174
11	5yrCC	Pre	2.61	32.907
12	5yrCC	Post	2.37	32.907
13	20yrCC	Pre	4.48	33.113
14	20yrCC	Post	4.19	33.105
15	50rCC	Pre	5.68	33.226
16	50rCC	Post	5.31	33.214

Cross section J

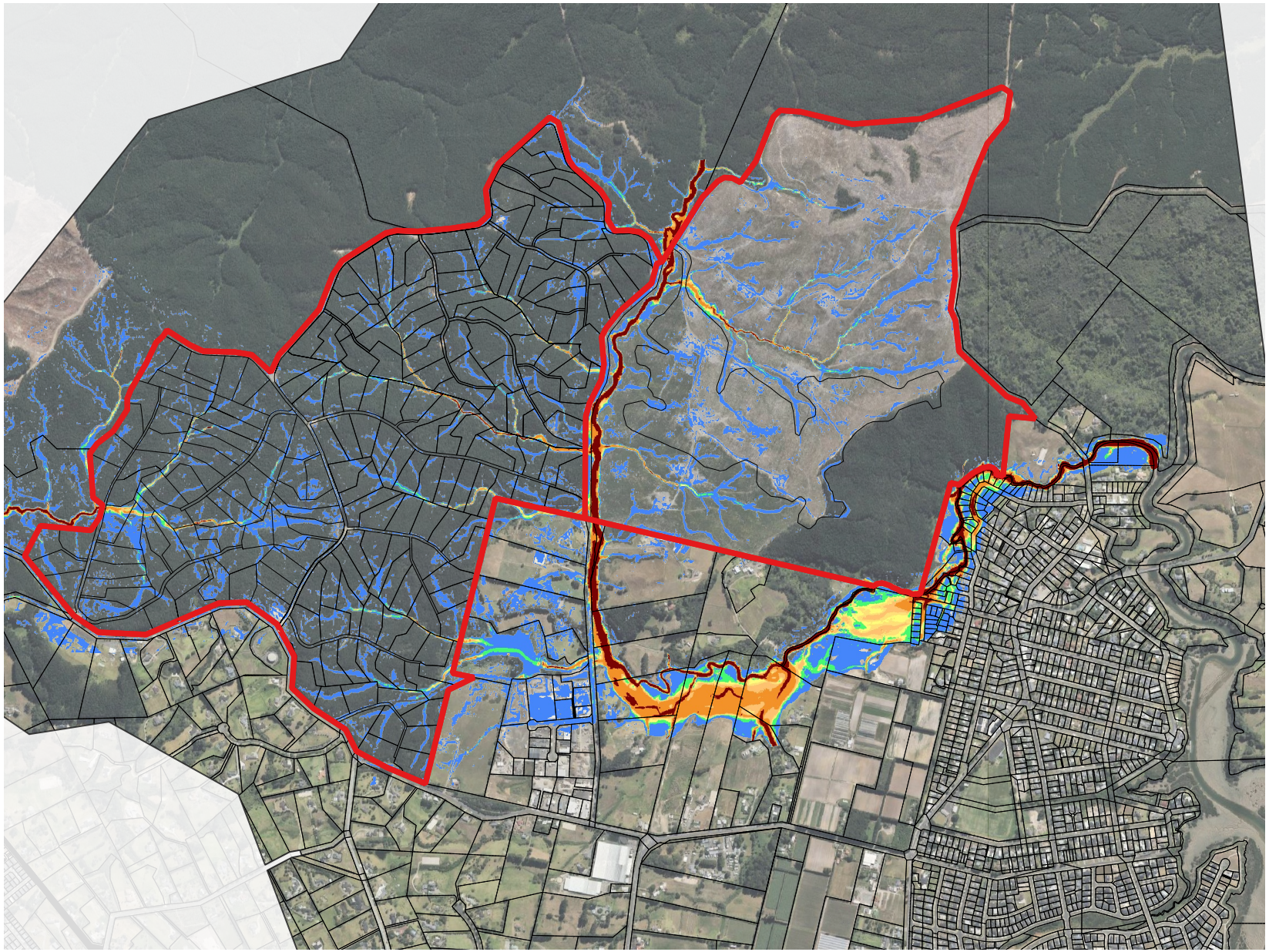
Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	3.19	27.915
2	2yrCC	Post	2.95	27.121
3	10yrCC	Pre	7.06	28.128
4	10yrCC	Post	6.64	27.429
5	100yrCC	Pre	16.24	28.492
6	100yrCC	Post	15.30	28.075
7	100yrCC	Pre (50% Blocked)	16.24	28.489
8	100yrCC	Post (50% Blocked)	14.92	28.609
9	100yr	Pre	8.93	28.238
10	100yr	Post	8.47	27.589
11	5yrCC	Pre	5.70	28.054
12	5yrCC	Post	5.30	27.318
13	20yrCC	Pre	8.80	28.226
14	20yrCC	Post	8.35	27.579
15	50rCC	Pre	11.10	28.321
16	50rCC	Post	10.36	27.724

Cross section K

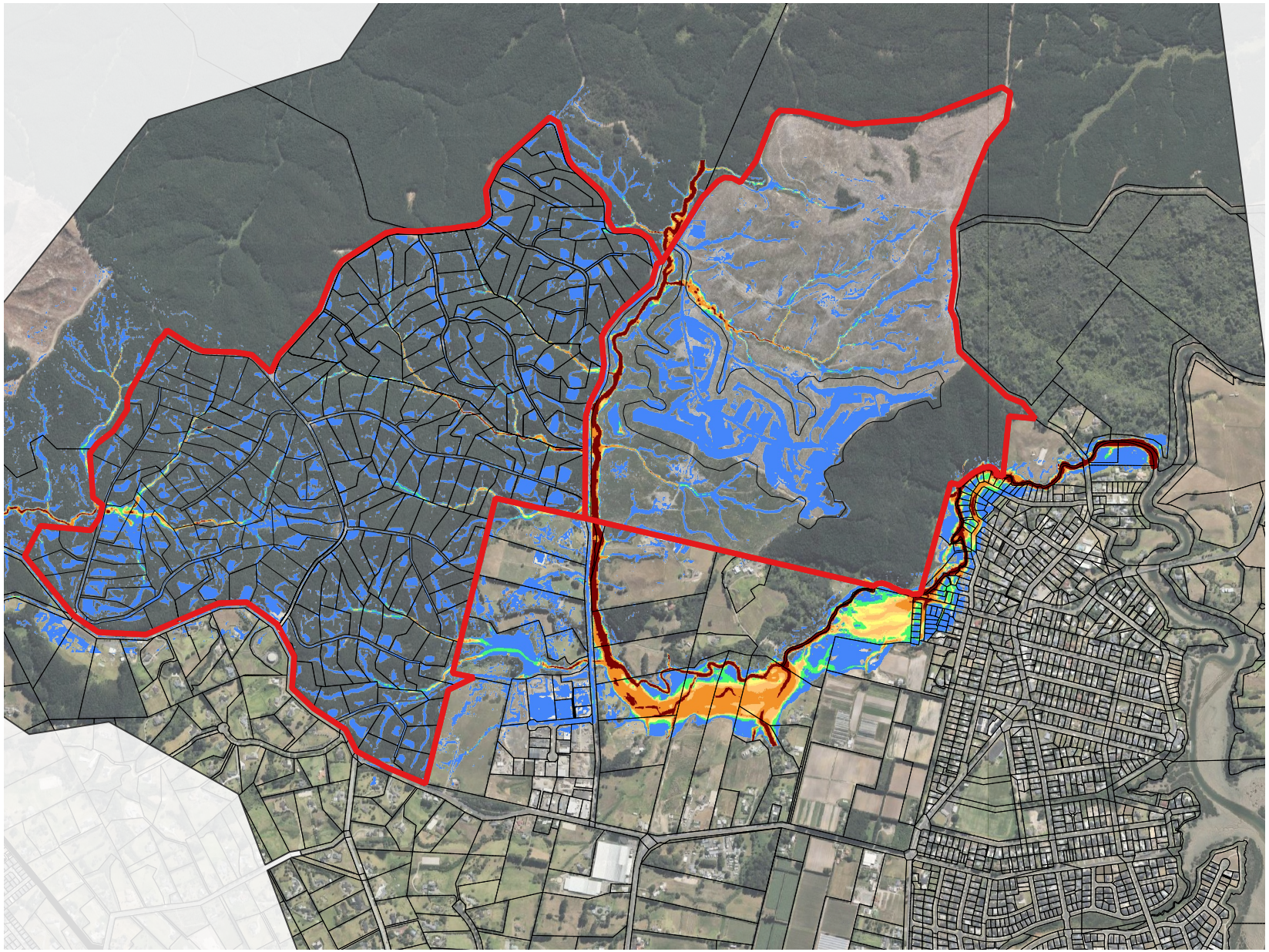
Scenario	Rainfall	Development	Flowrate (m3/s)	Flood level (mRL)
1	2yrCC	Pre	1.01	32.454
2	2yrCC	Post	1.09	30.875
3	10yrCC	Pre	2.89	32.703
4	10yrCC	Post	2.69	31.036
5	100yrCC	Pre	7.71	32.977
6	100yrCC	Post	7.20	31.943
7	100yrCC	Pre (50% Blocked)	7.71	32.977
8	100yrCC	Post (50% Blocked)	6.56	32.935
9	100yr	Pre	4.17	32.810
10	100yr	Post	3.90	31.173
11	5yrCC	Pre	2.09	32.636
12	5yrCC	Post	1.99	30.975
13	20yrCC	Pre	4.08	32.782
14	20yrCC	Post	3.82	31.174
15	50rCC	Pre	5.32	32.851
16	50rCC	Post	4.99	31.359

APPENDIX E – RESULTS – DEPTH VELOCITY MAPS

1%AEP Storm with (3.8 degree Climate Change) (50%Blocked)
Pre development Depth Velocity



1%AEP Storm with (3.8 degree Climate Change) (50%Blocked)
Post development Depth Velocity



LEGEND

Site Boundary

Existing Boundaries

DepthVelocity 100yrCC(50%Blocked)Post

<= 0.4

0.4 - 0.6

0.6 - 0.7

0.7 - 0.8

0.8 - 1.0

1.0 - 2.0

> 2.0

Appendix F – E36 Assessment

E36 Natural Hazards Flood Risk Assessment Table 2

E36.3 Policy Assessment	Assessment
a) The type, frequency and scale of the natural hazard and whether adverse effects on the development will be temporary or permanent;	The main risk to the development is flooding in the 1%AEP storm event. The 1% AEP+ CC design storm event is very infrequent, with associated flooding effects being temporary in nature. Although this will be mitigated onsite it won't remove the hazard completely from the site, but the flooding with be controlled through onsite channellisation along road and swales. All lots will have no flooding issues.
b) The type of activity being undertaken and its vulnerability to natural hazard events;	Master planned development. Habitable spaces, Community Facilities and Commercials spaces are vulnerable to natural hazards without appropriate mitigation.
c) The consequences of a natural hazard event in relation to the proposed activity;	The consequences would be flooding and potential loss of property unless proper mitigations are provided.
d) The potential effects on public safety and other property;	Flooding could be a risk to public safety by restricting movement and damaging property.
e) Any exacerbation of an existing natural hazard risk or the emergence of natural hazard risks that previously were not present at the location;	A flood assessment has been undertaken for the development. No exacerbation of existing natural hazards or create of new were identified. Flood shall be managed on the site via attenuation
f) whether any building, structure or activity located on land subject to natural hazards near the coast can be relocated in the event of severe coastal erosion, inundation or shoreline retreat;	There are no coastal areas within the site.
g) The ability to use non-structural solutions, such as planting or the retention or enhancement of natural landform buffers to avoid, remedy or mitigate hazards, rather than hard protection structures;	Covenant planting has been proposed for the balance of Lot 1 area which is not developed.
h) The design and construction of buildings and structures to mitigate the effects of natural hazards;	No buildings will be proposed to mitigate the flooding hazard.
i) The effect of structures used to mitigate hazards on landscape values and public access;	The use of two proposed road culverts and a stormwater dry pond minimises the impact of the mitigation strategy on land scape value and public access.

j) Site layout and management to avoid or mitigate the adverse effects of natural hazards, including access and exit during a natural hazard event.	The design of the development aligns with the council code of practise which stipulates egress routes, flow depths, flow velocities and freeboard requirements.
k) The duration of consent and how this may limit the exposure for more or less vulnerable activities to the effects of natural hazards including the likely effects of climate change.	The effects of climate change have been included in the assessment.