Tamworth City Wide Floodplain Risk Management Study

Report

Volume 2

March 2023

Prepared for
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APPENDIX B
EXISTING CATCHMENT CHARACTERISTICS

290000
295000
300000
305000
310000
6565000
6560000
6555000
6550000

HYDRO SPATIAL

- East and North Drainage Study
- Tamworth City Flood Study - Peel River Model
- Tamworth City Flood Study - South Tamworth Model
- Tamworth City Flood Study - Kingswood Model
- Tamworth City Flood Study - Murroon Creek Model
- Tamworth City Flood Study - Coledale Model
- Tamworth City Flood Study - Boltons Creek Model
- Tamworth City Flood Study - Tangaratta Creek Model
- Waterways

0 1 2 3 4 5 km

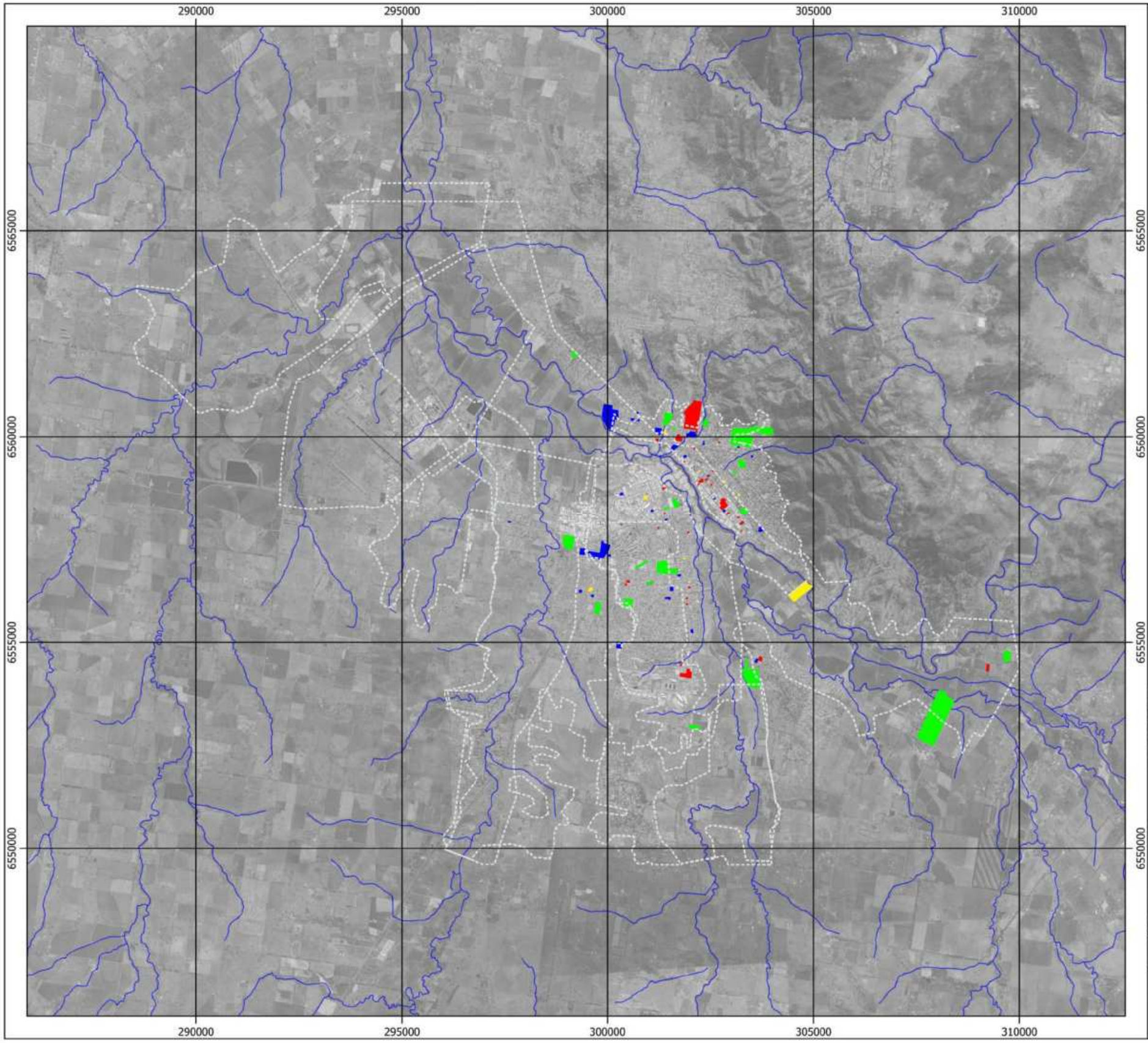
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE B01
STUDY AREA
HYDRAULIC MODEL EXTENTS



HYDRO SPATIAL

- Hydraulic Model Study Areas
- Waterways
- Aged Care Facilities
- Medical Facilities
- Childcare and Education Facilities
- Veterinary Care Facilities

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0 1 2 3 4 5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

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Map Location:
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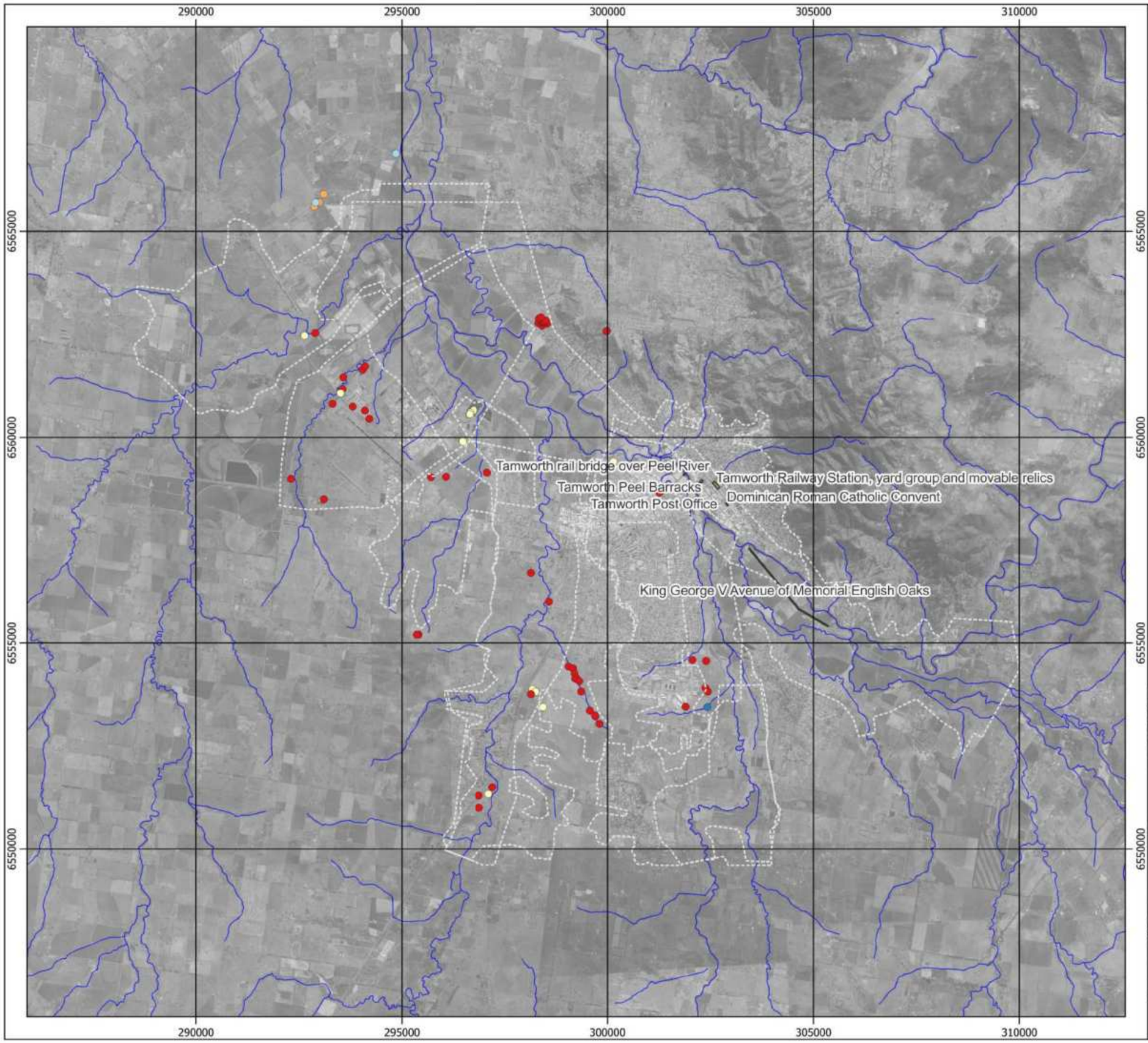
FIGURE B02
VULNERABLE FACILITIES AND INFRASTRUCTURE LOCATIONS



HYDRO SPATIAL

- Hydraulic Model Study Areas
- Waterways

Indigenous Australian Heritage Sites

- Artefact
- Grinding Groove
- Modified Tree
- Quarry
- Water Hole

Non-Indigenous Australian Heritage Sites

0 1 2 3 4 5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

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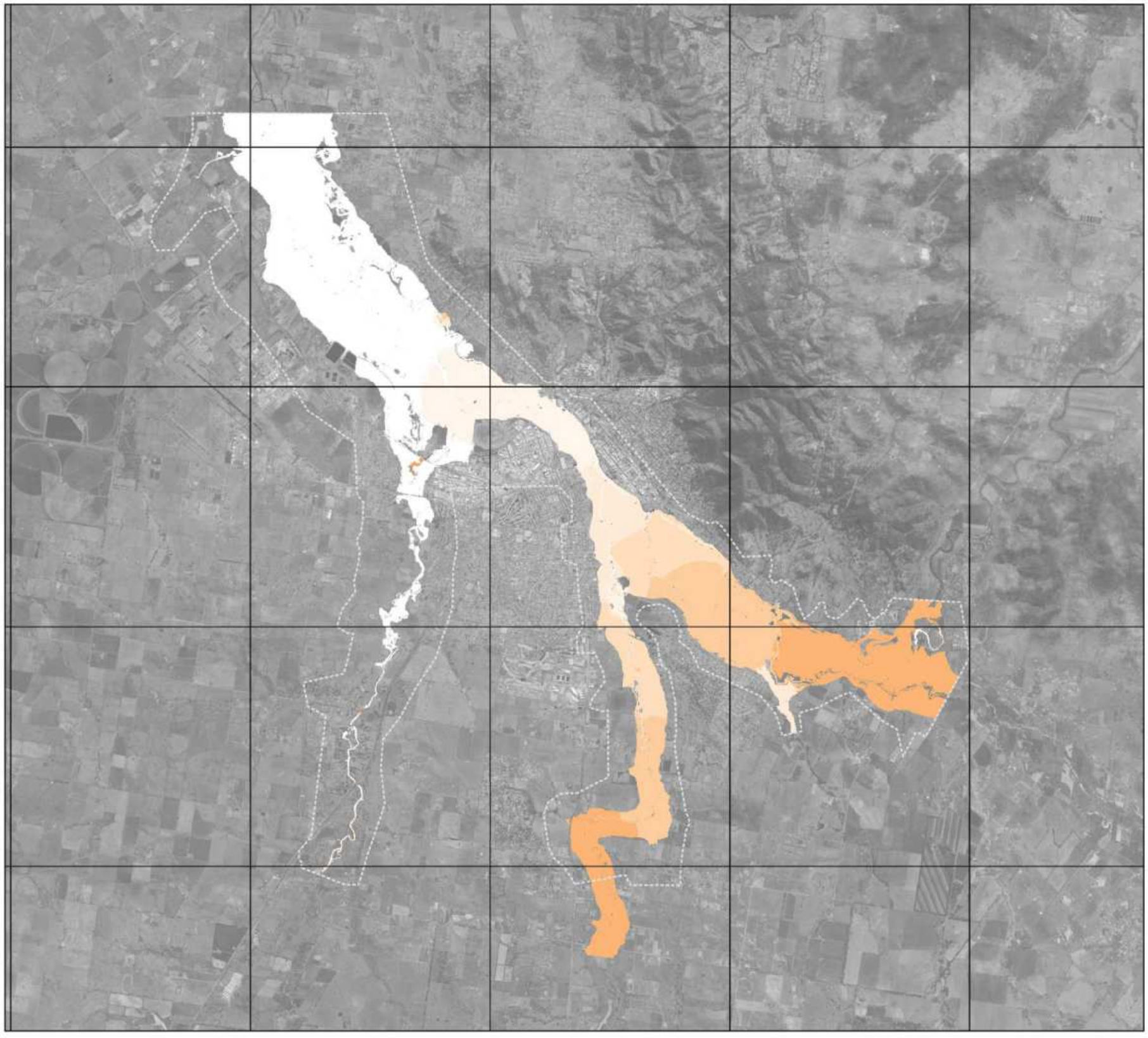
FIGURE B03
CULTURALLY AND HISTORICALLY SIGNIFICANT AREAS



HYDRO SPATIAL

Tamworth City Flood Study -
Peel River Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 1 2 3 4 5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

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FIGURE B05A
PEEL RIVER MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)

HYDRO SPATIAL

Tamworth City Flood Study -
Goonoo Goonoo Creek Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 1 2 3 4 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

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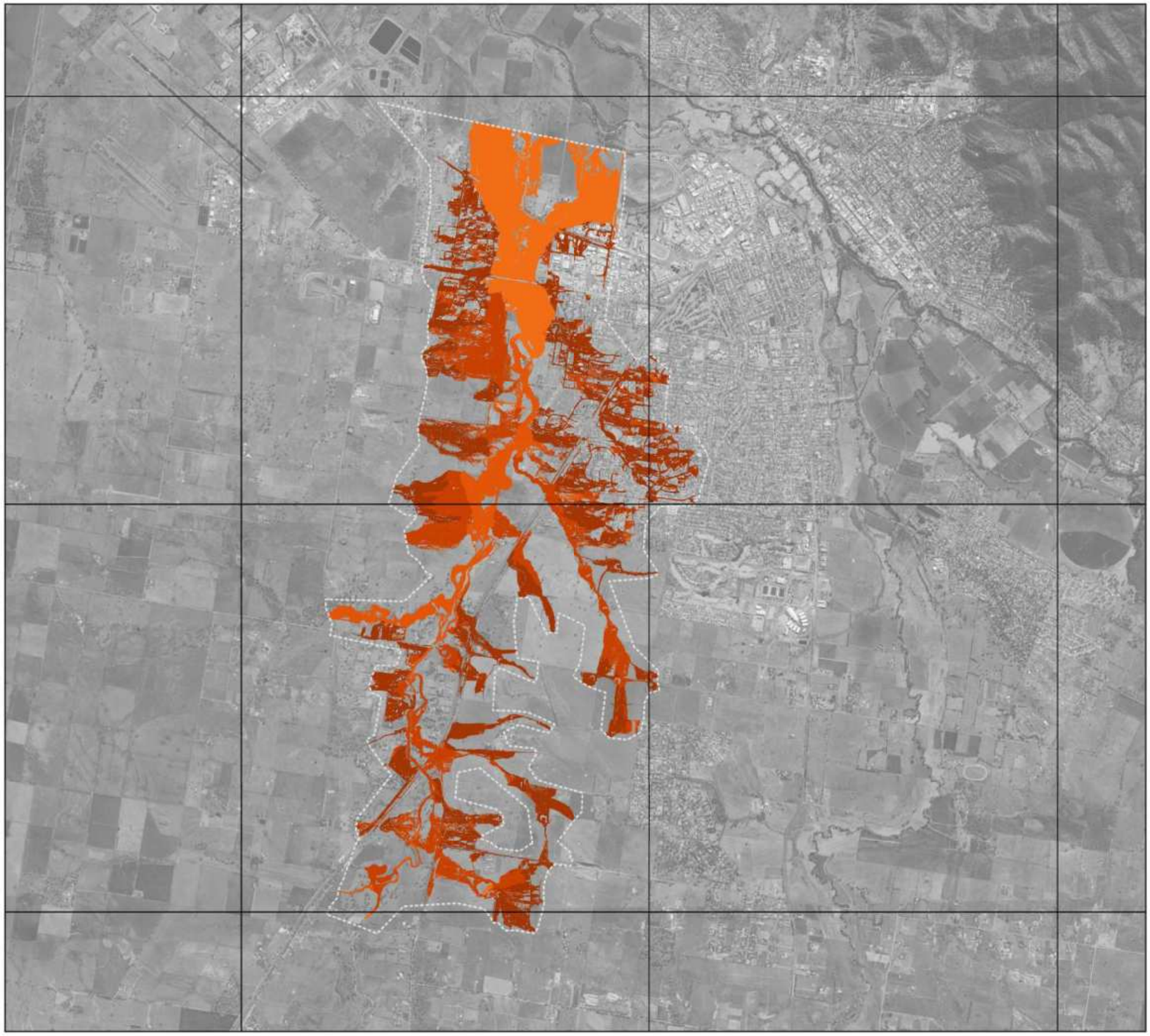
FIGURE B05B
GOONOO GOONOO CREEK MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study - Timbumburi Creek Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 1 2 3 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

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TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

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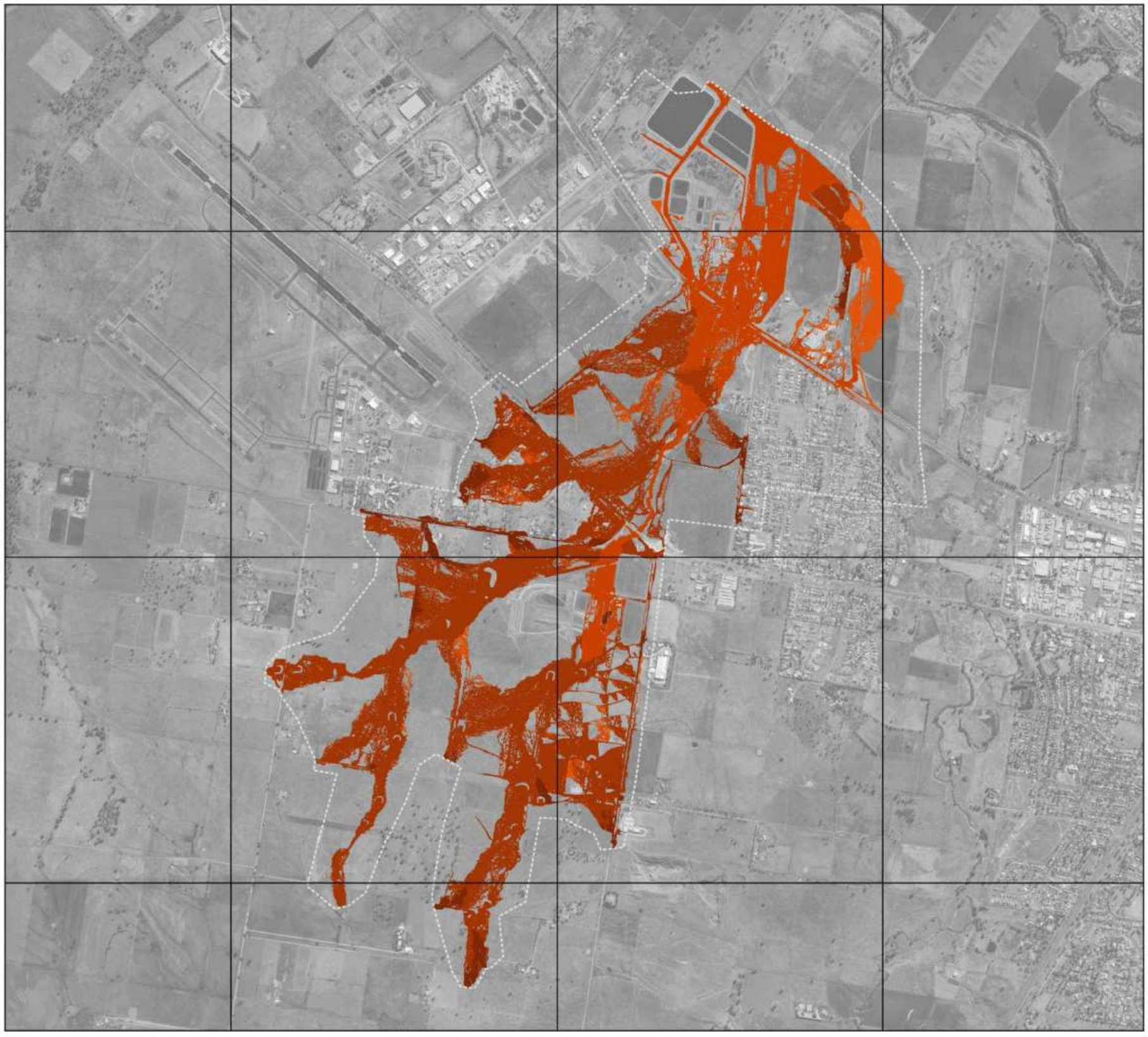
FIGURE B05C
TIMBUMBURI CREEK MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study - Murroon Creek Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

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FIGURE B05D
MURROON CREEK MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)

HYDRO SPATIAL

Tamworth City Flood Study - Boltons Creek Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

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TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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FIGURE B05E
BOLTONS CREEK MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)

HYDRO SPATIAL

Tamworth City Flood Study - Tangaratta Creek Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 1 2 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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FIGURE B05F
TANGARATTA CREEK MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)

HYDRO SPATIAL

Tamworth City Flood Study -
Calala Creek Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 1 2 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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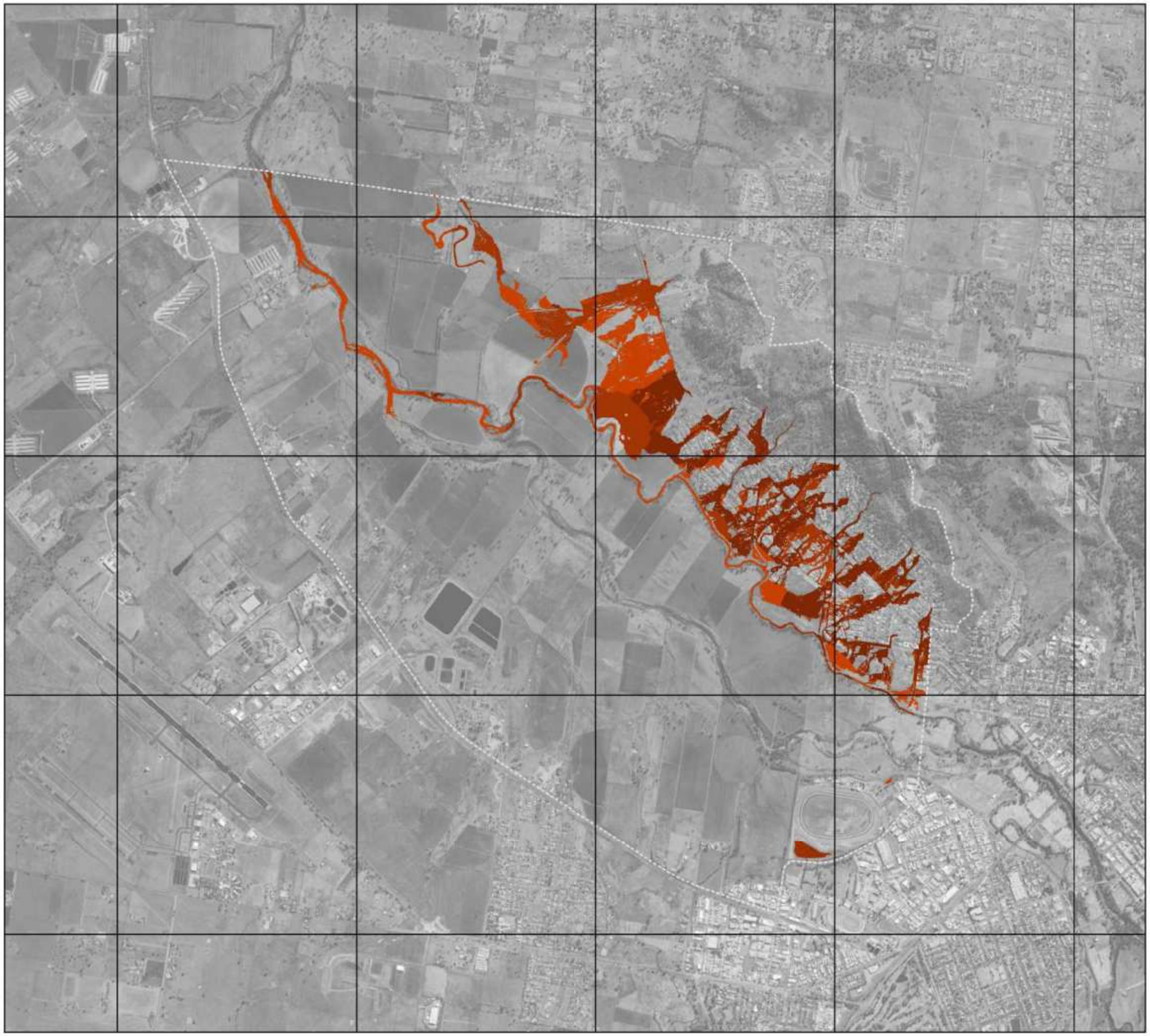
FIGURE B05G
CALALA CREEK MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study - Oxley Vale Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 1 2 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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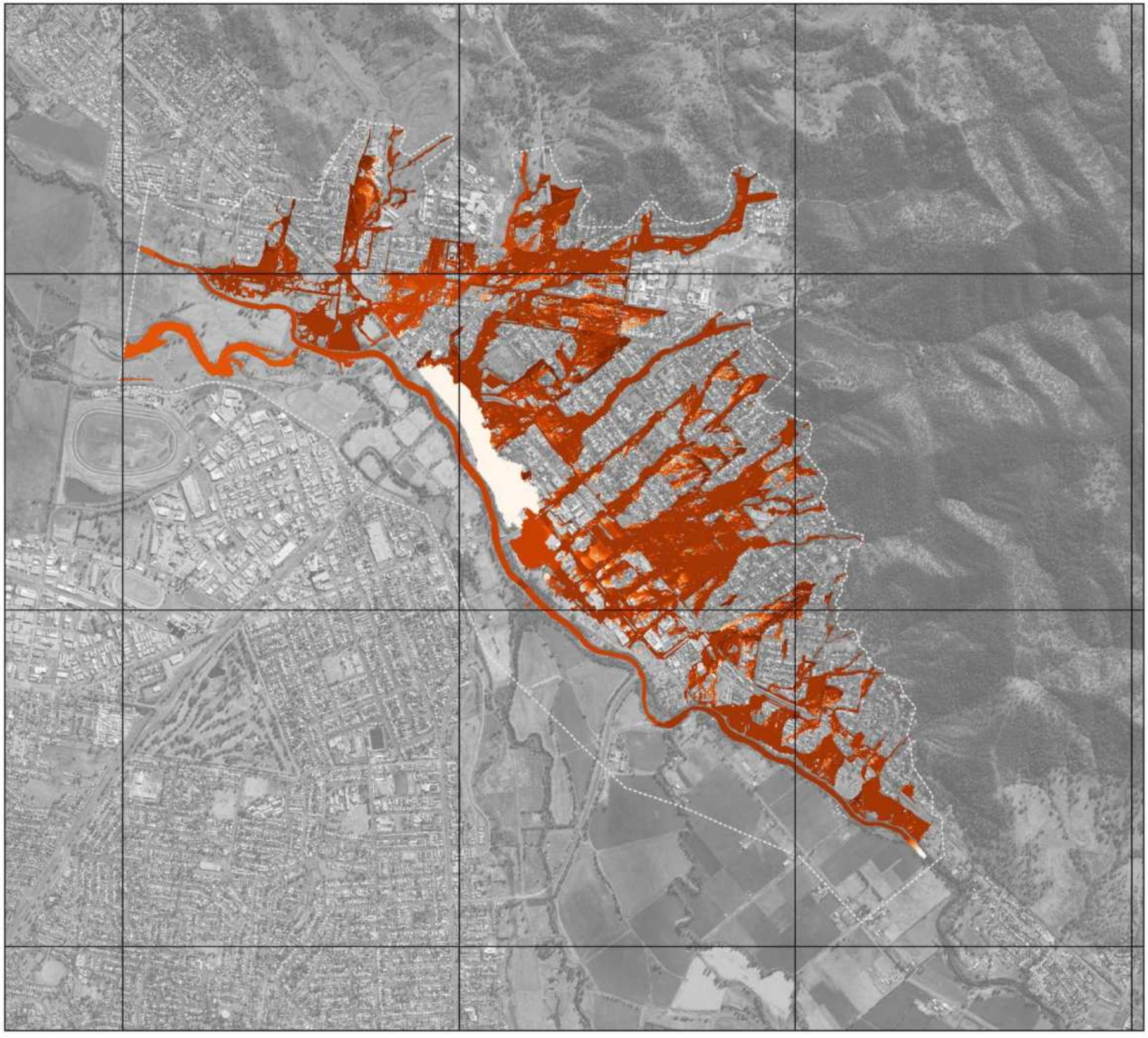
FIGURE B05H
OXLEY VALE MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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FIGURE B05I
EAST & NORTH TAMWORTH MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)
GATES CLOSED

HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Time to Peak

- < 1 hours
- < 2 hours
- < 3 hours
- < 4 hours
- < 5 hours
- < 6 hours
- < 7 hours
- < 8 hours
- < 9 hours
- < 10 hours
- < 11 hours
- < 12 hours
- > 12 hours

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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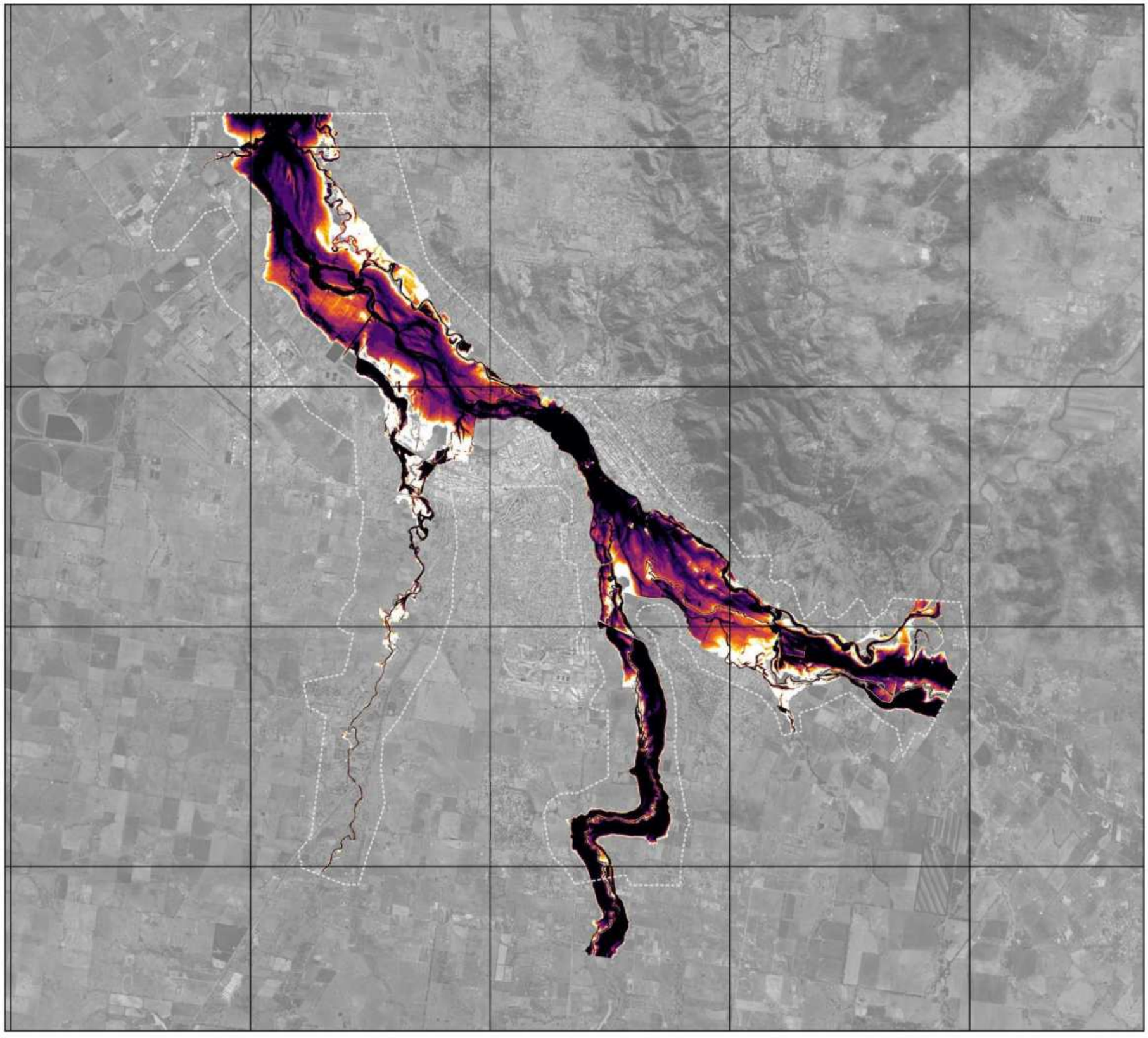
FIGURE B05J
EAST & NORTH TAMWORTH MODEL
TIME TO PEAK
1% AEP EVENT (CRITICAL DURATION)
GATES OPEN



HYDRO SPATIAL

Tamworth City Flood Study -
Peel River Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

0 1 2 3 4 5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

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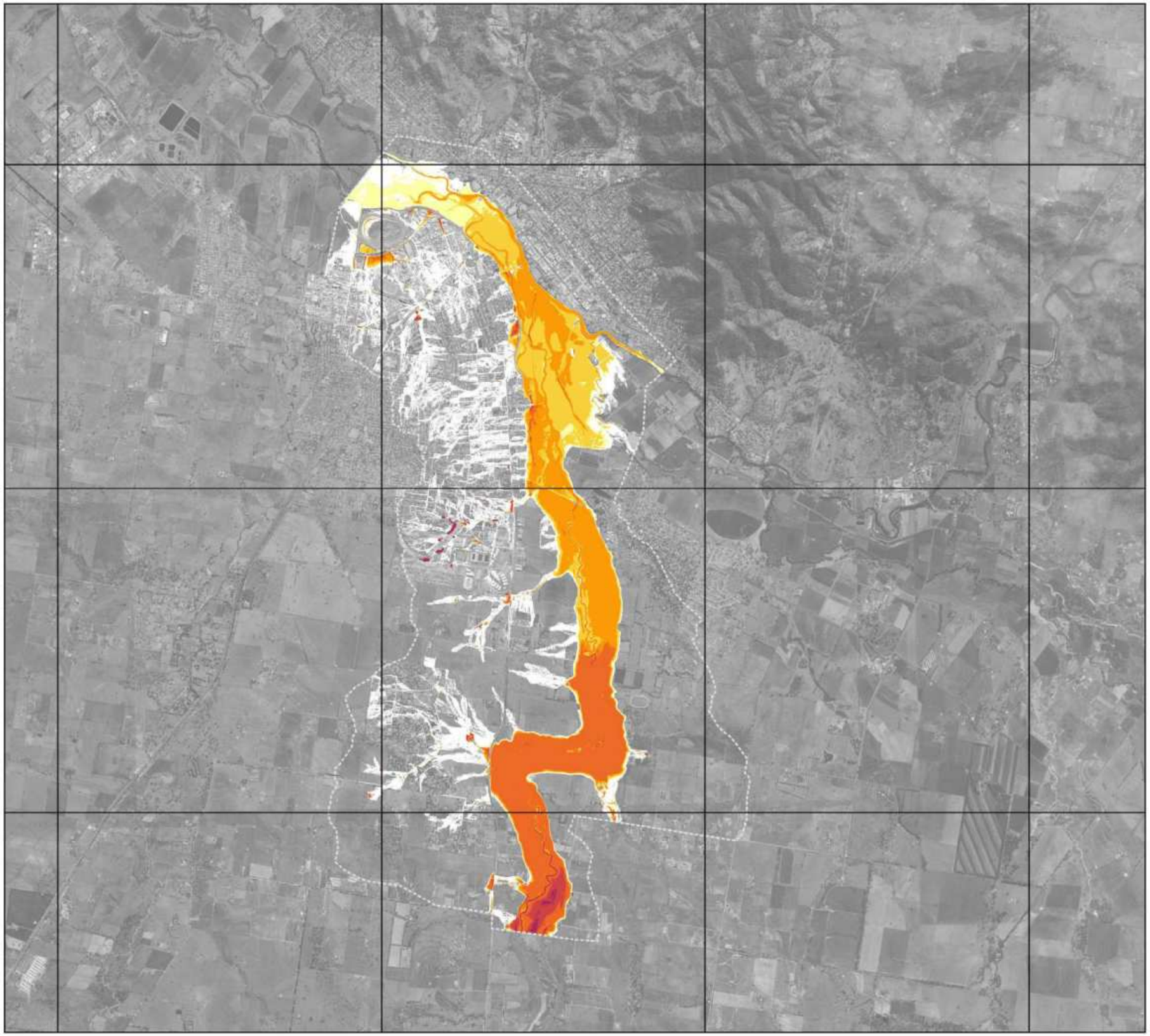
FIGURE B06A
PEEL RIVER MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study -
Goonoo Goonoo Creek Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

0 1 2 3 4 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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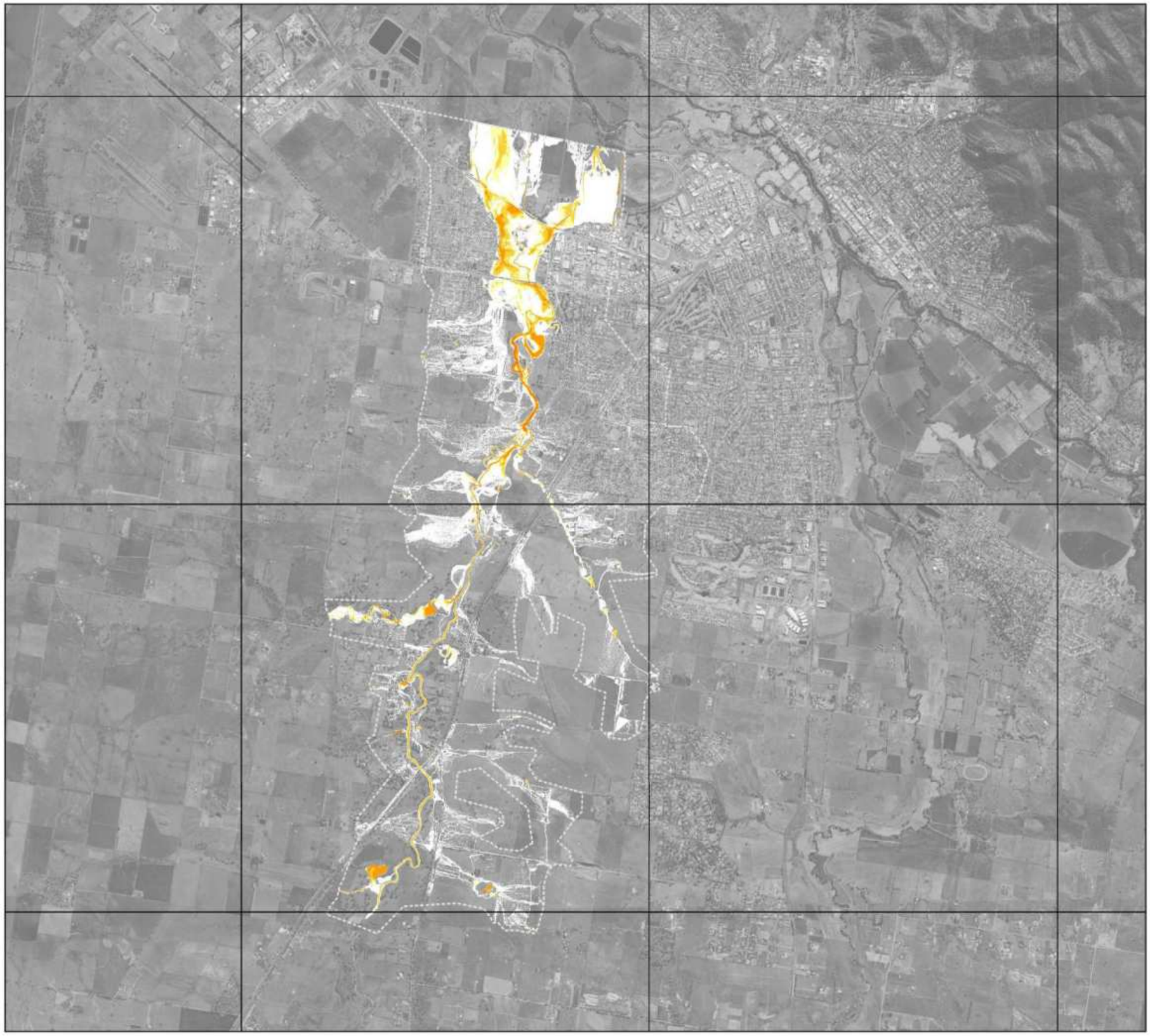
FIGURE B06B
GOONOO GOONOO CREEK MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study -
Timbumburi Creek Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

0 1 2 3 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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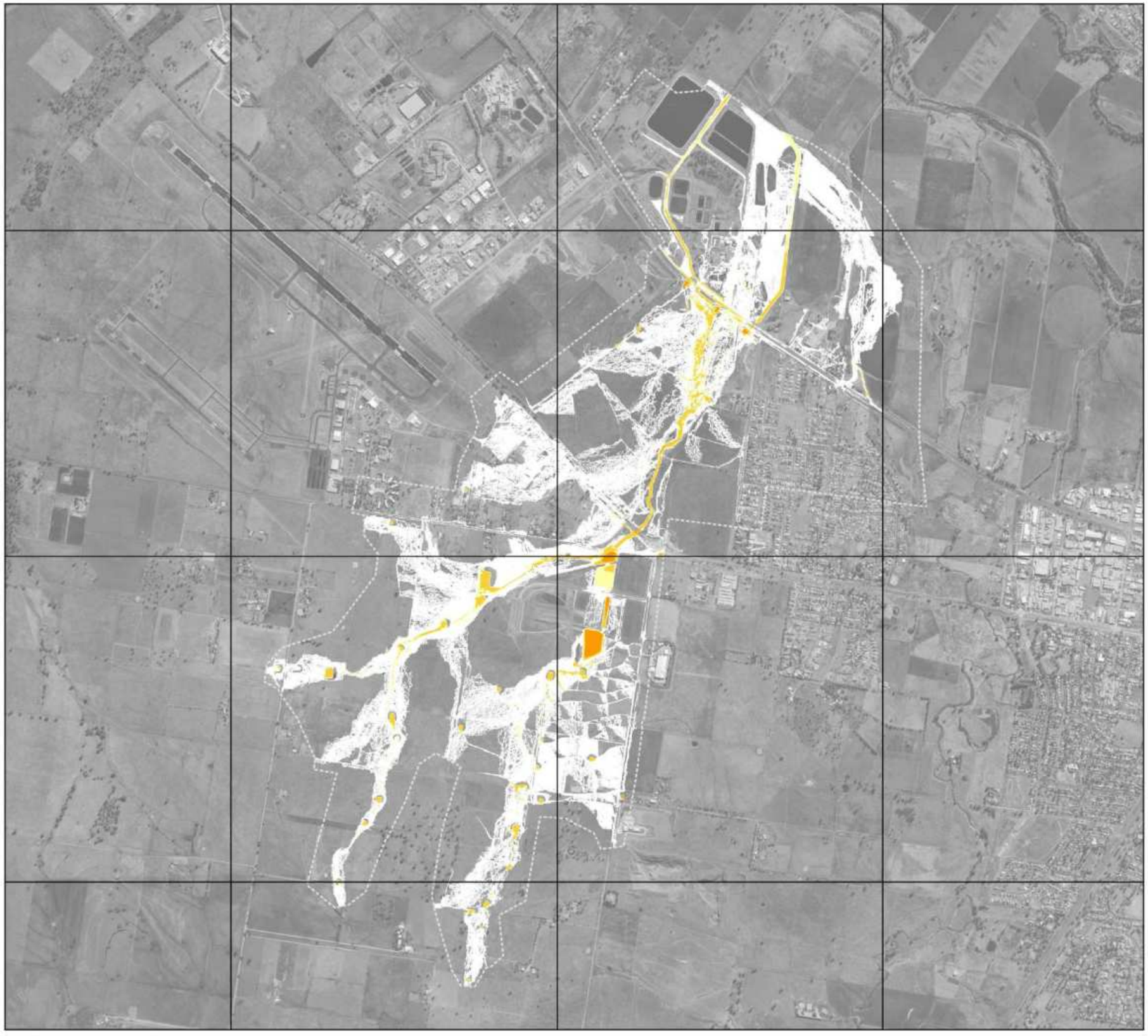
FIGURE B06C
TIMBUMBURI CREEK MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study -
Murroon Creek Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

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0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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FIGURE B06D
MURROON CREEK MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)

HYDRO SPATIAL

Tamworth City Flood Study -
Boltons Creek Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

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0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

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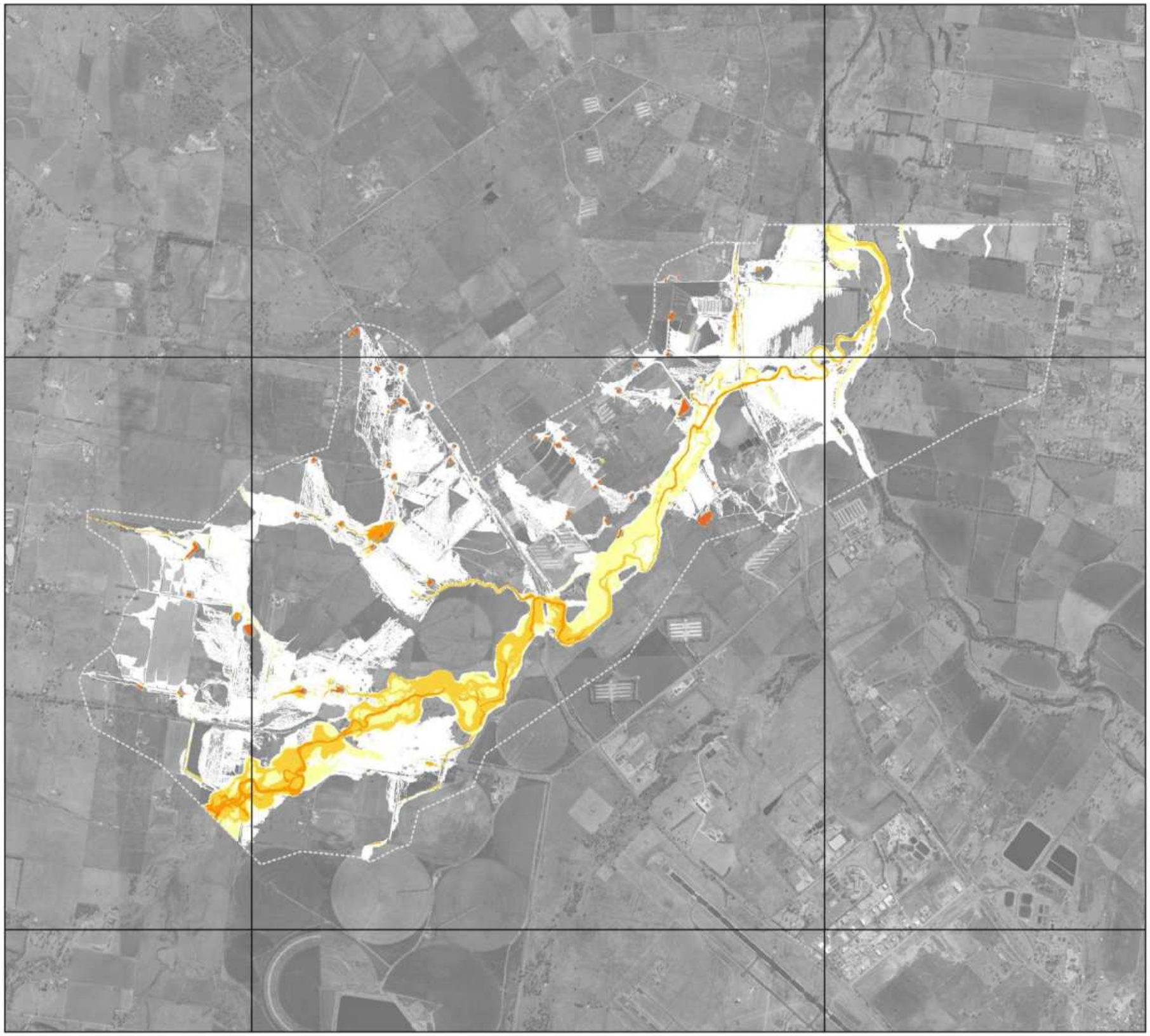
FIGURE B06E
BOLTONS CREEK MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study -
Tangaratta Creek Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

0 1 2 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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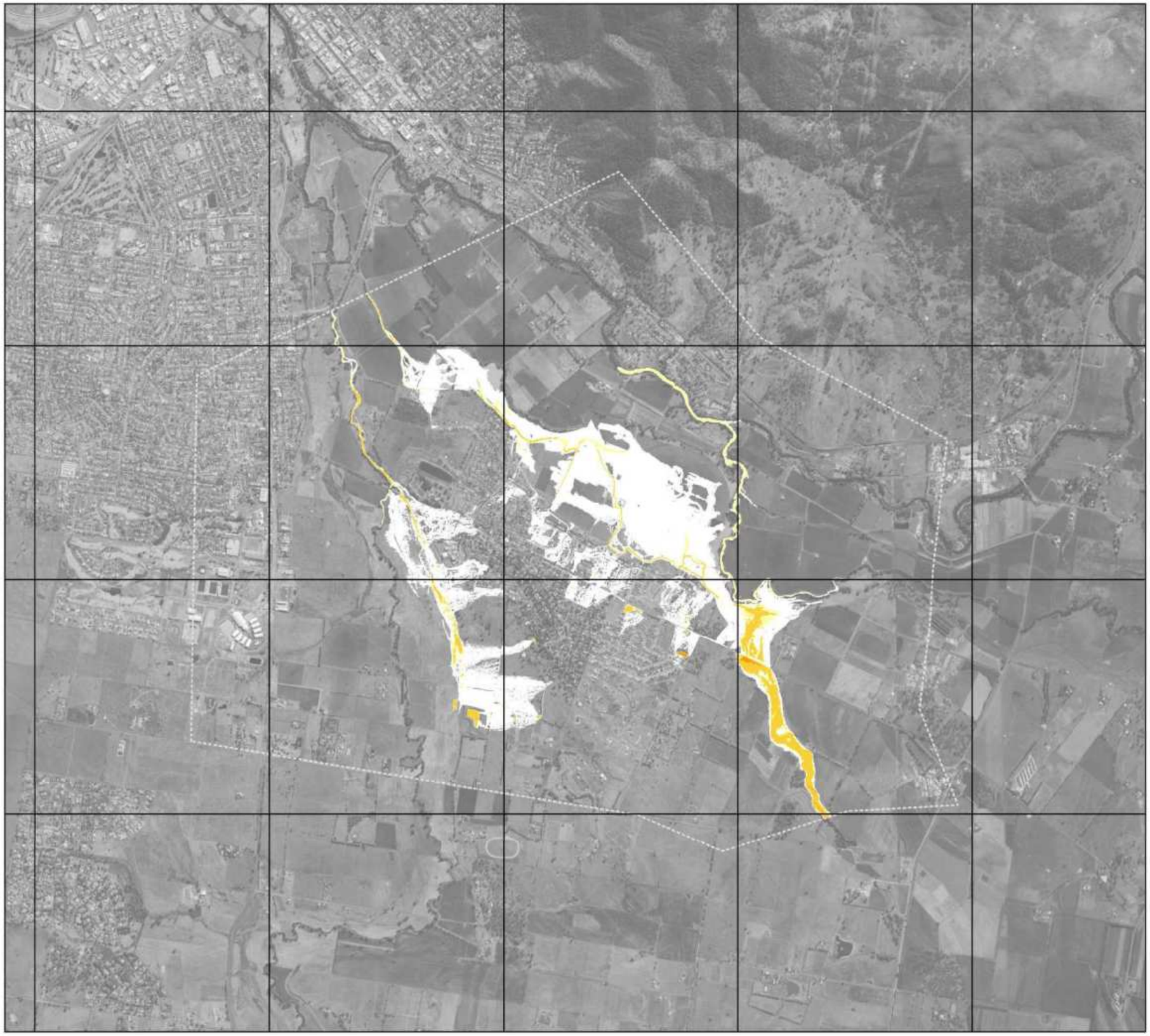
FIGURE B06F
TANGARATTA CREEK MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study -
Calala Creek Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

0 1 2 km

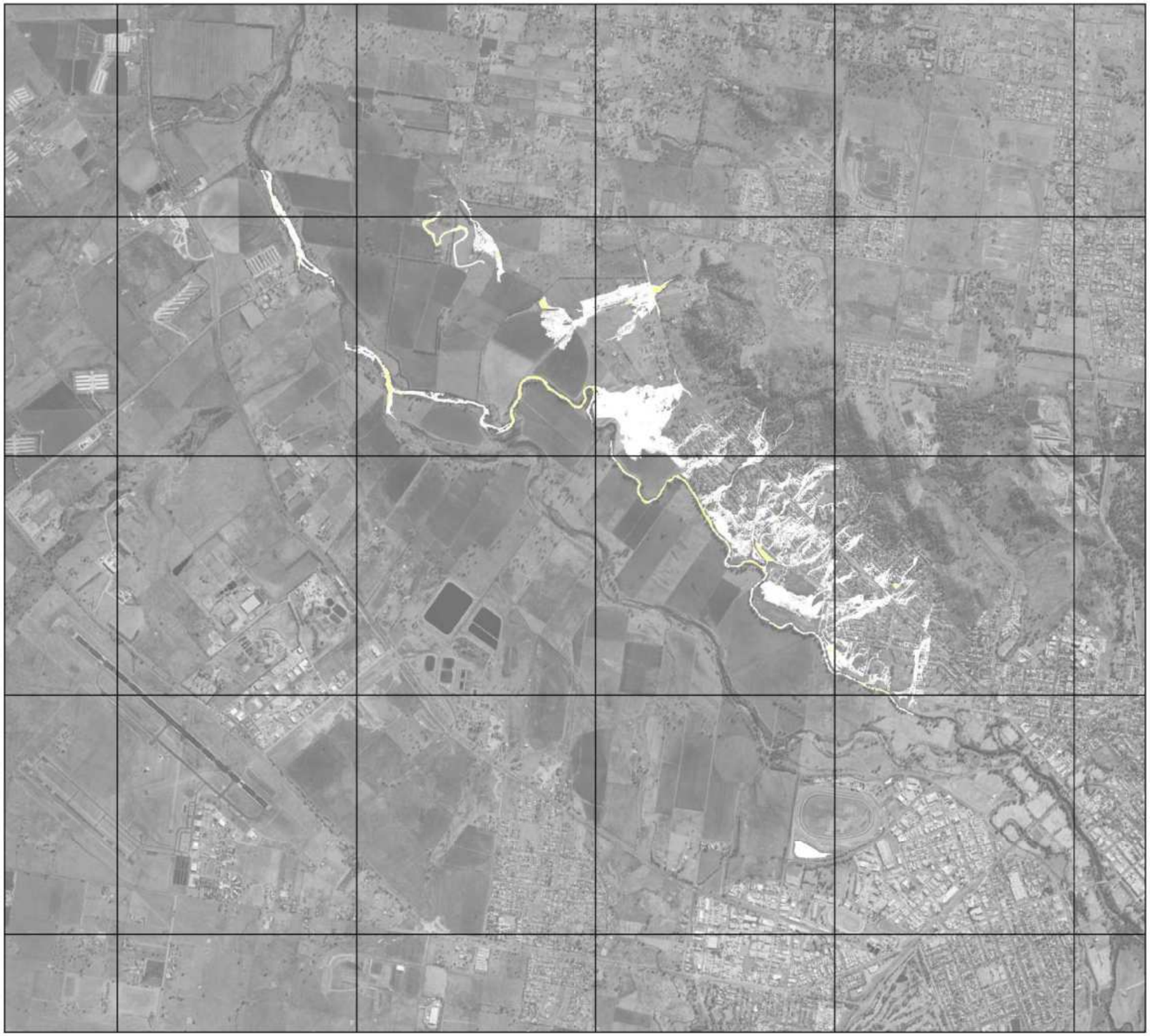
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE B06G
CALALA CREEK MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)



HYDRO SPATIAL

Tamworth City Flood Study -
Oxley Vale Model

Duration of Inundation – Depths greater than 0.3m

- <1 hours
- <2 hours
- <3 hours
- <4 hours
- <5 hours
- <6 hours
- <7 hours
- <8 hours
- <9 hours
- <10 hours
- >10 hours

0 1 2 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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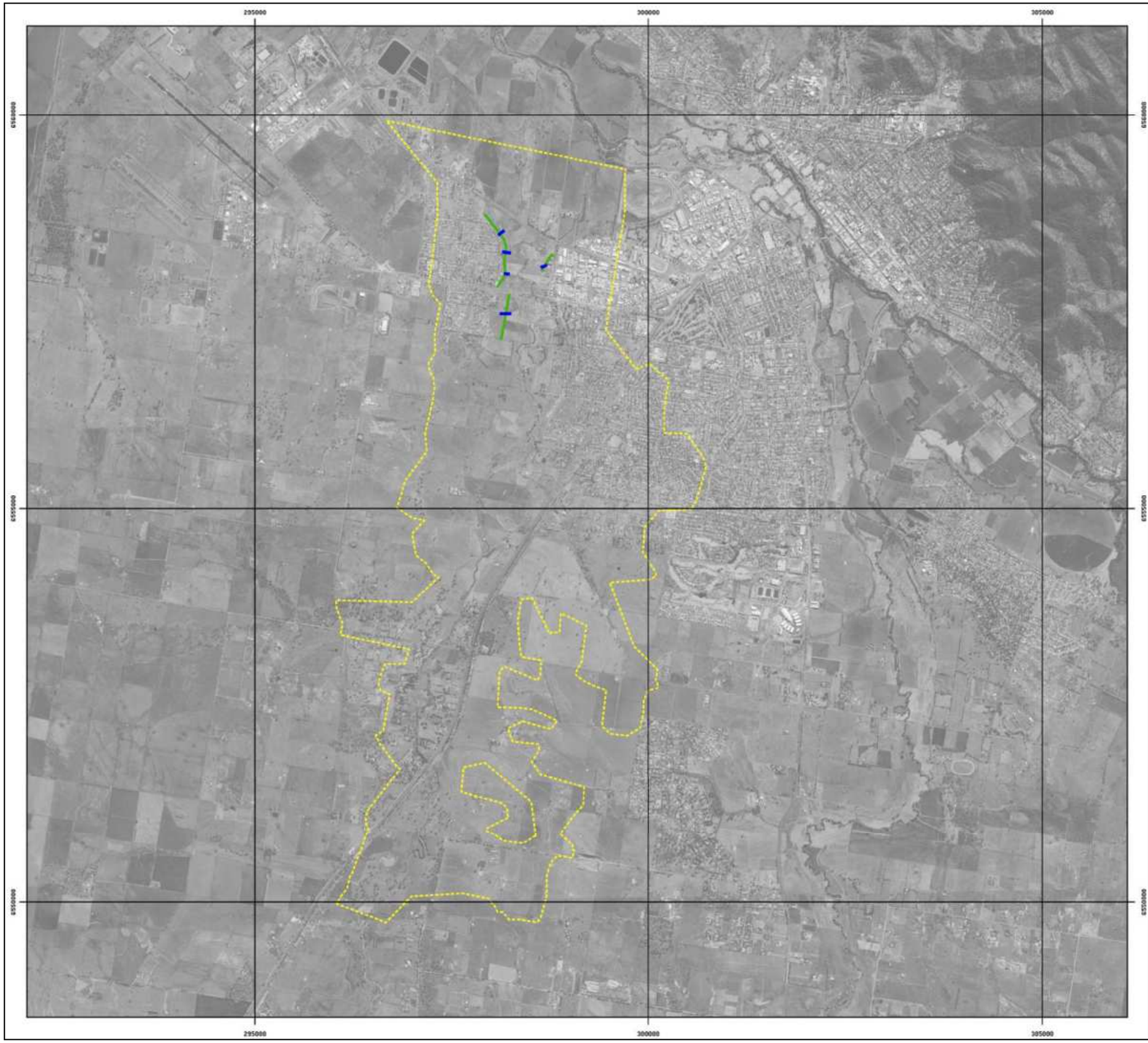
FIGURE B06H
OXLEY VALE MODEL
DURATION OF INUNDATION
1% AEP EVENT (CRITICAL DURATION)

APPENDIX C
POTENTIAL FLOODPLAIN RISK MANAGEMENT MEASURES



HYDRO SPATIAL

Tamworth City Flood Study - Timbumburi Creek Model

Proposed Culverts with Flapgates

Proposed Levees

0 1 2 3 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE C01
MODIFICATION MEASURE FM01
OPTION SCHEMATISATION

HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Proposed Pumps

0 0.5 1 1.5 km

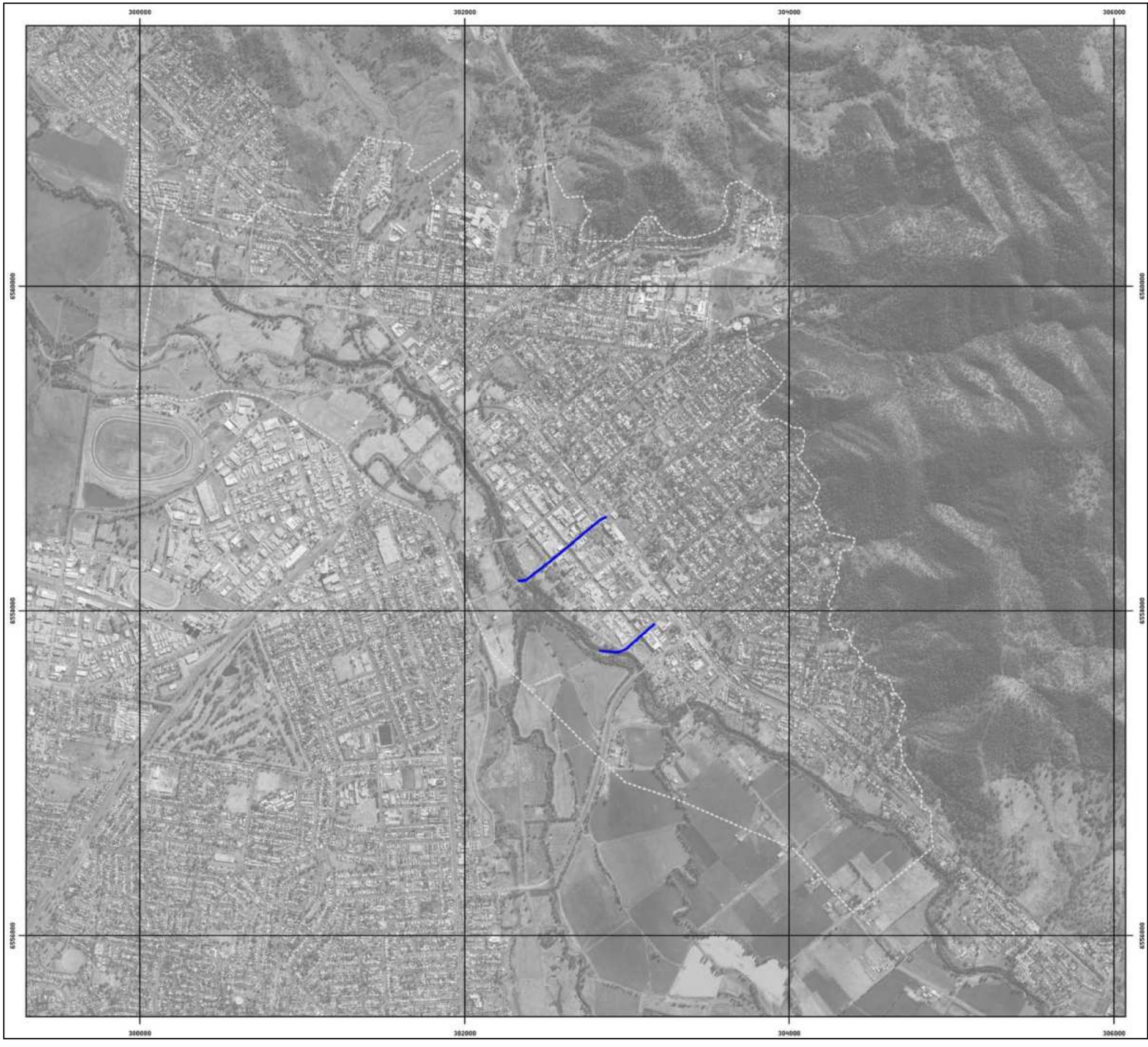
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE C02
MODIFICATION MEASURE FM02
OPTION SCHEMATISATION



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Proposed Pressure Tunnels

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

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TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
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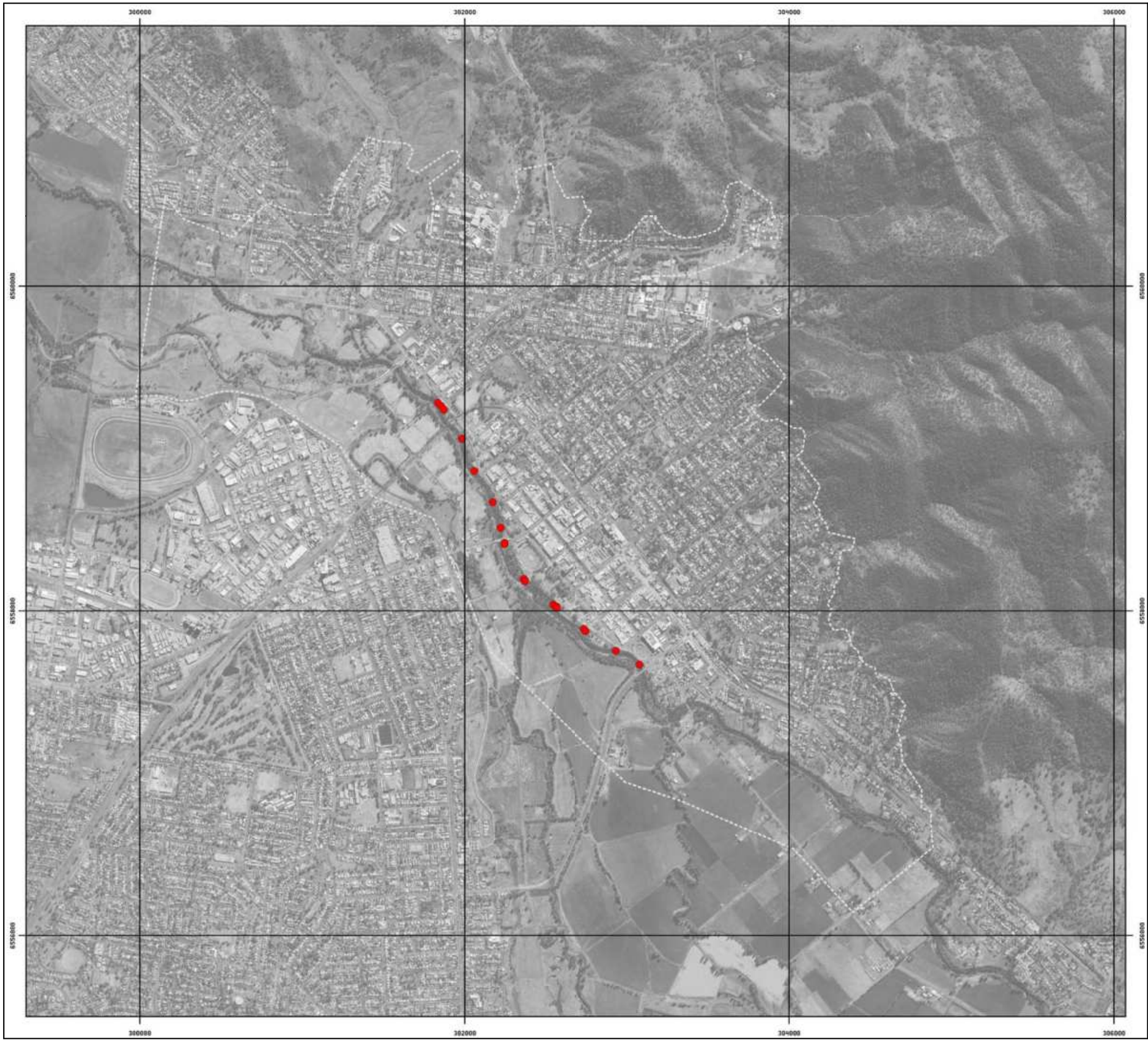
FIGURE C03
MODIFICATION MEASURE FM03
OPTION SCHEMATISATION



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Proposed Automatic Gates

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0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE C04
MODIFICATION MEASURE FM04
OPTION SCHEMATISATION

HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Proposed Detention Basins

Proposed Pipes

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
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FIGURE C05
MODIFICATION MEASURE FM05
OPTION SCHEMATISATION

HYDRO SPATIAL

Tamworth City Flood Study - Goonoo Goonoo Creek Model

Proposed Open Channel

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE C06
MODIFICATION MEASURE FM06
OPTION SCHEMATISATION

HYDRO SPATIAL

Tamworth City Flood Study -
Goonoo Goonoo Creek Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

Disclaimer: The material contained herein is provided for general information purposes only. Any action you take based upon the information contained herein is strictly at your own risk. Professional advice should be sought in relation to your own specific circumstances.

0 1 2 3 4 km

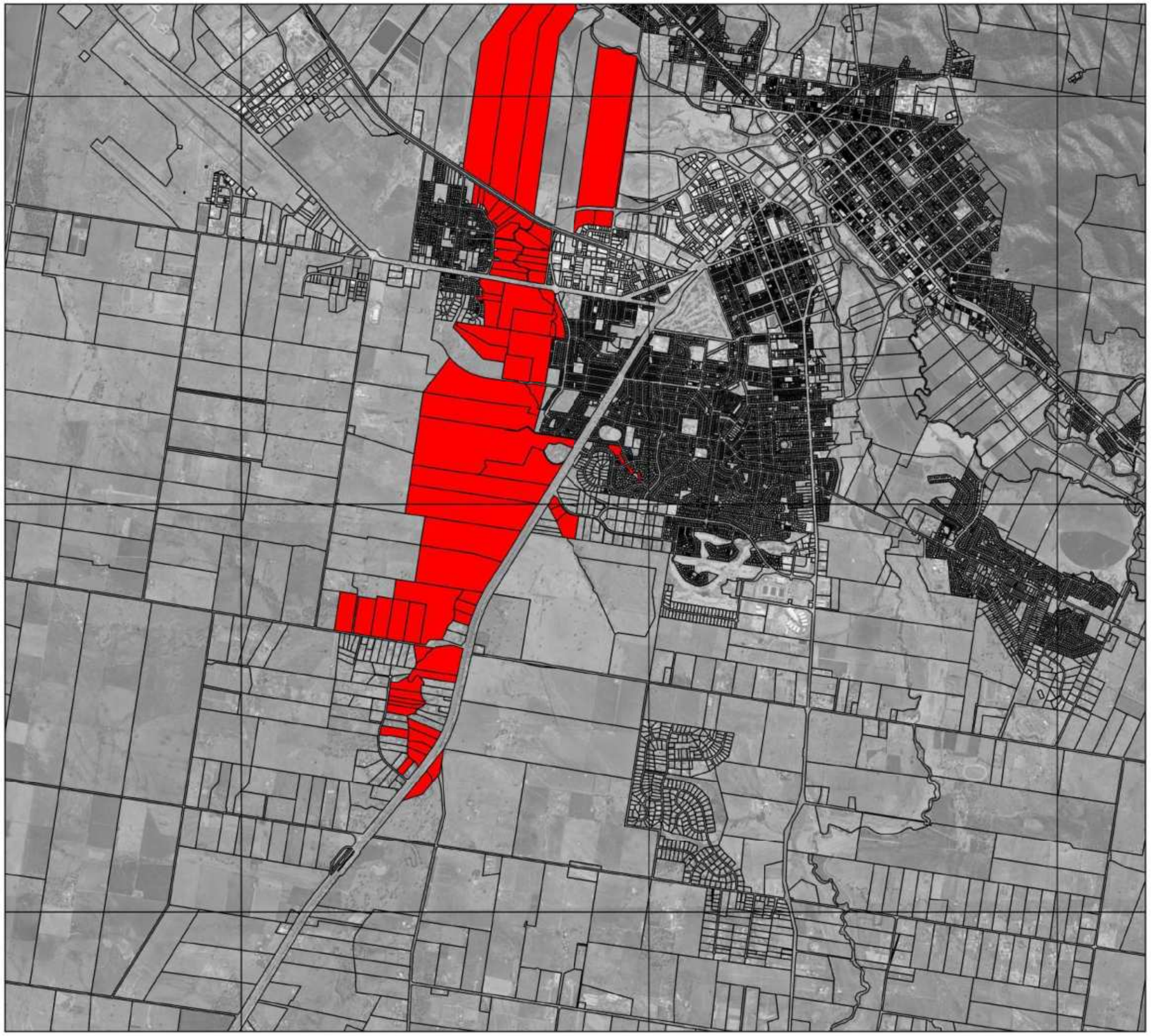
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C07A
GOONOO GOONOO CREEK MODEL PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING



HYDRO SPATIAL

Tamworth City Flood Study - Timbumburi Creek Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

0 1 2 3 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C07B
TIMBUMBURI CREEK MODEL
PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Murroon Creek Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C07C
MURROON CREEK MODEL
PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING

HYDRO SPATIAL

Tamworth City Flood Study -
Boltons Creek Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

Disclaimer: The material contained herein is provided for general information purposes only. Any action you take based upon the information contained herein is strictly at your own risk. Professional advice should be sought in relation to your own specific circumstances.

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C07D
BOLTONS CREEK MODEL PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Tangaratta Creek Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

0 1 2 km

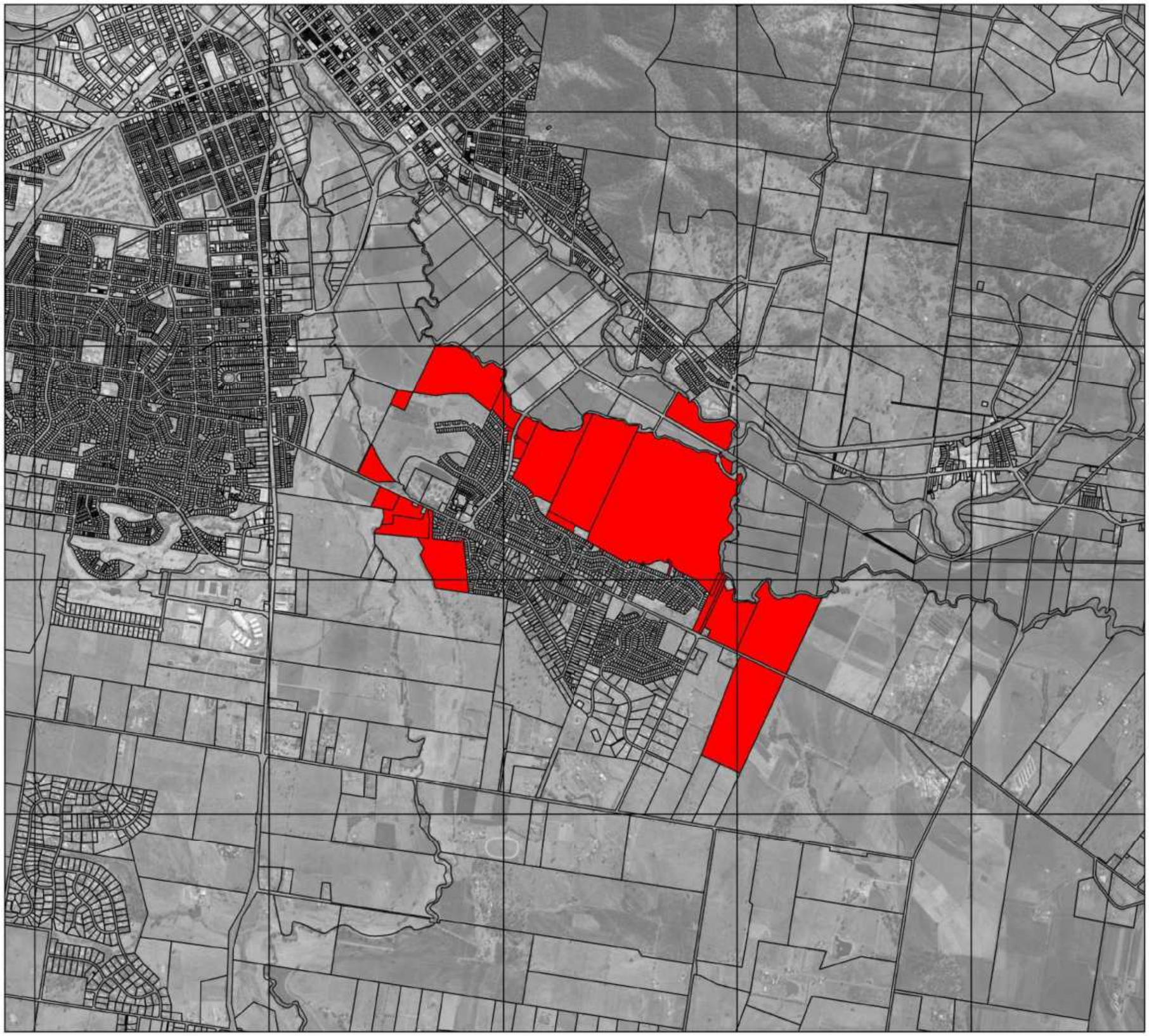
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C07E
TANGARATTA CREEK MODEL
PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING



HYDRO SPATIAL

Tamworth City Flood Study -
Calala Creek Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

0 1 2 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
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FIGURE C07F
CALALA CREEK MODEL
PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Oxley Vale Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

0 1 2 km

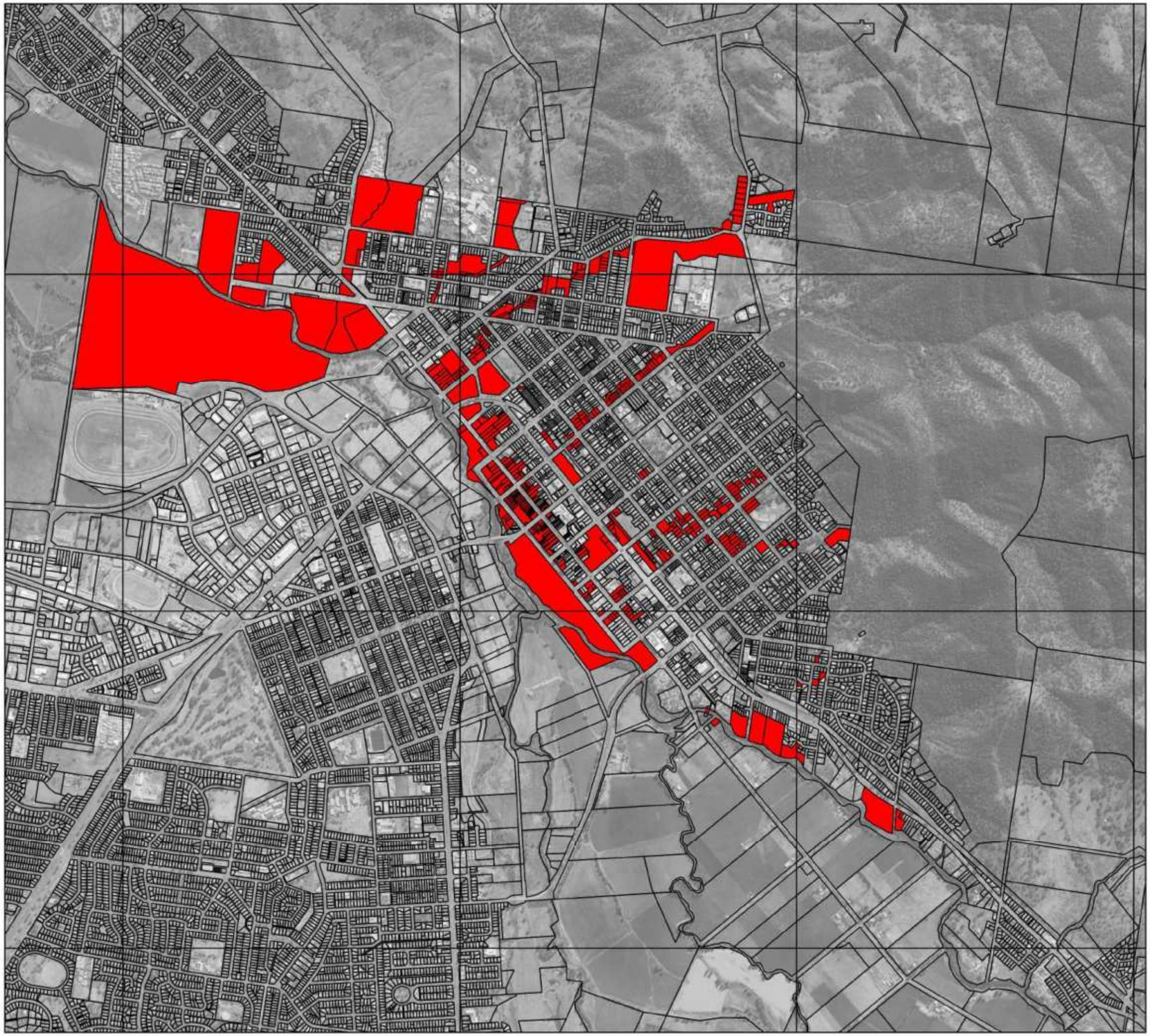
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C07G
OXLEY VALE MODEL
PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Properties subject to flood-related development controls – overland flooding

Lot Boundaries

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C07H
EAST & NORTH TAMWORTH MODEL PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - OVERLAND FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Peel River Model

Flood Planning Area

0 1 2 3 4 5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE B08A
PEEL RIVER MODEL
PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - MAINSTREAM FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Timbumburi Creek Model

Flood Planning Area

0 1 2 3 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C08B
TIMBUMBURI CREEK MODEL PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - MAINSTREAM FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Murroon Creek Model

Flood Planning Area

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C08C
MURROON CREEK MODEL PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - MAINSTREAM FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Boltons Creek Model

Flood Planning Area

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0 0.5 1 1.5 2 2.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C08D
BOLTONS CREEK MODEL
PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - MAINSTREAM FLOODING

HYDRO SPATIAL

Tamworth City Flood Study - Tangaratta Creek Model

Flood Planning Area

0 1 2 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

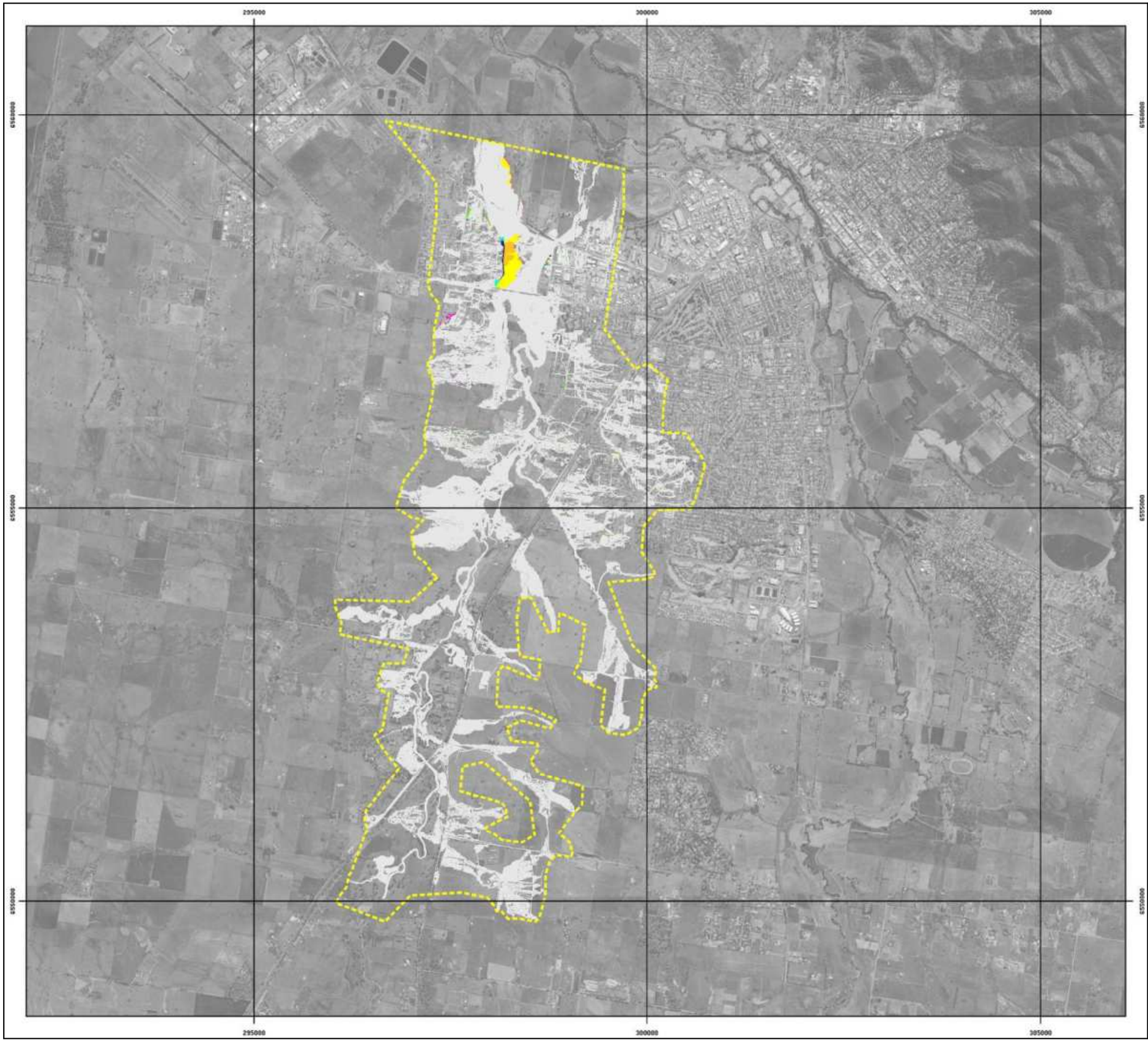
N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN REPORT

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\Addendum1

FIGURE C08E
TANGARATTA CREEK MODEL PRELIMINARY FLOOD-RELATED DEVELOPMENT CONTROLS - MAINSTREAM FLOODING

APPENDIX D
ESTIMATE OF BENEFITS



HYDRO SPATIAL

Tamworth City Flood Study - Timbumburi Creek Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 1 2 3 km

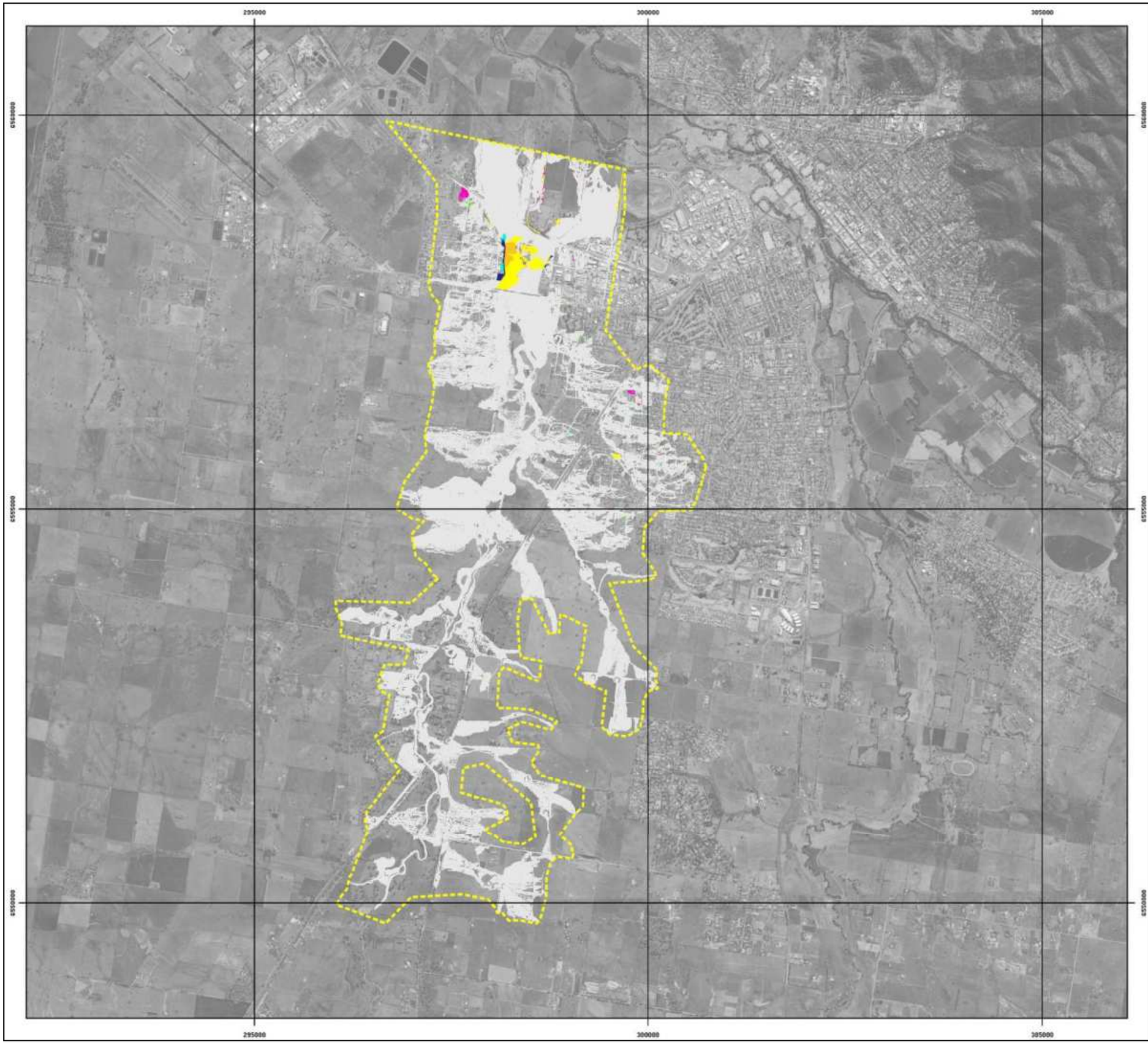
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D01
MODIFICATION MEASURE FM01
PEAK FLOOD LEVEL DIFFERENCE
5% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study - Timbumburi Creek Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 1 2 3 km

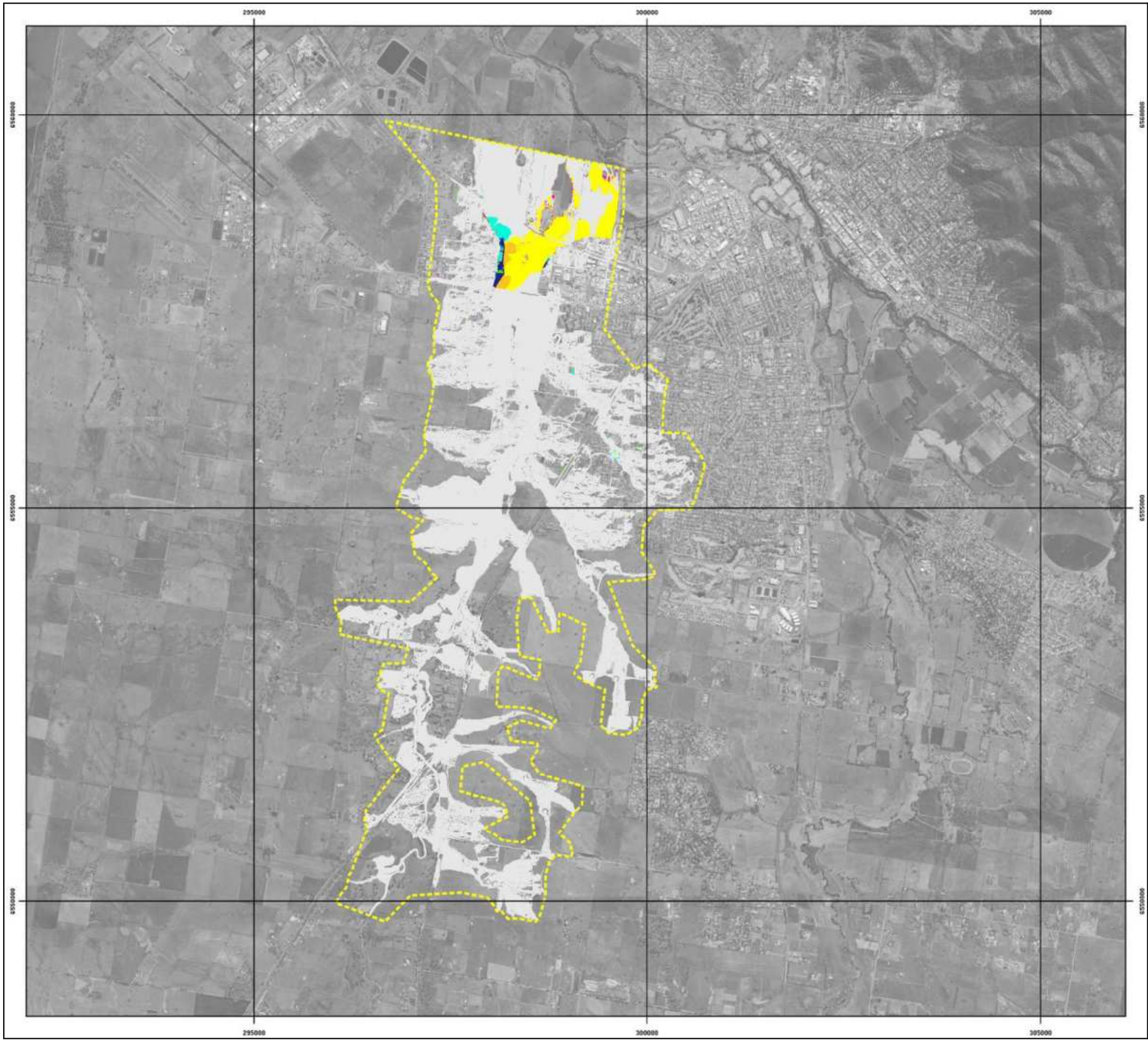
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D02
MODIFICATION MEASURE FM01
PEAK FLOOD LEVEL DIFFERENCE
1% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study - Timbumburi Creek Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 1 2 3 km

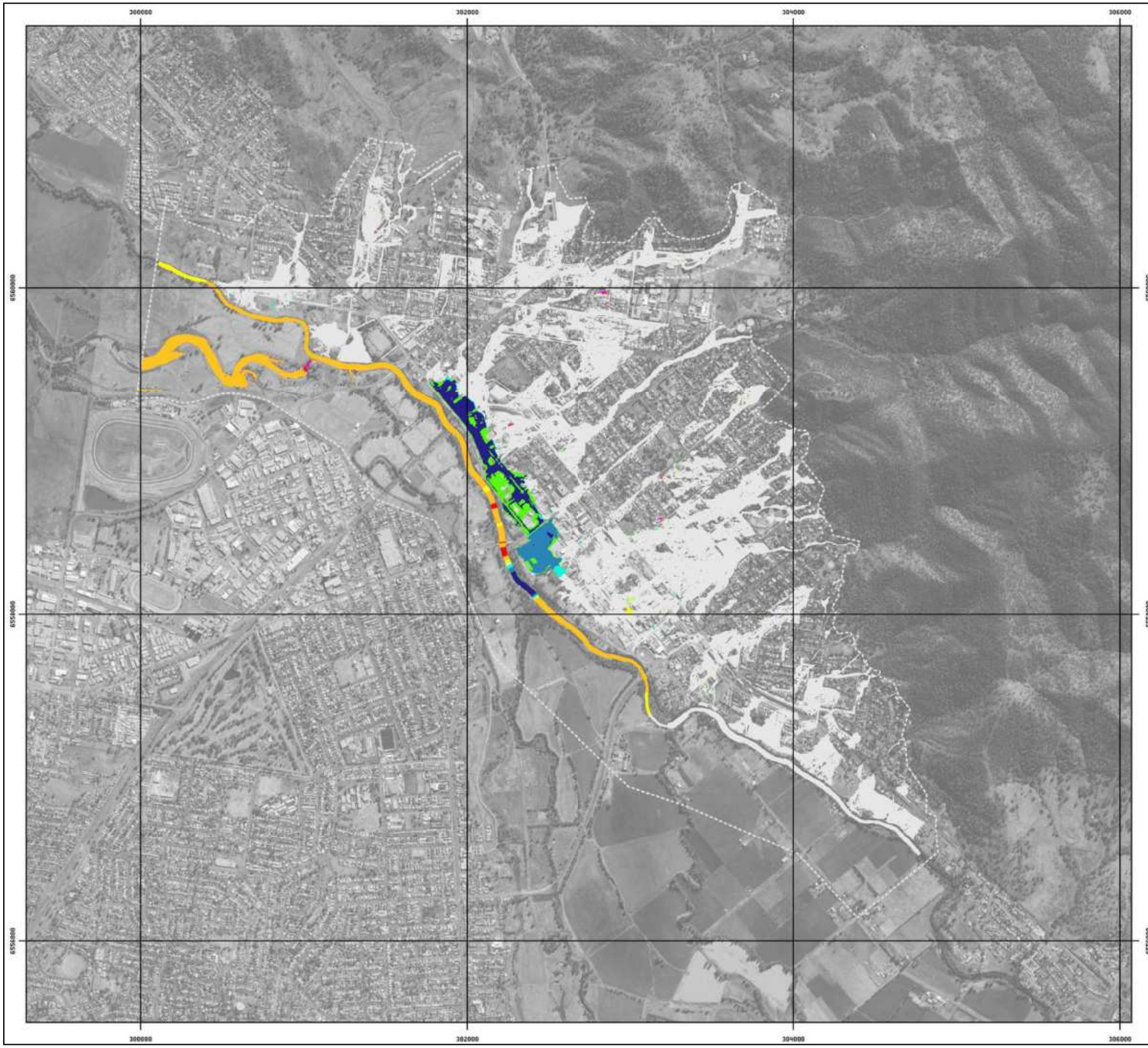
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D03
MODIFICATION MEASURE FM01
PEAK FLOOD LEVEL DIFFERENCE
0.2% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

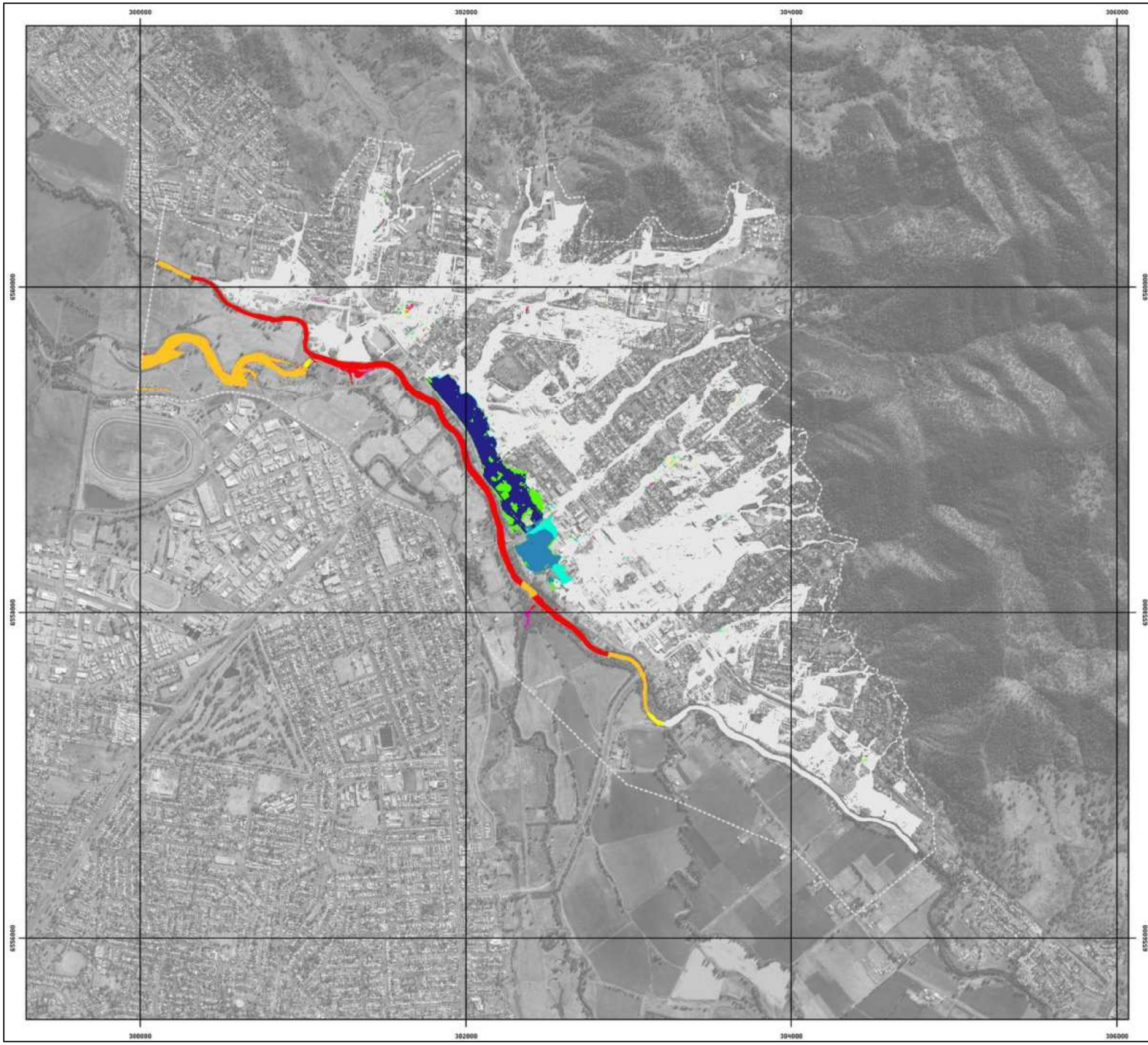
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D04
MODIFICATION MEASURE FM02
PEAK FLOOD LEVEL DIFFERENCE
5% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

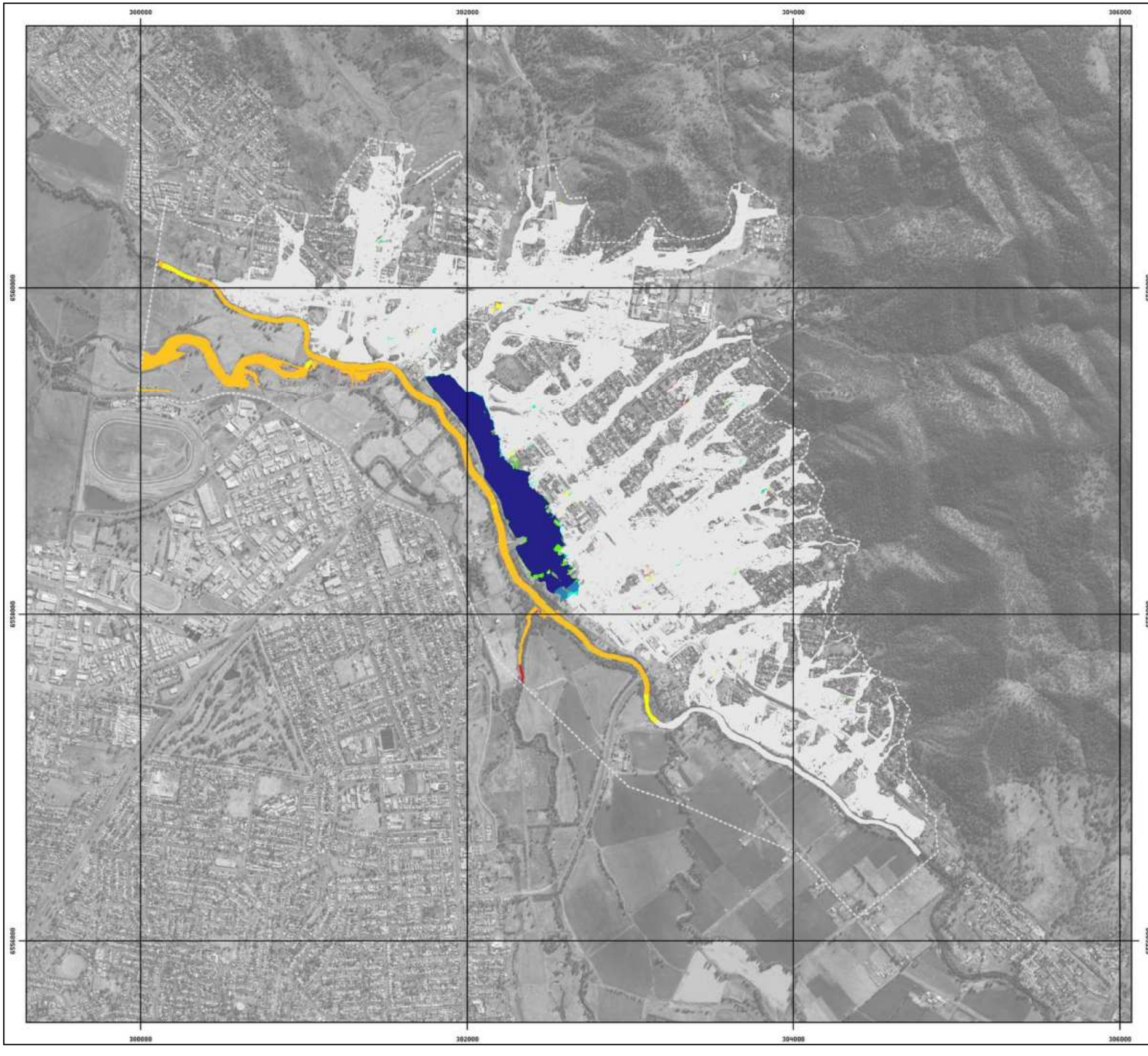
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D05
MODIFICATION MEASURE FM02
PEAK FLOOD LEVEL DIFFERENCE
1% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

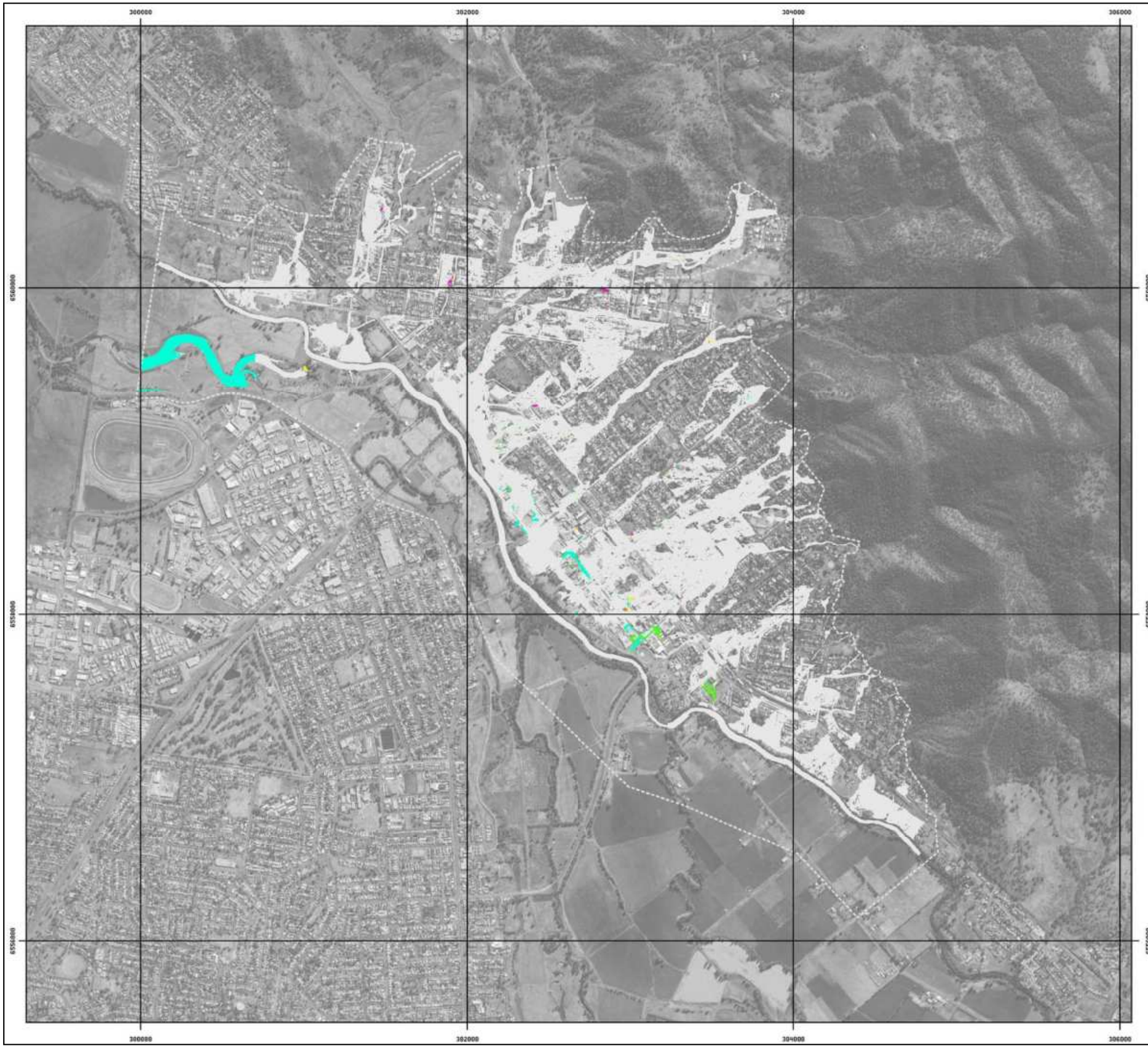
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D06
MODIFICATION MEASURE FM02
PEAK FLOOD LEVEL DIFFERENCE
0.2% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

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0 0.5 1 1.5 km

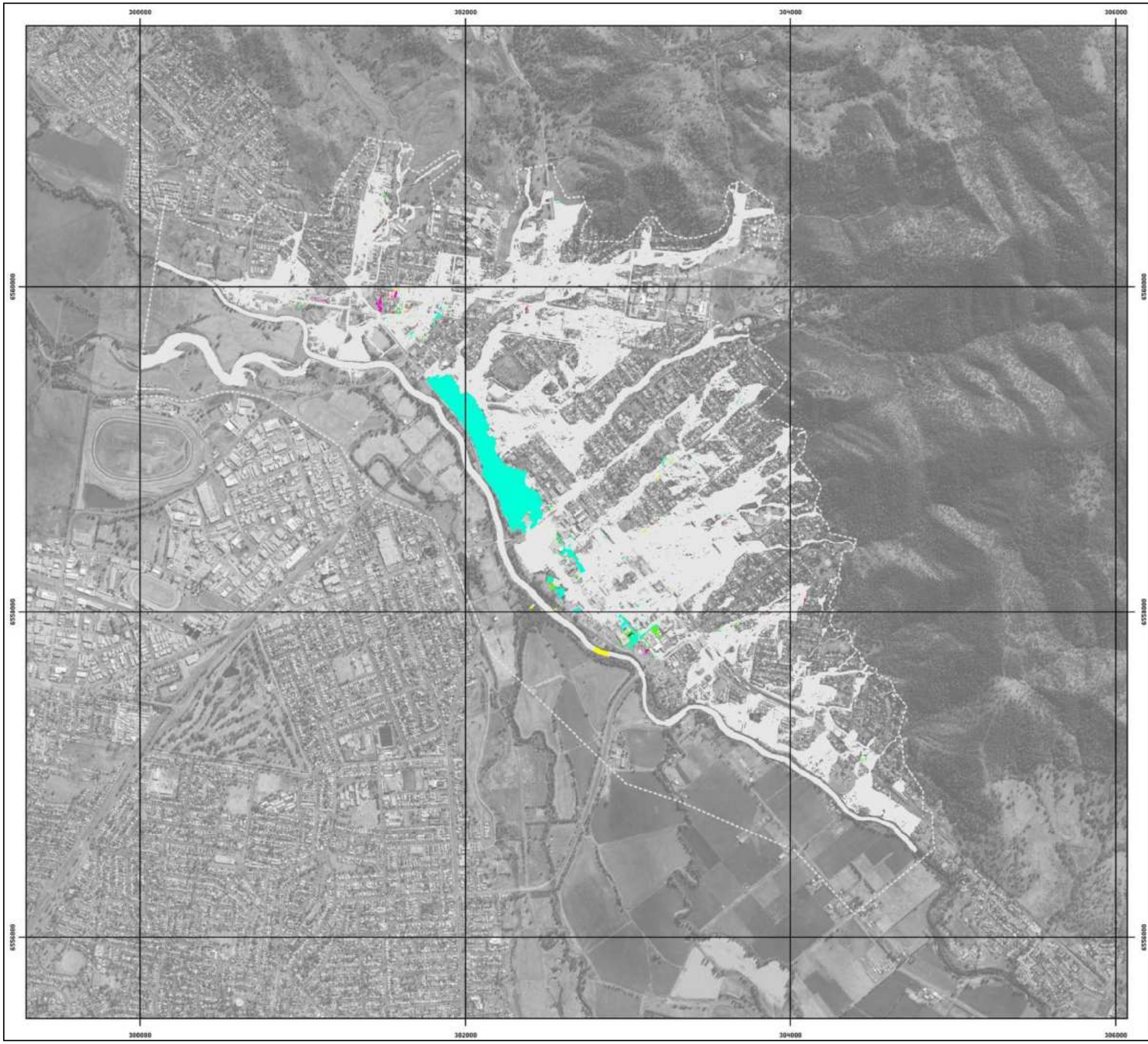
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D07
MODIFICATION MEASURE FM03
PEAK FLOOD LEVEL DIFFERENCE
5% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

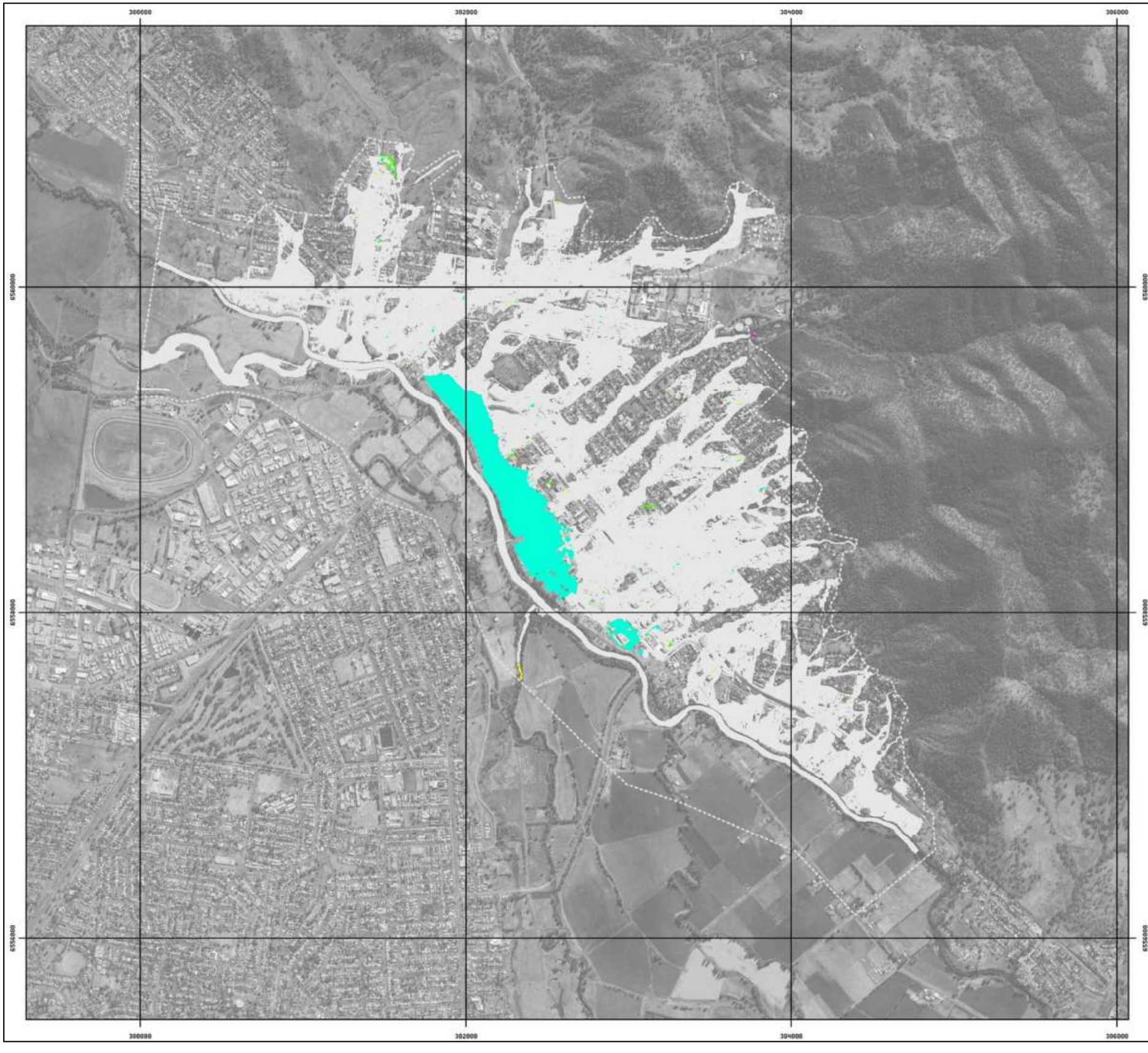
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D08
MODIFICATION MEASURE FM03
PEAK FLOOD LEVEL DIFFERENCE
1% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

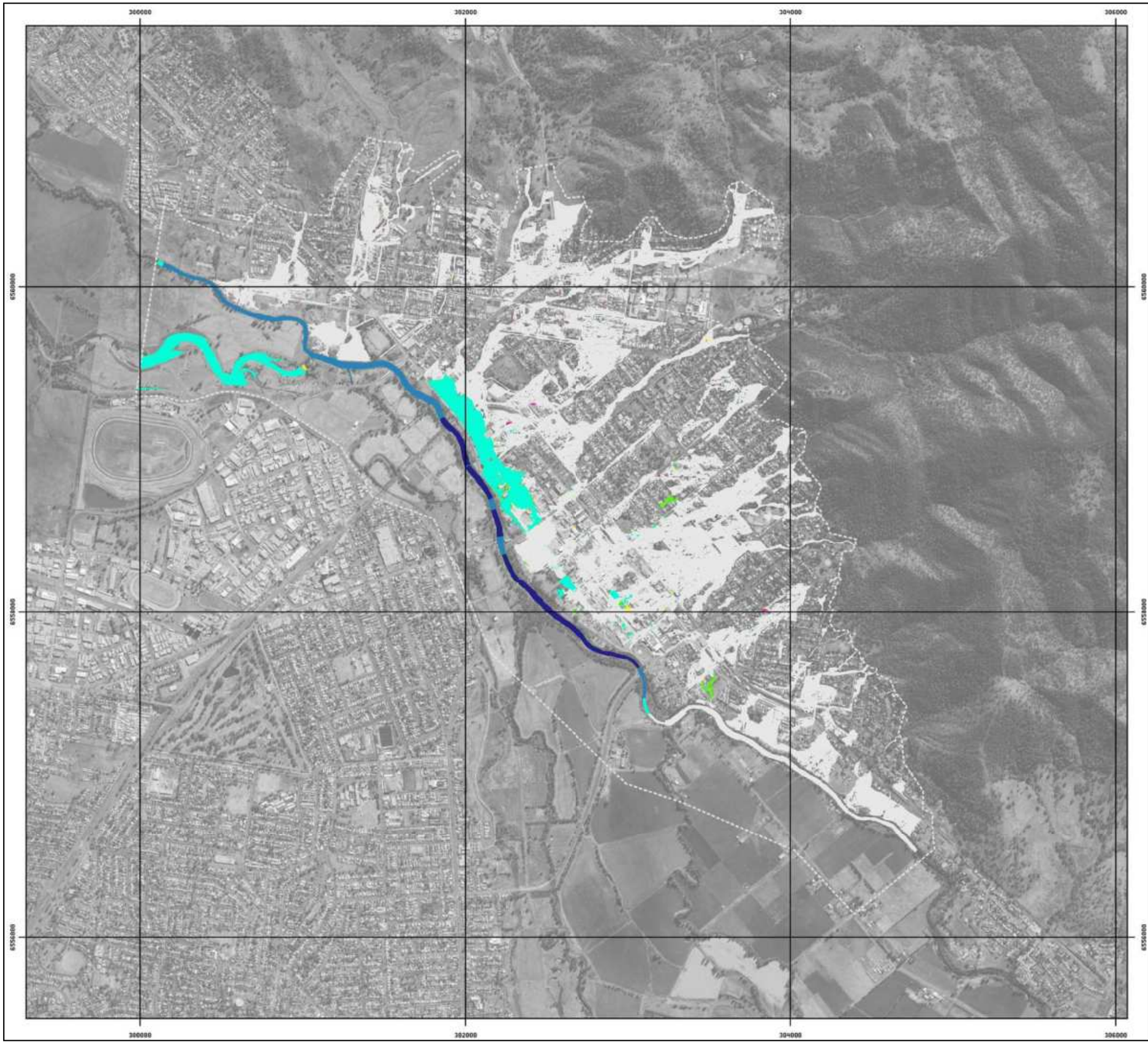
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D09
MODIFICATION MEASURE FM03
PEAK FLOOD LEVEL DIFFERENCE
0.2% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D10
MODIFICATION MEASURE FM04
PEAK FLOOD LEVEL DIFFERENCE
5% AEP EVENT

HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

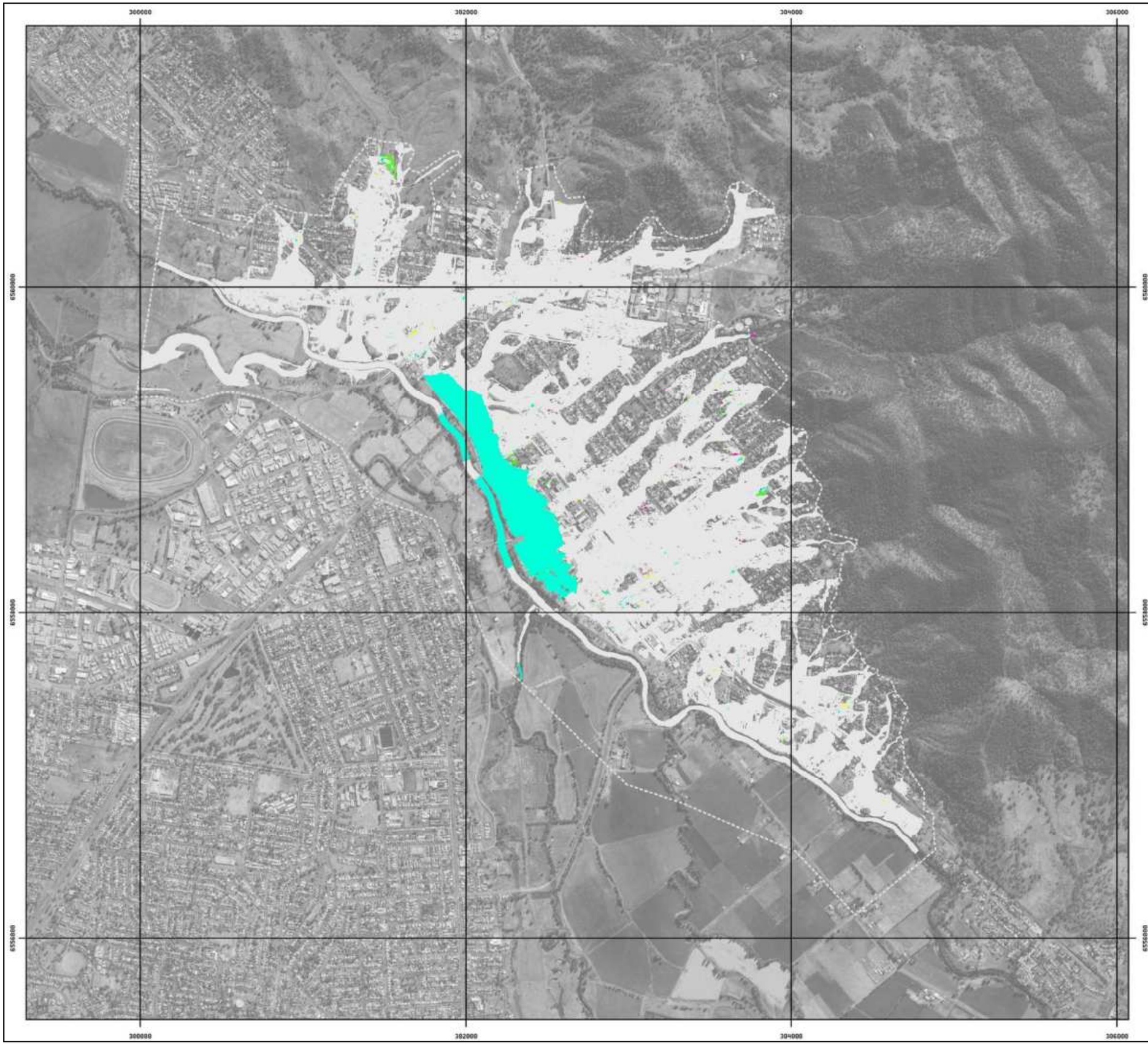
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D11
MODIFICATION MEASURE FM04
PEAK FLOOD LEVEL DIFFERENCE
1% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

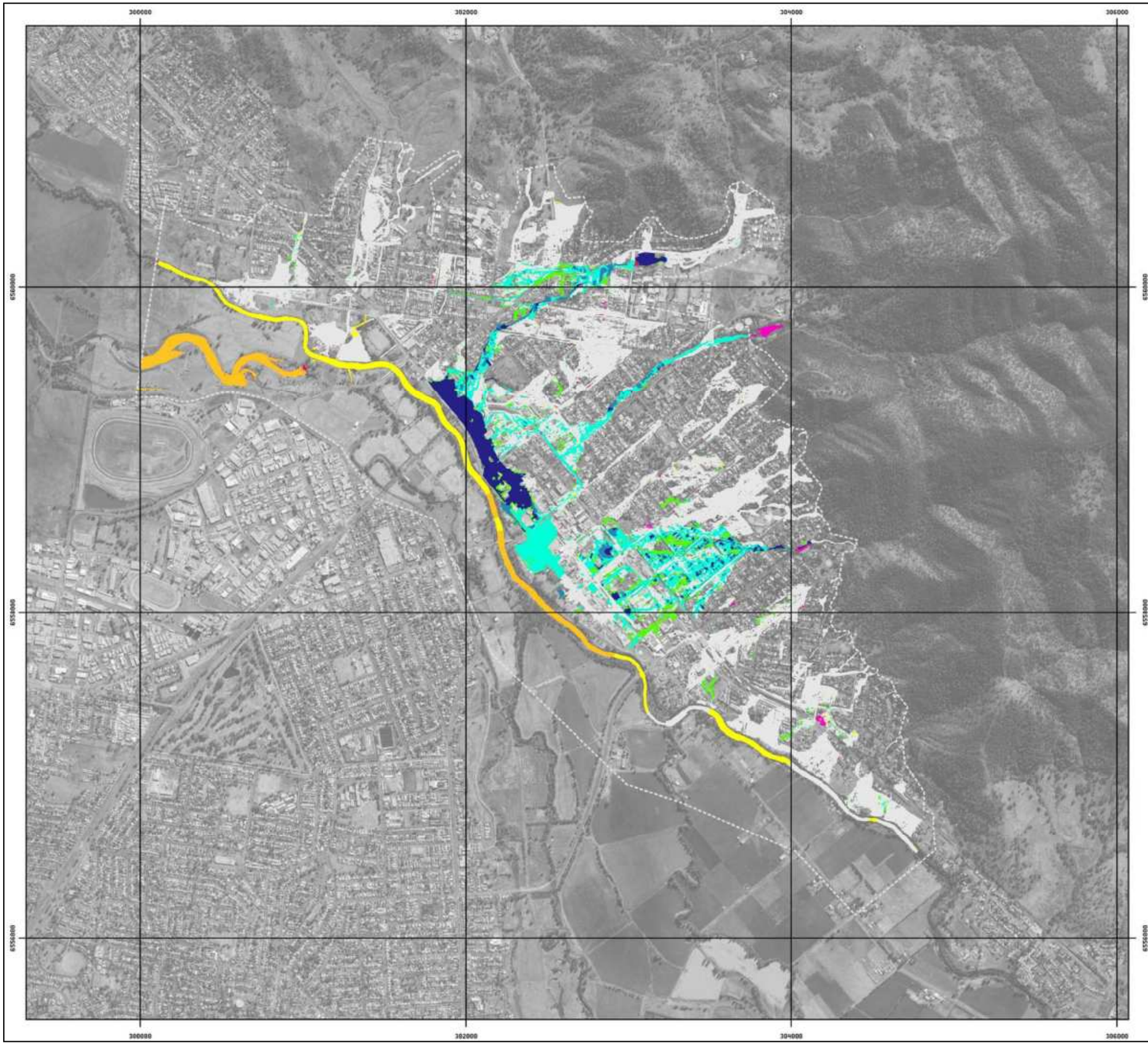
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D12
MODIFICATION MEASURE FM04
PEAK FLOOD LEVEL DIFFERENCE
0.2% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

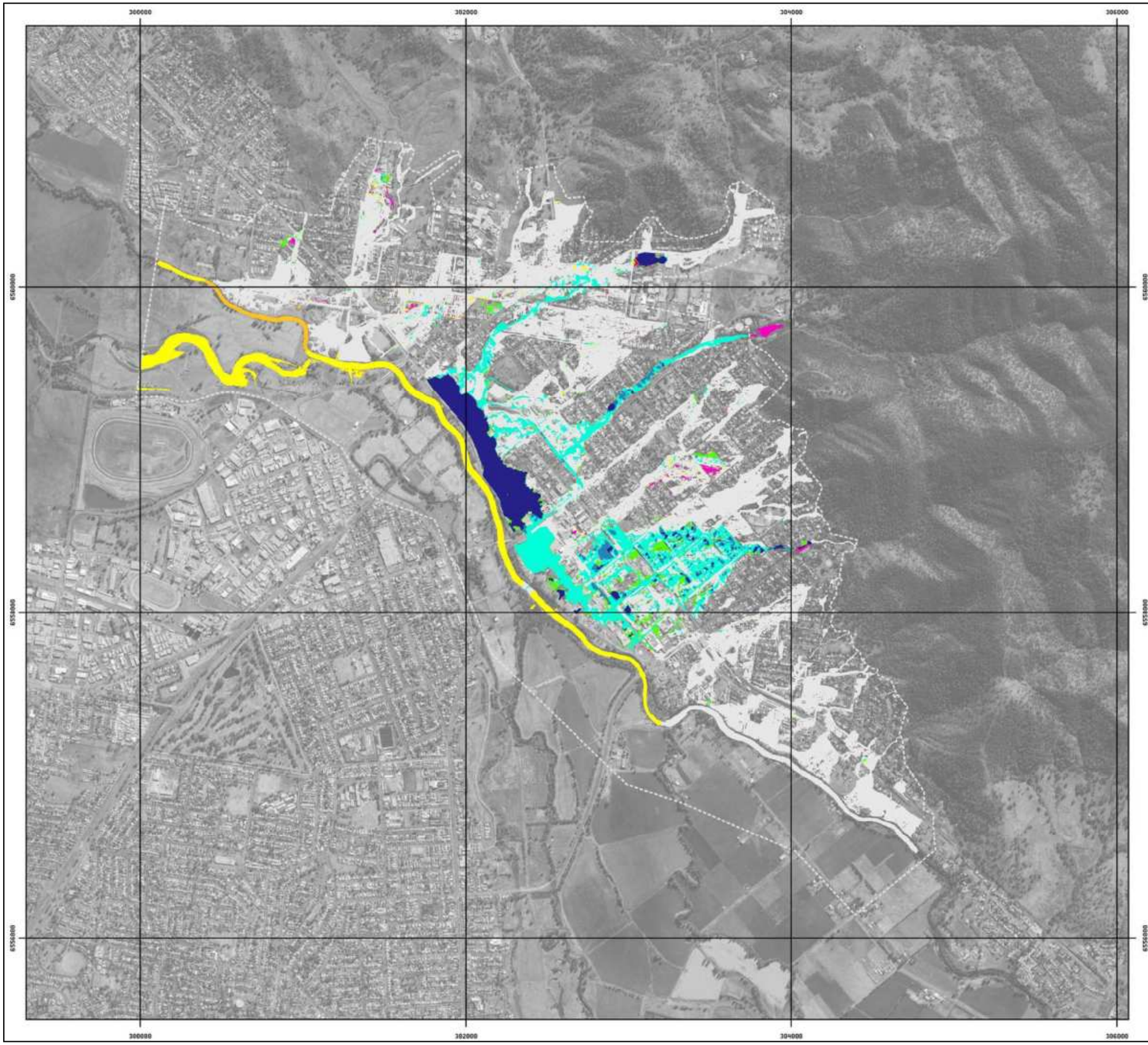
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D13
MODIFICATION MEASURE FM05
PEAK FLOOD LEVEL DIFFERENCE
5% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

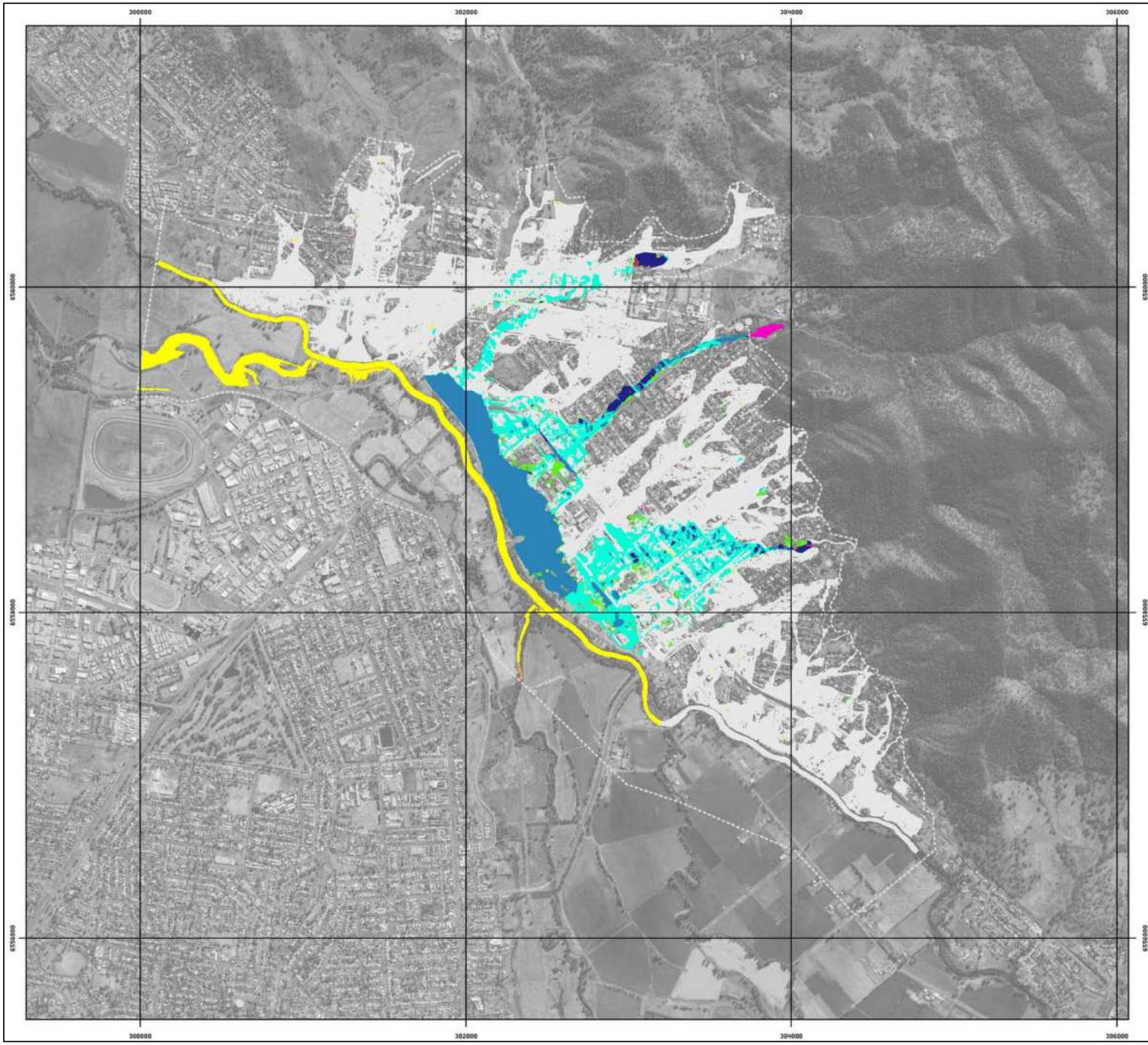
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D14
MODIFICATION MEASURE FM05
PEAK FLOOD LEVEL DIFFERENCE
1% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study -
East & North Tamworth Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 0.5 1 1.5 km

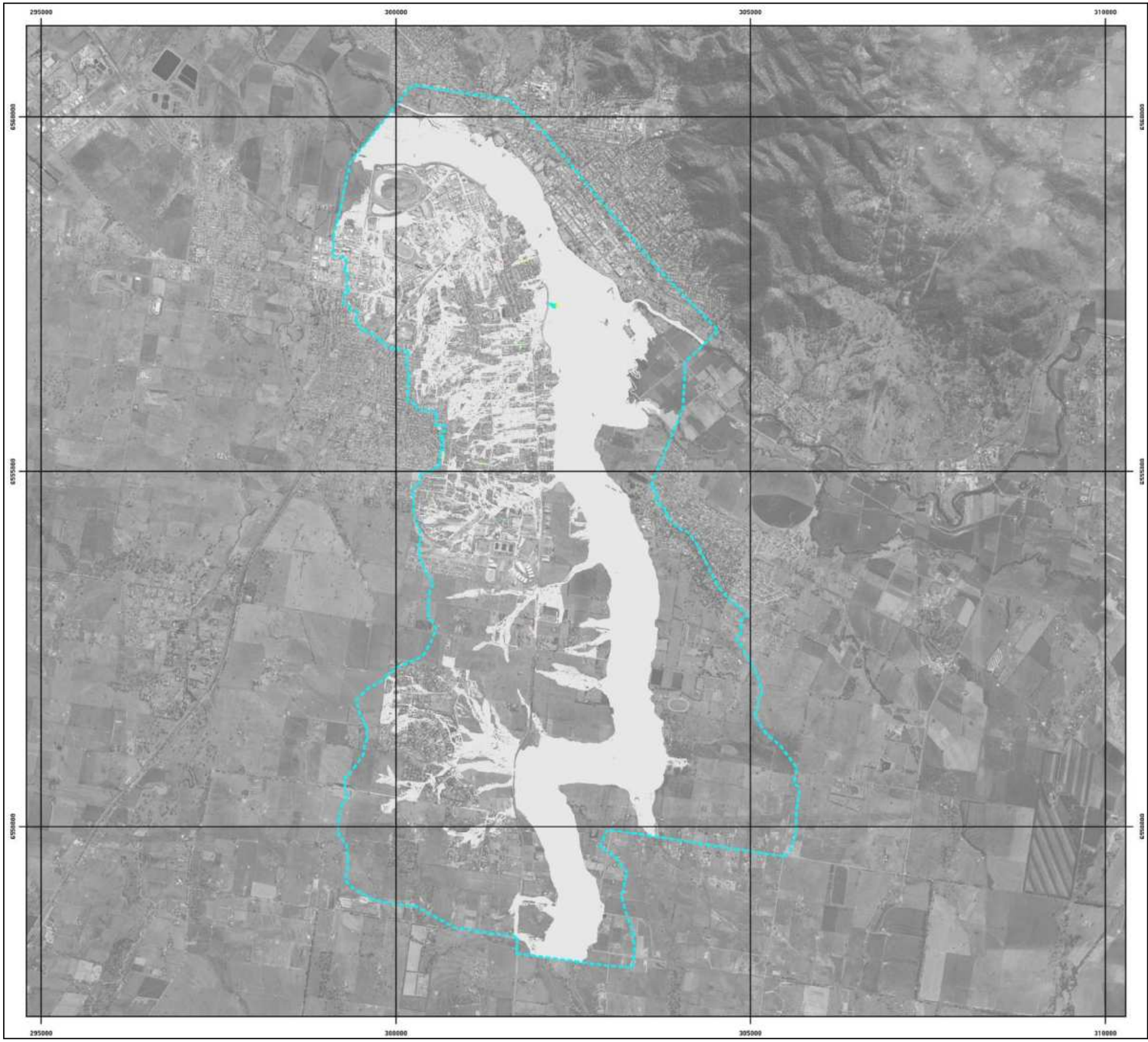
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D15
MODIFICATION MEASURE FM05
PEAK FLOOD LEVEL DIFFERENCE
0.2% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study - Goonoo Goonoo Creek Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 1 2 3 km

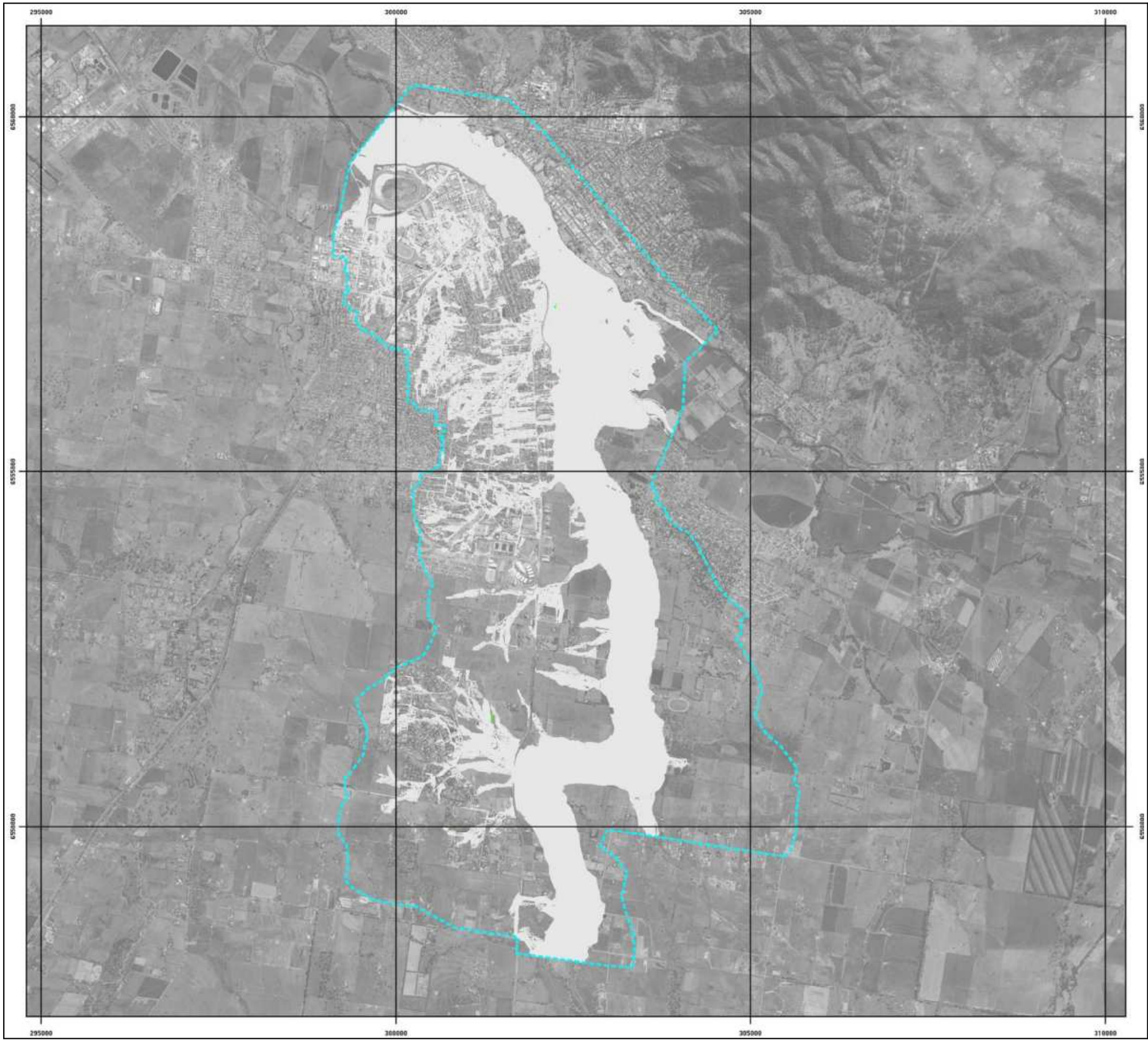
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D16
MODIFICATION MEASURE FM06
PEAK FLOOD LEVEL DIFFERENCE
5% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study - Goonoo Goonoo Creek Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 1 2 3 km

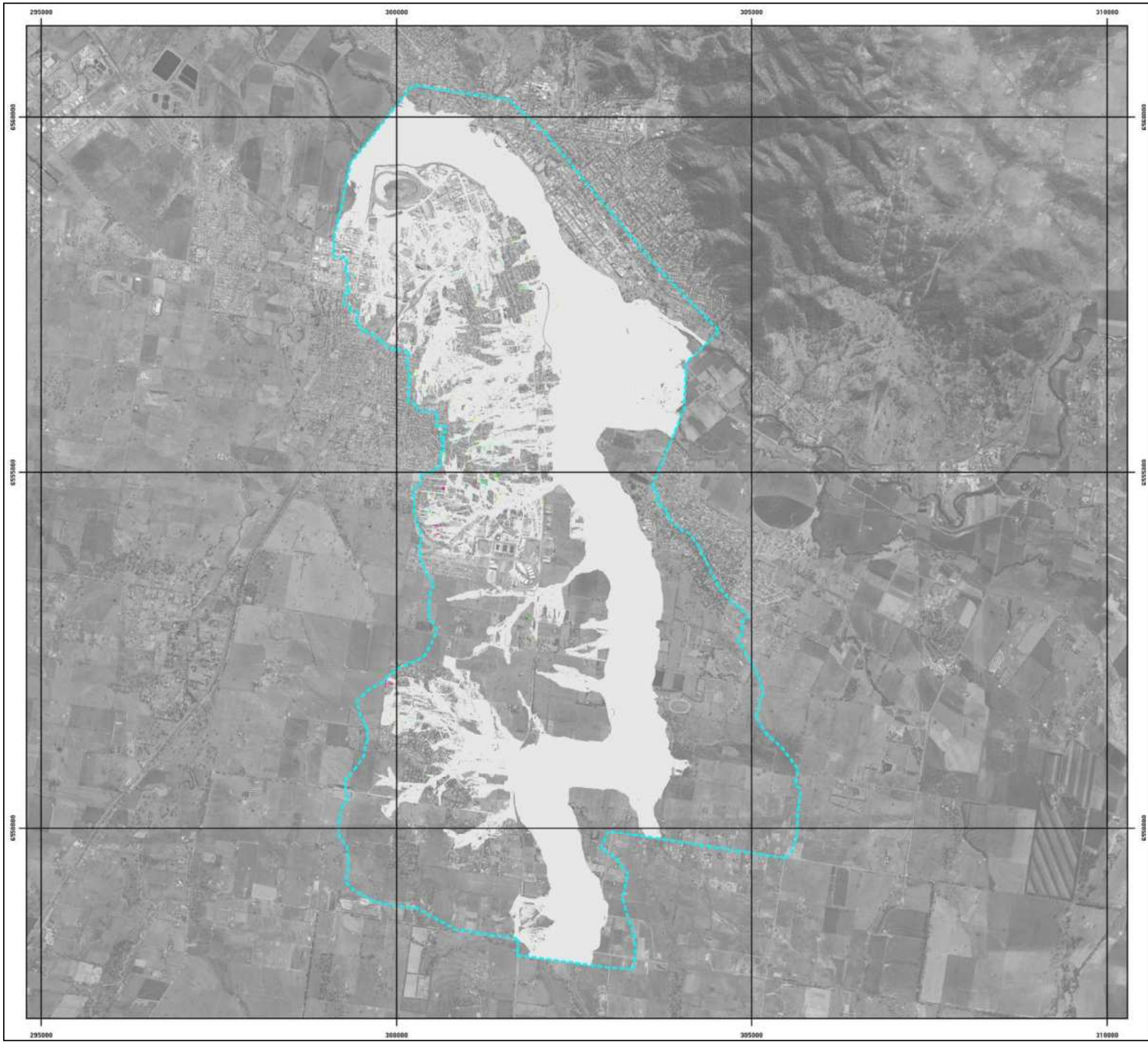
Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D17
MODIFICATION MEASURE FM06
PEAK FLOOD LEVEL DIFFERENCE
1% AEP EVENT



HYDRO SPATIAL

Tamworth City Flood Study - Goonoo Goonoo Creek Model

Peak Flood Level Difference (m)

- <= -0.10
- -0.10 to -0.05
- -0.05 to -0.01
- -0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- 0.10 to 0.30
- > 0.30

- No Longer Flooded
- Newly Flooded

0 1 2 3 km

Horizontal Datum: GDA 1994 / MGA Zone 56
Vertical Datum: m AHD

N

TAMWORTH FLOODPLAIN RISK MANAGEMENT STUDY AND PLAN

Map Location:
20001_Tamworth_FRMSP\GIS\Maps\Reports\FRMSP_Report

FIGURE D18
MODIFICATION MEASURE FM06
PEAK FLOOD LEVEL DIFFERENCE
0.2% AEP EVENT

APPENDIX E
ESTIMATE OF COSTS

E.1 Flood Modification Measures

E.1.1 FM01 – Levee on Timbumburi Creek

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$50,394.85
2.0	DEMOLITION, CLEARING AND GRUBBING				
2.1	Clearing & grubbing	10997.87	sq.m	$0.59	$6,488.74
2.2	Strip topsoil & stockpile for re-use	6598.72	cu.m	$1.67	$11,019.86
2.3	Dispose of excess topsoil	6239.28	cu.m	$1.22	$7,635.48
	SUBTOTAL				$25,144.08
3.0	FLAPGATE CULVERTS				
3.2	Installation of culverts	319.11	m	$630.00	$201,038.67
	SUBTOTAL				$201,038.67
4.0	EARTHWORKS				
4.1	Build levee clay layer	2848.27	cu.m	$1.67	$4,756.61
4.2	Build levee topsoil layer	359.44	sq.m	$1.67	$600.27
4.3	Level clay footing	3665.96	sq.m	$3.60	$13,197.44
	SUBTOTAL				$18,554.32
5.0	EROSION CONTROL				
5.1	Anchor turf reinforcement mesh	4673.20	sq.m	$7.02	$32,813.62
5.2	Plant erosion controlling turf seed	4673.20	sq.m	$2.50	$11,682.99
					$44,496.61
6.0	MINOR LANDSCAPING				
6.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	4673.20	sq.m	$10.00	$46,731.95
	SUBTOTAL				$46,731.95
	CONSTRUCTION SUBTOTAL				$386,360.48
7.0	CONTINGENCIES				
7.1	50% construction cost				$193,180.24
	CONSTRUCTION TOTAL, excluding GST				**$579,540.72**

Item Number	Description of works	Quantity	Unit	Rate	Cost
	GST				$57,954.07
	CONSTRUCTON TOTAL, including GST				$637,494.79
	CONSTRUCTION TOTAL, rounded				$637,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.2 FM02 –Pump out from behind the levee

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$612,037.89
2.0	DEMOLITION, CLEARING AND GRUBBING				
2.1	Clearing & grubbing	16.30	sq.m	$0.59	$9.62
2.2	Demolish asphalt and gravel layer	4.23	cu.m	$3.67	$15.53
2.3	Excavate clay layer	13.72	cu.m	$3.67	$50.36
2.4	Dispose of excess topsoil	2.96	cu.m	$1.22	$3.62
	SUBTOTAL				$79.13
3.0	STORMWATER PUMPS				
3.1	Installation of pump	3.00	item	$1,360,000.00	$4,080,000.00
3.3	Place and compact backfill	1.27	cu.m	$8.20	$10.41
	SUBTOTAL				$4,080,010.41
4.0	MINOR LANDSCAPING				
4.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	16.30	sq.m	10	$163.05
	SUBTOTAL				$163.05
	CONSTRUCTION SUBTOTAL				$4,692,290.48
5.0	CONTINGENCIES				
5.1	50% construction cost				$2,346,145.24
	CONSTRUCTION TOTAL, excluding GST				**$7,038,435.72**
	GST				**$703,843.57**
	CONSTRUCTON TOTAL, including GST				**$7,742,279.29**
	CONSTRUCTION TOTAL, rounded				**$7,743,000.00**

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.3 FM03 – Additional pressure tunnels

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$242,587.35
2.0	DEMOLITION, CLEARING AND GRUBBING				
2.1	Clearing & grubbing	1546.43	sq.m	$0.59	$912.39
2.2	Demolish asphalt and gravel layers	1030.95	m	$48.60	$50,104.27
2.3	Excavate clay layer	2165.00	cu.m	$3.67	$7,948.42
	SUBTOTAL				$58,965.08
3.0	BOX CULVERTS				
3.1	Installation of pipes	1030.95	m	$1,179.00	$1,215,492.41
	SUBTOTAL				$1,215,492.41
4.0	ROAD CONSTRUCTION				
4.1	Lay subbase	1030.95	m	$129.00	$132,992.81
4.2	Lay asphalt	1030.95	m	$100.00	$103,095.20
4.3	Prime Seal	1030.95	m	$26.70	$27,526.42
4.4	2 Coat Seal	1030.95	m	$61.80	$63,712.83
	SUBTOTAL				$327,327.26
5.0	MINOR LANDSCAPING				
5.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	1546.43	sq.m	10	$15,464.28
	SUBTOTAL				$15,464.28
	CONSTRUCTION SUBTOTAL				$1,859,836.39
6.0	CONTINGENCIES				
6.1	50% construction cost				$929,918.19
	CONSTRUCTION TOTAL, excluding GST				**$2,789,754.58**
	GST				**$278,975.46**
	CONSTRUCTON TOTAL, including GST				**$3,068,730.04**
	CONSTRUCTION TOTAL, rounded				**$3,069,000.00**

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.4 FM04 -Computerised flood gates

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Administrative costs	1	item		
	SUBTOTAL				$22,500.00
2.0	FLOOD GATES				
2.1	Computerized flood gates	15.00	item	$10,000	$150,000.00
	SUBTOTAL				$150,000.00
	CONSTRUCTION SUBTOTAL				$172,500.00
6.0	CONTINGENCIES				
6.1	50% construction cost				$86,250.00
	CONSTRUCTION TOTAL, excluding GST				$258,750.00
	GST				$25,875.00
	CONSTRUCTON TOTAL, including GST				$284,625.00
	CONSTRUCTION TOTAL, rounded				$285,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.5 FM05 – Detention basin upstream of East and North Tamworth

TAFE Basin

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$88,420.98
2.0	DEMOLITION, CLEARING AND GRUBBING				
2.1	Clearing & grubbing	15814.25	sq.m	$0.59	$9,330.41
2.2	Demolish asphalt and gravel layers	21.92	m	$48.60	$1,065.21
2.3	Strip topsoil and stockpile for re-use	9028.13	cu.m	$3.67	$33,145.24
2.4	Excavate clay layer	34989.33	cu.m	$3.67	$128,457.34
2.5	Dispose of excess topsoil and clay	15791.23	cu.m	$1.22	$19,324.94
	SUBTOTAL				$191,323.14
3.0	BOX CULVERTS				
3.1	Installation of pipes	21.92	m	$1,179.00	$25,841.32
	SUBTOTAL				$25,841.32
4.0	ROAD CONSTRUCTION				
4.1	Lay subbase	21.92	m	$129.00	$2,827.42
4.2	Lay asphalt	21.92	m	$100.00	$2,191.80
4.3	Prime Seal	21.92	m	$26.70	$585.21
4.4	2 Coat Seal	21.92	m	$61.80	$1,354.53
	SUBTOTAL				$6,958.97
5.0	EARTHWORKS AND EROSION CONTROL				
5.1	Level clay footing	15791.234	sq.m	$3.60	$56,848.44
5.2	Anchor turf reinforcement mesh	15791.234	sq.m	$7.02	$110,880.78
5.3	Plant erosion controlling turf seed	15791.234	sq.m	$2.50	$39,478.09
					$207,207.31
6.0	MINOR LANDSCAPING				
6.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	15814.25	sq.m	10	$158,142.48
	SUBTOTAL				$158,142.48

Item Number	Description of works	Quantity	Unit	Rate	Cost
	CONSTRUCTION SUBTOTAL				$677,894.20
7.0	CONTINGENCIES				
7.1	50% construction cost				$338,947.10
	CONSTRUCTION TOTAL, excluding GST				**$1,016,841.30**
	GST				**$101,684.13**
	CONSTRUCTON TOTAL, including GST				**$1,118,525.43**
	CONSTRUCTION TOTAL, rounded				**$1,119,000.00**

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

Victoria Park Basin

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$156,818.15
2.0	DEMOLITION, CLEARING AND GRUBBING				
2.1	Clearing & grubbing	17742.50	sq.m	$0.59	$10,468.08
2.2	Demolish asphalt and gravel layers	250.59	m	$48.60	$12,178.53
2.3	Strip topsoil and stockpile for re-use	10133.67	cu.m	$3.67	$37,204.04
2.4	Excavate clay layer	38947.70	cu.m	$3.67	$142,989.82
2.5	Dispose of excess topsoil and clay	48898.13	cu.m	$1.22	$59,840.37
	SUBTOTAL				$262,680.83
3.0	BOX CULVERTS				
3.1	Installation of pipes	250.59	m	$1,179.00	$295,442.07
	SUBTOTAL				$295,442.07
4.0	ROAD CONSTRUCTION				
4.1	Lay subbase	250.59	m	$129.00	$32,325.72
4.2	Lay asphalt	250.59	m	$100.00	$25,058.70
4.3	Prime Seal	250.59	m	$26.70	$6,690.67
4.4	2 Coat Seal	250.59	m	$61.80	$15,486.28
	SUBTOTAL				$79,561.37
5.0	EARTHWORKS AND EROSION CONTROL				

Item Number	Description of works	Quantity	Unit	Rate	Cost
5.1	Level clay footing	17554.56	sq.m	$3.60	$63,196.42
5.2	Anchor turf reinforcement mesh	17554.56	sq.m	$7.02	$123,262.27
5.3	Plant erosion controlling turf seed	17554.56	sq.m	$2.50	$43,886.40
					$230,345.08
6.0	MINOR LANDSCAPING				
6.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	17742.50	sq.m	10	$177,425.00
	SUBTOTAL				$177,425.00
	CONSTRUCTION SUBTOTAL				$1,202,272.52
7.0	CONTINGENCIES				
7.1	50% construction cost				$601,136.26
	CONSTRUCTION TOTAL, excluding GST				$1,803,408.78
	GST				$180,340.88
	CONSTRUCTON TOTAL, including GST				$1,983,749.66
	CONSTRUCTION TOTAL, rounded				$1,984,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

Murray Street Basin

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$361,936.05
2.0	DEMOLITION, CLEARING AND GRUBBING				
2.1	Clearing & grubbing	6584.91	sq.m	$0.59	$3,885.10
2.2	Demolish asphalt and gravel layers	1431.77	m	$48.60	$69,584.17
2.3	Strip topsoil and stockpile for re-use	3809.05	cu.m	$3.67	$13,984.28
2.4	Excavate clay layer	12839.99	cu.m	$3.67	$47,139.81
2.5	Dispose of excess topsoil and clay	4866.79	cu.m	$1.22	$5,955.86
	SUBTOTAL				$140,549.21
3.0	BOX CULVERTS				
3.1	Installation of pipes	1431.77	m	$1,179.00	$1,688,060.37

Item Number	Description of works	Quantity	Unit	Rate	Cost
	SUBTOTAL				$1,688,060.37
4.0	ROAD CONSTRUCTION				
4.1	Lay subbase	1431.77	m	$129.00	$184,698.72
4.2	Lay asphalt	1431.77	m	$100.00	$143,177.30
4.3	Prime Seal	1431.77	m	$26.70	$38,228.34
4.4	2 Coat Seal	1431.77	m	$61.80	$88,483.57
	SUBTOTAL				$454,587.93
5.0	EARTHWORKS AND EROSION CONTROL				
5.1	Level clay footing	4866.786	sq.m	$3.60	$17,520.43
5.2	Anchor turf reinforcement mesh	4866.786	sq.m	$7.02	$34,172.95
5.3	Plant erosion controlling turf seed	4866.786	sq.m	$2.50	$12,166.97
					$63,860.34
6.0	MINOR LANDSCAPING				
6.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	6584.91	sq.m	10	$65,849.14
	SUBTOTAL				$65,849.14
	CONSTRUCTION SUBTOTAL				$2,774,843.03
7.0	CONTINGENCIES				
7.1	50% construction cost				$1,387,421.51
	CONSTRUCTION TOTAL, excluding GST				**$4,162,264.54**
	GST				**$416,226.45**
	CONSTRUCTON TOTAL, including GST				**$4,578,491.00**
	CONSTRUCTION TOTAL, rounded				**$4,579,000.00**

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.6 FM06 - Diversion of Barnes Gully

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$3,818.44
2.0	DEMOLITION, CLEARING AND GRUBBING				
2.1	Clearing & grubbing	279.72	sq.m	$0.59	$165.03
2.2	Strip topsoil and stockpile for re-use	104.90	cu.m	$3.67	$385.10
2.3	Excavate clay layer	157.34	cu.m	$3.67	$577.66
2.4	Dispose of excess topsoil	73.43	cu.m	$1.22	$89.86
	SUBTOTAL				$1,217.65
3.0	CONCRETE CHANNEL				
3.1	Ground Compaction	262.24	cu.m	$4.43	$1,161.71
3.2	Concrete Installation	279.72	sq.m	$72.50	$20,279.70
	SUBTOTAL				$21,441.41
4.0	MINOR LANDSCAPING				
4.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	279.72	sq.m	10	$2,797.20
	SUBTOTAL				$2,797.20
	CONSTRUCTION SUBTOTAL				$29,274.70
5.0	CONTINGENCIES				
5.1	50% construction cost				$14,637.35
	CONSTRUCTION TOTAL, excluding GST				**$43,912.06**
	GST				**$4,391.21**
	CONSTRUCTON TOTAL, including GST				**$48,303.26**
	CONSTRUCTION TOTAL, rounded				**$49,000.00**

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.7 PM02 – Voluntary property purchase

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Administrative costs	1	item		
	SUBTOTAL				$8,692,501.49
2.0	VOLUNTARY PURCHASE				
2.1	House Purchase	122.00	item	$475,000	$57,950,009.91
	SUBTOTAL				$57,950,009.91
	TOTAL				$66,642,511.40
	TOTAL, rounded				$66,643,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.8 PM03 – Voluntary house raising

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Administrative costs	1	item		
	SUBTOTAL				$603,000.00
2.0	VOLUNTARY RAISING				
2.1	House Raising	67.00	item	$60,000	$4,020,000.00
	SUBTOTAL				$4,020,000.00
	TOTAL				$4,623,000.00
	TOTAL, rounded				$4,623,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.9 PM04 – Flood proofing properties

Item Number	Description of works	Quantity	Unit	Rate	Cost
1.0	GENERAL AND PRELIMINARIES				
1.1	Administrative costs	1	item		
	SUBTOTAL				$2,227,500.00
2.0	FLOOD PROOFING				
2.1	Flood Proofing	165.00	item	$90,000	$14,850,000.00
	SUBTOTAL				$14,850,000.00
	TOTAL				$17,077,500.00
	TOTAL, rounded				$17,078,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

E.1.10 RM03 – Improved access to Calala

	Replacement of Calala Lane Crossing Goonoo Goonoo Creek Bridge				
ITEM NO.	DESCRIPTION OF WORK	QUANTITY	UNIT	RATE	COST
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$9,060,625.88
2.0	BRIDGE WORKS				
2.1	Bridge Demolition	1818.98	sq.m	$360	$654,833.16
2.2	Single Span Bridge Construction	10730.84	sq.m	$5,558	$59,642,030.95
	SUBTOTAL				$60,296,864.11
3.0	MINOR LANDSCAPING				
3.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	10730.84	sq.m	$10.00	$107,308.44
	SUBTOTAL				$107,308.44
	CONSTRUCTION SUBTOTAL				$69,464,798.43
4.0	CONTINGENCIES				
4.1	50% construction cost				$34,732,399.22
	CONSTRUCTION TOTAL, excluding GST				**$104,197,197.65**
	GST				**$10,419,719.77**
	CONSTRUCTON TOTAL, including GST				**$114,616,917.42**
	CONSTRUCTION TOTAL, rounded				**$114,617,000.00**

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

	Replacement of Calala Lane Crossing Calala Creek Bridge				
ITEM NO.	DESCRIPTION OF WORK	QUANTITY	UNIT	RATE	COST
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$3,227,196.78
2.0	BRIDGE WORKS				
2.1	Bridge Demolition	589.40	sq.m	$360	$212,184.36
2.2	Single Span Bridge Construction	3825.87	sq.m	$5,558	$21,264,202.13
	SUBTOTAL				$21,476,386.49
3.0	MINOR LANDSCAPING				
3.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	3825.87	sq.m	$10.00	$38,258.73
	SUBTOTAL				$38,258.73
	CONSTRUCTION SUBTOTAL				$24,741,842.01
4.0	CONTINGENCIES				
4.1	50% construction cost				$12,370,921.00
	CONSTRUCTION TOTAL, excluding GST				$37,112,763.01
	GST				$3,711,276.30
	CONSTRUCTON TOTAL, including GST				$40,824,039.31
	CONSTRUCTION TOTAL, rounded				$40,824,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).

	Replacement of O'Brien's Lane Crossing the Peel River Bridge				
ITEM NO.	DESCRIPTION OF WORK	QUANTITY	UNIT	RATE	COST
1.0	GENERAL AND PRELIMINARIES				
1.1	Site establishment, security fencing, facilities & disestablishment	1	item		
1.2	Provision of sediment & erosion control	1	item		
1.3	Construction setout & survey	1	item		
1.4	Work as executed survey & documentation	1	item		
1.5	Geotechnical supervision, testing & certification	1	item		
	SUBTOTAL				$12,779,602.88
2.0	BRIDGE WORKS				
2.1	Bridge Demolition	452.07	sq.m	$360	$162,745.20
2.2	Single Span Bridge Construction	15272.02	sq.m	$5,558	$84,881,887.16
	SUBTOTAL				$85,044,632.36
3.0	MINOR LANDSCAPING				
3.1	Repair disturbed areas in accordance with landscape architects requirements (nominal allowance)	15272.02	sq.m	$10.00	$152,720.20
	SUBTOTAL				$152,720.20
	CONSTRUCTION SUBTOTAL				$97,976,955.44
4.0	CONTINGENCIES				
4.1	50% construction cost				$48,988,477.72
	CONSTRUCTION TOTAL, excluding GST				$146,965,433.17
	GST				$14,696,543.32
	CONSTRUCTON TOTAL, including GST				$161,661,976.48
	CONSTRUCTION TOTAL, rounded				$161,662,000.00

* General and preliminary work subtotal was calculated as 15% of the construction value (excluding contingencies).