6. Levee Maintenance

6.1. Inspections

6.1.1. Routine Inspections

Frequency: quarterly

Purpose: To inspect the embankment for any changes in batters, crest width and height. To monitor erosion, sink holes, drainage, invasive weeds, tree growth, damage caused by animals. Inspect stockpile area for material quantity and access.

Reporting: A checklist should be developed that can be ticked off and field comments added. Repairs to be organised prior to next inspection.

6.1.2. Comprehensive Inspections

Frequency: Five yearly

Purpose: Survey levee to check crest and batters are on design grade and height. Survey of long section to check for movement. All items included in routine inspection.

Reporting: Prepare survey report and recommendations for maintenance if required.

6.1.3. Post Flood Inspections

Frequency: Following flood event

Purpose: check freeboard consistency, erosion and washouts, signs of leakage, subsidence, remove debris. Check adequacy of seal between permanent and removable levee wall.

Reporting: Record water heights along levee, record damage, repairs to be organised.

6.2. Maintenance

6.2.1. Clearances

- Clearances refers to regrowth vegetation as well as infrastructure, such as dwellings and utilities.
- A buffer distance of a minimum 12m should be maintained between any regrowth and the footprint of the embankment to minimize moisture loss in & under the embankment. Lateral roots can be deep ripped to stop incursion.
- Infrastructure should be a minimum of 10m away from the toe of the bank to allow for maintenance & future changes to the footprint of the bank.

6.2.2. Vegetation

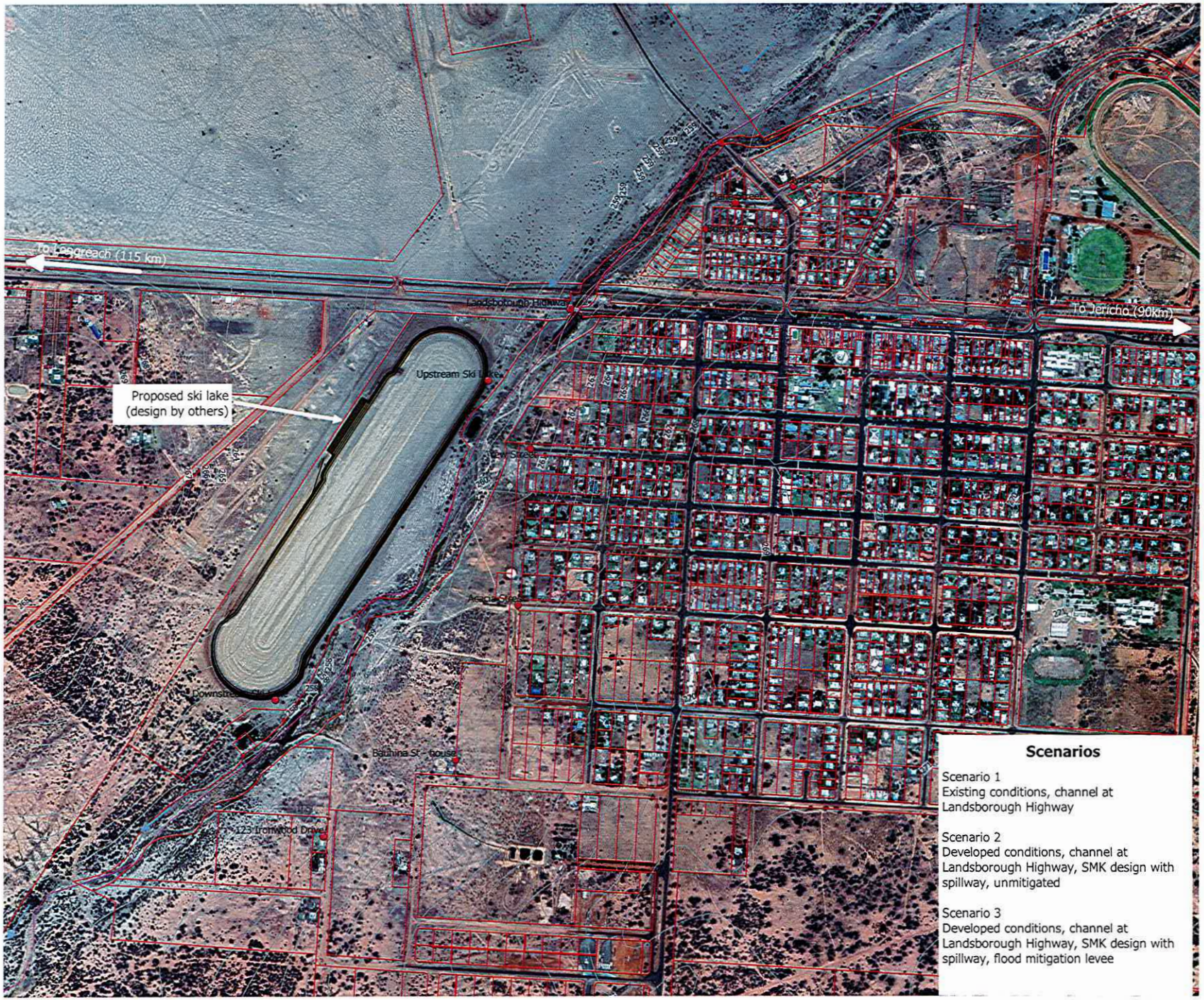
- Topsoil is to spread over the embankment during the construction
- A grass cover is to be encouraged to grow over the external batter and the internal batter away from crop areas. Grasses such as native couch are preferred.
- Rank growth should be slashed.
- Debris should be removed from the embankment to allow for slashing.
- Weed control should be undertaken to avoid spread to the surrounding area.

6.2.3. Animals

- Domestic stock should be excluded from the levee bank.

6.2.4. Grading and trimming

- Cracking of the bank is expected during prolonged dry periods.
- The crest of the bank needs to be maintained so that rain water is shed and not ponded. Wheel ruts, sink holes, cracks are to filled with fines during grading.
- Where possible the trimming should be undertaken with a grader so that a camber can be maintained sloping away from the centerline of the bank.



Scenarios

Scenario 1
Existing conditions, channel at Landsborough Highway

Scenario 2
Developed conditions, channel at Landsborough Highway, SMK design with spillway, unmitigated

Scenario 3
Developed conditions, channel at Landsborough Highway, SMK design with spillway, flood mitigation levee

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Barcaldine Recreation Park Flood Impact Assessment

Figure 1 of 40.
Flood Innundation Mapping Overview

Legend

- Flood innundation_Critical Points
- Contours
- SMK Design
- Cadastral_data_LOTBDY
- Surface HydroLines National

A3 Scale: 1:10000
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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

Figure 2 of 40.
Flood Innundation Mapping
Scenario 1 - 50% Aep

Legend

- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
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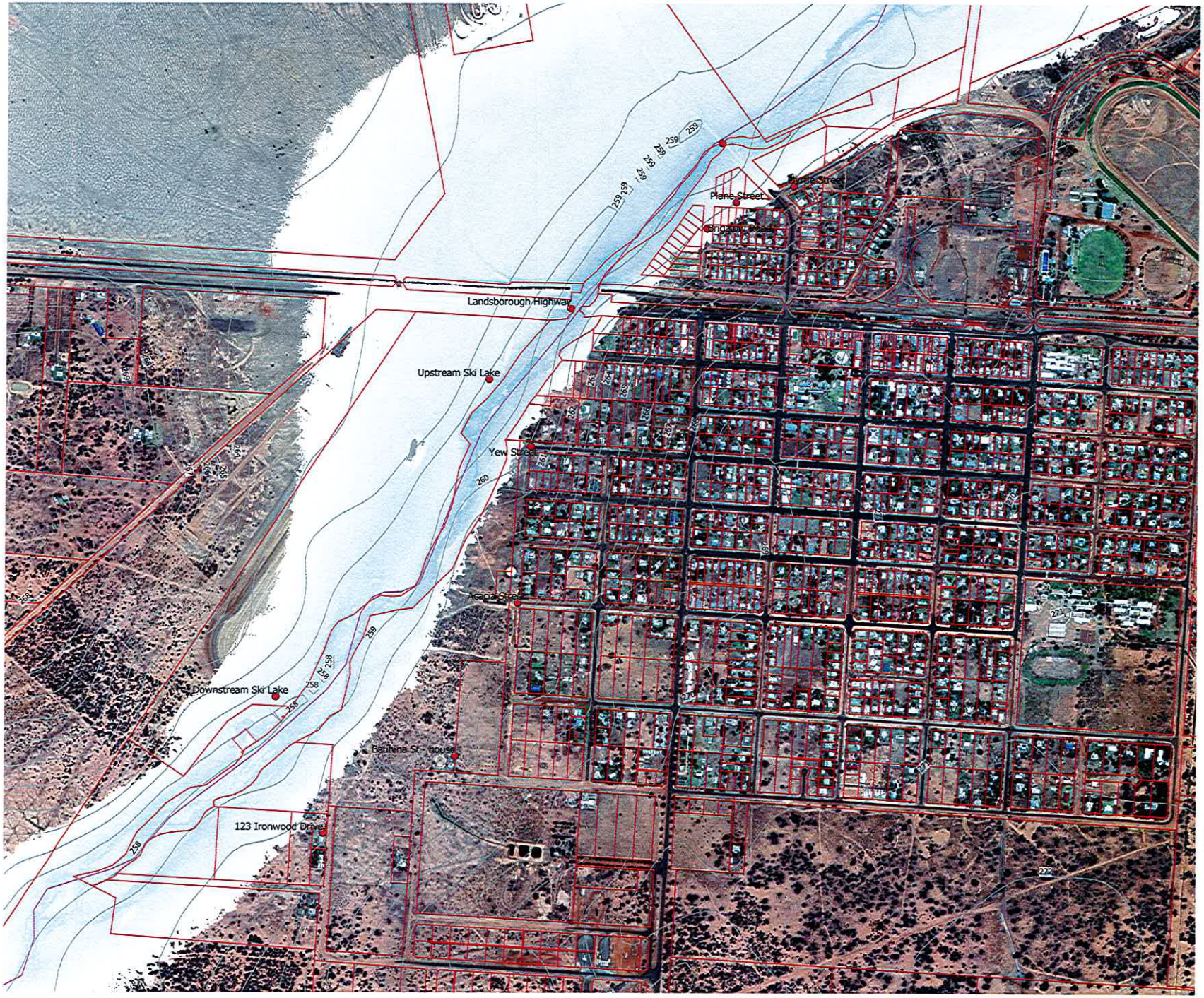

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Barcaldine Recreation Park Flood Impact Assessment

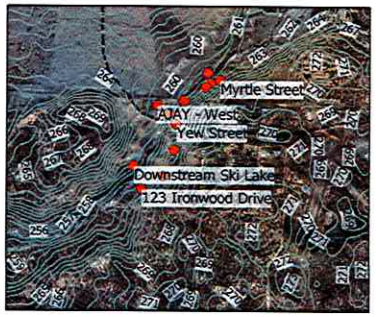
Figure 3 of 40.
Flood Innundation Mapping
Scenario 1 - 10% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



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Barcaldine Recreation Park Flood Impact Assessment

Figure 4 of 40.
Flood Innundation Mapping
Scenario 1 - 5% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

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0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

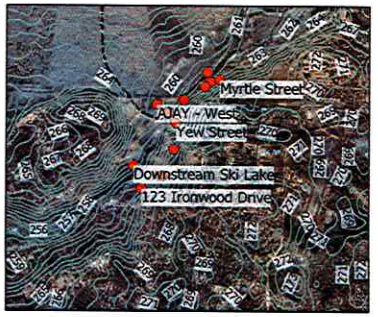
Figure 5 of 40.
Flood Innundation Mapping
Scenario 1 - 1% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
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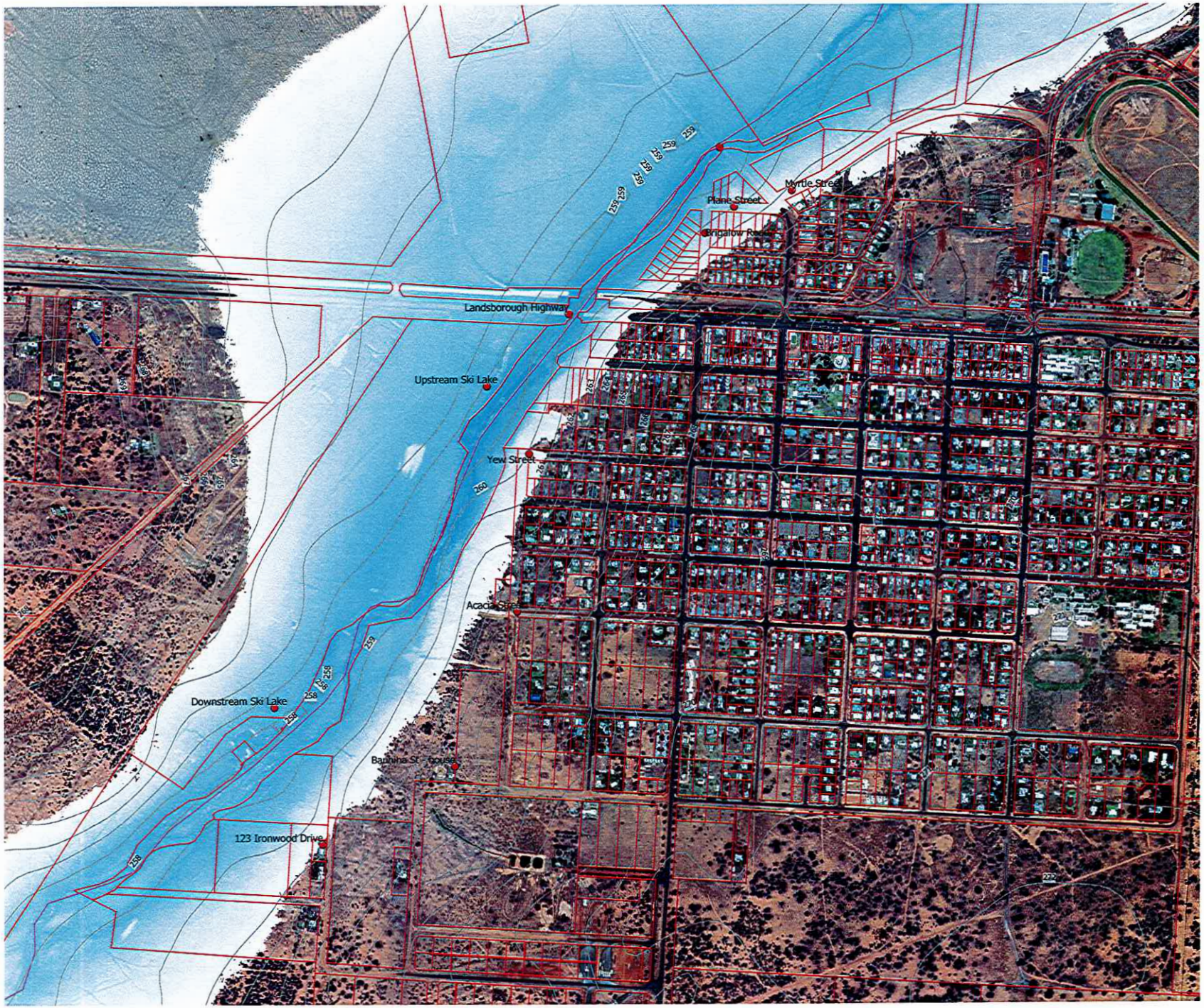

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Barcaldine Recreation Park Flood Impact Assessment

Figure 6 of 40.
Flood Innundation Mapping
Scenario 1 - 0.2% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
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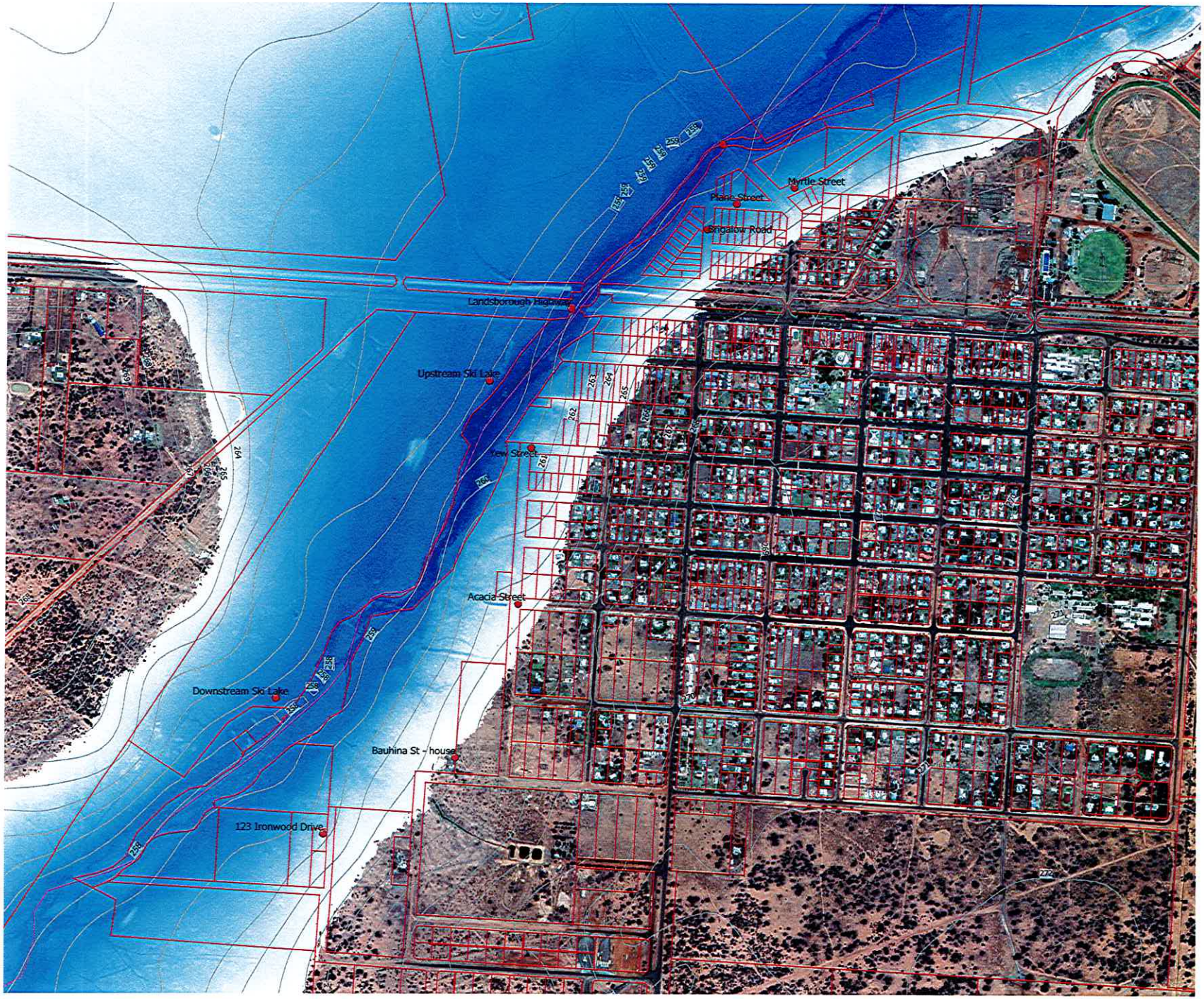

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Barcaldine Recreation Park Flood Impact Assessment

Figure 7 of 40.
Flood Innundation Mapping
Scenario 1 - Pmf

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

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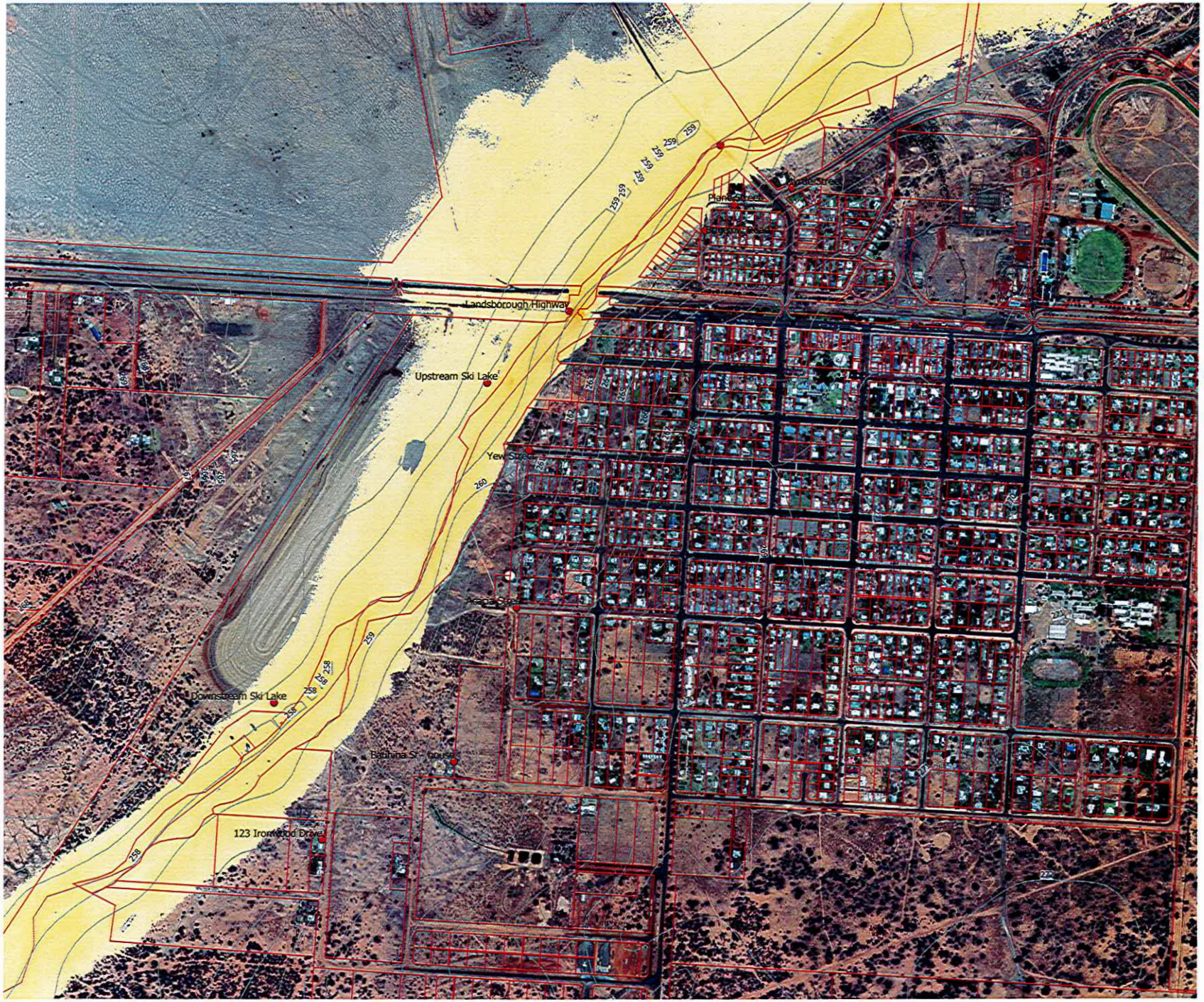
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 8 of 40.
Flood Innundation Mapping
Scenario 1 - 50% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
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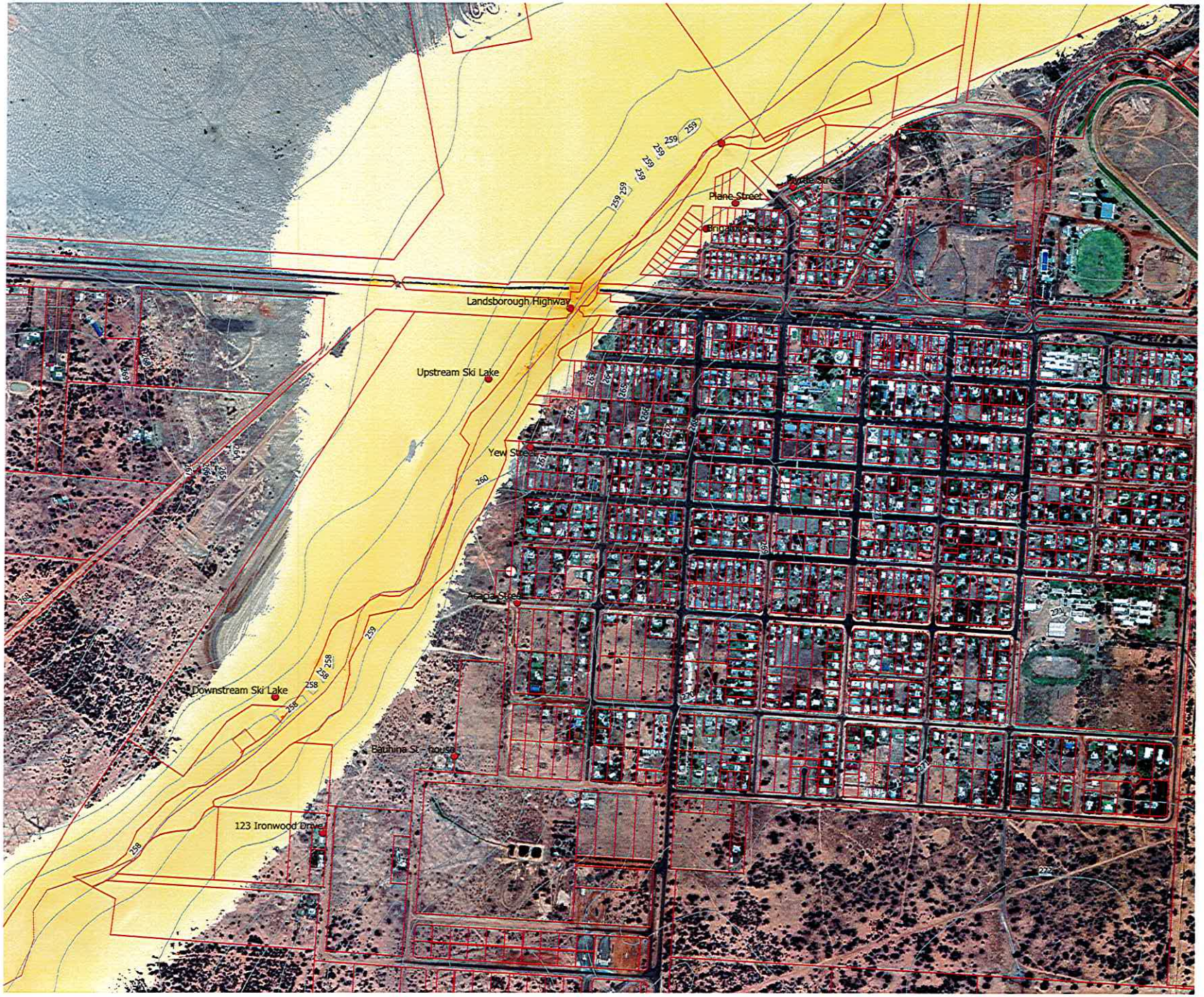
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

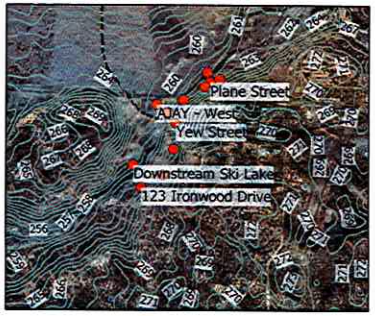
Figure 9 of 40.
Flood Innundation Mapping
Scenario 1 - 10% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



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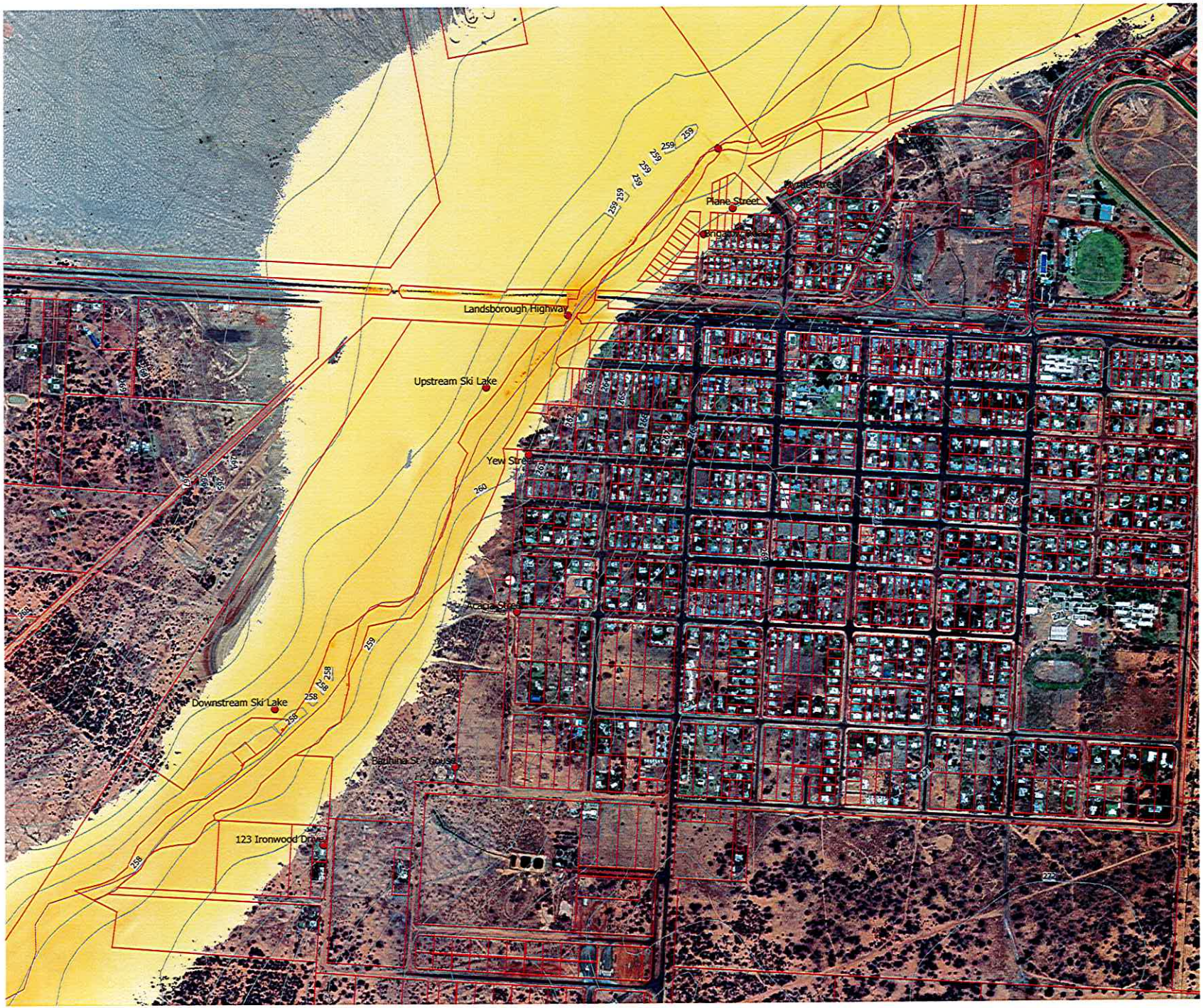
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 10 of 40.
Flood Innundation Mapping
Scenario 1 - 5% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

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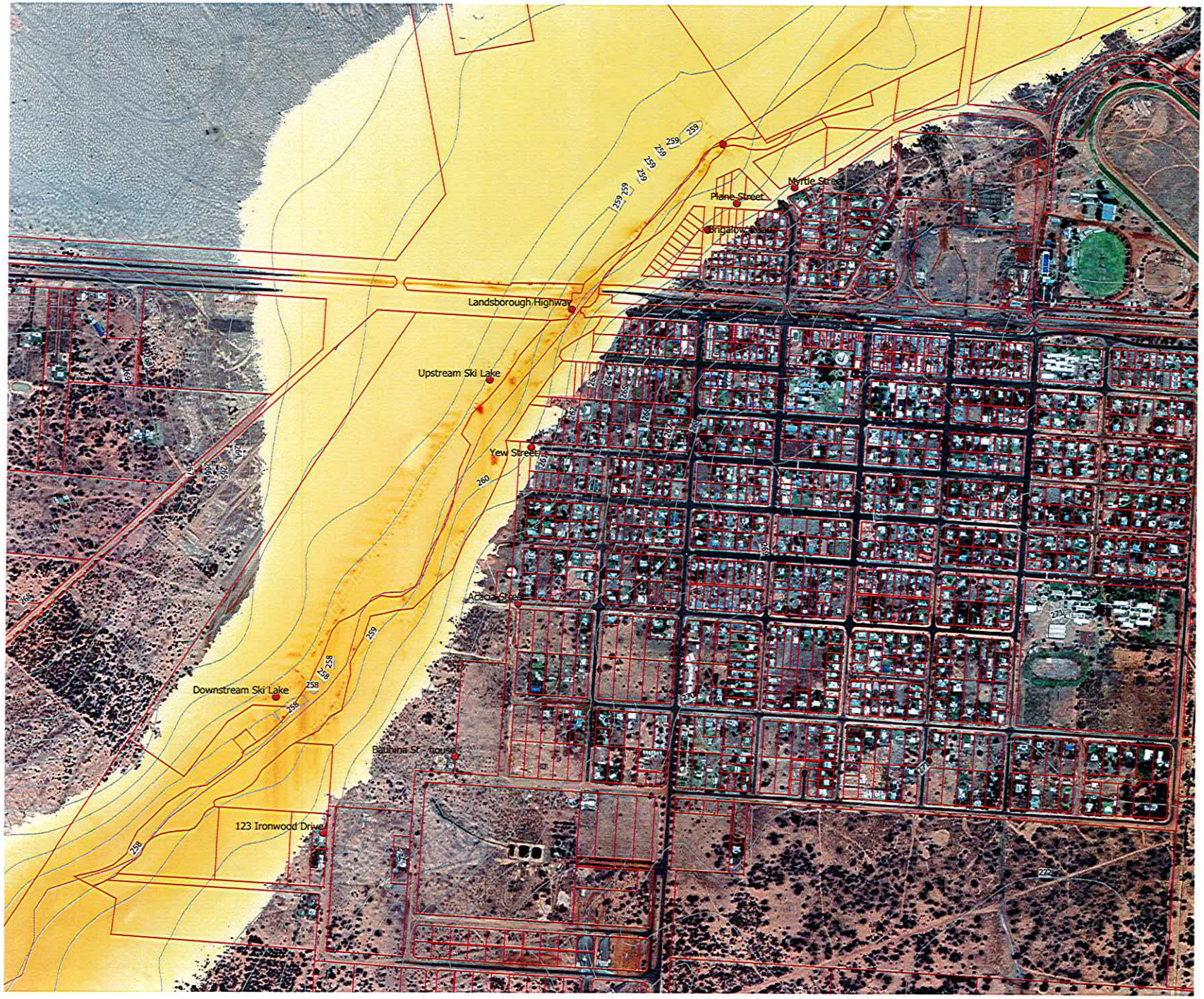
0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

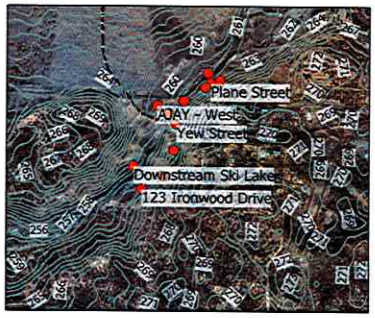
Figure 11 of 40.
Flood Innundation Mapping
Scenario 1 - 1% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



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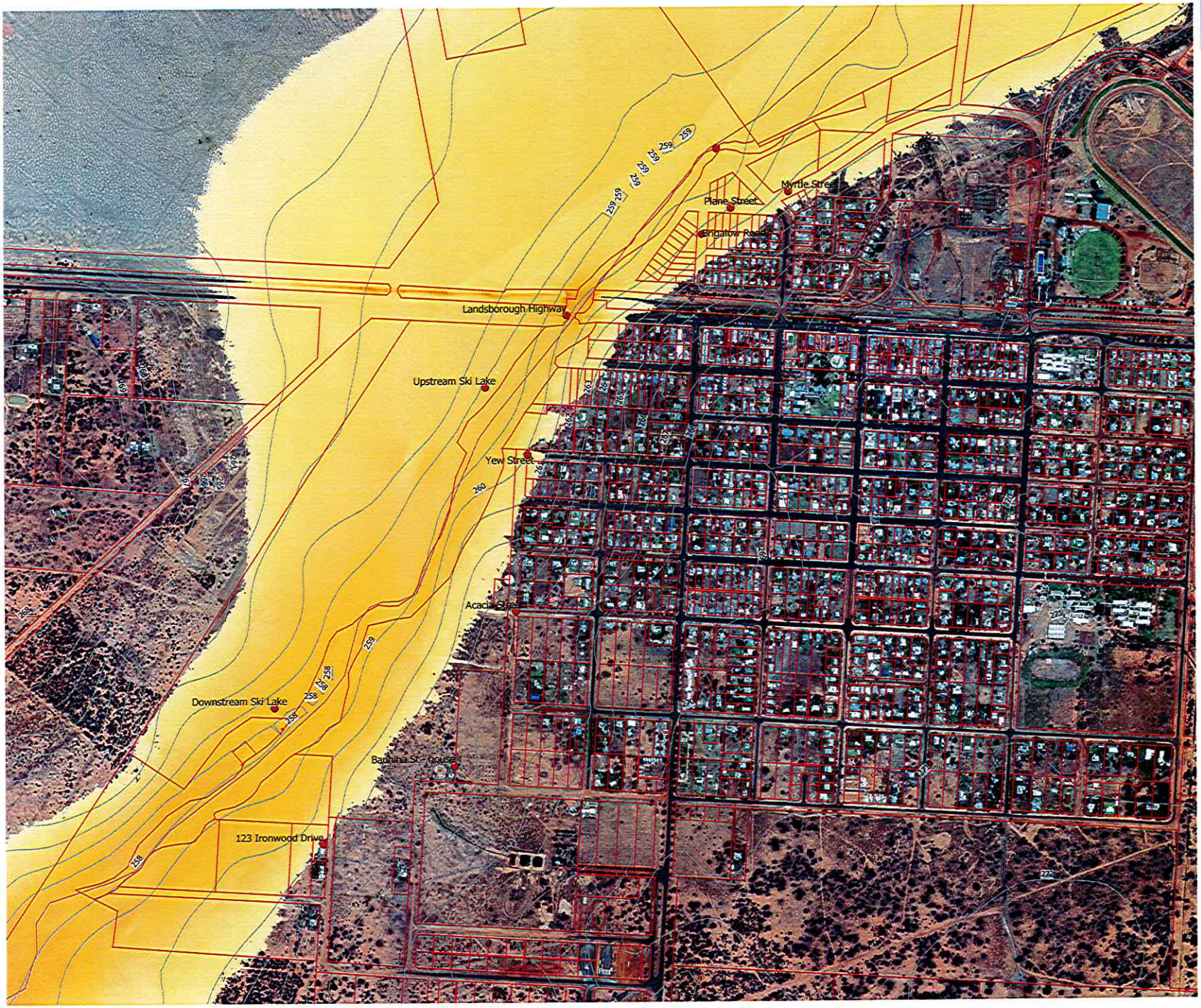
0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 12 of 40.
Flood Innundation Mapping
Scenario 1 - 0.2% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
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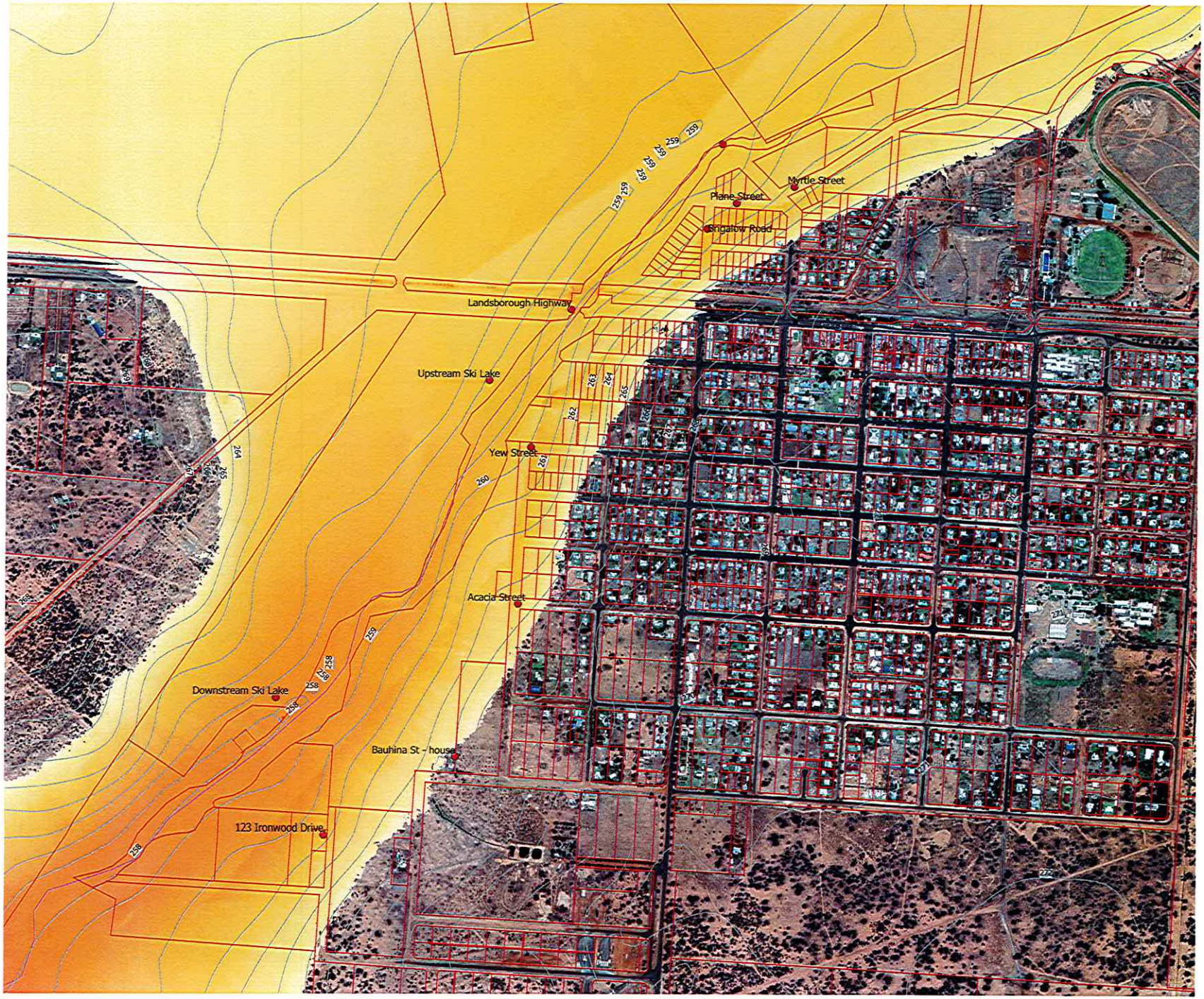
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

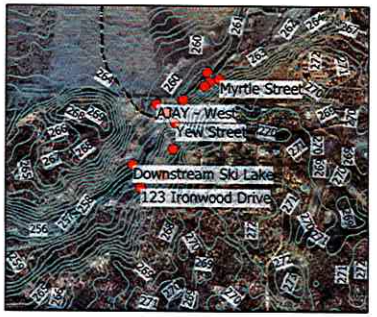
Figure 13 of 40.
Flood Innundation Mapping
Scenario 1 - Pmf Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

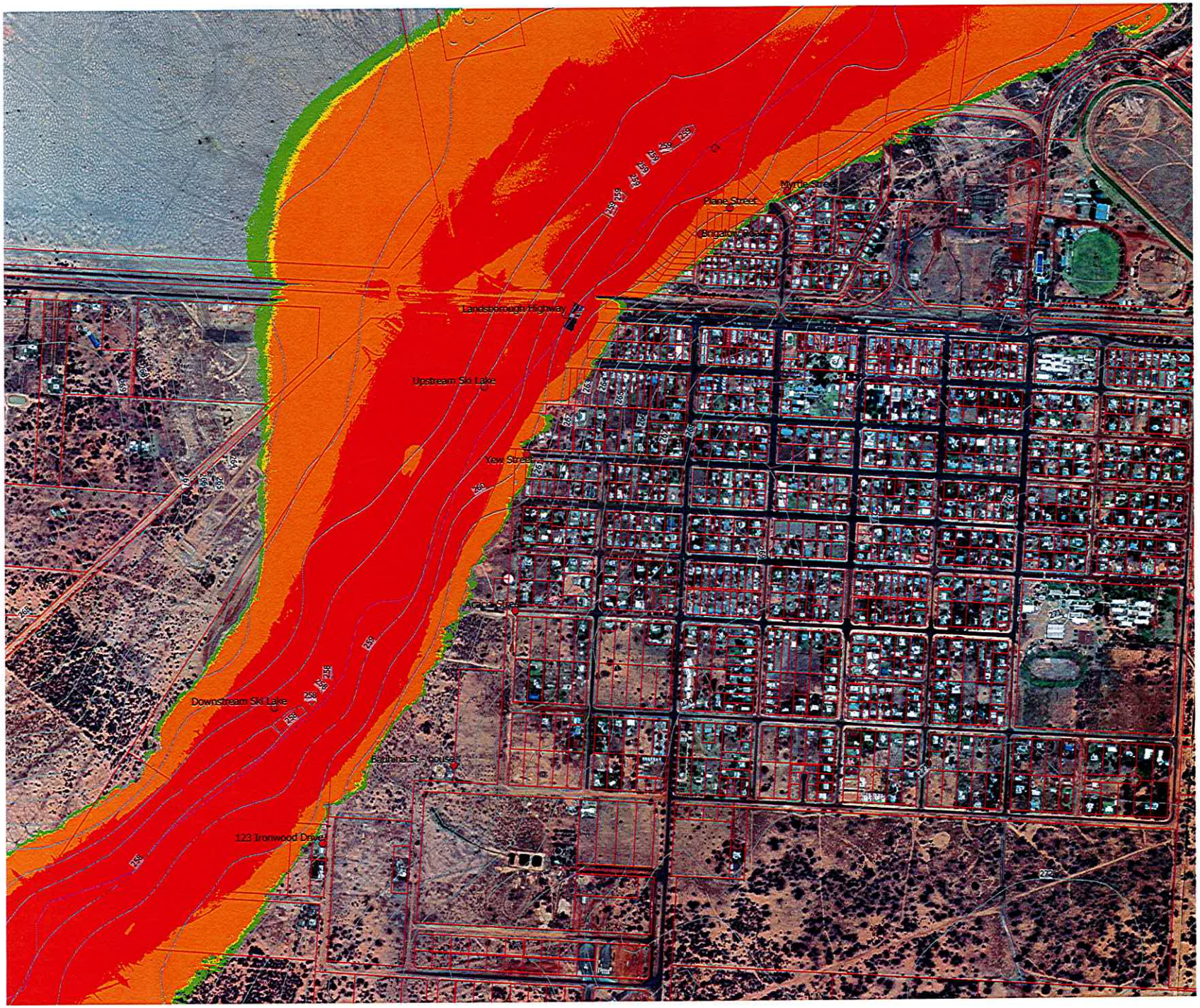


A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
23/07/2020

N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 14 of 40.
Flood Innundation Mapping
Scenario 1: 1% Aep D * V

Legend

- Cadastral_data_LOTBDY
- contour
- SMK Design cont contour LineString
- Flood innundation_Critical Points-
- Surface HydroLines National
- LOW (<0.6)
- SIGNIFICANT (0.6 to <0.8)
- HIGH (0.8 to <1.2)
- EXTREME (>1.2)

A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
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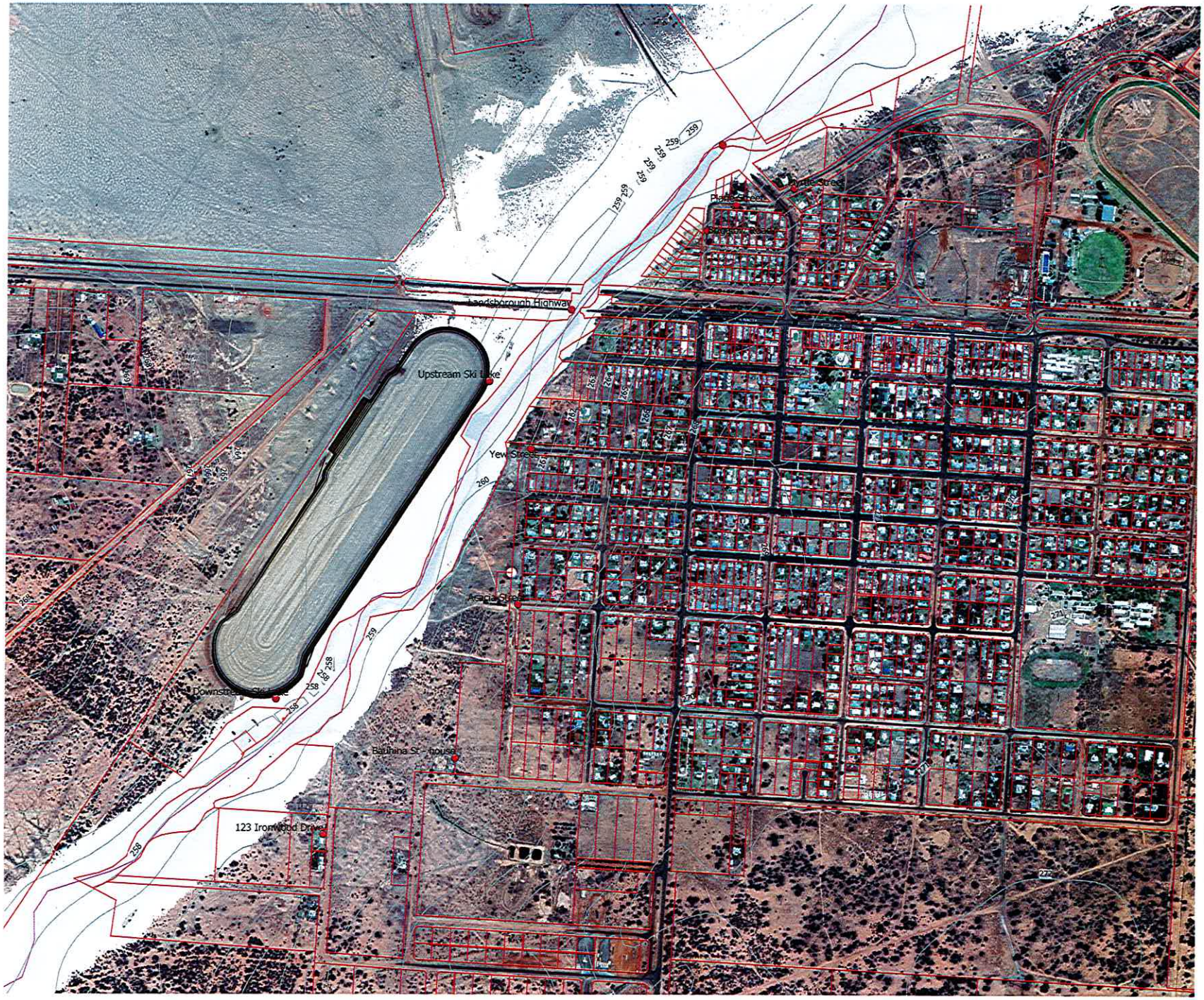
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

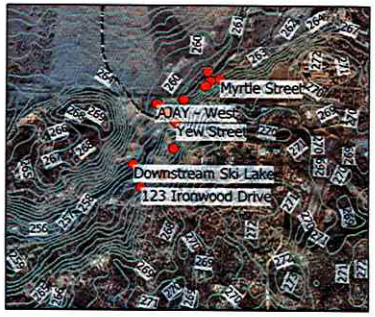
Figure 15 of 40.
Flood Innundation Mapping
Scenario 2 - 50% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



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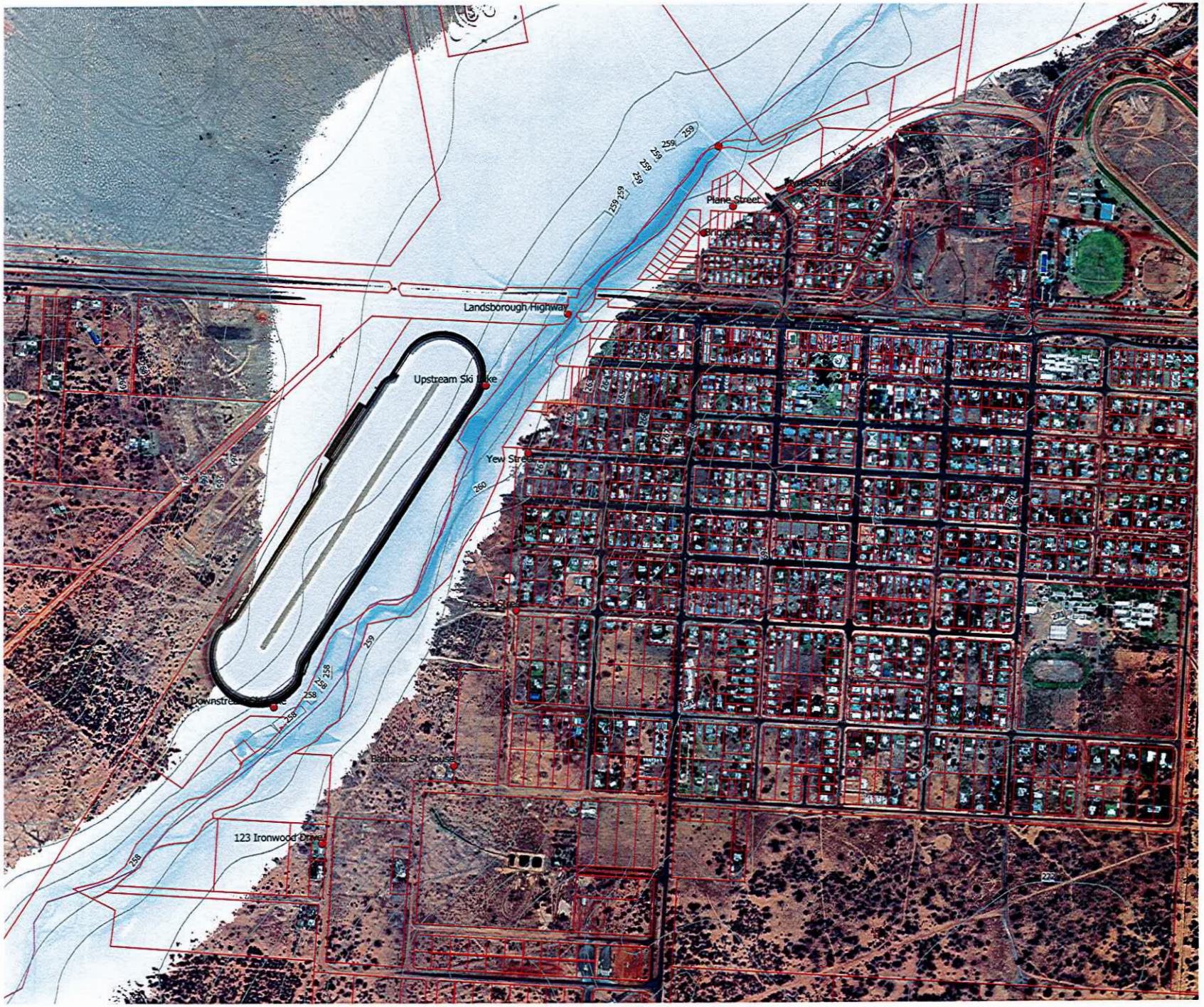
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 16 of 40.
Flood Innundation Mapping
Scenario 2 - 10% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

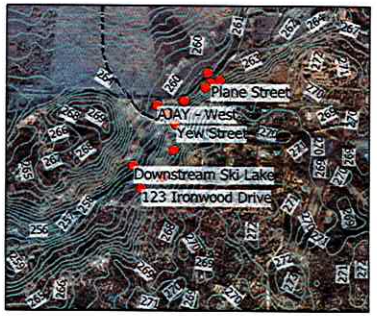
Figure 17 of 40.
Flood Innundation Mapping
Scenario 2 - 5% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

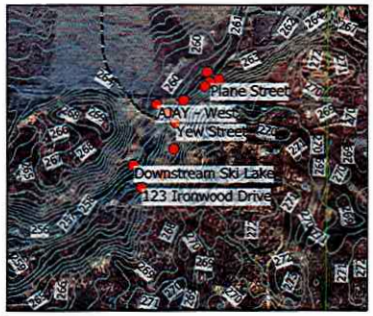
Figure 18 of 40.
Flood Innundation Mapping
Scenario 2 - 1% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



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Job ID: 190005
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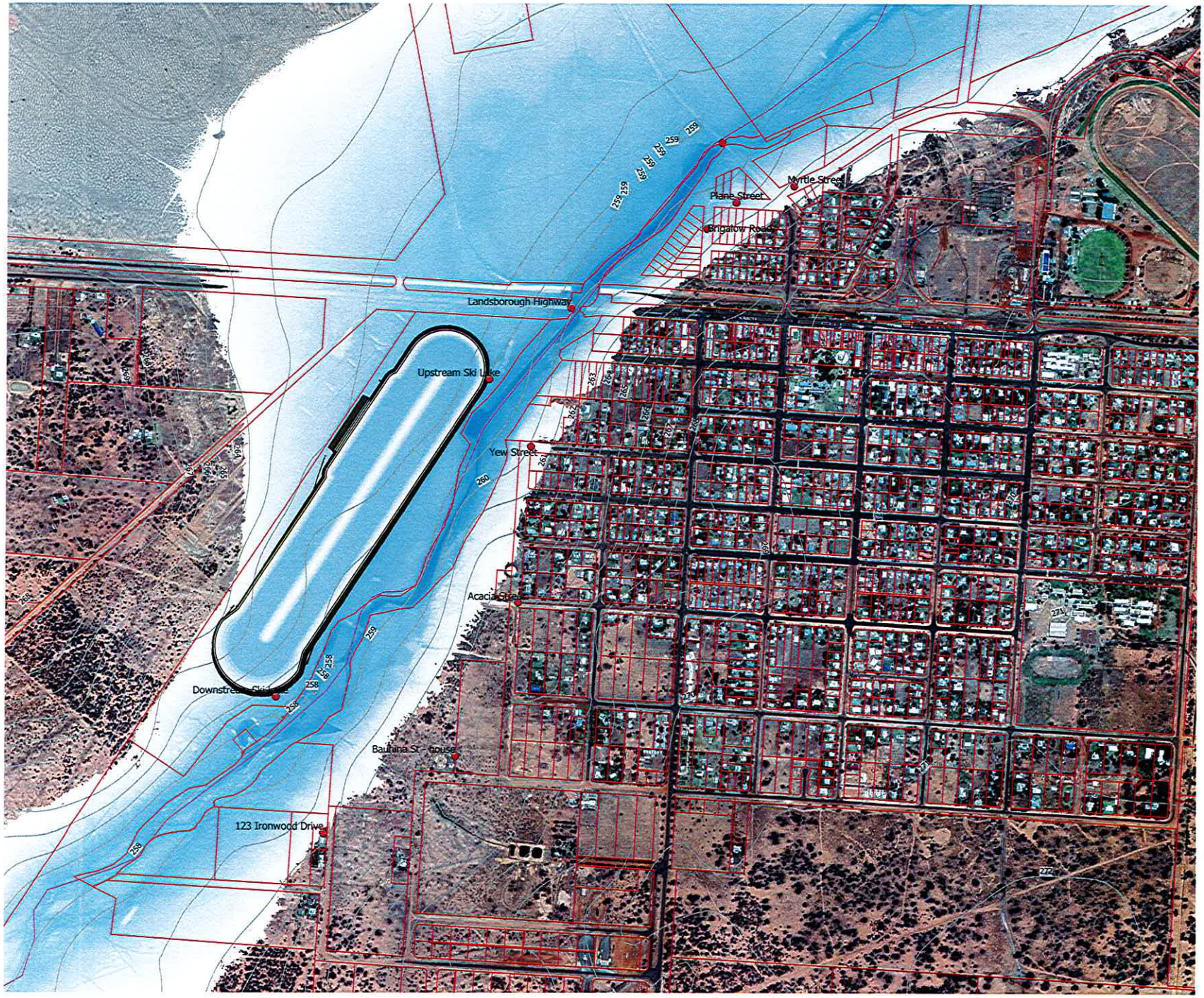
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 19 of 40.
Flood Innundation Mapping
Scenario 2 - 0.2% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

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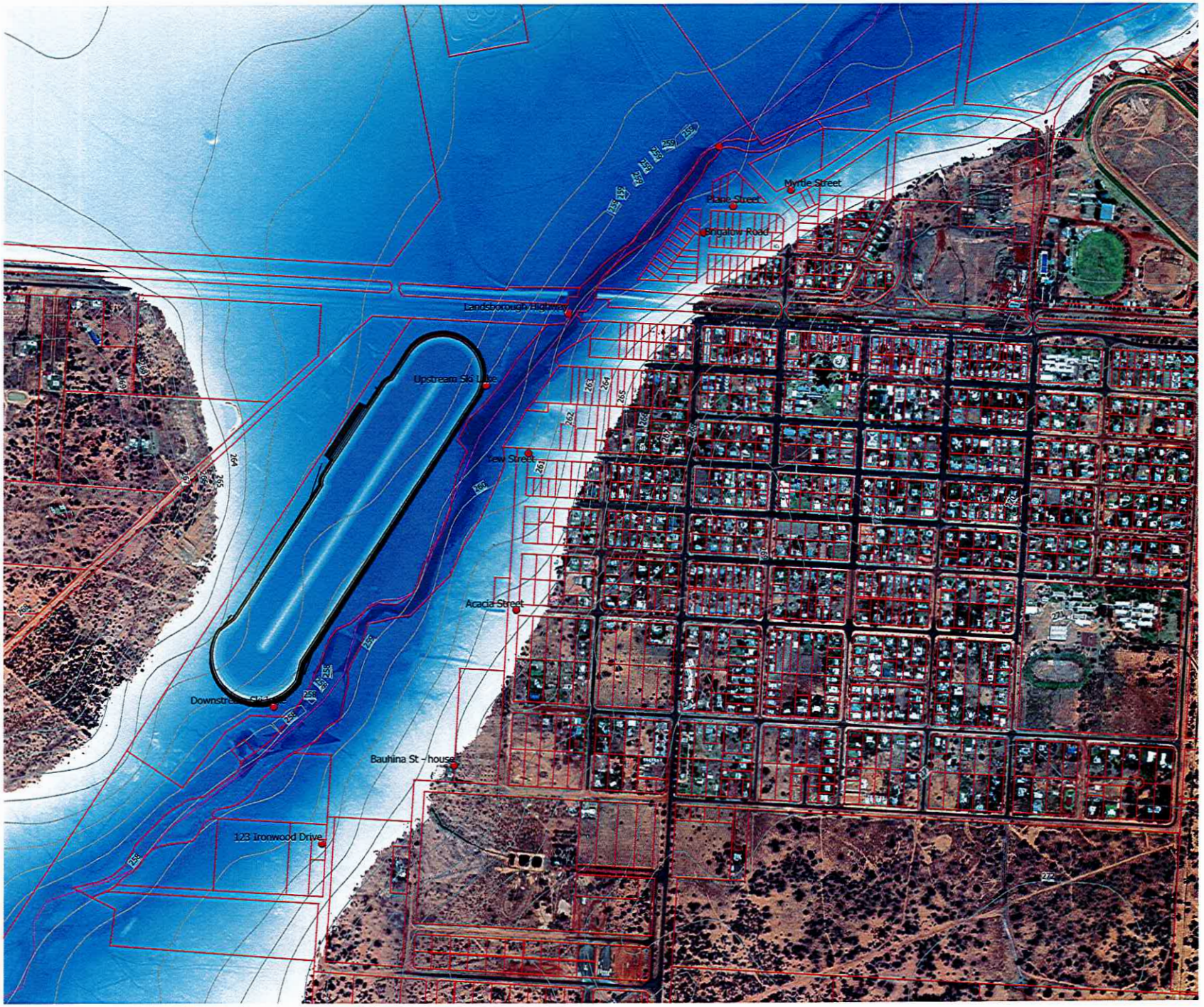
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 20 of 40.
Flood Innundation Mapping
Scenario 2 - Pmf

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

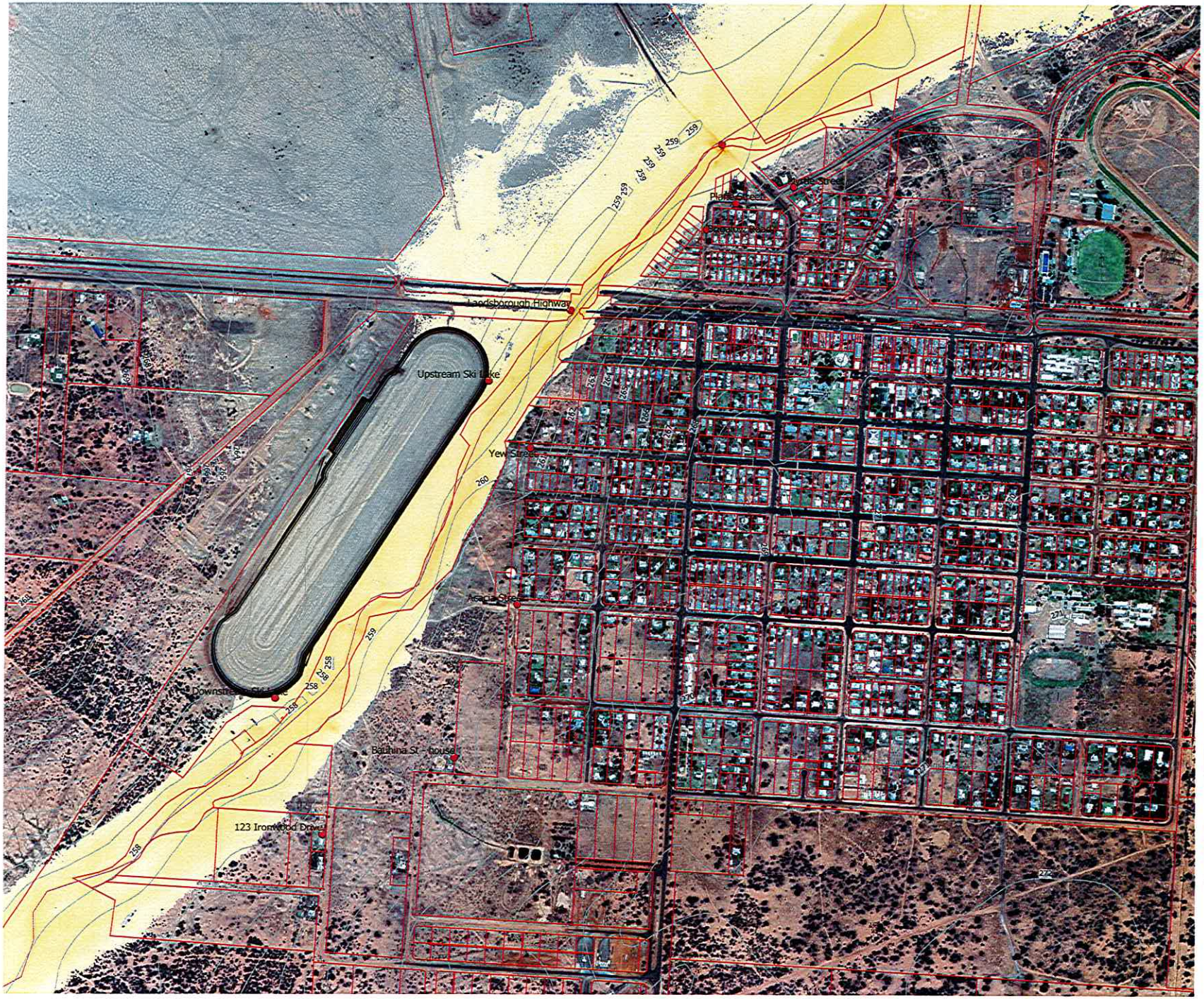
- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
23/07/2020

N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

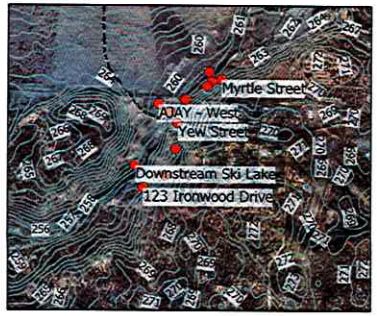
Figure 21 of 40.
Flood Innundation Mapping
Scenario 2 - 50% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

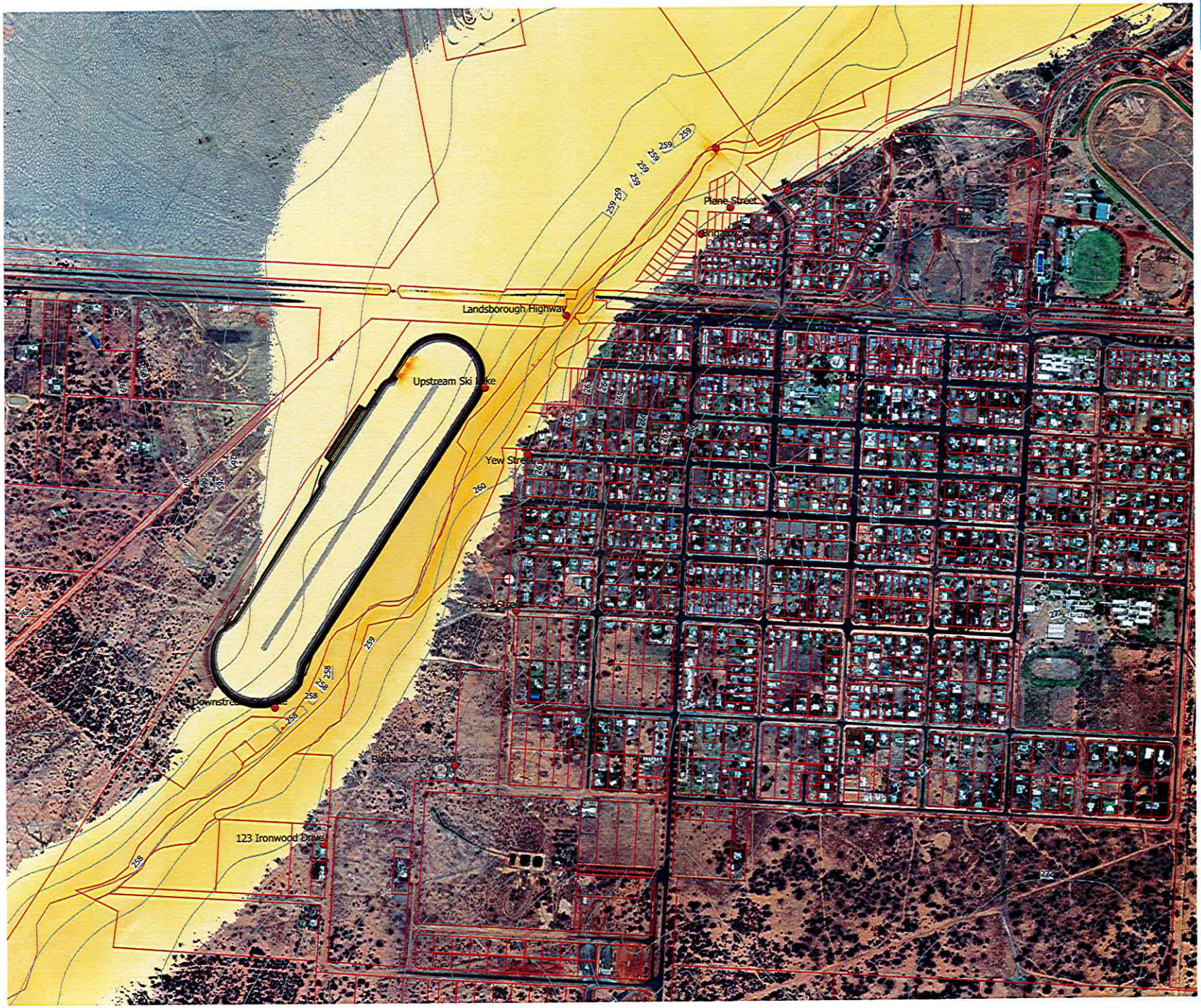


A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
23/07/2020

N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

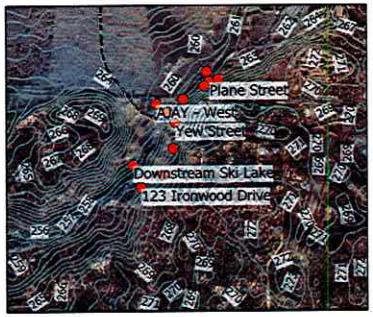
Figure 22 of 40.
Flood Innundation Mapping
Scenario 2 - 10% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
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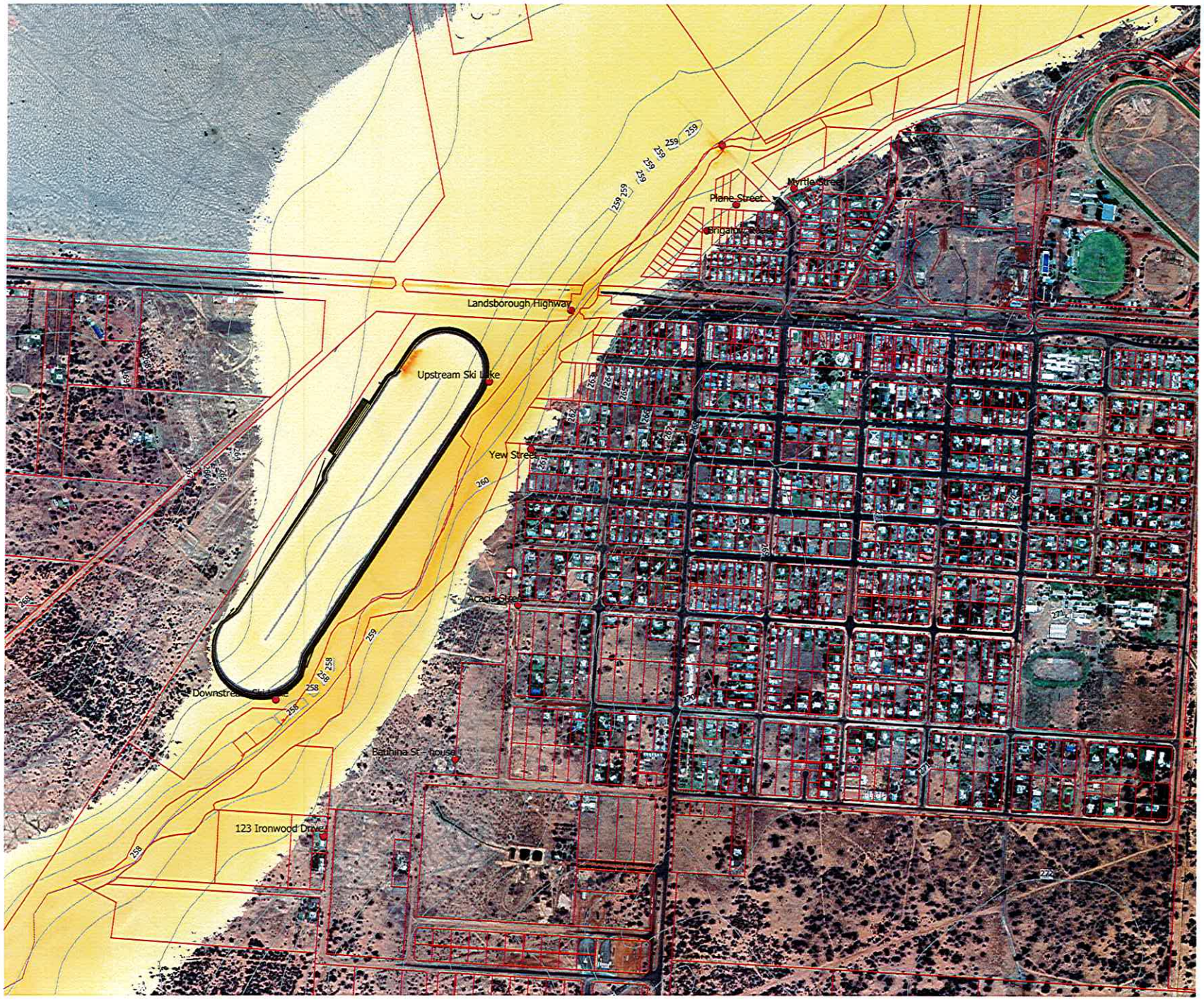
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 23 of 40.
Flood Innundation Mapping
Scenario 2 - 5% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
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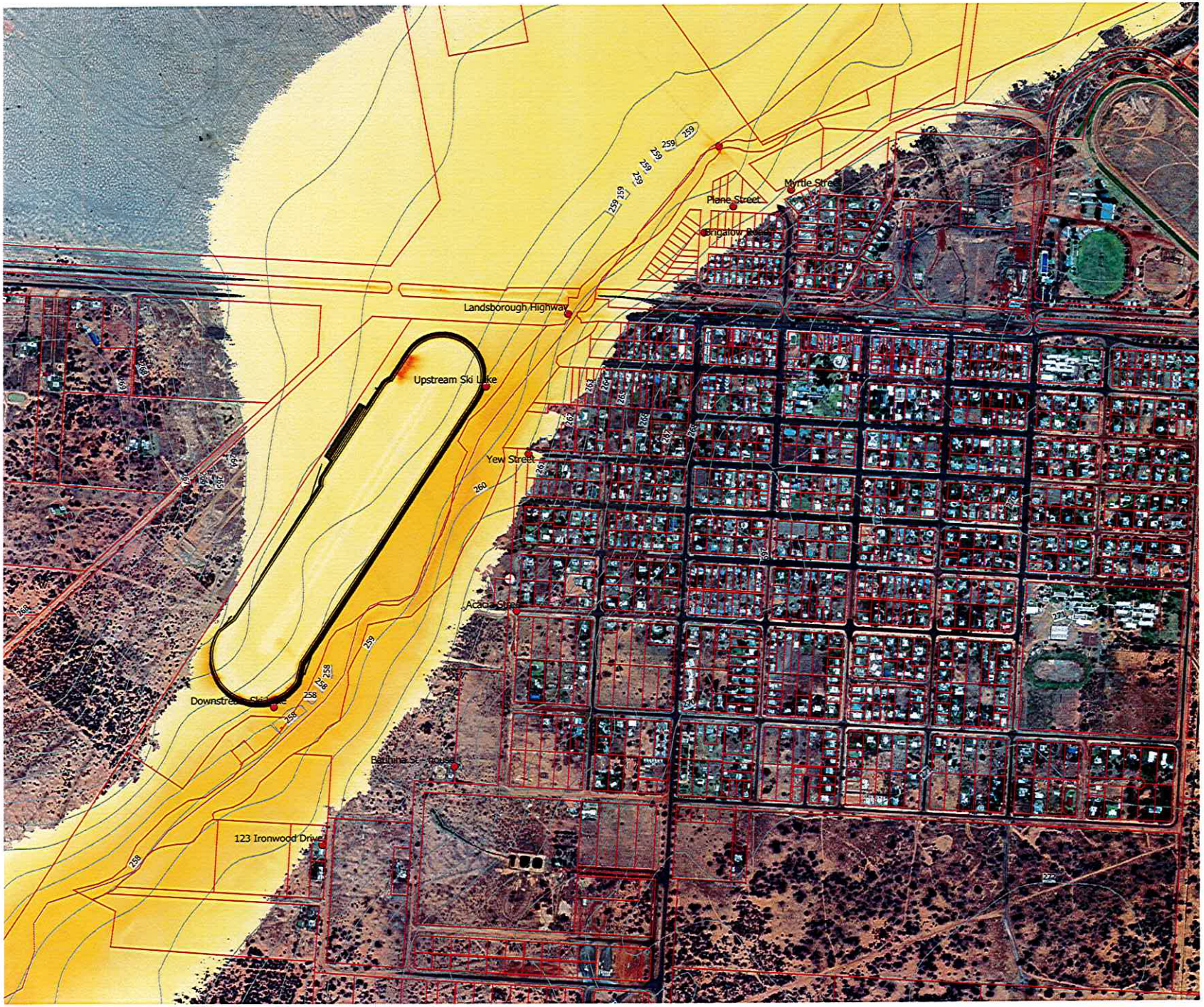
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 24 of 40.
Flood Innundation Mapping
Scenario 2 - 1% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

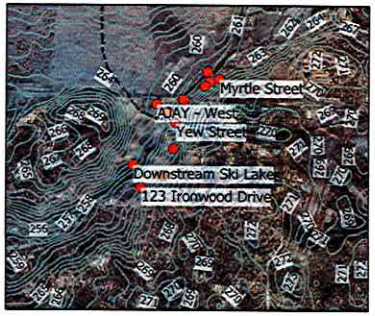
Figure 25 of 40.
Flood Innundation Mapping
Scenario 1 - 0.2% Aep Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



A3 Scale: 1:10000
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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

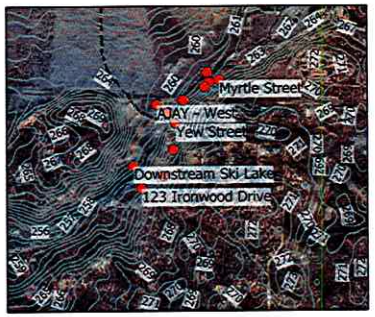
Figure 26 of 40.
Flood Innundation Mapping
Scenario 2 - Pmf Velocity

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Velocity (Max) m/s

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



A3 Scale: 1:10000
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Job ID: 190005
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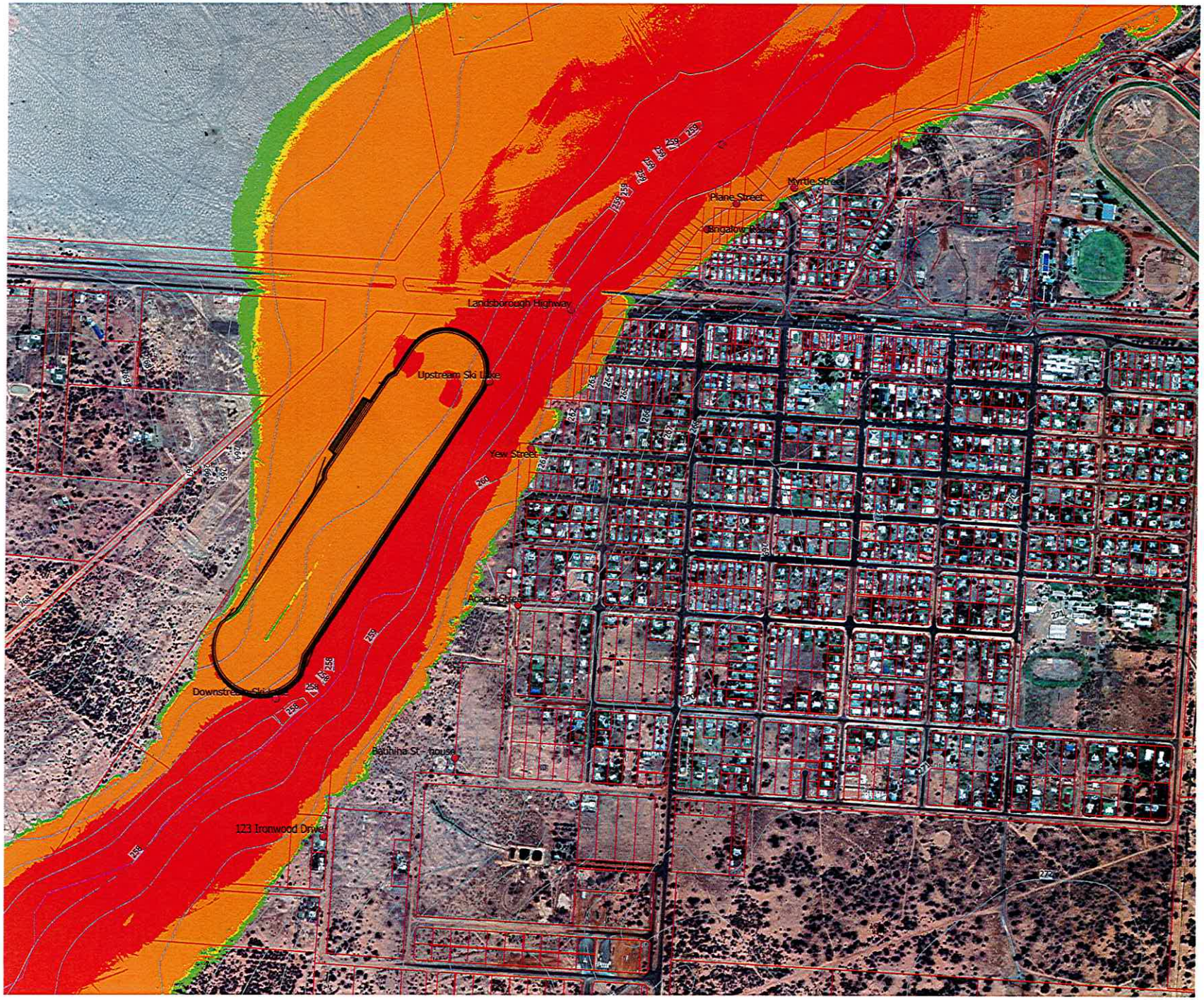
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 27 of 40.
Flood Innundation Mapping
Scenario 2: 1% Aep D * V

Legend

- Cadastral_data_LOTBDY
- contour
- SMK Design cont contour LineString
- Flood innundation_Critical Points-
- Surface HydroLines National
- LOW (<0.6)
- SIGNIFICANT (0.6 to <0.8)
- HIGH (0.8 to <1.2)
- EXTREME (>1.2)

A3 Scale: 1:10000
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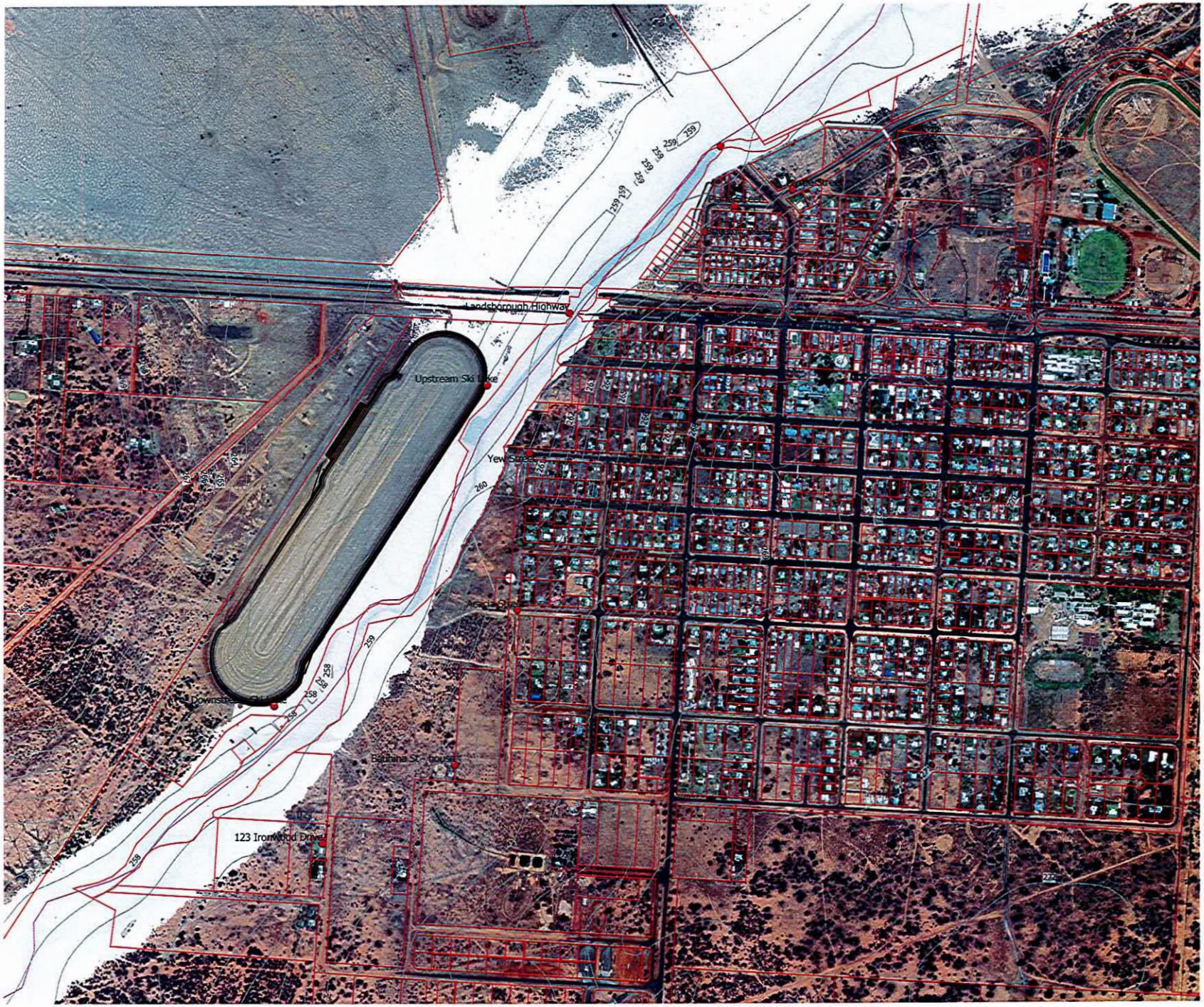
N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 28 of 40.
Flood Innundation Mapping
Scenario 3 - 50% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

Figure 29 of 40.
Flood Innundation Mapping
Scenario 3 - 10% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

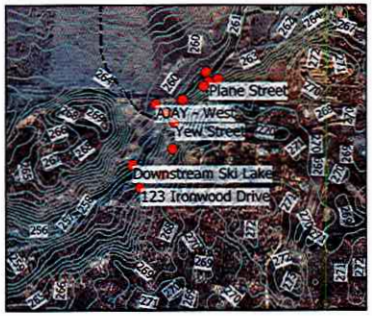
Figure 30 of 40.
Flood Innundation Mapping
Scenario 3 - 5% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6



A3 Scale: 1:10000
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N

0 100 200 300 400 m

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Barcaldine Recreation Park Flood Impact Assessment

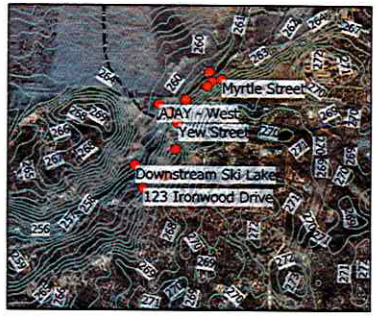
Figure 31 of 40.
Flood Innundation Mapping
Scenario 3 - 1% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

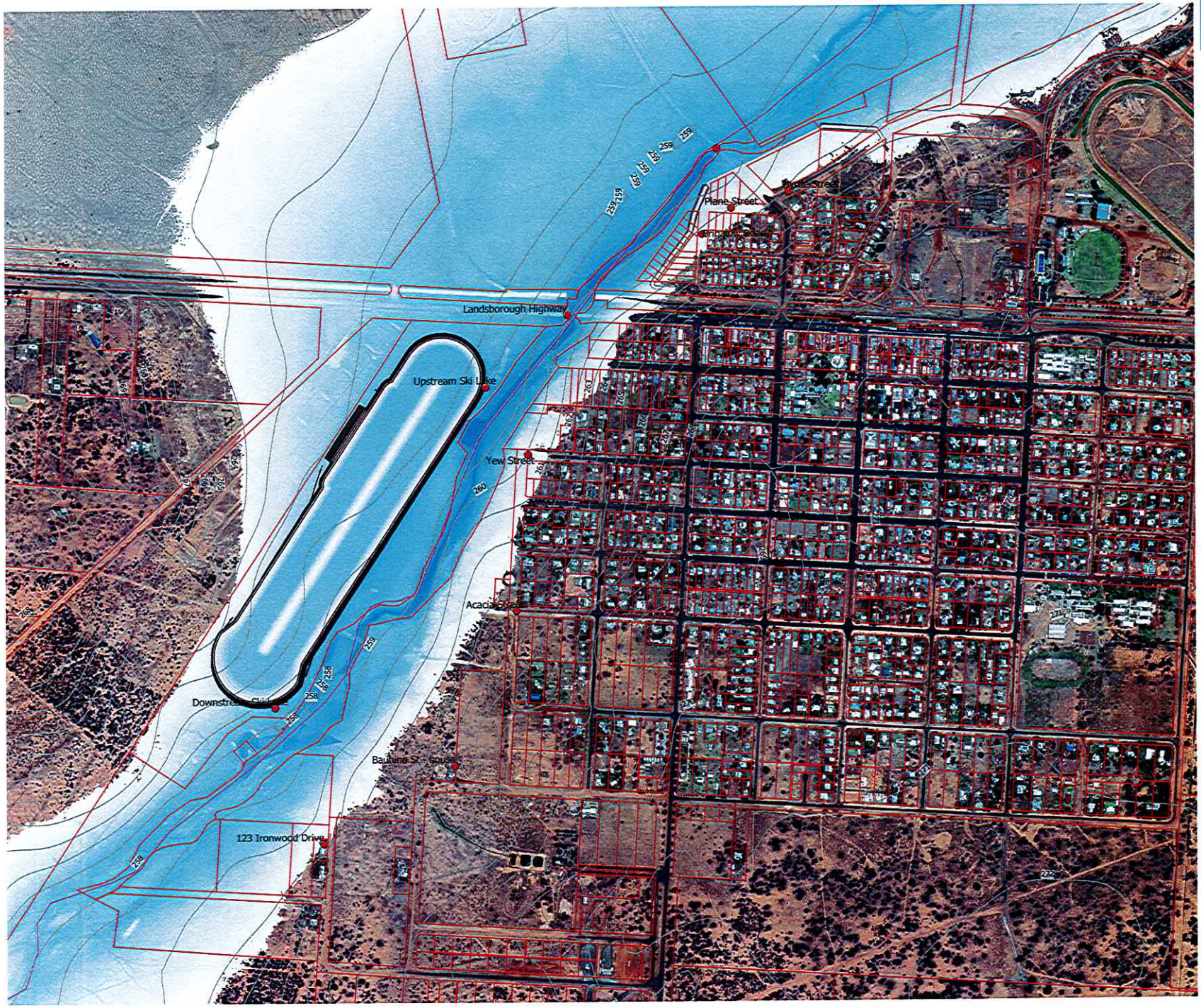


A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
23/07/2020

N

0 100 200 300 400 m



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Barcaldine Recreation Park Flood Impact Assessment

Figure 32 of 40.
Flood Innundation Mapping
Scenario 3 - 0.2% Aep

Legend

- SMK Design cont contour LineString
- Cadastral_data_LOTBDY
- Flood innundation_Critical Points-
- contour
- Surface HydroLines National

Depth (Max) m

- 0
- 0.5
- 1
- 1.5
- 2
- 2.5
- 3
- 3.5
- 4
- 4.5
- 5
- 5.5
- 6

A3 Scale: 1:10000
GDA 1994 / MGA Zone 55

Job ID: 190005
23/07/2020

N

0 100 200 300 400 m