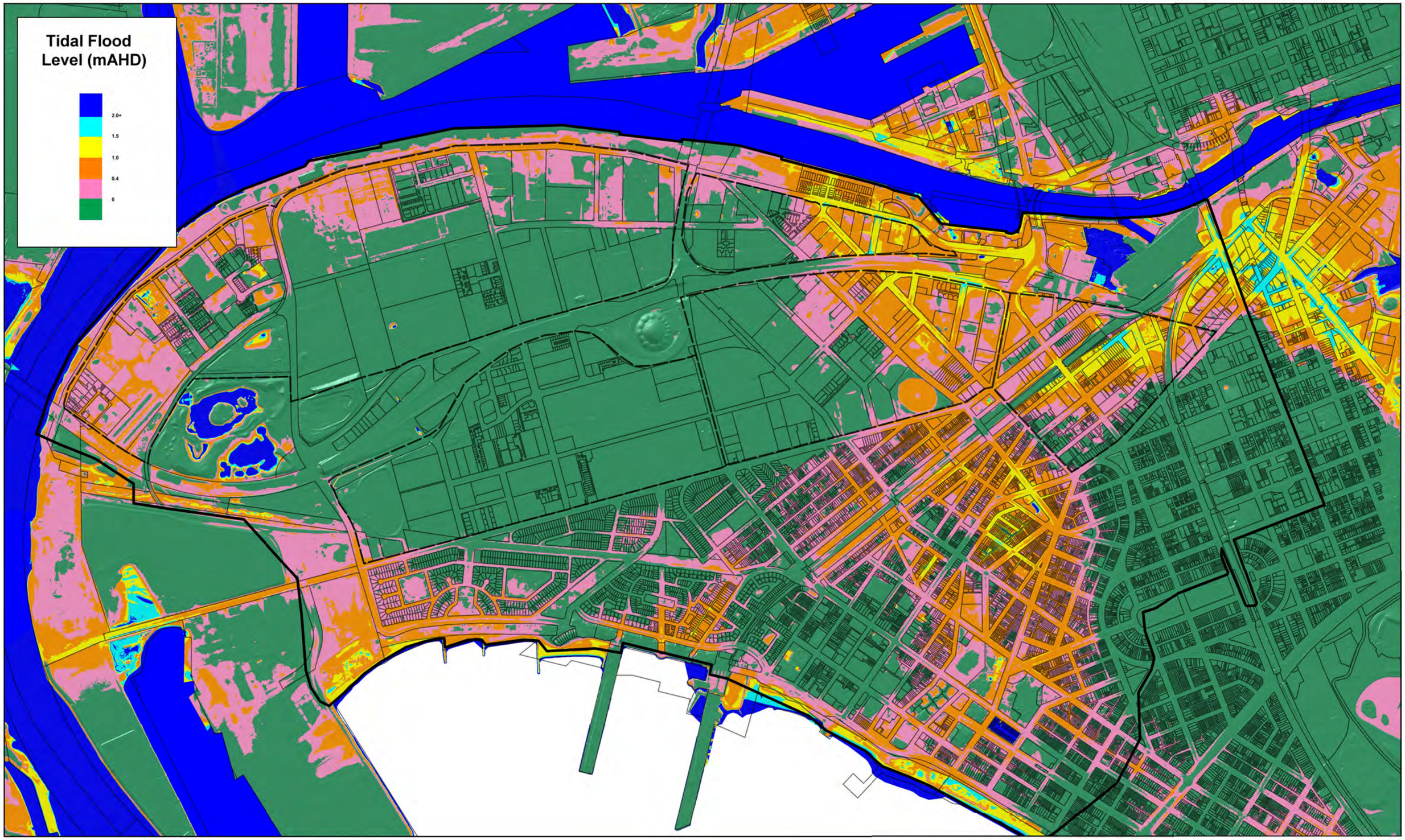
Appendices

Appendix A – Tidal flooding



1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Depths of flooding with the 100-yr ARI tide level including climate change (2.4mAHD)

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure A2

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - GROUND LEVELS A2.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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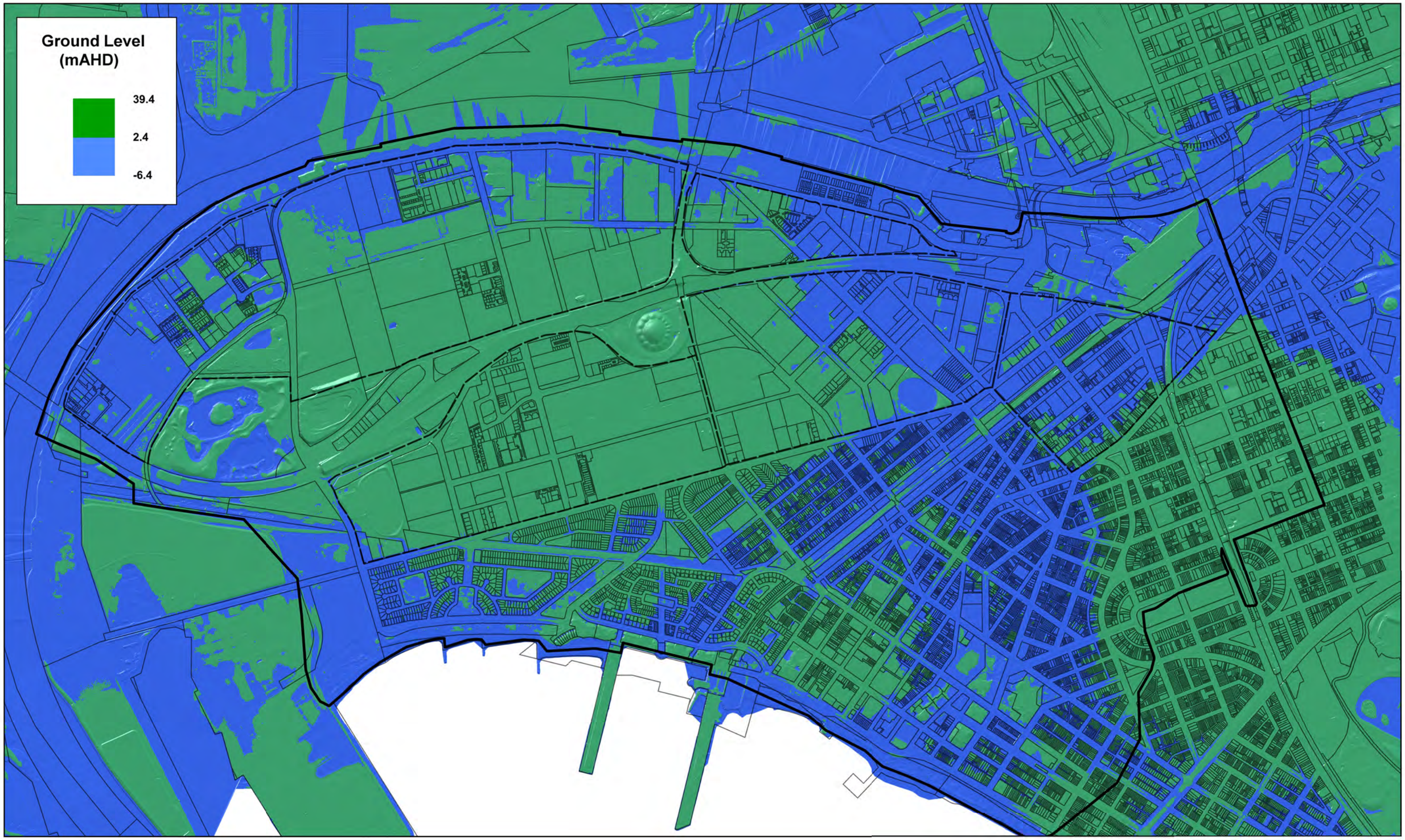

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Land above and below 2.4mAHD (100-yr ARI tide level including climate change)

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure A1

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - GROUND LEVELS A1.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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Appendix B – Developed conditions without mitigation

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Developed conditions without mitigation
100 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 17 02 2017

Figure B1

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - DEV.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Developed conditions without mitigation
20 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure B2

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - DEV.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Developed conditions without mitigation
5 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure B3

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - DEV.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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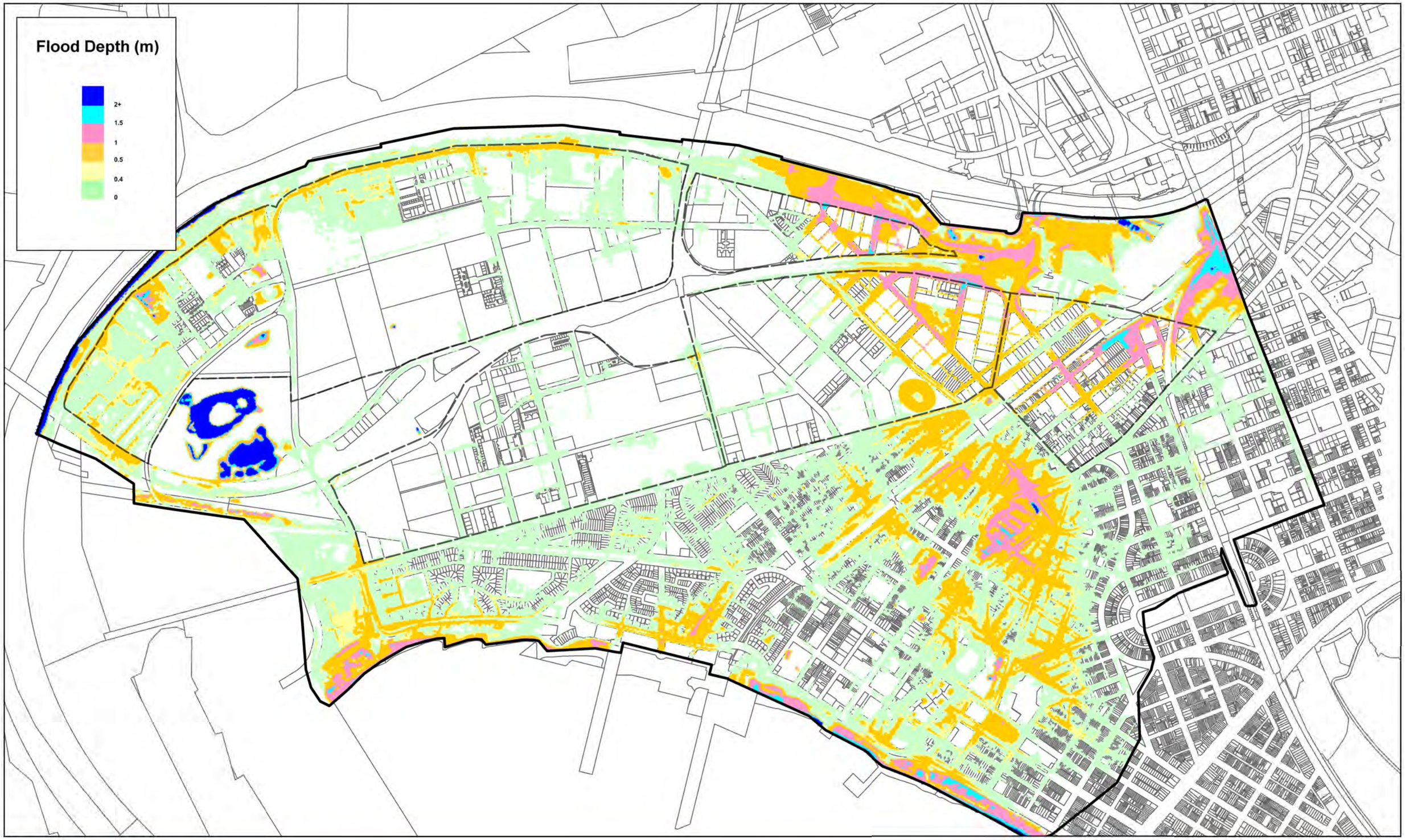

1:15,000 (at A3)

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

MELBOURNE WATER
FISHERMAN'S BEND RSS

Developed conditions without mitigation
100 year ARI Rainfall - 2.4 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure B4

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - DEV.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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Flood Depth (m)

2+
1.5
1
0.5
0.4
0.05
0

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Developed conditions without mitigation
20 year ARI Rainfall - 2.05 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure B5

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - DEV.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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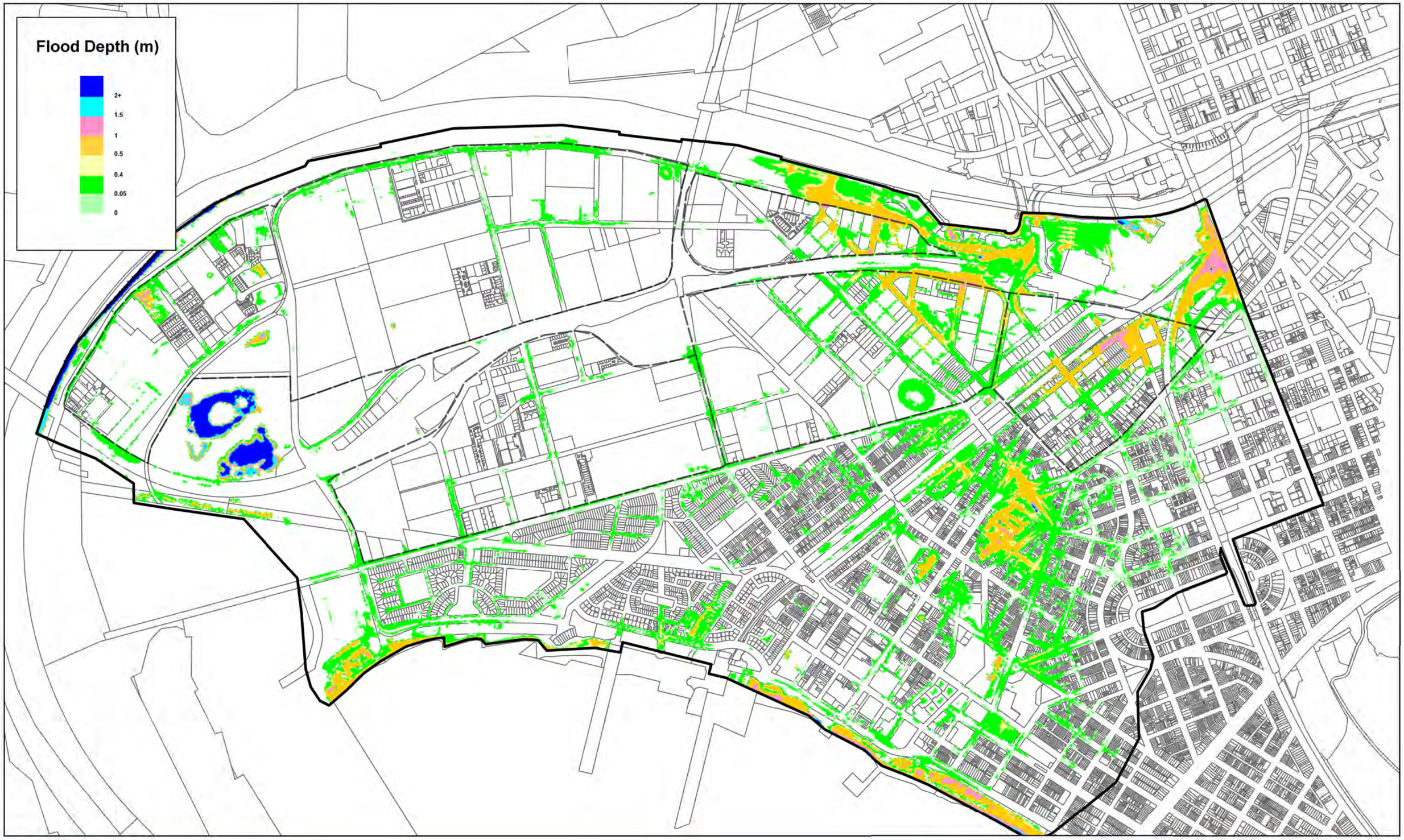

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Developed conditions without mitigation
5 year ARI Rainfall - 1.9 mAHD Tailwater

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure B6

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - DEV.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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Appendix C – Rainwater tanks

Critical Duration

- 72 hr
- 48 hr
- 36 hr
- 30 hr
- 24 hr
- 18 hr
- 12 hr
- 9 hr
- 6 hr
- 4.5hr
- 3 hr
- 2 hr
- 1 hr
- 45 min
- 30 min
- 25 min
- 20 min
- 15 min
- 10 min

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Critical duration - Flood mitigation - Rainwater tanks only
100 year ARI Rainfall - 0.52 mAHD Tailwater

Figure C1

Job Number	31-34157
Revision	0
Date	21 02 2017

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - CRIT DUR.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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Critical Duration

- 72 hr
- 48 hr
- 36 hr
- 30 hr
- 24 hr
- 18 hr
- 12 hr
- 9 hr
- 6 hr
- 4.5hr
- 3 hr
- 2 hr
- 1 hr
- 45 min
- 30 min
- 25 min
- 20 min
- 15 min
- 10 min

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Critical duration - Flood mitigation - Rainwater tanks only
20 year ARI Rainfall - 0.52 mAHD Tailwater

Figure C2

Job Number	31-34157
Revision	0
Date	21 02 2017

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - CRIT DUR.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Critical duration - Flood mitigation - Rainwater tanks only
5 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number 31-34157
Revision 0
Date 21 02 2017

Figure C3

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - CRIT DUR.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

Flood Levee

MELBOURNE WATER
FISHERMAN'S BEND RSS

Critical duration - Flood mitigation - High LOS (20yr ARI)
100 year ARI Rainfall - 2.4 mAHD Tailwater

Figure C4

Job Number	31-34157
Revision	0
Date	21 02 2017

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - CRIT DUR.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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Appendix C5: Roof and podium runoff volumes

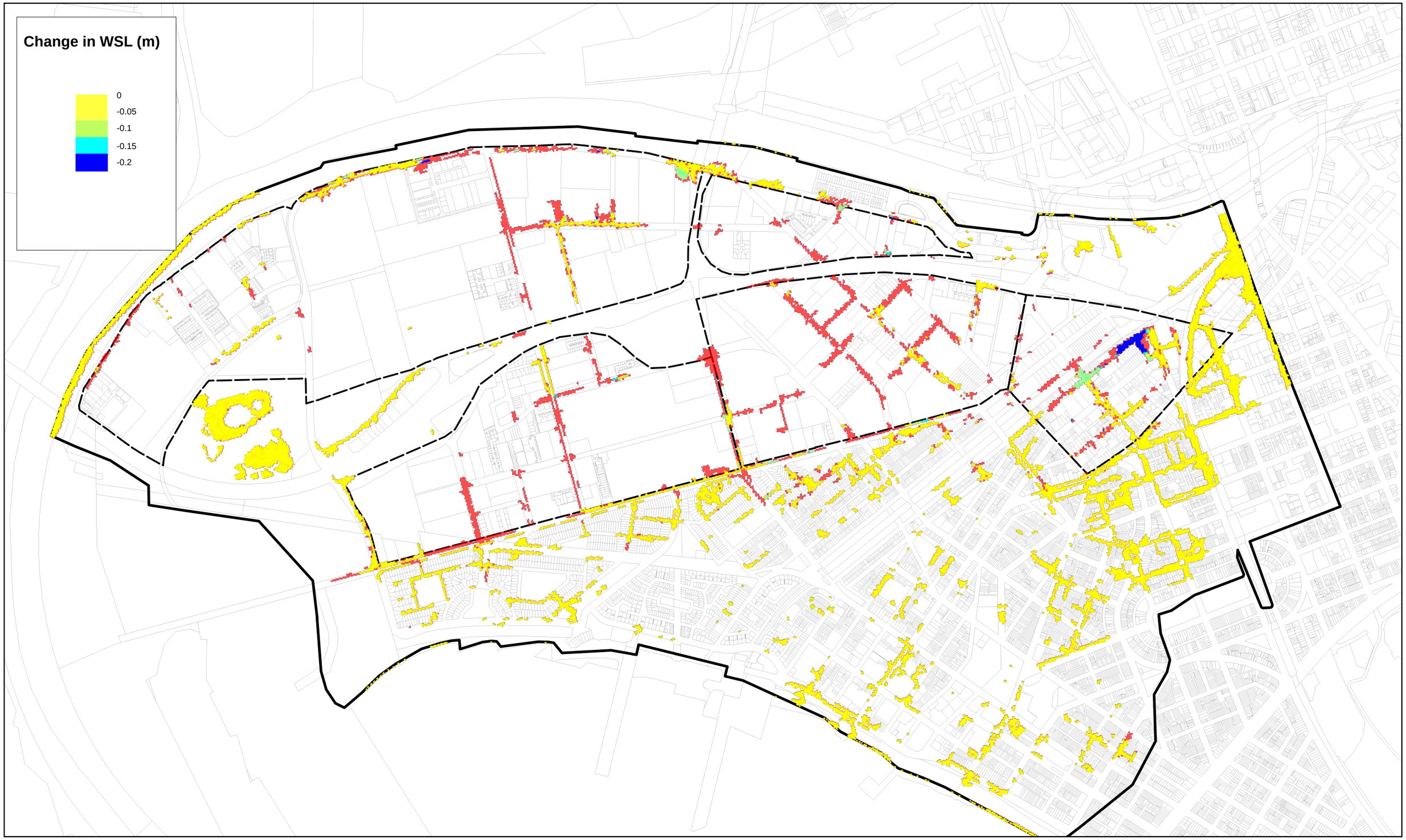
5 year							
Duration	Hours	IFD			IFD with Climate Change		
		Intensity (mm/h)	Depth (mm)	Required Tank Size (KL)[1]	Intensity (mm/h)	Depth (mm)	Required Tank Size (KL)[1]
10m	0.167	65.18	10.86	30	75.28	12.55	35
15m	0.250	53.74	13.44	37	62.07	15.52	43
20m	0.333	46.35	15.45	43	53.53	17.84	49
25m	0.417	41.07	17.11	47	47.44	19.77	54
30m	0.50	37.08	18.54	51	42.83	21.41	59
45m	0.75	29.24	21.93	60	33.78	25.33	70
1h	1.0	24.53	24.53	68	28.34	28.34	78
1_5h	1.5	18.81	28.22	78	21.73	32.59	90
2h	2.0	15.52	31.04	86	17.93	35.86	99
3h	3.0	11.80	35.40	98	13.63	40.89	113
4_5h	4.5	8.96	40.32	111	10.35	46.57	128
6h	6.0	7.37	44.23	122	8.51	51.09	141
9h	9.0	5.60	50.44	139	6.47	58.26	161
12h	12.0	4.62	55.38	153	5.33	63.97	176
18h	18.0	3.58	64.46	178	4.14	74.46	205
24h	24.0	2.98	71.63	197	3.45	82.73	228
30h	30.0	2.58	77.52	214	2.98	89.53	247
36h	36.0	2.29	82.48	227	2.65	95.27	263
48h	48.0	1.88	90.37	249	2.17	104.37	288
72h	72.0	1.40	100.76	278	1.62	116.38	321

20 year							
Duration	Hours	IFD			IFD with Climate Change		
		Intensity (mm/h)	Depth (mm)	Required Tank Size (KL)[1]	Intensity (mm/h)	Depth (mm)	Required Tank Size (KL)[1]
10m	0.167	93.64	15.61	43	108.16	18.03	50
15m	0.250	76.79	19.20	53	88.70	22.17	61
20m	0.333	65.95	21.98	61	76.17	25.39	70
25m	0.417	58.25	24.27	67	67.28	28.03	77
30m	0.50	52.44	26.22	72	60.56	30.28	83
45m	0.75	41.08	30.81	85	47.44	35.58	98
1h	1.0	34.29	34.29	95	39.61	39.61	109
1_5h	1.5	26.18	39.27	108	30.24	45.35	125
2h	2.0	21.53	43.06	119	24.87	49.73	137
3h	3.0	16.29	48.88	135	18.82	56.46	156
4_5h	4.5	12.32	55.42	153	14.22	64.01	176
6h	6.0	10.10	60.60	167	11.66	69.99	193
9h	9.0	7.64	68.78	190	8.83	79.44	219
12h	12.0	6.27	75.28	207	7.25	86.95	240
18h	18.0	4.89	87.96	242	5.64	101.60	280
24h	24.0	4.08	98.01	270	4.72	113.20	312
30h	30.0	3.54	106.31	293	4.09	122.78	338
36h	36.0	3.15	113.32	312	3.64	130.88	361
48h	48.0	2.59	124.53	343	3.00	143.83	396
72h	72.0	1.94	139.48	384	2.24	161.10	444

100 year							
Duration	Hours	IFD			IFD with Climate Change		
		Intensity (mm/h)	Depth (mm)	Required Tank Size (KL)[1]	Intensity (mm/h)	Depth (mm)	Required Tank Size (KL)[1]
10m	0.167	136.69	22.78	63	157.88	26.31	73
15m	0.250	111.54	27.89	77	128.83	32.21	89
20m	0.333	95.42	31.81	88	110.22	36.74	101
25m	0.417	84.02	35.01	96	97.04	40.43	111
30m	0.50	75.43	37.72	104	87.13	43.56	120
45m	0.75	58.73	44.05	121	67.83	50.87	140
1h	1.0	48.81	48.81	135	56.37	56.37	155
1_5h	1.5	37.11	55.66	153	42.86	64.29	177
2h	2	30.43	60.86	168	35.14	70.29	194
3h	3	22.93	68.79	190	26.49	79.46	219
4_5h	4.5	17.26	77.66	214	19.93	89.70	247
6h	6	14.11	84.66	233	16.30	97.79	269
9h	9	10.63	95.70	264	12.28	110.53	305
12h	12.0	8.70	104.42	288	10.05	120.61	332
18h	18.0	6.80	122.45	337	7.86	141.43	390
24h	24.0	5.70	136.79	377	6.58	157.99	435
30h	30.0	4.96	148.67	410	5.72	171.72	473
36h	36.0	4.41	158.75	438	5.09	183.35	505
48h	48.0	3.64	174.93	482	4.21	202.04	557
72h	72.0	2.73	196.76	542	3.16	227.26	626

Notes

1) This represents the tank size required to capture all the runoff for that duration from typical roof and podium (70%) area.



1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

Areas where rainwater tanks have removed flooding

MELBOURNE WATER
FISHERMAN'S BEND RSS

Afflux (Rainwater Tanks Case - No Tanks Case)
5 year ARI - 0.52 mAHD Tailwater

Job Number	31-34157
Revision	A
Date	30 01 2017

Figure C6

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - Afflux - TANKS.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014) . Created by: hlhartenthaler

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Appendix D – Flood mitigation results – Rainwater tanks only

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Rainwater tanks only
100 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure D1

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRED - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hlhartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Rainwater tanks only
20 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure D2

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRED - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Rainwater tanks only
5 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure D3

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRED - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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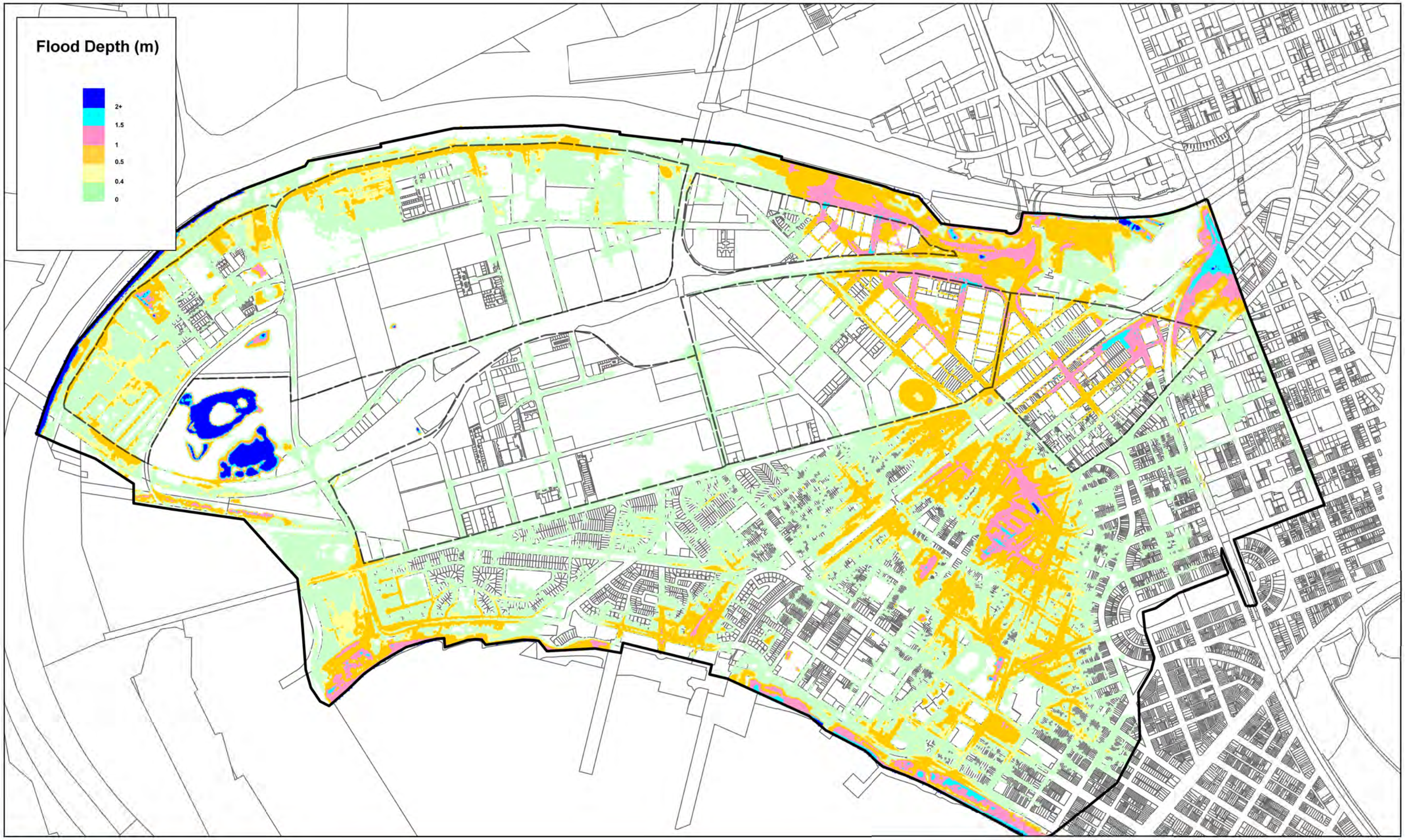

1:15,000 (at A3)

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Rainwater tanks only
100 year ARI Rainfall - 2.4 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure D4

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRED - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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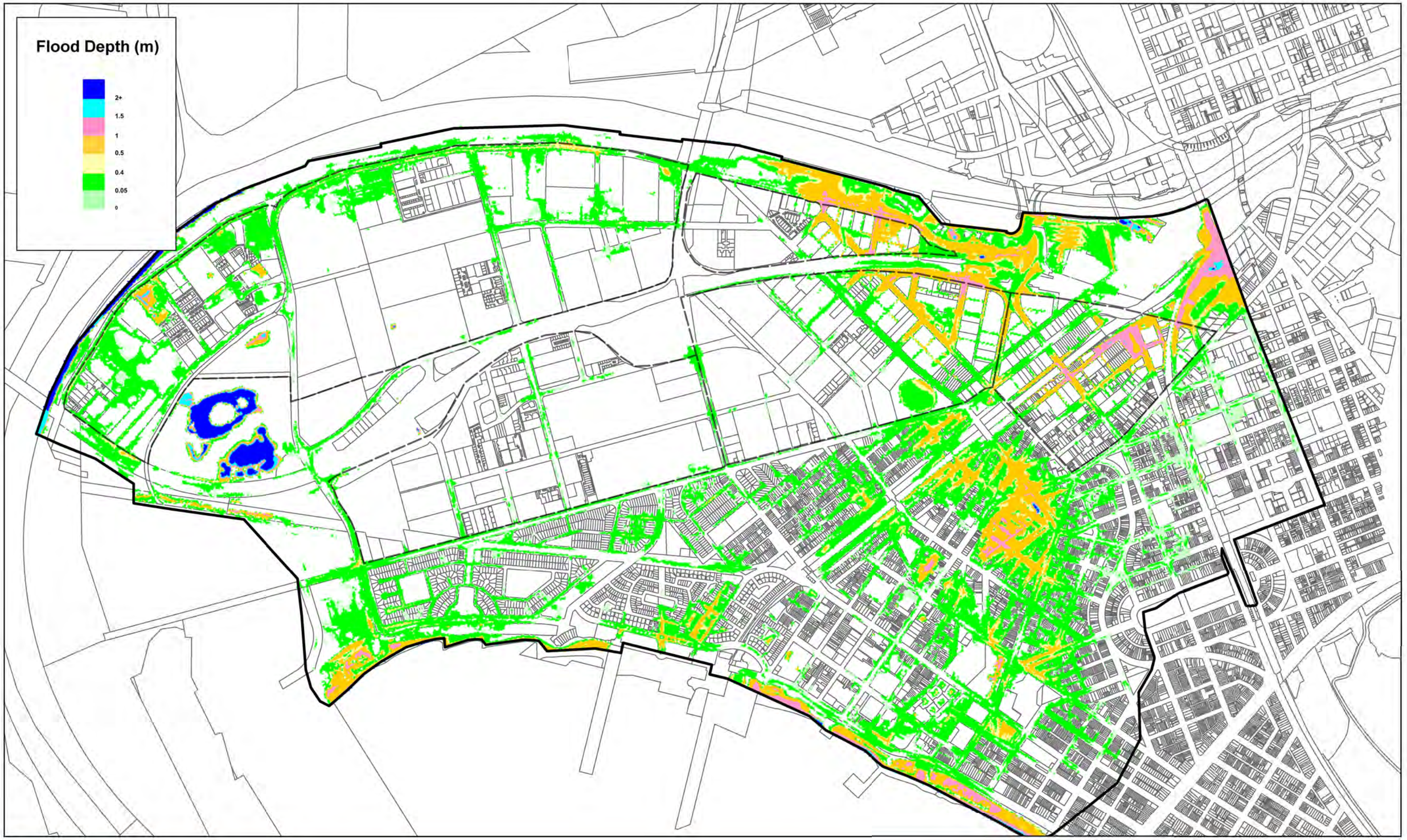

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Rainwater tanks only
20 year ARI Rainfall - 2.05 mAHD Tailwater

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure D5

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRED - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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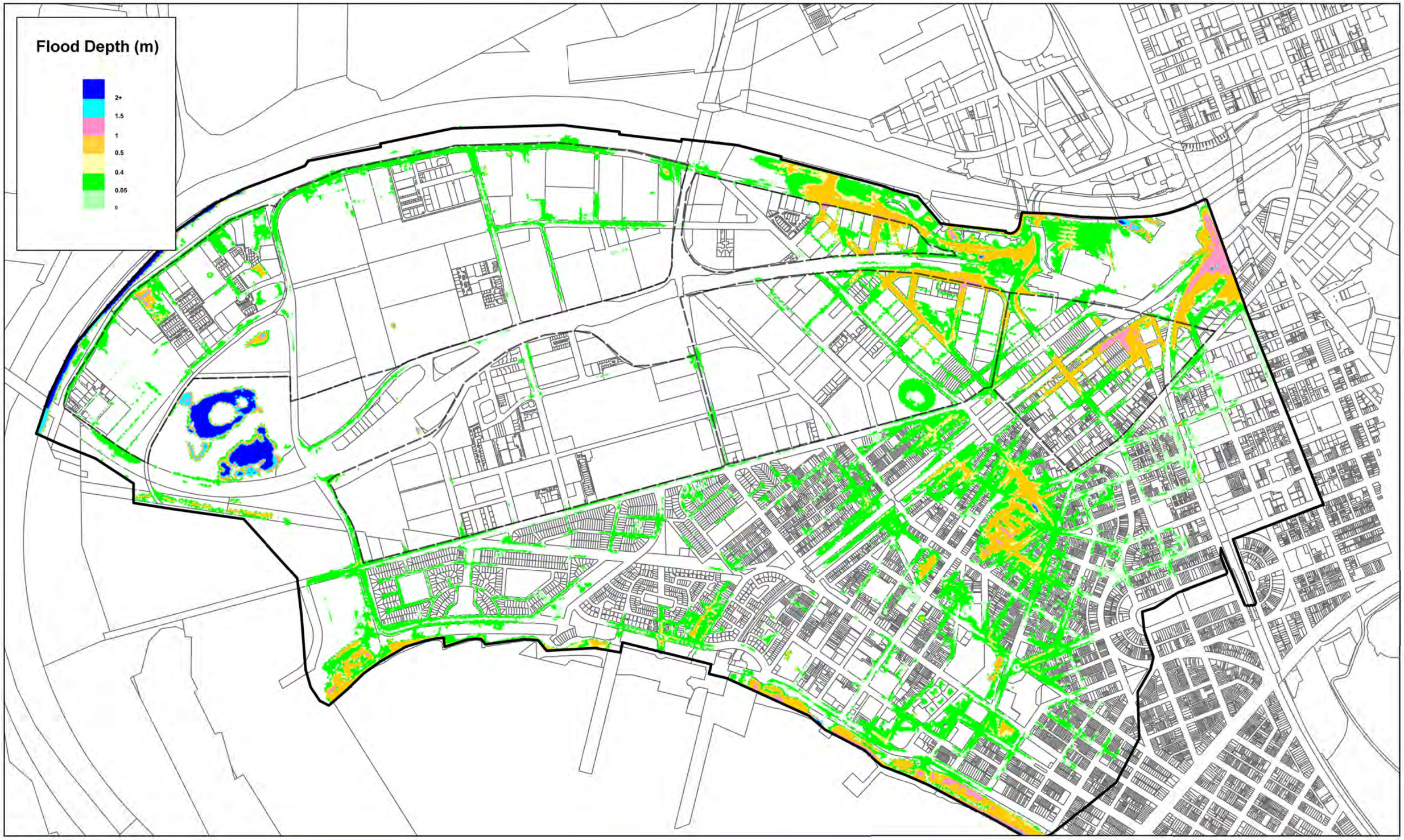

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Rainwater tanks only
5 year ARI Rainfall - 1.9 mAHD Tailwater

Job Number	31-34157
Revision	0
Date	21 02 2017

Figure D6

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRED - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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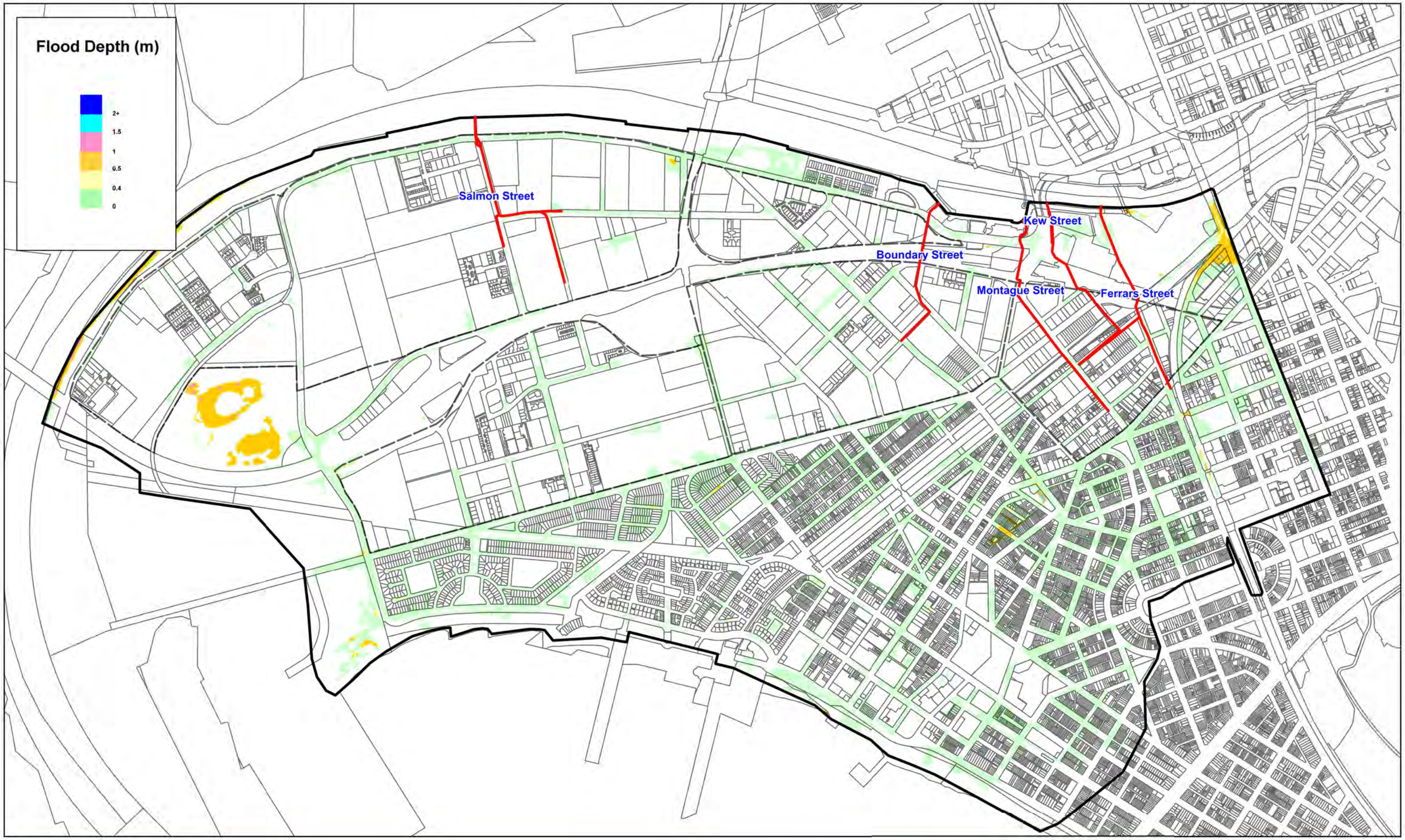
Appendix E – Flood mitigation results – Rainwater tanks with further drainage works



1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Upgraded Drainage Line

Precinct Boundaries

Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Flood mitigation - Base level of service (20-yr ARI)
100 year ARI Rainfall - 0.52 mAHD Tailwater

Figure E1

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRP1 - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hlhartenthaler

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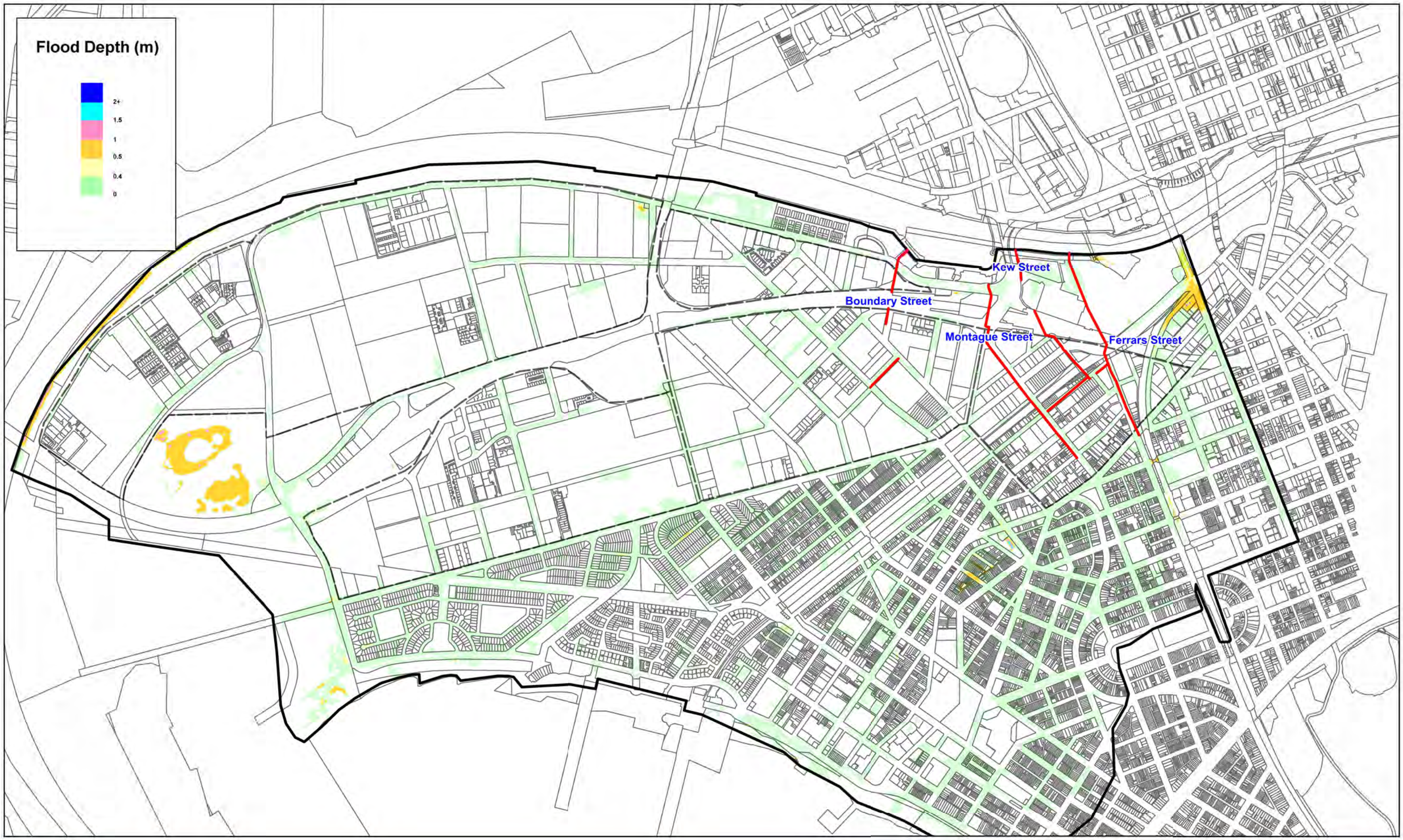

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

Upgraded Drainage Line

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Base level of service (5yr ARI)
100 year ARI Rainfall - 0.52 mAHD Tailwater

Figure E2

Job Number	31-34157
Revision	0
Date	21 02 2017

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRPIPES - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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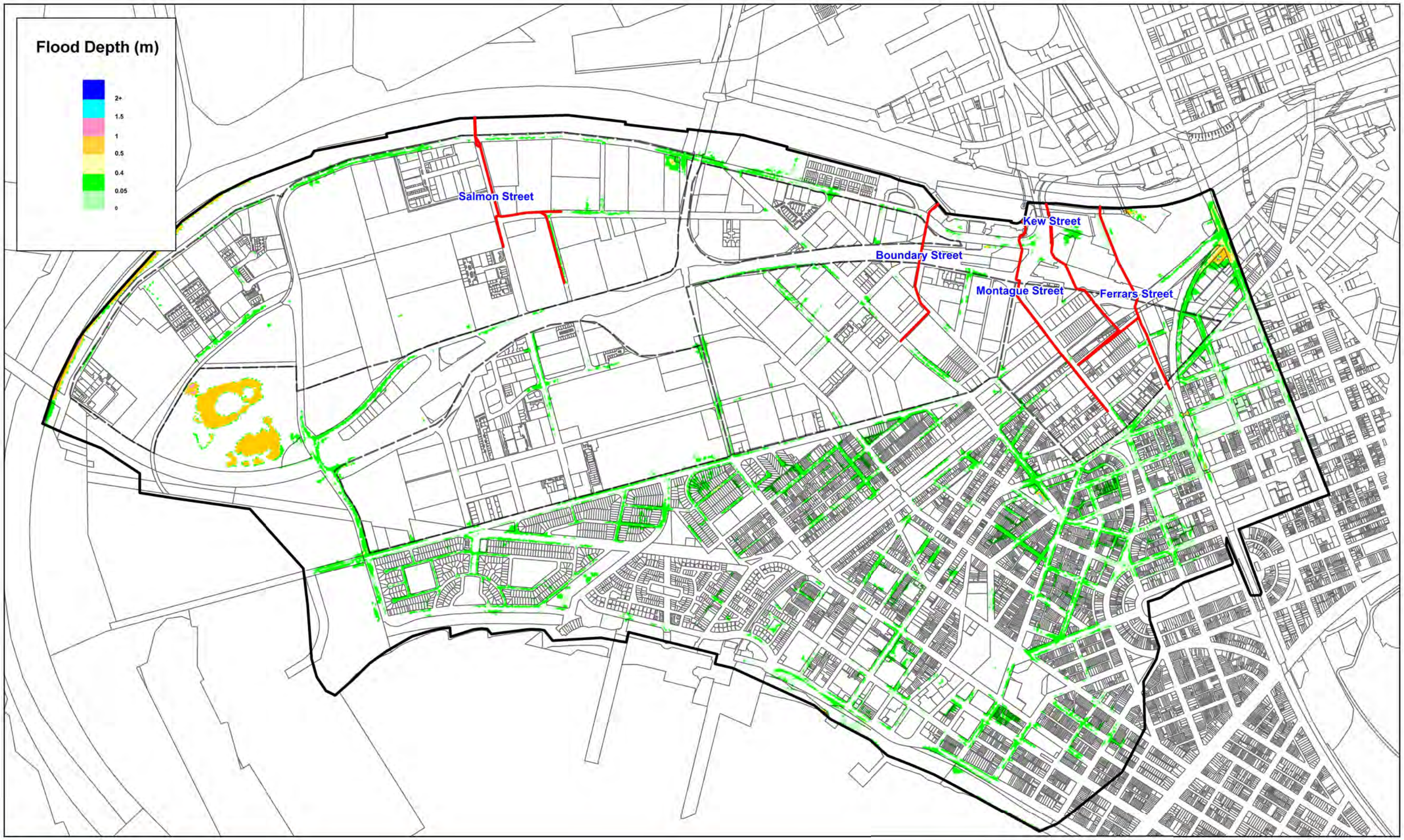

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

Upgraded Drainage Line

MELBOURNE WATER
FISHERMAN'S BEND RSS

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Flood mitigation - Base level of service (20-yr ARI)
20 year ARI Rainfall - 0.52 mAHD Tailwater

Figure E3

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRPIPES - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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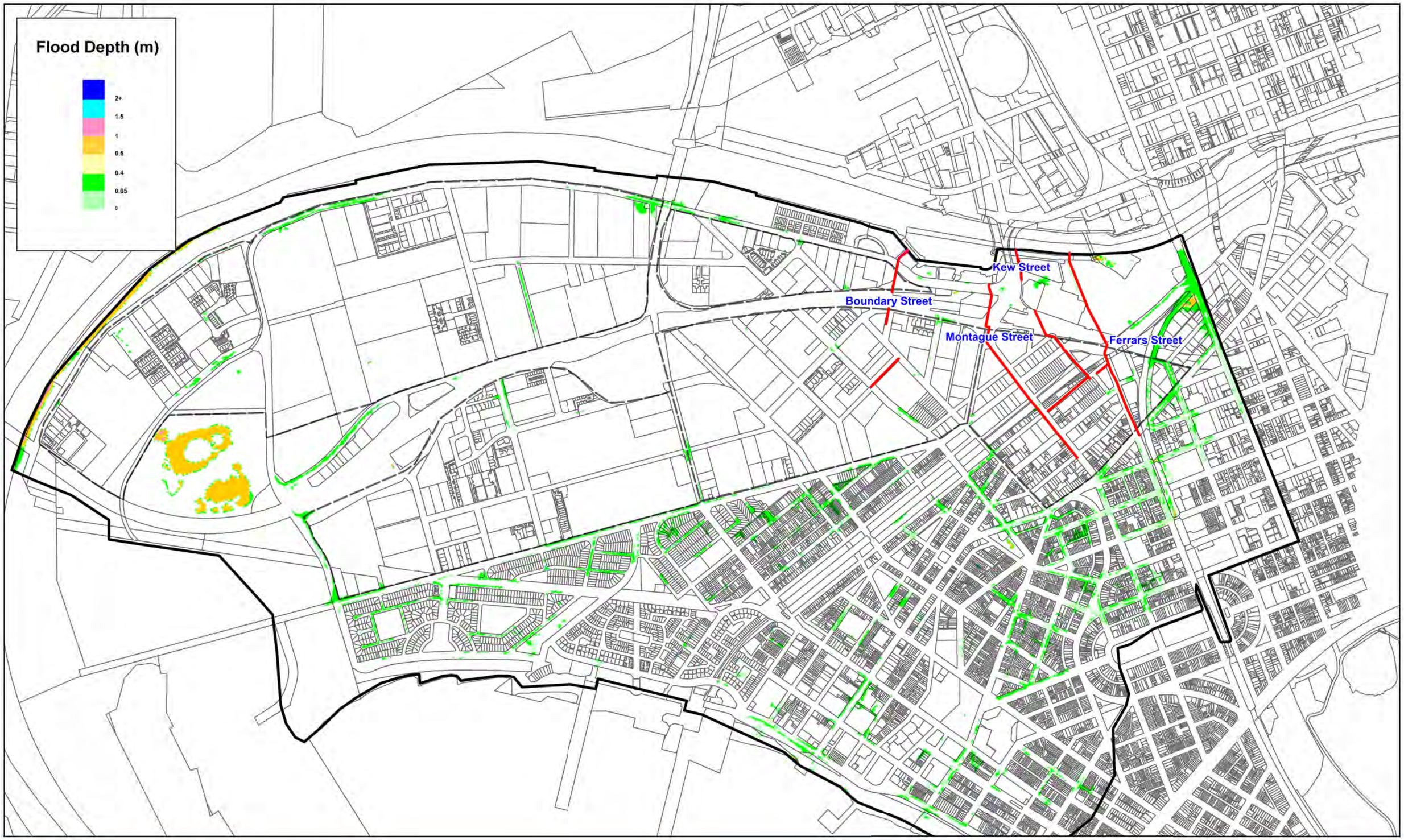

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

Precinct Boundaries

Hydraulic Model Boundary

Upgraded Drainage Line

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Base level of service (5yr ARI)
5 year ARI Rainfall - 0.52 mAHD Tailwater

Job Number 31-34157
Revision 0
Date 21 02 2017

Figure E4

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRP1 - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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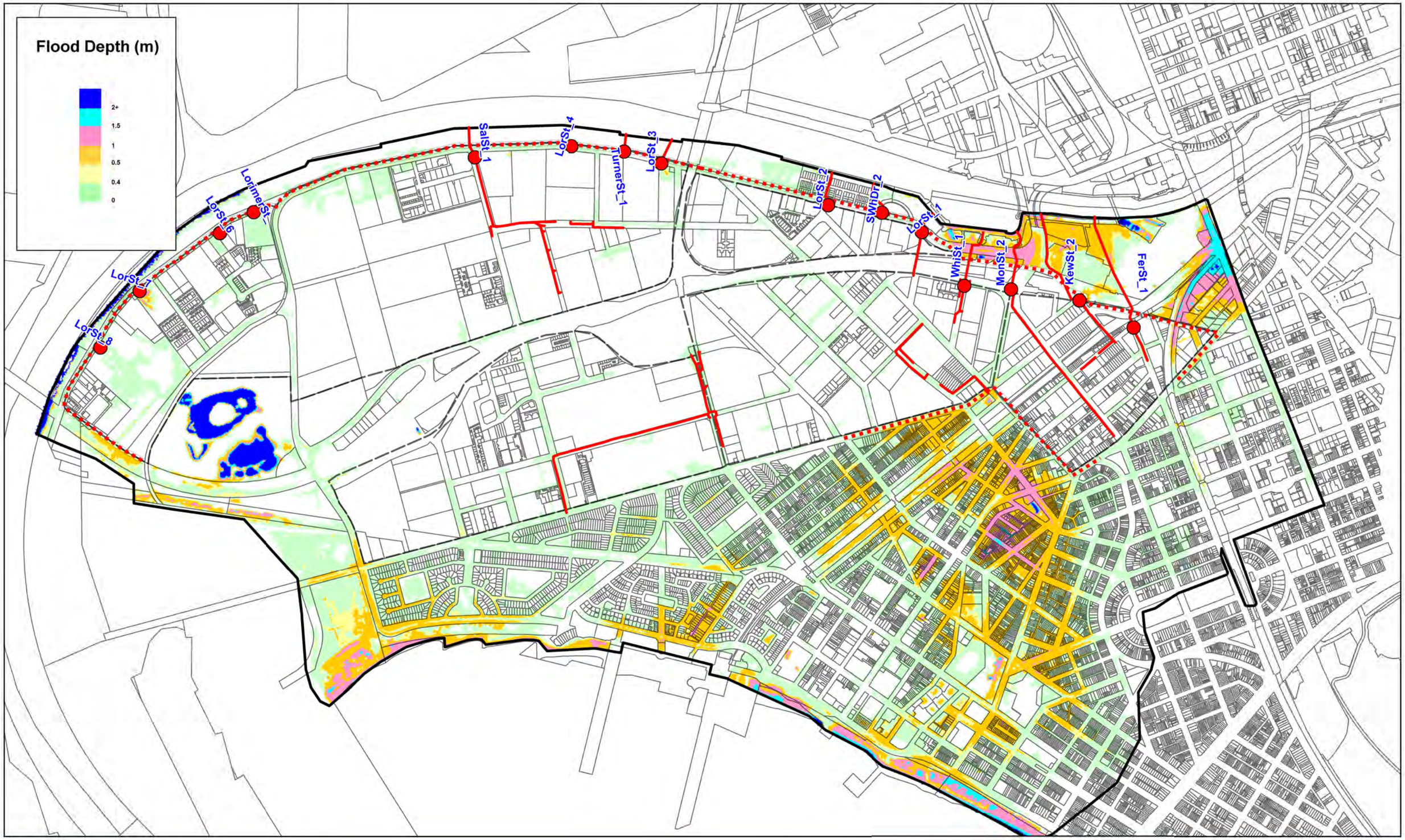

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Flood Levee
- Upgraded Drainage Line
- Pump Stations
- Precinct Boundaries
- Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - High level of service (20yr ARI)
100 year ARI Rainfall - 2.4 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure E5

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRP2 - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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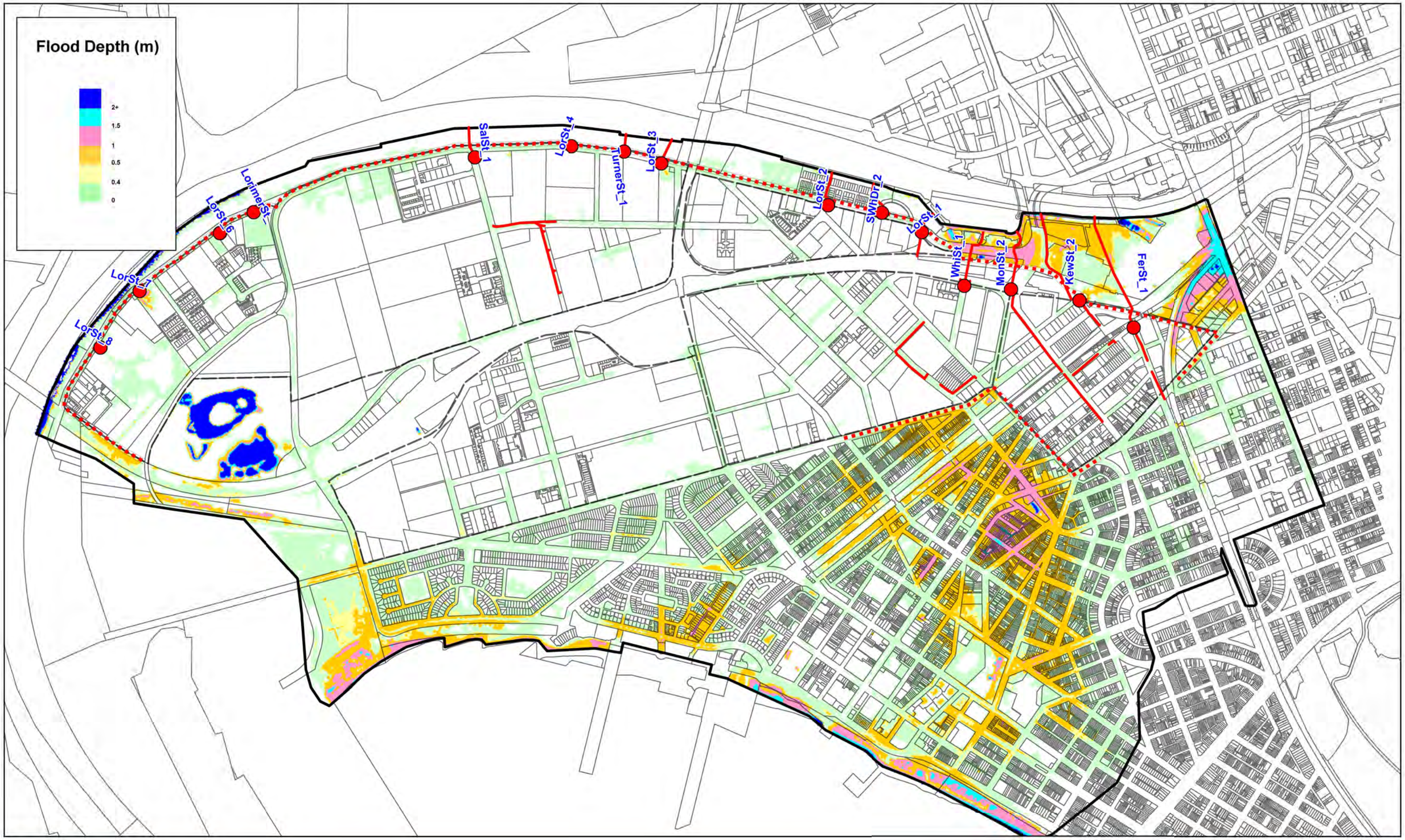

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Flood Levee
- Upgraded Drainage Line
- Pump Stations
- Precinct Boundaries
- Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - High level of service (5yr ARI)
100 year ARI Rainfall - 2.4 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure E6

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRP2 - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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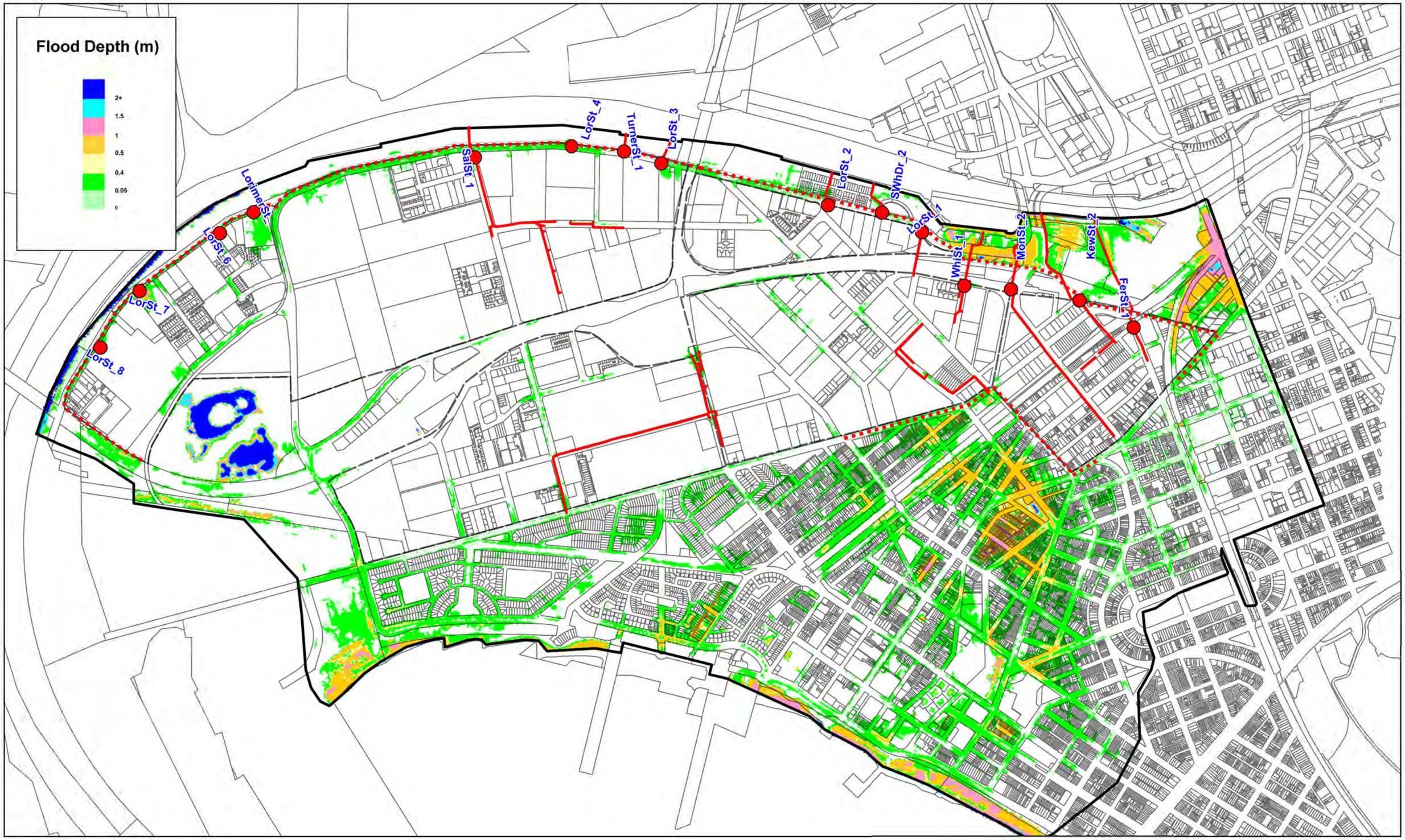

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Flood Levee
- Upgraded Drainage Line
- Pump Stations
- Precinct Boundaries
- Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - High level of service (20yr ARI)
20 year ARI Rainfall - 2.05 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure E7

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRP2 - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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Flood Depth (m)

2+
1.5
1
0.5
0.4
0.05
0

LorimerSt_
SalSt_1
LorSt_4
TurnerSt_1
LorSt_3
LorSt_2
SWhDr_2
LorSt_7
WhiSt_1
MonSt_2
KewSt_2
FerSt_1
LorSt_6
LorSt_7
LorSt_8

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Flood Levee
- Upgraded Drainage Line
- Pump Stations
- Precinct Boundaries
- Hydraulic Model Boundary

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - High level of service (5yr ARI)
5 year ARI Rainfall - 1.9 mAHD Tailwater

Job Number | 31-34157
Revision | 0
Date | 21 02 2017

Figure E8

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - TRP2 - DEPTH.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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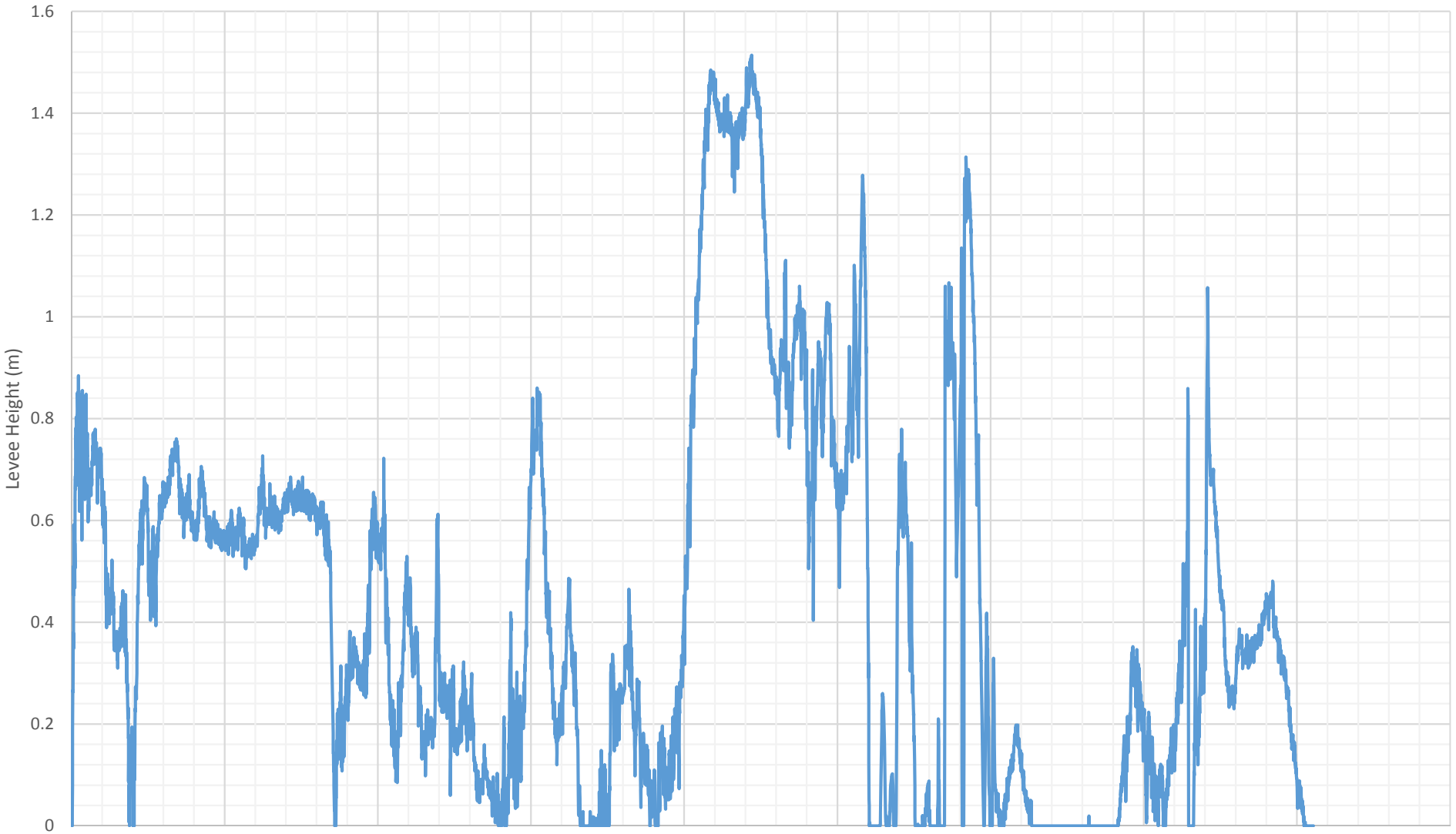
Appendix E9: Levee height longitudinal profile



Note: Distance taken from Western boundary

Appendix F – Cost estimates

1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Melbourne Water Catchment (>60ha)
- City of Melbourne Pipe Upgrade
- City of Port Phillip Pipe Upgrade
- Melbourne Water Pipe Upgrade
- City of Melbourne Boundary
- City of Melbourne Levee
- City of Port Philip Levee
- Precinct Boundaries

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Base level of service (20yr ARI)
Drainage infrastructure upgrade responsibility

Job Number | 31-34157
Revision | 0
Date | 22 02 2017

Figure F1

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - EXISTING INFRASTRUCTURE.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Melbourne Water Catchment (>60ha)
- City of Melbourne Pipe Upgrade
- City of Port Phillip Pipe Upgrade
- Melbourne Water Pipe Upgrade
- City of Melbourne Boundary
- City of Melbourne Levee
- City of Port Philip Levee
- Precinct Boundaries

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - Base level of service (5yr ARI)
Drainage infrastructure upgrade responsibility

Job Number | 31-34157
Revision | 0
Date | 22 02 2017

Figure F2

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - EXISTING INFRASTRUCTURE.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Melbourne Water Catchment (>60ha)
- City of Melbourne Pipe Upgrade
- City of Port Phillip Pipe Upgrade
- Melbourne Water Pipe Upgrade
- City of Melbourne Pump Station
- City of Melbourne Boundary
- City of Melbourne Levee
- City of Port Philip Levee
- Precinct Boundaries
- City of Port Phillip Pump Station

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - High level of service (20yr ARI) Drainage infrastructure upgrade responsibility

Job Number | 31-34157
Revision | 0
Date | 22 02 2017

Figure F3

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - EXISTING INFRASTRUCTURE.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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1:15,000 (at A3)

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid Of Australia, Zone 55

N

LEGEND

- Melbourne Water Catchment (>60ha)
- City of Melbourne Pipe Upgrade
- City of Port Phillip Pipe Upgrade
- Melbourne Water Pipe Upgrade
- City of Melbourne Pump Station
- City of Melbourne Boundary
- City of Melbourne Levee
- City of Port Philip Levee
- Precinct Boundaries
- City of Port Phillip Pump Station

MELBOURNE WATER
FISHERMAN'S BEND RSS

Flood mitigation - High level of service (5yr ARI)
Drainage infrastructure upgrade responsibility

Job Number | 31-34157
Revision | 0
Date | 22 02 2017

Figure F4

G:\31\34157\GIS\Maps\Working\Fishermans Bend Task Force Mapping - EXISTING INFRASTRUCTURE.WOR

Data Source: MW - Aerial Imagery (2013), Existing Drainage (2014); GHD - Flooding Extents (2016); VicMap - Parcel, Roads (2016), CoPP - Existing Drainage (2014); MCC - Existing Drainage (2014). Created by: hihartenthaler

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Appendix F5: Preliminary cost estimate breakdown for pipe upgrades

Base level of service - 5-yr ARI

Summary

Work Type	Cost
Pipes	$ 20,843,931
Structures	$ 4,850,000
Total ($)	$ 25,693,931

Drainage Branch Cost Breakdown

Work Type	Quantity	Unit	Rate ($/unit)	Factor	Cost
BOUNDARY ST					
600 mm diameter pipe		m	$1,150	3	$0.00
675 mm diameter pipe	174	m	$1,200	3	$627,584.76
900 mm diameter pipe		m	$1,350	3	$0.00
1050 mm diameter pipe		m	$1,455	3	$0.00
1200 mm diameter pipe	68	m	$1,575	3	$320,454.70
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe	286	m	$1,855	3	$1,590,883.25
1575 mm diameter pipe	73	m	$2,062	3	$453,518.15
1650 mm diameter pipe		m	$2,160	3	$0.00
1800 mm diameter pipe		m	$2,435	3	$0.00
1900 mm diameter pipe	59	m	$2,555	3	$449,915.57
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC		m	$364	3	$0.00
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC		m	$798	3	$0.00
1500 x 1300 mm RCBC		m	$980	3	$0.00
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC		m	$1,730	3	$0.00
2300 x 1200 mm RCBC		m	$1,732	3	$0.00
Junction Pits, jacking pits & Inlet/Outlet Structures	17	No.	$50,000		$850,000
					$4,292,356
FERRER ST					
600 mm diameter pipe		m	$1,150		$0.00
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe	64	m	$1,350	3	$258,816.47
1050 mm diameter pipe		m	$1,455	3	$0.00
1200 mm diameter pipe		m	$1,575	3	$0.00
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe		m	$1,855	3	$0.00
1575 mm diameter pipe		m	$2,062	3	$0.00
1650 mm diameter pipe		m	$2,160	3	$0.00
1800 mm diameter pipe	282	m	$2,435	3	$2,058,915.71
1900 mm diameter pipe	53	m	$2,555	3	$409,797.73
2100 mm diameter pipe	479	m	$3,110	3	$4,468,959.44
1200 x 450 mm RCBC		m	$364	3	$0.00
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC		m	$798	3	$0.00
1500 x 1300 mm RCBC		m	$980	3	$0.00
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC		m	$1,730	3	$0.00
2300 x 1200 mm RCBC		m	$1,732	3	$0.00

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Junction Pits, jacking pits & Inlet/Outlet Structures	20	No.	$50,000		$1,000,000
					$8,196,489
			KEW ST		
600 mm diameter pipe	228	m	$1,150	3	$786,100.16
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe		m	$1,350	3	$0.00
1050 mm diameter pipe		m	$1,455	3	$0.00
1200 mm diameter pipe	385	m	$1,575	3	$1,818,989.06
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe		m	$1,855	3	$0.00
1575 mm diameter pipe		m	$2,062	3	$0.00
1650 mm diameter pipe	105	m	$2,160	3	$680,405.83
1800 mm diameter pipe	62	m	$2,435	3	$450,075.66
1900 mm diameter pipe		m	$2,555	3	$0.00
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC	2	m	$364	3	$2,128.43
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC		m	$798	3	$0.00
1500 x 1300 mm RCBC		m	$980	3	$0.00
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC		m	$1,730	3	$0.00
2300 x 1200 mm RCBC		m	$1,732	3	$0.00
Junction Pits, jacking pits & Inlet/Outlet Structures	24	No.	$50,000		$1,200,000
					$4,937,699
			MONTAGUE ST		
600 mm diameter pipe		m	$1,150	3	$0.00
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe		m	$1,350	3	$0.00
1050 mm diameter pipe	216	m	$1,455	3	$941,469.39
1200 mm diameter pipe	243	m	$1,575	3	$1,146,447.45
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe	52	m	$1,855	3	$288,978.43
1575 mm diameter pipe		m	$2,062	3	$0.00
1650 mm diameter pipe	8	m	$2,160	3	$51,178.78
1800 mm diameter pipe	424	m	$2,435	3	$3,093,807.39
1900 mm diameter pipe		m	$2,555	3	$0.00
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC		m	$364	3	$0.00
2300 x 1500 mm RCBC	115	m	$1,774	3	$611,895.31
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC	17	m	$798	3	$40,691.06
1500 x 1300 mm RCBC	32	m	$980	3	$93,246.14
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC		m	$1,730	3	$0.00
2300 x 1200 mm RCBC	38	m	$1,732	3	$199,672.54
Junction Pits, jacking pits & Inlet/Outlet Structures	36	No.	$50,000		$1,800,000
					$8,267,386

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Appendix F6: Preliminary cost estimate breakdown for pipe upgrades

Base level of service - 20-yr ARI

Summary

Work Type	Cost
Pipes	$ 40,437,717
Structures	$ 7,850,000
Total ($)	$ 48,287,717

Drainage Branch Cost Breakdown

Work Type	Quantity	Unit	Rate ($/unit)	Factor	Cost
BOUNDARY ST					
600 mm diameter pipe		m	$1,150	3	$0.00
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe	328	m	$1,350	3	$1,330,164.18
1050 mm diameter pipe	20	m	$1,455	3	$88,271.65
1200 mm diameter pipe	442	m	$1,575	3	$2,087,280.09
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe	316	m	$1,855	3	$1,758,745.91
1575 mm diameter pipe	76	m	$2,062	3	$472,869.34
1650 mm diameter pipe		m	$2,160	3	$0.00
1800 mm diameter pipe		m	$2,435	3	$0.00
1900 mm diameter pipe	117	m	$2,555	3	$899,831.14
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC		m	$364	3	$0.00
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC		m	$798	3	$0.00
1500 x 1300 mm RCBC		m	$980	3	$0.00
3000 X 1500 mm RCBC	72	m	$2,351	3	$507,298.35
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC		m	$1,730	3	$0.00
2300 x 1200 mm RCBC		m	$1,732	3	$0.00
Junction Pits, jacking pits & Inlet/Outlet Structures	22	No.	$50,000		$1,100,000
					$8,244,461
FERRER ST					
600 mm diameter pipe		m	$1,150		$0.00
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe	52	m	$1,350	3	$209,831.43
1050 mm diameter pipe		m	$1,455	3	$0.00
1200 mm diameter pipe	64	m	$1,575	3	$301,952.54
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe		m	$1,855	3	$0.00
1575 mm diameter pipe		m	$2,062	3	$0.00
1650 mm diameter pipe		m	$2,160	3	$0.00
1800 mm diameter pipe	334	m	$2,435	3	$2,439,200.86
1900 mm diameter pipe	787	m	$2,555	3	$6,033,732.48
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC		m	$364	3	$0.00
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC		m	$798	3	$0.00
1500 x 1300 mm RCBC		m	$980	3	$0.00
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC		m	$1,730	3	$0.00

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2300 x 1200 mm RCBC		m	$1,732	3	$0.00
Junction Pits, jacking pits & Inlet/Outlet Structures	23	No.	$50,000		$1,150,000
					$10,134,717
KEW ST					
600 mm diameter pipe		m	$1,150	3	$0.00
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe	255	m	$1,350	3	$1,031,517.75
1050 mm diameter pipe		m	$1,455	3	$0.00
1200 mm diameter pipe	218	m	$1,575	3	$1,029,111.24
1350 mm diameter pipe	43	m	$1,710	3	$221,702.90
1500 mm diameter pipe		m	$1,855	3	$0.00
1575 mm diameter pipe		m	$2,062	3	$0.00
1650 mm diameter pipe		m	$2,160	3	$0.00
1800 mm diameter pipe	306	m	$2,435	3	$2,234,364.72
1900 mm diameter pipe	567	m	$2,555	3	$4,348,930.14
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC	4	m	$364	3	$4,256.87
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC		m	$798	3	$0.00
1500 x 1300 mm RCBC		m	$980	3	$0.00
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC	155	m	$1,055	3	$489,838.58
2300 x 1650 mm RCBC		m	$1,730	3	$0.00
2300 x 1200 mm RCBC		m	$1,732	3	$0.00
Junction Pits, jacking pits & Inlet/Outlet Structures	44	No.	$50,000		$2,200,000
					$11,559,722
MONTAGUE ST					
600 mm diameter pipe		m	$1,150	3	$0.00
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe		m	$1,350	3	$0.00
1050 mm diameter pipe		m	$1,455	3	$0.00
1200 mm diameter pipe	383	m	$1,575	3	$1,809,310.61
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe	320	m	$1,855	3	$1,779,817.44
1575 mm diameter pipe		m	$2,062	3	$0.00
1650 mm diameter pipe	416	m	$2,160	3	$2,694,819.39
1800 mm diameter pipe	159	m	$2,435	3	$1,159,997.04
1900 mm diameter pipe		m	$2,555	3	$0.00
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC		m	$364	3	$0.00
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC	77	m	$1,969	3	$453,853.03
1200 x 1200 mm RCBC	12	m	$798	3	$27,684.85
1500 x 1300 mm RCBC	32	m	$980	3	$93,246.14
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC	240	m	$1,730	3	$1,242,871.83
2300 x 1200 mm RCBC		m	$1,732	3	$0.00
Junction Pits, jacking pits & Inlet/Outlet Structures	42	No.	$50,000		$2,100,000
					$11,361,600
SALMON ST					
600 mm diameter pipe	304	m	$1,150	3	$1,050,250.38
675 mm diameter pipe		m	$1,200	3	$0.00
900 mm diameter pipe	305	m	$1,350	3	$1,234,045.04
1050 mm diameter pipe		m	$1,455	3	$0.00
1200 mm diameter pipe	720	m	$1,575	3	$3,402,920.76
1350 mm diameter pipe		m	$1,710	3	$0.00
1500 mm diameter pipe		m	$1,855	3	$0.00
1575 mm diameter pipe		m	$2,062	3	$0.00

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1650 mm diameter pipe		m	$2,160	3	$0.00
1800 mm diameter pipe		m	$2,435	3	$0.00
1900 mm diameter pipe		m	$2,555	3	$0.00
2100 mm diameter pipe		m	$3,110	3	$0.00
1200 x 450 mm RCBC		m	$364	3	$0.00
2300 x 1500 mm RCBC		m	$1,774	3	$0.00
2300 x 1800 mm RCBC		m	$1,969	3	$0.00
1200 x 1200 mm RCBC		m	$798	3	$0.00
1500 x 1300 mm RCBC		m	$980	3	$0.00
3000 X 1500 mm RCBC		m	$2,351	3	$0.00
1500 x 1400 mm RCBC		m	$1,055	3	$0.00
2300 x 1650 mm RCBC		m	$1,730	3	$0.00
2300 x 1200 mm RCBC		m	$1,732	3	$0.00
Junction Pits, jacking pits & Inlet/Outlet Structures	26	No.	$50,000		$1,300,000
					$6,987,216

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Appendix F7: Preliminary cost estimate breakdown for pipe upgrades

High level of service - 5-yr ARI

Summary

Work Type	Cost
Pipes	$ 11,712,565
Structures	$ 4,800,000
Total ($)	$ 16,512,565

Drainage Branch Cost Breakdown

Work Type	Quantity	Unit	Rate ($/unit)	Factor	Cost
BOUNDARY ST					
450 mm diameter pipe	195	m	$1,000	3	$584,492.52
675 mm diameter pipe	174	m	$1,200	3	$627,584.76
1500 mm diameter pipe	209	m	$1,855	3	$1,162,745.54
Junction Pits, jacking pits & Inlet/Outlet Structures	16	No.	$50,000		$800,000
					$3,174,823
FERRER ST					
1200 mm diameter pipe	283	m	$1,575	3	$1,338,382.24
Junction Pits, jacking pits & Inlet/Outlet Structures	6	No.	$50,000		$300,000
					$1,638,382
KERR ST					
600 mm diameter pipe	165	m	$1,150	3	$568,359.56
900 mm diameter pipe	138	m	$1,350	3	$558,808.11
1200 x 450 mm RCBC	2	m	$364	3	$2,128.43
Junction Pits, jacking pits & Inlet/Outlet Structures	11	No.	$50,000		$550,000
					$1,679,296
MONTAGUE ST					
900 mm diameter pipe	79	m	$1,350	3	$320,653.89
1200 mm diameter pipe	670	m	$1,575	3	$3,166,649.03
1200 x 600 mm RCBC	12	m	$416	3	$14,420.64
Junction Pits, jacking pits & Inlet/Outlet Structures	30	No.	$50,000		$1,500,000
					$5,001,724
LITTLE INGLES ST					
300 mm diameter pipe	1	m	$930	3	$1,882.82
450 mm diameter pipe	193	m	$1,000	3	$580,152.90
Junction Pits, jacking pits & Inlet/Outlet Structures	9	No.	$50,000		$450,000
					$1,032,036
SALMON ST					
525 mm diameter pipe	9	m	$1,075	3	$30,120.82
600 mm diameter pipe	49	m	$1,150	3	$169,243.27
750 mm diameter pipe	329	m	$1,250	3	$1,232,945.25
900 mm diameter pipe	258	m	$1,350	3	$1,045,389.12
1200 mm diameter pipe	11	m	$1,575	3	$51,048.43

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Junction Pits, jacking pits & Inlet/Outlet Structures	19	No.	$50,000		$950,000
					$3,478,747
WHITE ST					
600 mm diameter pipe	75	m	$1,150	3	$257,557.34
Junction Pits, jacking pits & Inlet/Outlet Structures	5	No.	$50,000		$250,000
					$507,557

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Appendix F8: Preliminary cost estimate breakdown for pipe upgrades

High level of service - 20-yr ARI

Summary

Work Type	Cost
Pipes	$ 27,523,222
Structures	$ 9,950,000
Total ($)	$ 37,473,222

Drainage Branch Cost Breakdown

Work Type	Quantity	Unit	Rate ($/unit)	Factor	Cost
BOUNDARY ST					
450 mm diameter pipe	92	m	$1,000	3	$276,802.47
600 mm diameter pipe	195	m	$1,150	3	$672,166.40
900 mm diameter pipe	164	m	$1,350	3	$665,082.09
1200 mm diameter pipe	15	m	$1,575	3	$71,262.45
1500 mm diameter pipe	209	m	$1,855	3	$1,162,745.54
3000 X 1500 mm RCBC	72	m	$2,351	3	$507,298.35
Junction Pits, jacking pits & Inlet/Outlet Structures	23	No.	$50,000		$1,150,000
					$4,505,357
FERRER ST					
650 mm diameter pipe	12	m	$1,180	3	$41,807.40
1350 mm diameter pipe	154	m	$1,710	3	$790,935.71
Junction Pits, jacking pits & Inlet/Outlet Structures	6	No.	$50,000		$300,000
					$1,132,743
KERR ST					
450 mm diameter pipe	78	m	$1,000	3	$235,205.34
600 mm diameter pipe	83	m	$1,150	3	$285,718.31
900 mm diameter pipe	235	m	$1,350	3	$953,597.45
900 x 450 mm RCBC	2	m	$360	3	$2,100.28
Junction Pits, jacking pits & Inlet/Outlet Structures	19	No.	$50,000		$950,000
					$952,100
LITTLE INGLES ST					
300 mm diameter pipe	1	m	$930	3	$1,882.82
600 mm diameter pipe	193	m	$1,150	3	$667,175.66
900 mm diameter pipe	88	m	$1,350	3	$355,711.95
Junction Pits, jacking pits & Inlet/Outlet Structures	12	No.	$50,000		$600,000
					$1,624,770
MONTAGUE ST					
300 mm diameter pipe	2	m	$930	3	$6,342.43
900 mm diameter pipe	136	m	$1,350	3	$550,446.56
1200 mm diameter pipe	161	m	$1,575	3	$762,322.00
1500 mm diameter pipe	37	m	$1,855	3	$205,526.13

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1650mm diameter pipe	437	m	$2,160	3	$2,830,780.22
1200 X 1500mm RCBC	6	m	$998	3	$17,303.03
1350 X 730mm RCBC	16	m	$766	3	$36,446.21
Junction Pits, jacking pits & Inlet/Outlet Structures	38	No.	$50,000		$1,900,000
					$6,309,167

PLUMMER ST					
525 mm diameter pipe	11	m	$1,075	3	$36,591.43
600 mm diameter pipe	324	m	$1,150	3	$1,118,900.55
675 mm diameter pipe	19	m	$1,200	3	$68,043.96
900 mm diameter pipe	14	m	$1,350	3	$56,083.19
1050 mm diameter pipe	113	m	$1,455	3	$494,308.31
1200 mm diameter pipe	131	m	$1,575	3	$619,510.06
1500 mm diameter pipe	9	m	$1,855	3	$49,077.35
1650 mm diameter pipe	21	m	$2,160	3	$134,228.02
1800 mm diameter pipe	428	m	$2,435	3	$3,125,697.59
1950 mm diameter pipe	377	m	$2,555	3	$2,891,961.96
2100 mm diameter pipe	129	m	$3,110	3	$1,205,147.70
Junction Pits, jacking pits & Inlet/Outlet Structures	57	No.	$50,000		$2,850,000
					$12,649,550

SALMON ST					
300 mm diameter pipe	19	m	$930	3	$54,343.76
600 mm diameter pipe	58	m	$1,150	3	$201,465.54
900 mm diameter pipe	531	m	$1,350	3	$2,148,644.07
1200 mm diameter pipe	666	m	$1,575	3	$3,148,230.98
Junction Pits, jacking pits & Inlet/Outlet Structures	32	No.	$50,000		$1,600,000
					$7,152,684

WHITE ST					
450 mm diameter pipe	95	m	$1,000	3	$284,094.30
600 mm diameter pipe	228	m	$1,150	3	$788,234.92
Junction Pits, jacking pits & Inlet/Outlet Structures	12	No.	$50,000		$600,000
					$1,672,329

Appendix F9: Preliminary cost estimate breakdown for pumping stations

High level of service

											4	30%	
Pump Name	Peak Flow (m3/s)	Peak Flow (m3/h)	Rqd Pipe Diameter	Dist to Yarra	Pipe Losses	Level (mAHD	Static Head	Total Head	Power (kW)	Reference Rate ($) 2017	Civil works multiplier	Contingency	COST ESTIMATE $
Lorimer St 1	3.39	12218	1.5	97.3003	0.15	1.05	1.4	1.5	67	278,572	1,114,289.72	334,286.9	**1,450,000**
SWhDr_2	2.15	7751	1.2	149.163	0.30	0.98	1.4	1.7	49	215,454	861,816.01	258,544.8	**1,130,000**
Lorimer St 2	2.12	7632	1.2	149.005	0.29	0.78	1.6	1.9	53	230,514	922,055.65	276,616.7	**1,200,000**
Lorimer St 4	1.22	4392	0.9	84.65	0.25	1.64	0.8	1.0	16	103,581	414,322.87	124,296.9	**540,000**
Montague St	6.40	23040	2.1	266.36	0.26	1.82	0.6	0.8	71	291,052	1,164,208.63	349,262.6	**1,520,000**
White St	1.08	3874	0.9	255.371	0.58	0.95	1.5	2.0	29	146,777	587,108.63	176,132.6	**770,000**
Ferrer St	2.23	8017	1.2	517.774	1.13	1.12	1.3	2.4	70	288,869	1,155,477.57	346,643.3	**1,510,000**
Lorimer St 3	0.84	3024	0.75	113.693	0.41	2.07	0.3	0.7	8	76,277	305,107.57	91,532.3	**400,000**
Salmon St	4.33	15581	1.8	136.039	0.14	1.90	0.5	0.6	36	172,216	688,863.46	206,659.0	**900,000**
Turner St	2.93	10552	1.5	75.4123	0.09	2.06	0.3	0.4	16	104,957	419,827.11	125,948.1	**550,000**
Kew St	1.45	5234	1.05	443.929	0.83	1.55	0.8	1.7	32	158,189	632,756.17	189,826.9	**830,000**
Lorimer St 8	0.26	932	0.45	101.381	0.50	1.80	0.6	1.1	4	61,238	244,953.56	73,486.1	**320,000**
Lorimer St 6	0.39	1415	0.525	118.506	0.59	1.54	0.9	1.4	7	74,102	296,408.44	88,922.5	**390,000**
Lorimer St 5	1.39	4997	1.05	108.986	0.19	1.71	0.7	0.9	16	103,275	413,098.64	123,929.6	**540,000**
Lorimer St 7	1.31	4698	1.05	90.6978	0.14	1.79	0.6	0.7	13	92,192	368,766.10	110,629.8	**480,000**
													12,530,000

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180 Lonsdale Street
Melbourne, Victoria 3000
T: (03) 8687 8000 F: (03) 8687 8111 E: melmail@ghd.com.au

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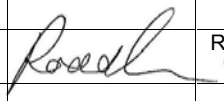
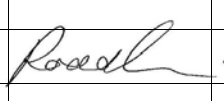
Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Draft A	P Joyce	R Mickelson		R Mickelson		18/11/2016
Final	P Joyce	R Mickelson		R Mickelson		17/2/2017

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