

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Part 2 of 8

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix E Nicol Creek flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix E

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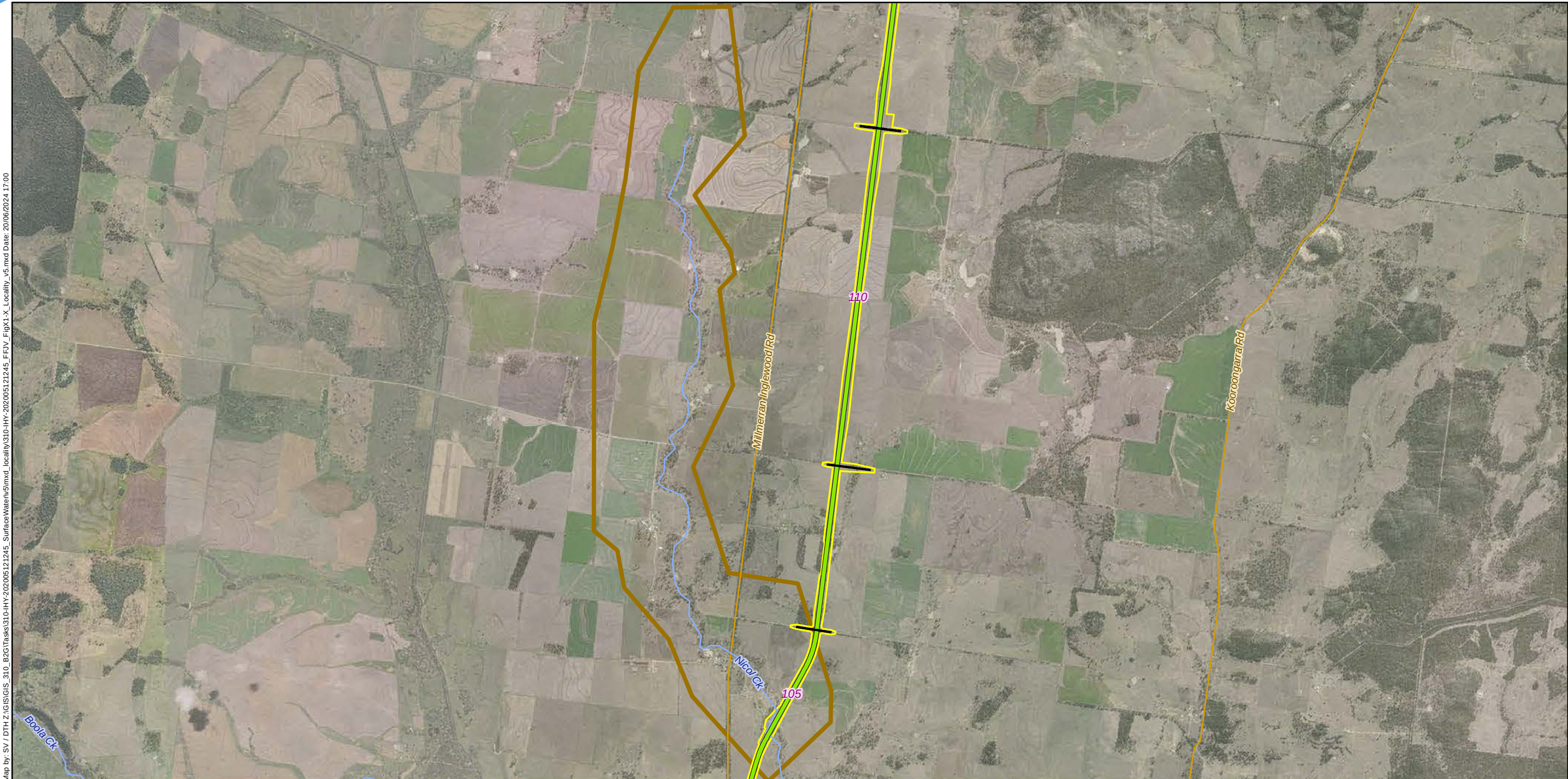
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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Watercourses
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint



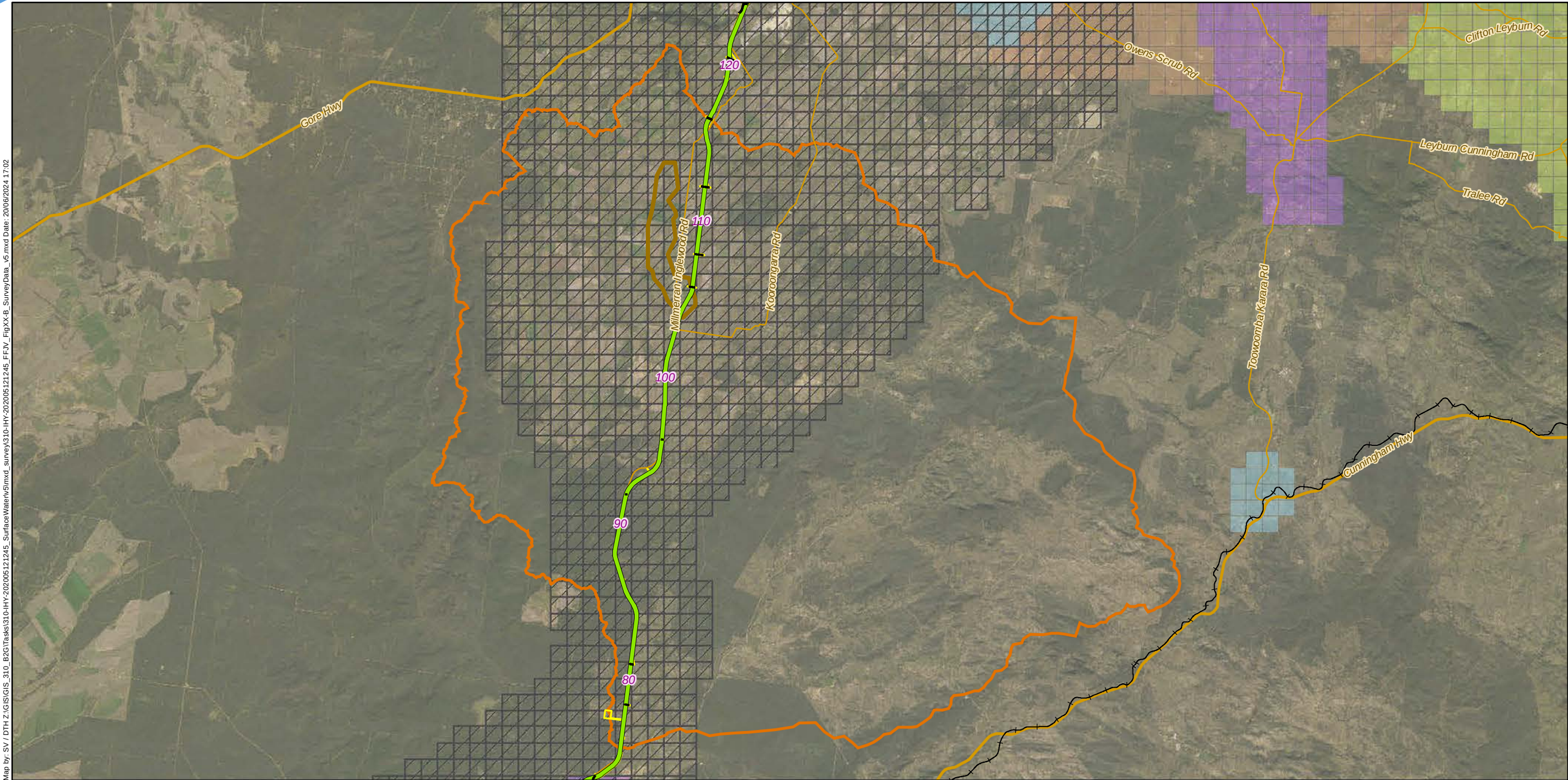
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0 0.5 1 1.5 2 2.5km



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Border to Gowrie
Figure E1-A:
Locality Plan - Nicol Creek

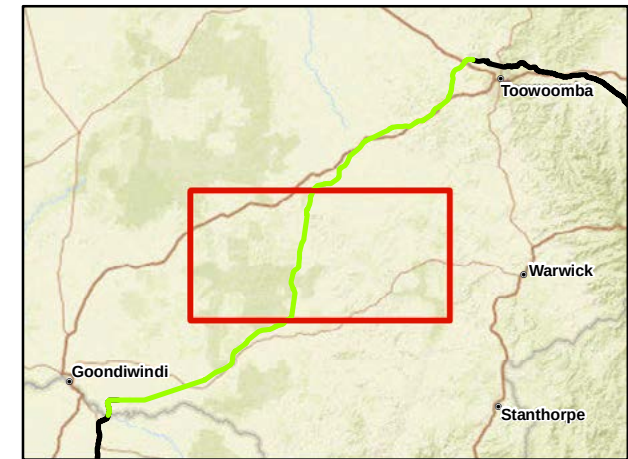


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Project footprint
- Hydrologic model extent
- Regional hydraulic model extent

LiDAR datasets (1m grid)

- Inland Towns Stage 2 2011
- Inland Towns Stage 4 2012
- Inland Towns Stage 6 2014
- Southern Downs 2010
- 2015 ARTC LiDAR 1m

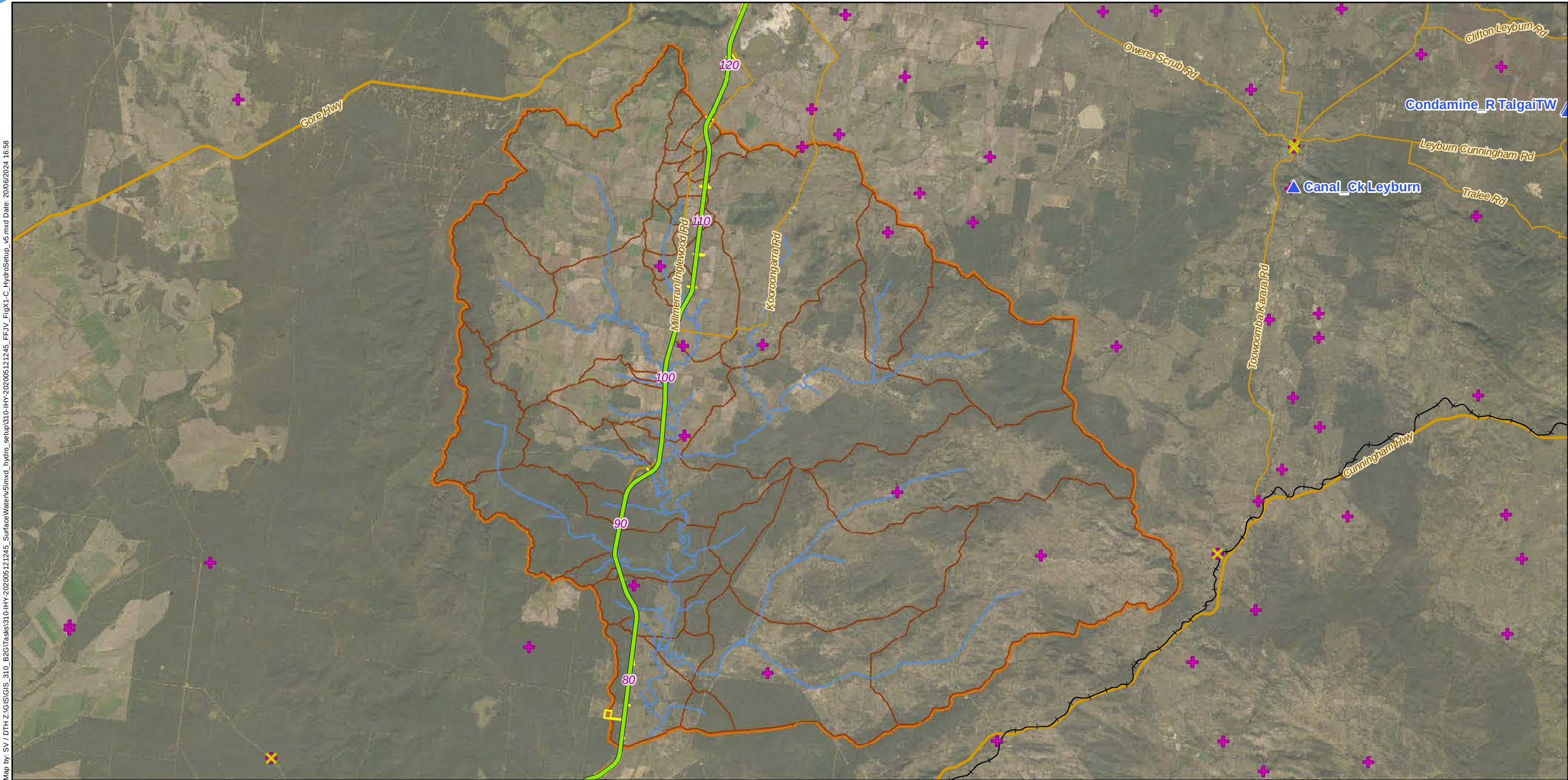


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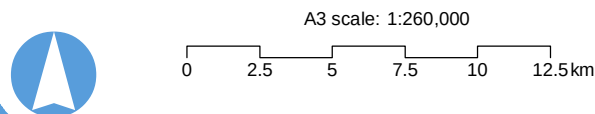
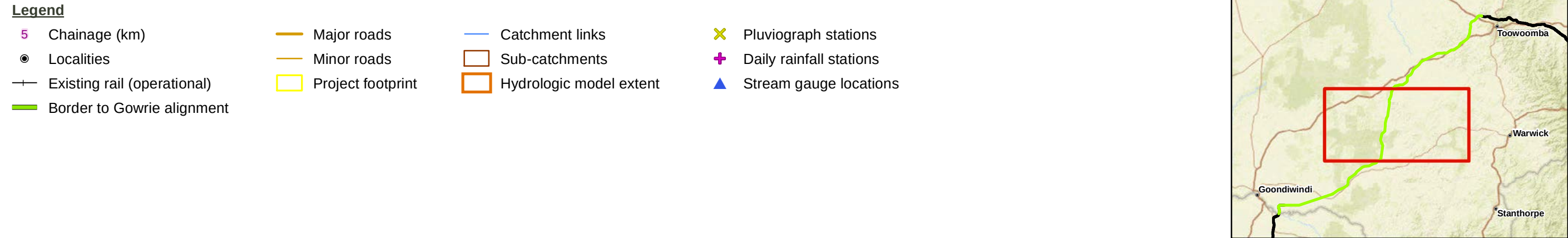


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Border to Gowrie
Figure E1-B:
Survey Data - Nicol Creek

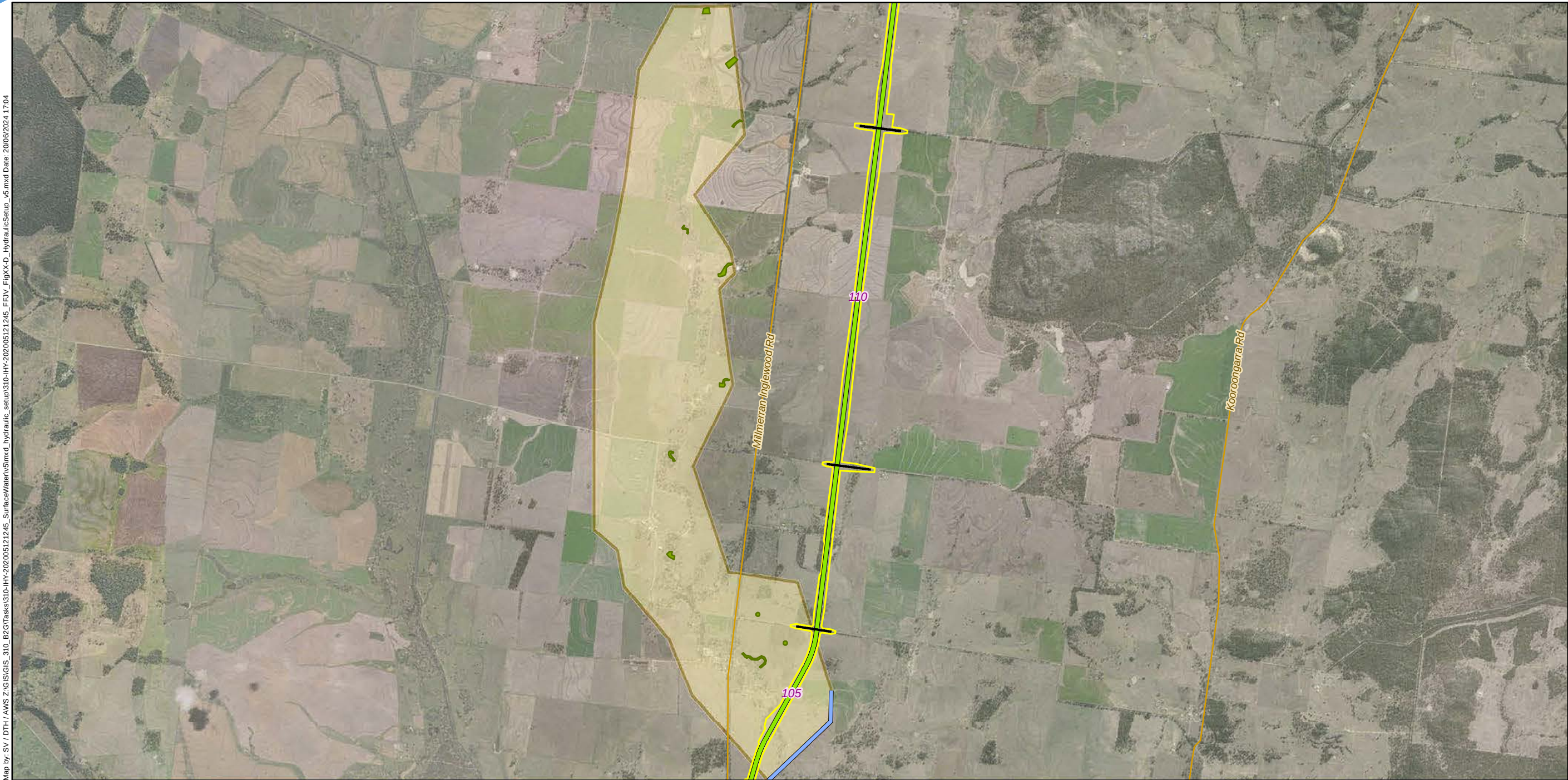


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Border to Gowrie
Figure E1-C:
Hydrologic Model Setup - Nicol Creek

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Hydraulic_setup\310-IHY-202005121245_FFIV_FigXX-D_HydraulicSetup_v5.mxd Date: 20/06/2024 17:04



Legend

- | | | |
|----------------------------|---------------------|---------------------------------|
| 5 Chainage (km) | Minor roads | Regional hydraulic model extent |
| Border to Gowrie alignment | Project road design | Outflow boundary |
| | Project footprint | Inflow boundary |



A3 scale: 1:52,000

0 0.5 1 1.5 2 2.5km



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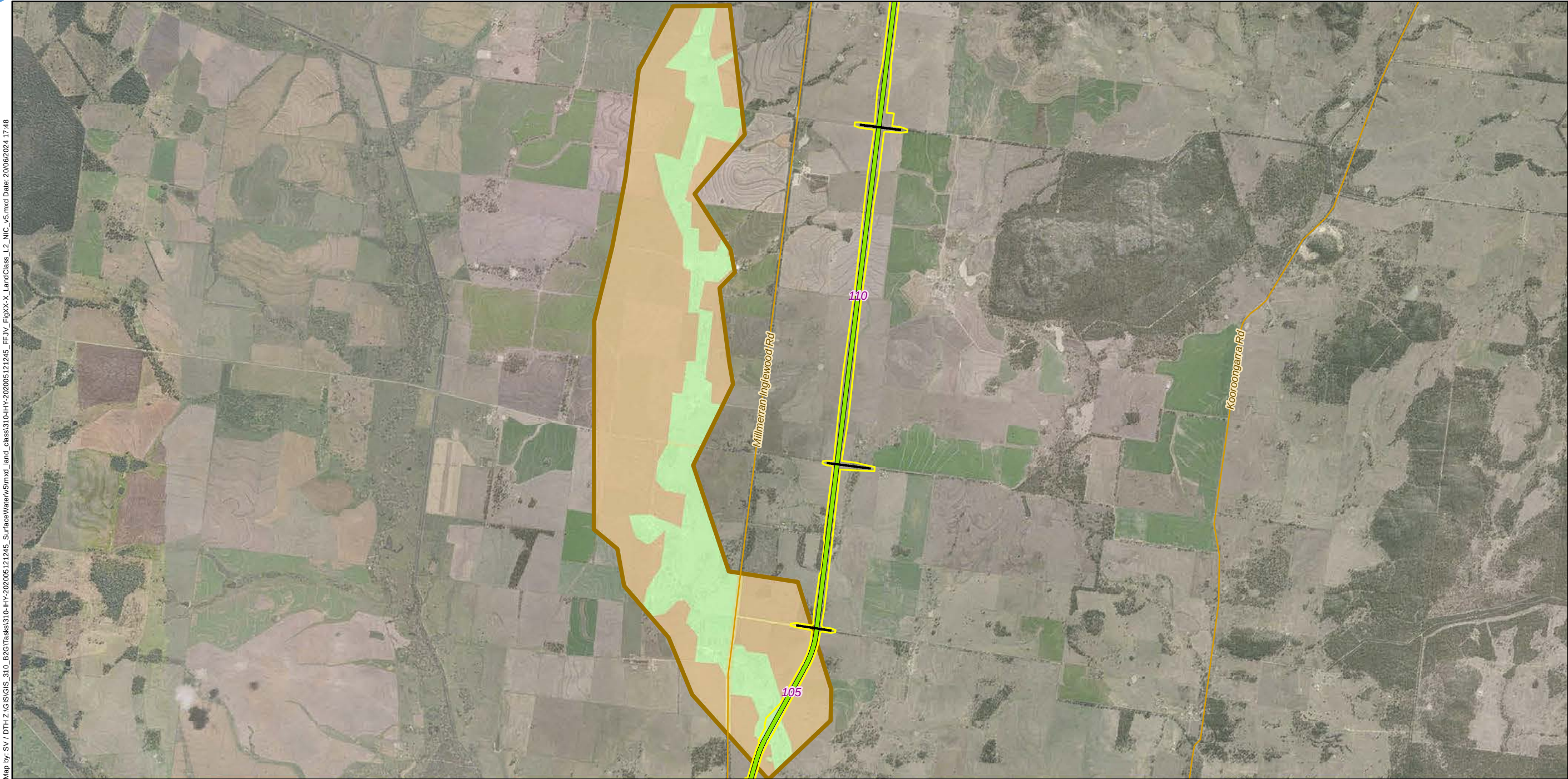
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E1-D:

Hydraulic Model Setup - Nicol Creek

Map by: SV / DTH Z:\GIS\GIS_310_B2G1Tasks\310-IHY-202005121245_SurfaceWater\310mxd Land_class\310-IHY-202005121245_FFJV_FigXX-X_LandClass_L2_NIC_v5.mxd Date: 20/06/2024 17:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Landuse classification

- | | |
|--------------------------------------|---------------------------------------|
| River (n = 0.035) | Open Space - Moderate Veg (n = 0.055) |
| Sealed Road Corridor (n = 0.015) | Open Space - Heavy Veg (n = 0.065) |
| Unsealed Road Corridor (n = 0.025) | Open Water (n = 0.025) |
| Rural Residential (n = 0.09) | Rail (n = 0.025) |
| Urban Residential (n = 0.1) | Riparian (n = 0.04) |
| Commercial (n = 0.06) | Crop (n = 0.1085) |
| Open Space - Minimum Veg (n = 0.045) | |



A3 scale: 1:52,000
0 0.5 1 1.5 2 2.5km



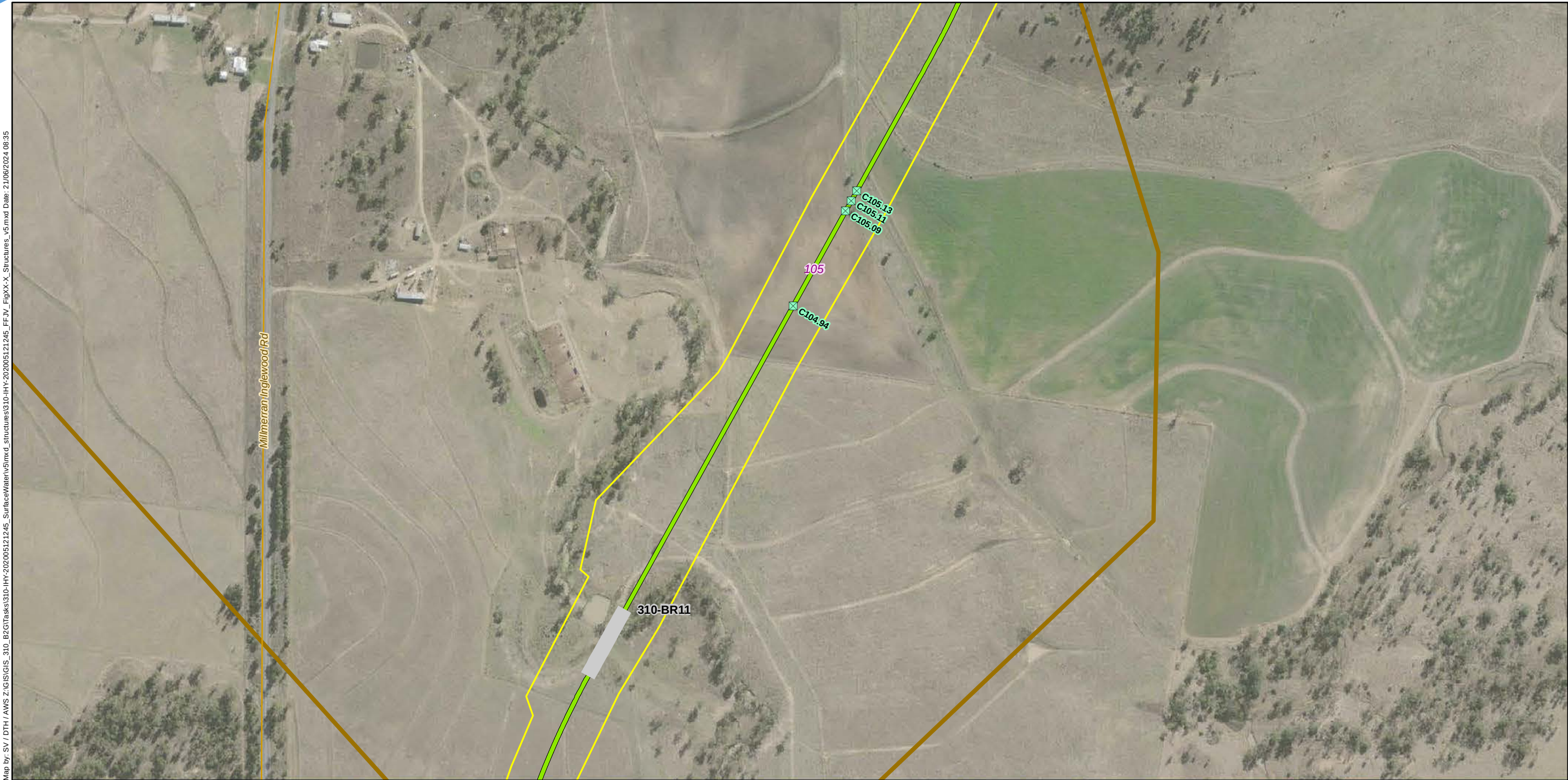
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Border to Gowrie

Figure E1-E:

Landuse classifications - Nicol Creek



Legend

- 5 Chainage (km)
- ✕ Floodplain culvert
- Border to Gowrie alignment
- Minor roads
- Bridges
- Regional hydraulic model extent
- Project footprint



A3 scale: 1:6,000

0 0.06 0.12 0.18 0.24 0.3km



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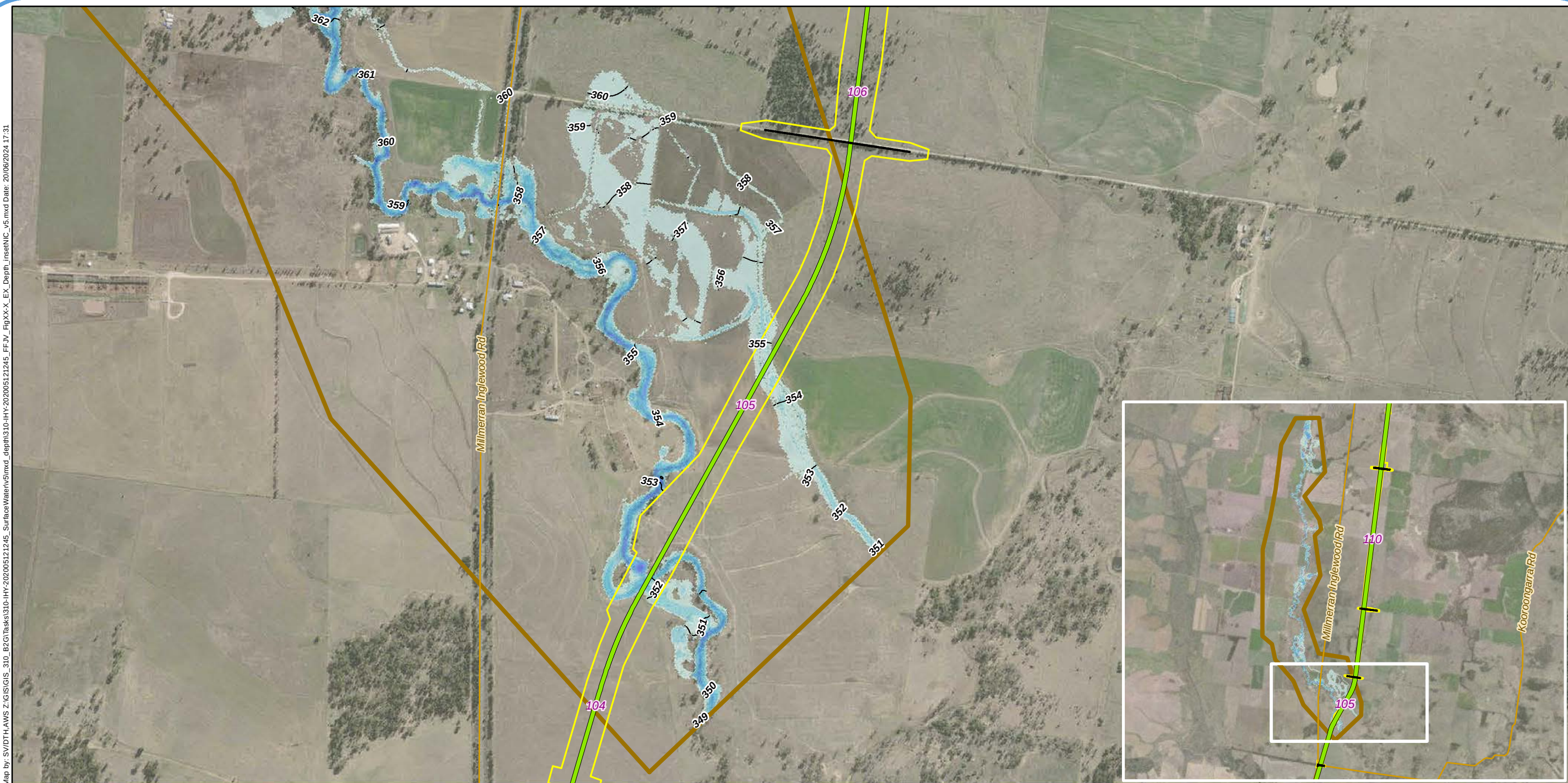
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E1-F:

Proposed Design Structures - Nicol Creek

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



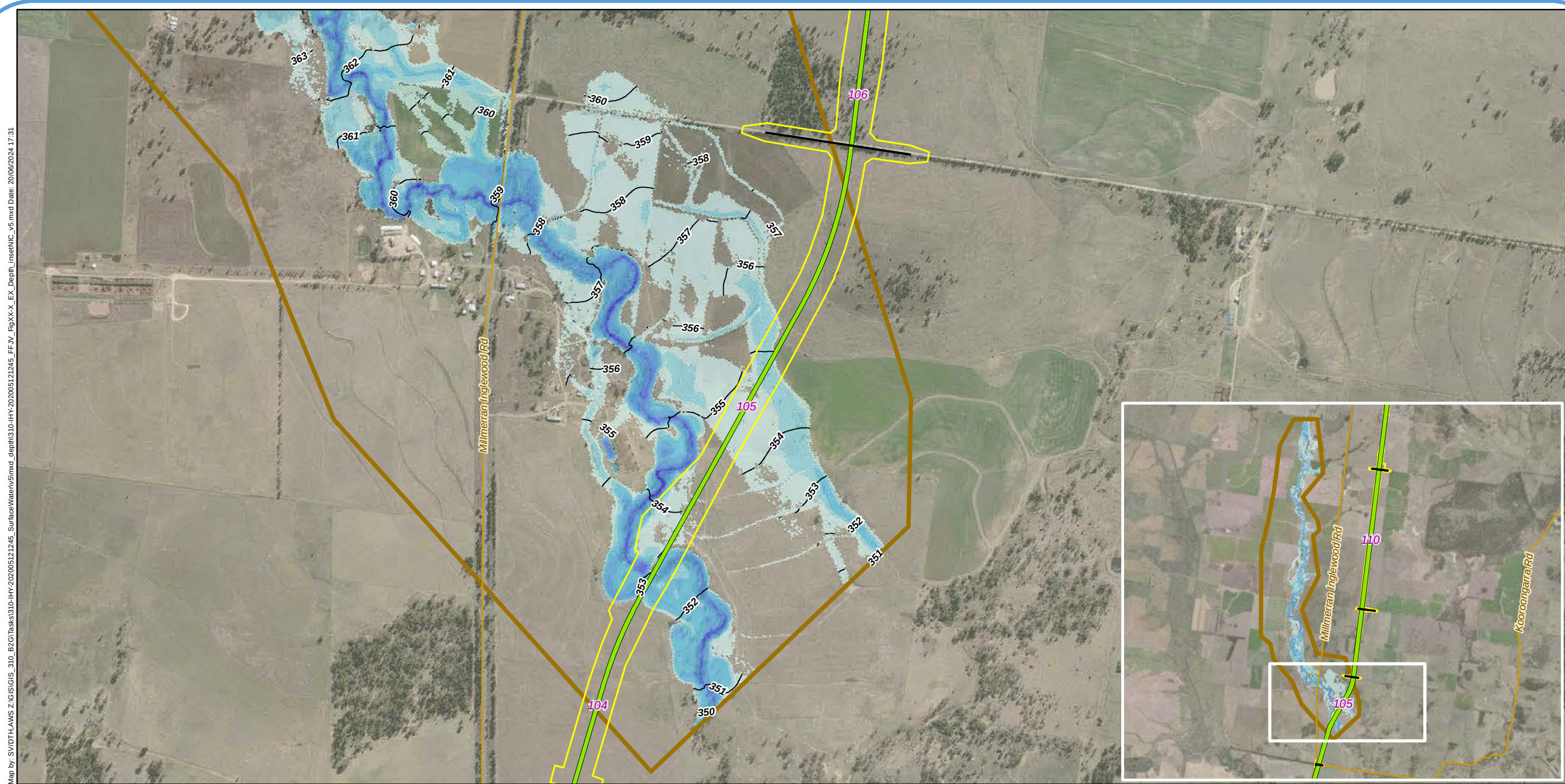
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Border to Gowrie

Figure E2-A:

20% AEP Event - Peak Water Levels - Existing Case - Nicol Creek

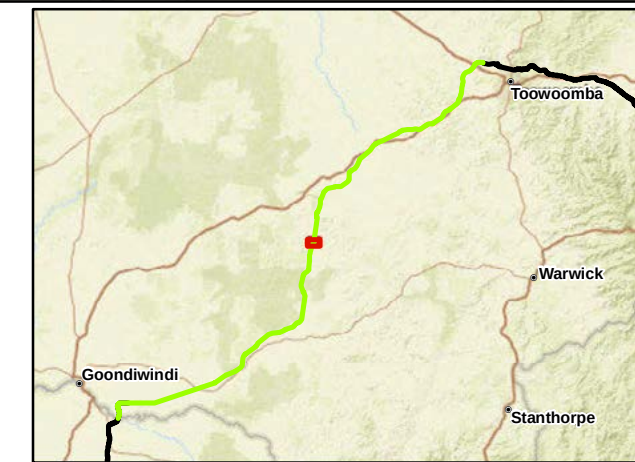
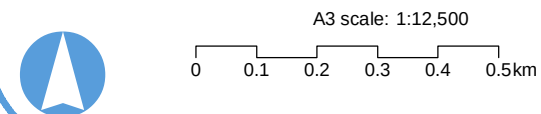
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Legend

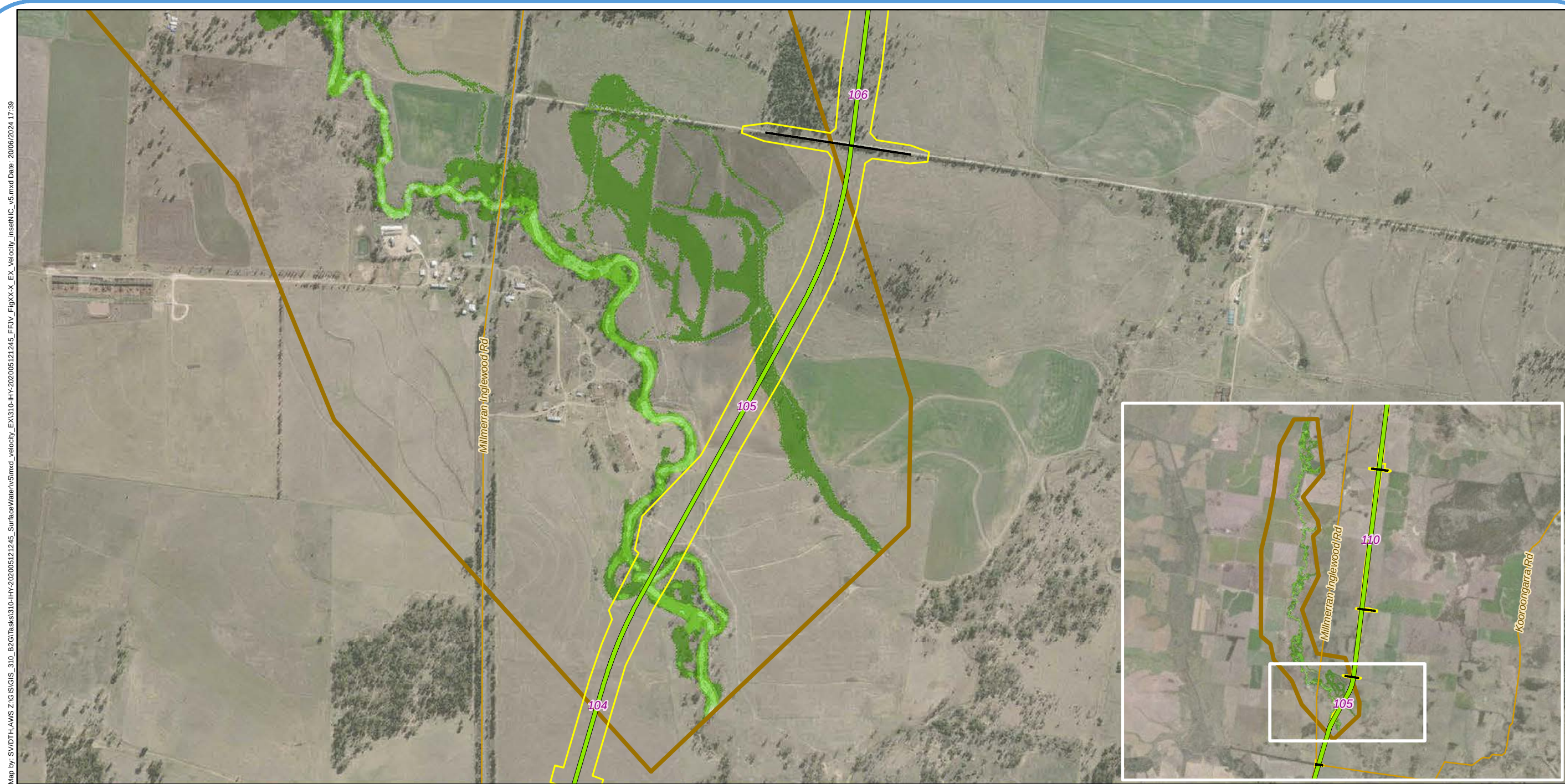
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)	
0 - 0.25	2.5 - 3.0
0.25 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
— 1m peak water contour (mAHD)	



Border to Gowrie
Figure E2-B:
1% AEP Event - Peak Water Levels - Existing Case - Nicol Creek

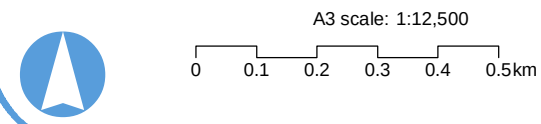
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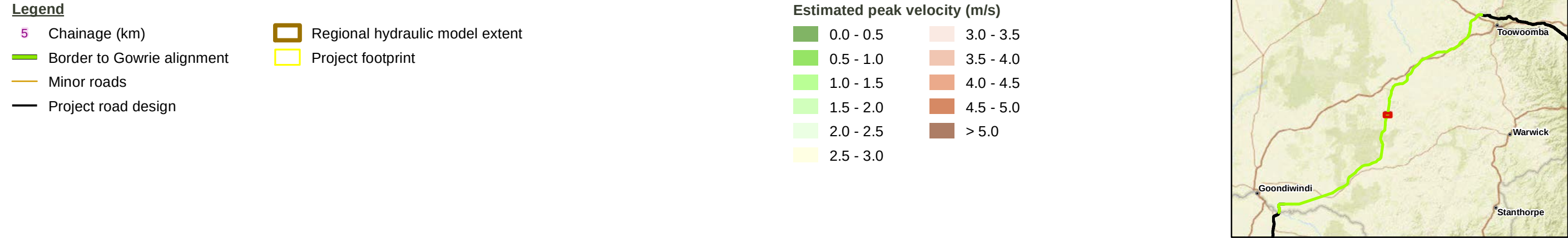
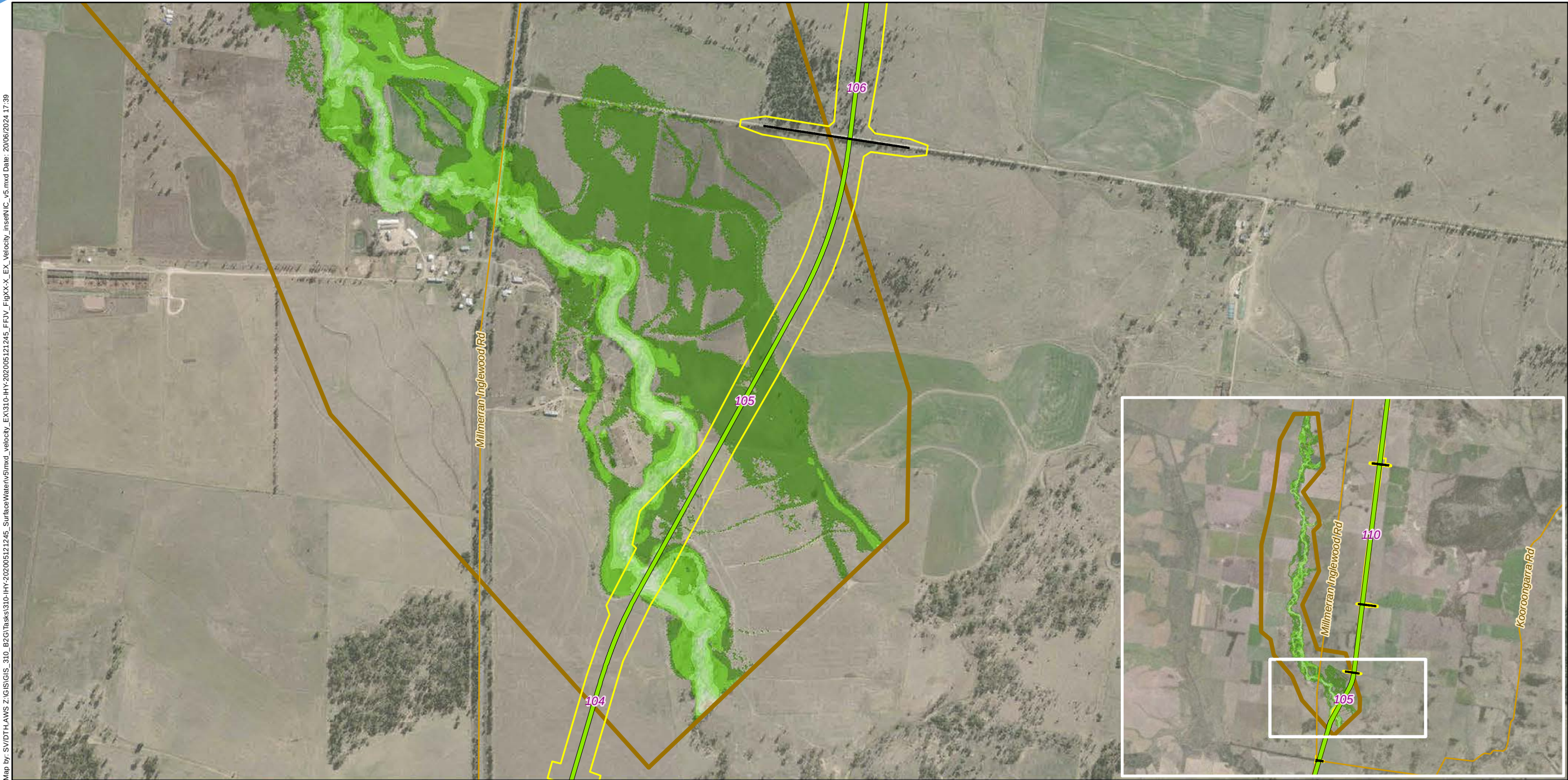
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

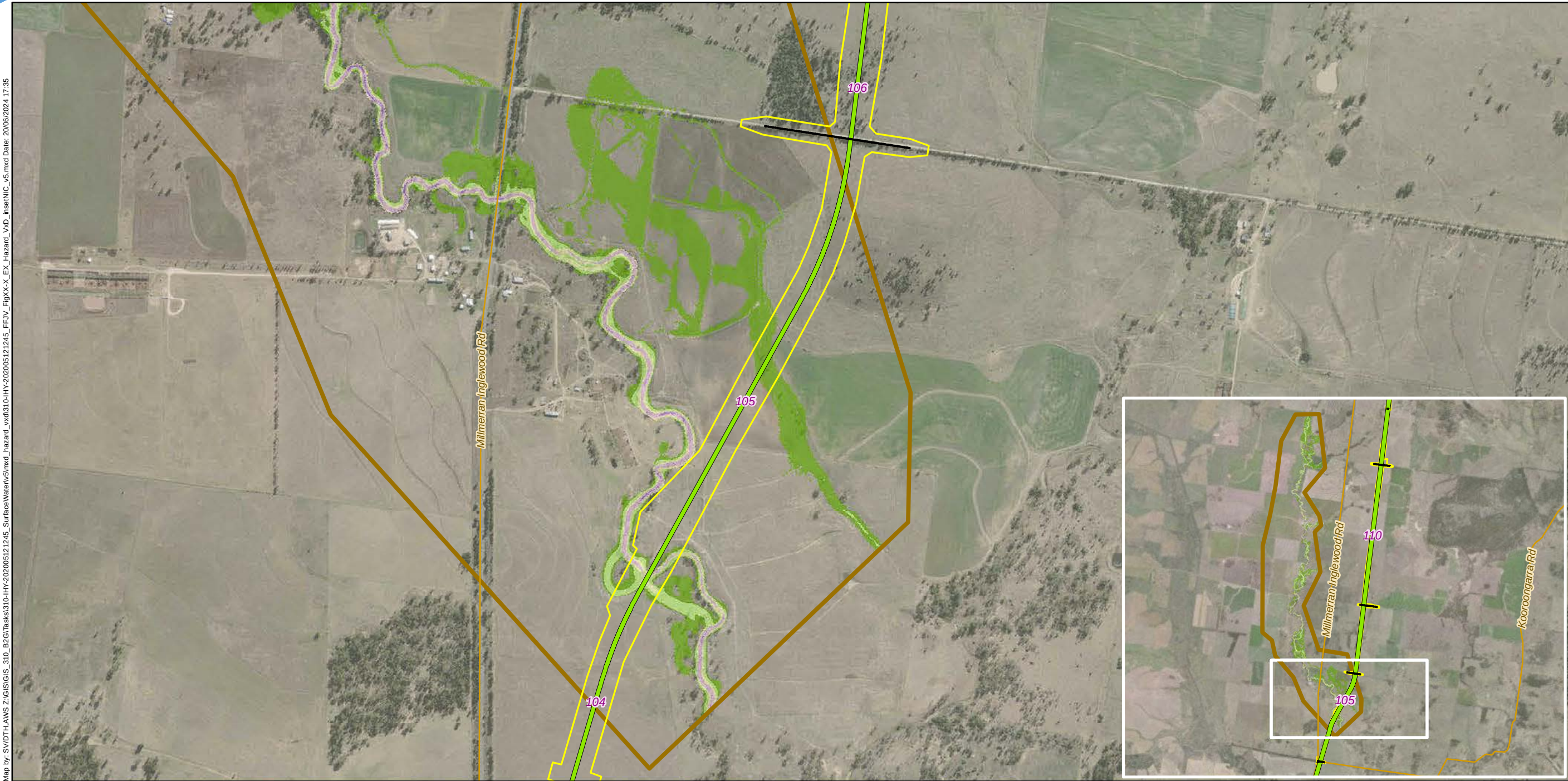
Estimated peak velocity (m/s)	
0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



Border to Gowrie
Figure E2-C:
20% AEP Event - Peak Velocity - Existing Case - Nicol Creek



Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51mnd_Hazard_Vrd\310-HY-2020\05121245_FF3V_FigX-X_EX_Hazard_Vrd_insetNIC_v5.mxd Date: 20/06/2024 17:35

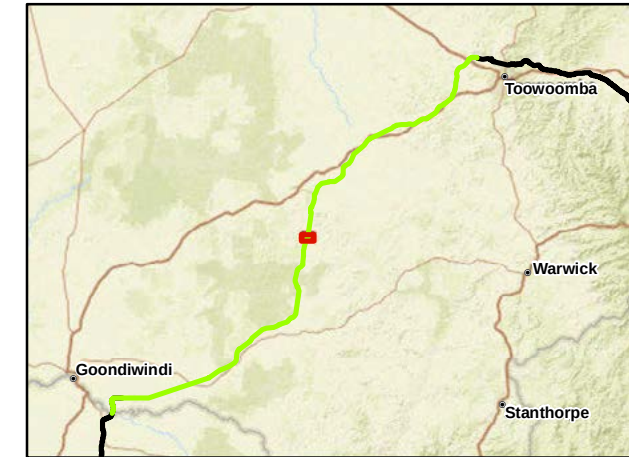


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



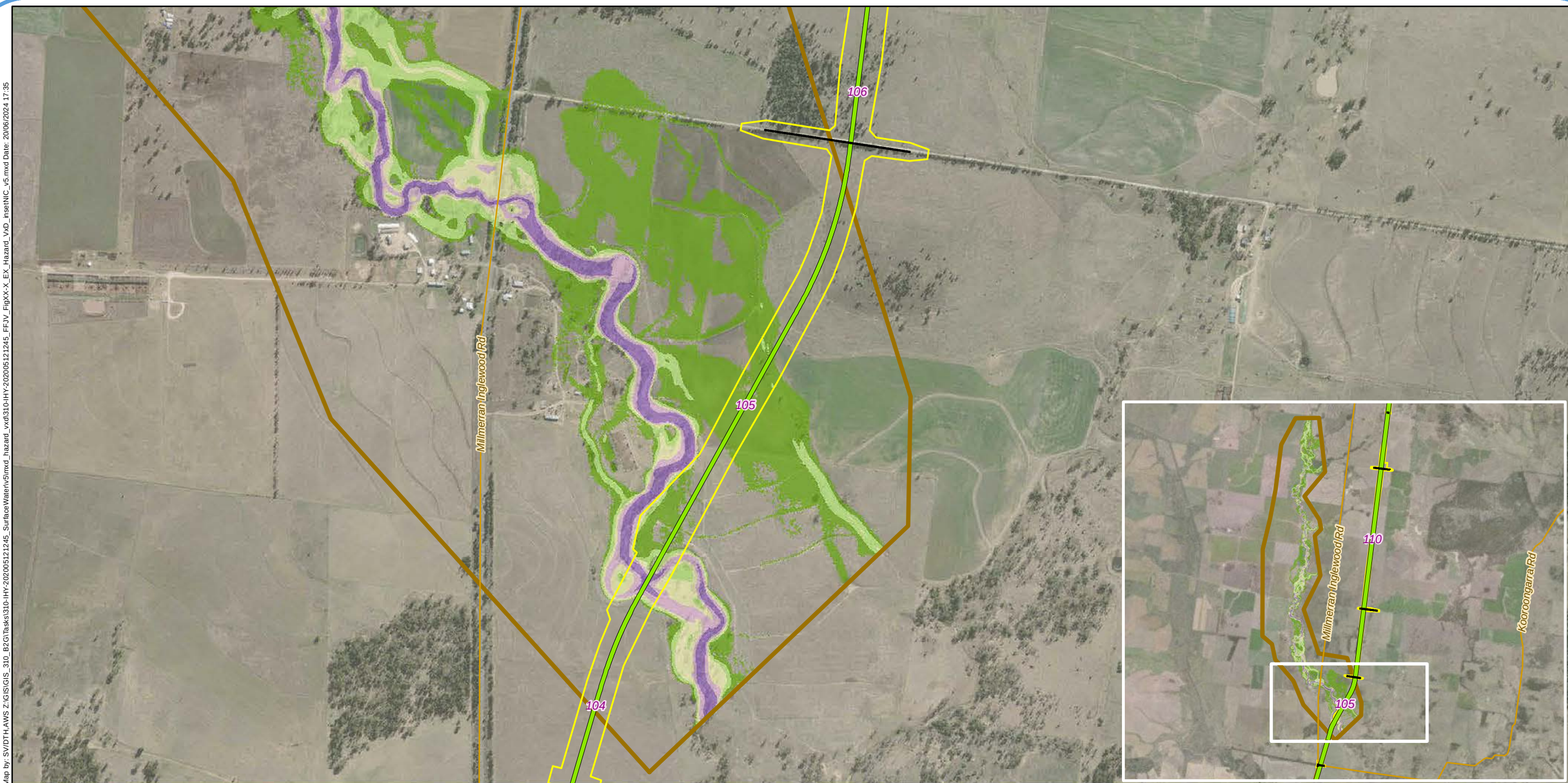
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E2-E:

20% AEP Event - Peak Hazard - Existing Case - Nicol Creek

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



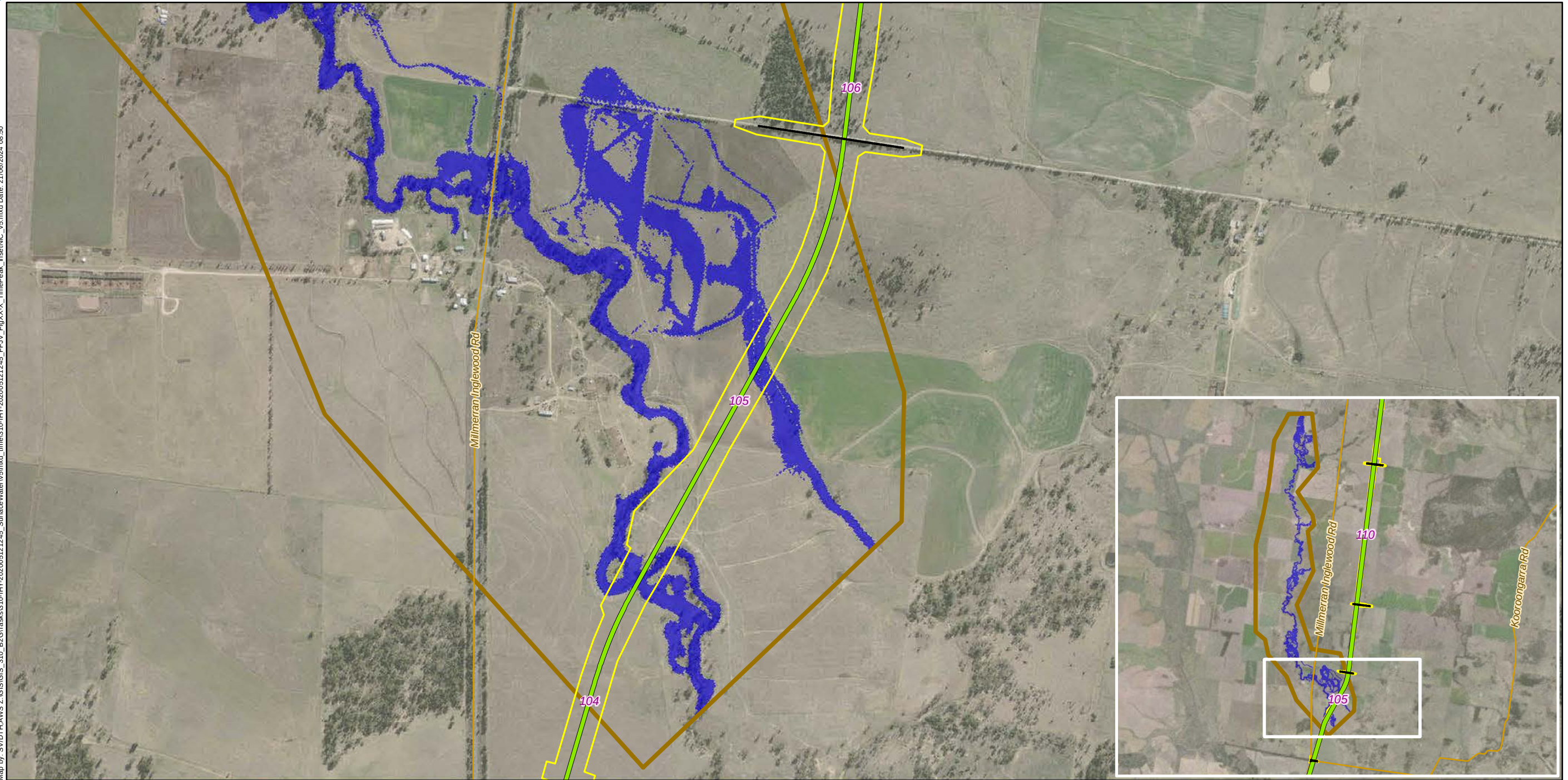
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E2-F:

1% AEP Event - Peak Hazard - Existing Case - Nicol Creek

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

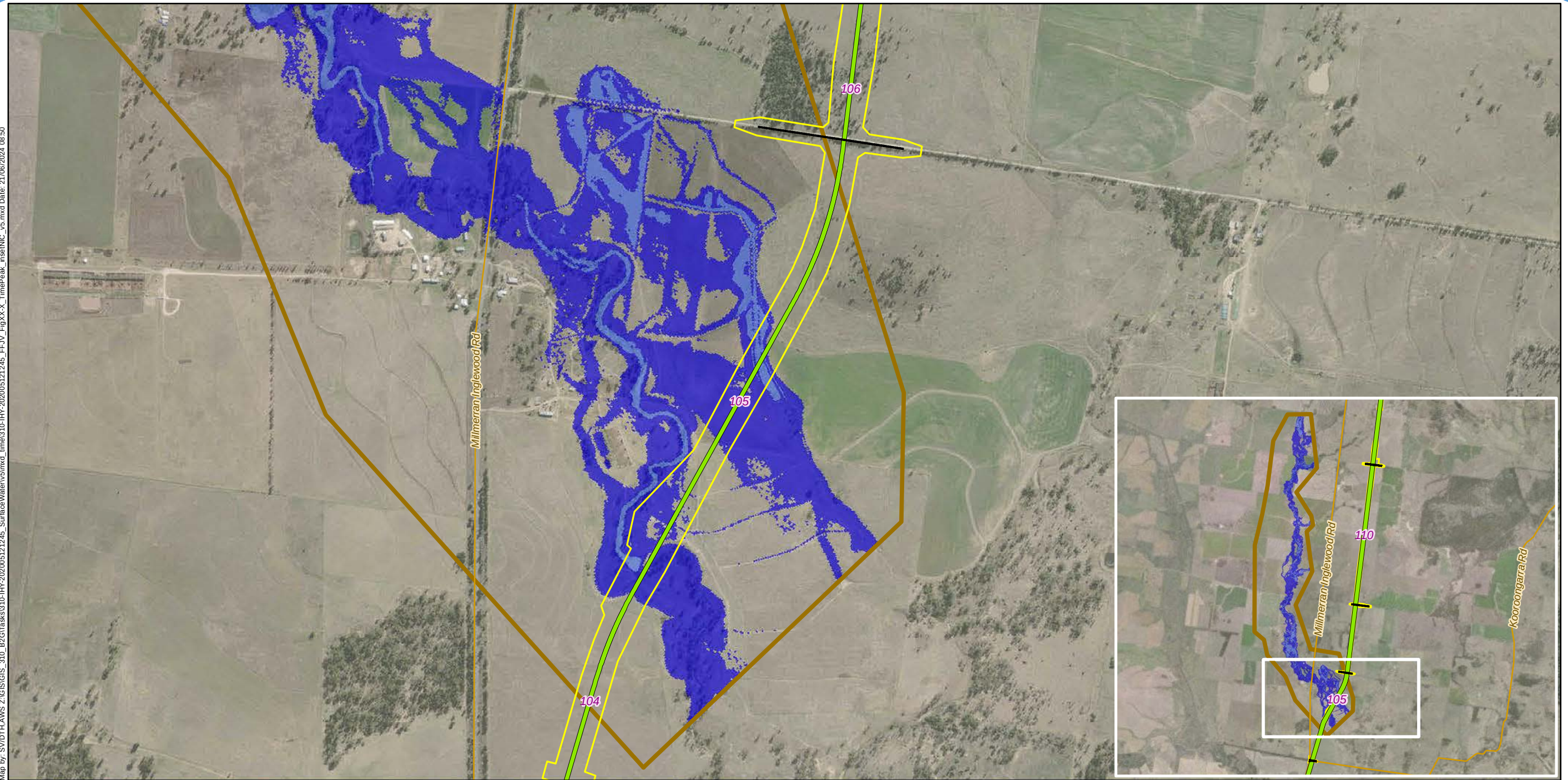
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd _time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_InsetHLC_v5.mxd Date: 21/06/2024 09:50



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

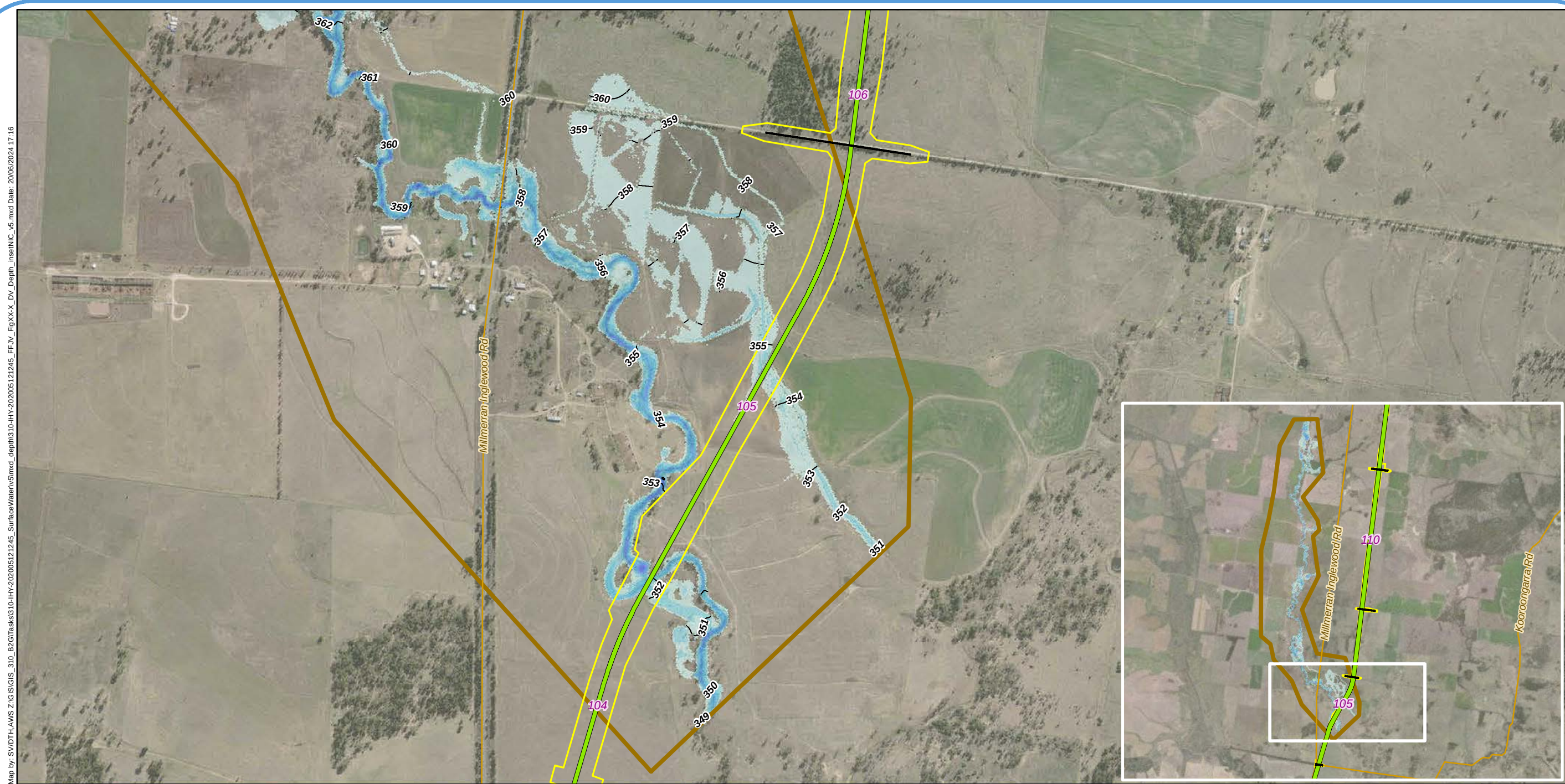
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

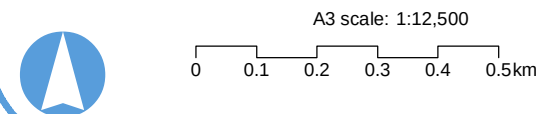
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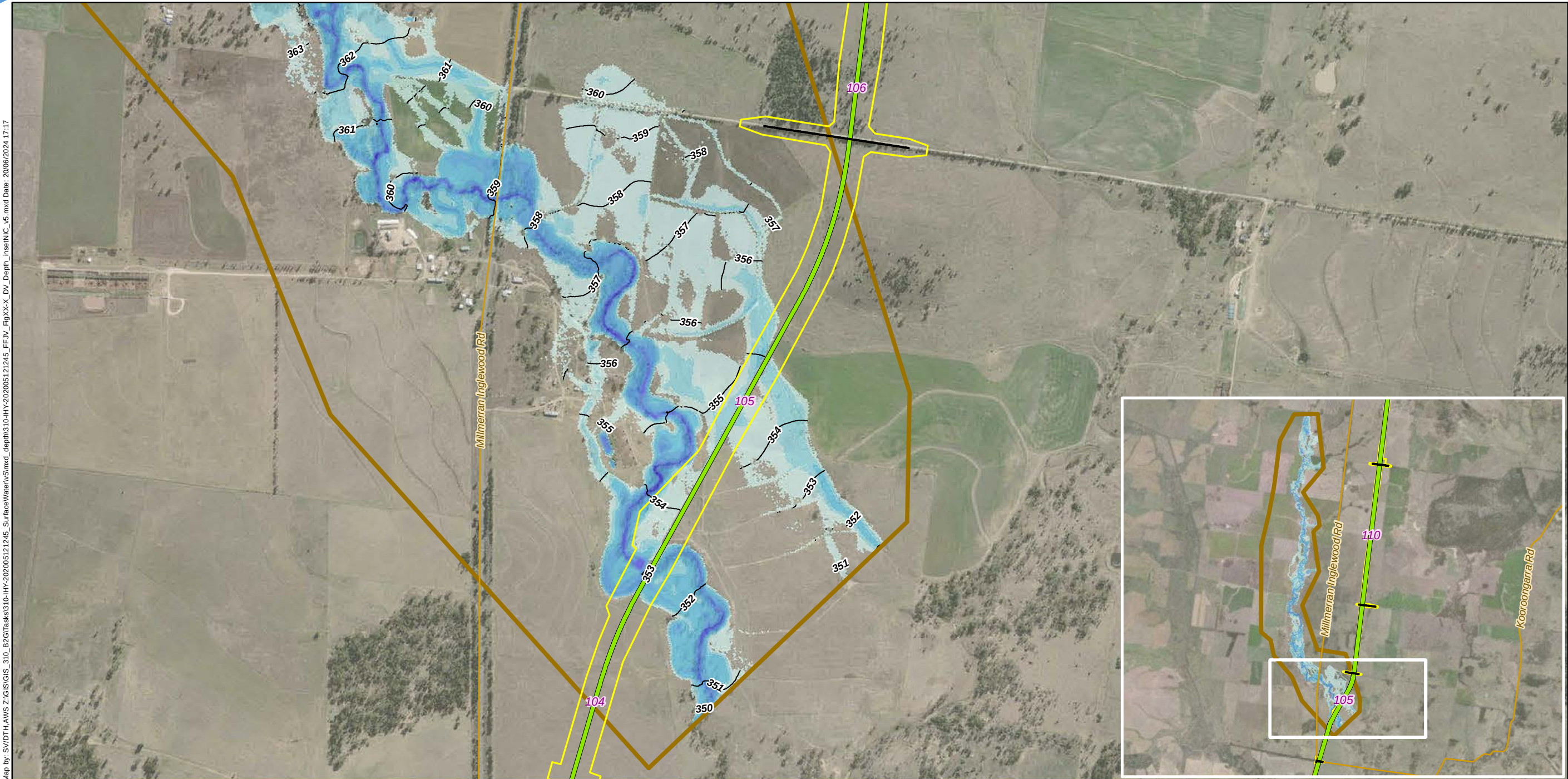
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)	
0 - 0.25	2.5 - 3.0
0.25 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
— 1m peak water contour (mAHD)	



Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF\3V_FigX-X_DV_Depth_insetNIC_v5.mxd Date: 20/06/2024 17:17



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

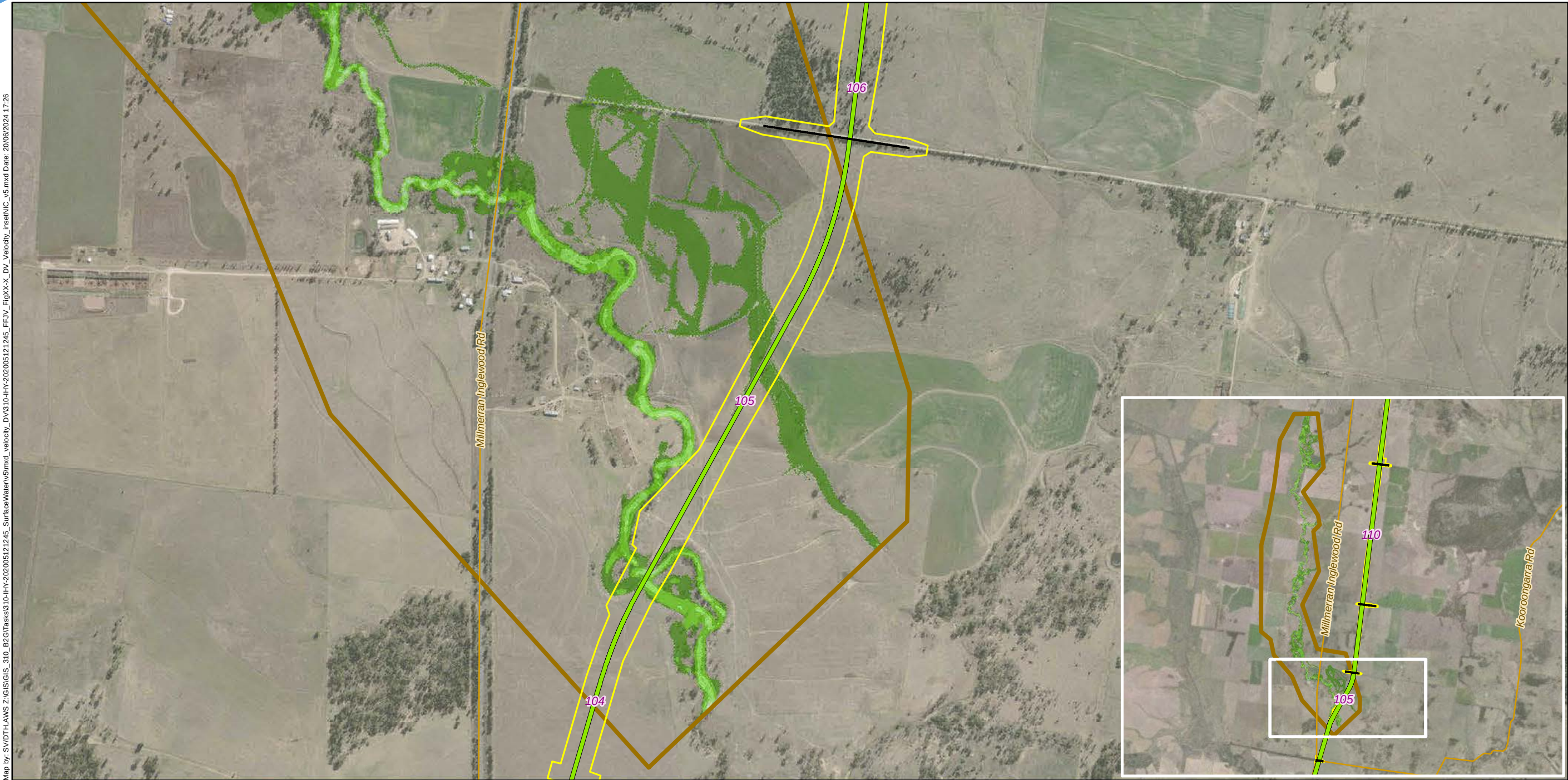
Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_DV310-HY-2020\05121245_FF3V_FigXX-X_DV_Velocity_insetNC_v5.mxd Date: 20/06/2024 17:26



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

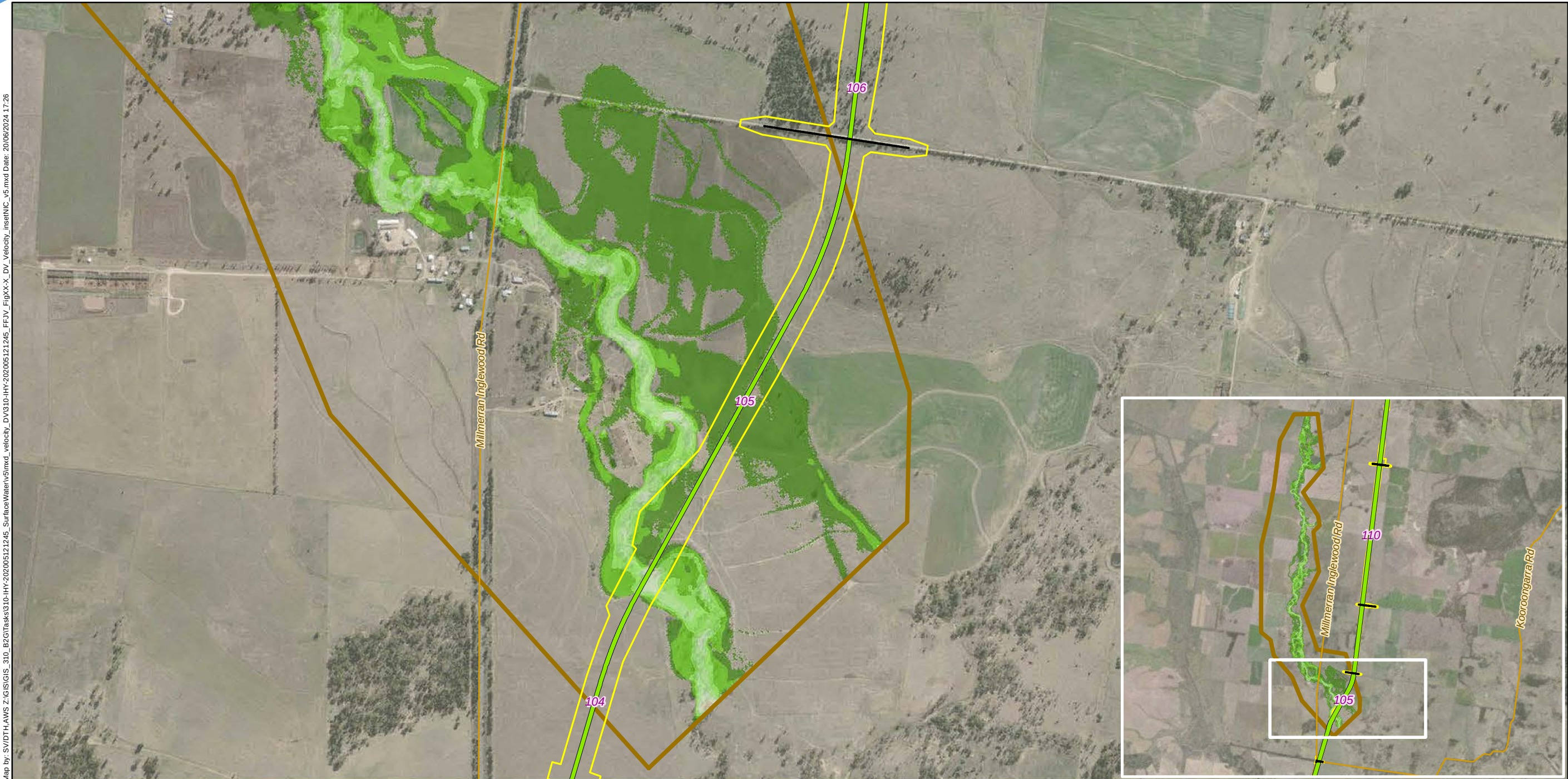
Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

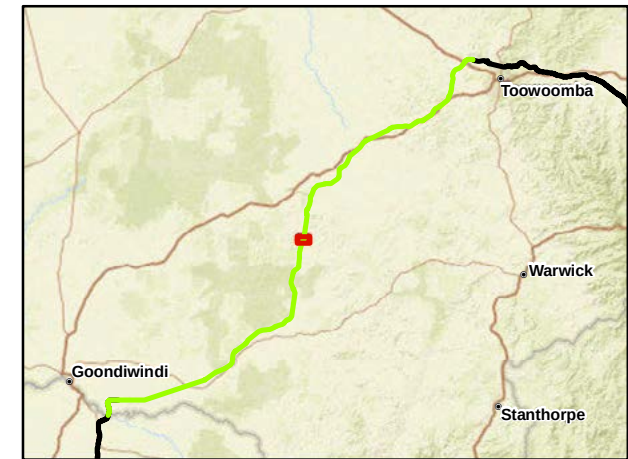
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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)			
0.0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0
2.0 - 2.5	2.5 - 3.0	3.0 - 3.5	3.5 - 4.0
4.0 - 4.5	4.5 - 5.0	> 5.0	



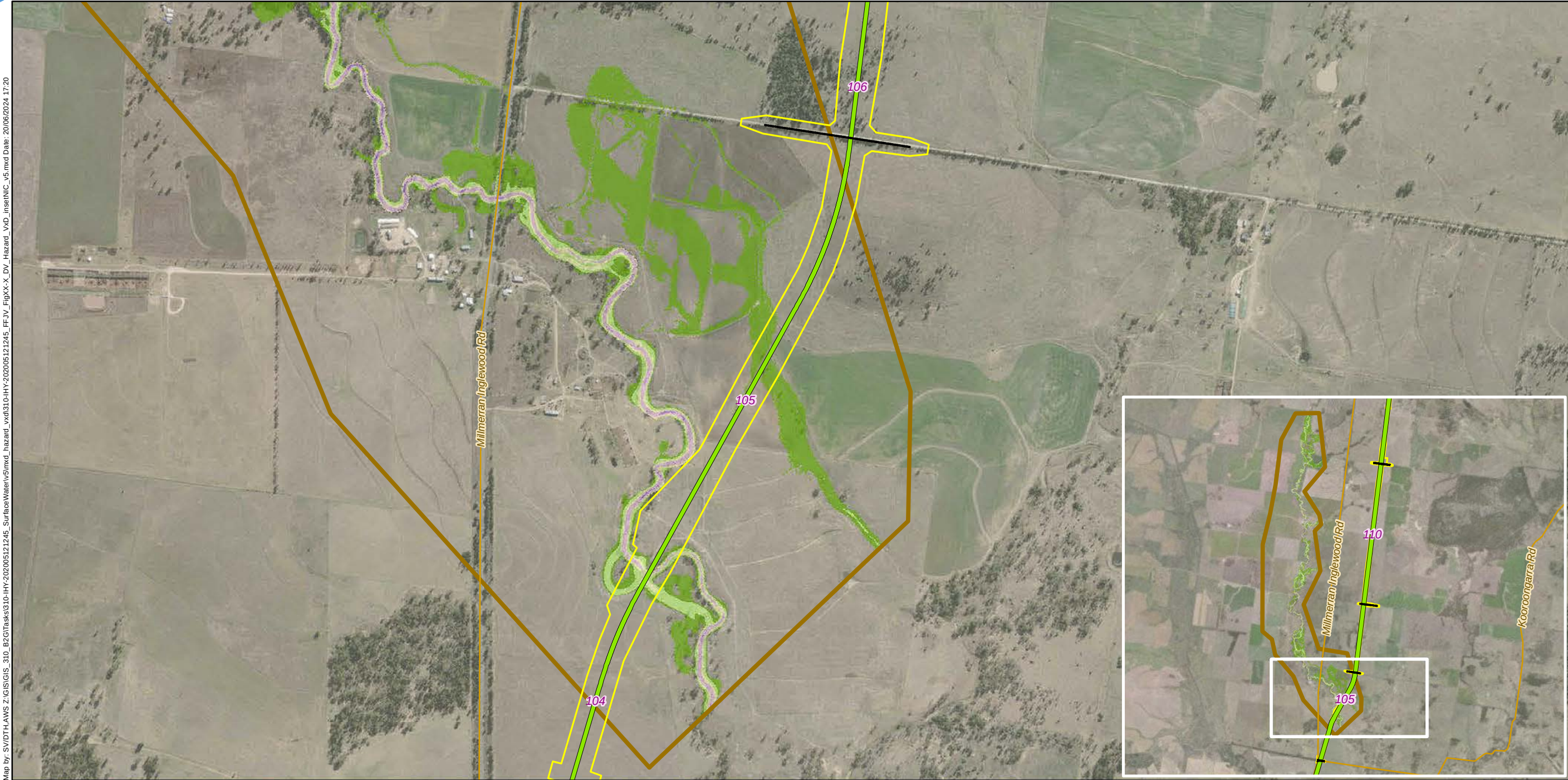
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0 0.1 0.2 0.3 0.4 0.5km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure E3-D:
1% AEP Event - Peak Velocity - Developed Case - Nicol Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51245_Hazard_Vrd_inset\NIC_v5.mxd Date: 20/06/2024 17:20

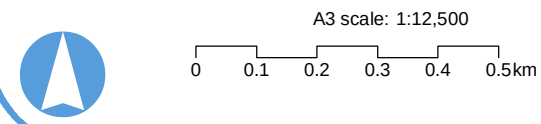


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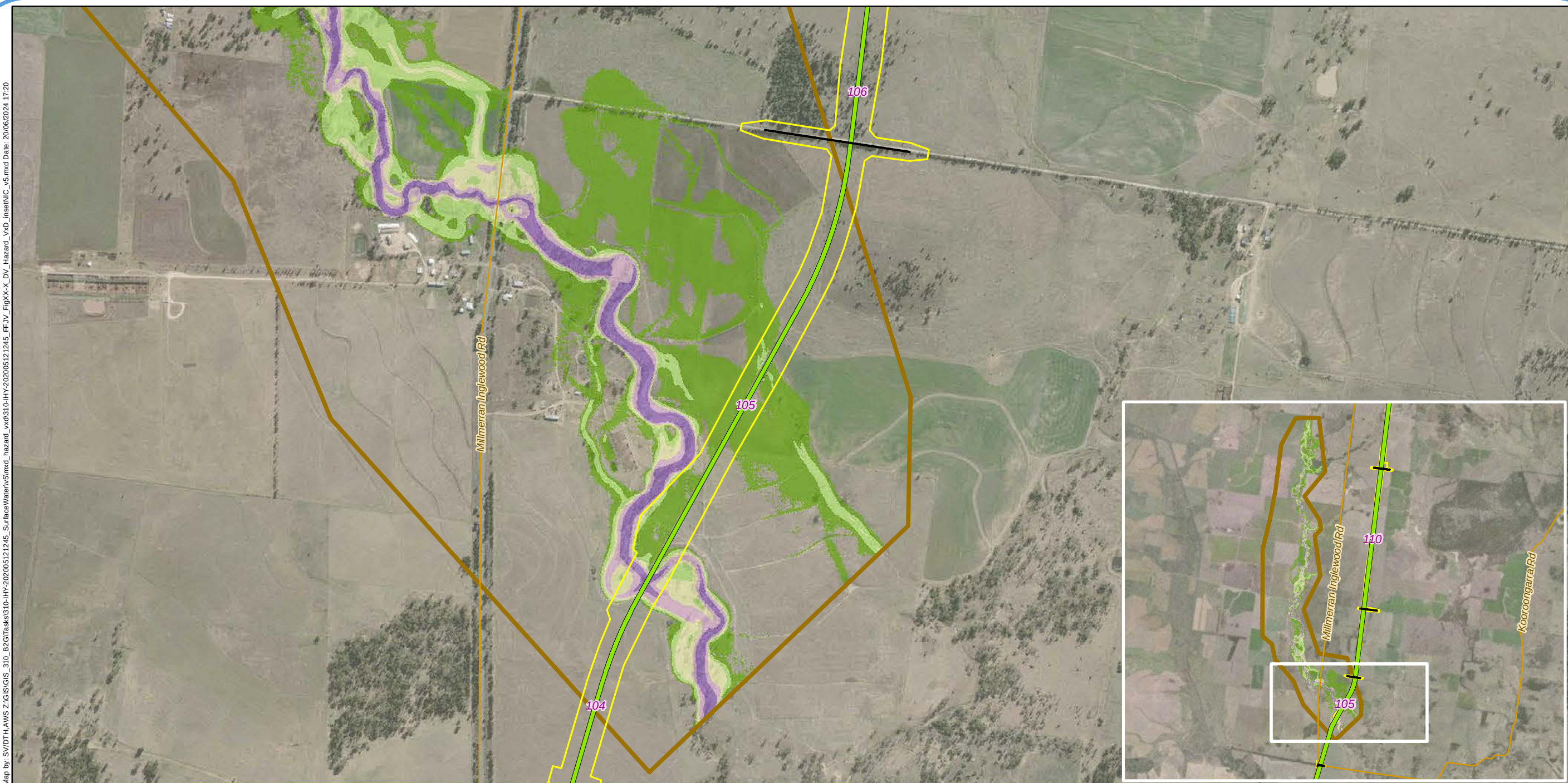
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\51245_Hazard_Vrd_inset\NIC_v5.mxd Date: 20/06/2024 17:20



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

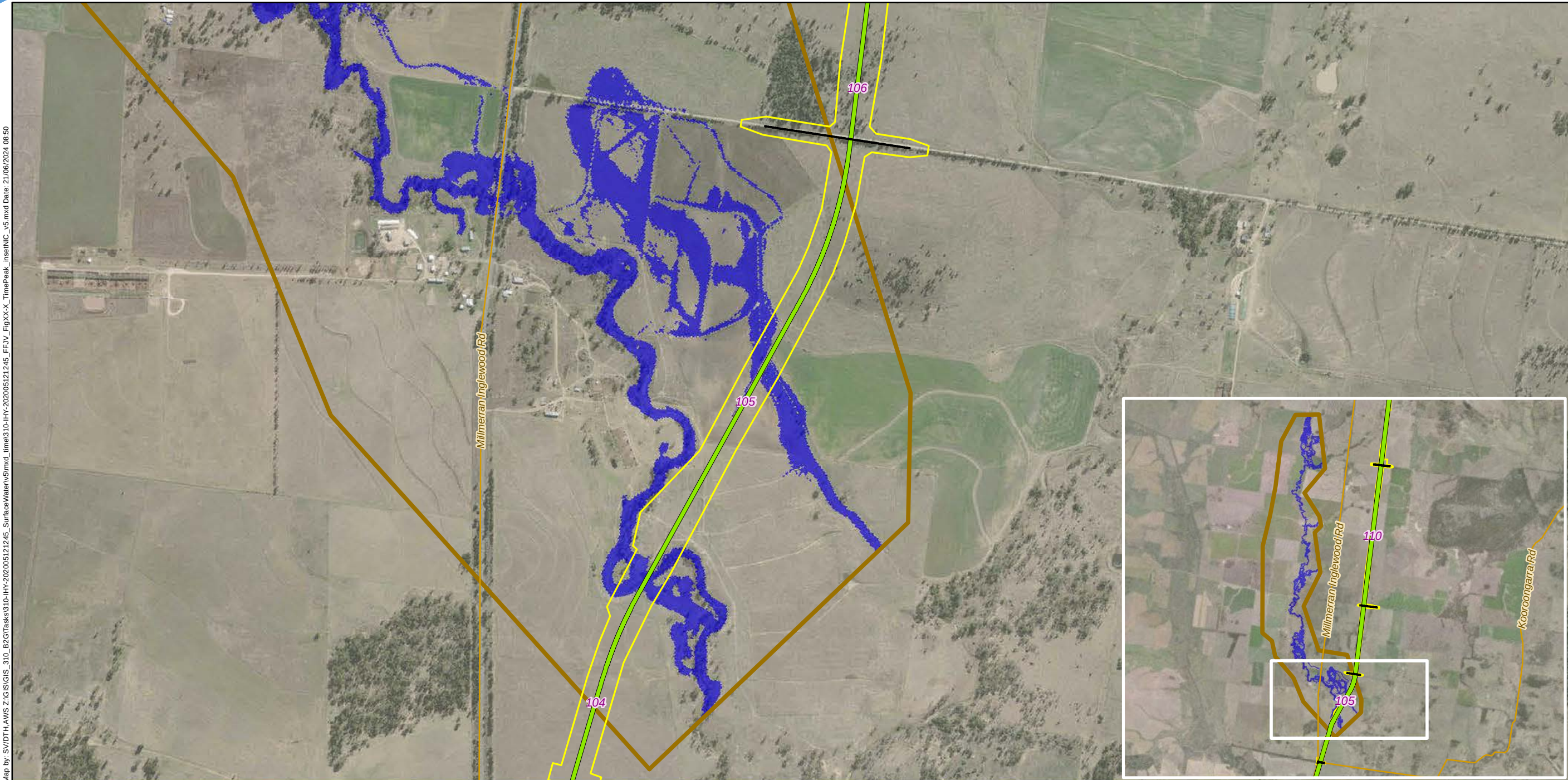
Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd _time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_InsetHLC_v5.mxd Date: 21/06/2024 09:50



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



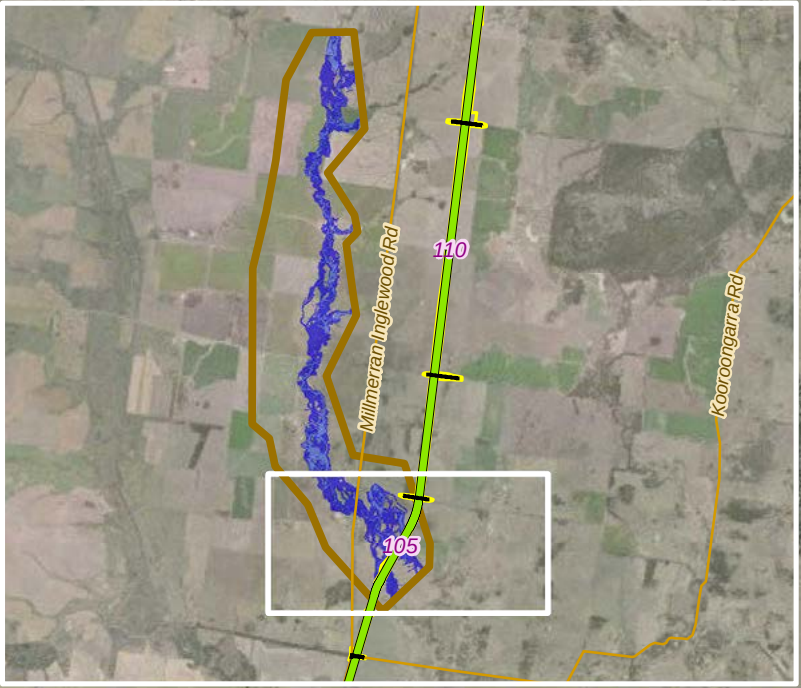
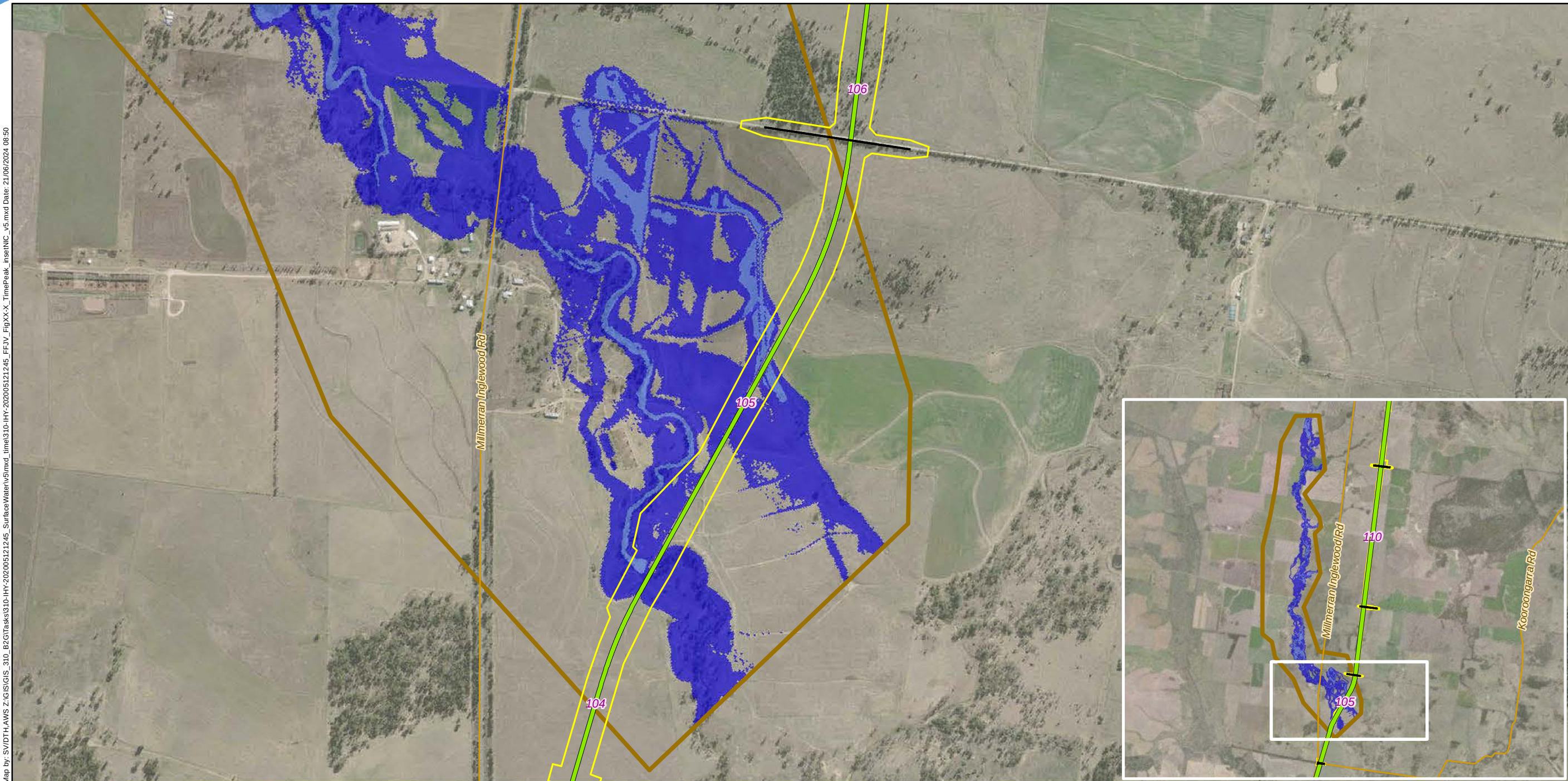
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E3-G:

20% AEP Event - Peak Time of Inundation - Developed Case - Nicol Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd _time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_InsetHIC_v5.mxd Date: 21/06/2024 09:50



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



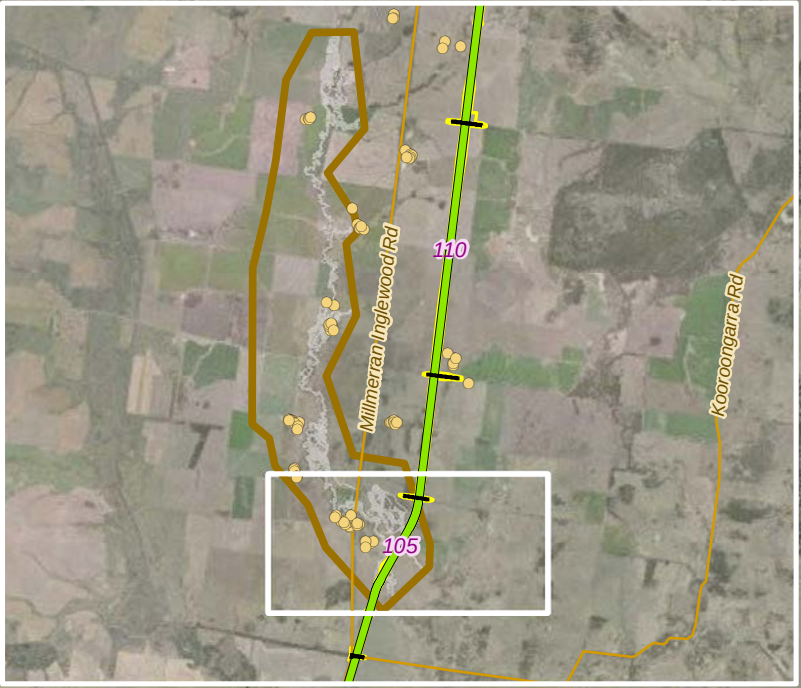
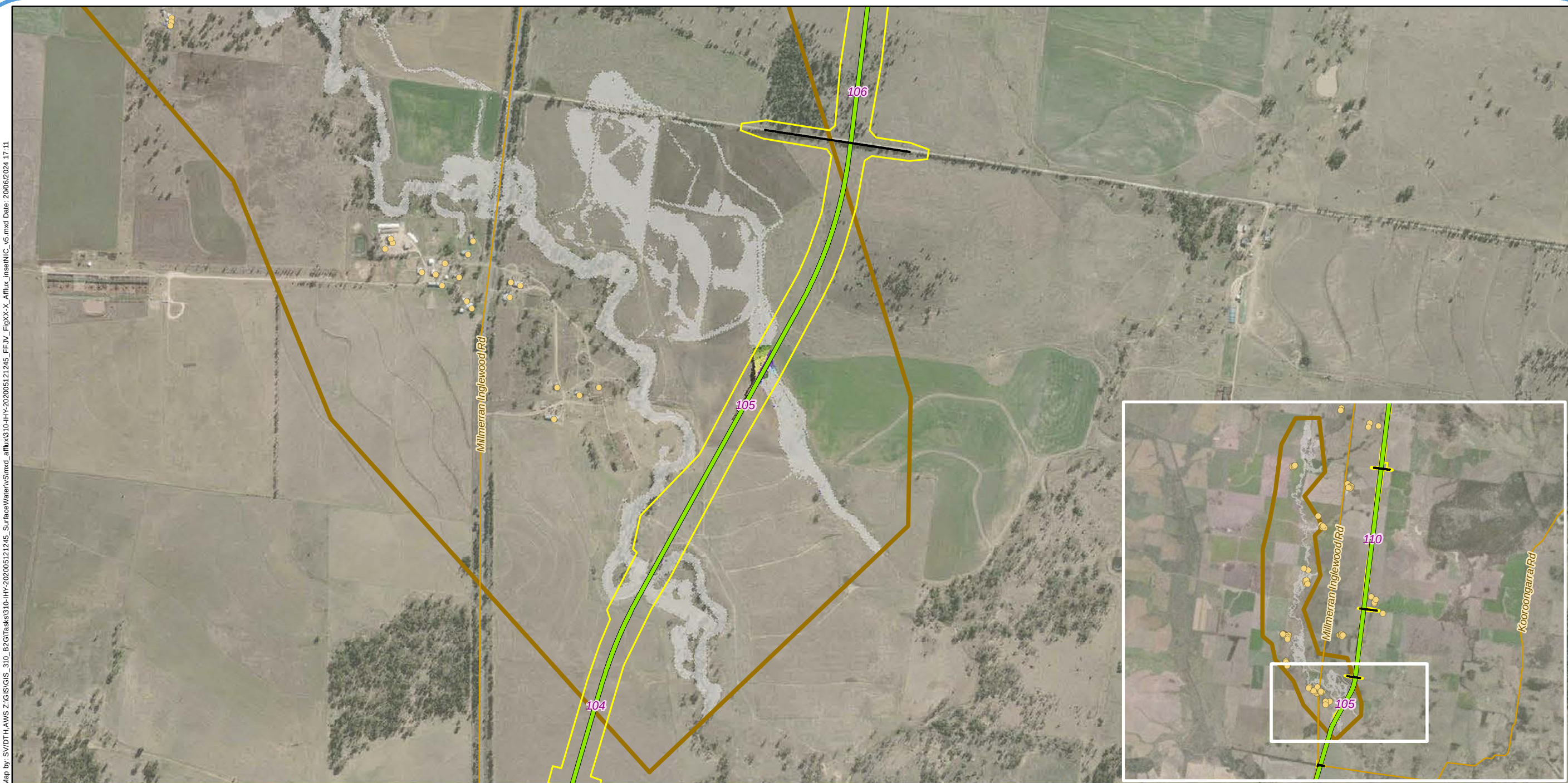
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E3-H:

1% AEP Event - Peak Time of Inundation - Developed Case - Nicol Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\51245_FF_IV_FigXX-X_Afflux_InseNIC_v5.mxd Date: 20/06/2024 17:11



Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



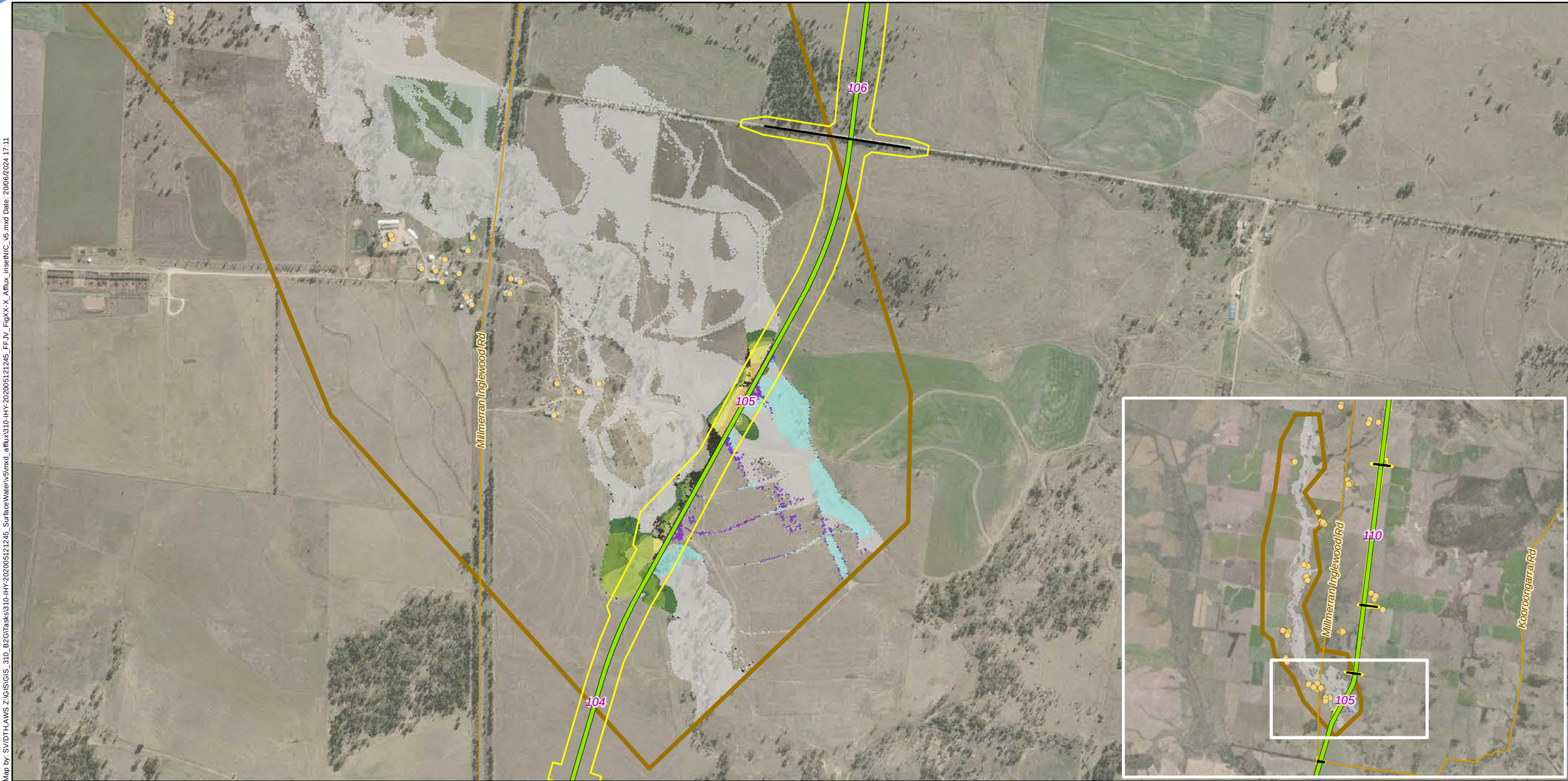
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E4-A:

20% AEP Event - Afflux - Nicol Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_afflux\310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_InseNIC_v5.mxd Date: 20/06/2024 17:11

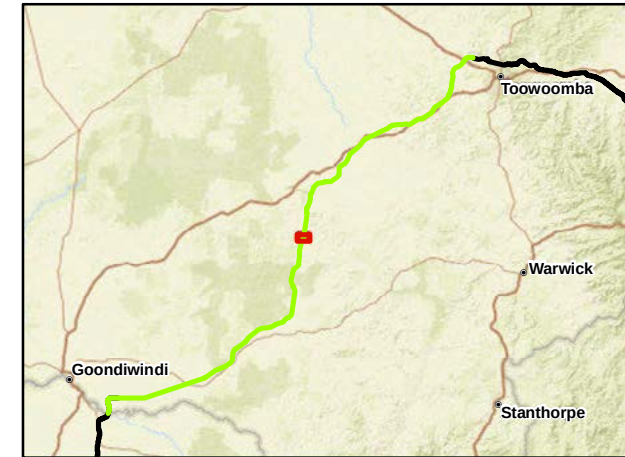


Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

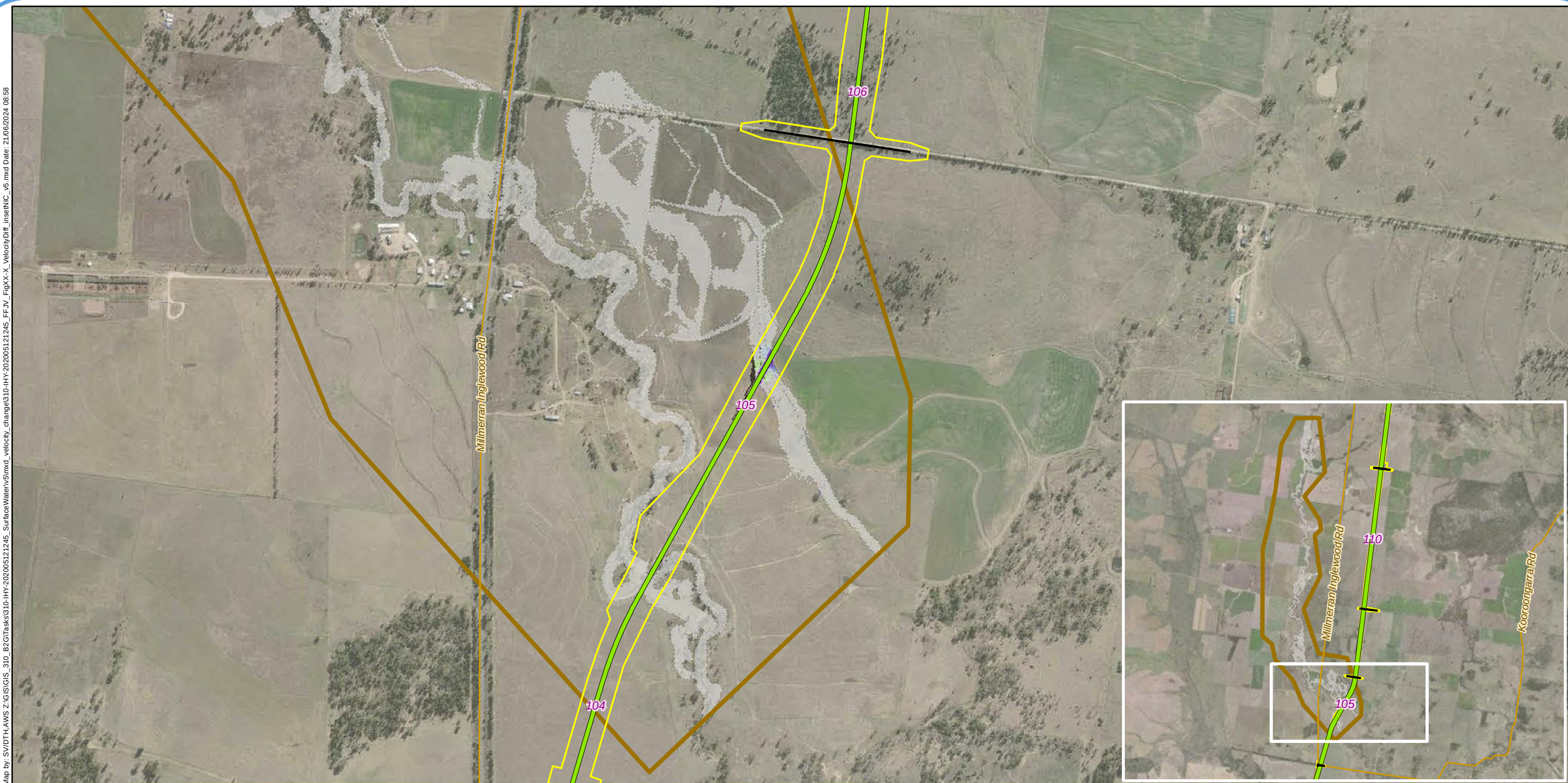
Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\mcd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_inseNIC_v5.mxd Date: 21/06/2024 08:58



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

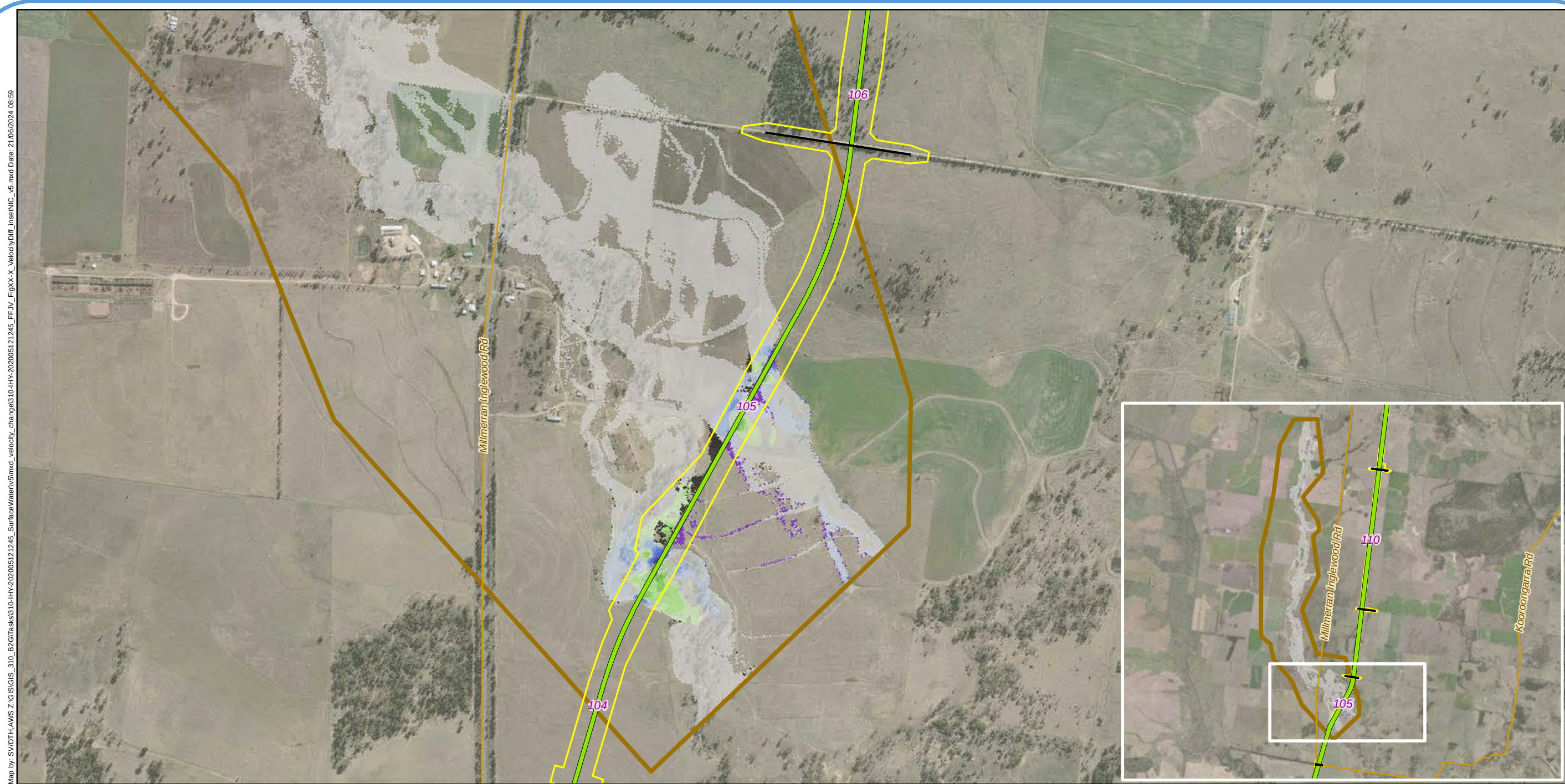
Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51mvd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_inseNIC_v5.mxd Date: 21/06/2024 08:59



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

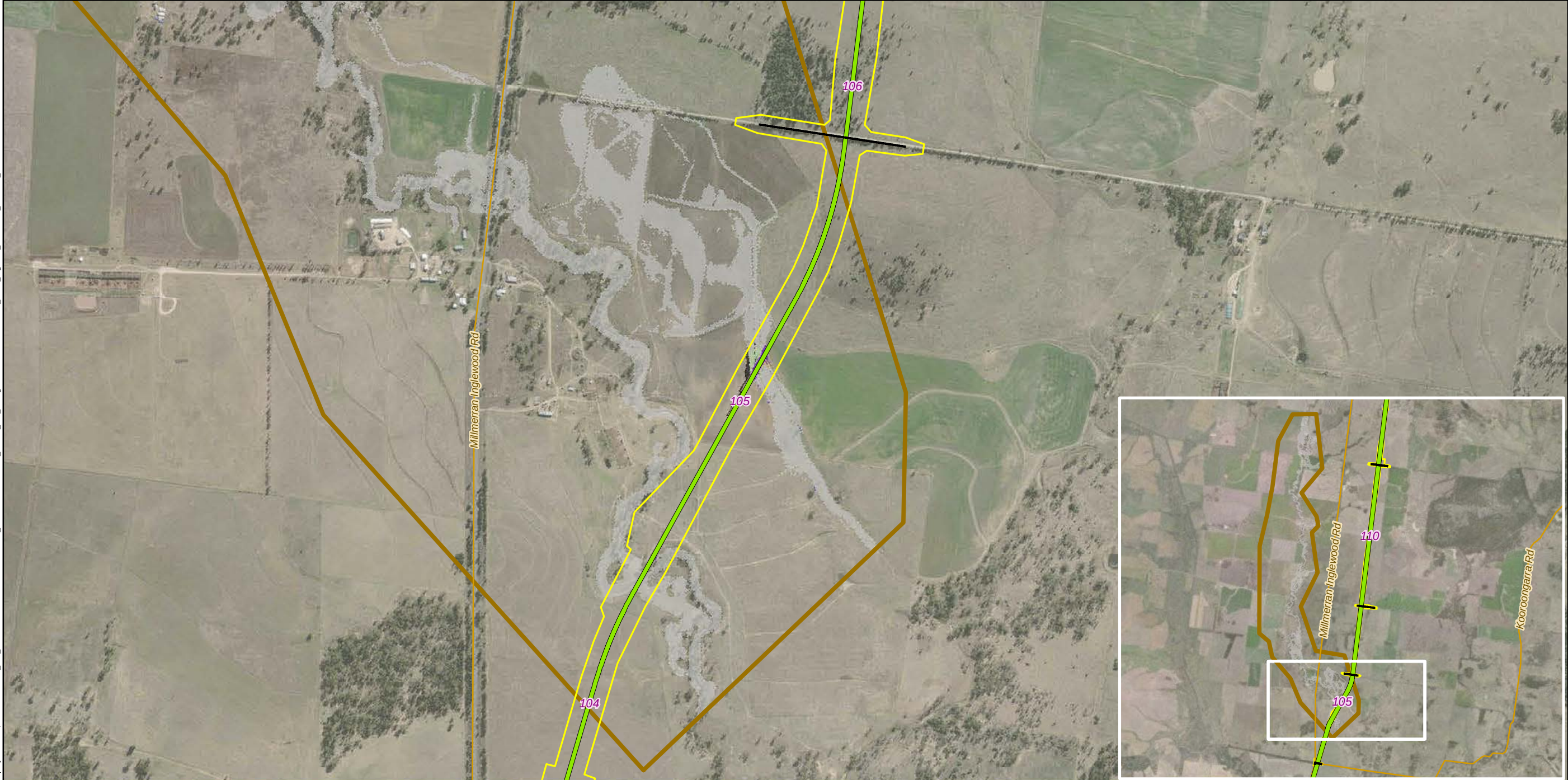
Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_hazard_vyd_change\310-IHY-2020\05121245_FF3V_FigX-X_HazardDiff_insetNIC_v5.mxd Date: 20/06/2024 17:42



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



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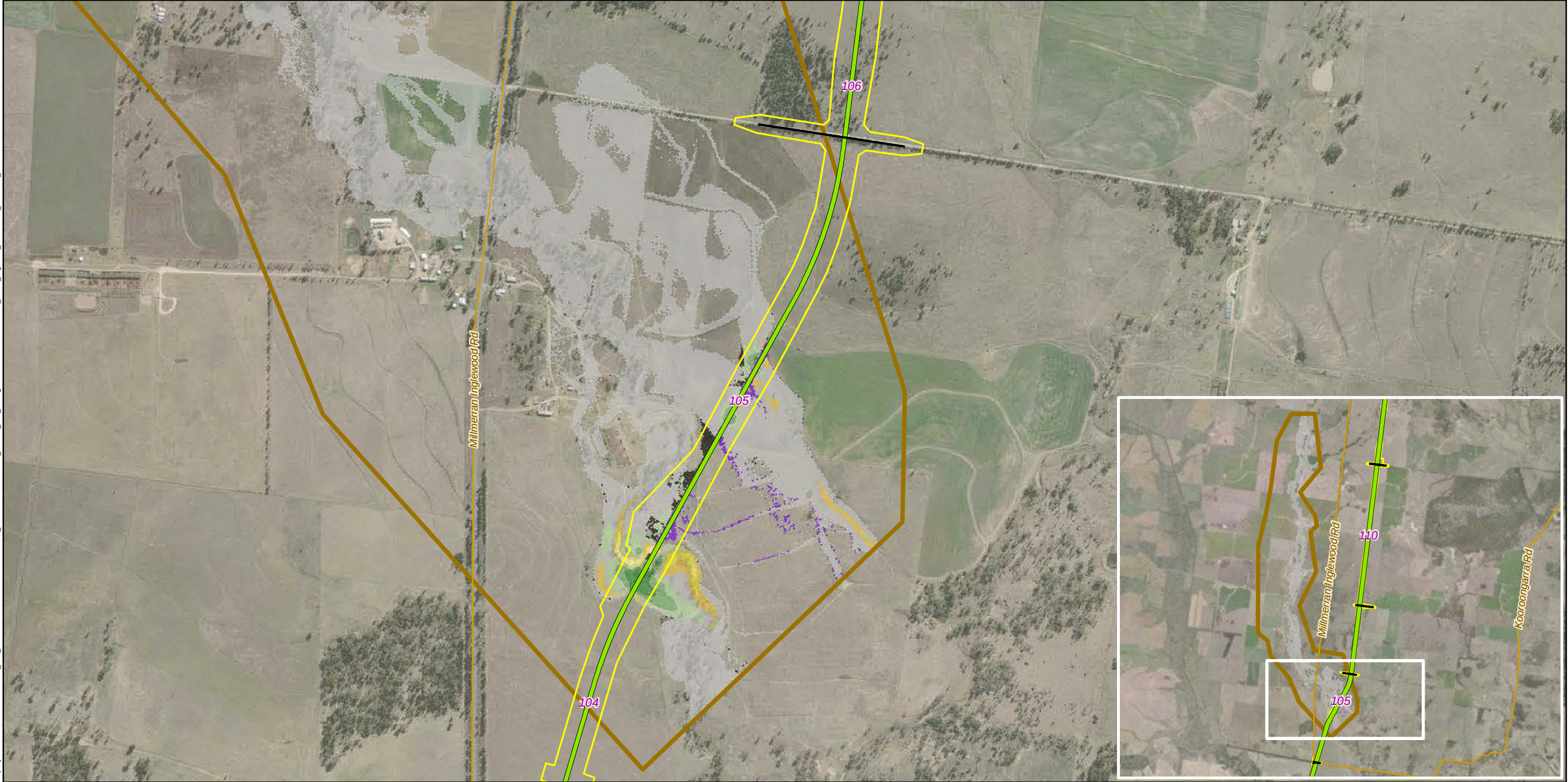
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E4-E:

20% AEP Event - Change in Hazard - Nicol Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_hazard_vyd_change\310-IHY-2020\05121245_FF3V_FigX-X_HazardDiff_insetNIC_v5.mxd Date: 20/06/2024 17:42



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m²/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



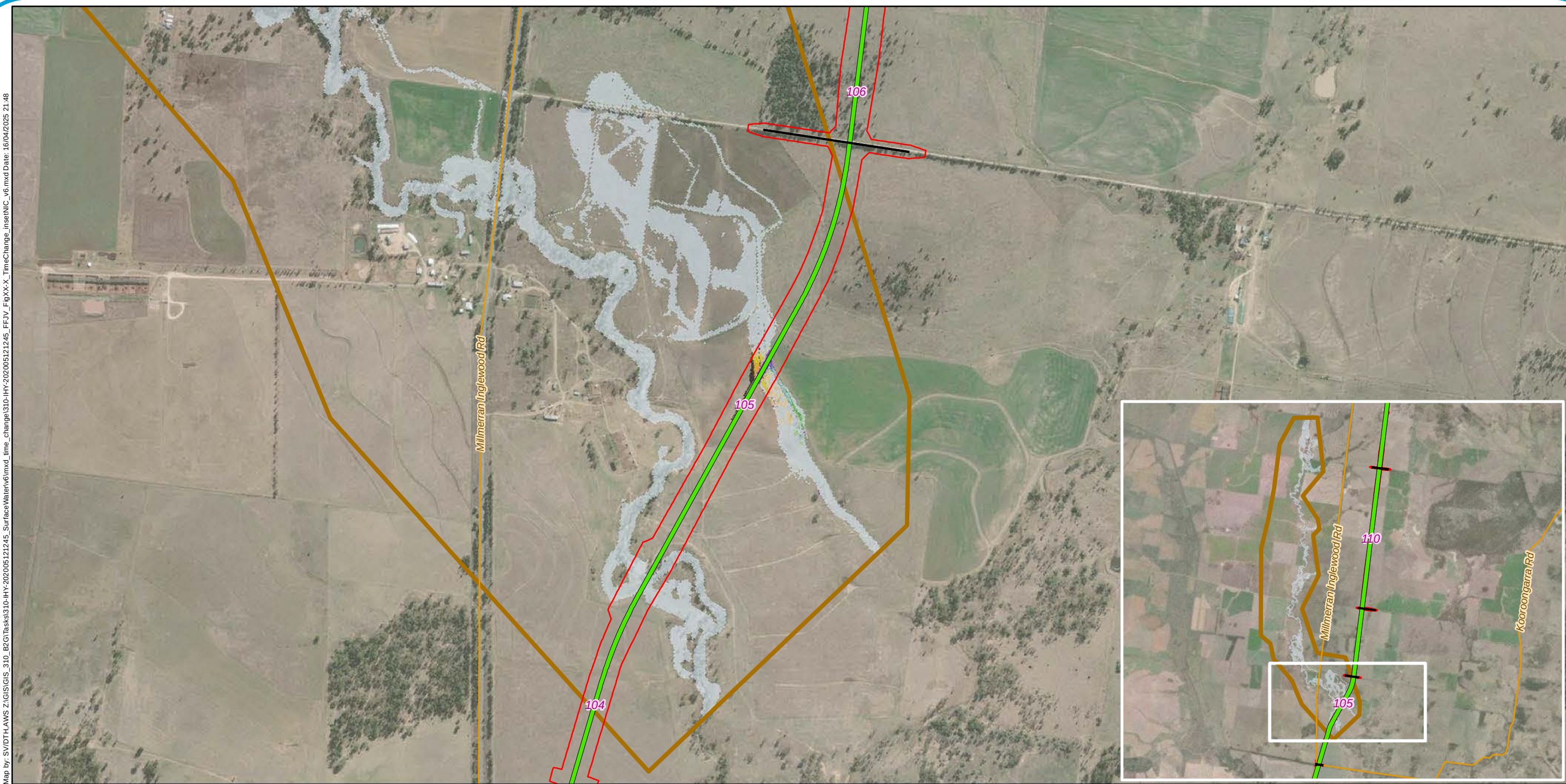
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E4-F:

1% AEP Event - Change in Hazard - Nicol Creek

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Task\310-HY-2020\05121245_SurfaceWater\6mxd_time_change\310-HY-2020\05121245_FFJV_FigXX-X_TimeChange_InsertNIC_v6.mxd Date: 16/04/2025 21:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

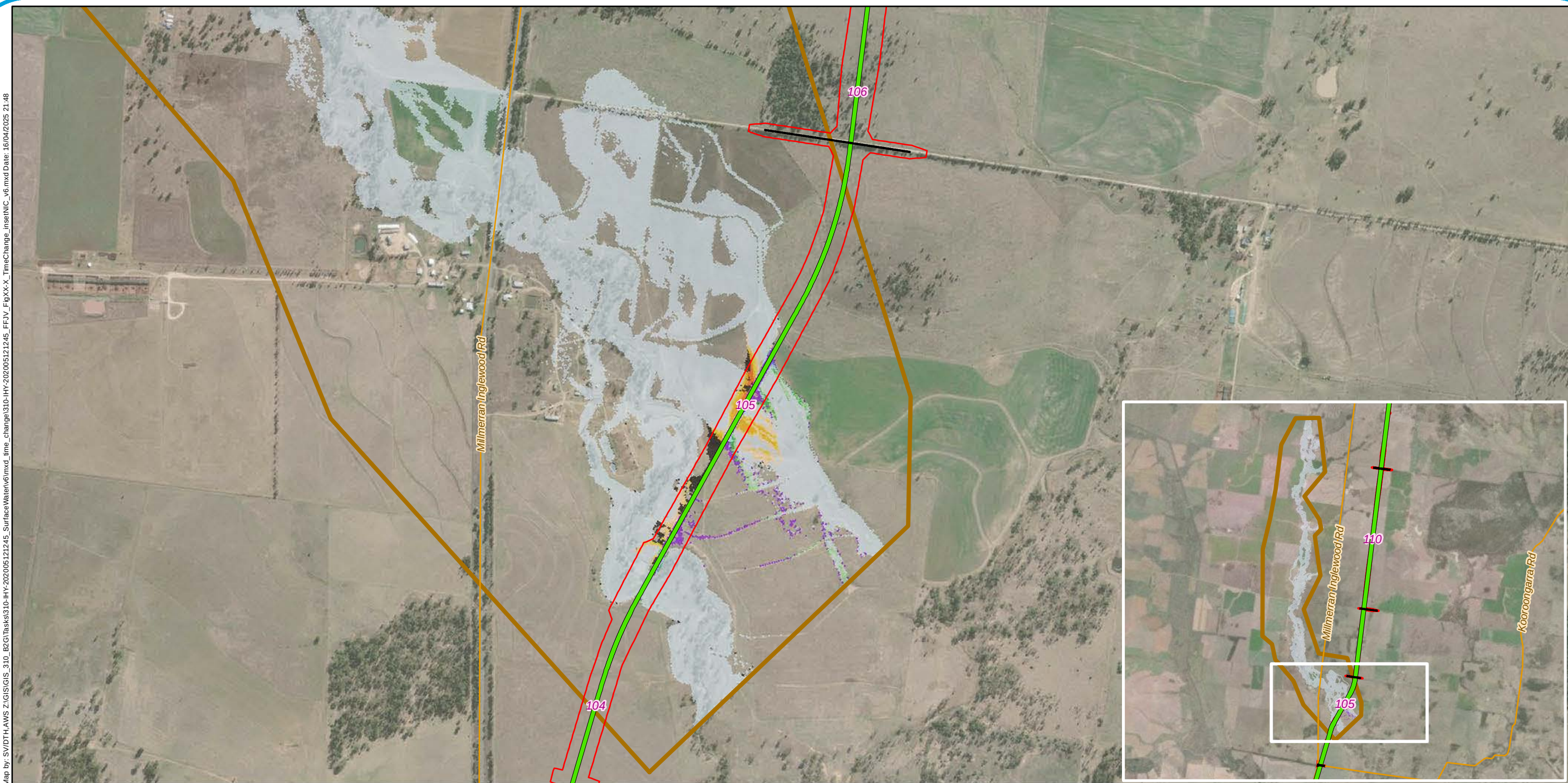
Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\6mxd_time_change\310-HY-2020\05121245_FFJV_FigXX-X_TimeChange_InsertNIC_v6.mxd Date: 16/04/2025 21:48

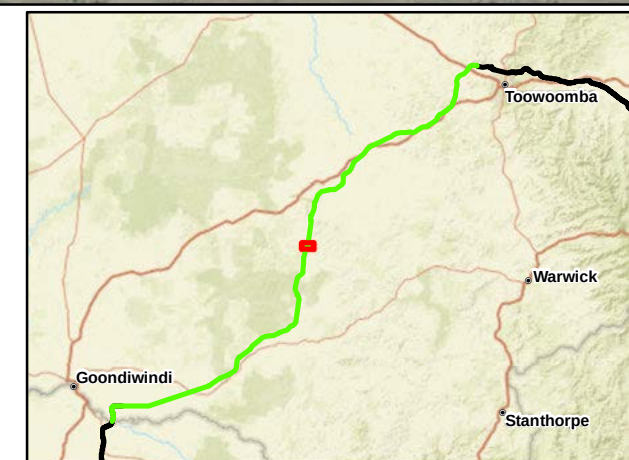


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

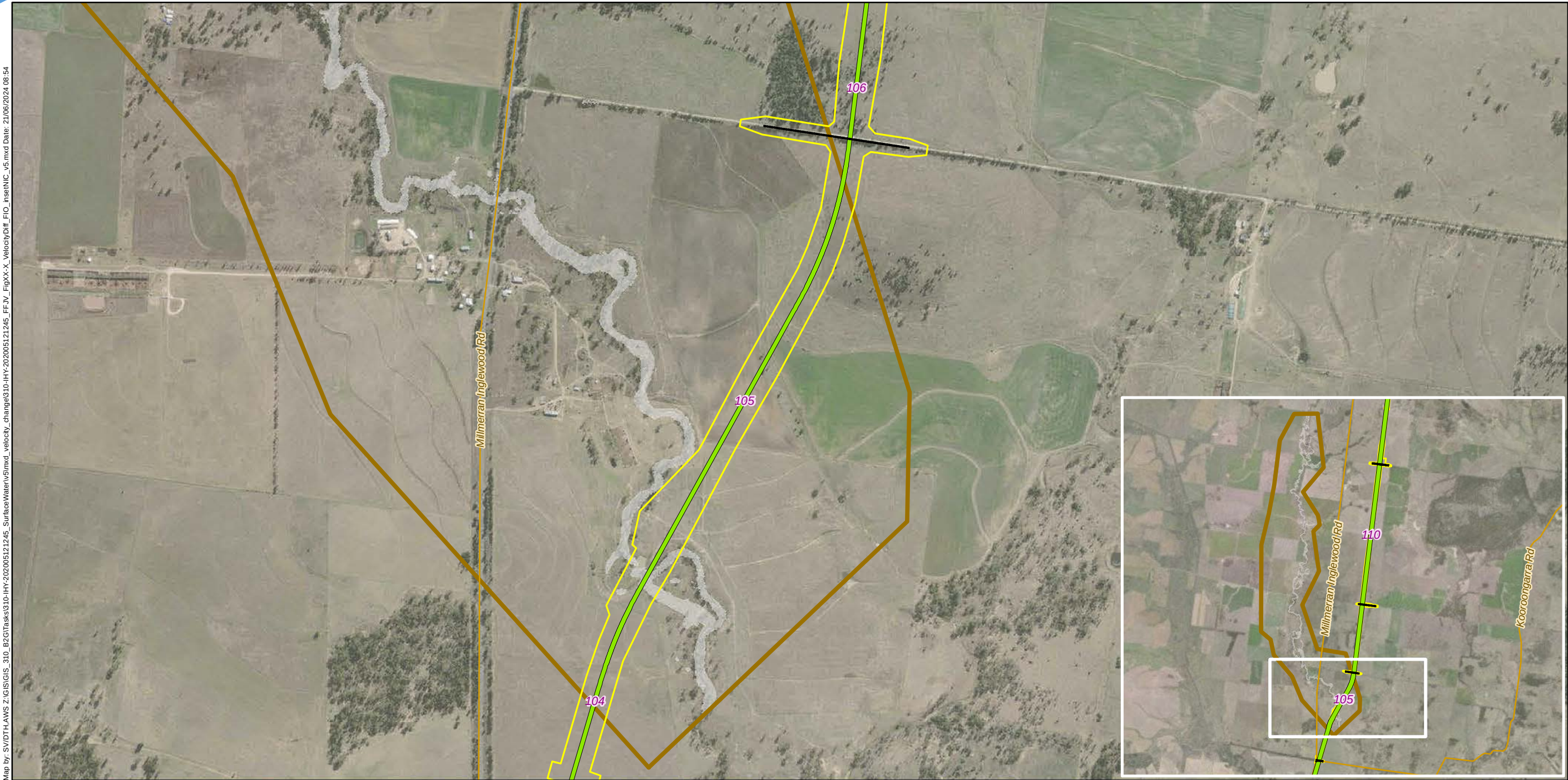
Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_FIO_insetNIC_v5.mxd Date: 21/06/2024 08:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

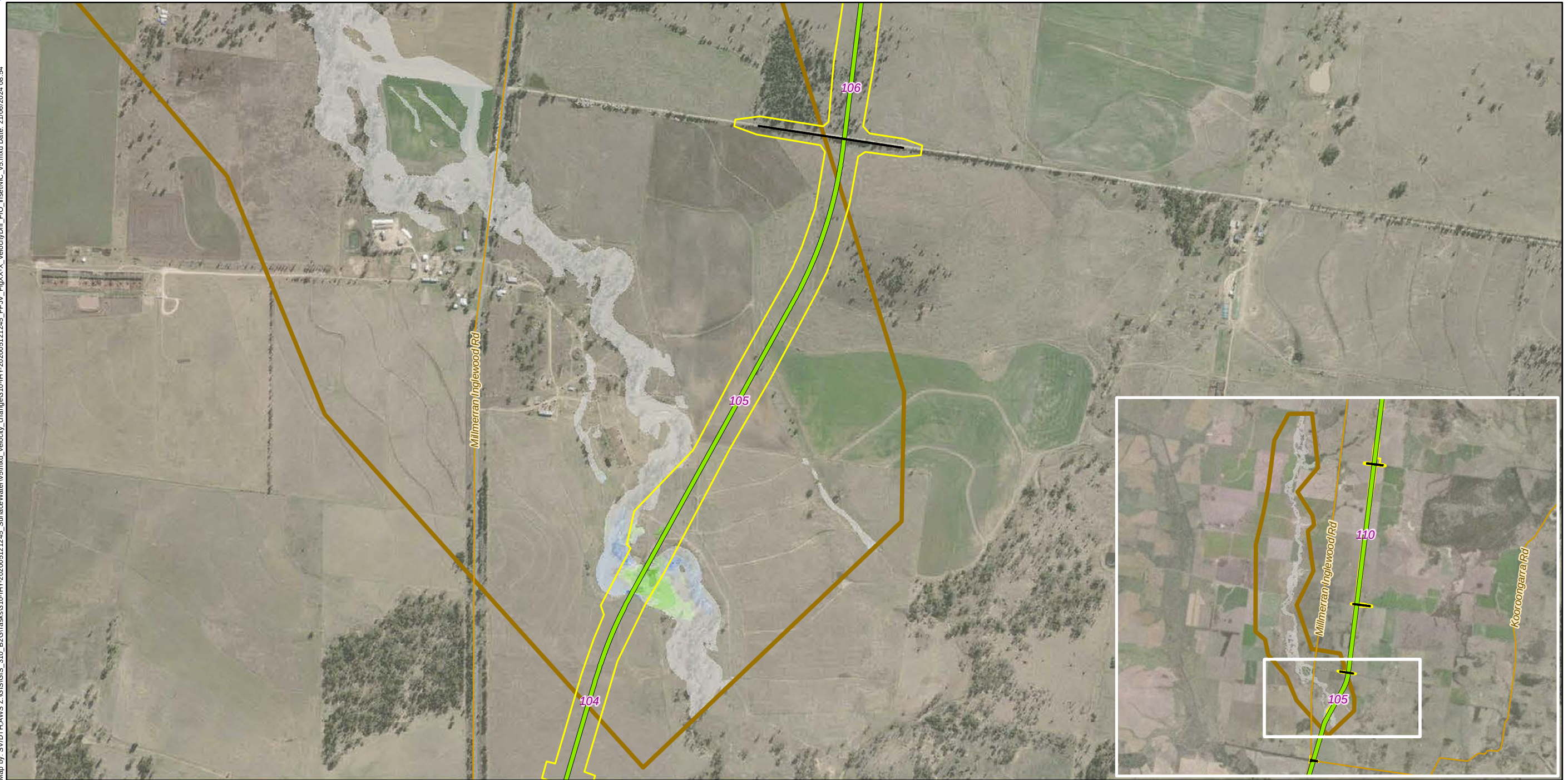
< -0.5	0.01 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.50
-0.05 to -0.01	> 0.50
-0.01 to 0.01	

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mvd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_FIO_insetNIC_v5.mxd Date: 21/06/2024 08:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

< -0.5	0.01 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.50
-0.05 to -0.01	> 0.50
-0.01 to 0.01	

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



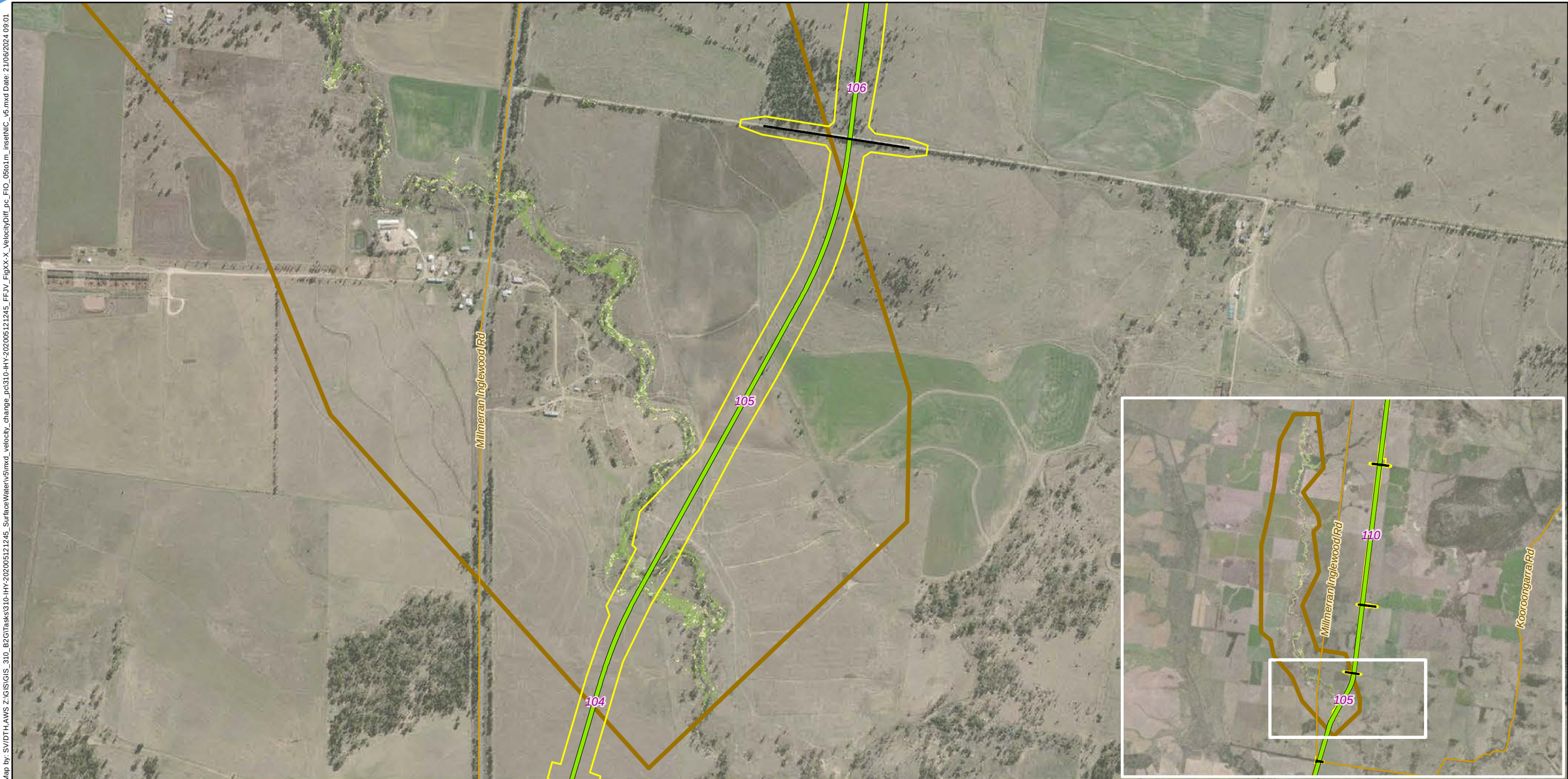
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E5-B:

1% AEP Event - Change in Velocity (<0.5m/s cutoff) - Nicol Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mvd_velocity_change_pc310-IHY-2020\05121245_FF\J_V_FigXX-X_VelocityDiff_pc_FIO_0501m_insetNIC_v6.mxd Date: 21/06/2024 09:01



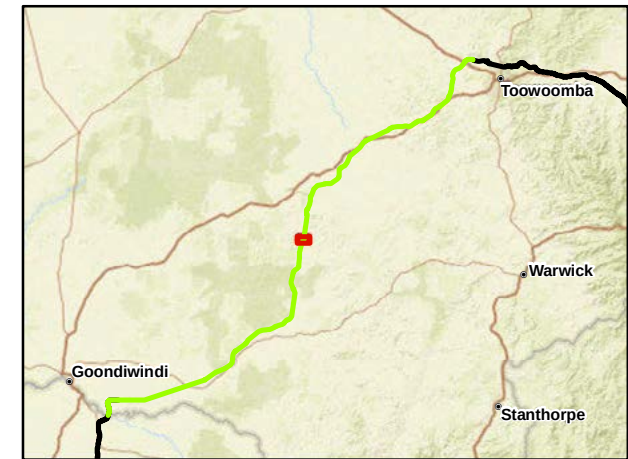
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



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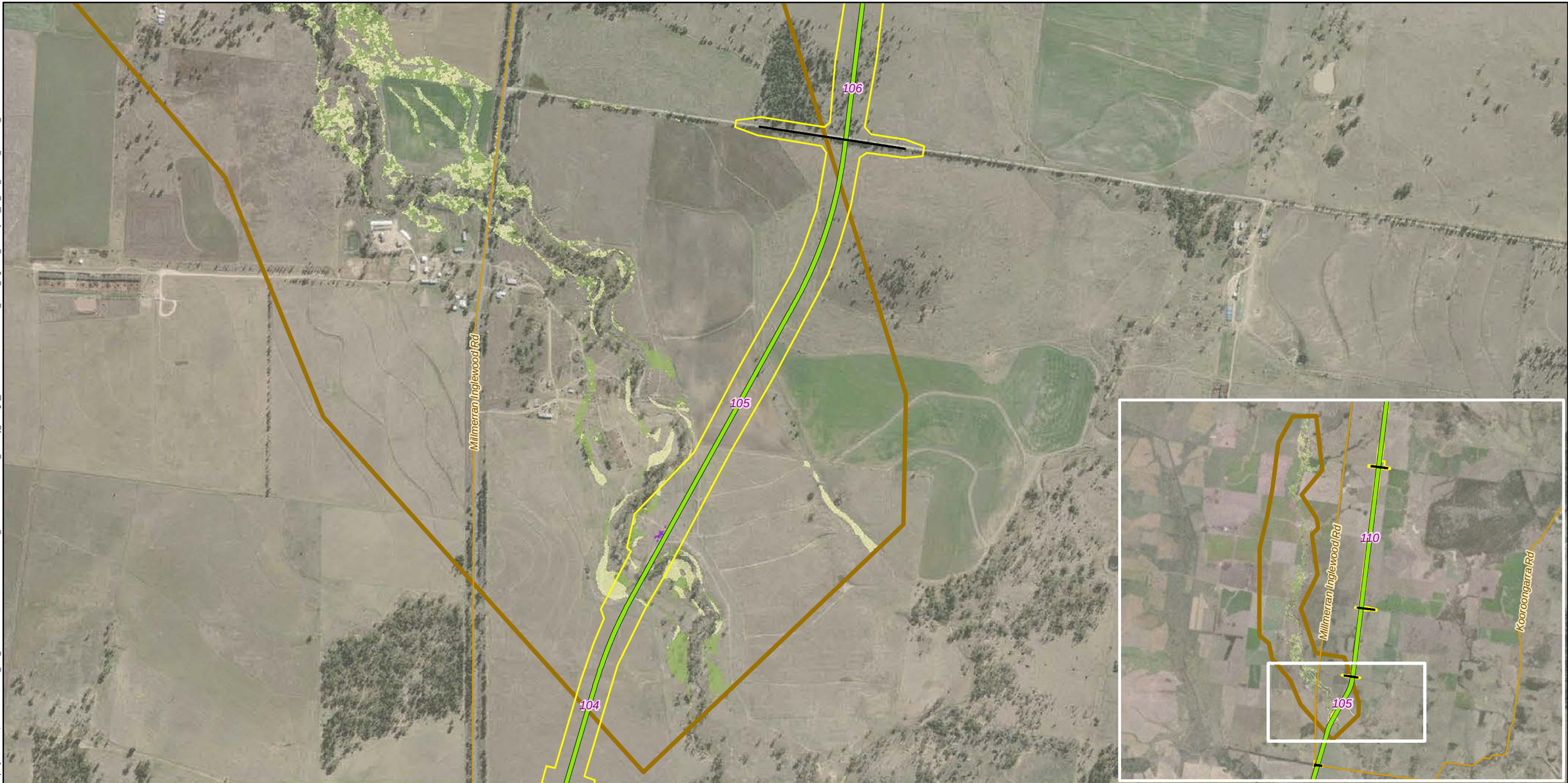
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E5-C:

20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Nicol Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mvd_velocity_change_pc310-IHY-2020\05121245_FF\3V_FigXX-X_VelocityDiff_pc_FIO_0501m_insetNIC_v6.mxd Date: 21/06/2024 09:02



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



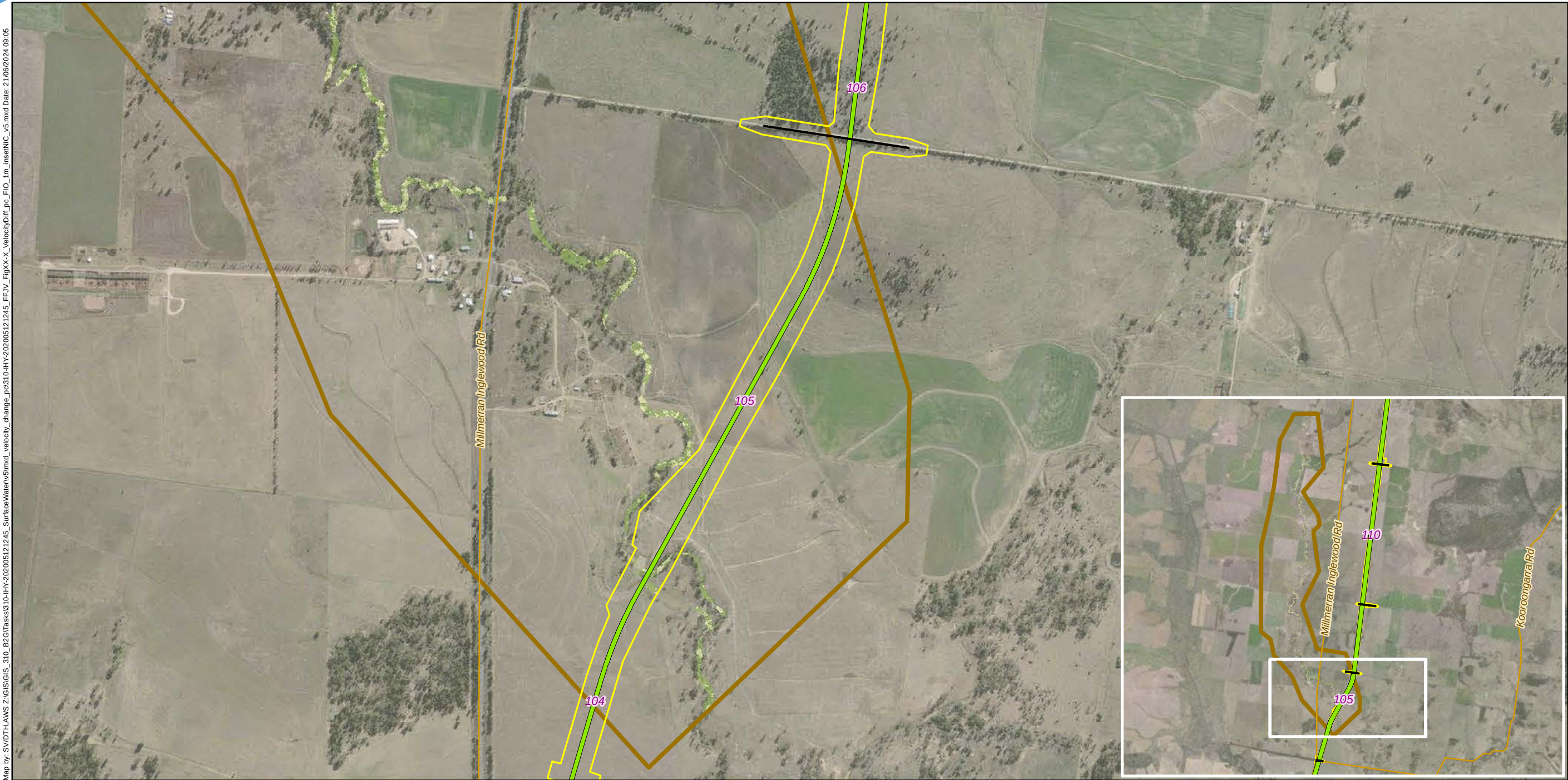
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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E5-D:

1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Nicol Creek



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

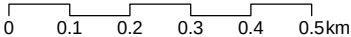
Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:12,500



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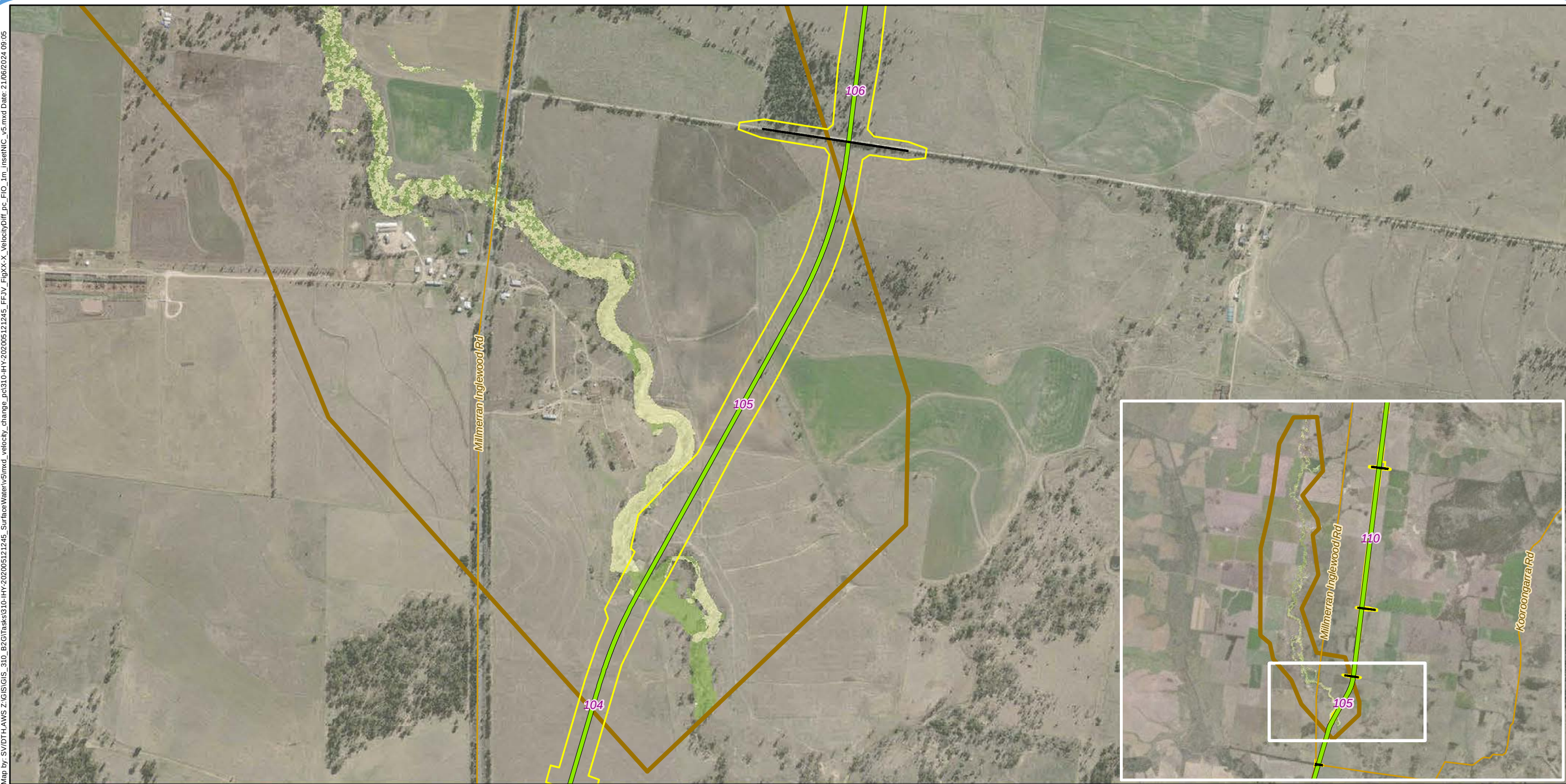
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E5-E:

20% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Nicol Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_velocity_change_pc310-IHY-2020\05121245_FF\J_V_FigXX-X_VelocityDiff_pc_FIO_1m_insetNIC_v5.mxd Date: 21/06/2024 09:05



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



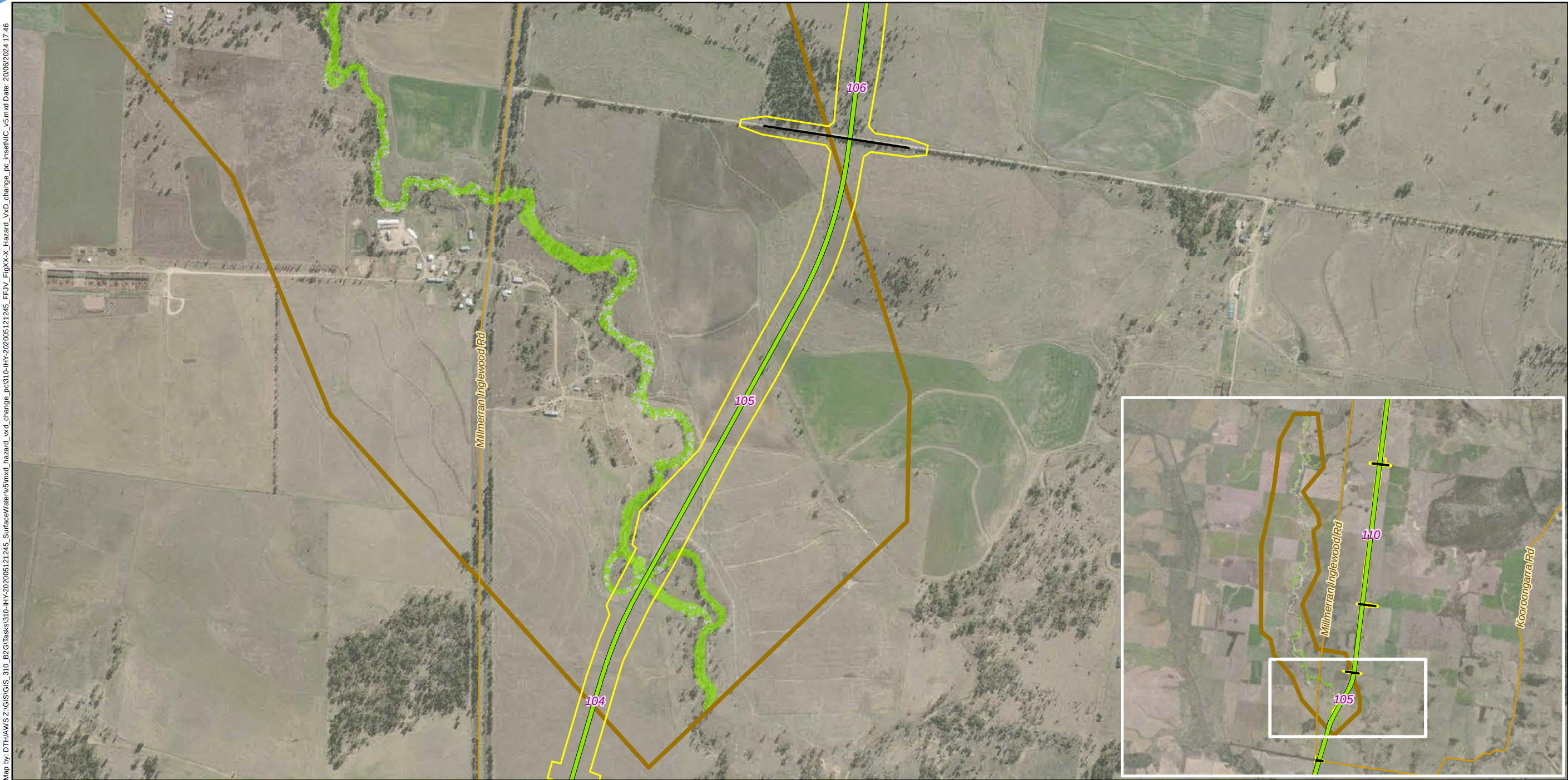
A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure E5-F:
1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Nicol Creek

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vmsd_hazard_vxd_change_pc_insetNIC_v5.mxd Date: 20/06/2024 17:46



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E6-A:

20% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Nicol Creek



- Estimated change in velocity x depth product (%)**

- A data filter has been applied; results where model input design velocity $\times$ depth $< 0.15 \text{ m}^2/\text{s}$ have been cut off and are not displayed.

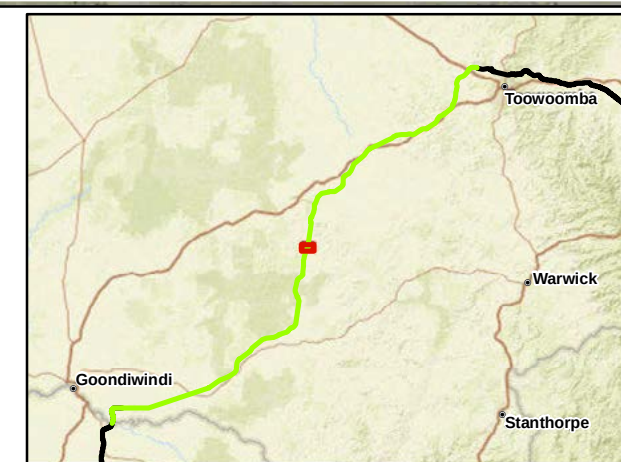


Figure E6-B:

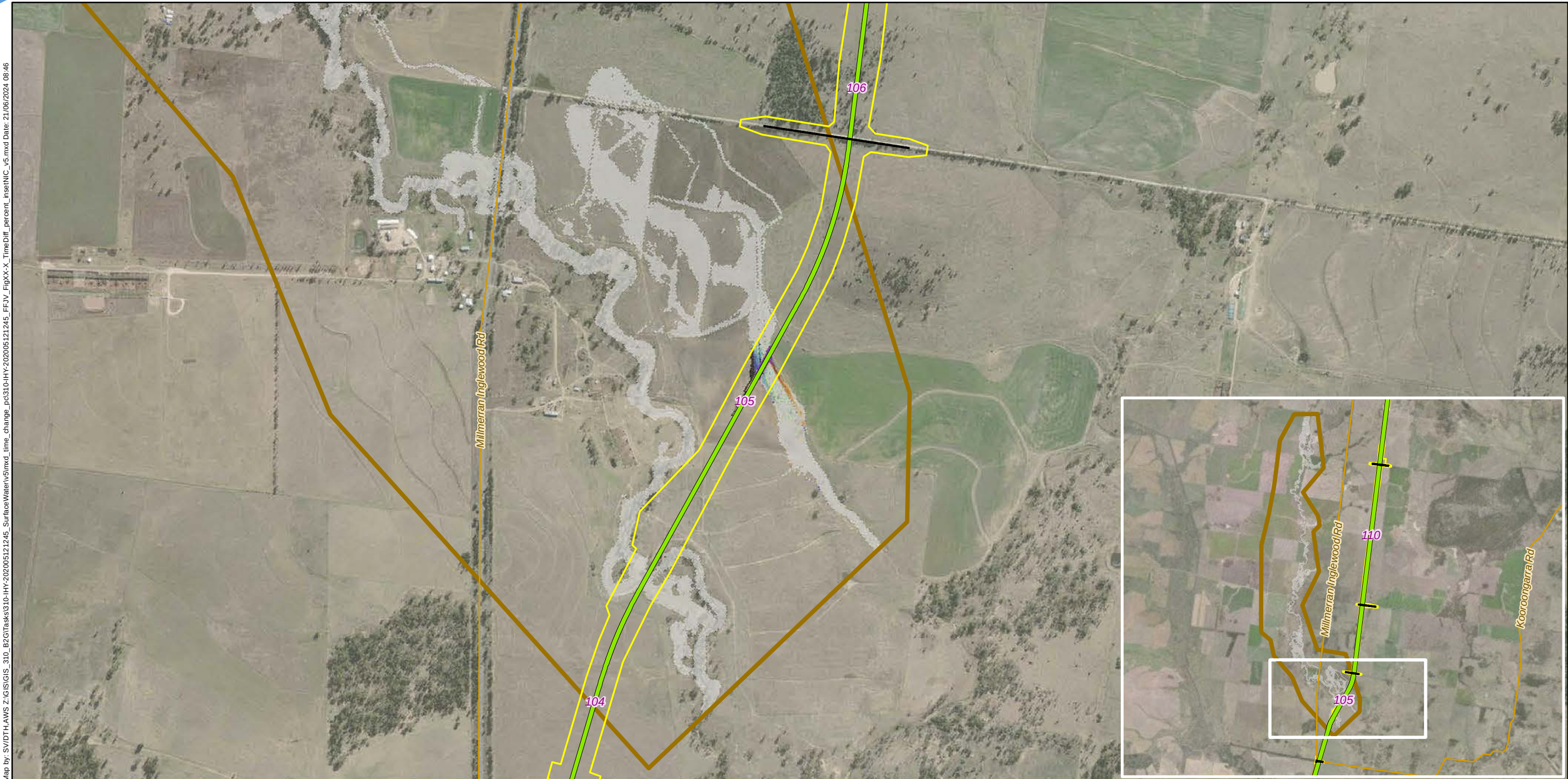
1% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Nicol Creek

A3 scale: 1:12,500



0 0.1 0.2 0.3 0.4 0.5km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\mxd_time_change_pct\310-HY-2020\05121245_FF\XV_FigXX-X_TimeDiff_percent_insetNIC_v5.mxd Date: 21/06/2024 08:46



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



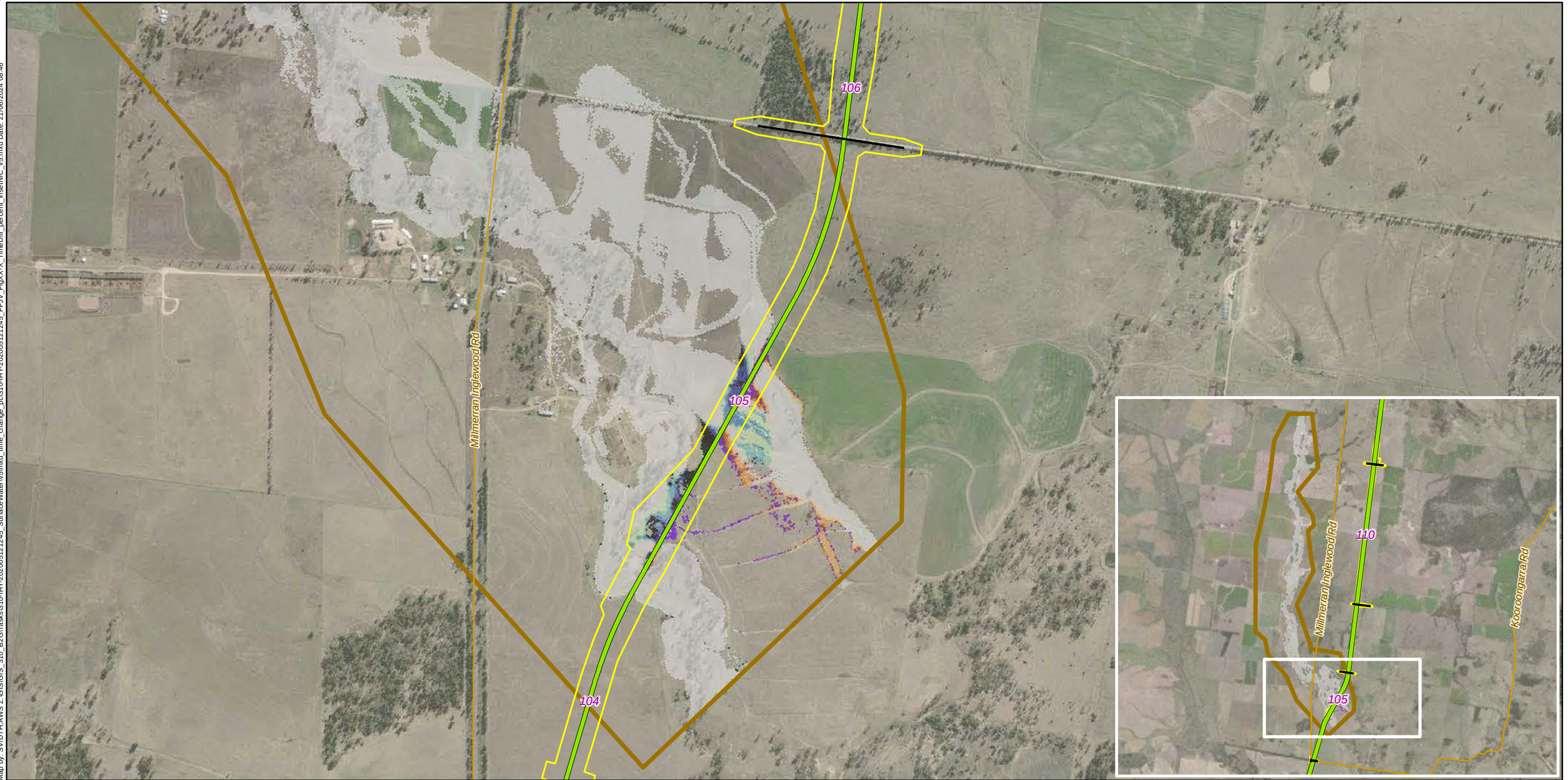
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E7-A:

20% AEP Event - Percentage Change in Time of Inundation - Nicol Creek

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_time_change_pct\310-HY-2020\05121245_FF\3V_FigXX-X_TimeDiff_percent_insetNIC_v5.mxd Date: 21/06/2024 08:46



Legend

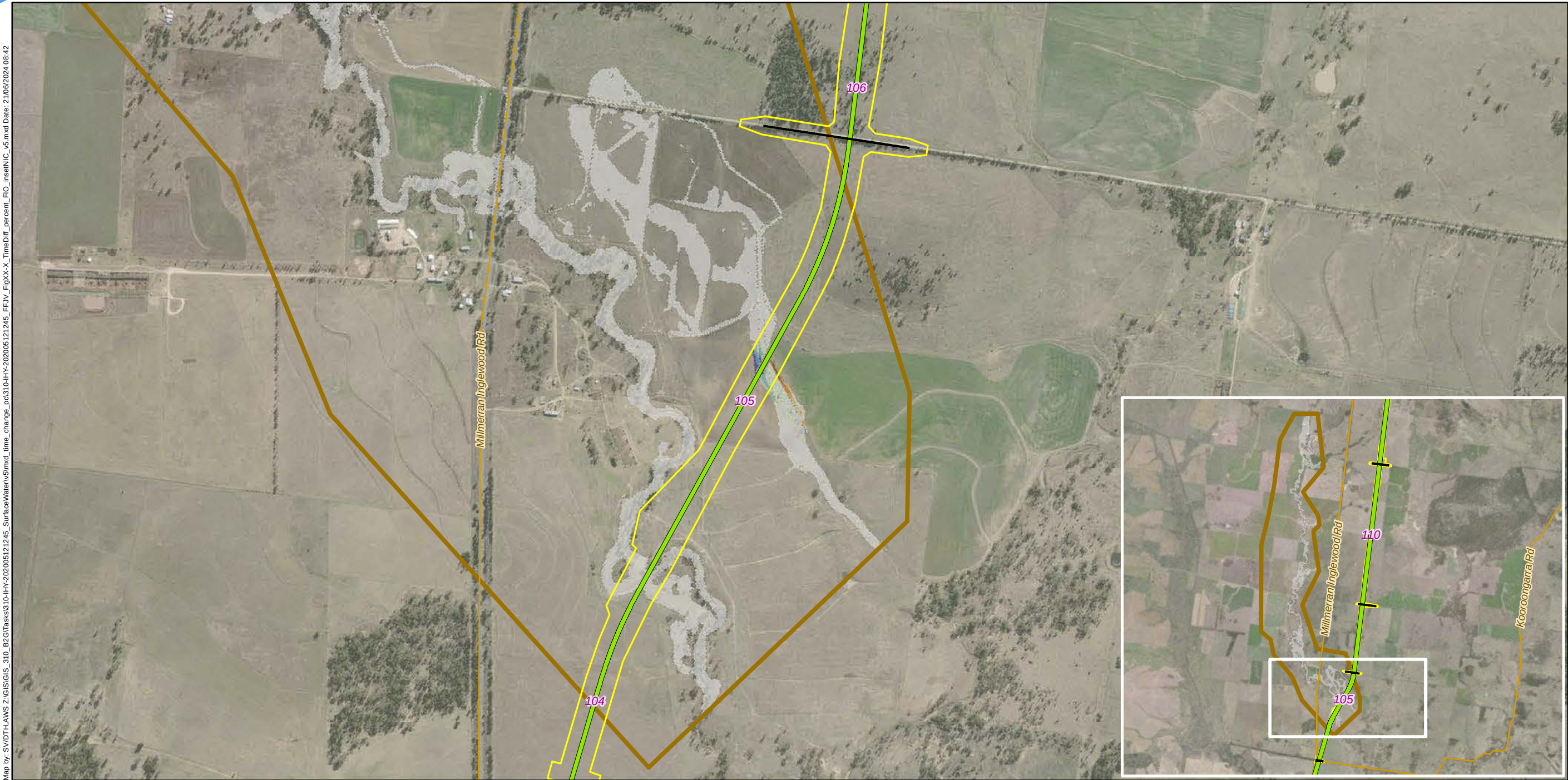
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



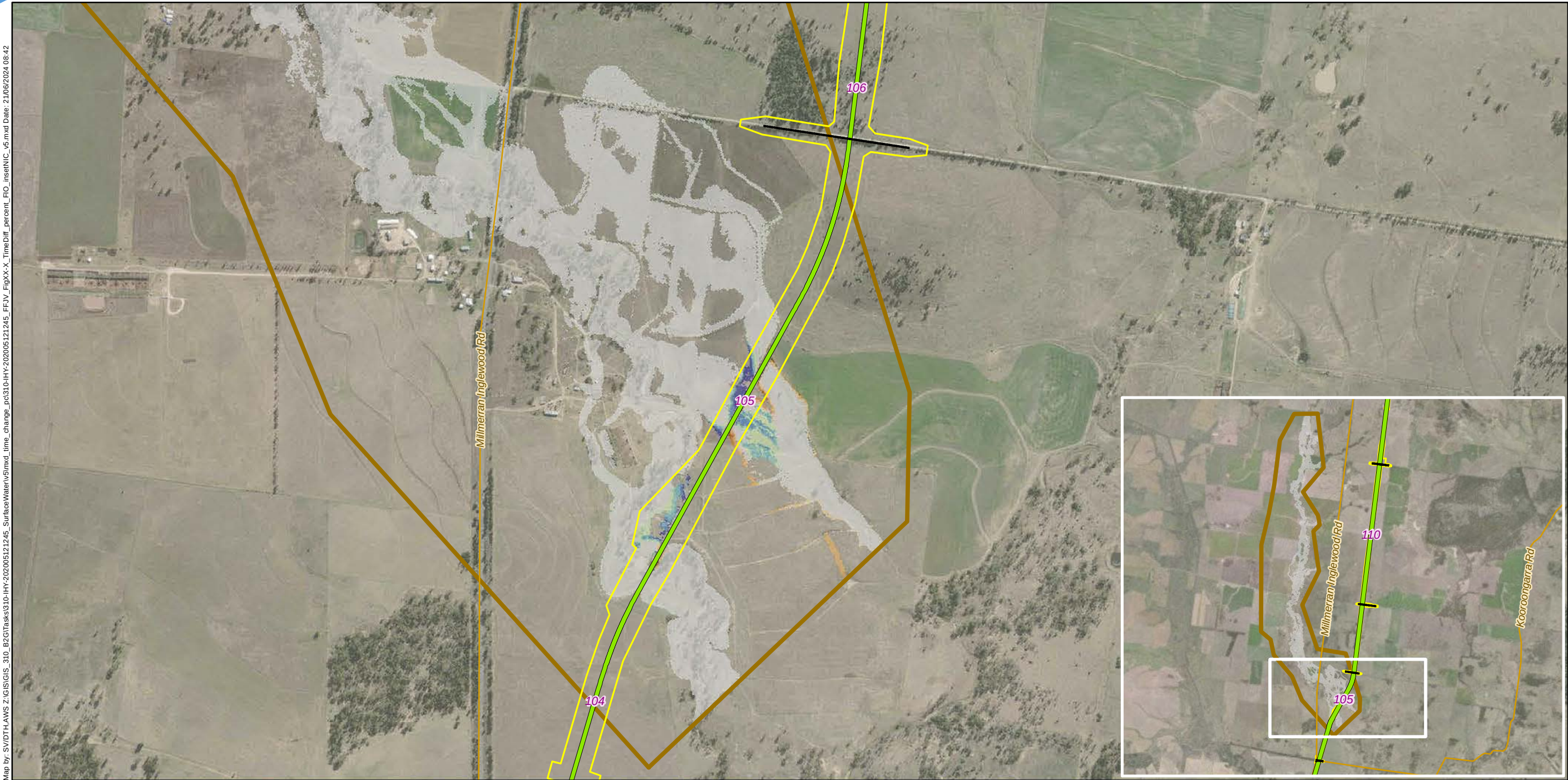
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E7-C:

20% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Nicol Creek



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

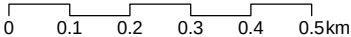
Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:12,500

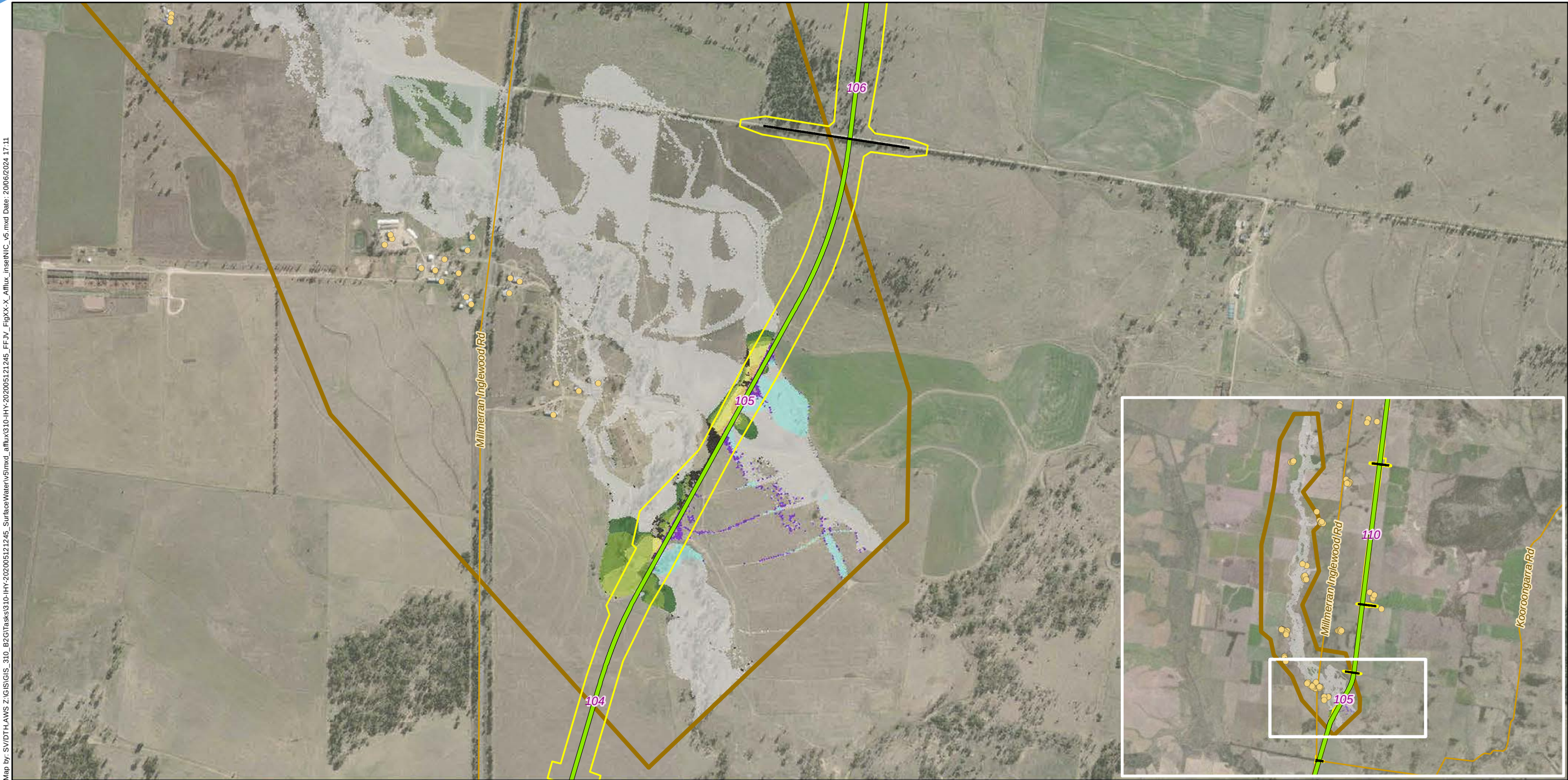


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure E7-D:
1% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Nicol Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF_IV_FigXX-X_Afflux_InseNIC_v5.mxd Date: 20/06/2024 17:11

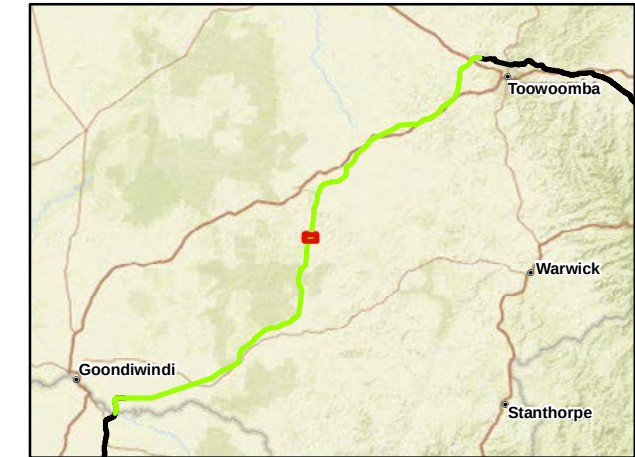


Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

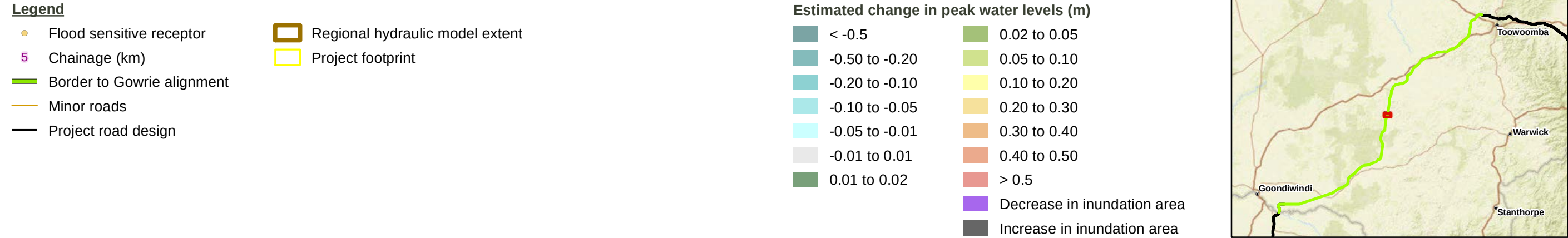
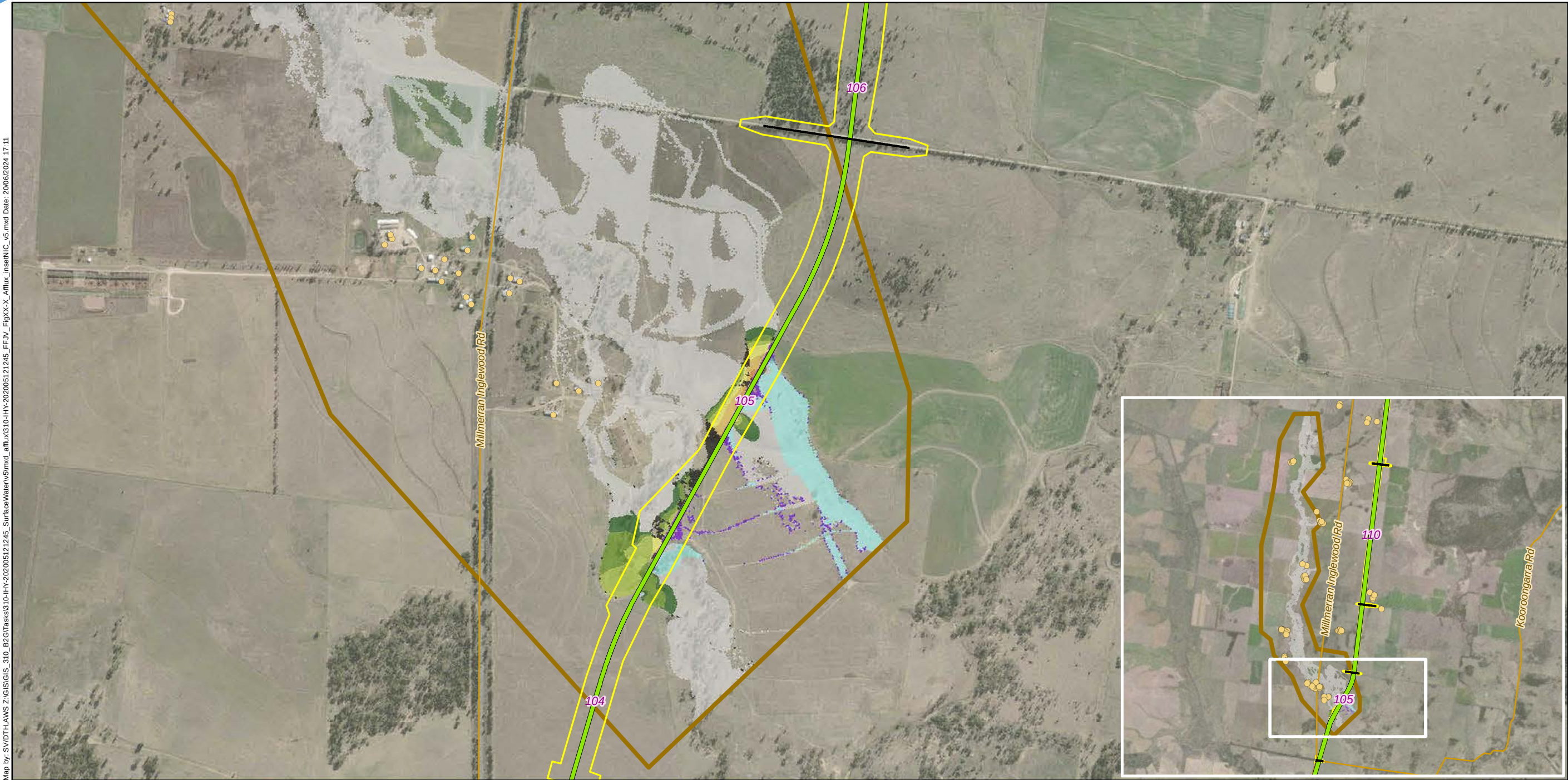
Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



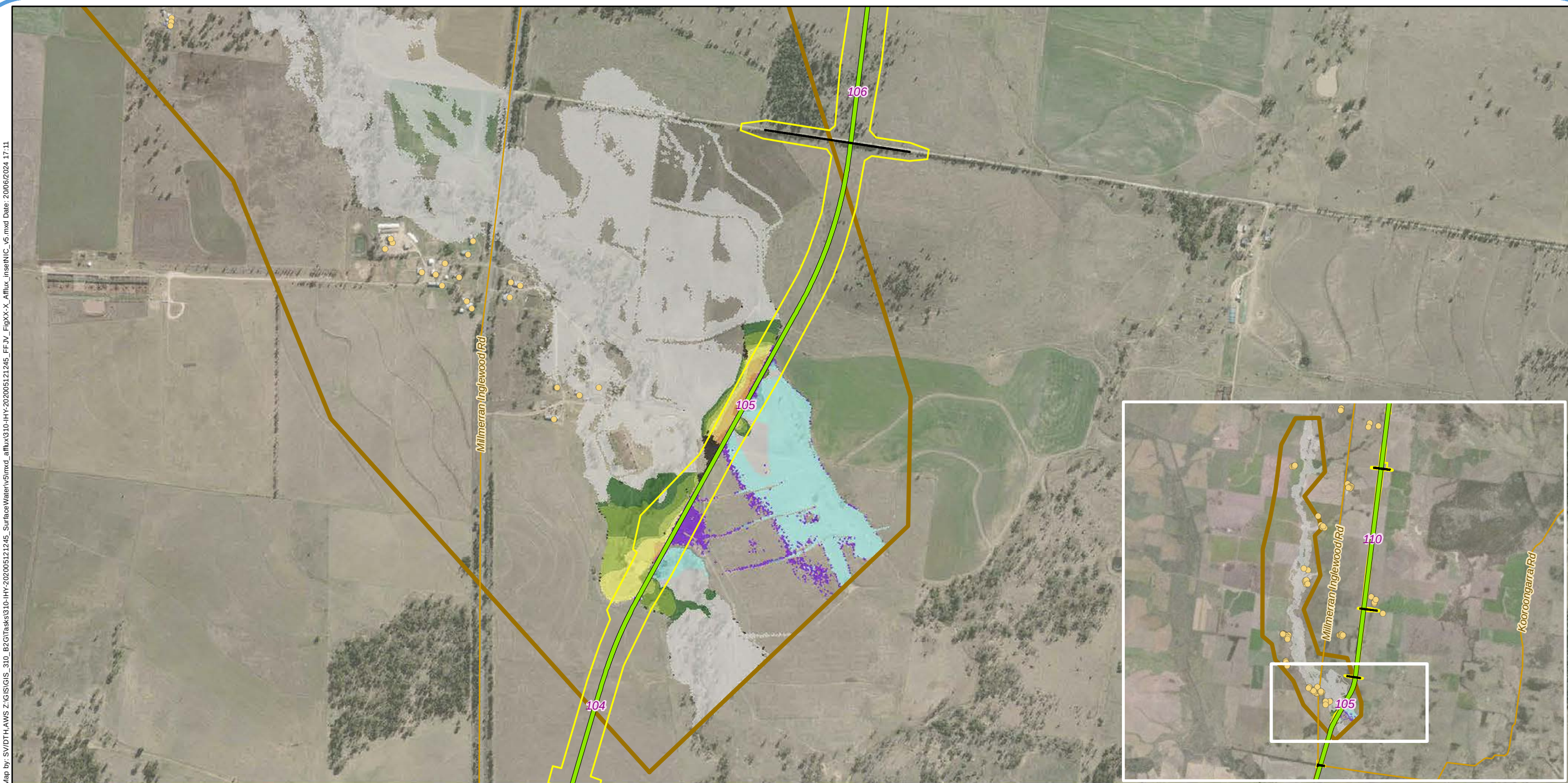
A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF_IV_FigXX-X_Afflux_InseNIC_v5.mxd Date: 20/06/2024 17:11



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF_IV_FigXX-X_Afflux_InseNIC_v5.mxd Date: 20/06/2024 17:11



Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:12,500
0 0.1 0.2 0.3 0.4 0.5km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure E8-C:

1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Nicol Creek

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix F Bringalily Creek flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix F

Bringalily Creek Flood Maps

Figure F1-A Locality Plan
Figure F1-B Survey Data
Figure F1-C Hydrologic Model Setup
Figure F1-D Hydraulic Model Setup
Figure F1-E Landuse Classifications
Figure F1-F Proposed Design Structures

Figure F2-A 20% AEP Event - Peak Water Levels - Existing Case
Figure F2-B 1% AEP Event - Peak Water Levels - Existing Case
Figure F2-C 20% AEP Event - Peak Velocity - Existing Case
Figure F2-D 1% AEP Event - Peak Velocity - Existing Case
Figure F2-E 20% AEP Event - Peak Hazard - Existing Case
Figure F2-F 1% AEP Event - Peak Hazard - Existing Case
Figure F2-G 20% AEP Event - Peak Time of Inundation - Existing Case
Figure F2-H 1% AEP Event - Peak Time of Inundation - Existing Case

Figure F3-A 20% AEP Event - Peak Water Levels - Developed Case
Figure F3-B 1% AEP Event - Peak Water Levels - Developed Case
Figure F3-C 20% AEP Event - Peak Velocity - Developed Case
Figure F3-D 1% AEP Event - Peak Velocity - Developed Case
Figure F3-E 20% AEP Event - Peak Hazard - Developed Case
Figure F3-F 1% AEP Event - Peak Hazard - Developed Case
Figure F3-G 20% AEP Event - Peak Time of Inundation - Developed Case
Figure F3-H 1% AEP Event - Peak Time of Inundation - Developed Case

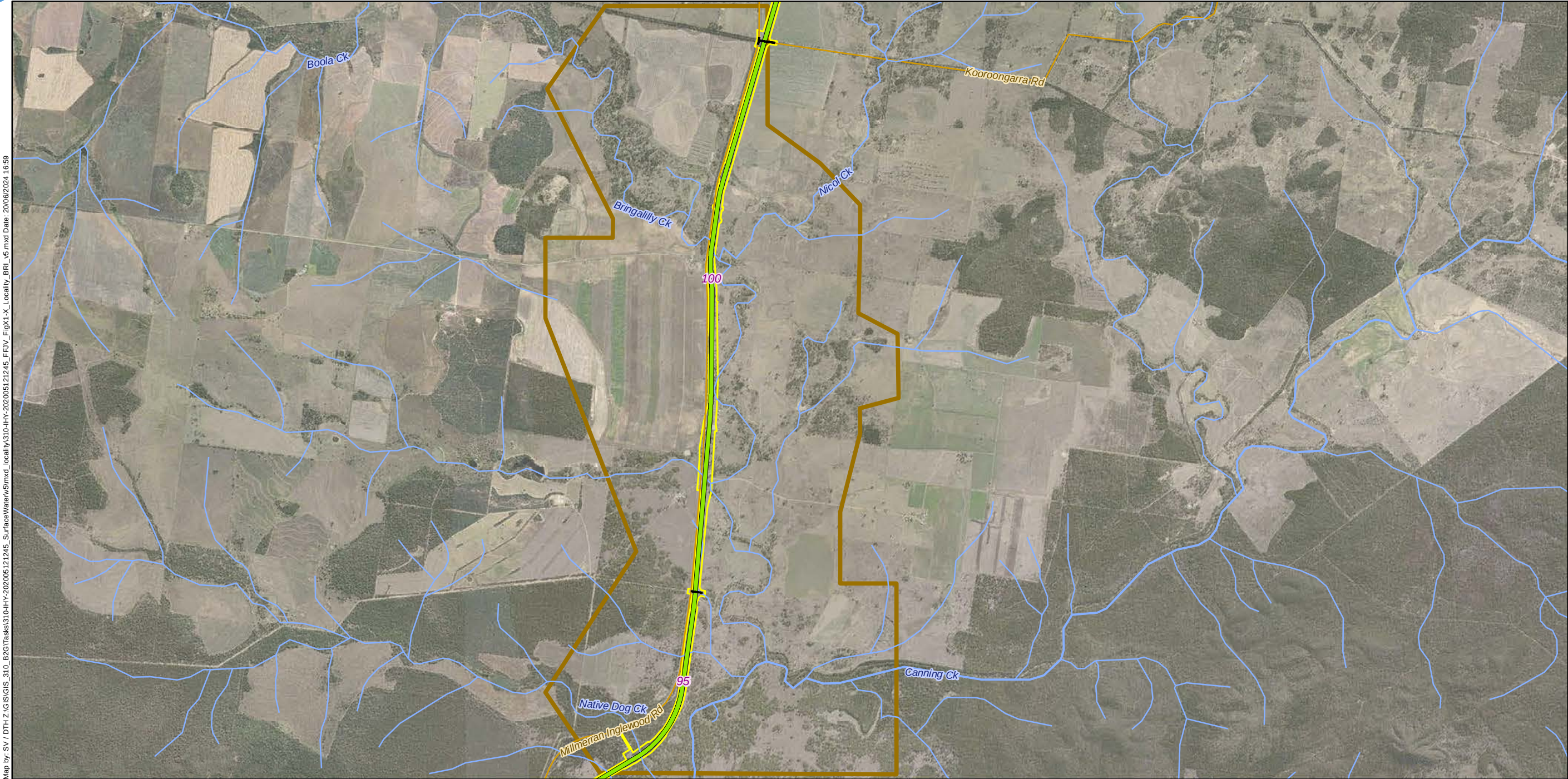
Figure F4-A 20% AEP Event - Afflux
Figure F4-B 1% AEP Event - Afflux
Figure F4-C 20% AEP Event - Change in Velocity
Figure F4-D 1% AEP Event - Change in Velocity
Figure F4-E 20% AEP Event - Change in Hazard
Figure F4-F 1% AEP Event - Change in Hazard
Figure F4-G 20% AEP Event - Change in Time of Inundation
Figure F4-H 1% AEP Event - Change in Time of Inundation

Figure F5-A 20% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure F5-B 1% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure F5-C 20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure F5-D 1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure F5-E 20% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure F5-F 1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)

Figure F6-A 20% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)
Figure F6-B 1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)

Figure F7-A 20% AEP Event - Percentage Change in Time of Inundation
Figure F7-B 1% AEP Event - Percentage Change in Time of Inundation
Figure F7-C 20% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
Figure F7-D 1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)

Figure F8-A 1% AEP Event - Sensitivity - 0% Blockage
Figure F8-B 1% AEP Event - Sensitivity - 50% Blockage
Figure F8-C 1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Watercourses
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint



A3 scale: 1:52,000
0 0.5 1 1.5 2 2.5km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure F1-A:
Locality Plan - Bringalily Creek

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\310mxd SurveyData_v5.mxd Date: 20/06/2024 17:02



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Project footprint
- Hydrologic model extent
- Regional hydraulic model extent

LiDAR datasets (1m grid)

- 2015 ARTC LiDAR 1m



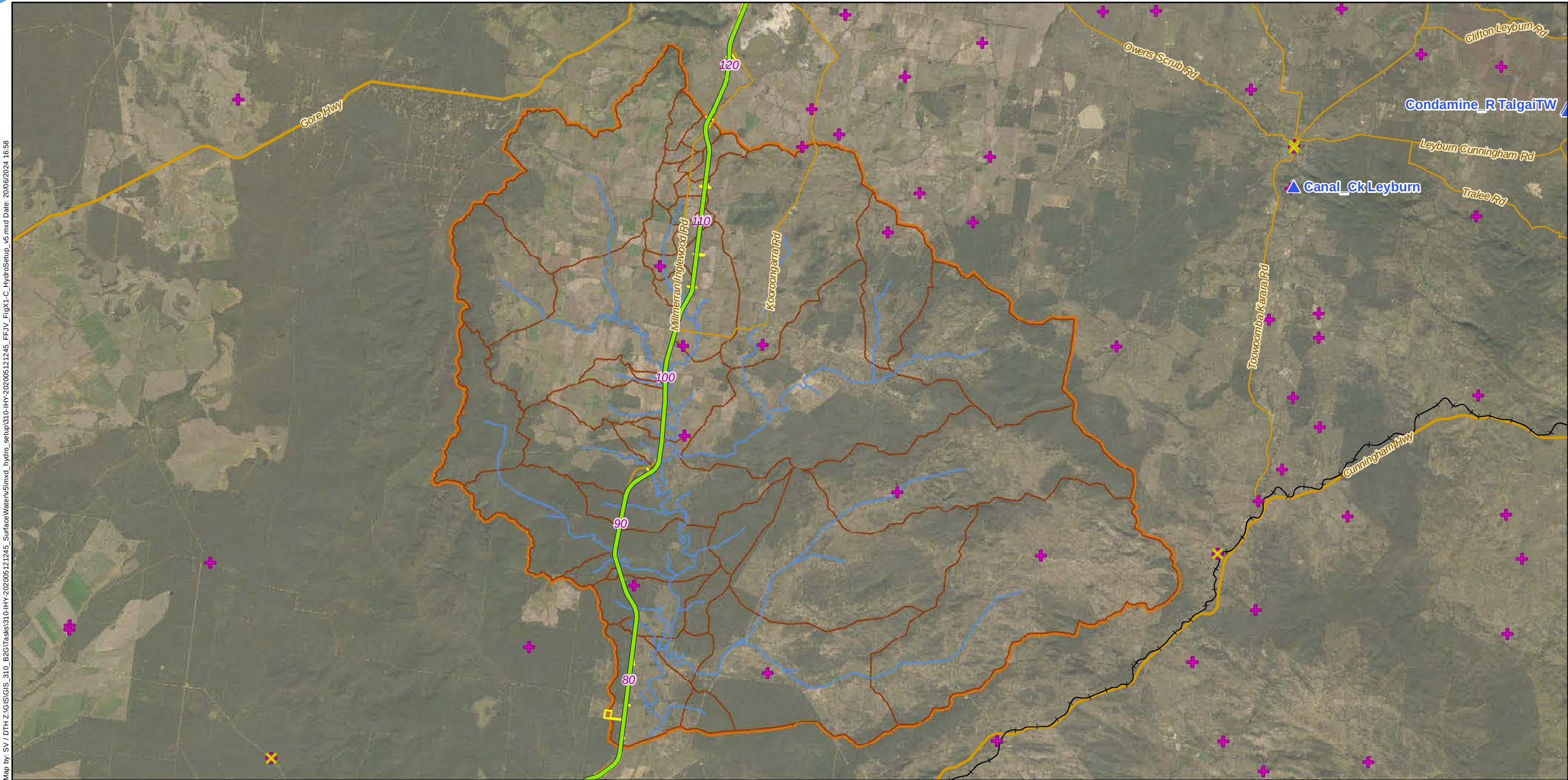
A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



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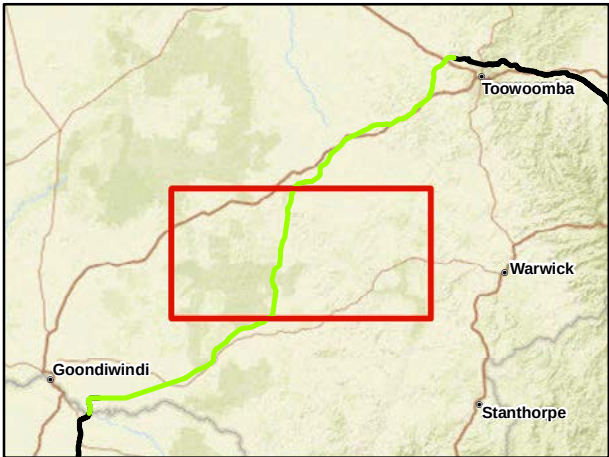
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure F1-B:
Survey Data - Bringalily Creek



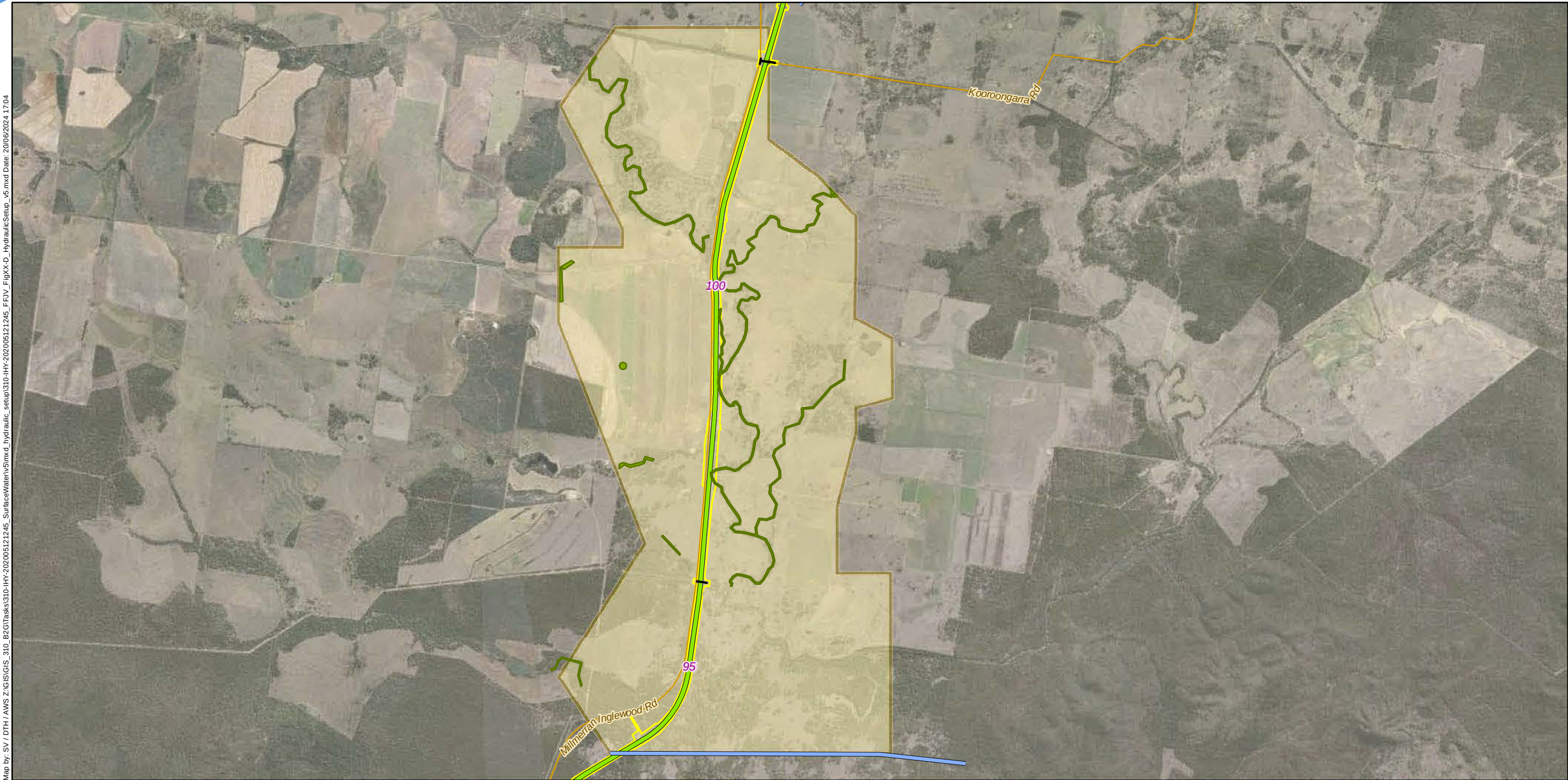
Legend

- | | | | |
|-----------------------------|-------------------|-------------------------|-------------------------|
| 5 Chainage (km) | Major roads | Catchment links | Pluviograph stations |
| Localities | Minor roads | Sub-catchments | Daily rainfall stations |
| Existing rail (operational) | Project footprint | Hydrologic model extent | Stream gauge locations |
| Border to Gowrie alignment | | | |



A3 scale: 1:260,000
0 2.5 5 7.5 10 12.5 km

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5\mxd_HydraulicSetup_v5.mxd Date: 20/06/2024 17:04



Legend

- | | | |
|----------------------------|---------------------|---------------------------------|
| 5 Chainage (km) | Minor roads | Regional hydraulic model extent |
| Border to Gowrie alignment | Project road design | Outflow boundary |
| | Project footprint | Inflow boundary |



A3 scale: 1:55,000

0 0.55 1.1 1.65 2.2 2.75 km



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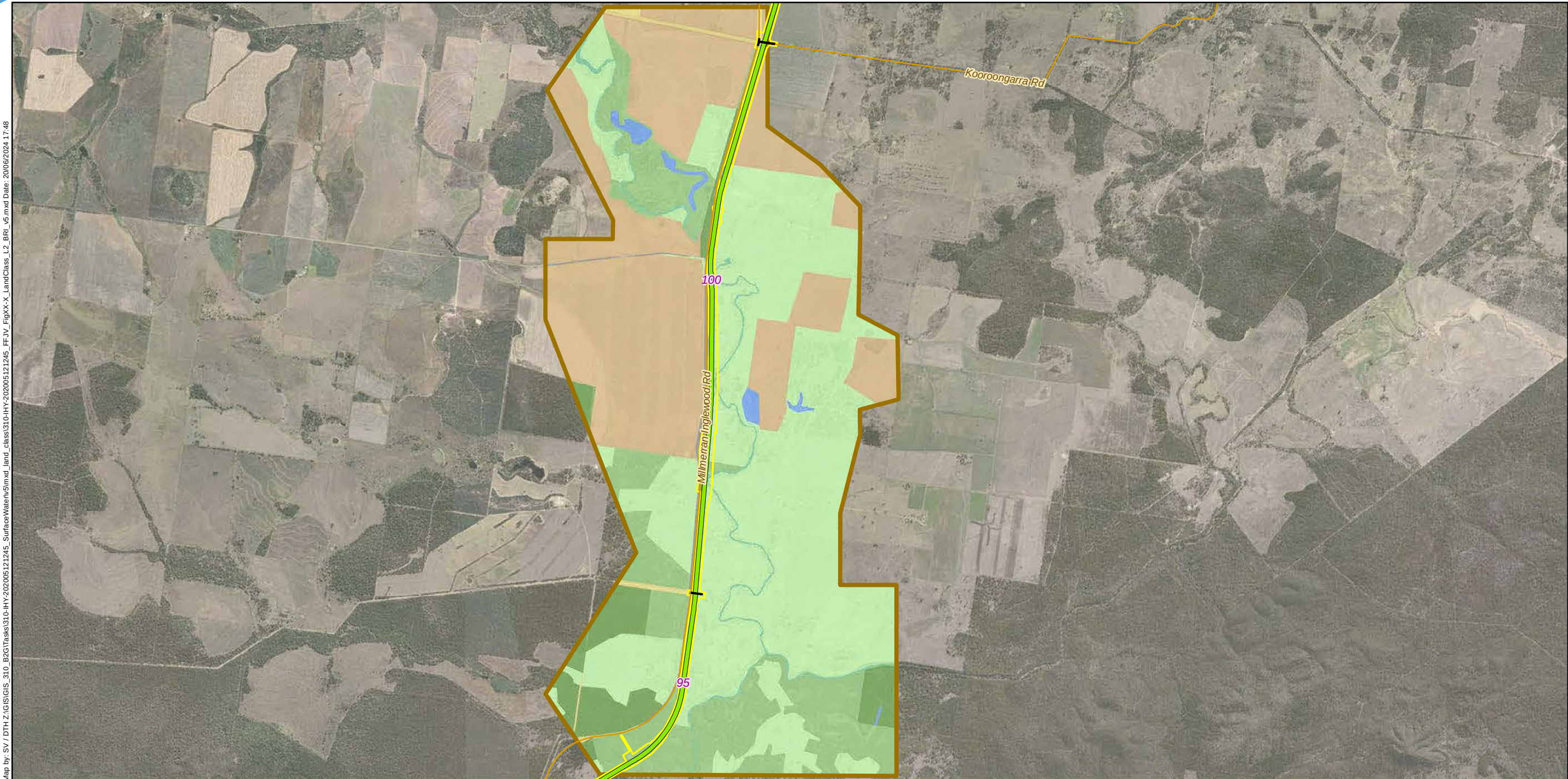
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F1-D:

Hydraulic Model Setup - Bringalily Creek

Map by: SV / DTH 2:GIS/GIS_310_B2G1Tasks/310-HY-202005121245_SurfaceWater/v3mxd_land_class/310-HY-202005121245_FFJV_FigXX-X_LandClass_L2_BRI_v5.mxd Date: 20/06/2024 17:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Landuse classification

- | | |
|--------------------------------------|---------------------------------------|
| River (n = 0.035) | Open Space - Moderate Veg (n = 0.055) |
| Sealed Road Corridor (n = 0.015) | Open Space - Heavy Veg (n = 0.065) |
| Unsealed Road Corridor (n = 0.025) | Open Water (n = 0.025) |
| Rural Residential (n = 0.09) | Rail (n = 0.025) |
| Urban Residential (n = 0.1) | Riparian (n = 0.04) |
| Commercial (n = 0.06) | Crop (n = 0.1085) |
| Open Space - Minimum Veg (n = 0.045) | |



A3 scale: 1:52,000
0 0.5 1 1.5 2 2.5km



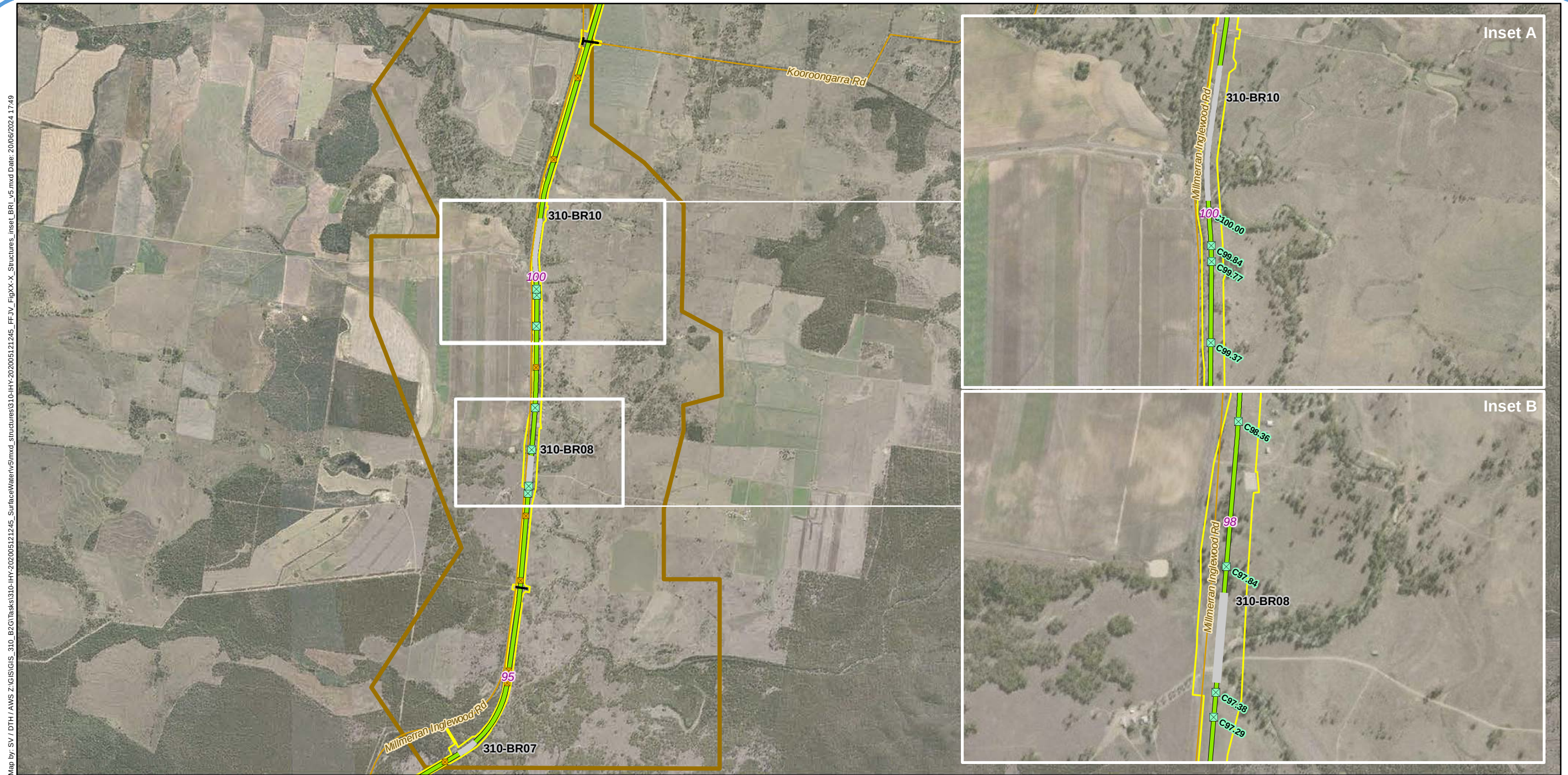
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F1-E:

Landuse classifications - Bringalily Creek

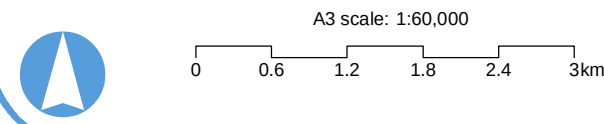
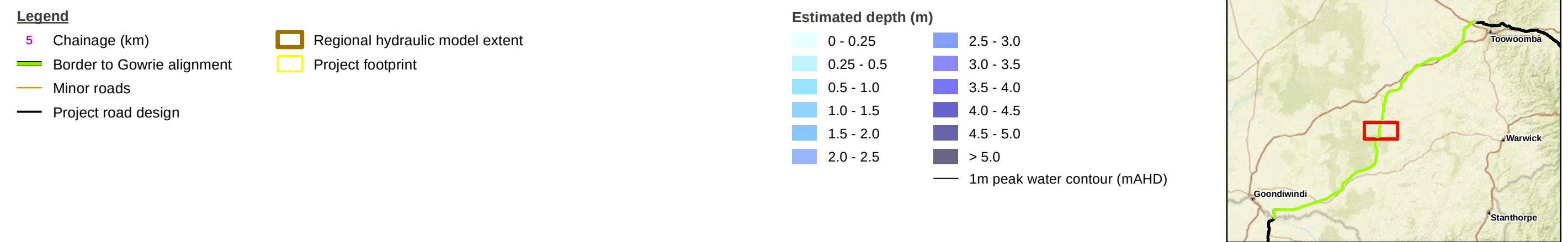
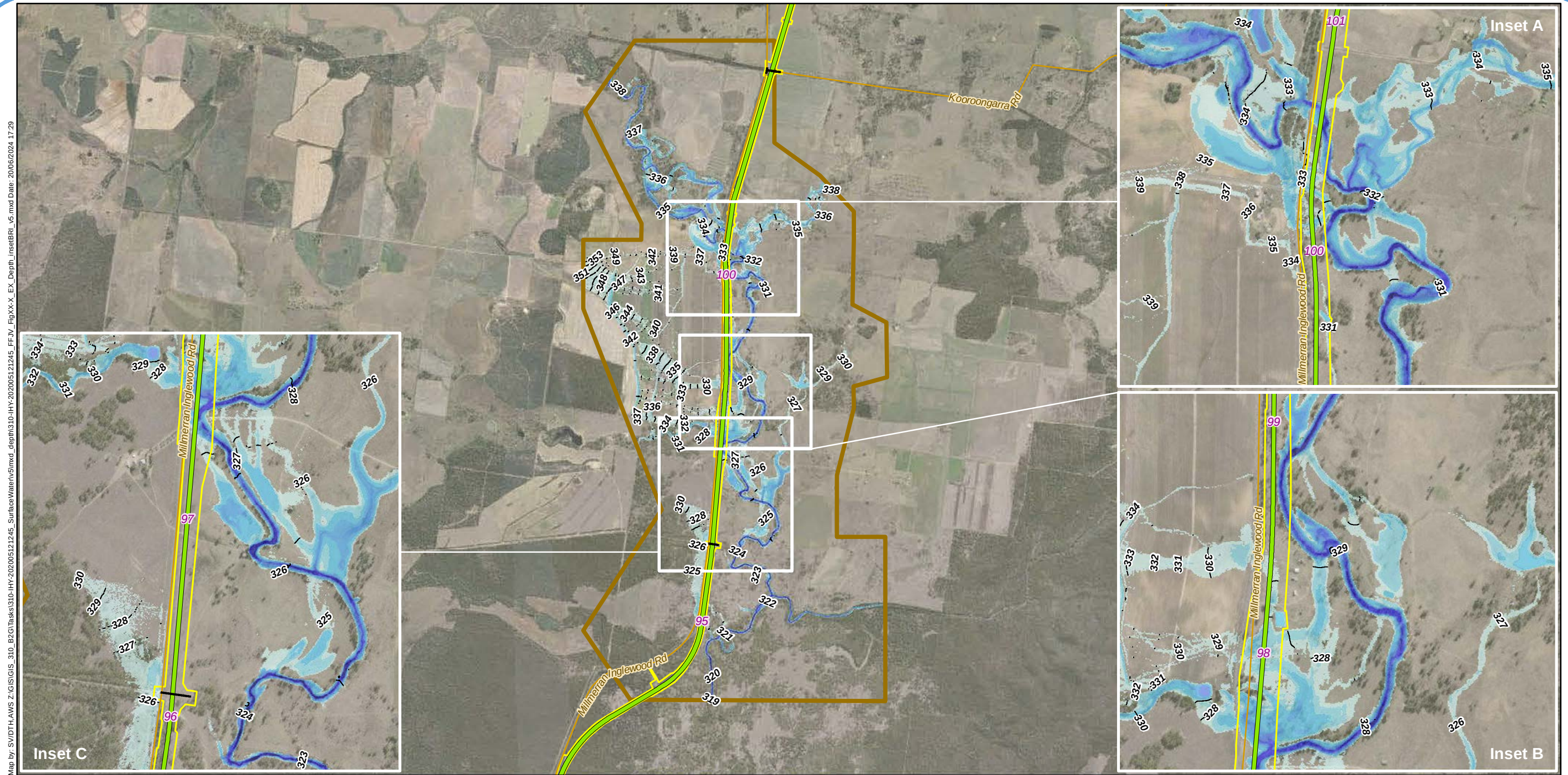


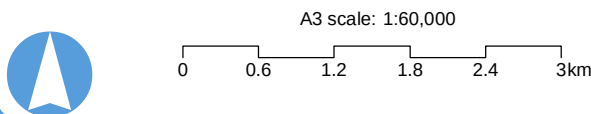
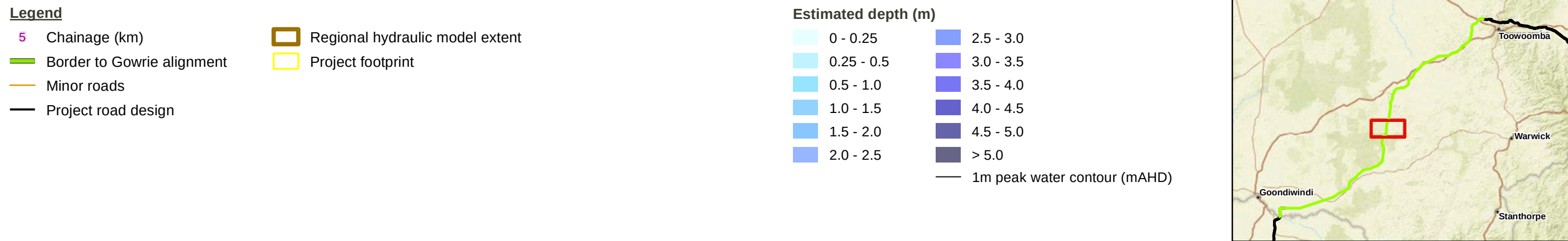
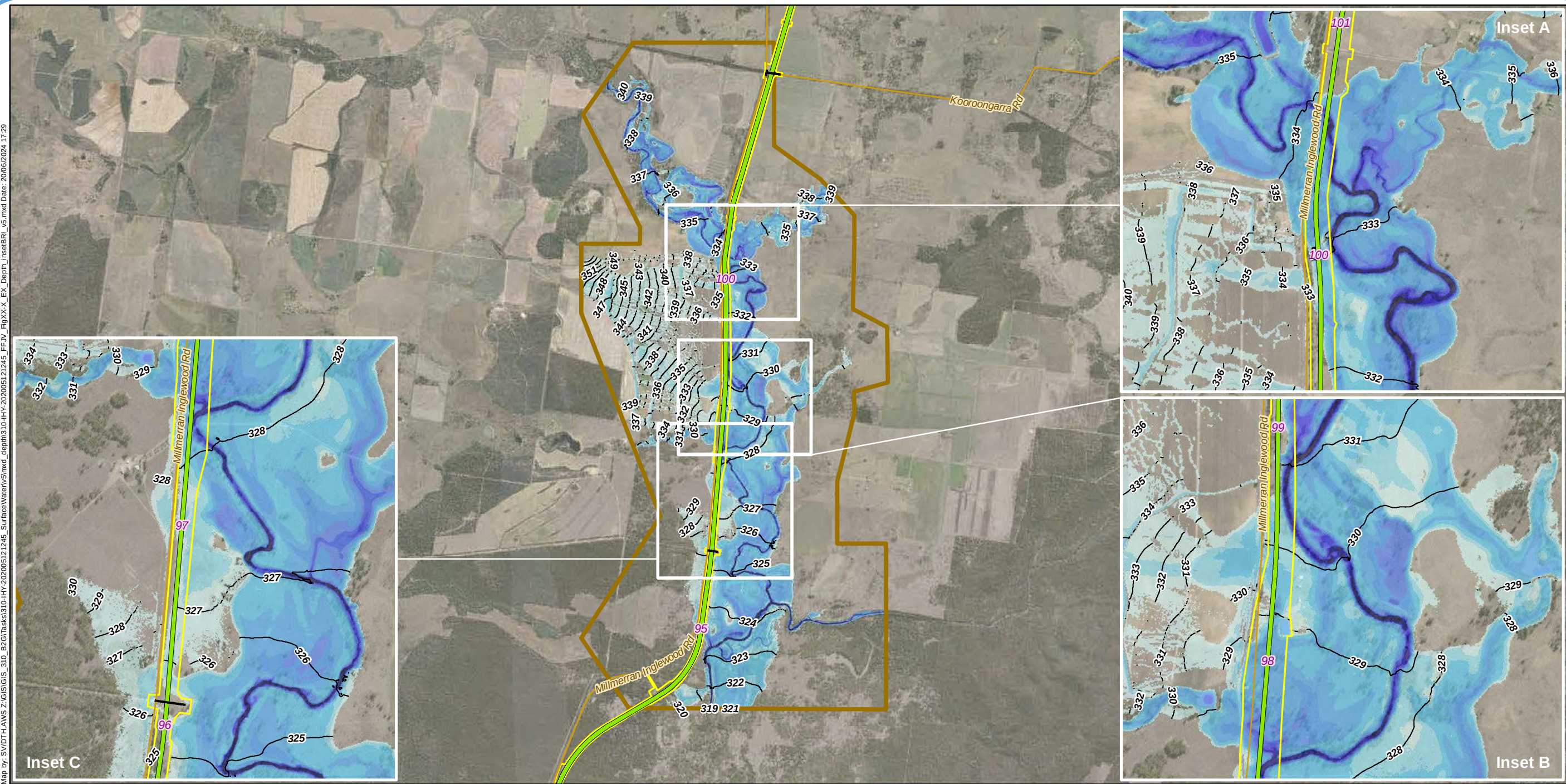
Legend

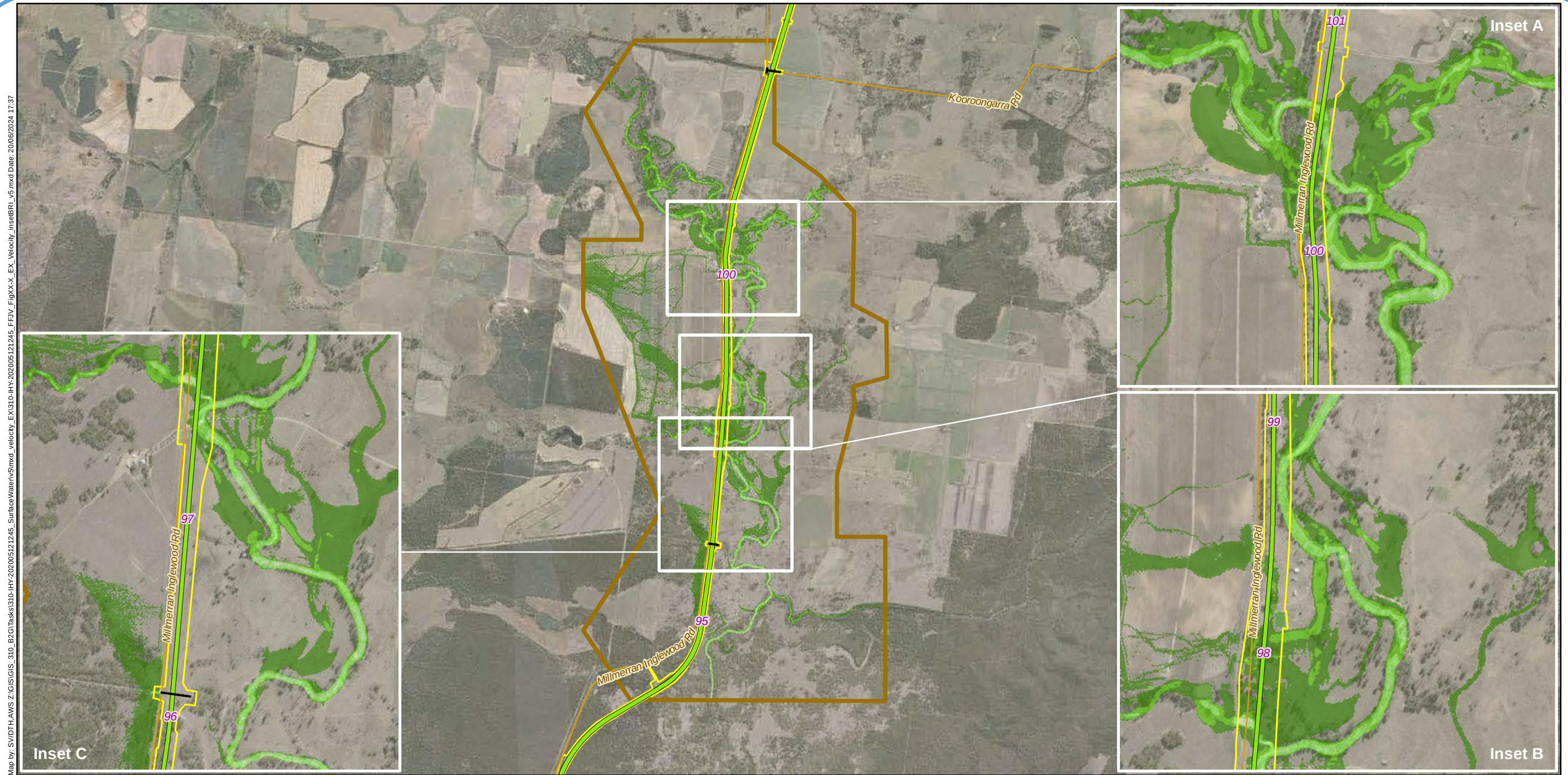
- | | |
|------------------------------|-----------------------------------|
| 5 Chainage (km) | — Project road design |
| ⊠ Floodplain culvert | ▬ Bridges |
| ⊠ Local drainage culvert | ▭ Regional hydraulic model extent |
| ▬ Border to Gowrie alignment | ▭ Project footprint |
| ▬ Minor roads | |



A3 scale: 1:52,000
0 0.5 1 1.5 2 2.5km







Legend

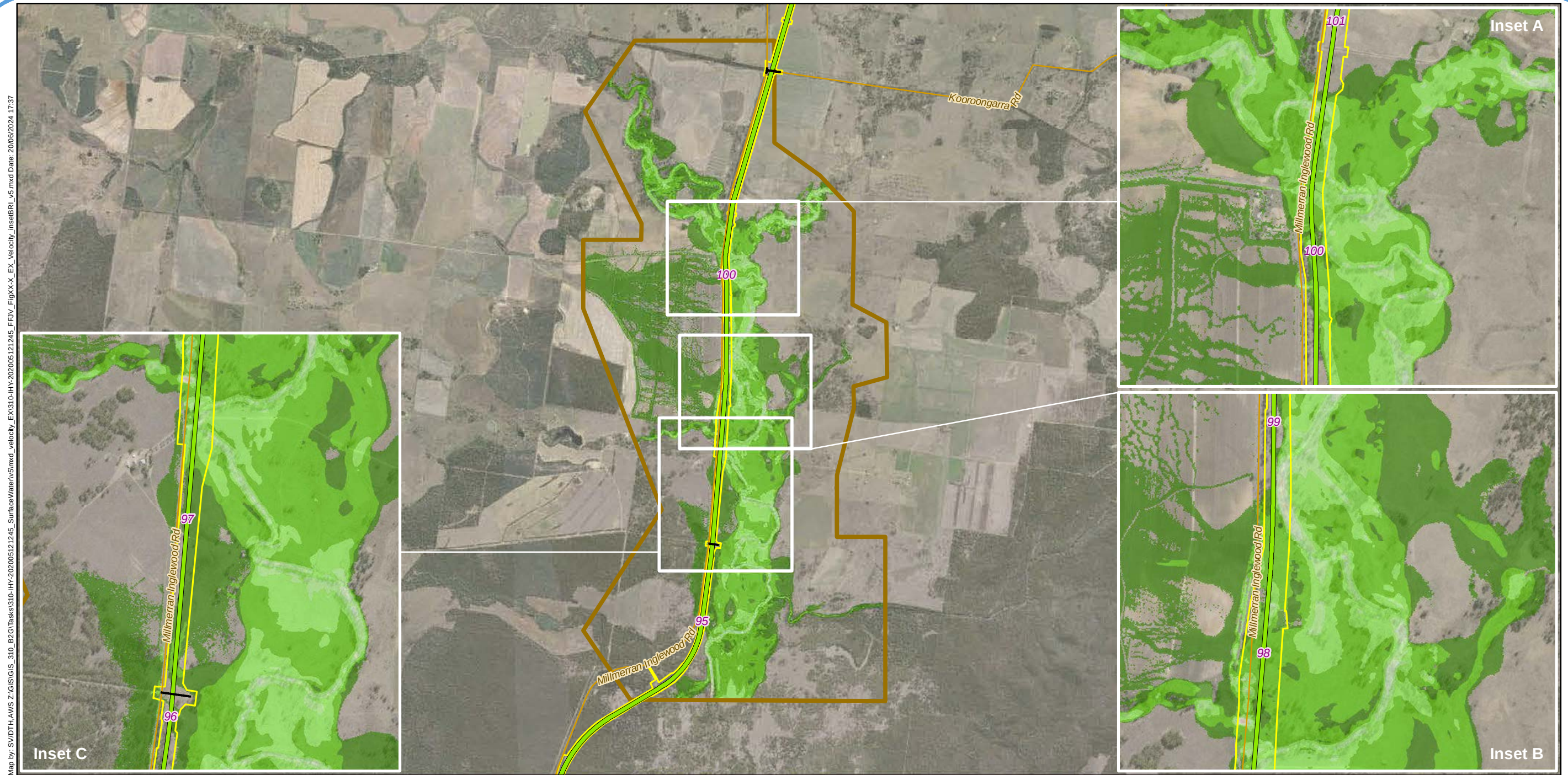
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



Legend

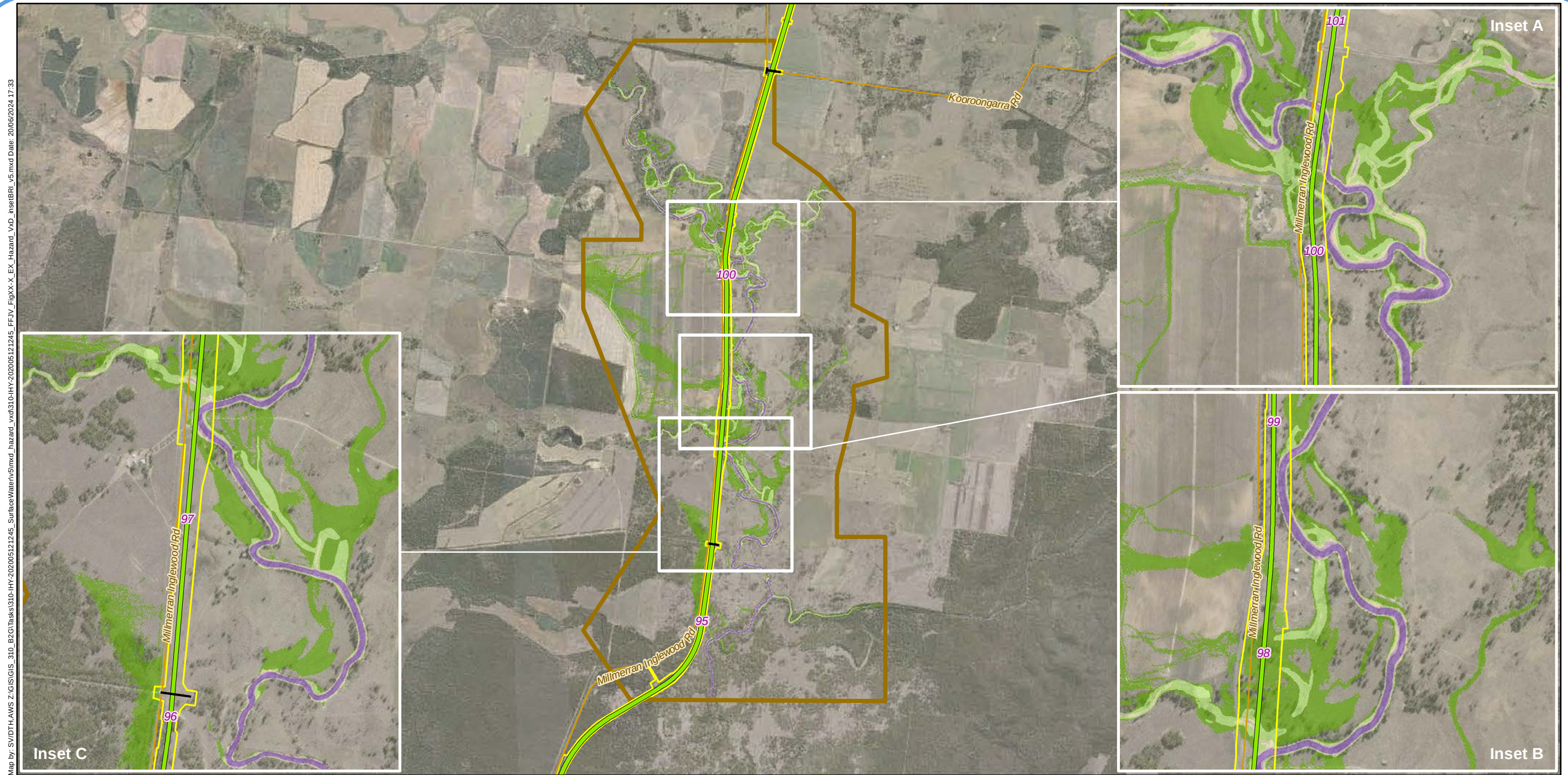
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km

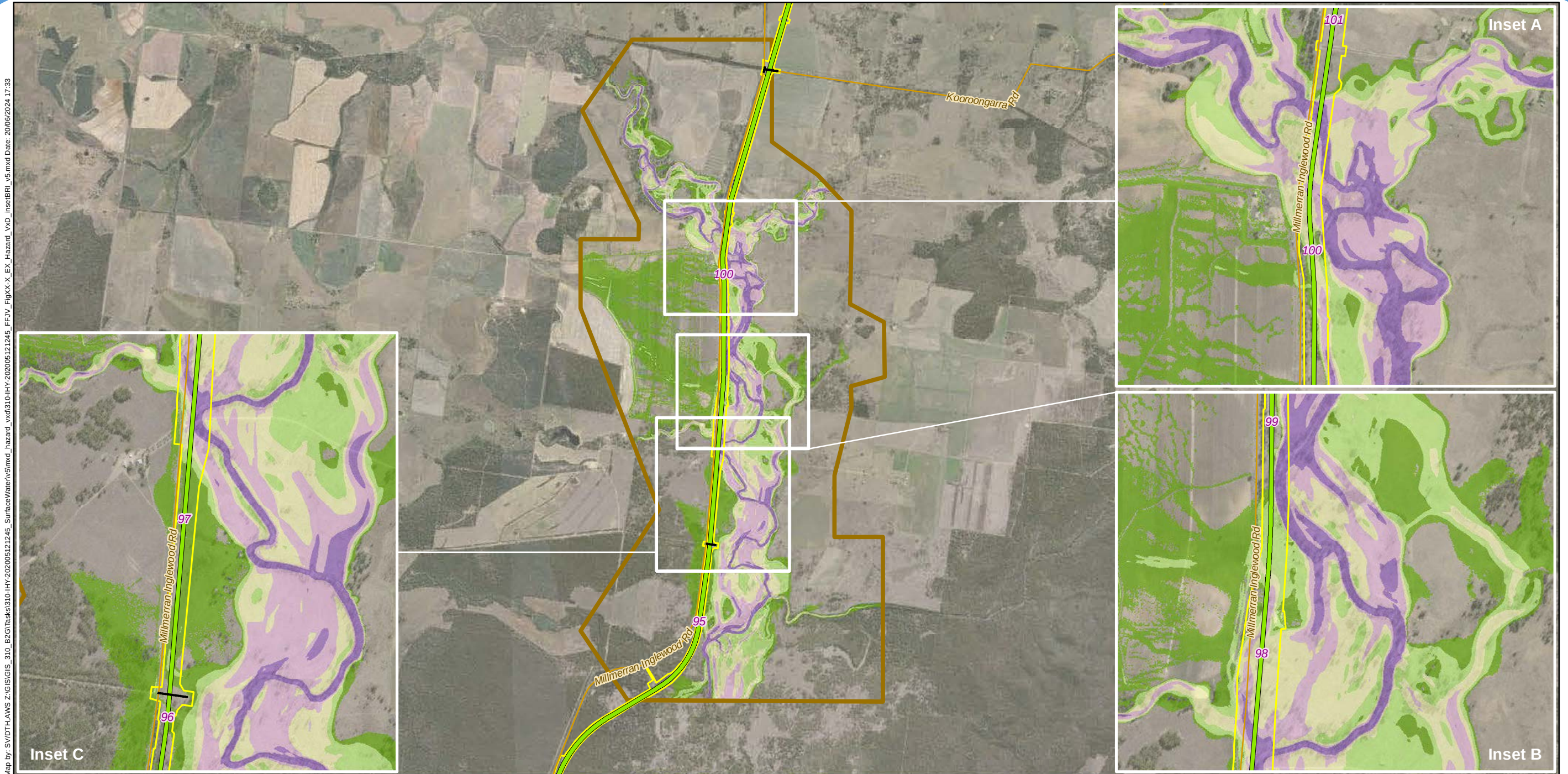


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F2-E:

20% AEP Event - Peak Hazard - Existing Case - Bringally Creek



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

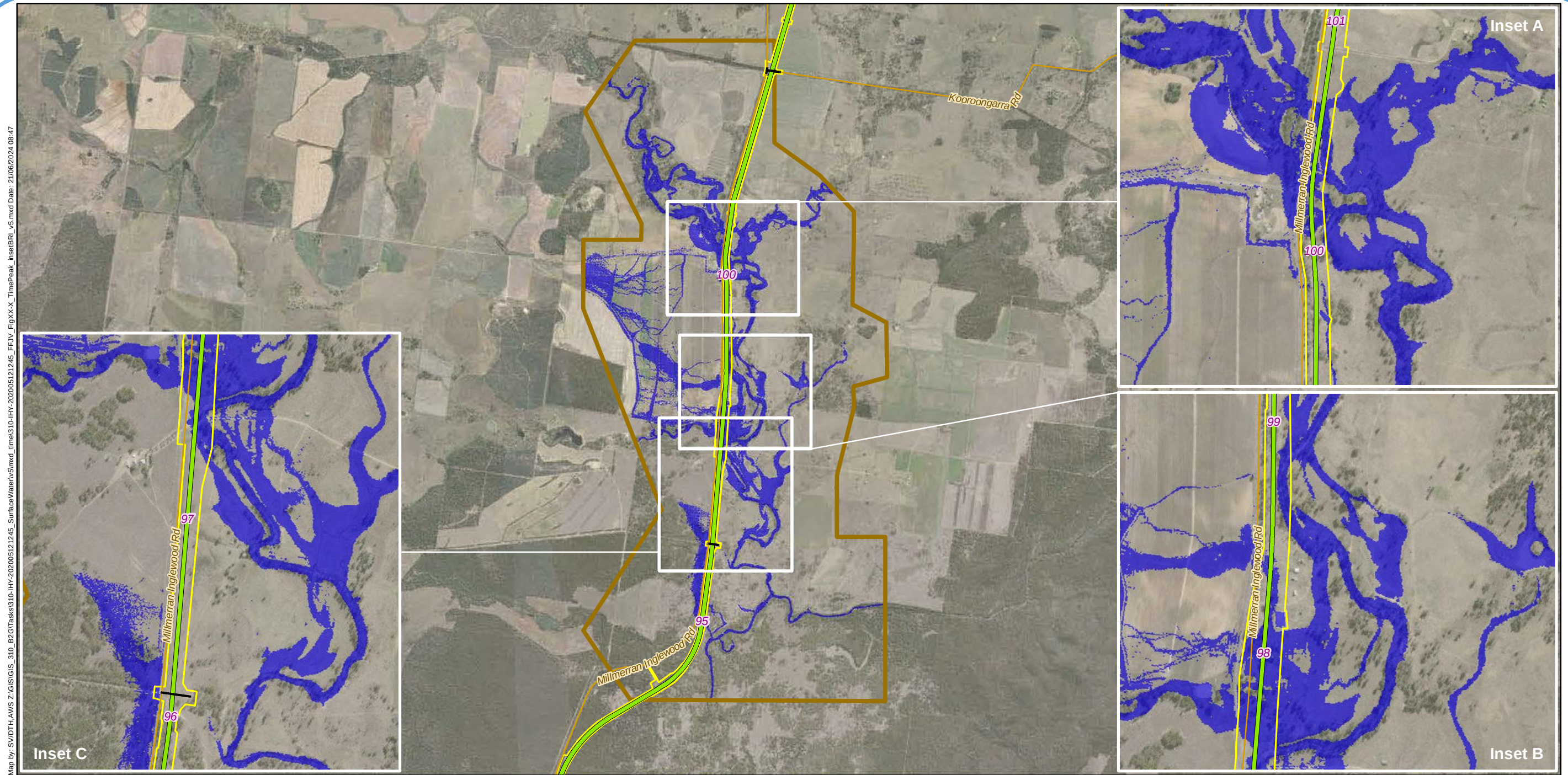
Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:60,000

0 0.6 1.2 1.8 2.4 3km



Legend

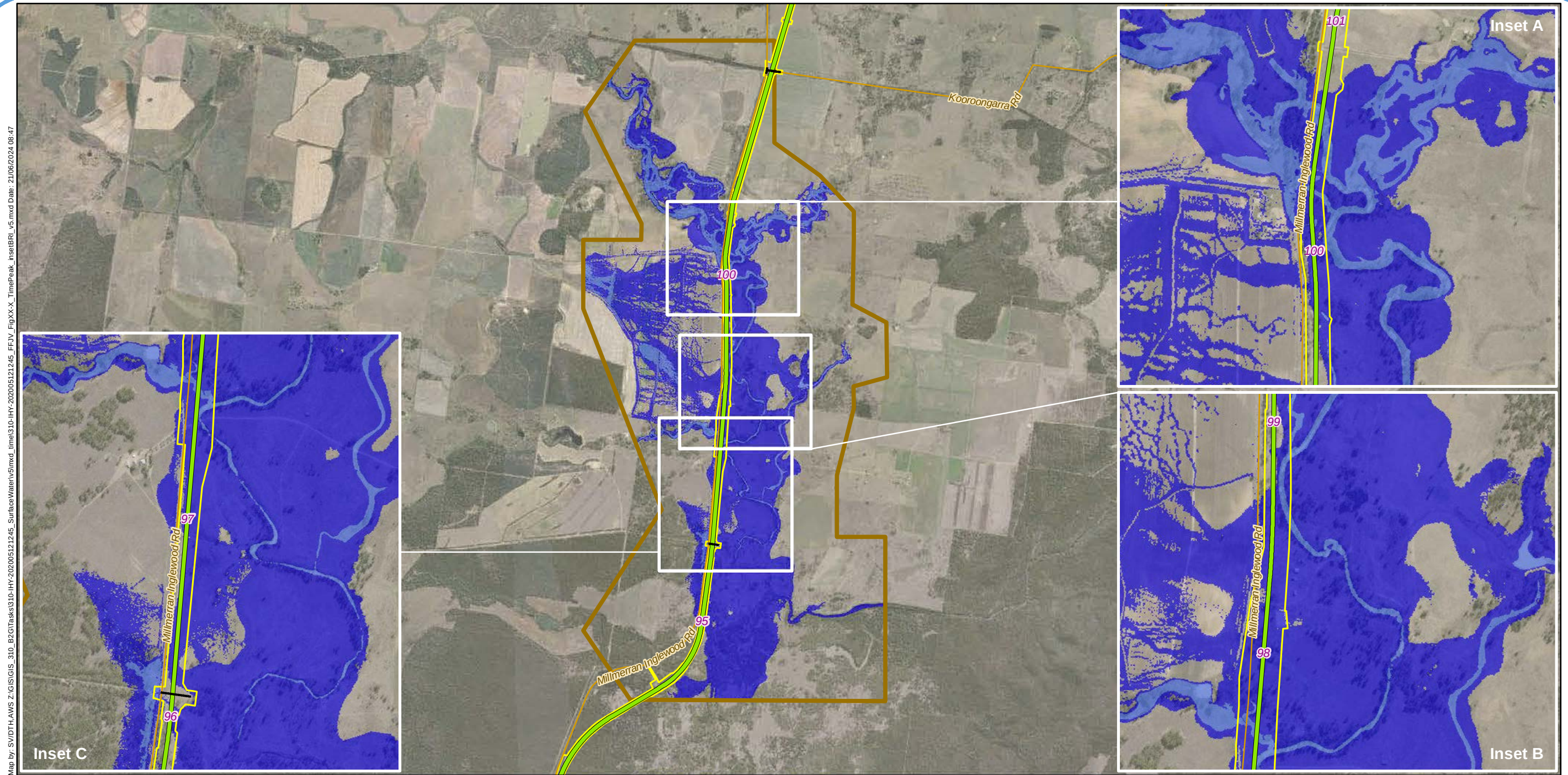
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



Legend

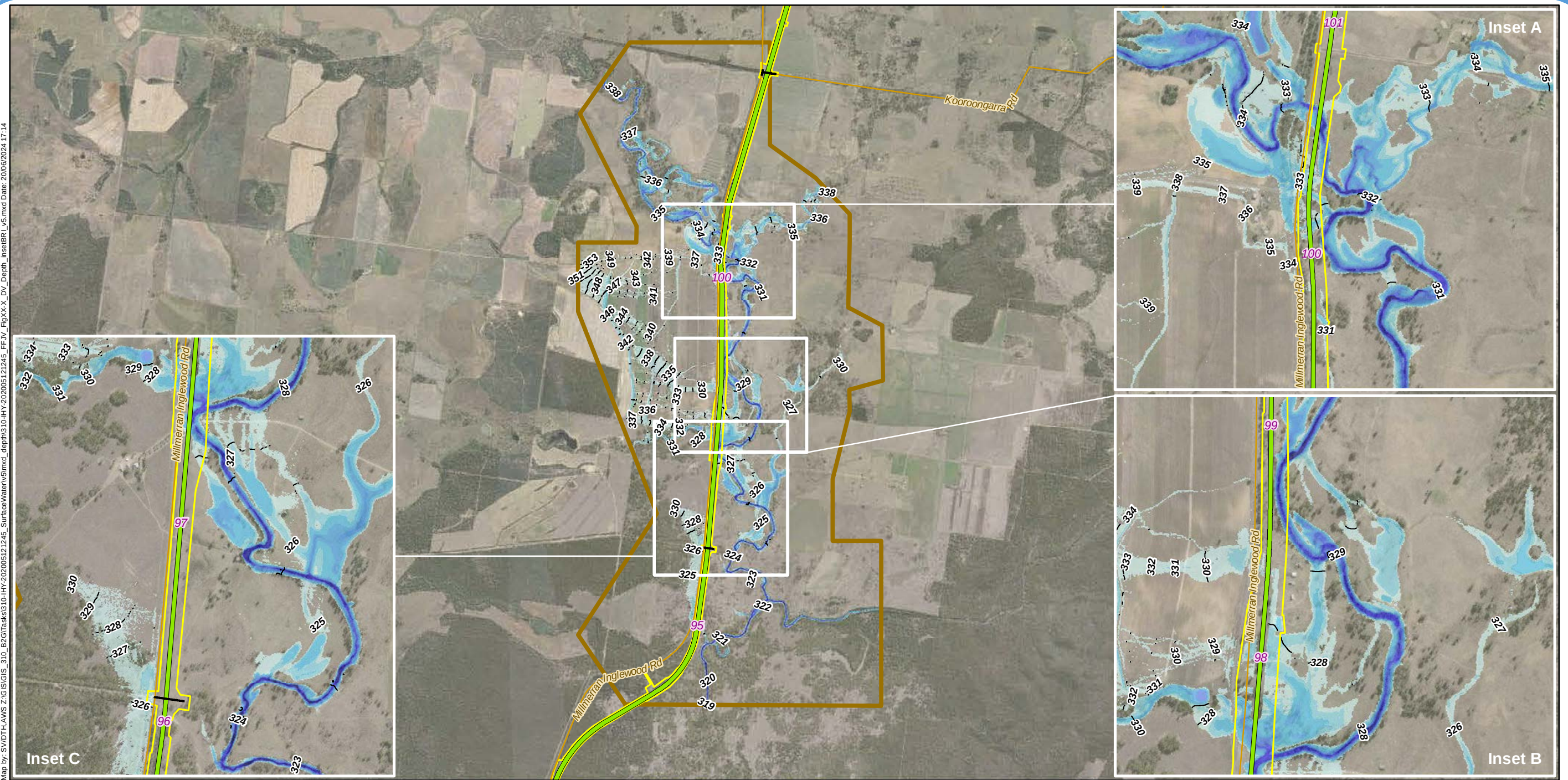
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km

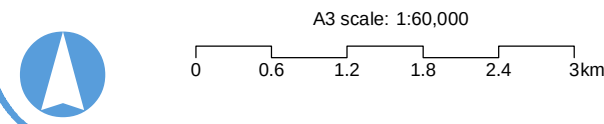
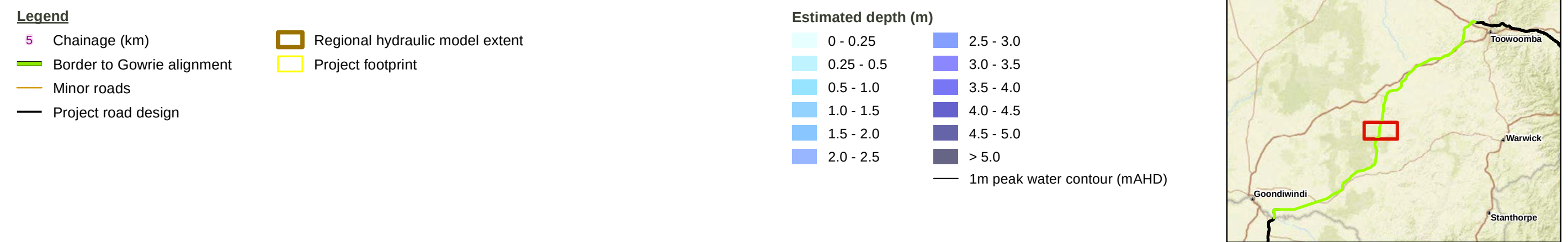
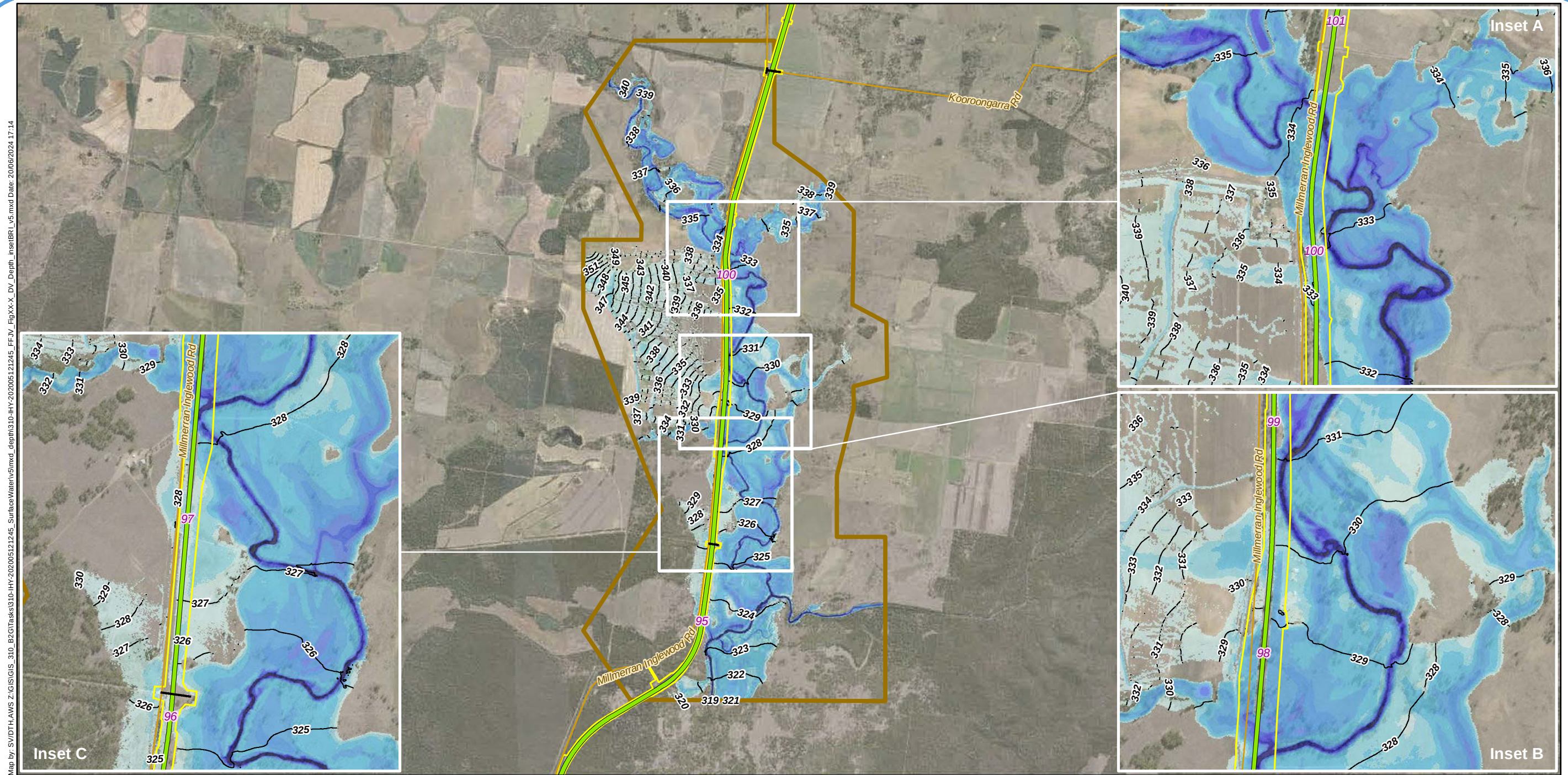


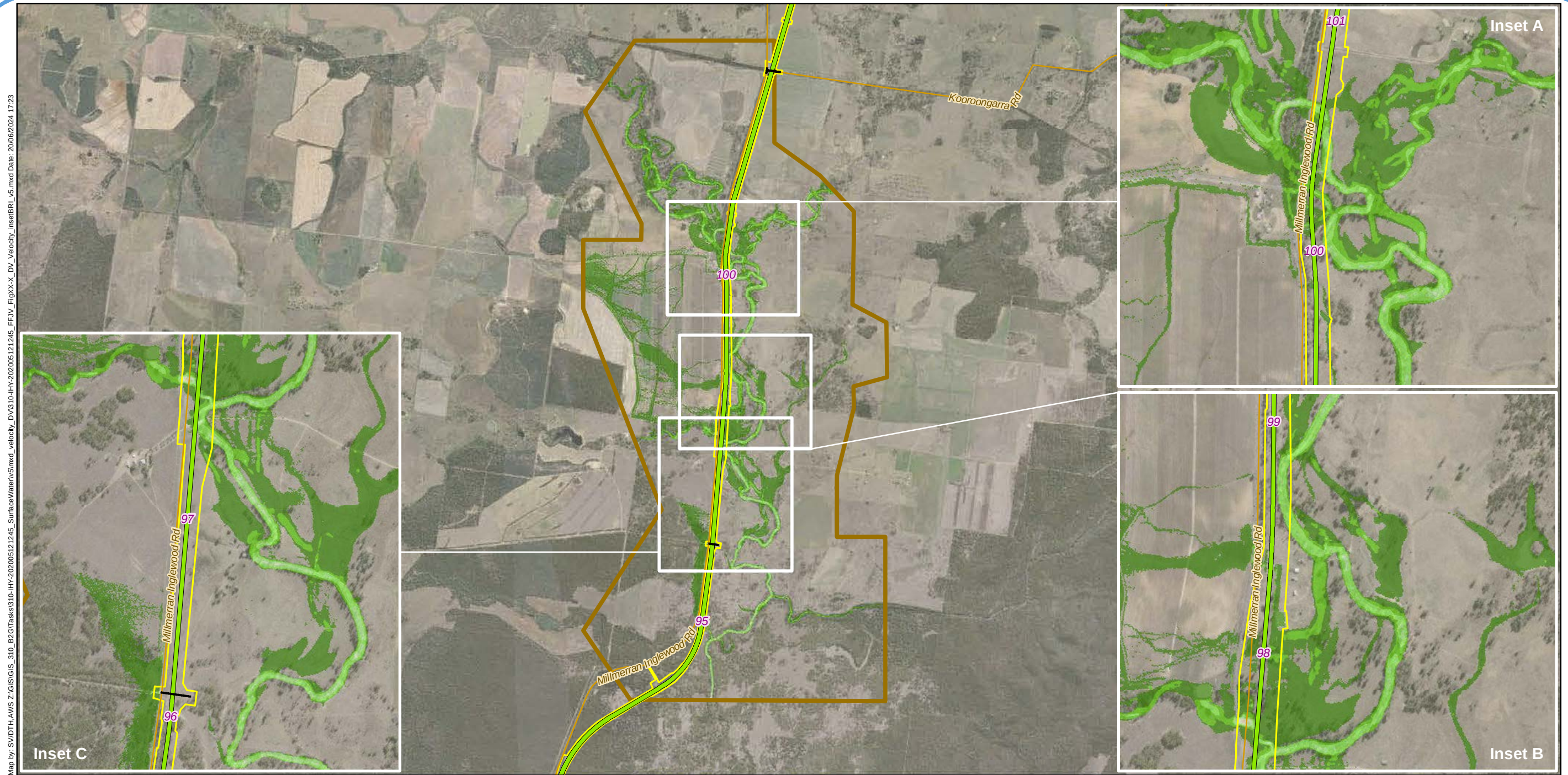
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F3-A:

20% AEP Event - Peak Water Levels - Developed Case - Bringalily Creek





Legend

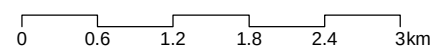
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

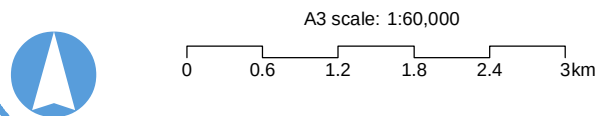
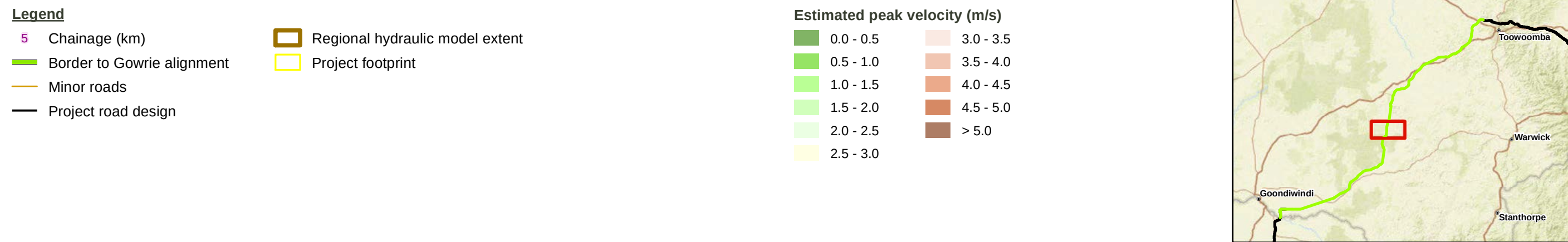
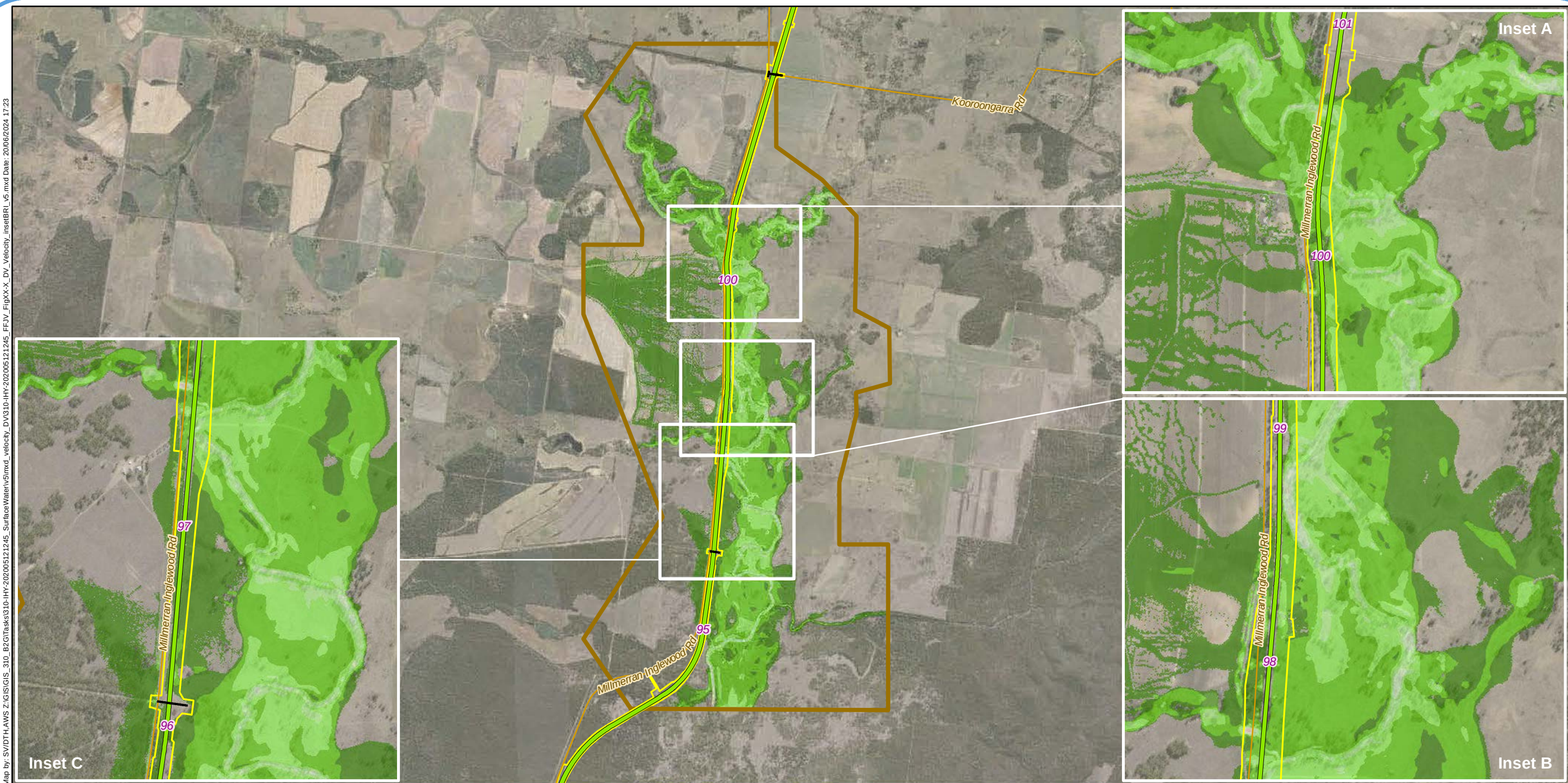
Estimated peak velocity (m/s)

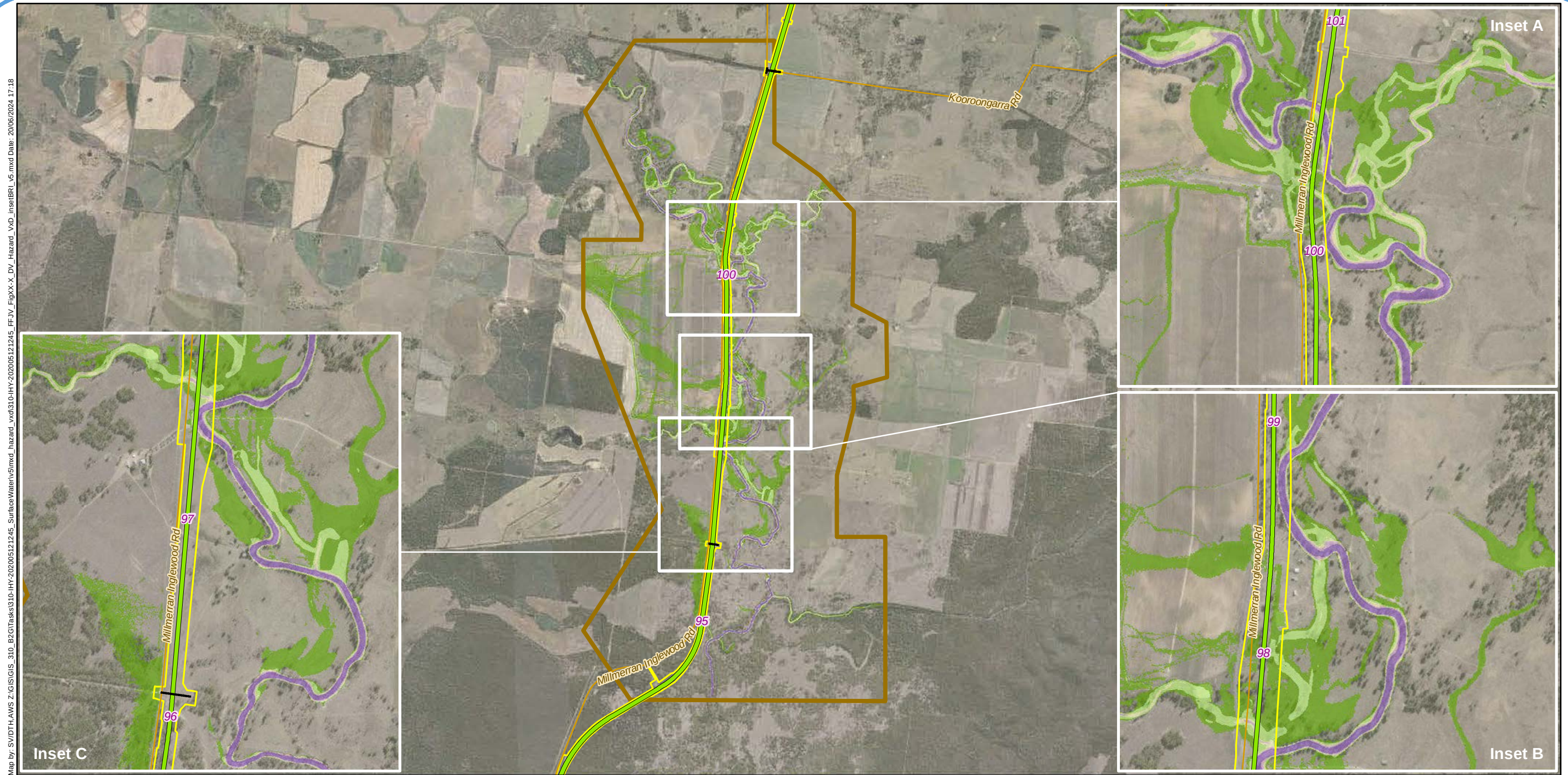
0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:60,000







Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

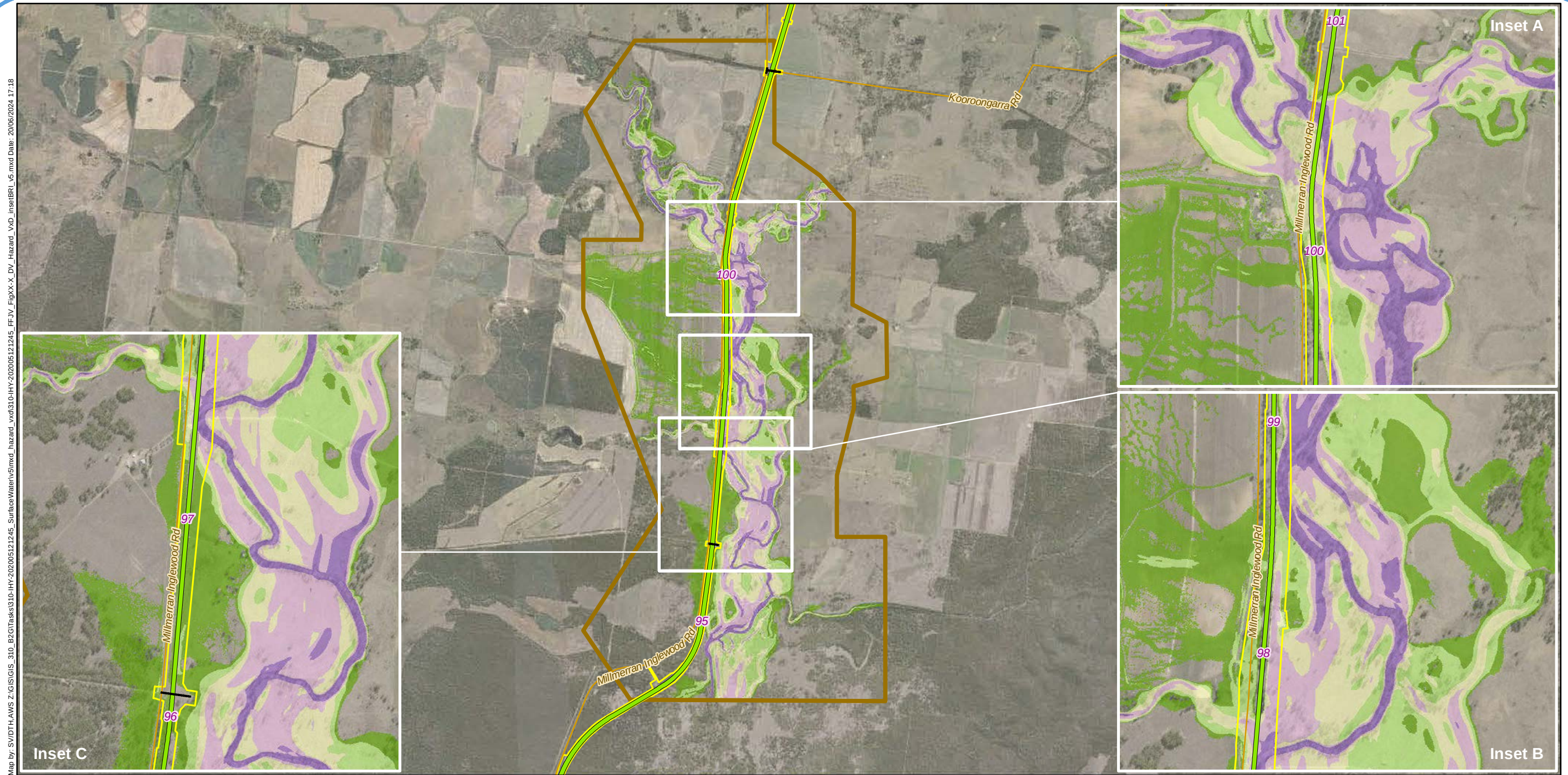
Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



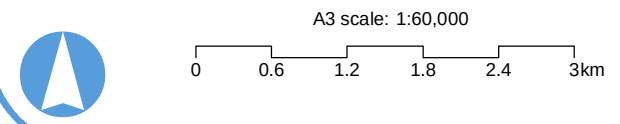
A3 scale: 1:60,000

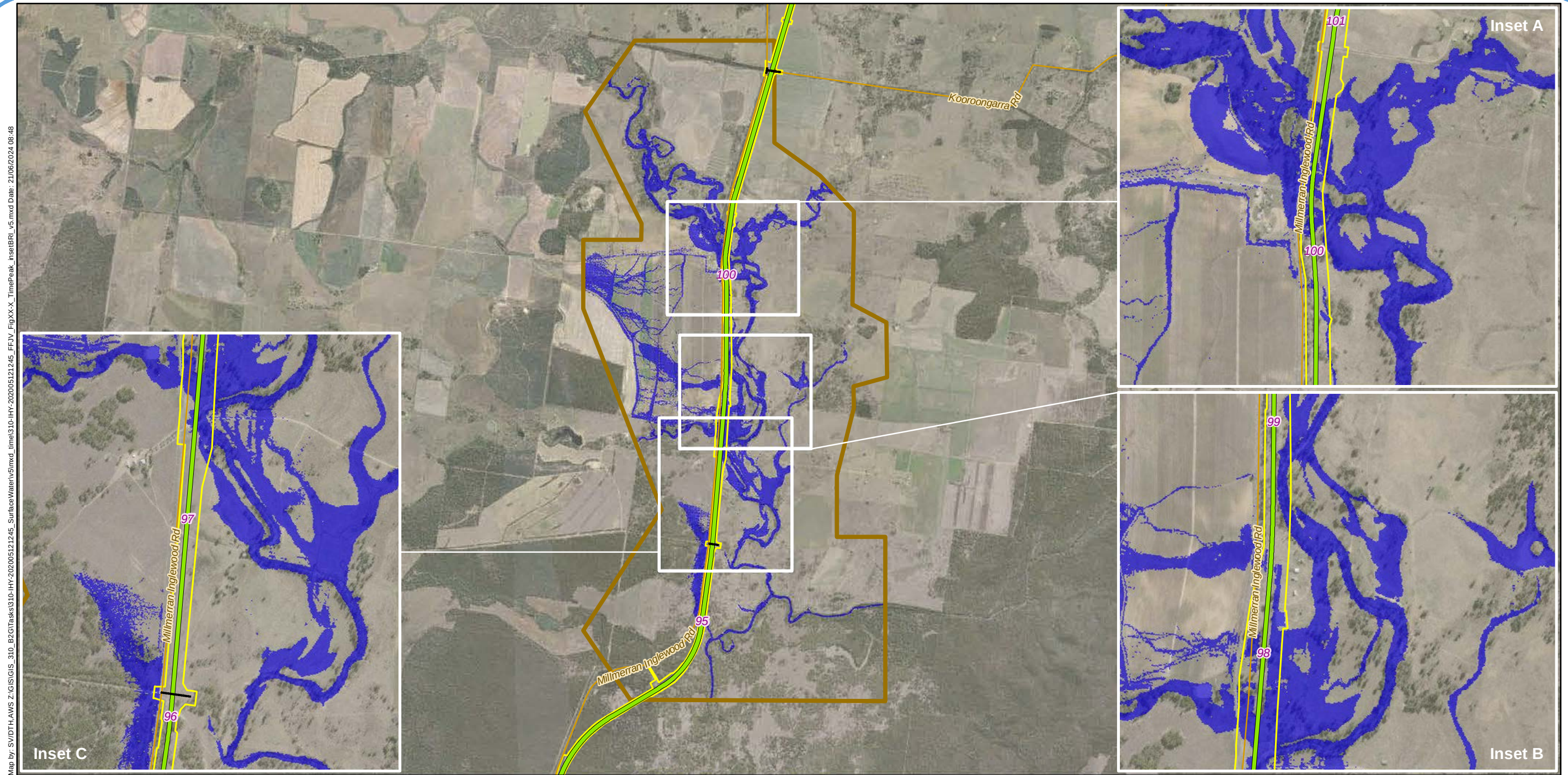




- Legend**
- 5 Chainage (km)
 - Border to Gowrie alignment
 - Minor roads
 - Project road design
 - Regional hydraulic model extent
 - Project footprint

- Estimated Velocity x Depth product (m^2/s)**
- < 0.15
 - 0.15 - 0.5
 - 0.5 - 1.0
 - 1.0 - 2.0
 - > 2.0





Legend

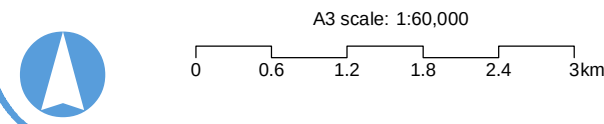
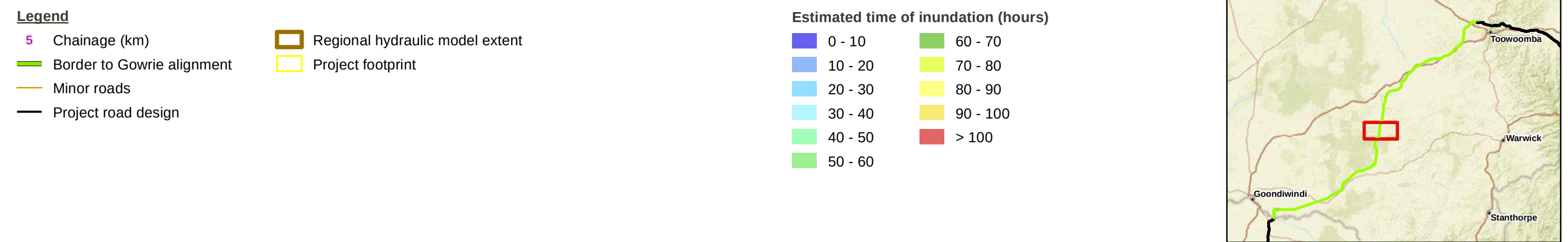
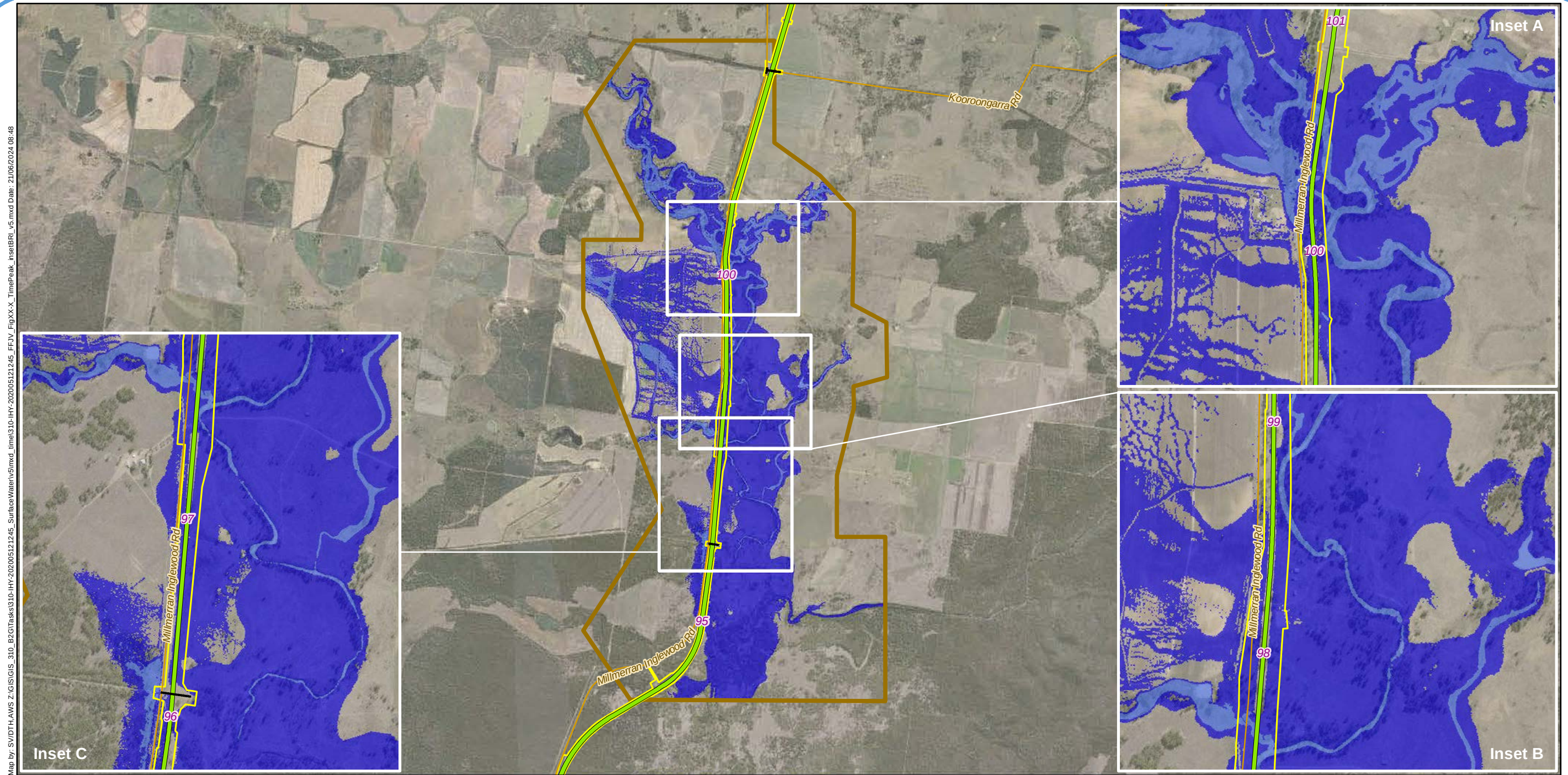
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

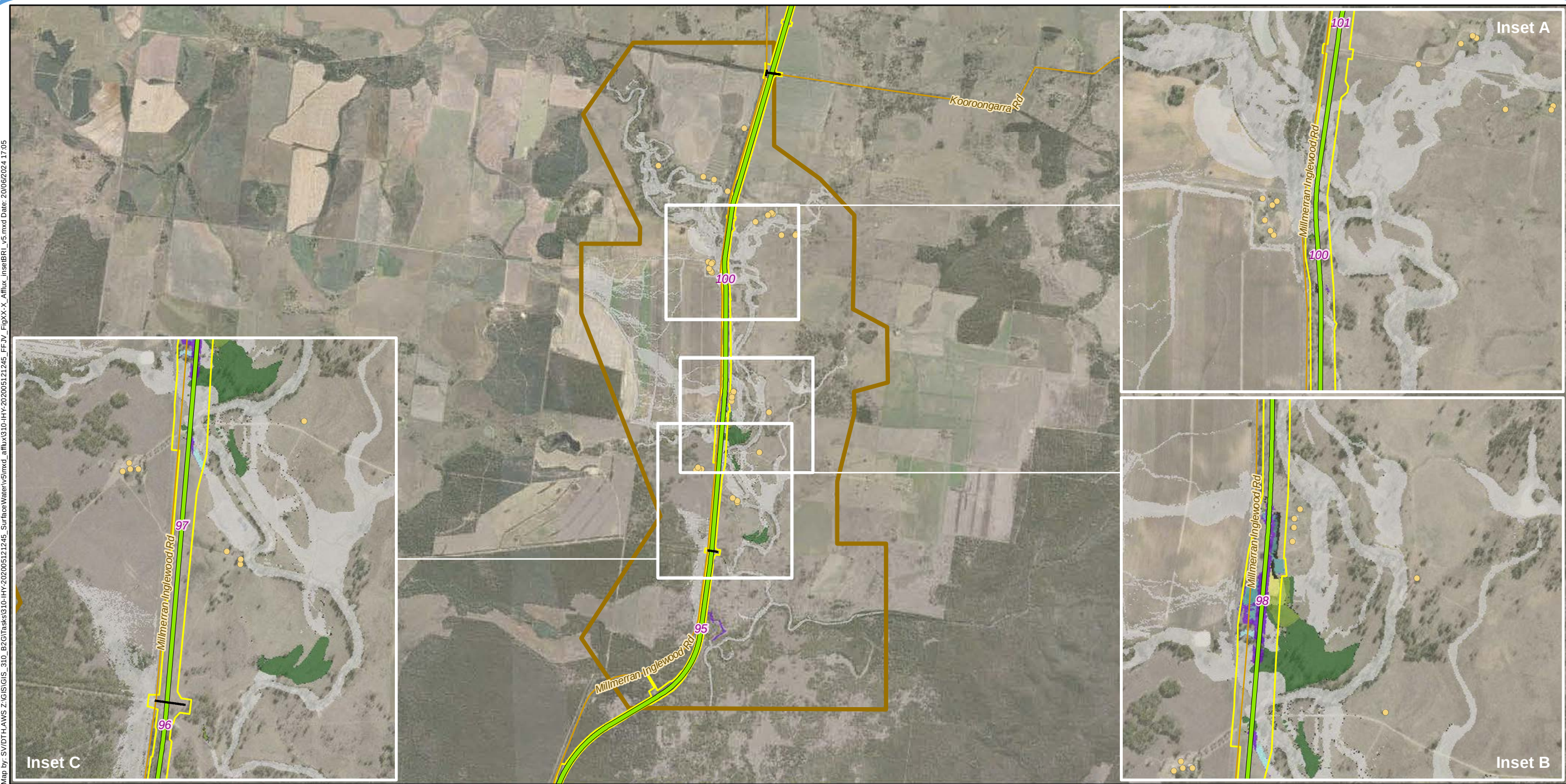
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km





Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



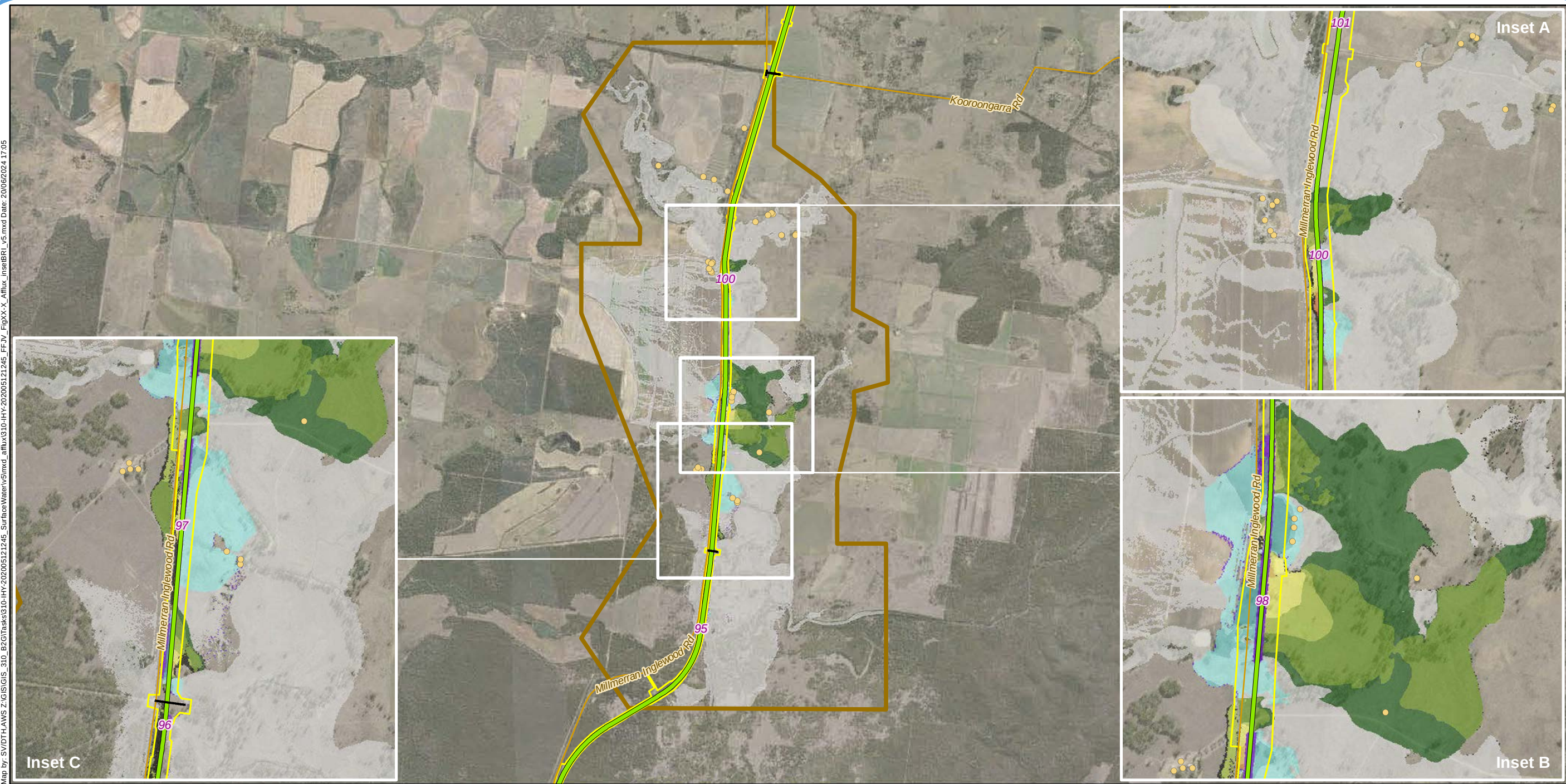
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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F4-A:

20% AEP Event - Afflux - Bringalily Creek



Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



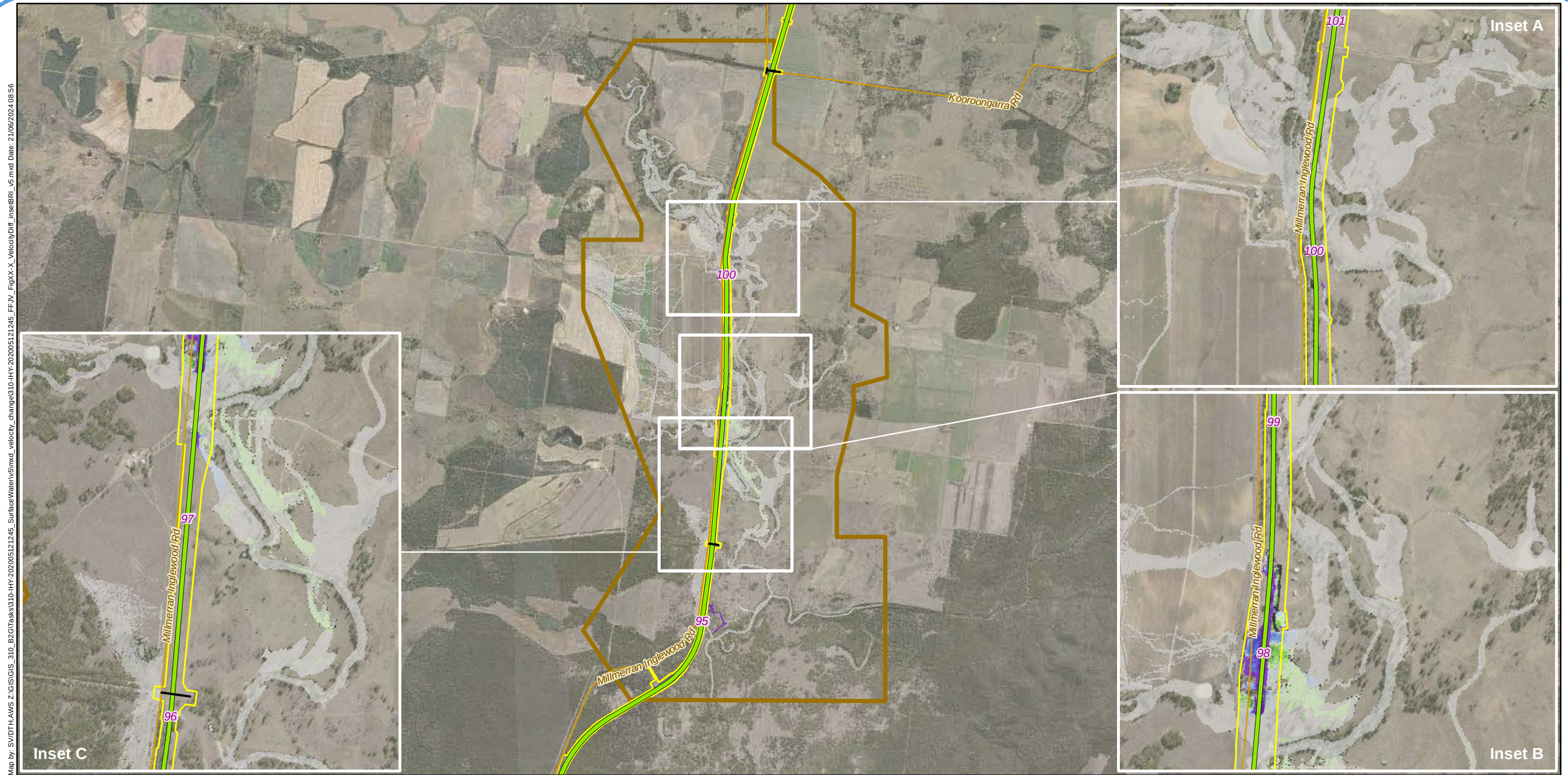
Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F4-B:

1% AEP Event - Afflux - Bringality Creek

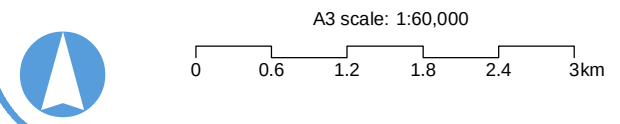


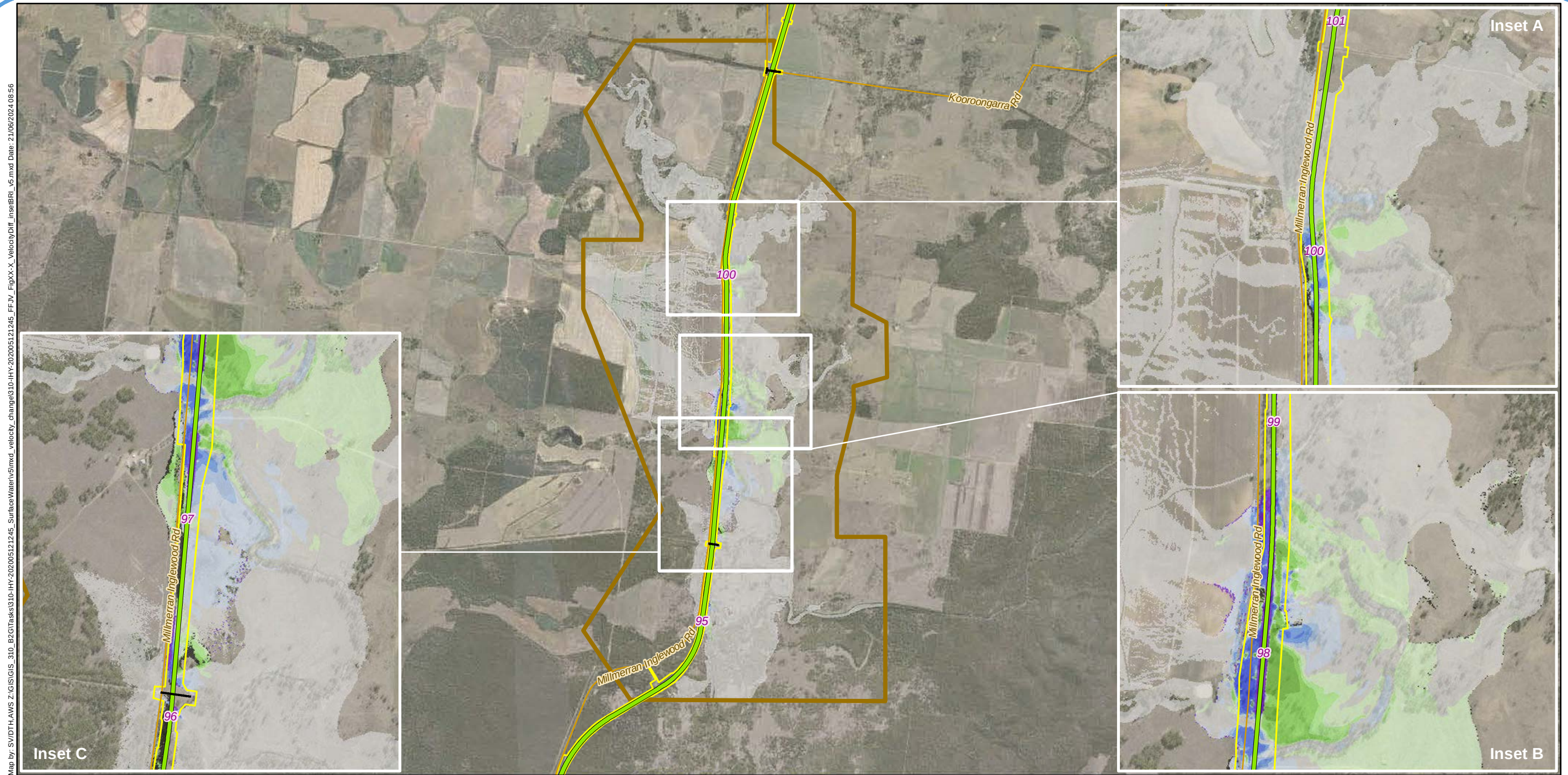
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |





Legend

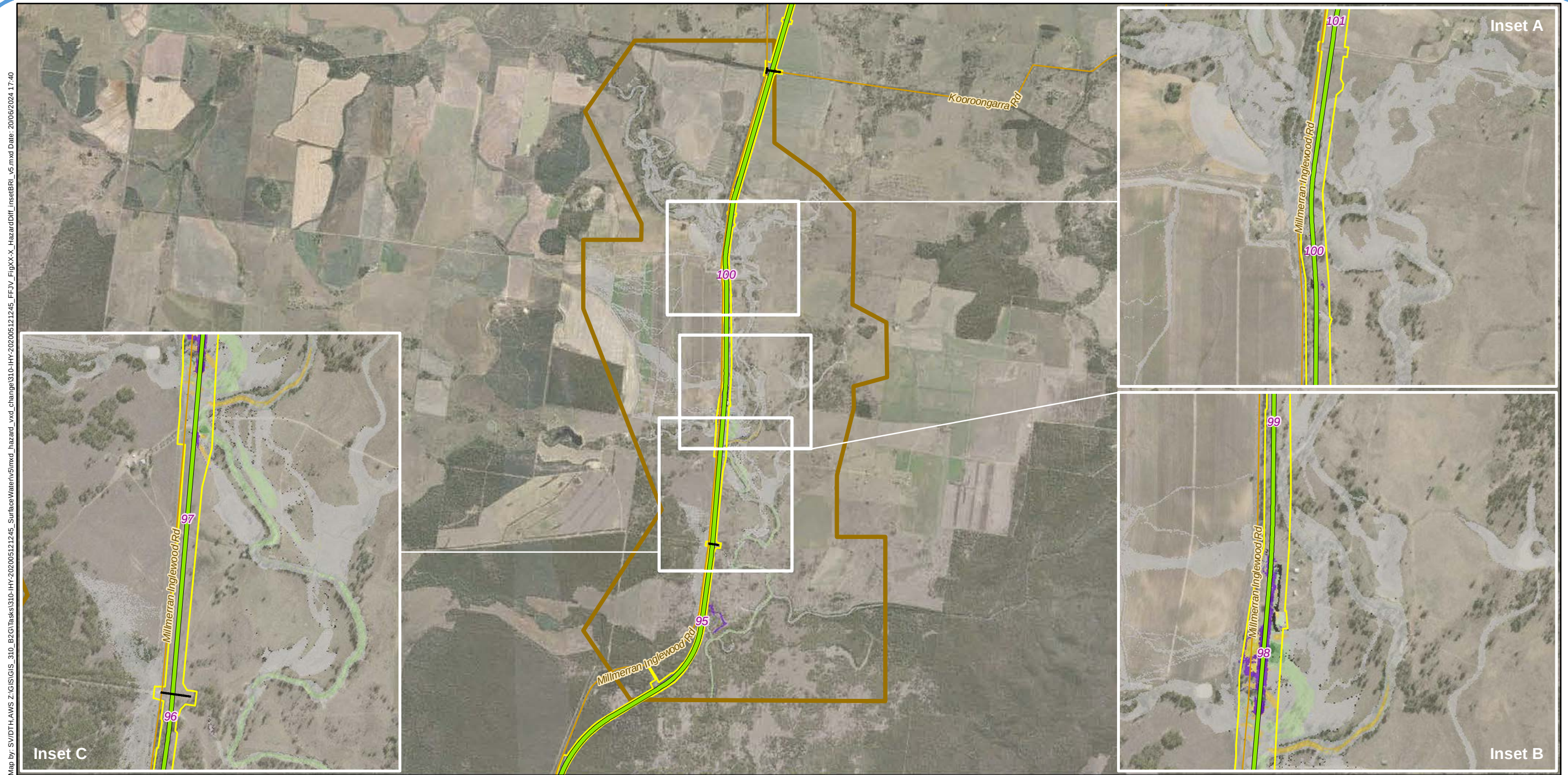
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



Legend

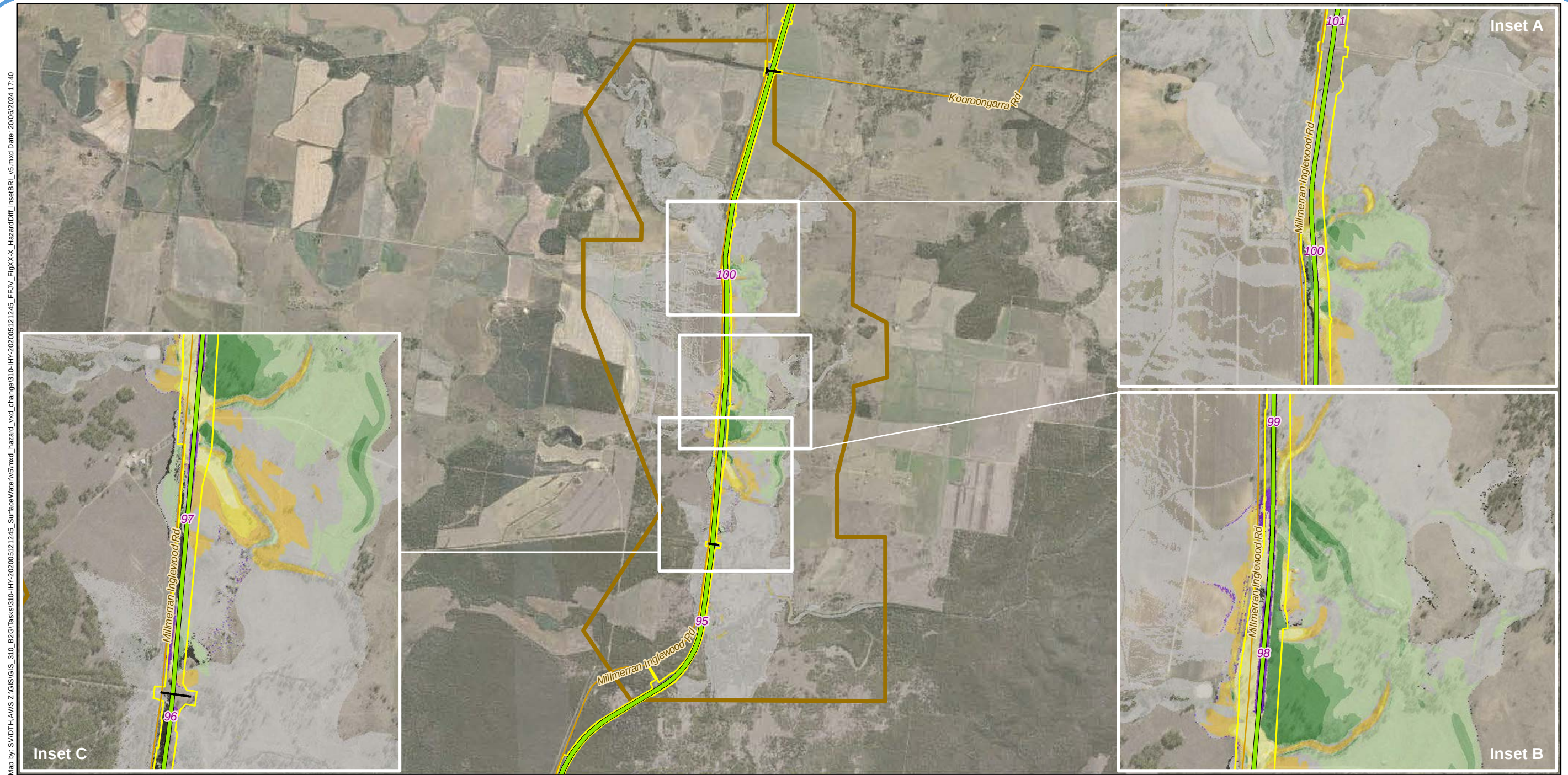
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km

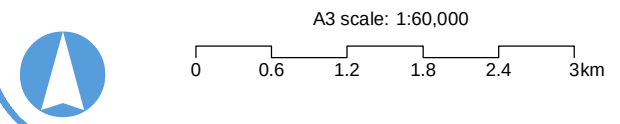


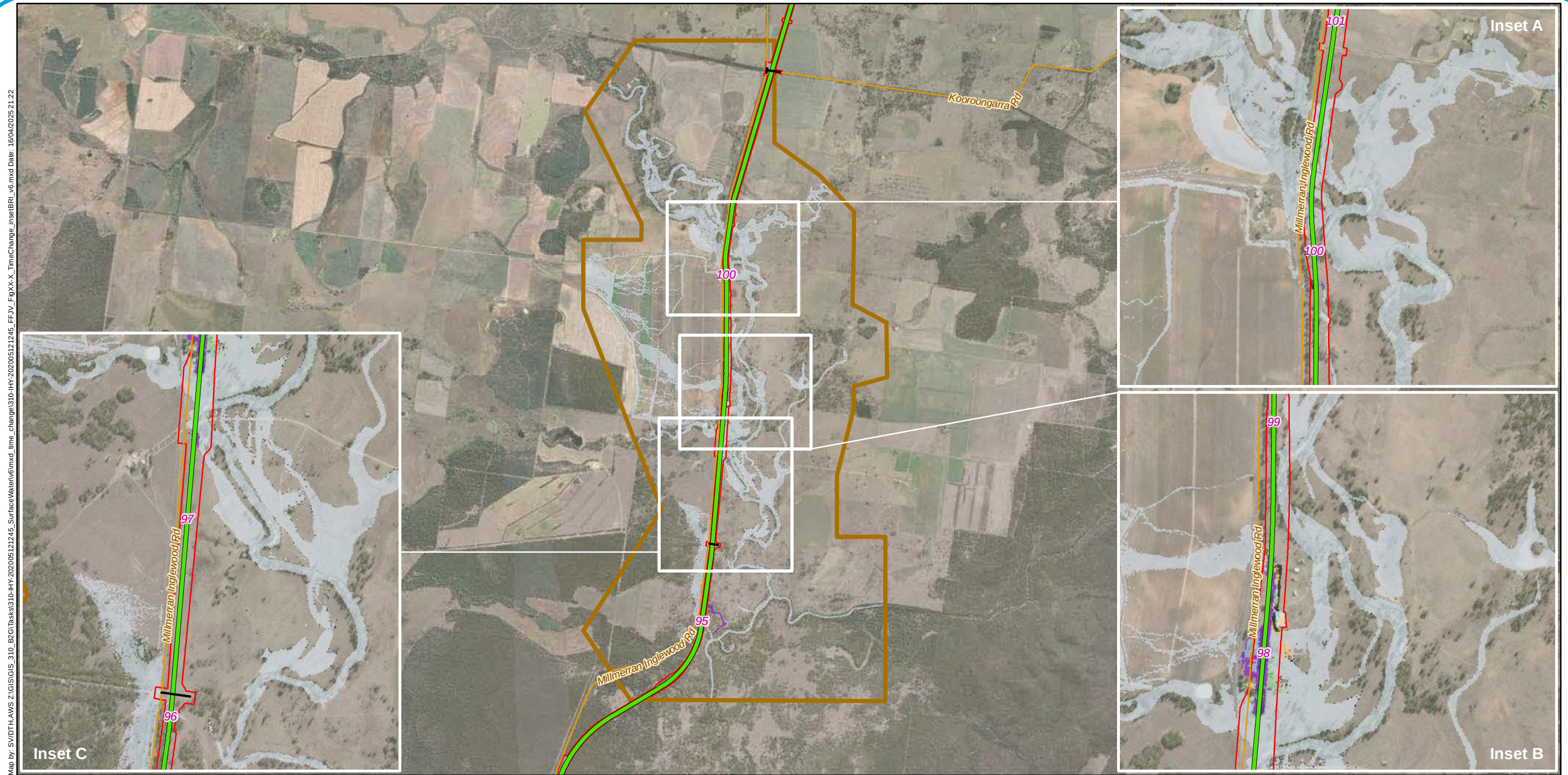
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



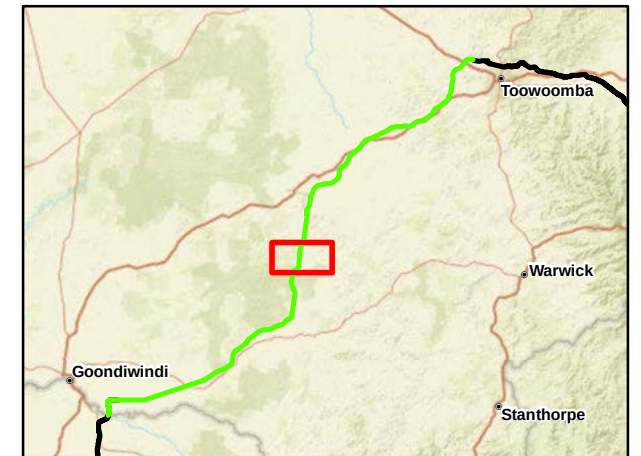


Legend

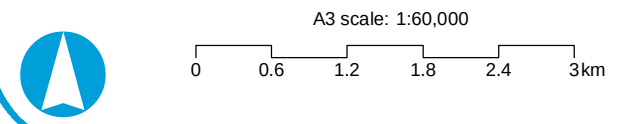
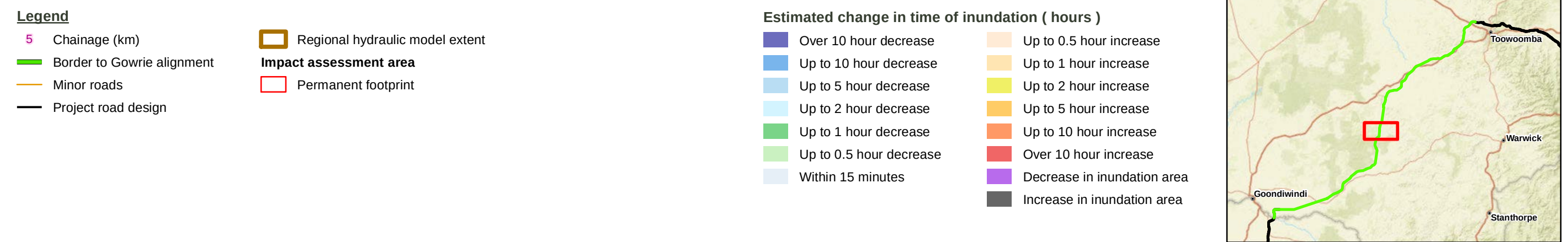
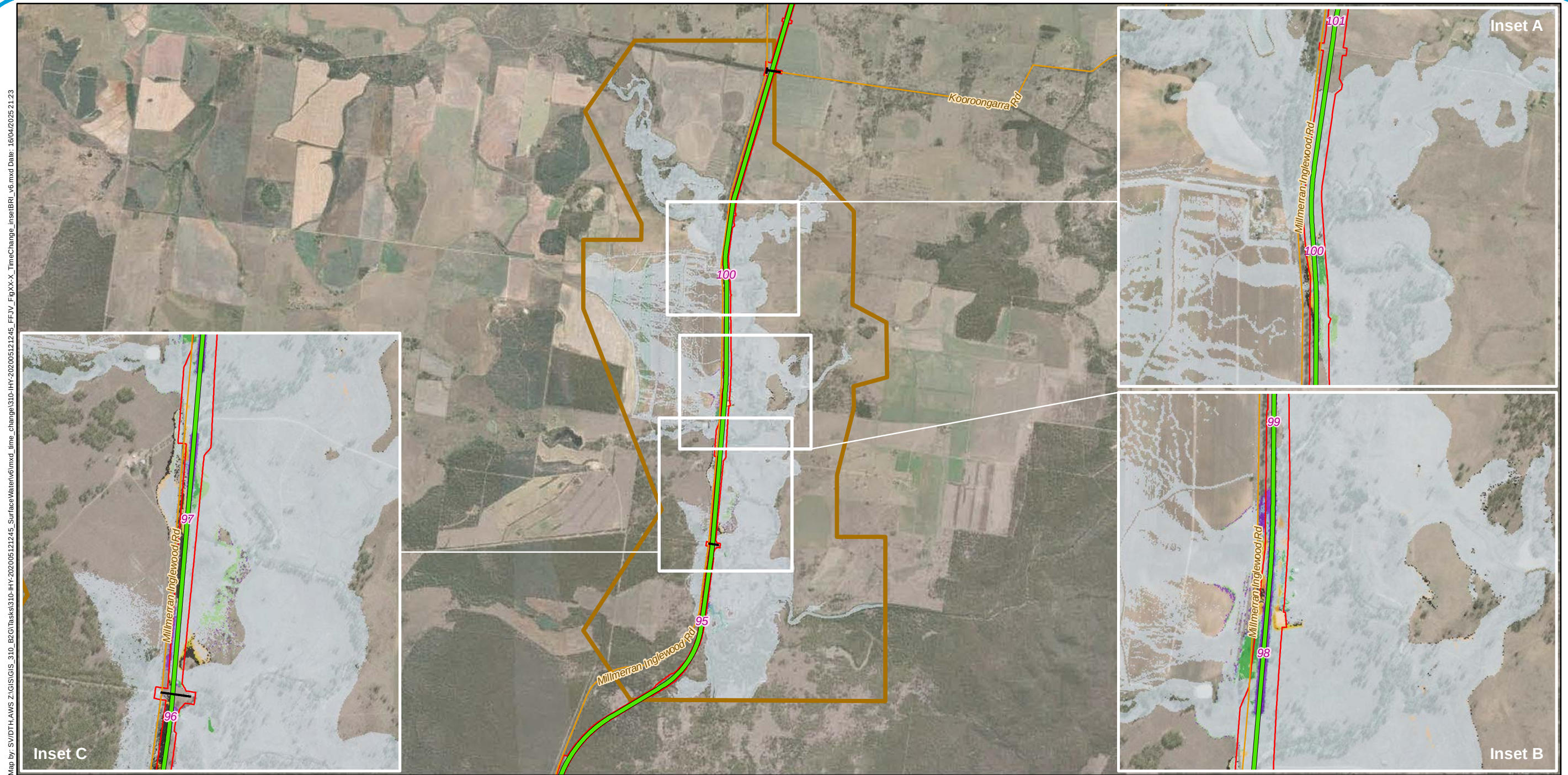
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

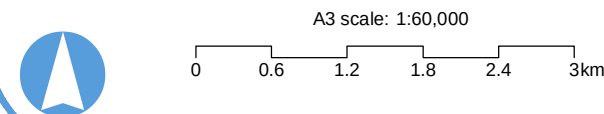
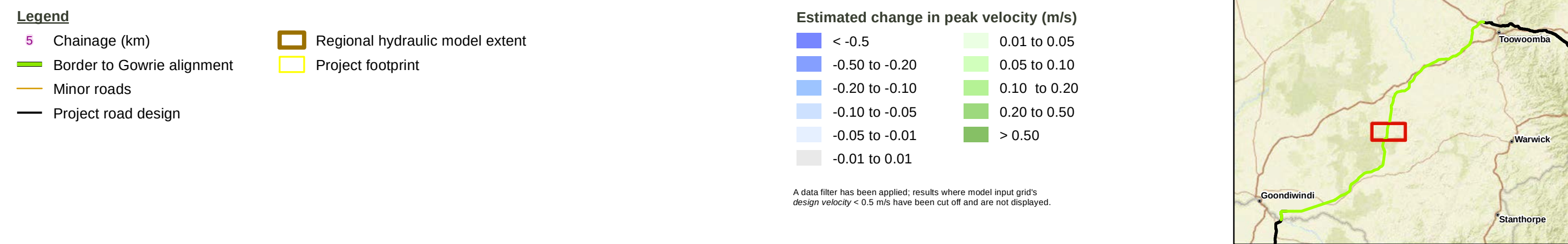
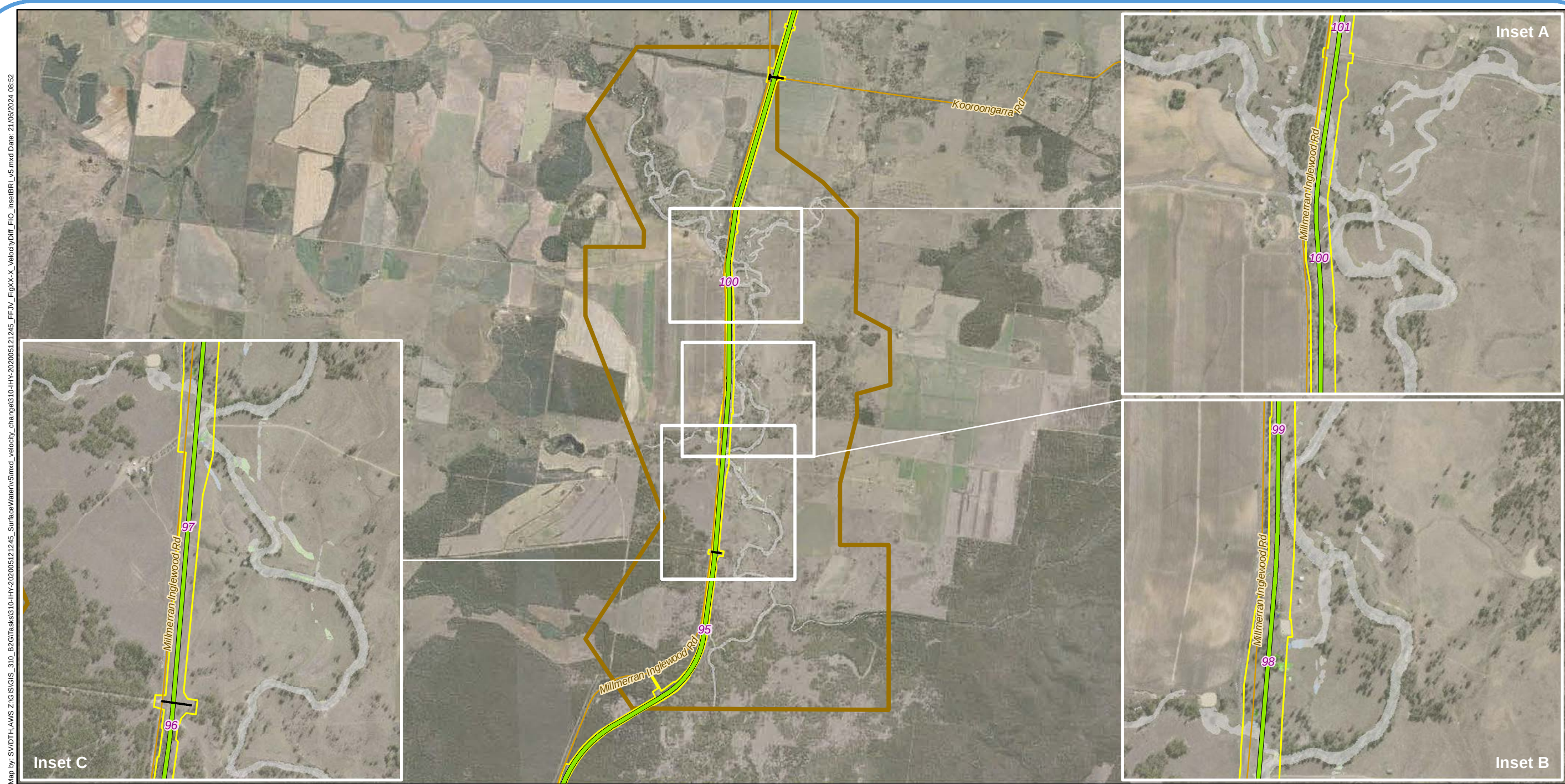
- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |

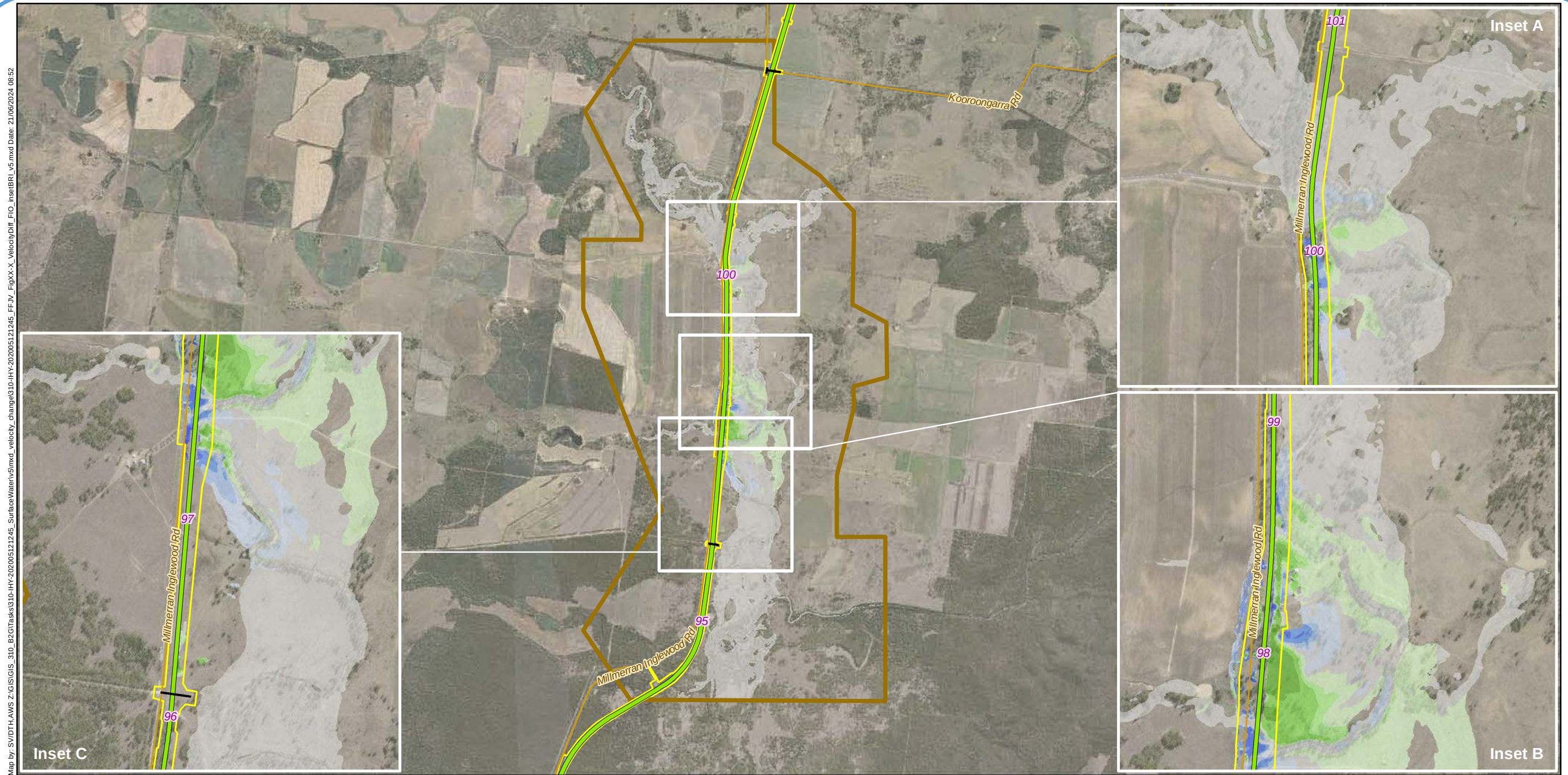


A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2GTask\310-HY-2020\5121245_SurfaceWater\5121245_FF_V_FigXX-X_VelocityDIT_FIO_insetBRI_V5.mxd Date: 21/06/2024 08:52





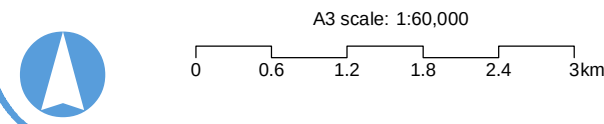
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

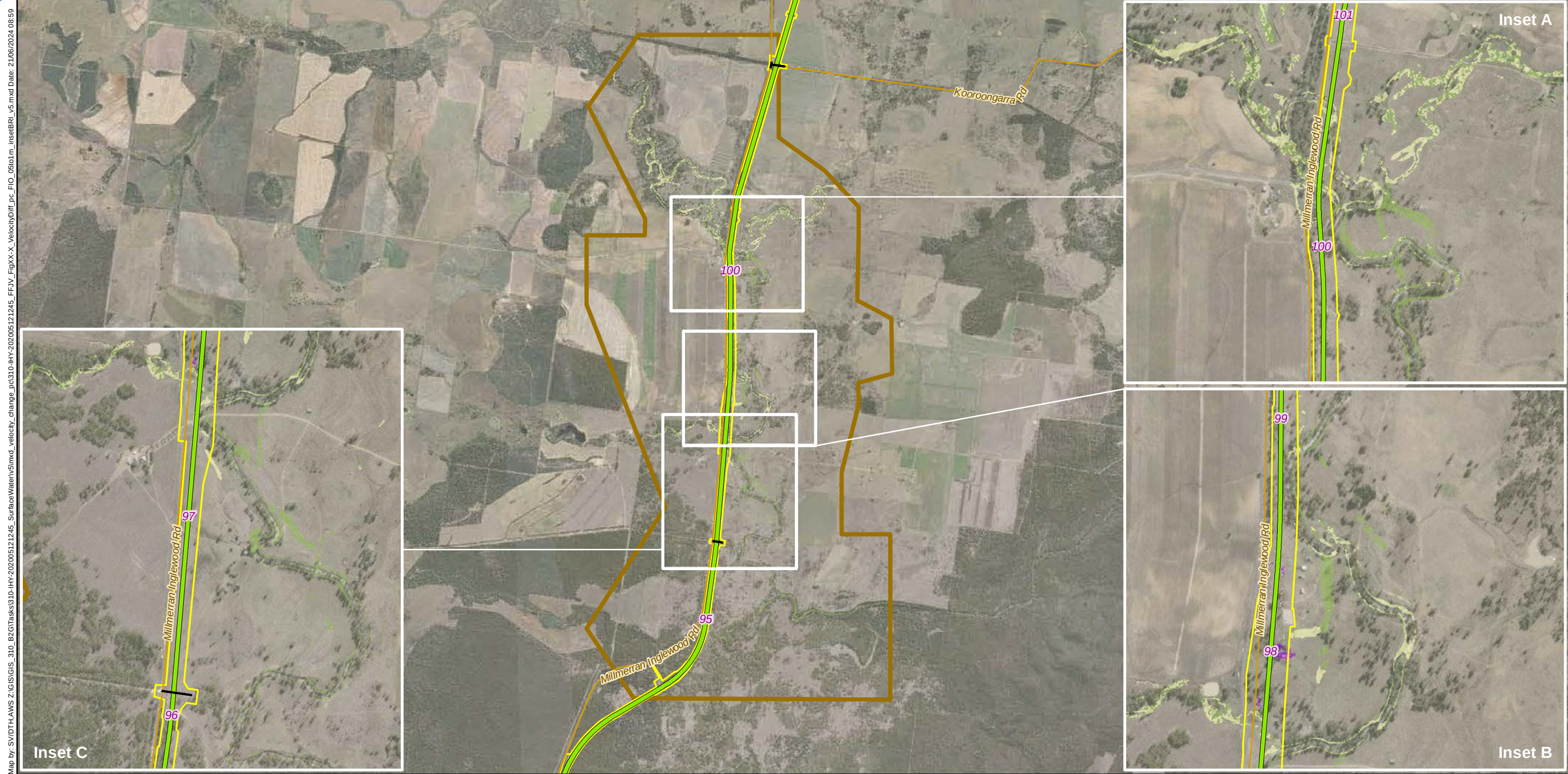
Estimated change in peak velocity (m/s)

< -0.5	0.01 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.50
-0.05 to -0.01	> 0.50
-0.01 to 0.01	

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



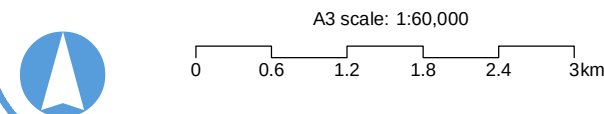
Border to Gowrie
Figure F5-B:
1% AEP Event - Change in Velocity (<0.5m/s cutoff) - Bringalily Creek

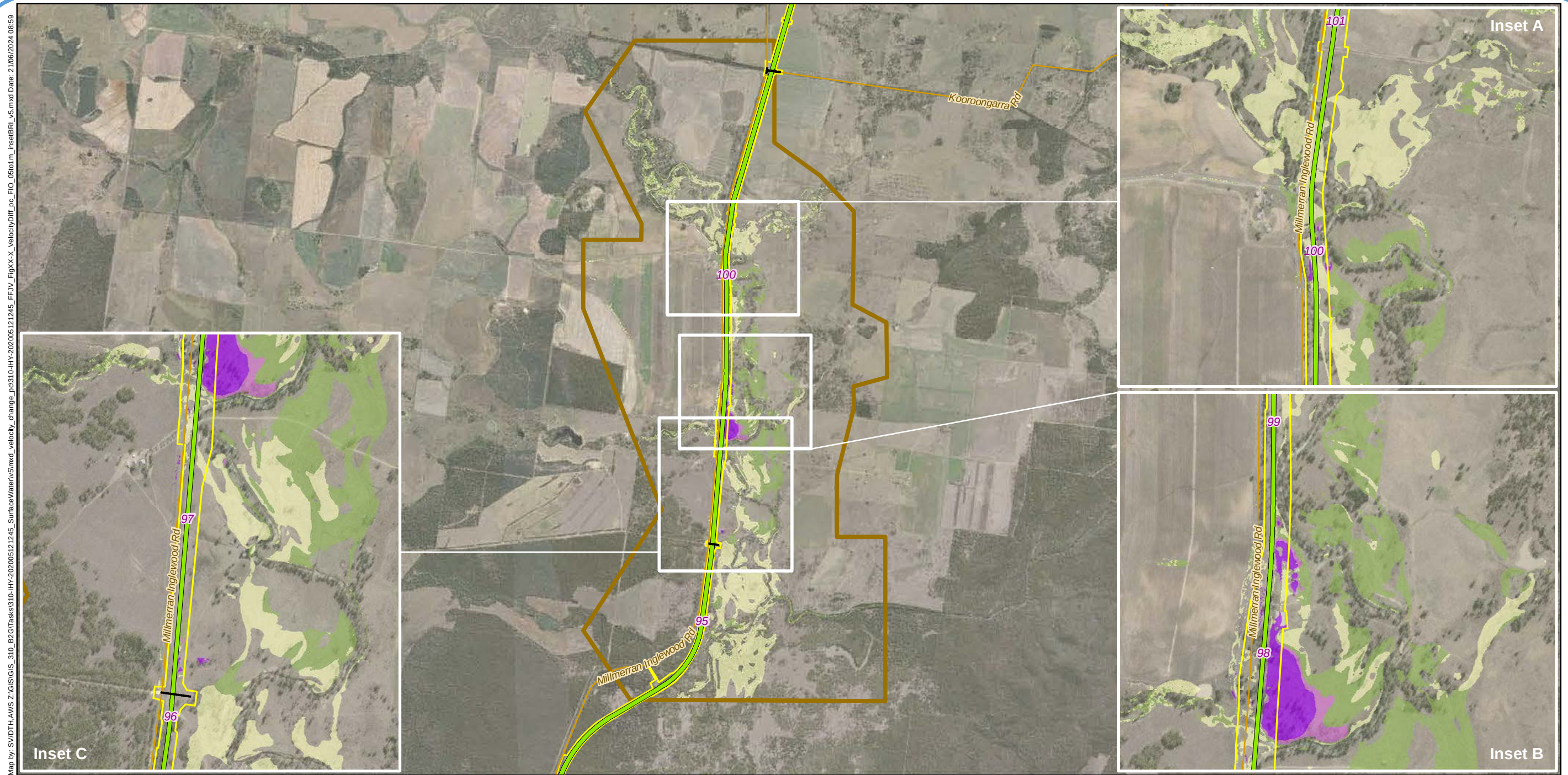


- Legend**
- 5 Chainage (km)
 - Border to Gowrie alignment
 - Minor roads
 - Project road design
 - Regional hydraulic model extent
 - Project footprint

- Estimated change in velocities (%)**
- < 0
 - 0 to 10
 - 10 to 20
 - > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.





Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



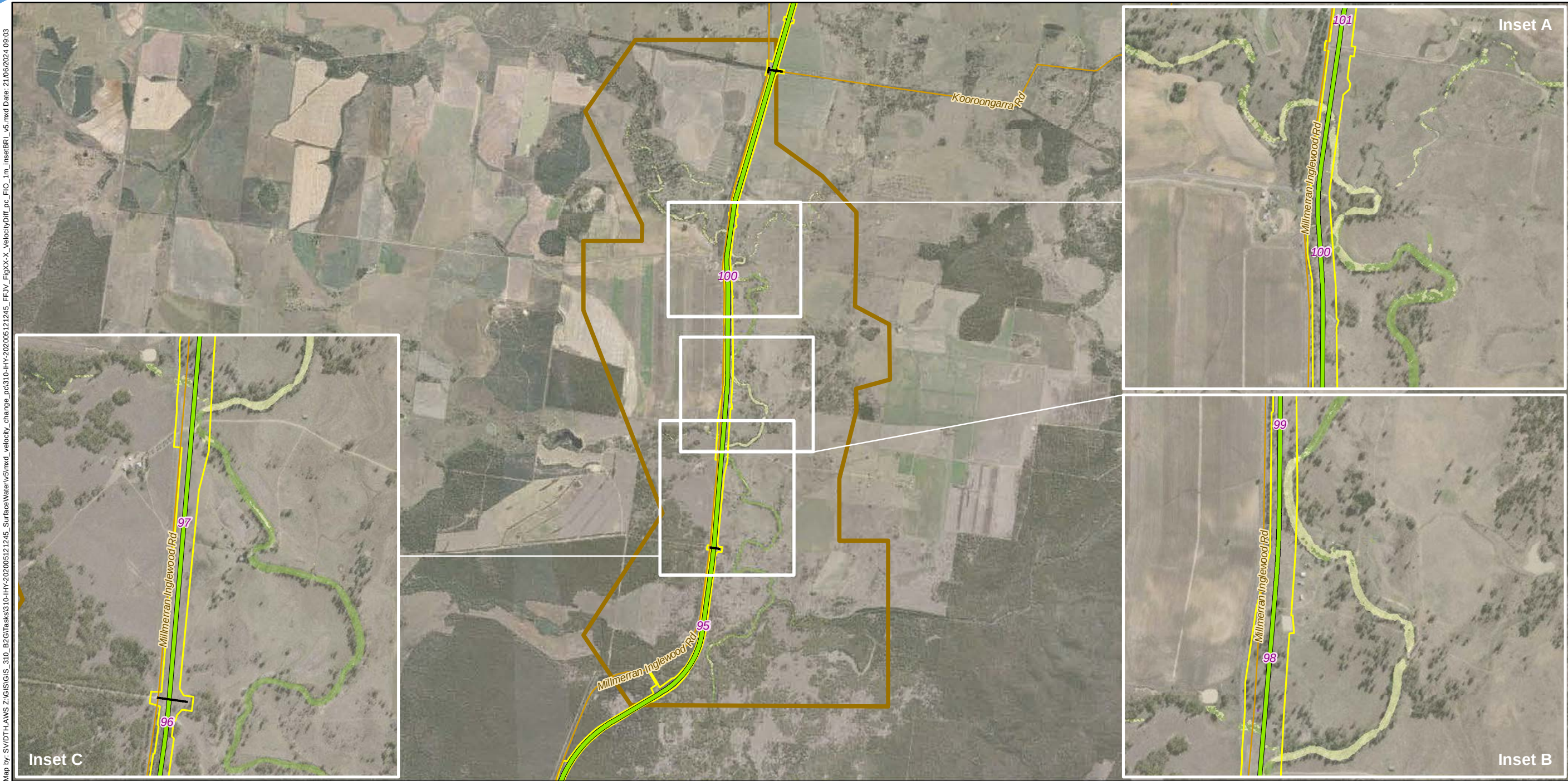
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F5-D:

1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Bringalily Creek



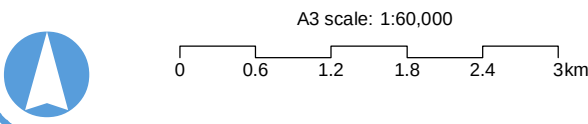
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

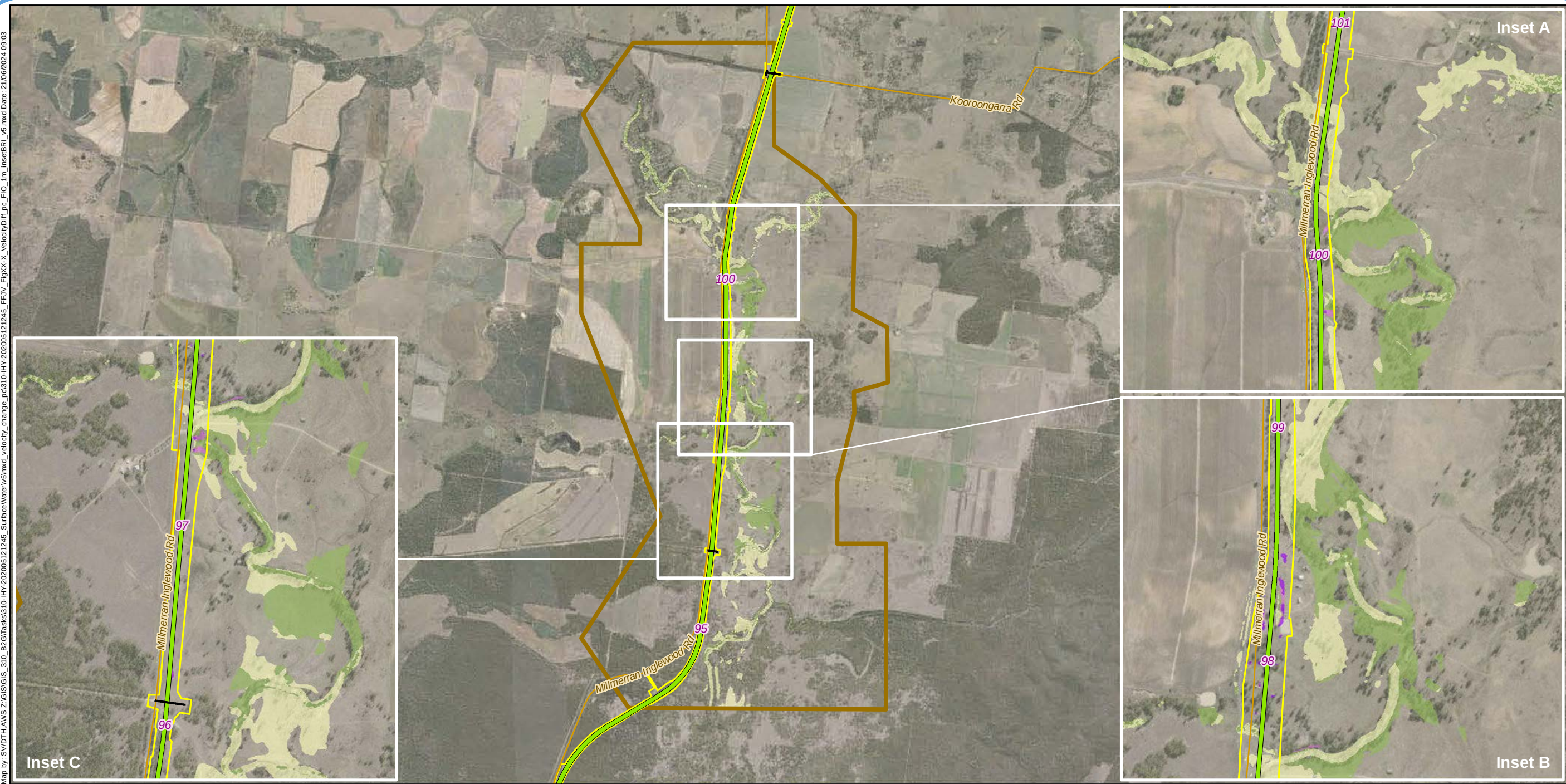
Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



Border to Gowrie
Figure F5-E:
20% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Bringally Creek



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:60,000

0 0.6 1.2 1.8 2.4 3km



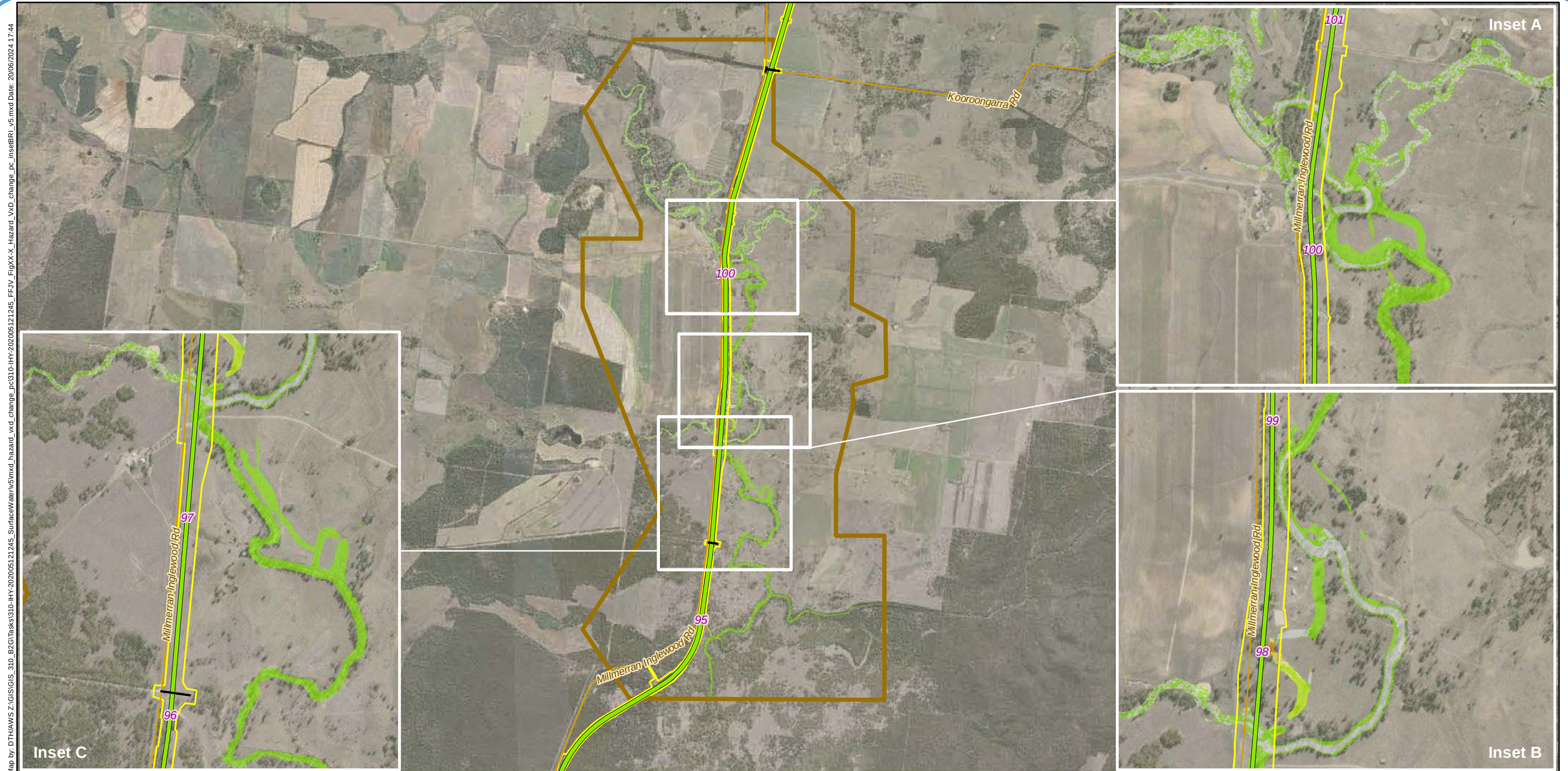
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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure F5-F:

1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Bringalily Creek



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

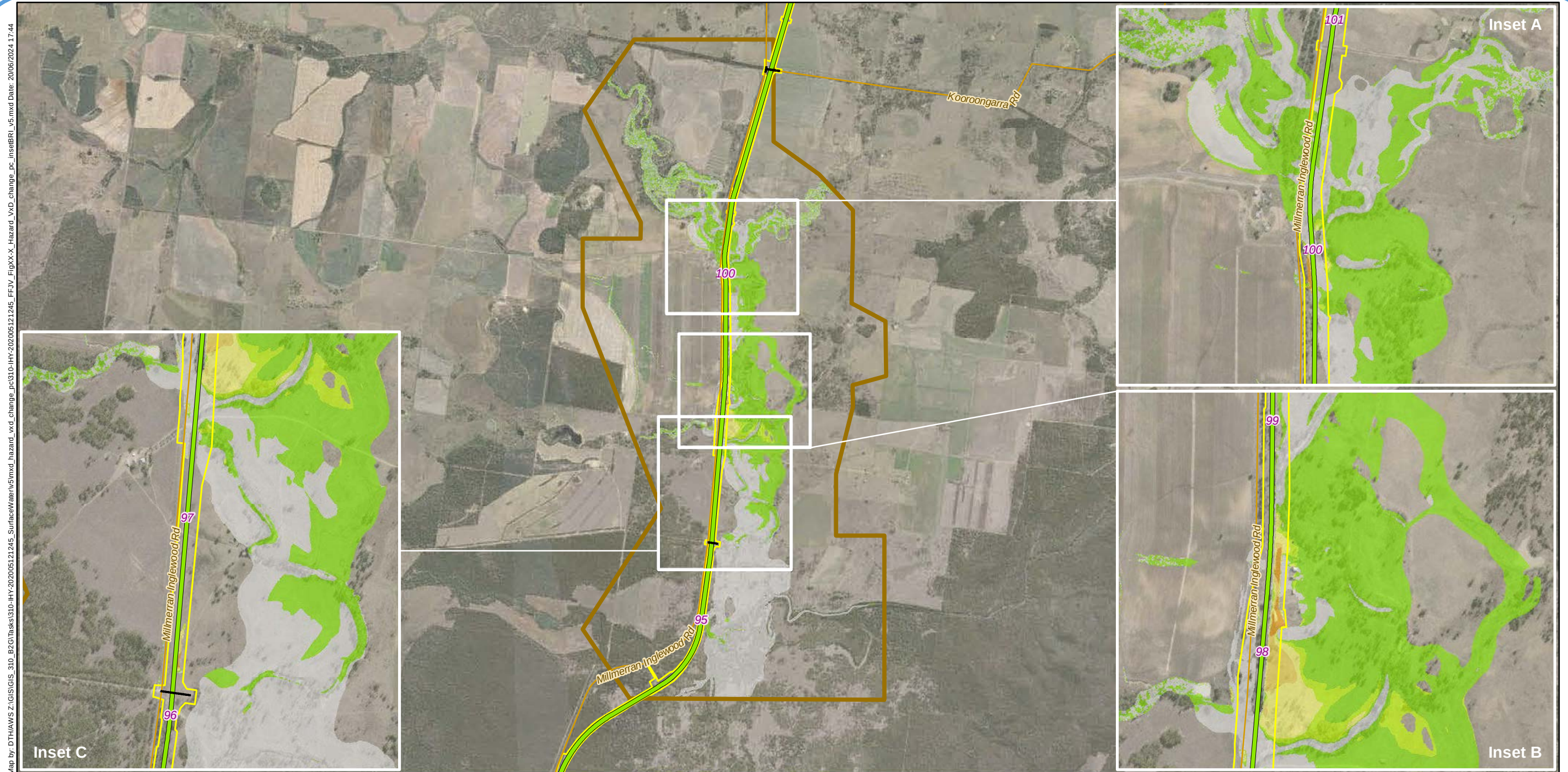
- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



A3 scale: 1:60,000

0 0.6 1.2 1.8 2.4 3km



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

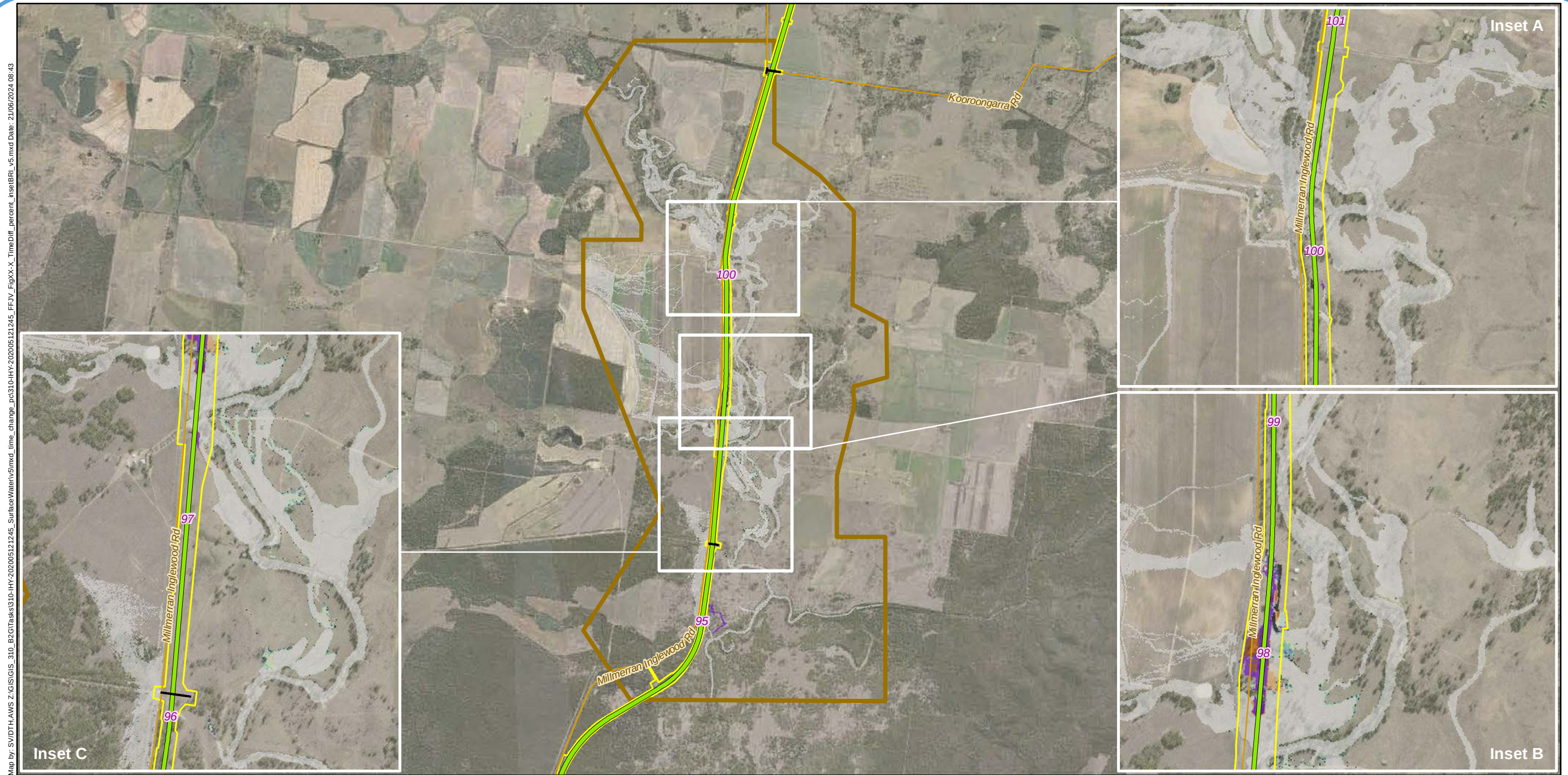
- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



A3 scale: 1:60,000

0 0.6 1.2 1.8 2.4 3km

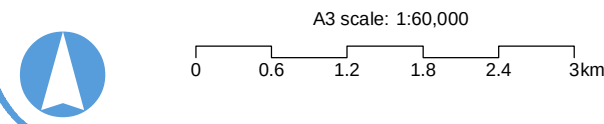


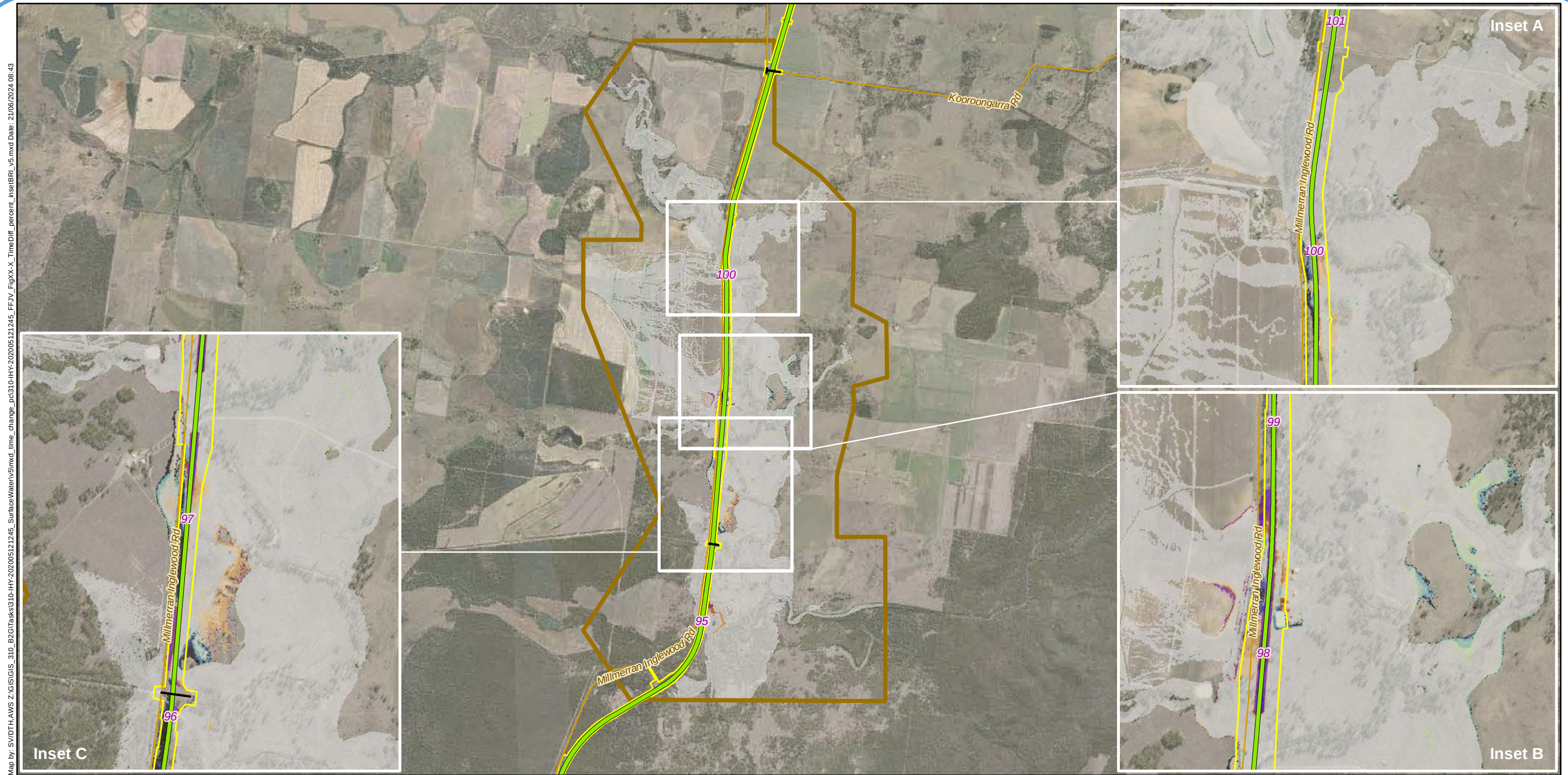
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |





Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

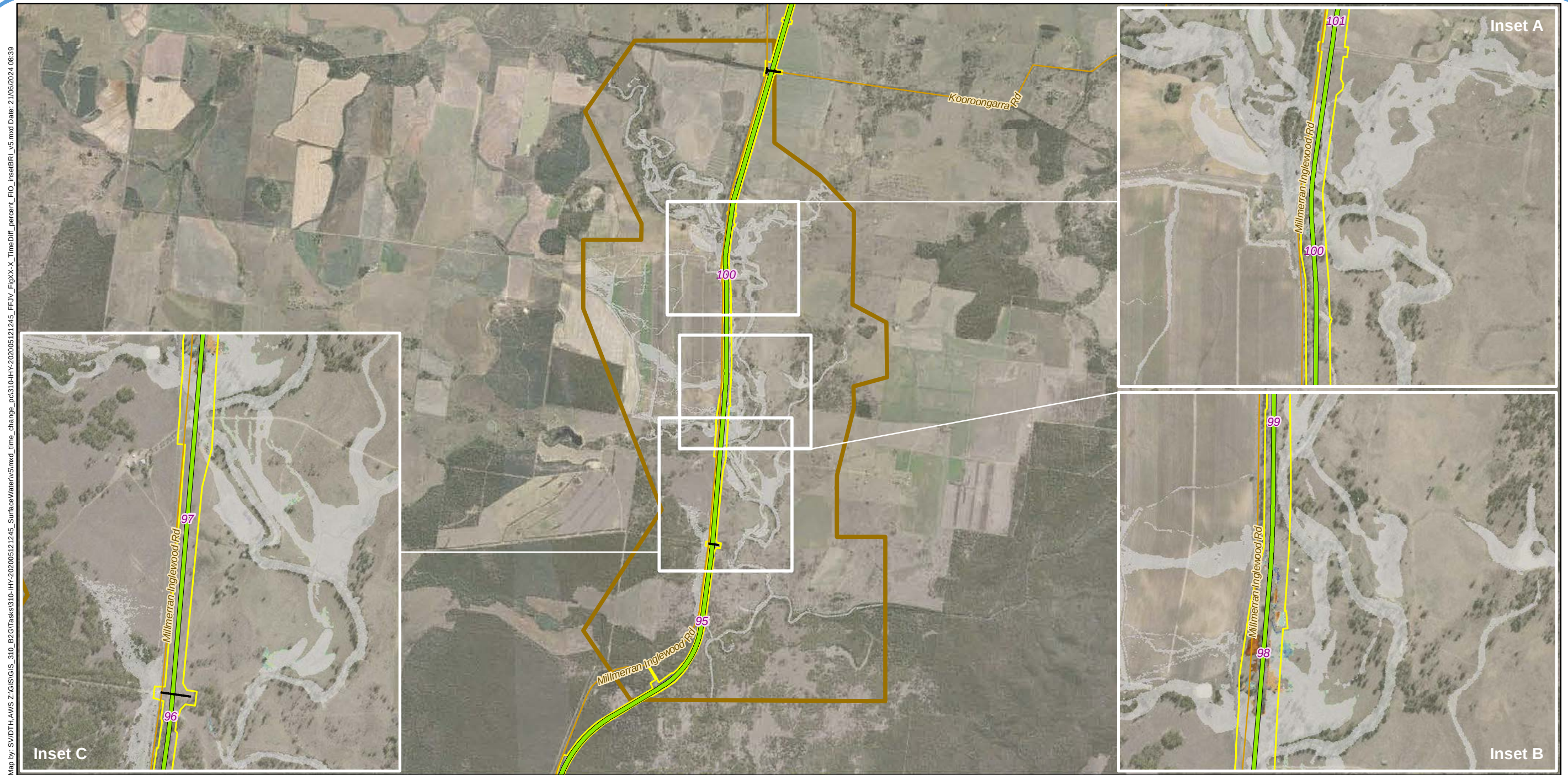
Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:60,000

0 0.6 1.2 1.8 2.4 3km

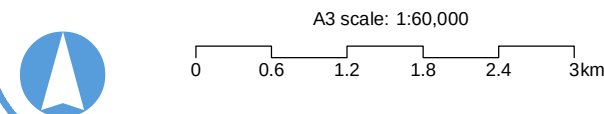


- Legend**
- 5 Chainage (km)
 - Border to Gowrie alignment
 - Minor roads
 - Project road design
 - Regional hydraulic model extent
 - Project footprint

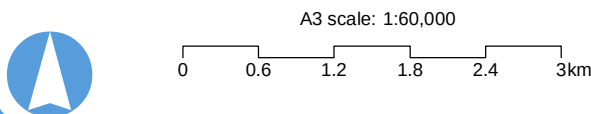
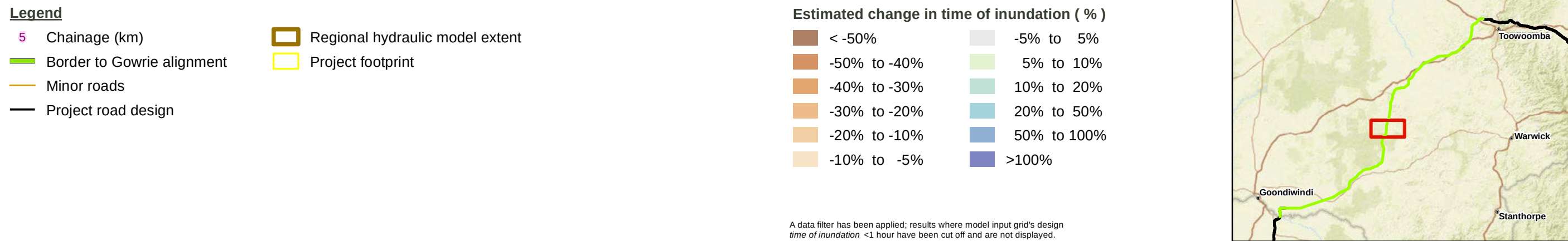
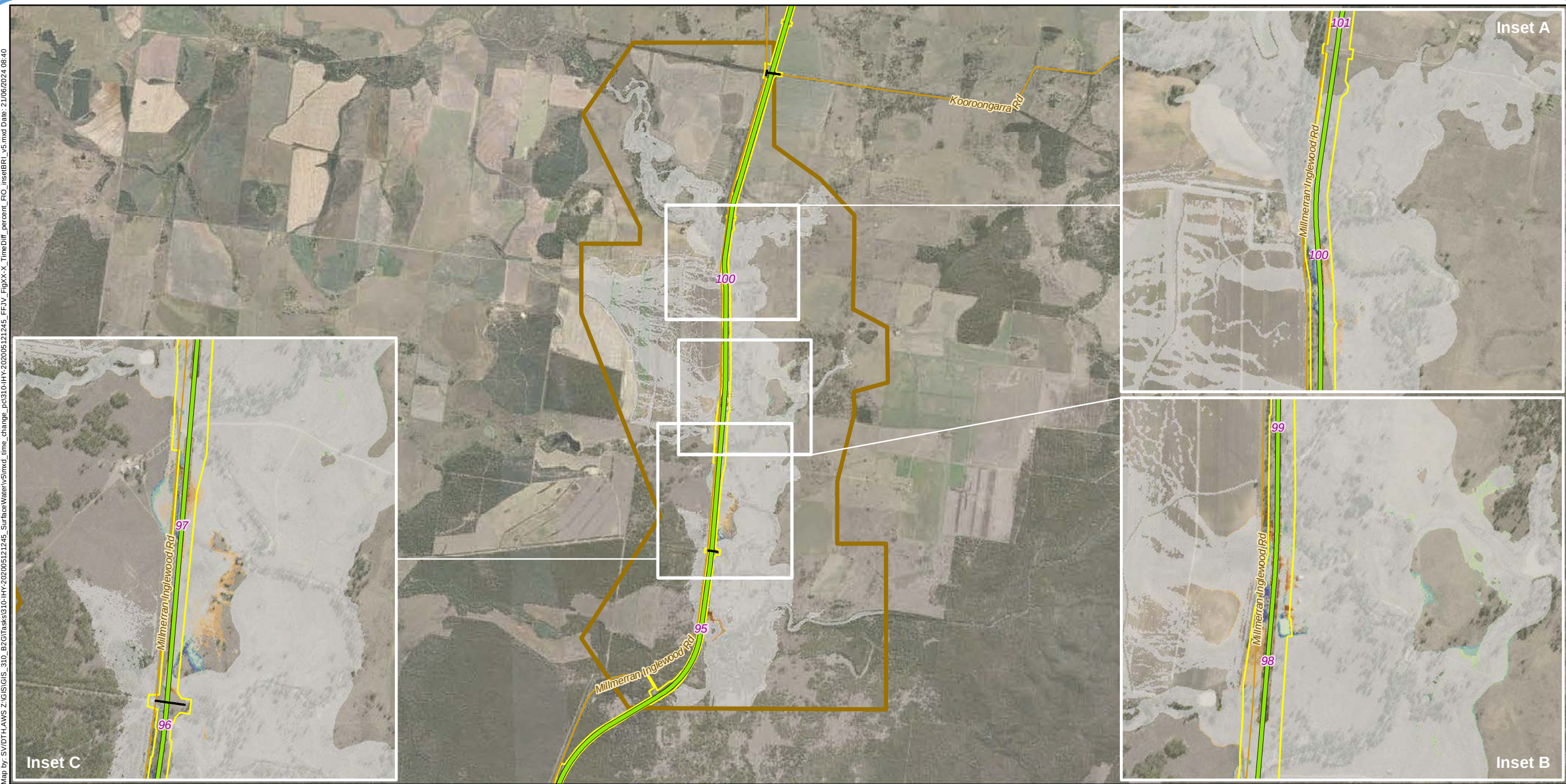
Estimated change in time of inundation (%)

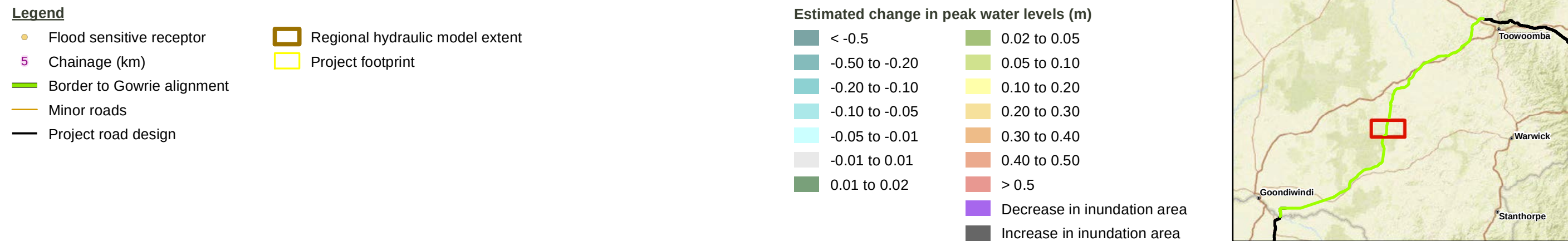
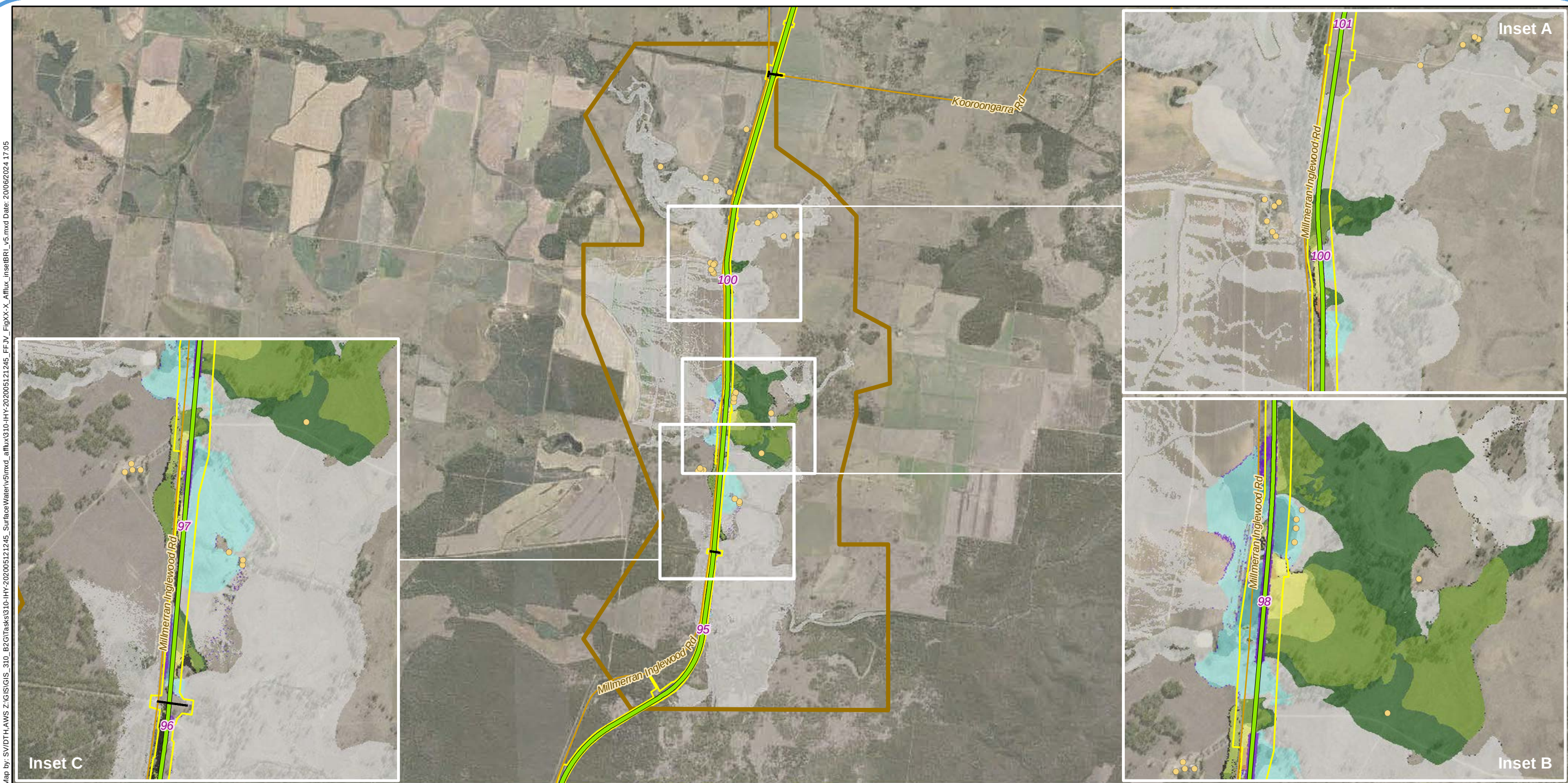
< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



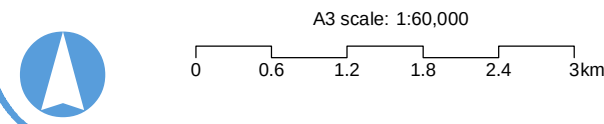
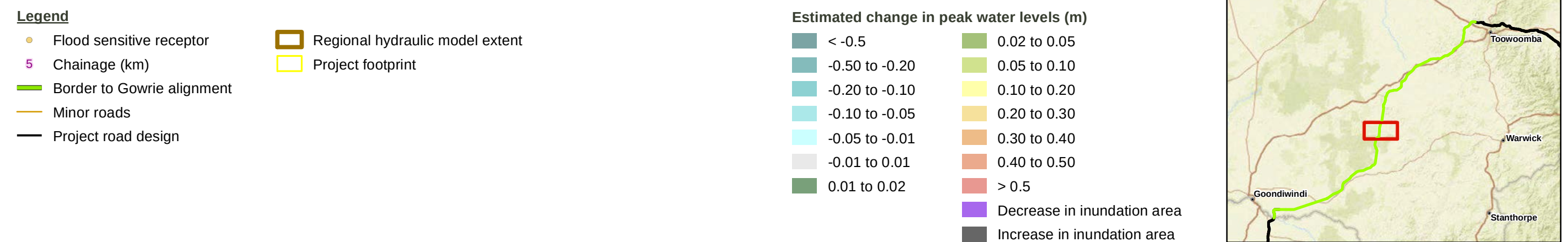
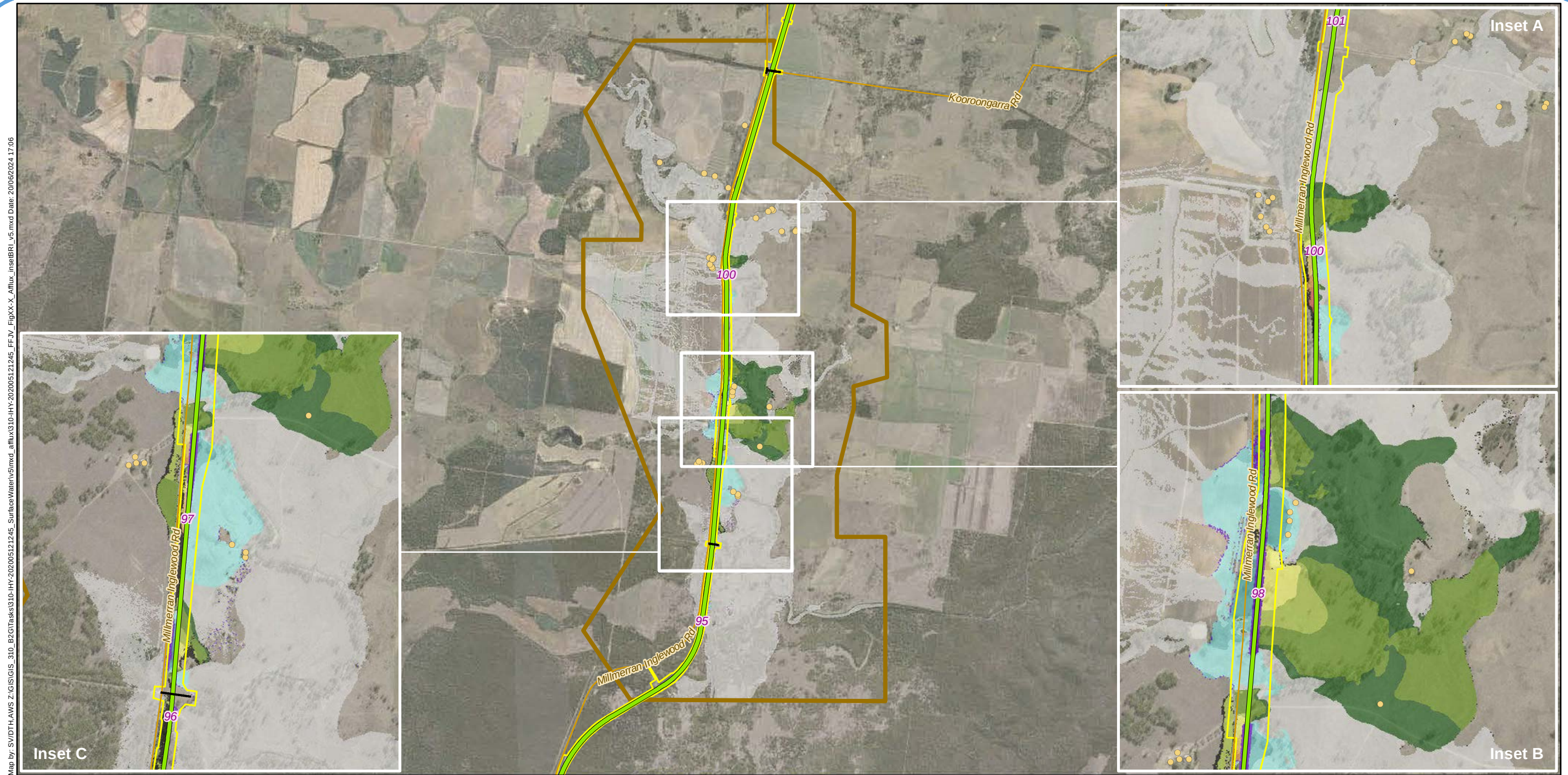
Border to Gowrie
Figure F7-C:
20% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Bringalily Creek

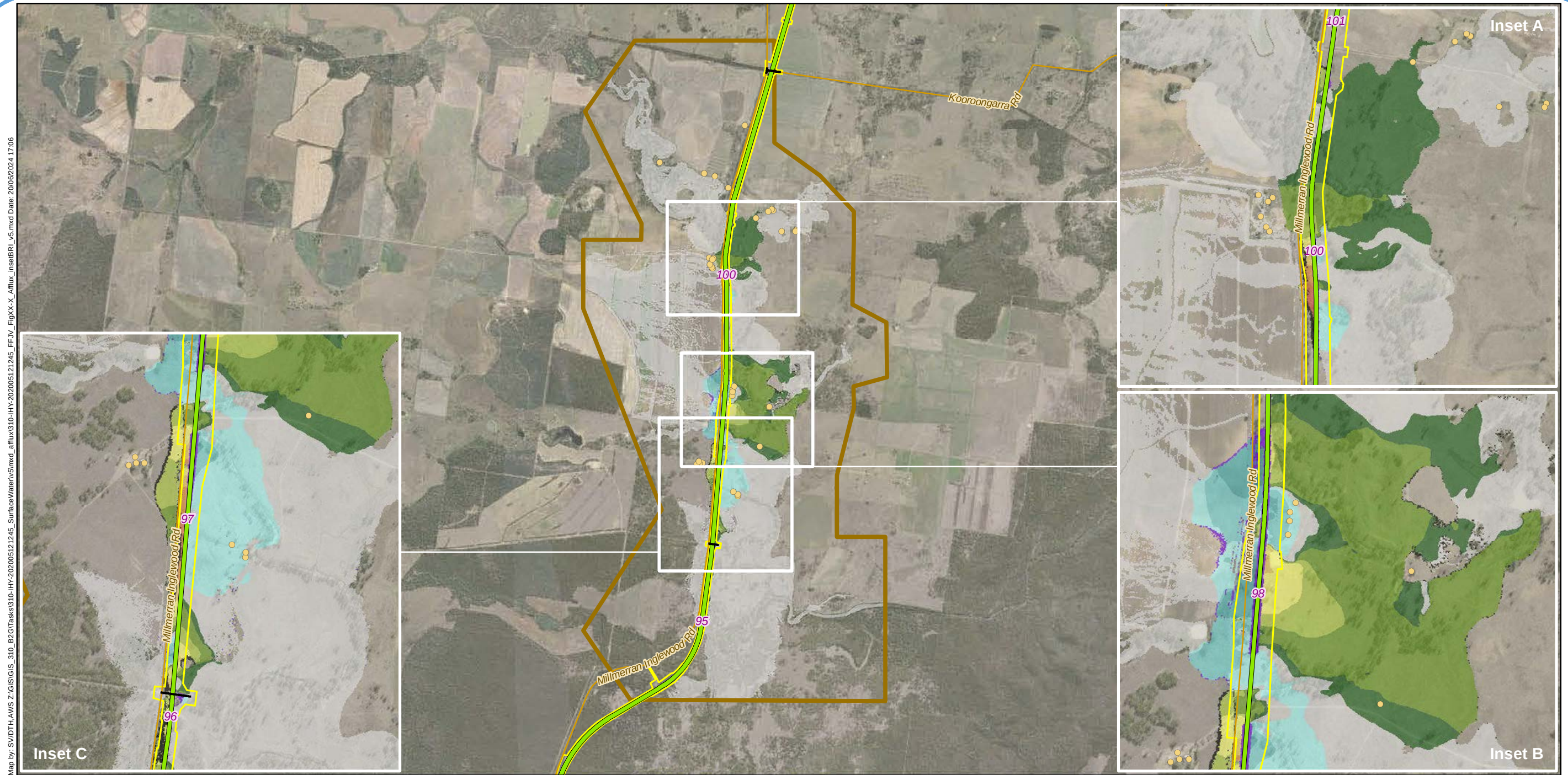




A3 scale: 1:60,000

0 0.6 1.2 1.8 2.4 3km





Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:60,000
0 0.6 1.2 1.8 2.4 3km



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Border to Gowrie

Figure F8-C:

1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Bringalily Creek

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix G Native Dog Creek flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix G

Native Dog Creek Flood Maps

Figure G1-A Locality Plan
Figure G1-B Survey Data
Figure G1-C Hydrologic Model Setup
Figure G1-D Hydraulic Model Setup
Figure G1-E Landuse Classifications
Figure G1-F Proposed Design Structures

Figure G2-A 20% AEP Event - Peak Water Levels - Existing Case
Figure G2-B 1% AEP Event - Peak Water Levels - Existing Case
Figure G2-C 20% AEP Event - Peak Velocity - Existing Case
Figure G2-D 1% AEP Event - Peak Velocity - Existing Case
Figure G2-E 20% AEP Event - Peak Hazard - Existing Case
Figure G2-F 1% AEP Event - Peak Hazard - Existing Case
Figure G2-G 20% AEP Event - Peak Time of Inundation - Existing Case
Figure G2-H 1% AEP Event - Peak Time of Inundation - Existing Case

Figure G3-A 20% AEP Event - Peak Water Levels - Developed Case
Figure G3-B 1% AEP Event - Peak Water Levels - Developed Case
Figure G3-C 20% AEP Event - Peak Velocity - Developed Case
Figure G3-D 1% AEP Event - Peak Velocity - Developed Case
Figure G3-E 20% AEP Event - Peak Hazard - Developed Case
Figure G3-F 1% AEP Event - Peak Hazard - Developed Case
Figure G3-G 20% AEP Event - Peak Time of Inundation - Developed Case
Figure G3-H 1% AEP Event - Peak Time of Inundation - Developed Case

Figure G4-A 20% AEP Event - Afflux
Figure G4-B 1% AEP Event - Afflux
Figure G4-C 20% AEP Event - Change in Velocity
Figure G4-D 1% AEP Event - Change in Velocity
Figure G4-E 20% AEP Event - Change in Hazard
Figure G4-F 1% AEP Event - Change in Hazard
Figure G4-G 20% AEP Event - Change in Time of Inundation
Figure G4-H 1% AEP Event - Change in Time of Inundation

Figure G5-A 20% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure G5-B 1% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure G5-C 20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure G5-D 1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure G5-E 20% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure G5-F 1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)

Figure G6-A 20% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)
Figure G6-B 1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)

Figure G7-A 20% AEP Event - Percentage Change in Time of Inundation
Figure G7-B 1% AEP Event - Percentage Change in Time of Inundation
Figure G7-C 20% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
Figure G7-D 1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)

Figure G8-A 1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\310md_Locality_v5.mxd Date: 20/06/2024 17:00



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Watercourses
- Minor roads
- Regional hydraulic model extent
- Project footprint



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



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Border to Gowrie
Figure G1-A:
Locality Plan - Native Dog Creek

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\310mxd_SurveyData_v5.mxd Date: 20/06/2024 17:02



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project footprint
- Hydrologic model extent
- Regional hydraulic model extent

LiDAR datasets (1m grid)

- 2015 ARTC LiDAR 1m



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km

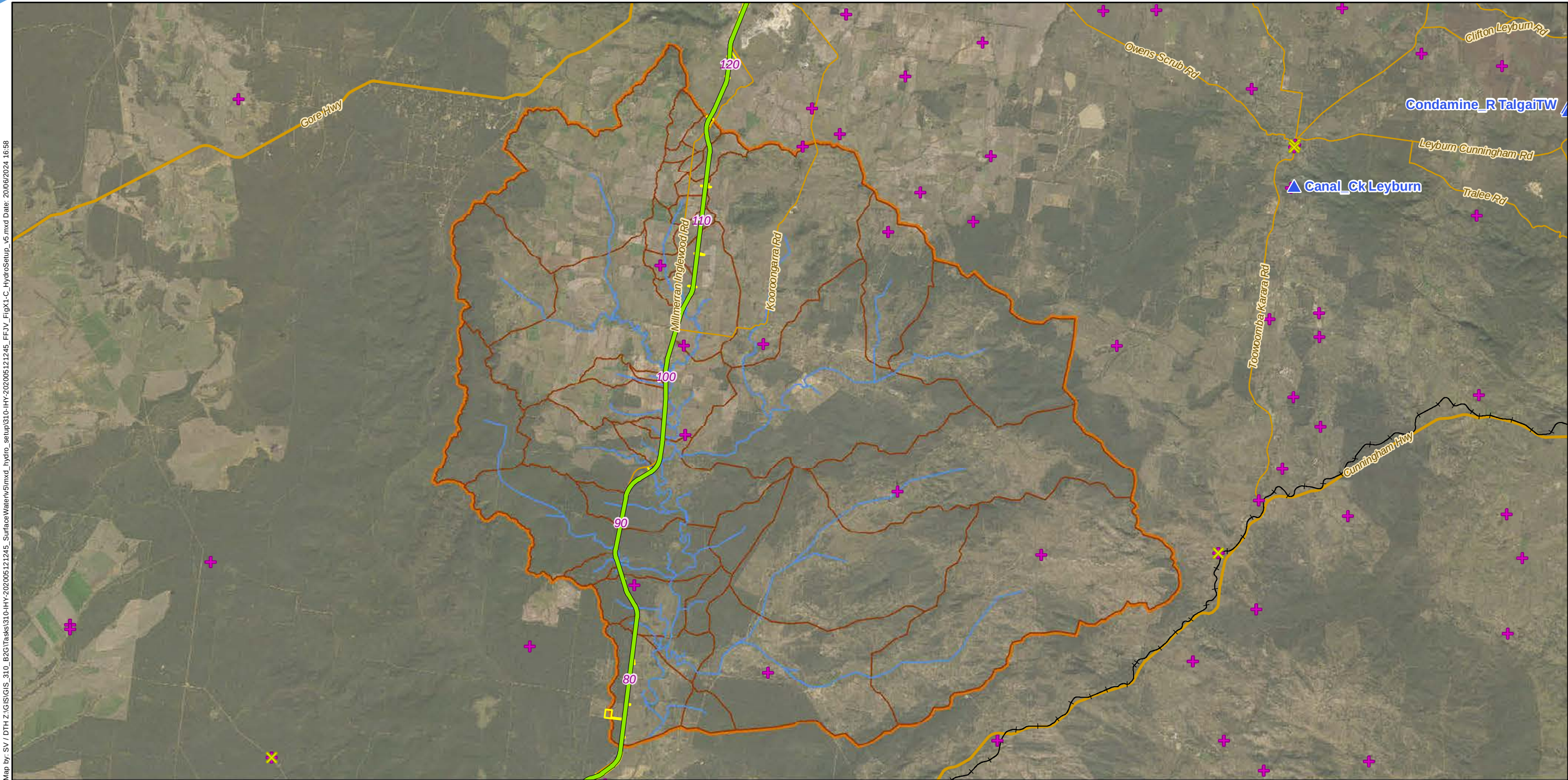


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Coordinate System: GDA 1994 MGA Zone 56

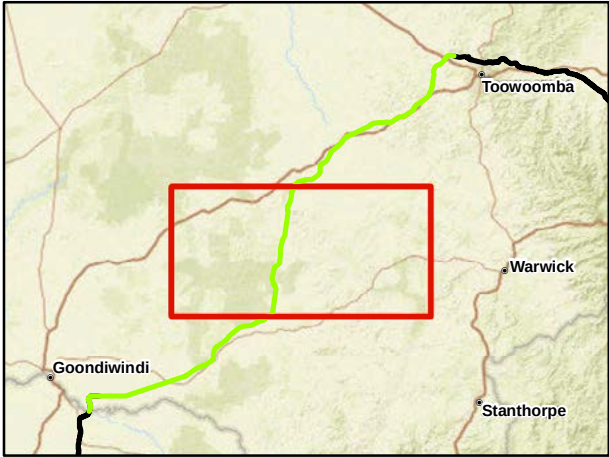
Border to Gowrie

Figure G1-B:
Survey Data - Native Dog Creek



Legend

- | | | | |
|-----------------------------|-------------------|-------------------------|-------------------------|
| 5 Chainage (km) | Major roads | Catchment links | Pluviograph stations |
| Localities | Minor roads | Sub-catchments | Daily rainfall stations |
| Existing rail (operational) | Project footprint | Hydrologic model extent | Stream gauge locations |
| Border to Gowrie alignment | | | |



A3 scale: 1:260,000
0 2.5 5 7.5 10 12.5 km



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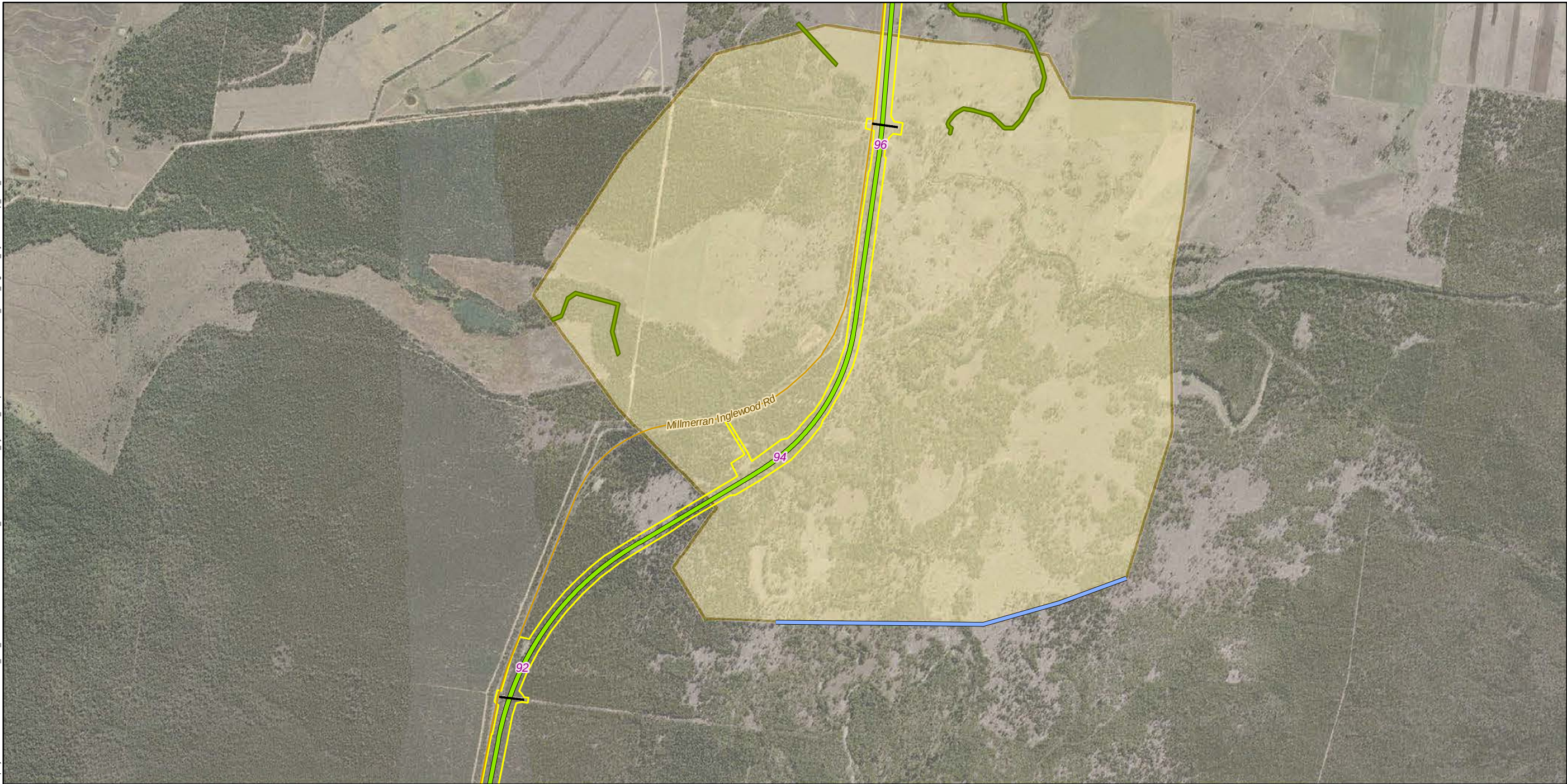
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G1-C:

Hydrologic Model Setup - Native Dog Creek

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FFTV_FigXX-D_HydraulicSetup_NAT_v5.mxd Date: 20/06/2024 17:04



Legend

- | | | |
|----------------------------|---------------------|---------------------------------|
| 5 Chainage (km) | Minor roads | Regional hydraulic model extent |
| Border to Gowrie alignment | Project road design | Outflow boundary |
| | Project footprint | Inflow boundary |



A3 scale: 1:25,000
0 0.25 0.5 0.75 1 1.25 km



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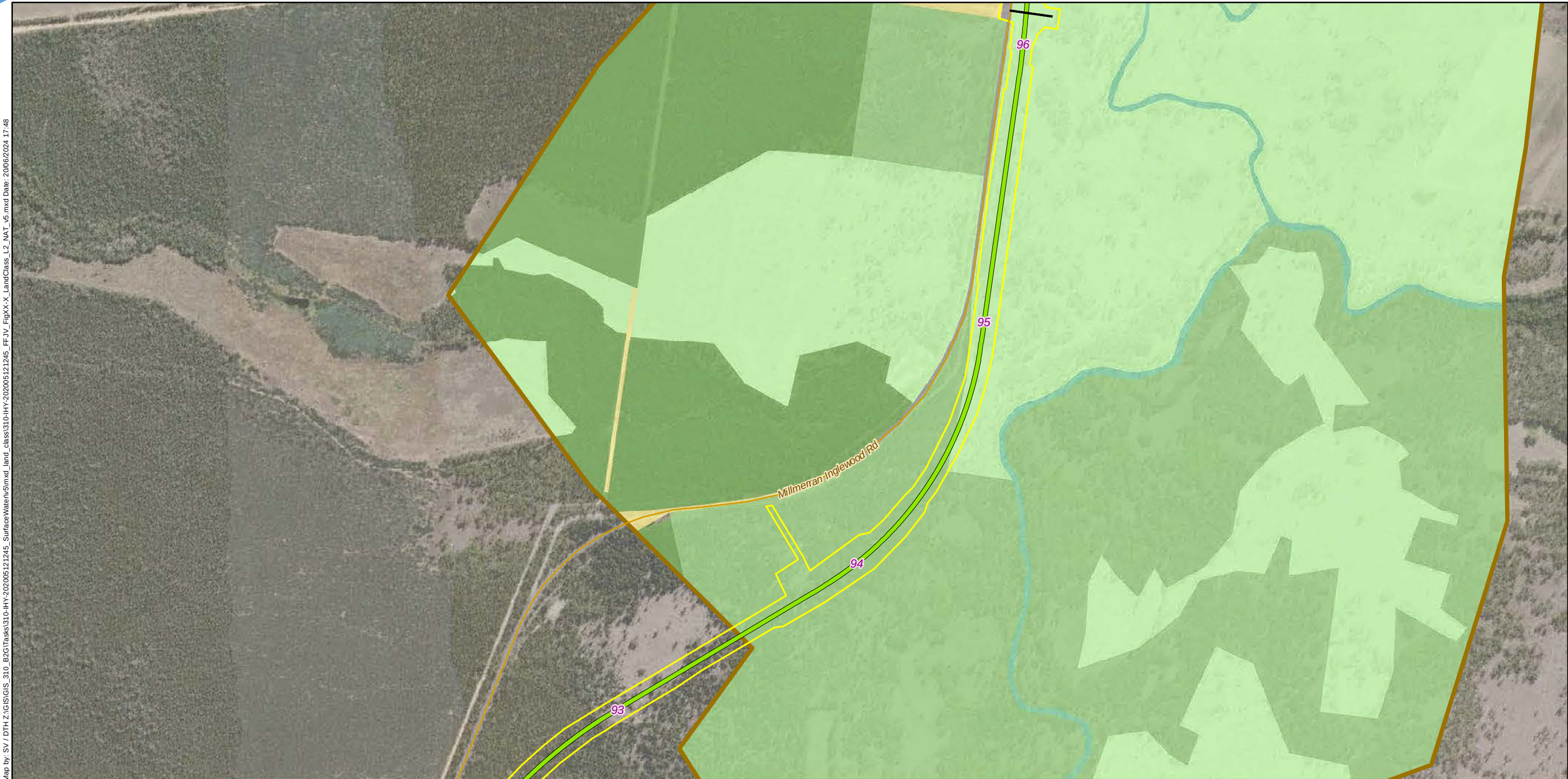
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G1-D:

Hydraulic Model Setup - Native Dog Creek

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\310-HY-202005121245_FF JV_FigXX-X_LandClass_L2_NAT_v6.mxd Date: 2006/2024 17:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Landuse classification

- | | |
|--------------------------------------|---------------------------------------|
| River (n = 0.035) | Open Space - Moderate Veg (n = 0.055) |
| Sealed Road Corridor (n = 0.015) | Open Space - Heavy Veg (n = 0.065) |
| Unsealed Road Corridor (n = 0.025) | Open Water (n = 0.025) |
| Rural Residential (n = 0.09) | Rail (n = 0.025) |
| Urban Residential (n = 0.1) | Riparian (n = 0.04) |
| Commercial (n = 0.06) | Crop (n = 0.1085) |
| Open Space - Minimum Veg (n = 0.045) | |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



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Border to Gowrie

Figure G1-E:

Landuse classifications - Native Dog Creek

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_SurfaceWater\5mxd_FigX-X_Structures_v5.mxd Date: 21/06/2024 08:35



- Legend**
- 5 Chainage (km)
 - Local drainage culvert
 - Border to Gowrie alignment
 - Minor roads
 - Bridges
 - Regional hydraulic model extent
 - Project footprint



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



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Border to Gowrie

Figure G1-F:

Proposed Design Structures - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\51mxd_depth\310-IHY-2020\5121245_FF\3V_FigX-X_EX_Depth_v5.mxd Date: 20/06/2024 17:32



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



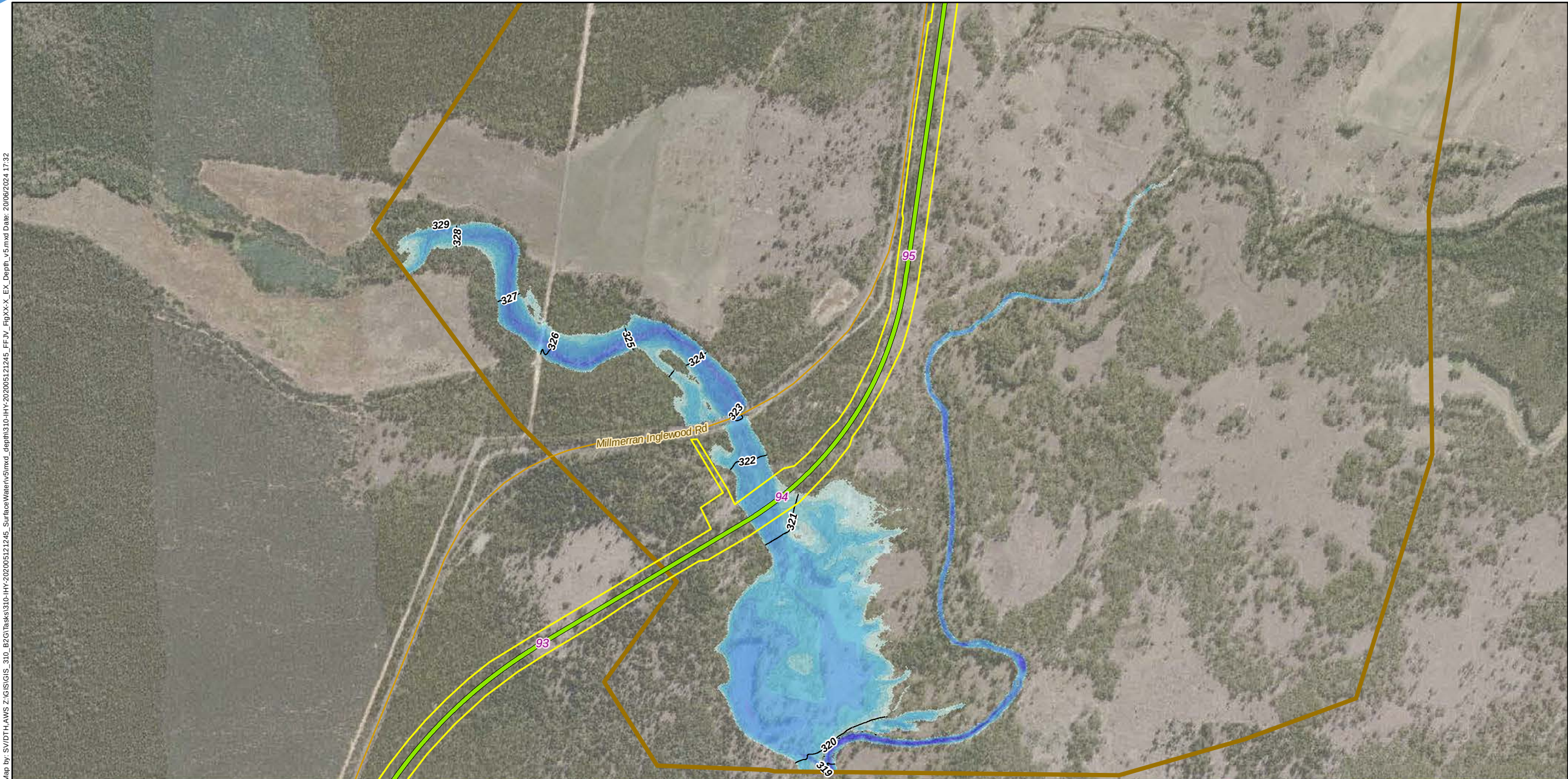
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G2-A:

20% AEP Event - Peak Water Levels - Existing Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\51mxd_depth\310-IHY-2020\5121245_FF\3V_FigX-X_EX_Depth_v5.mxd Date: 20/06/2024 17:32



Legend

- 5

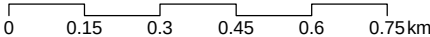
 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|-----------------------|----------------------|
| <div>0 - 0.25</div> | <div>2.5 - 3.0</div> |
| <div>0.25 - 0.5</div> | <div>3.0 - 3.5</div> |
| <div>0.5 - 1.0</div> | <div>3.5 - 4.0</div> |
| <div>1.0 - 1.5</div> | <div>4.0 - 4.5</div> |
| <div>1.5 - 2.0</div> | <div>4.5 - 5.0</div> |
| <div>2.0 - 2.5</div> | <div>> 5.0</div> |
- 1m peak water contour (mAHD)



A3 scale: 1:15,000



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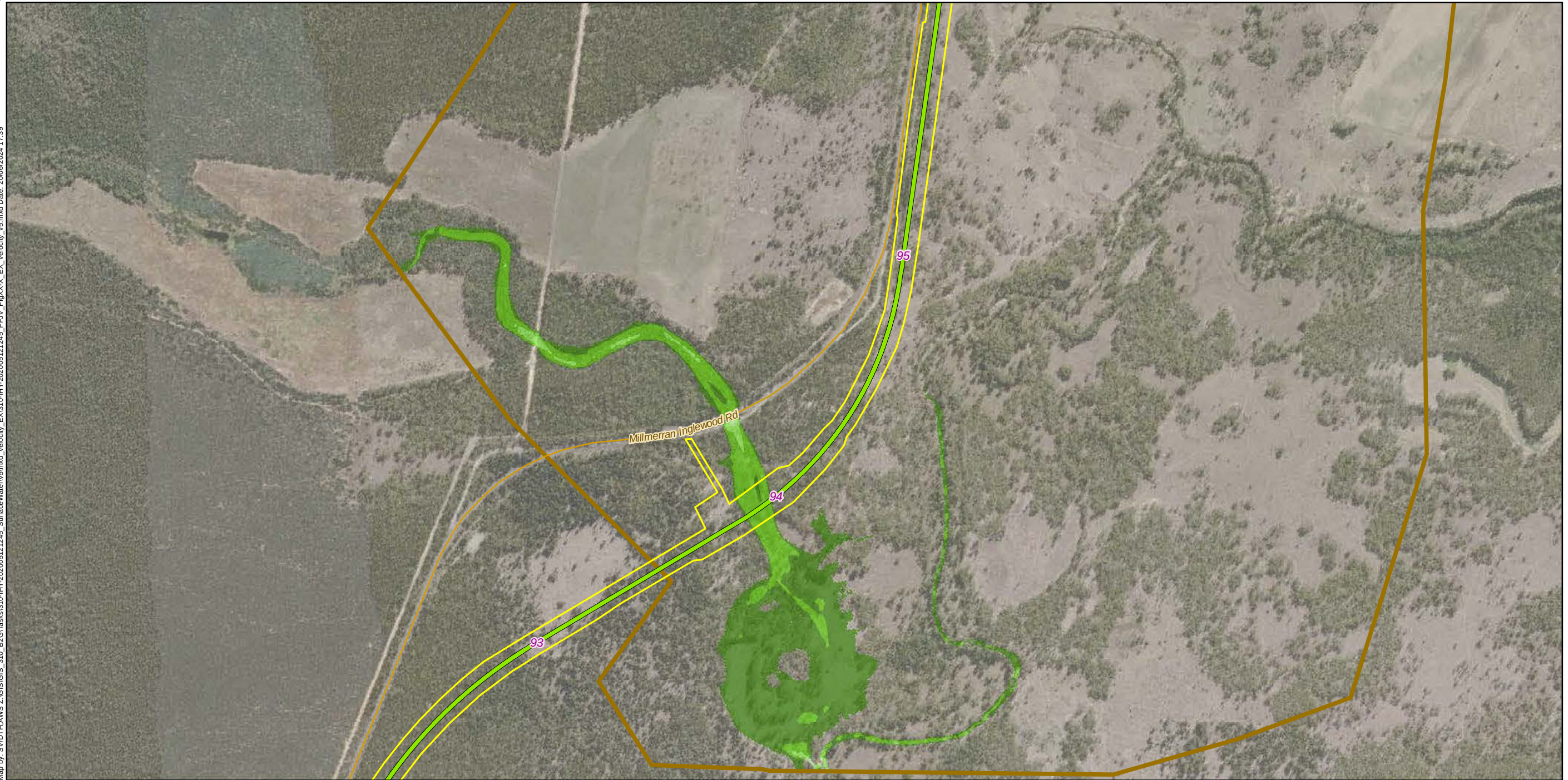
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G2-B:

1% AEP Event - Peak Water Levels - Existing Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2GT\Task\310-HY-2020\05121245_SurfaceWater\51mxd_velocity_EX\310-HY-2020\05121245_FF3V_FigXX-X_EX_Velocity_v5.mxd Date: 20/06/2024 17:39



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

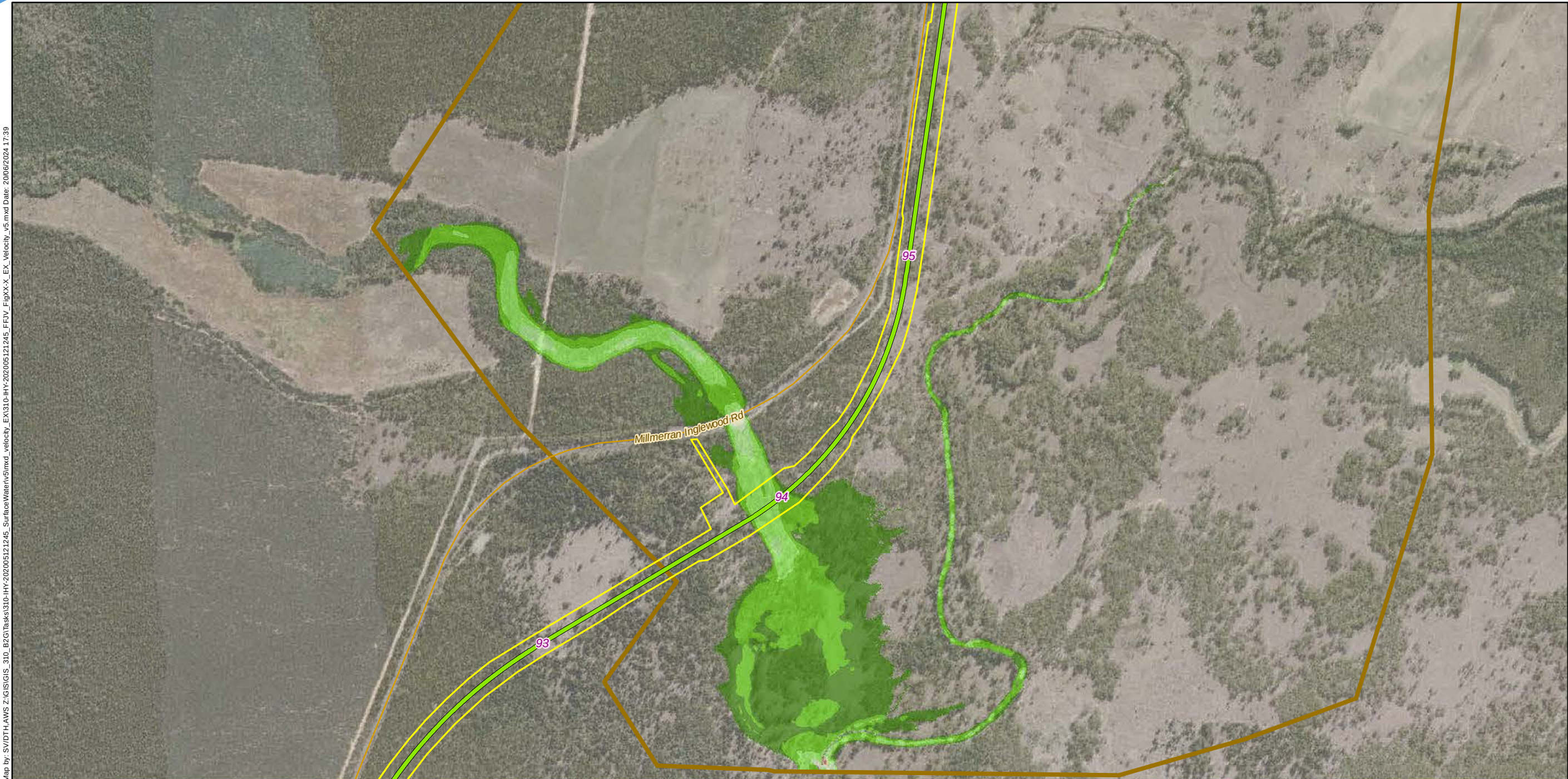
Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km

Map by: SV\DT\HAWES\Z\GIS\GIS_310_B2GT\Task\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_EX\310-HY-2020\05121245_FFIV_FigXX-X_EX_Velocity_v5.mxd Date: 20/06/2024 17:39



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)	
0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G2-D:
1% AEP Event - Peak Velocity - Existing Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2GT\Task\310-HY-2020\05121245_SurfaceWater\5m\med_hazard_vxd310-HY-2020\05121245_FF3V_FigX-X_EX_Hazard_VaD_v5.mxd Date: 20/06/2024 17:35



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G2-E:
20% AEP Event - Peak Hazard - Existing Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_hazard_vxd310-HY-2020\05121245_FF3V_FigX-X_EX_Hazard_VaD_v5.mxd Date: 20/06/2024 17:36



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



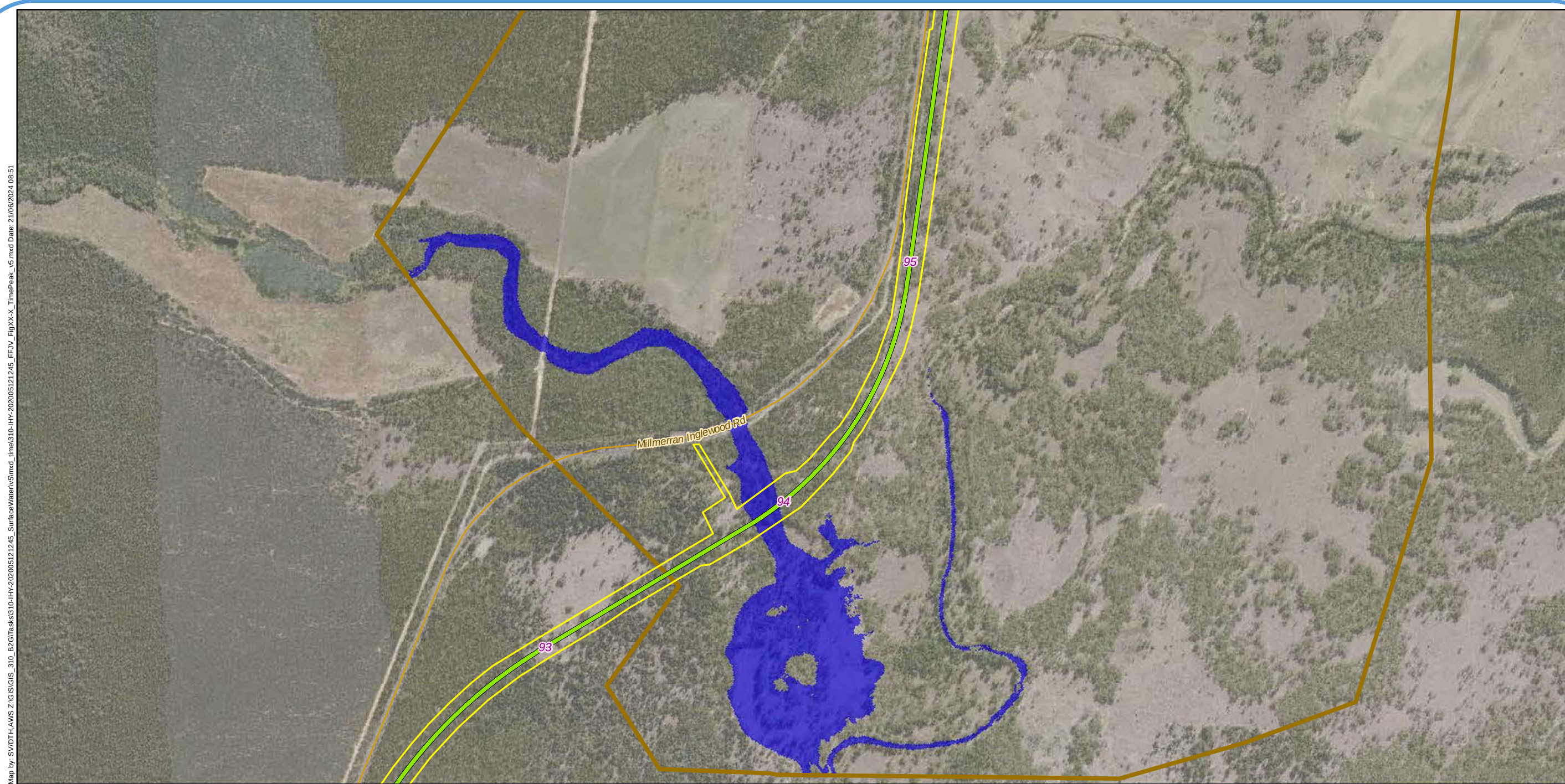
A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G2-F:
1% AEP Event - Peak Hazard - Existing Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51

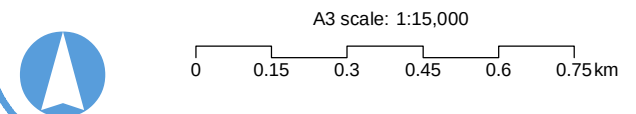
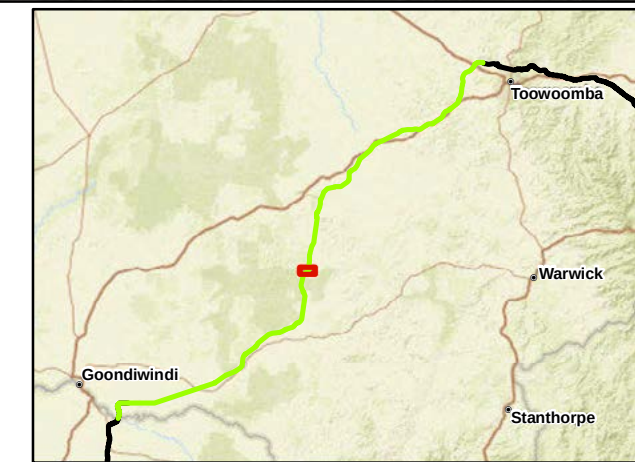


Legend

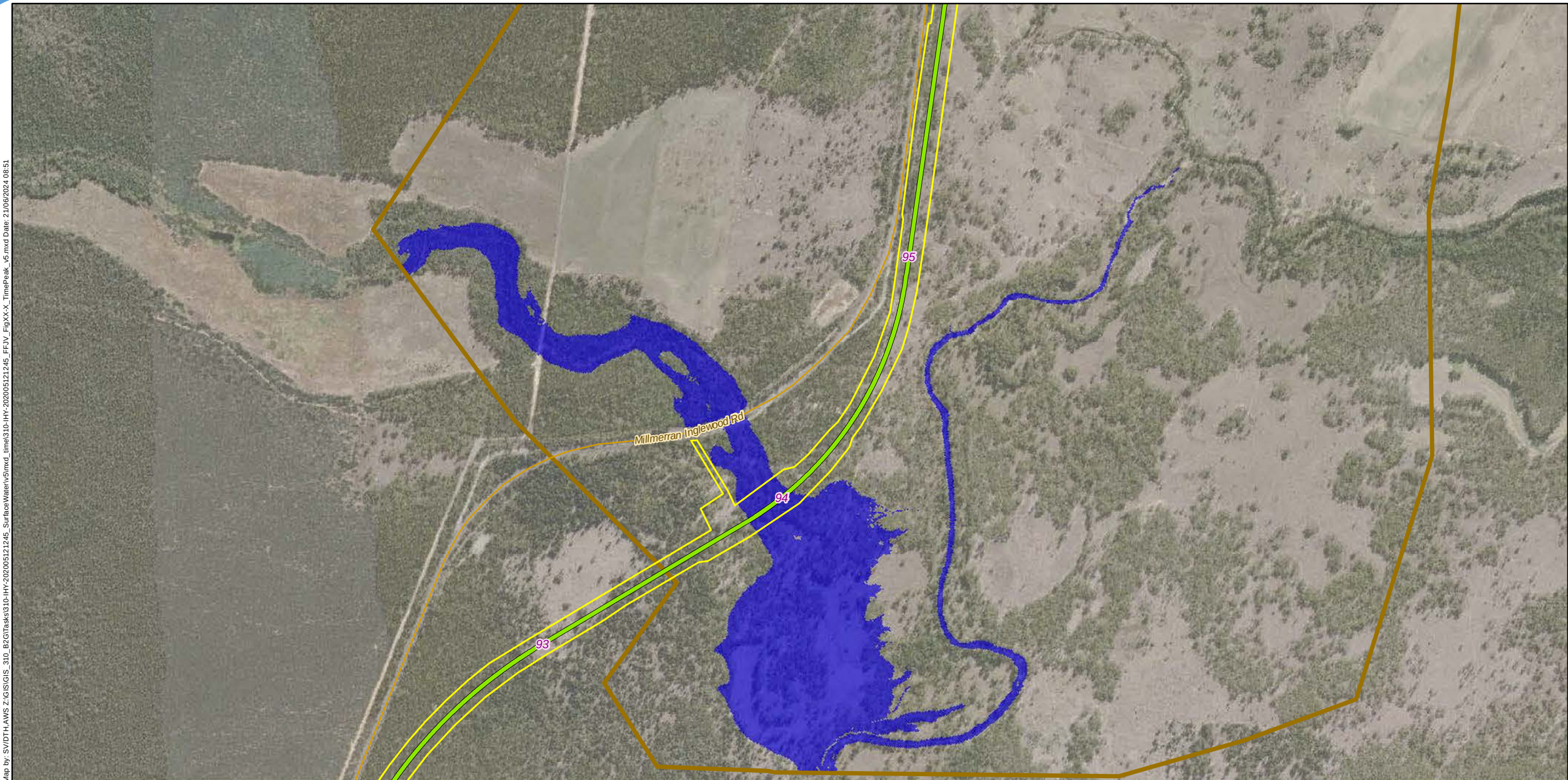
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



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Border to Gowrie

Figure G2-H:

1% AEP Event - Peak Time of Inundation - Existing Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_depth\310-IHY-2020\05121245_FF\3V_FigX-X_DV_Depth_v5.mxd Date: 20/06/2024 17:17



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



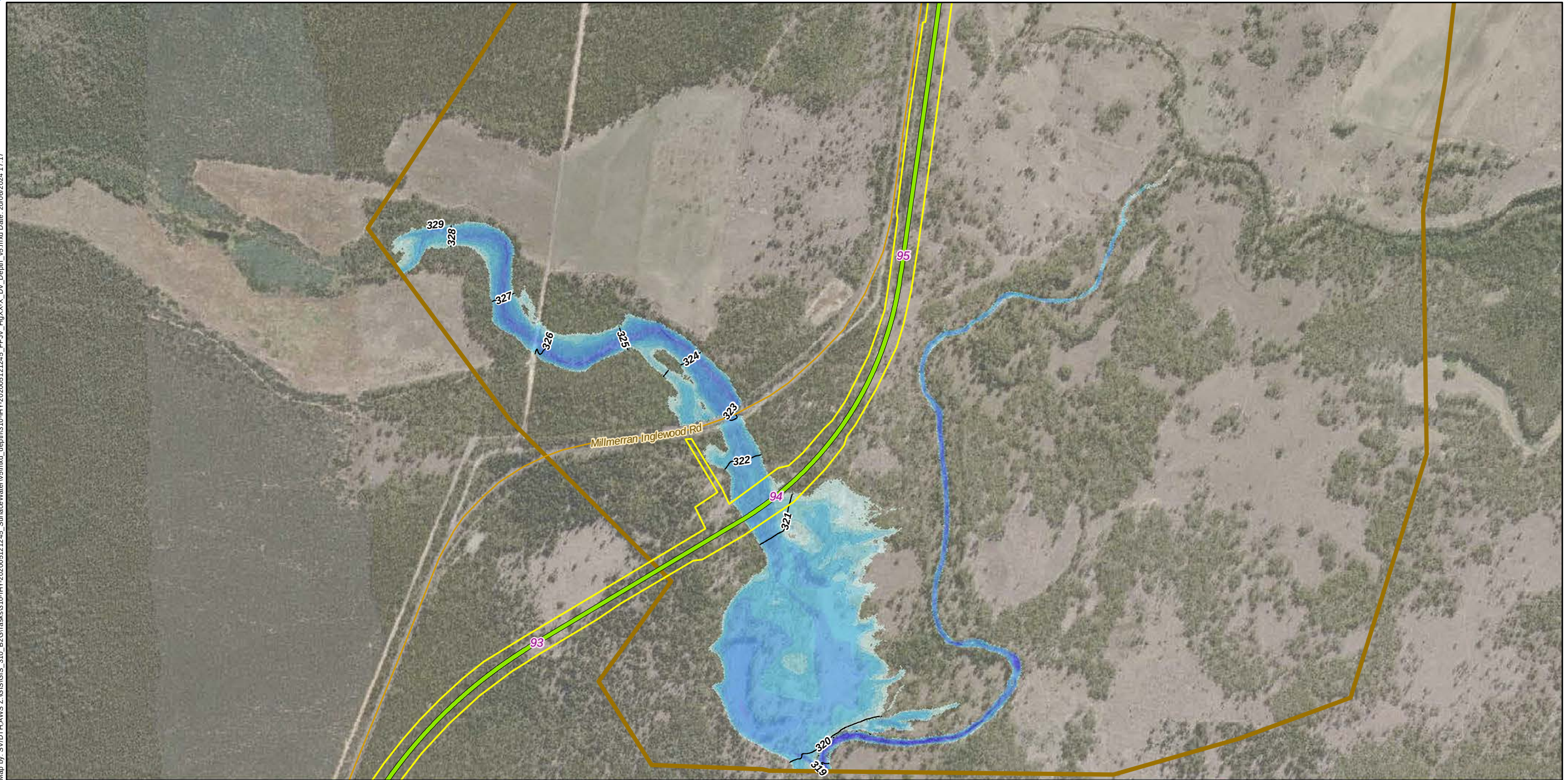
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G3-A:

20% AEP Event - Peak Water Levels - Developed Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_depth\310-IHY-2020\05121245_FF\3V_FigX-X_DV_Depth_v5.mxd Date: 20/06/2024 17:17



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

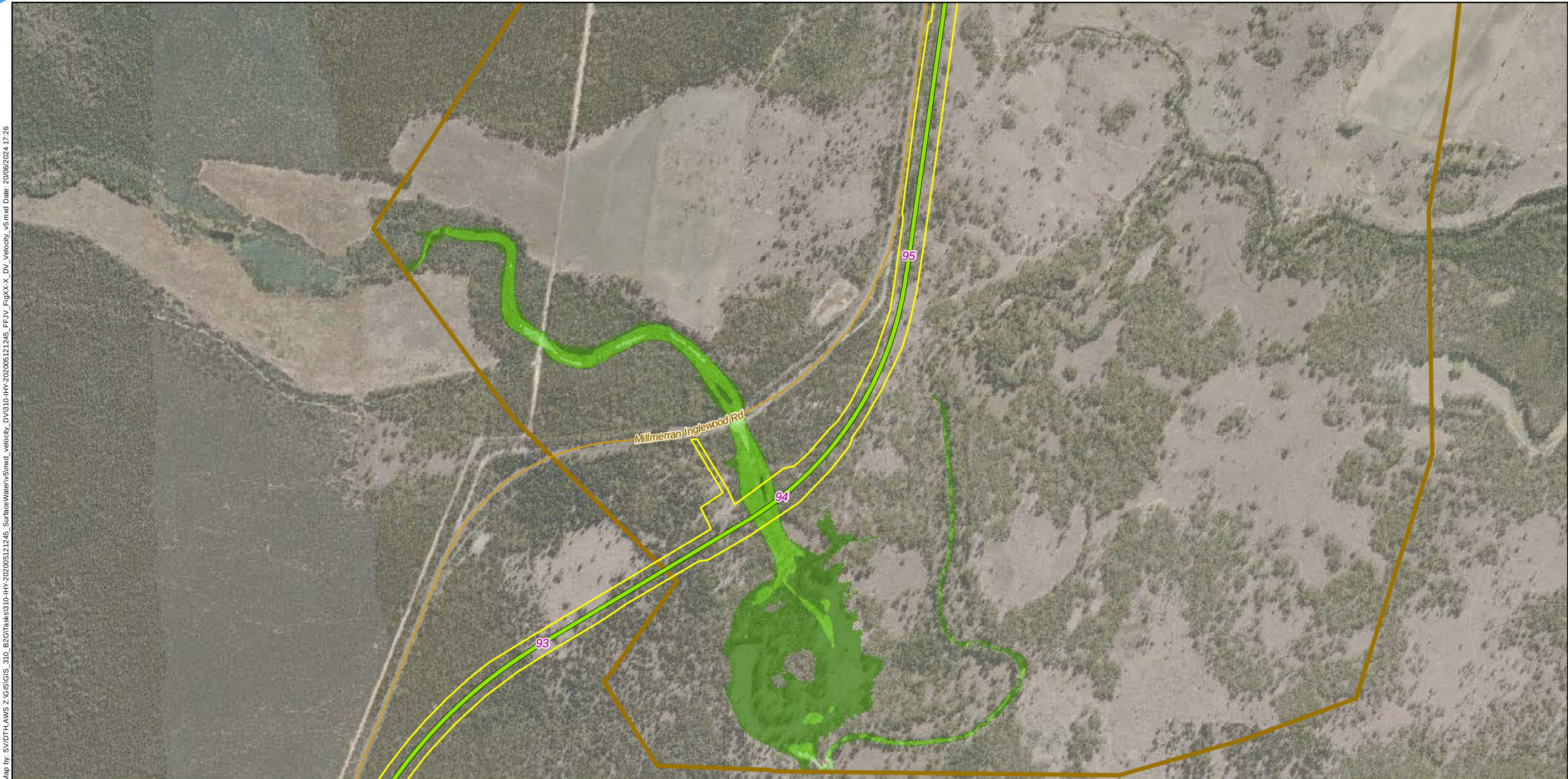
Estimated depth (m)

0 - 0.25	2.5 - 3.0
0.25 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
— 1m peak water contour (mAHD)	



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_DV310-HY-2020\05121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:26



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)	
0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km

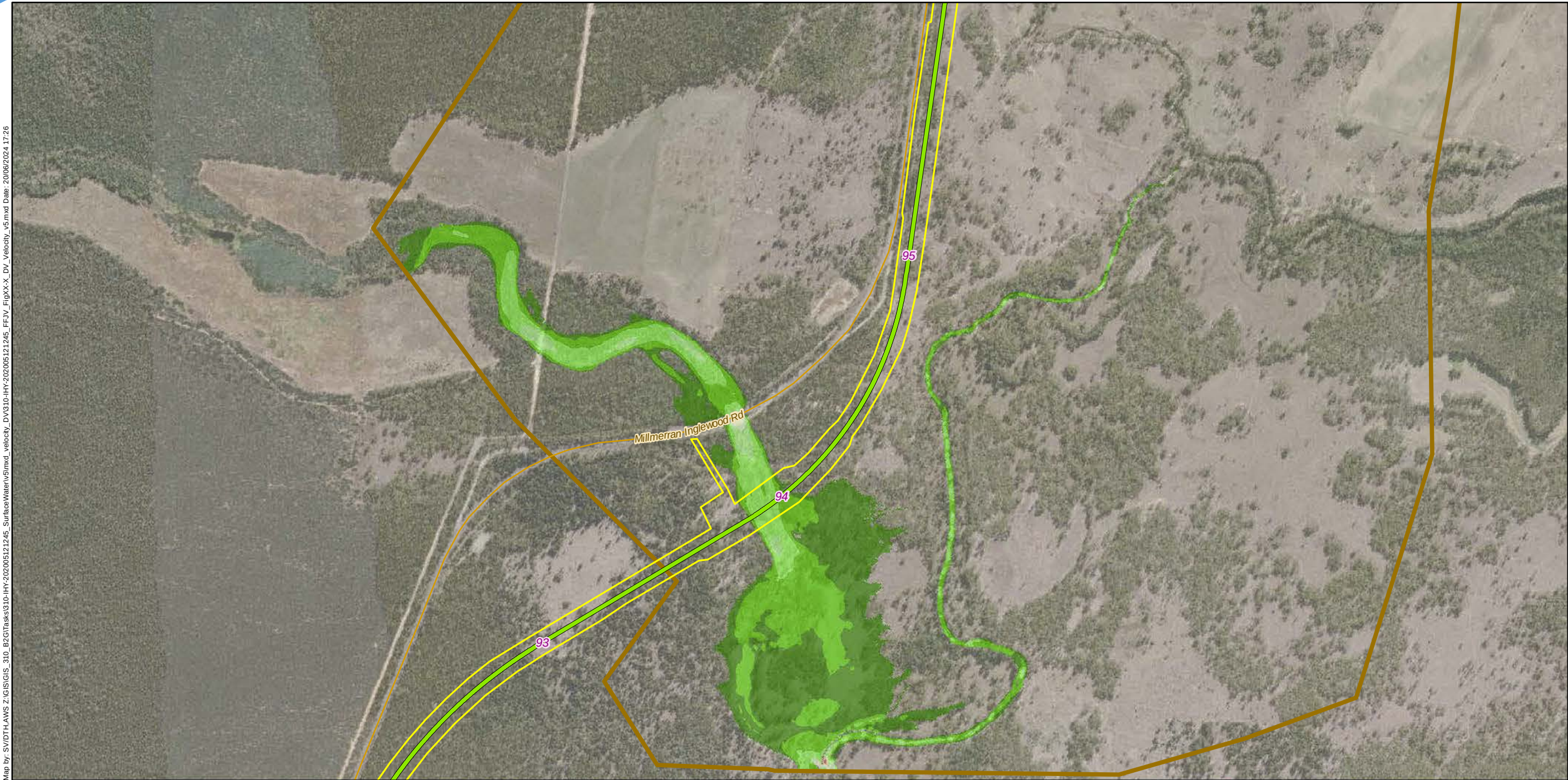


Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G3-C:
20% AEP Event - Peak Velocity - Developed Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_DV310-HY-2020\05121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:26



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G3-D:

1% AEP Event - Peak Velocity - Developed Case - Native Dog Creek

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_hazard_vxd310-HY-2020\05121245_FF3V_FigX-X_DV_Hazard_VAD_v5.mxd Date: 20/06/2024 17:21



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G3-E:
20% AEP Event - Peak Hazard - Developed Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_hazard_vxd310-HY-2020\05121245_FF3V_FigX-X_DV_Hazard_VAD_v5.mxd Date: 20/06/2024 17:21



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G3-F:

1% AEP Event - Peak Hazard - Developed Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\J_V_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



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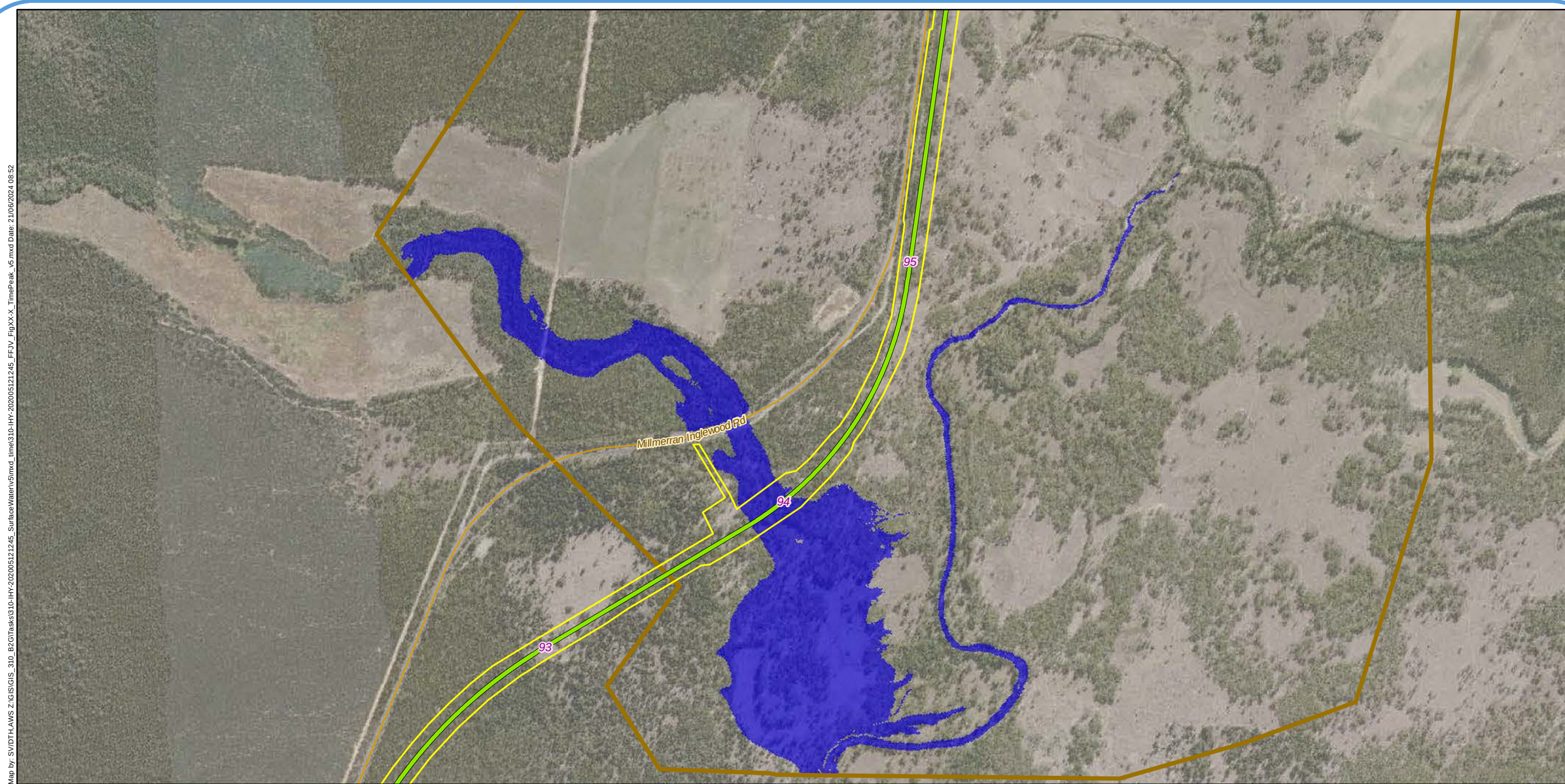
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G3-G:

20% AEP Event - Peak Time of Inundation - Developed Case - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\J_V_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:52

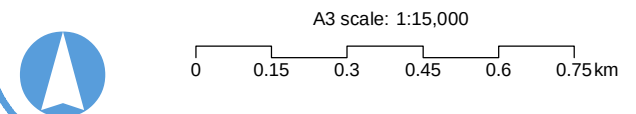
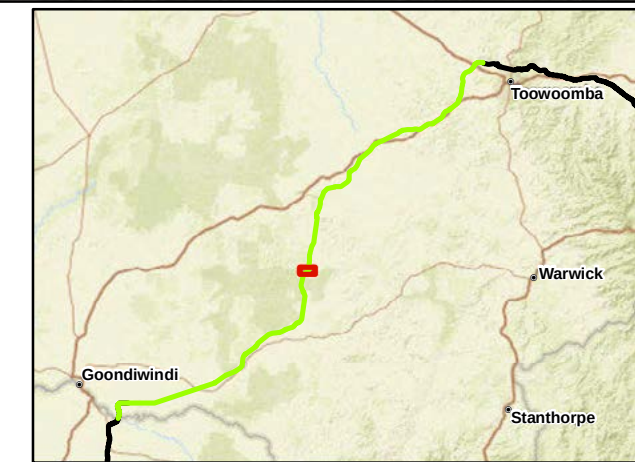


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_afflux\310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:12



Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

■ < -0.5	■ 0.02 to 0.05
■ -0.50 to -0.20	■ 0.05 to 0.10
■ -0.20 to -0.10	■ 0.10 to 0.20
■ -0.10 to -0.05	■ 0.20 to 0.30
■ -0.05 to -0.01	■ 0.30 to 0.40
■ -0.01 to 0.01	■ 0.40 to 0.50
■ 0.01 to 0.02	■ > 0.5
	■ Decrease in inundation area
	■ Increase in inundation area



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G4-A:

20% AEP Event - Afflux - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_afflux\310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:12



Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G4-B:

1% AEP Event - Afflux - Native Dog Creek

Map by: SV\DT\H.AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51mcd_velocity_change\310-HY-2020\5121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G4-C:

20% AEP Event - Change in Velocity - Native Dog Creek

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51mcd_velocity_change\310-HY-2020\5121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G4-D:

1% AEP Event - Change in Velocity - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_hazard_vxd_change\310-IHY-2020\05121245_FF3V_FigX-X_HazardDiff_v5.mxd Date: 20/06/2024 17:43

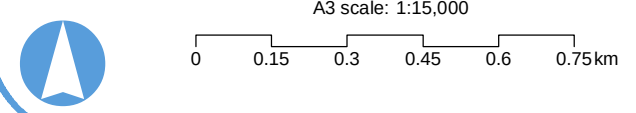


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_hazard_vxd_change\310-IHY-2020\05121245_FF3V_FigX-X_HazardDiff_v5.mxd Date: 20/06/2024 17:43



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

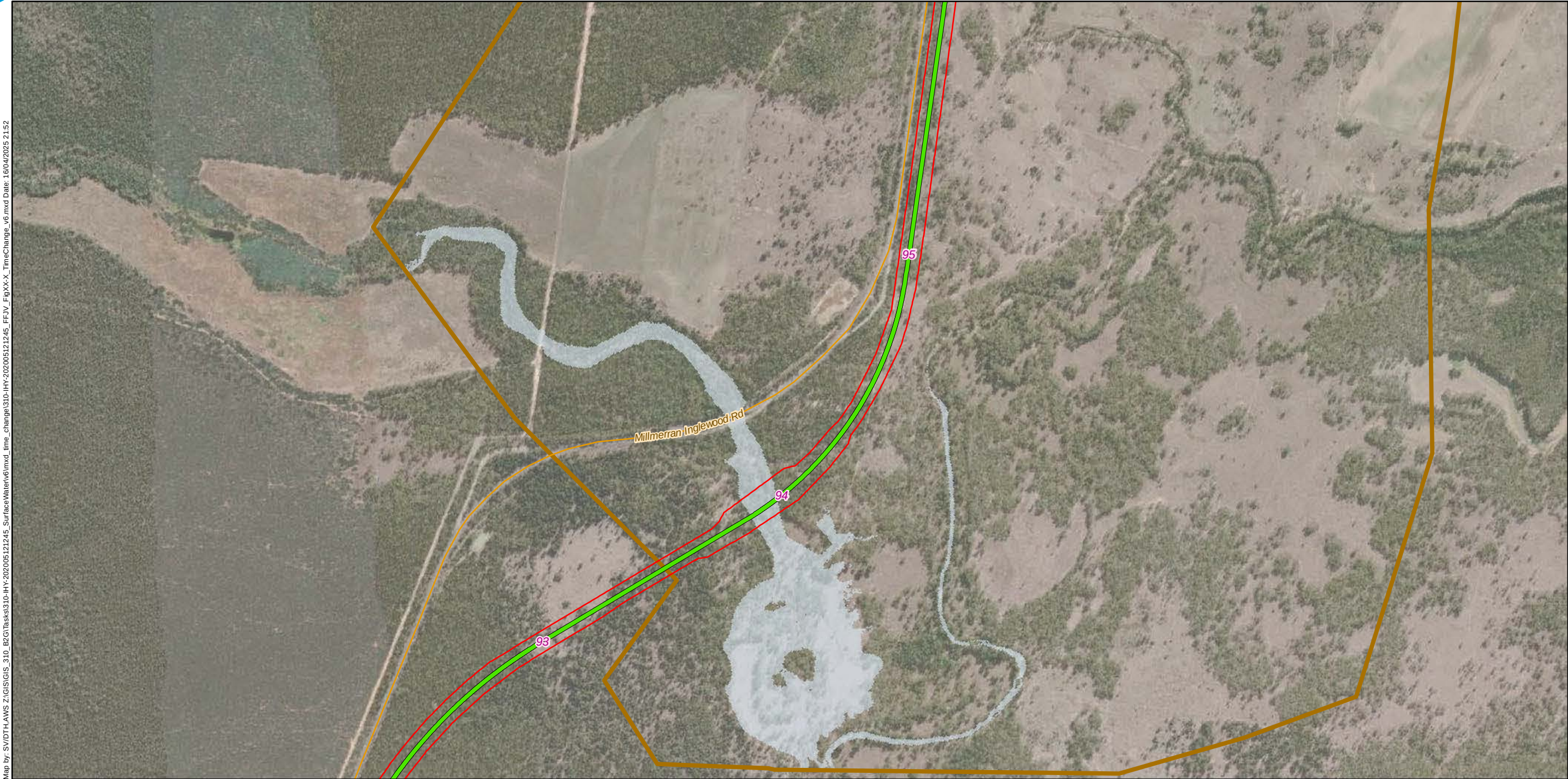
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G4-F:

1% AEP Event - Change in Hazard - Native Dog Creek

Map by: SV\DT\LAWS Z\GIS\GIS_310_B2G\Task\310-HY-2020\05121245_SurfaceWater\6mxd_time_change\310-HY-2020\05121245_FFJV_FigXX-X_TimeChange_v6.mxd Date: 16/04/2025 21:52



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 16/04/2025 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G4-G:

20% AEP Event - Change in Time of Inundation - Native Dog Creek

Map by: SV\DT\LAWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\6mxd TimeChange_v6.mxd Date: 16/04/2025 21:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 16/04/2025 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G4-H:

1% AEP Event - Change in Time of Inundation - Native Dog Creek

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_change\310-HY-2020\5121245_FF_V_FigXX-X_VelocityDiff_FIO_v5.mxd Date: 21/06/2024 08:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

< -0.5	0.01 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.50
-0.05 to -0.01	> 0.50
-0.01 to 0.01	

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G5-A:

20% AEP Event - Change in Velocity (<0.5m/s cutoff) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_change\310-HY-2020\5121245_FF_V_FigXX-X_VelocityDiff_FIO_v5.mxd Date: 21/06/2024 08:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|--------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | |

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G5-B:

1% AEP Event - Change in Velocity (<0.5m/s cutoff) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\mcd_velocity_change_pc310-IHY-2020\05121245_FF\JV_FigXX-X_VelocityDiff_pc_FIO_0501m_v5.mxd Date: 21/06/2024 09:02



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G5-C:
20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\mcd_velocity_change_pc310-IHY-2020\05121245_FF\JV_FigXX-X_VelocityDiff_pc_FIO_0501m_v5.mxd Date: 21/06/2024 09:02



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

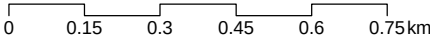
Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:15,000



Future Freight
Integrating Community, Environment and Engineering

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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G5-D:
1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\med_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_v5.mxd Date: 21/06/2024 09:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G5-E:
20% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\med_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_v5.mxd Date: 21/06/2024 09:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G5-F:
1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Native Dog Creek



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



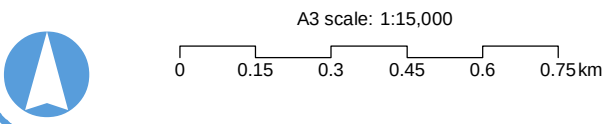
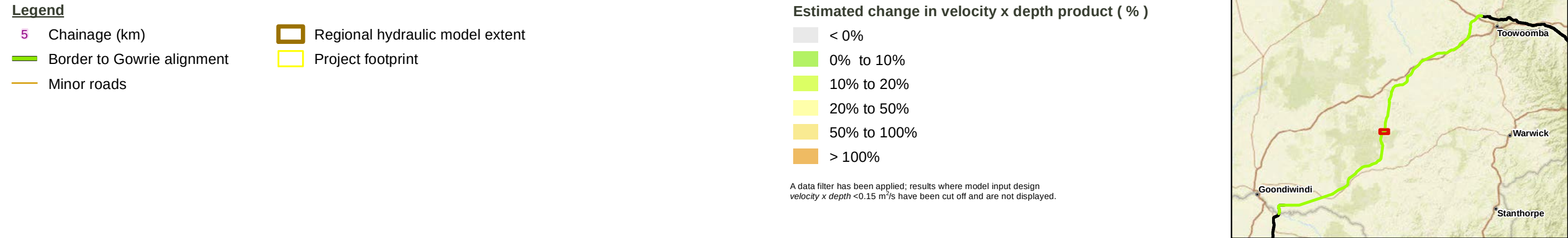
Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G6-A:

20% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Native Dog Creek



Border to Gowrie
Figure G6-B:
1% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_time_change_pcd310-HY-2020\05121245_FF3V_FigXX-X_TimeDiff_percent_v5.mxd Date: 21/06/2024 08:46

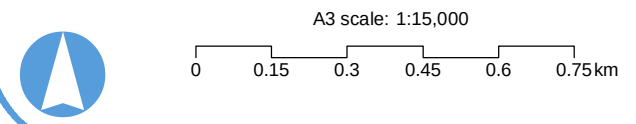
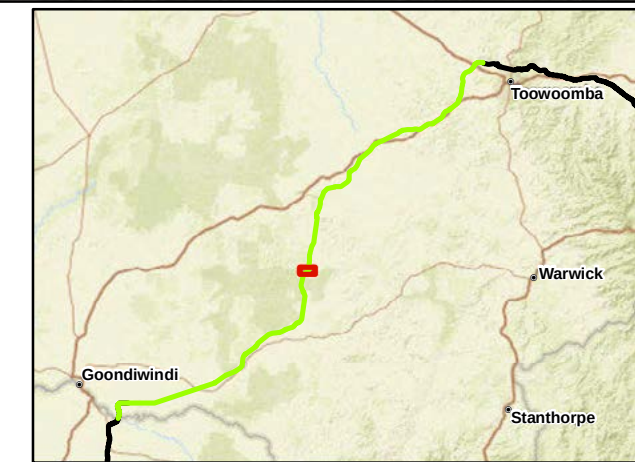


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_time_change_pcd310-HY-2020\05121245_FF\FF_V_FigXX-X_TimeDiff_percent_v5.mxd Date: 21/06/2024 08:46

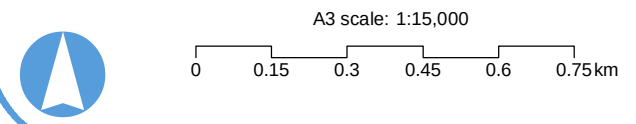
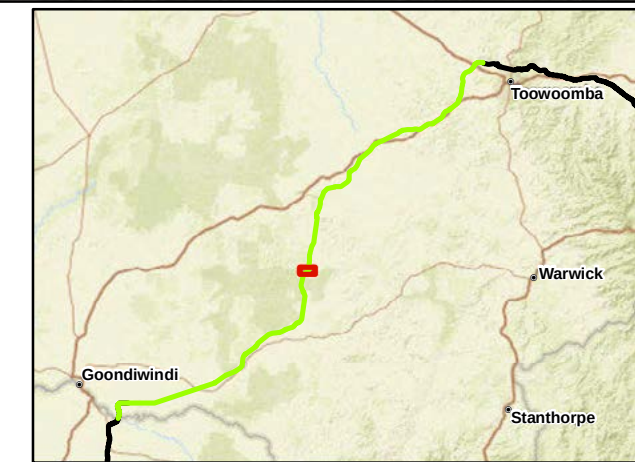


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |



Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\6mxd_time_change_pc\1310-HY-2020\05121245_FF\3V_FigXX-X_TimeDiff_percent_FIO_v6.mxd Date: 16/04/2025 22:08



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Issue date: 16/04/2025 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure G7-C:

20% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\mxd_time_change_pct310-HY-2020\05121245_FF\JV_FigXX-X_TimeDiff_percent_FIO_v5.mxd Date: 21/06/2024 08:42



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

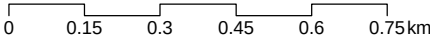
Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:15,000



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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G7-D:
1% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Native Dog Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_afflux\310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13



Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure G8-A:
1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Native Dog Creek

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix H Cattle Creek flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix H

Cattle Creek Flood Maps

Figure H1-A Locality Plan
Figure H1-B Survey Data
Figure H1-C Hydrologic Model Setup
Figure H1-D Hydraulic Model Setup
Figure H1-E Landuse Classifications
Figure H1-F Proposed Design Structures

Figure H2-A 20% AEP Event - Peak Water Levels - Existing Case
Figure H2-B 1% AEP Event - Peak Water Levels - Existing Case
Figure H2-C 20% AEP Event - Peak Velocity - Existing Case
Figure H2-D 1% AEP Event - Peak Velocity - Existing Case
Figure H2-E 20% AEP Event - Peak Hazard - Existing Case
Figure H2-F 1% AEP Event - Peak Hazard - Existing Case
Figure H2-G 20% AEP Event - Peak Time of Inundation - Existing Case
Figure H2-H 1% AEP Event - Peak Time of Inundation - Existing Case

Figure H3-A 20% AEP Event - Peak Water Levels - Developed Case
Figure H3-B 1% AEP Event - Peak Water Levels - Developed Case
Figure H3-C 20% AEP Event - Peak Velocity - Developed Case
Figure H3-D 1% AEP Event - Peak Velocity - Developed Case
Figure H3-E 20% AEP Event - Peak Hazard - Developed Case
Figure H3-F 1% AEP Event - Peak Hazard - Developed Case
Figure H3-G 20% AEP Event - Peak Time of Inundation - Developed Case
Figure H3-H 1% AEP Event - Peak Time of Inundation - Developed Case

Figure H4-A 20% AEP Event - Afflux
Figure H4-B 1% AEP Event - Afflux
Figure H4-C 20% AEP Event - Change in Velocity
Figure H4-D 1% AEP Event - Change in Velocity
Figure H4-E 20% AEP Event - Change in Hazard
Figure H4-F 1% AEP Event - Change in Hazard
Figure H4-G 20% AEP Event - Change in Time of Inundation
Figure H4-H 1% AEP Event - Change in Time of Inundation

Figure H5-A 20% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure H5-B 1% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure H5-C 20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure H5-D 1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure H5-E 20% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure H5-F 1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)

Figure H6-A 20% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)
Figure H6-B 1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)

Figure H7-A 20% AEP Event - Percentage Change in Time of Inundation
Figure H7-B 1% AEP Event - Percentage Change in Time of Inundation
Figure H7-C 20% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
Figure H7-D 1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)

Figure H8-A 1% AEP Event - Sensitivity - 0% Blockage
Figure H8-B 1% AEP Event - Sensitivity - 50% Blockage
Figure H8-C 1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels

Map by: SV / DTH 2:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\310mxd Locality\310-IHY-202005121245_FF\IV_Fig\1-X_Locality_CAT_v6.mxd Date: 20/06/2024 16:59



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Watercourses
- Minor roads
- Regional hydraulic model extent
- Project footprint



A3 scale: 1:20,000



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure H1-A:
Locality Plan - Cattle Creek

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\310mxd_SurveyData_CAT_v5.mxd Date: 20/06/2024 17:01



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project footprint
- Hydrologic model extent

LiDAR datasets (1m grid)

- 2015 ARTC LiDAR 1m



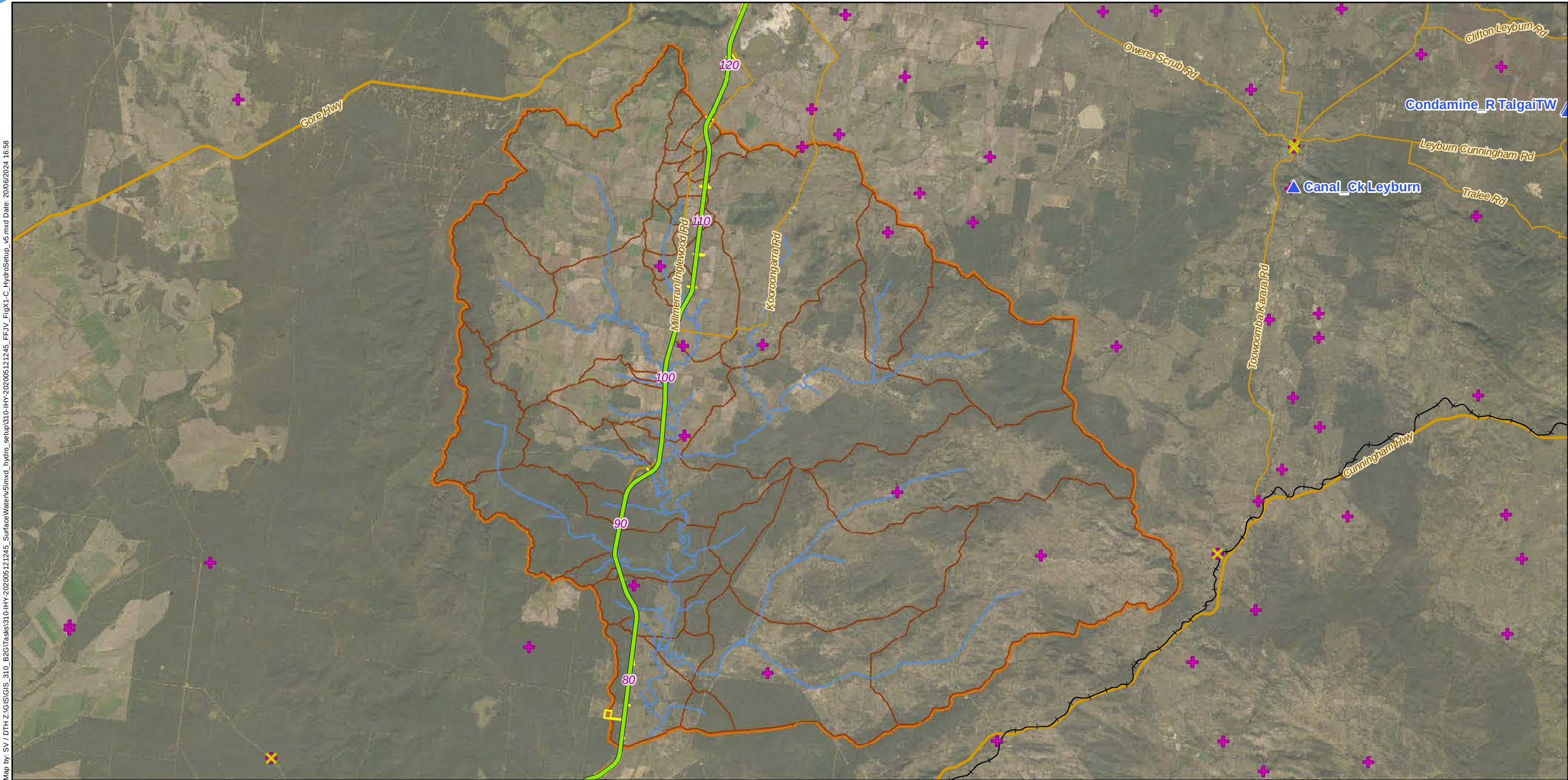
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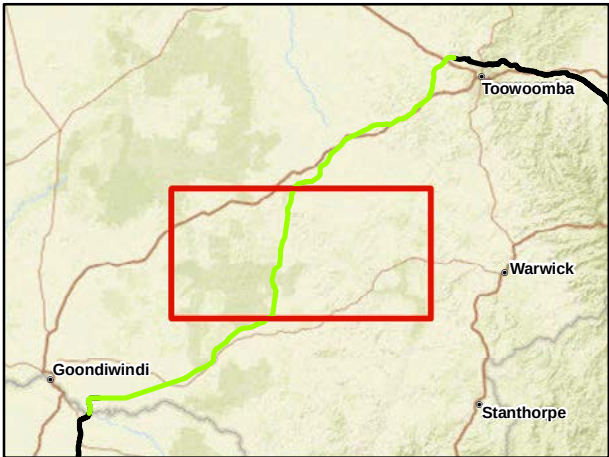
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure H1-B:
Survey Data - Cattle Creek



Legend

- | | | | |
|-----------------------------|-------------------|-------------------------|-------------------------|
| 5 Chainage (km) | Major roads | Catchment links | Pluviograph stations |
| Localities | Minor roads | Sub-catchments | Daily rainfall stations |
| Existing rail (operational) | Project footprint | Hydrologic model extent | Stream gauge locations |
| Border to Gowrie alignment | | | |



A3 scale: 1:260,000
0 2.5 5 7.5 10 12.5 km

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5\mxd_HydraulicSetup_v5.mxd Date: 20/06/2024 17:04



Legend

- | | | |
|----------------------------|-------------------|---------------------------------|
| 5 Chainage (km) | Minor roads | Regional hydraulic model extent |
| Border to Gowrie alignment | Project footprint | Outflow boundary |
| | | Inflow boundary |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H1-D:

Hydraulic Model Setup - Cattle Creek

Map by: SV / DTH 2:\GIS\GIS_310_B2G1Tasks\310-HY-202005121245_SurfaceWater\310mxd Land_class\310-HY-202005121245_FF JV_FigXX-X_LandClass_L2_CAT_v6.mxd Date: 2006/2024 17:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Landuse classification

- Sealed Road Corridor (n = 0.015)
- Open Space - Heavy Veg (n = 0.065)



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



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Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H1-E:

Landuse classifications - Cattle Creek

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Surfaces\Water\5mxd_FigX-X_Structures_v5.mxd Date: 21/06/2024 08:35



Legend

- 5 Chainage (km)
- ⊠ Floodplain culvert
- ⊠ Local drainage culvert
- Border to Gowrie alignment
- Minor roads
- Bridges
- Regional hydraulic model extent
- Project footprint



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



Future Freight
Integrating Community, Environment and Engineering

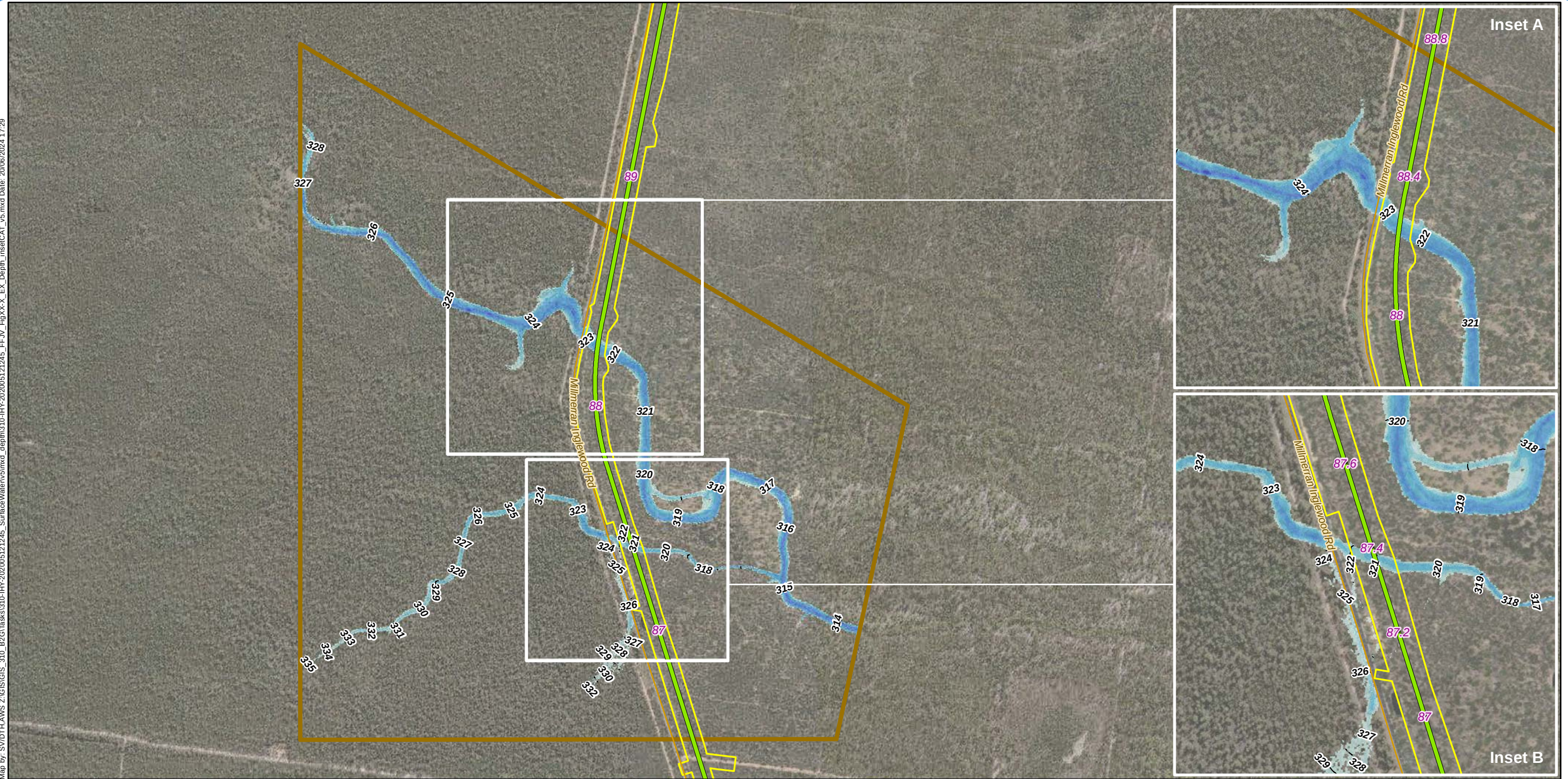
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H1-F:

Proposed Design Structures - Cattle Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\51mxd_depth\310-IHY-2020\5121245_FF\JV_FigX-X_EX_Depth_insetCAT_v5.mxd Date: 20/06/2024 17:29



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

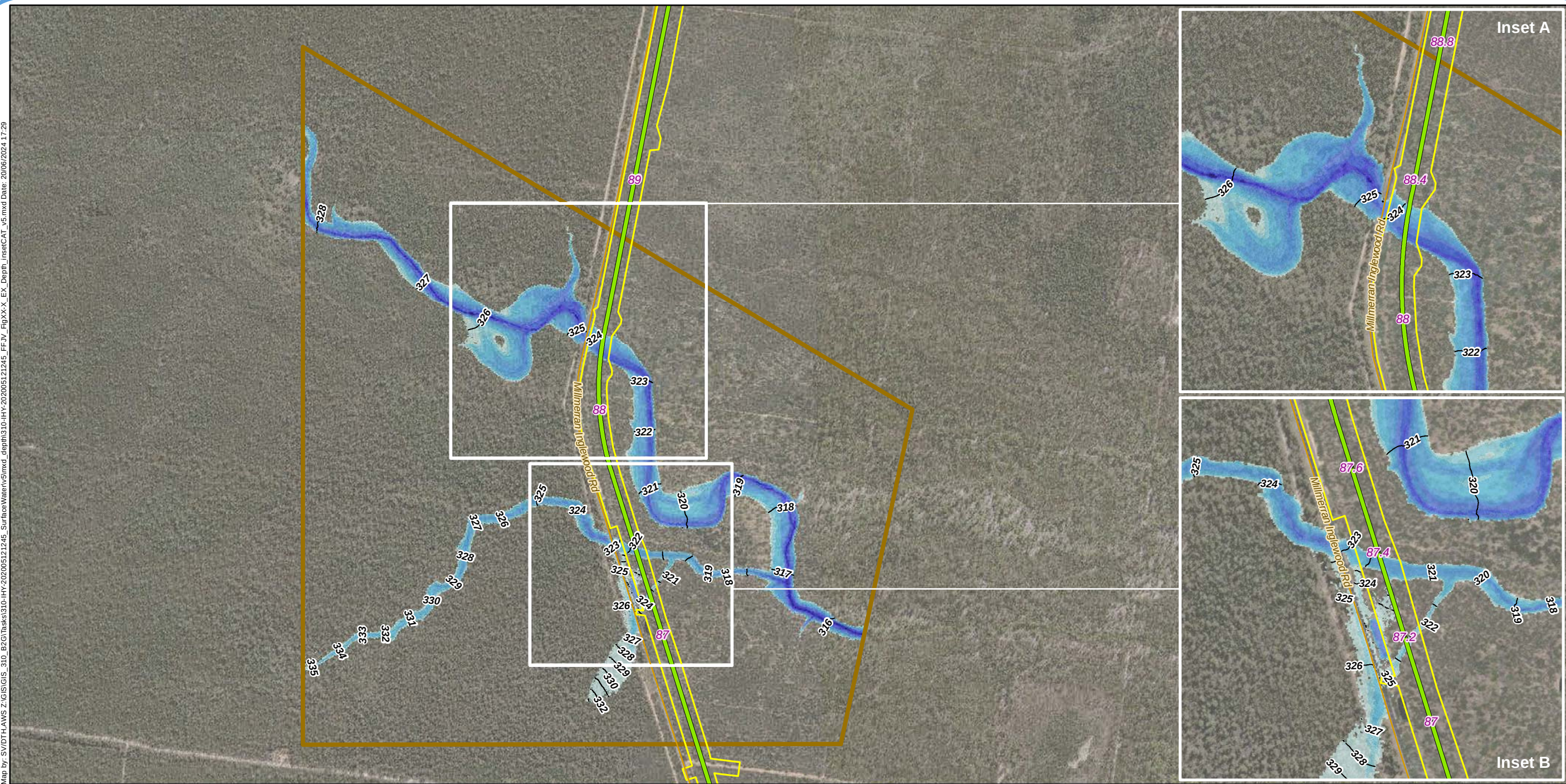
Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_depth\310-IHY-2020\05121245_FF\3V_FigX-X_EX_Depth_insetCAT_v5.mxd Date: 20/06/2024 17:29



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



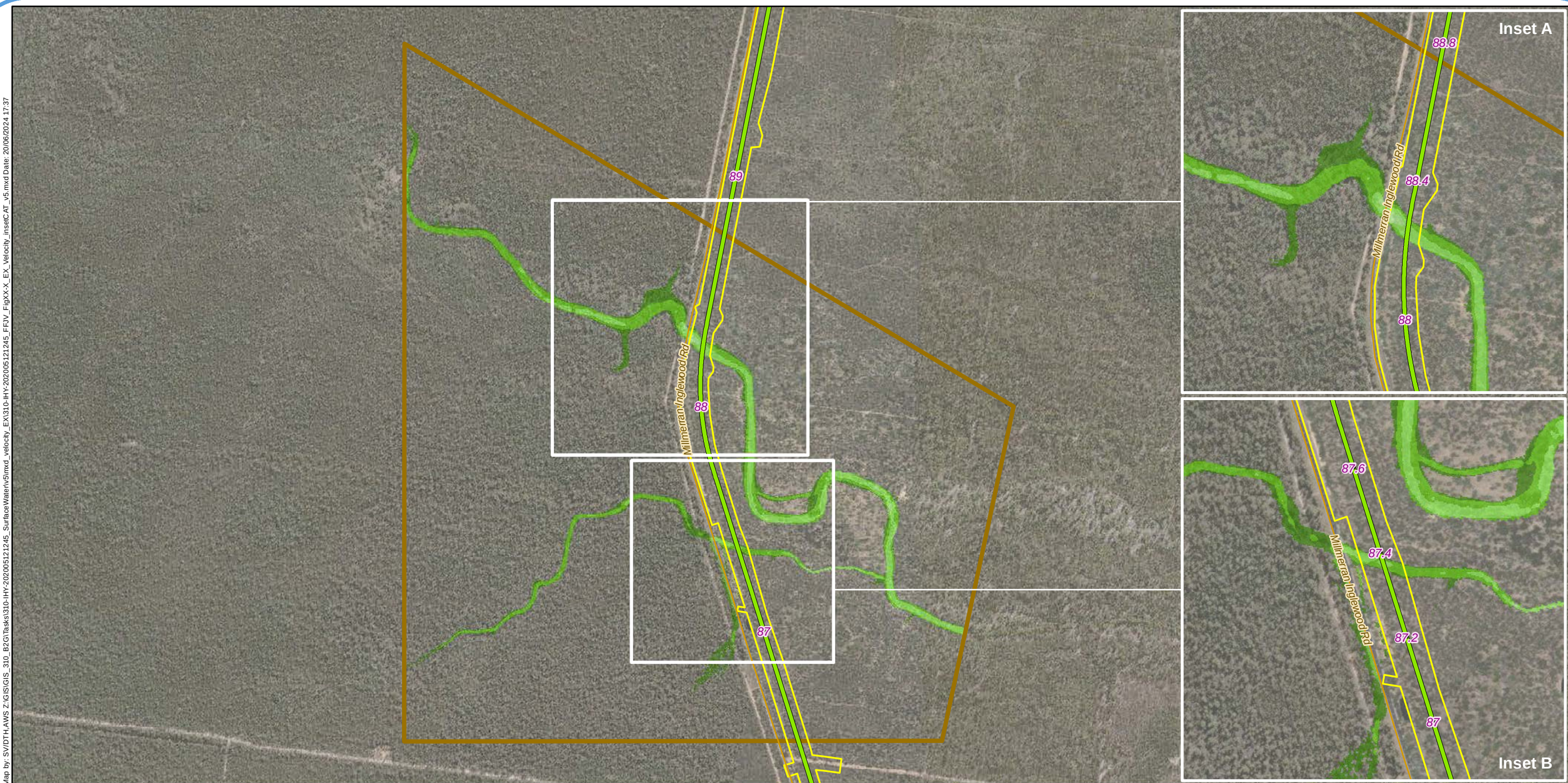
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H2-B:

1% AEP Event - Peak Water Levels - Existing Case - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51245_FFEV_FigXX-X_EX_Velocity_insetCAT_v5.mxd Date: 20/06/2024 17:37



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_EX\310-HY-2020\05121245_FF3V_FigXX-X_EX_Velocity_insetCAT_v5.mxd Date: 20/06/2024 17:37



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



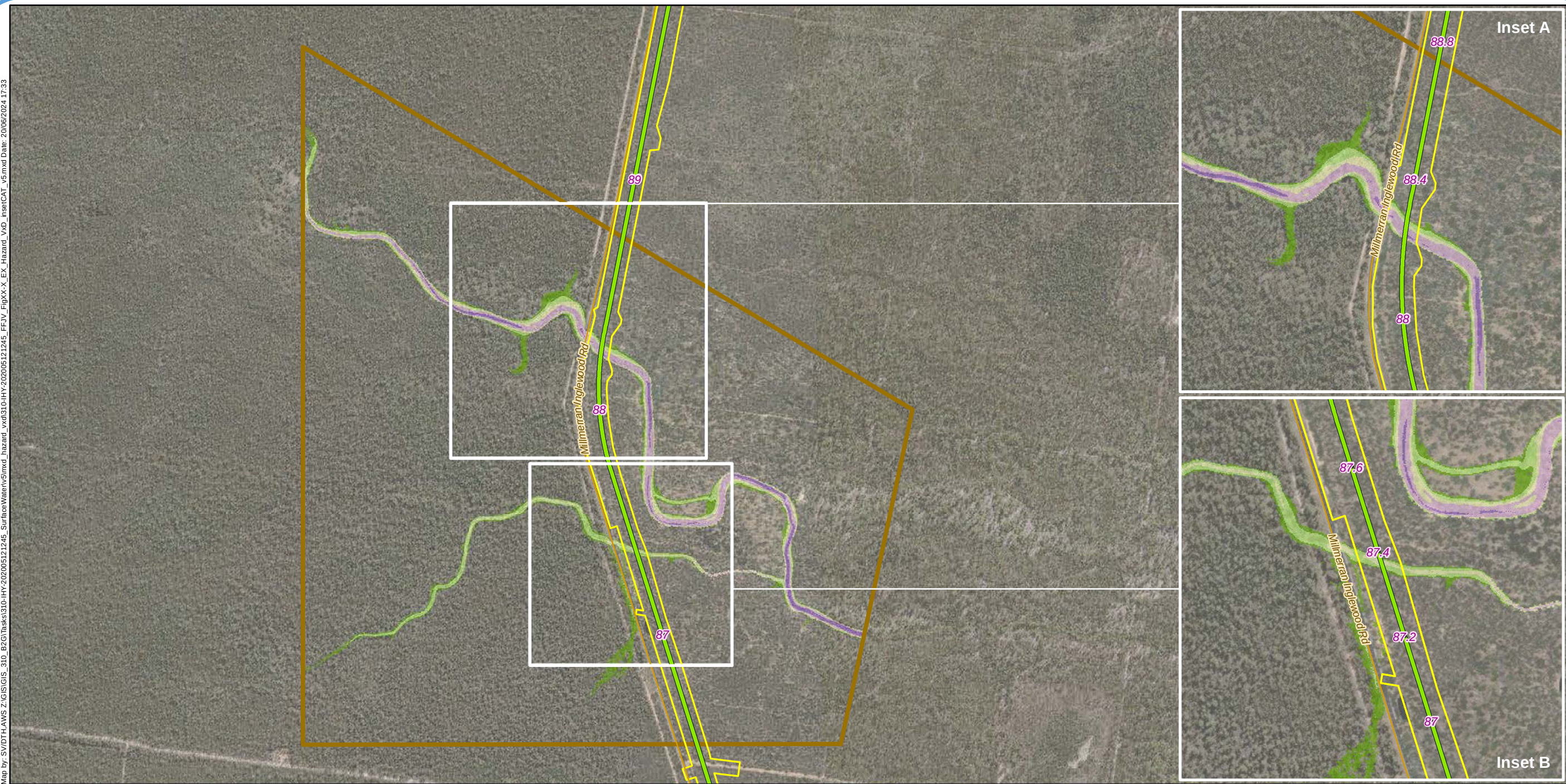
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H2-D:

1% AEP Event - Peak Velocity - Existing Case - Cattle Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51245_FF3V_FigX-X_EX_Hazard_VaD_InsetCAT_v5.mxd Date: 20/06/2024 17:33



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

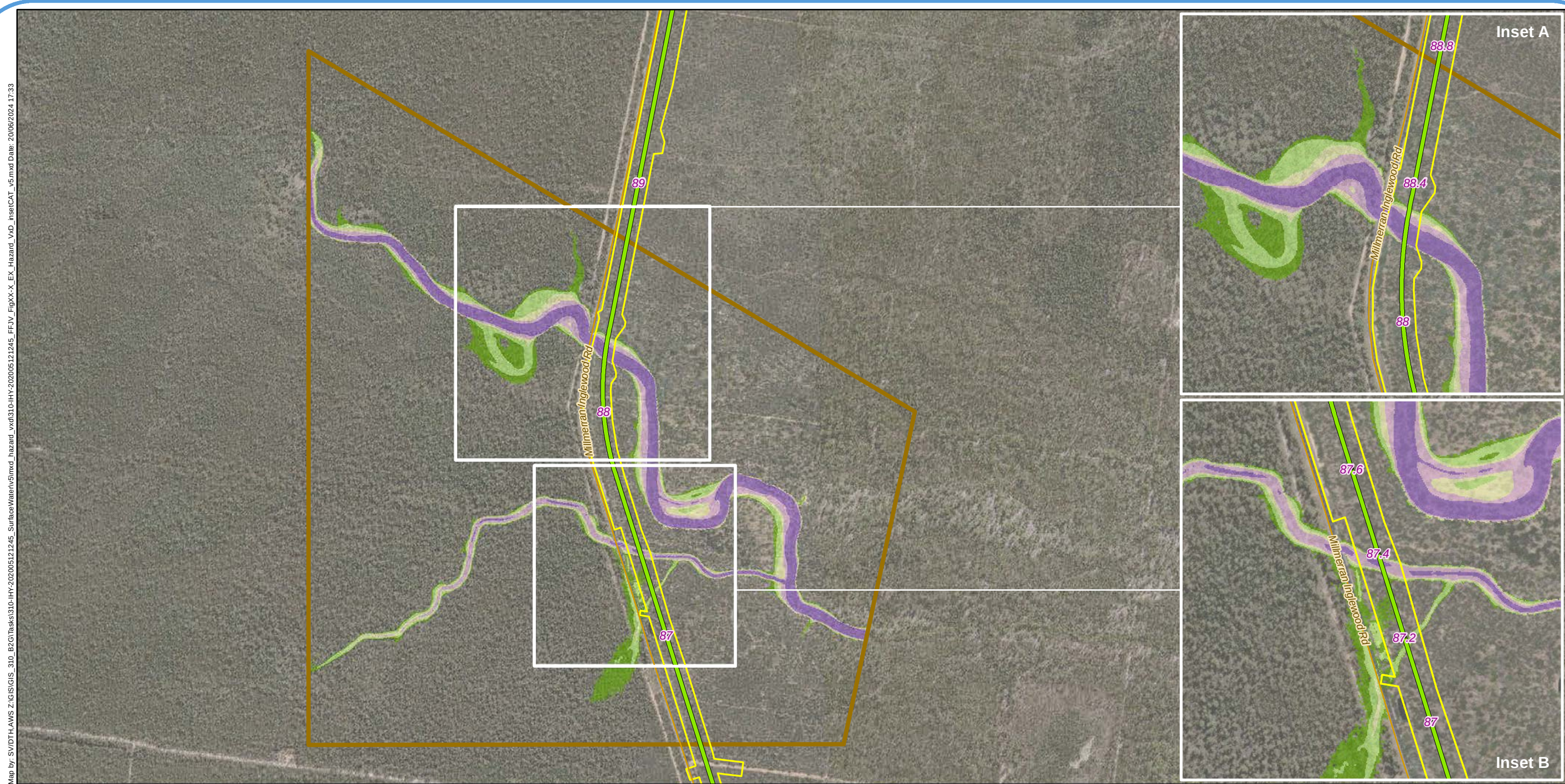
Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2GTasks\310-IHY-2020\05121245_SurfaceWater\5mxd_Hazard_Vxd_InsetCAT_v5.mxd Date: 20/06/2024 17:33

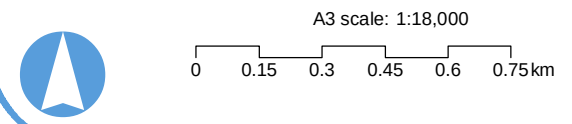


Legend

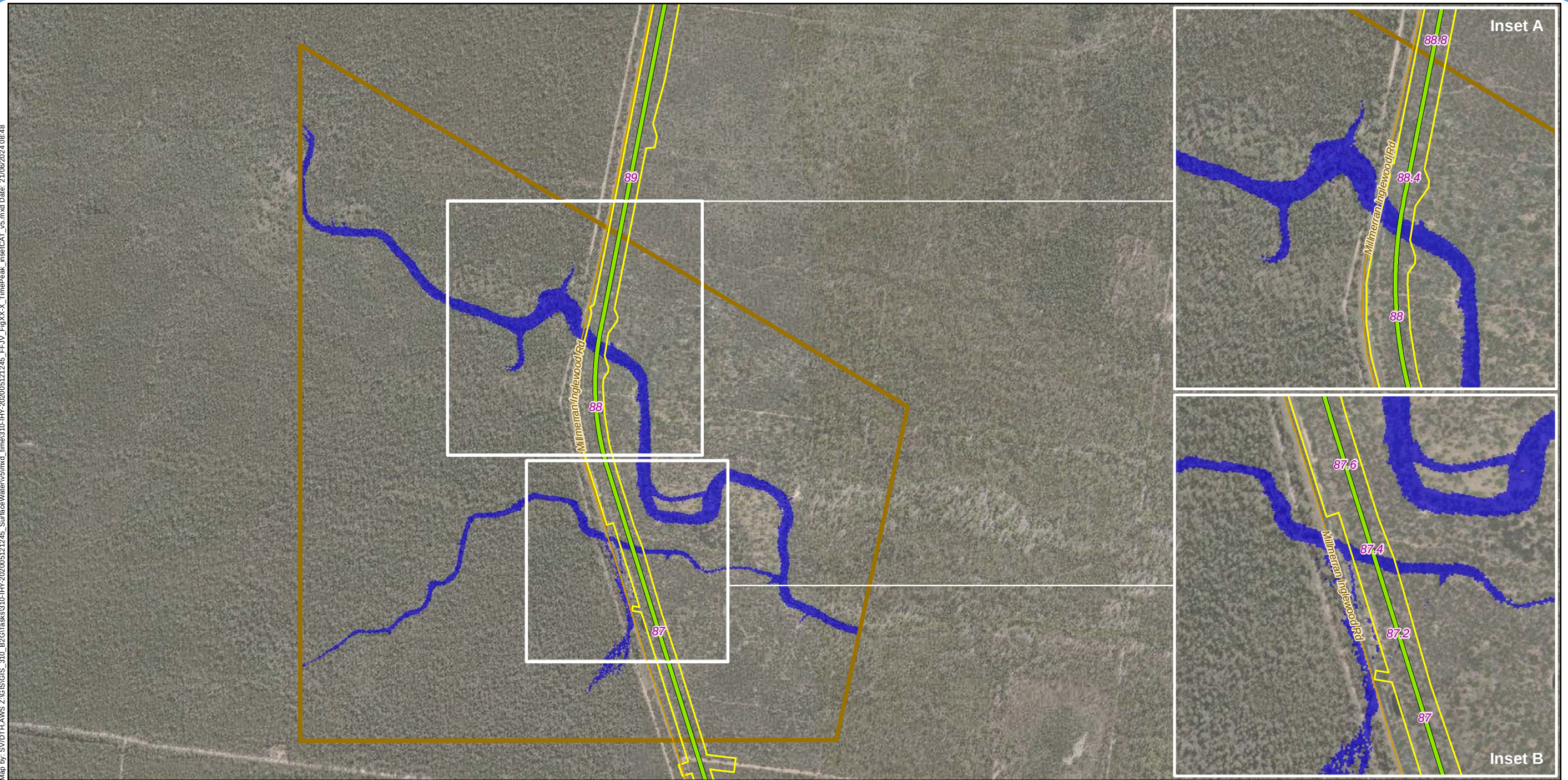
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_InsetCAT_v5.mxd Date: 21/06/2024 08:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

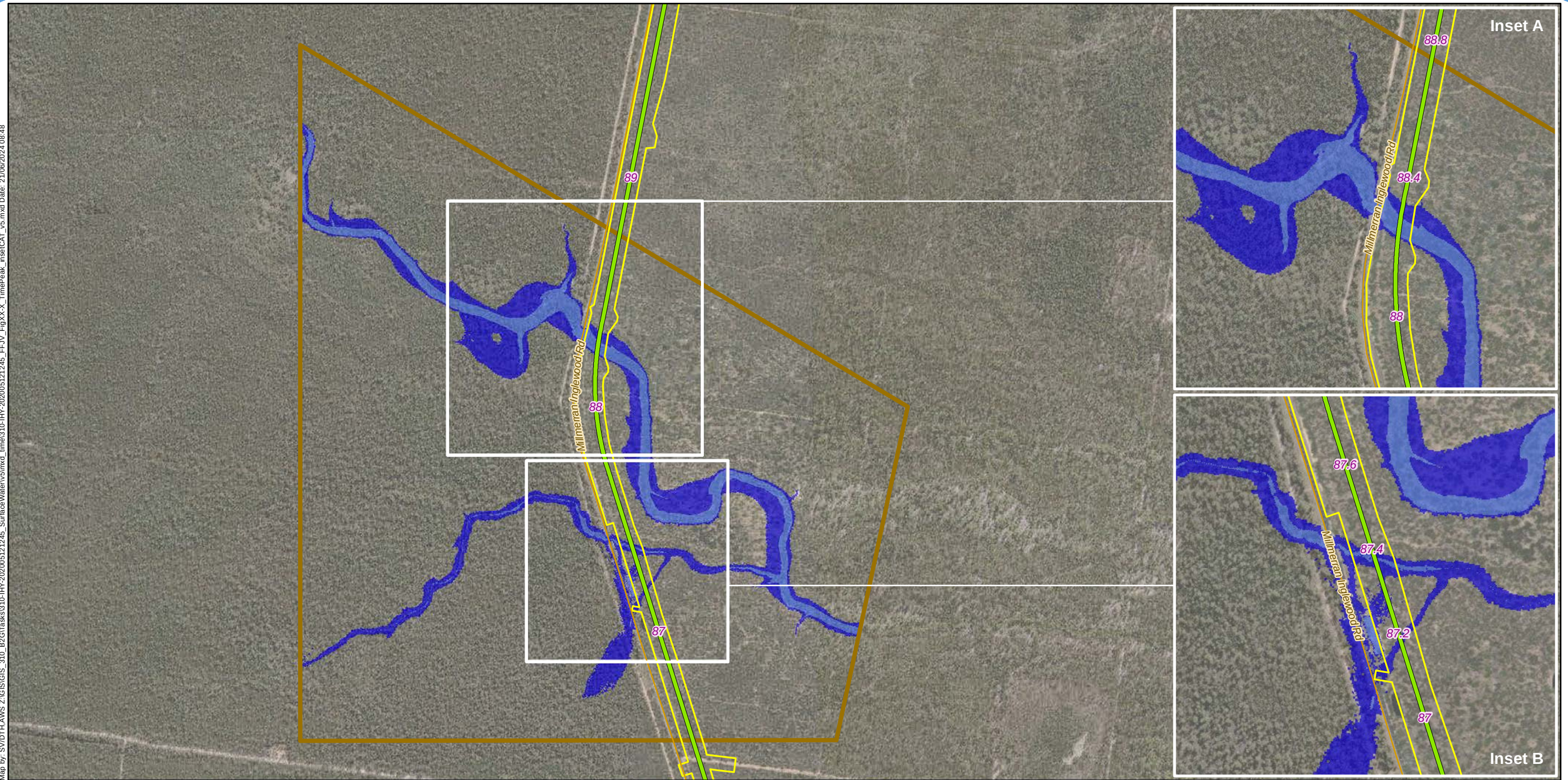
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_InsetCAT_v5.mxd Date: 21/06/2024 08:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



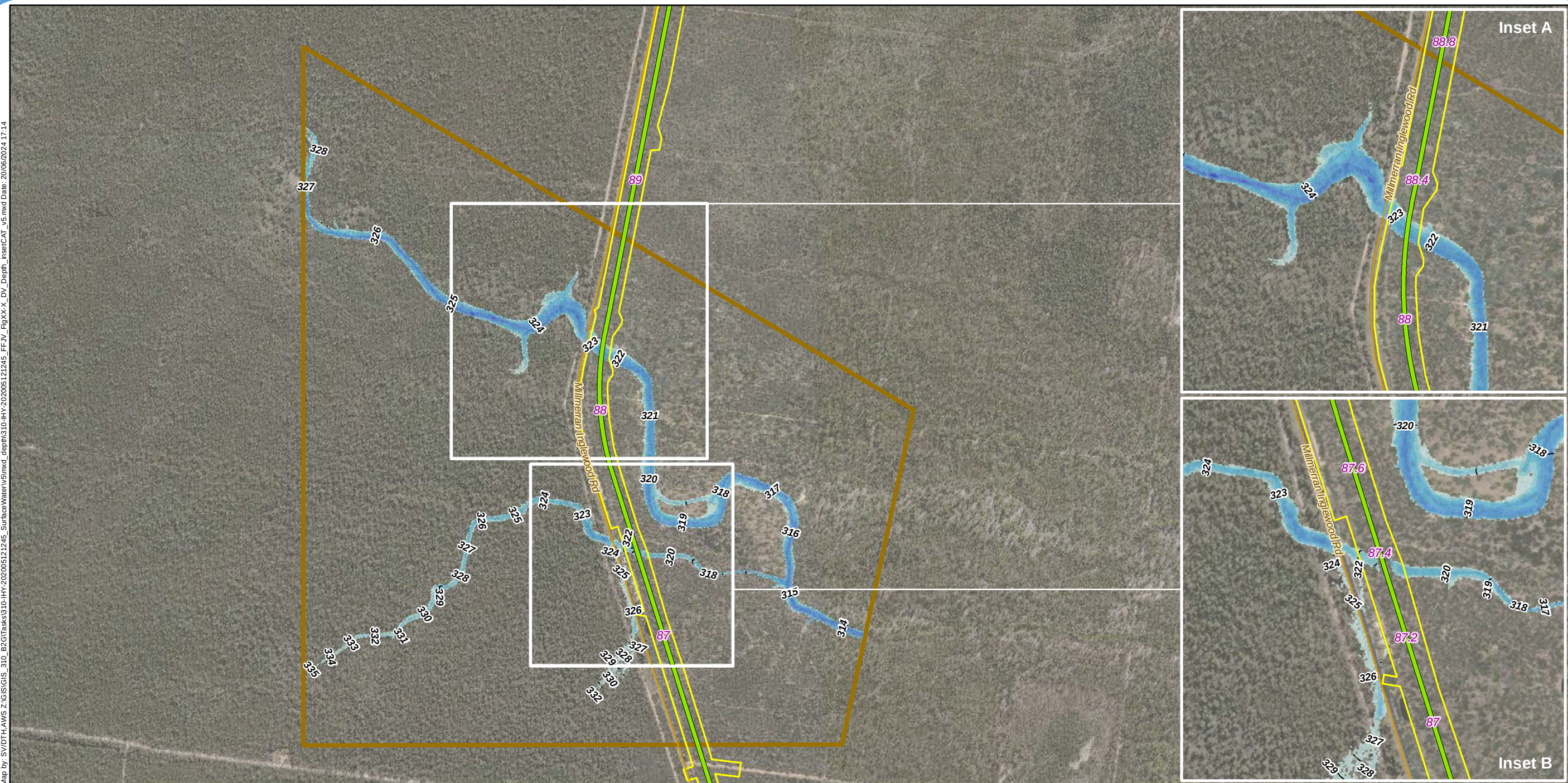
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H2-H:

1% AEP Event - Peak Time of Inundation - Existing Case - Cattle Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF\3V_FigX-X_DV_Depth_insetCAT_v5.mxd Date: 20/06/2024 17:14



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



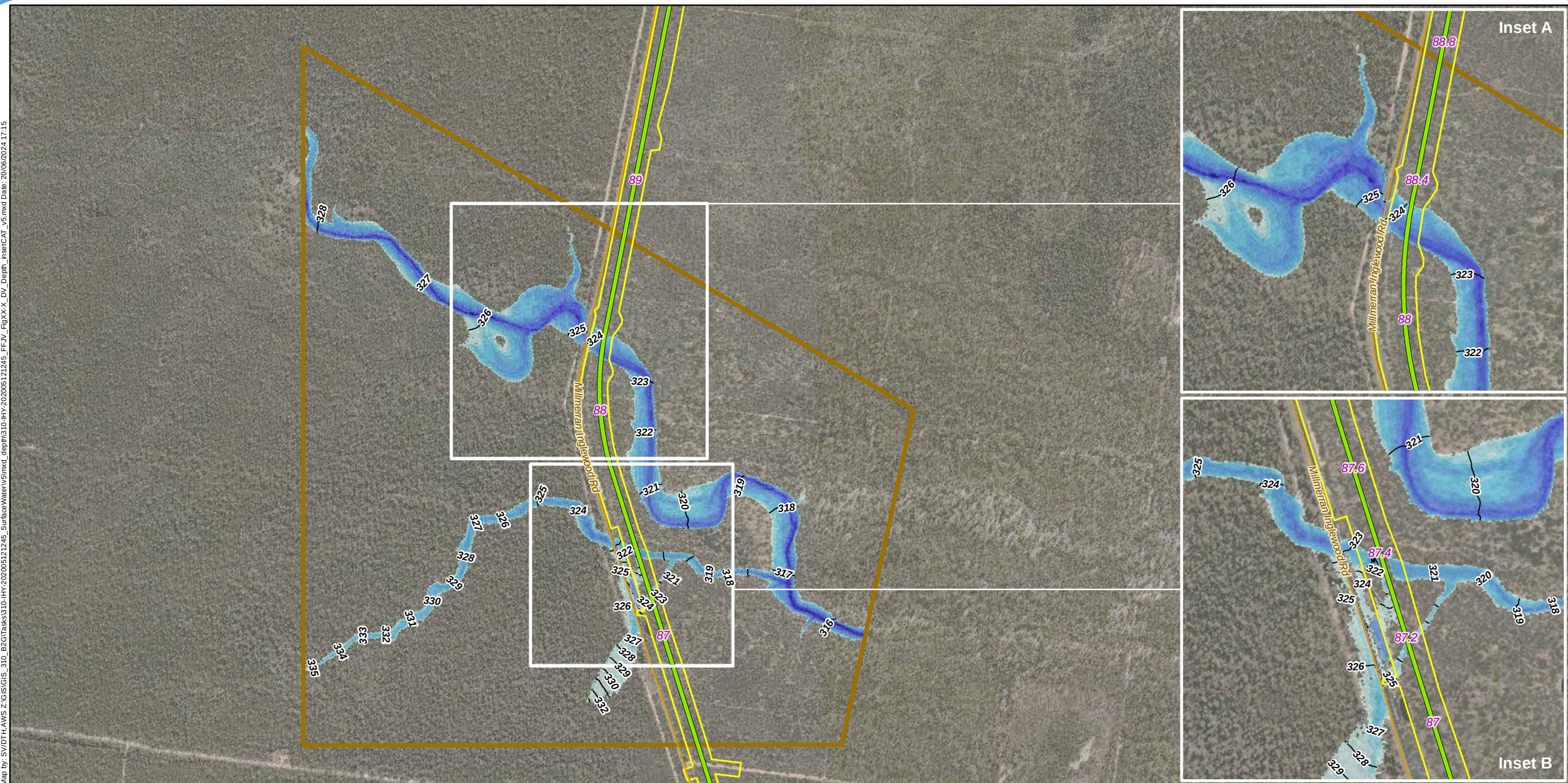
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H3-A:

20% AEP Event - Peak Water Levels - Developed Case - Cattle Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF\3V_FigX-X_DV_Depth_insetCAT_v5.mxd Date: 20/06/2024 17:15



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

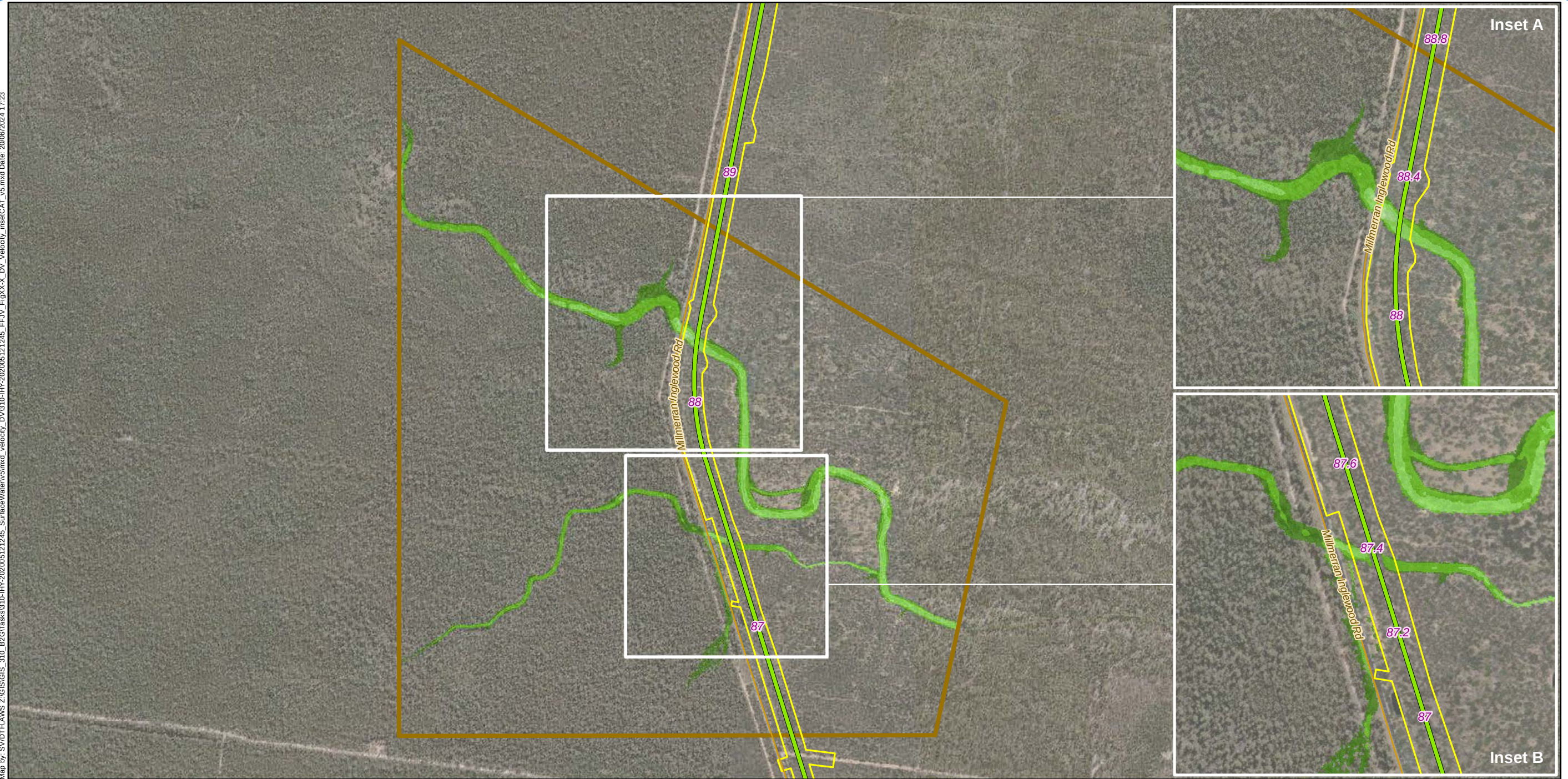
Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: SV\DT\H.AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\5121245_SurfaceWater\5121245_FF3V_FigXX-X_DV_Velocity_insetCAT_v5.mxd Date: 20/06/2024 17:23



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

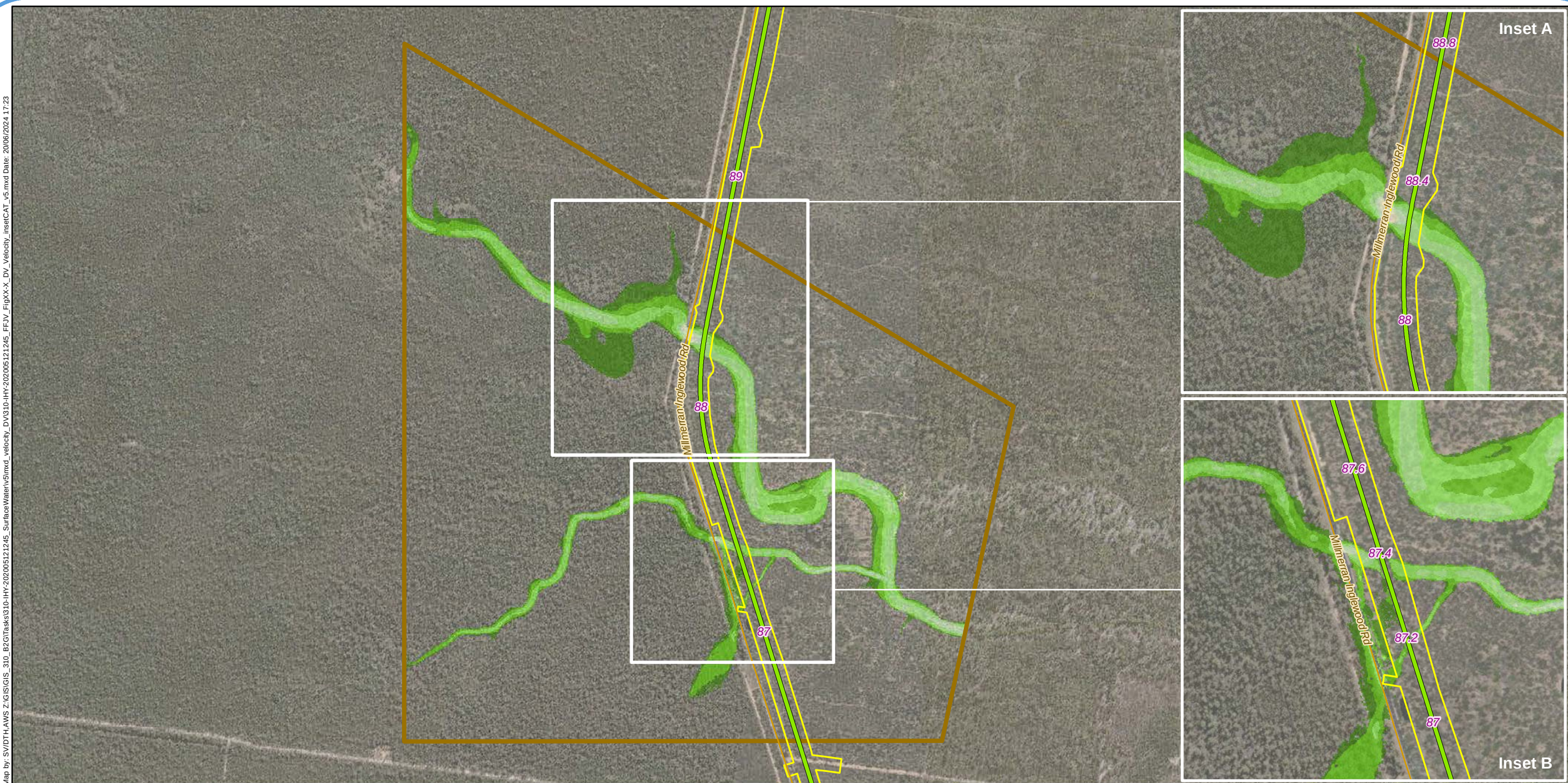
Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\5121245_SurfaceWater\51245_FF3V_FigXX-X_DV_Velocity_insetCAT_v5.mxd Date: 20/06/2024 17:23



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

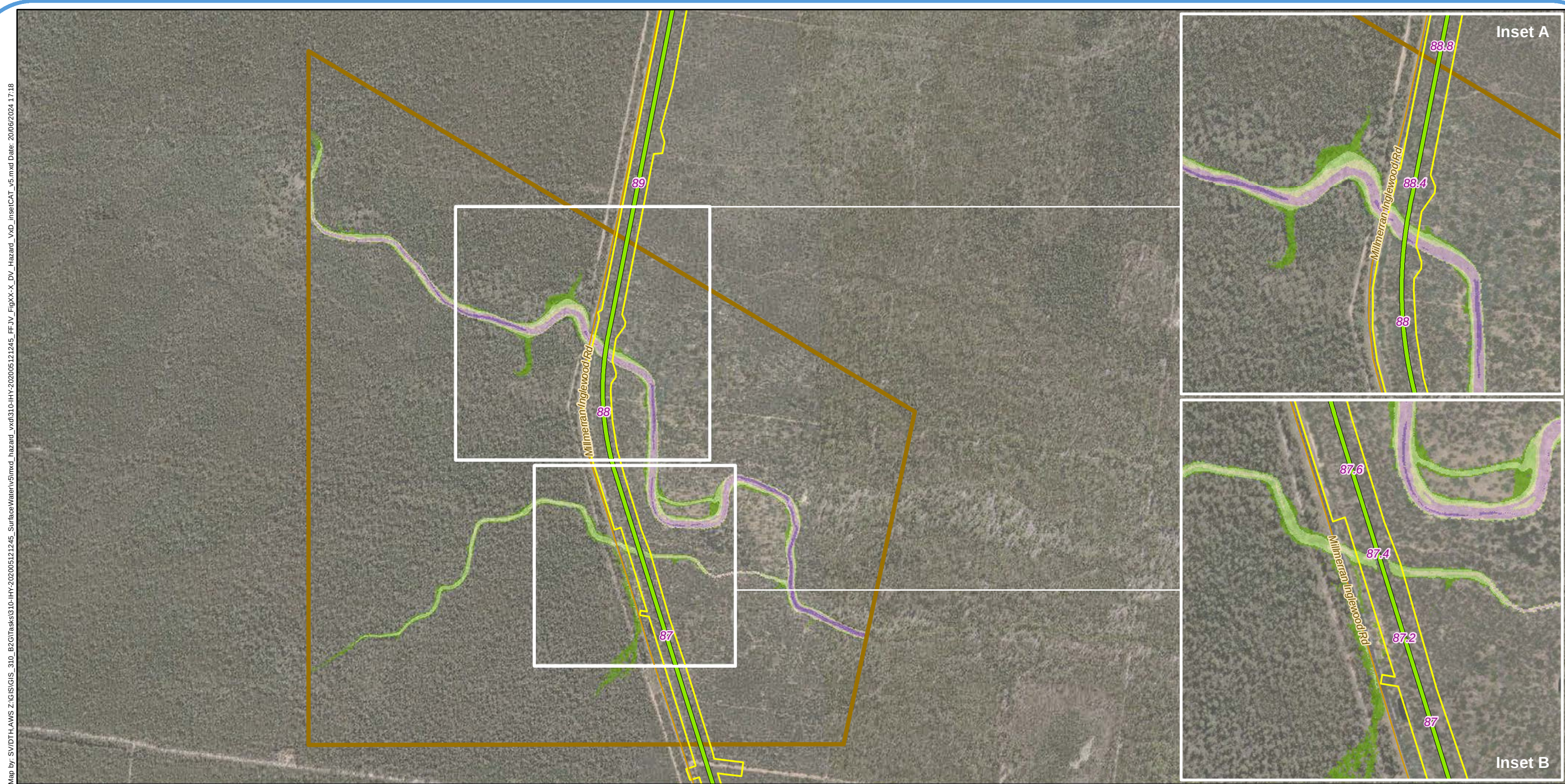
Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\ Hazard_Vad_insetCAT_v5.mxd Date: 20/06/2024 17:18

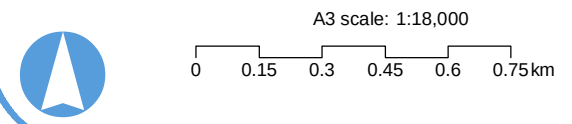


Legend

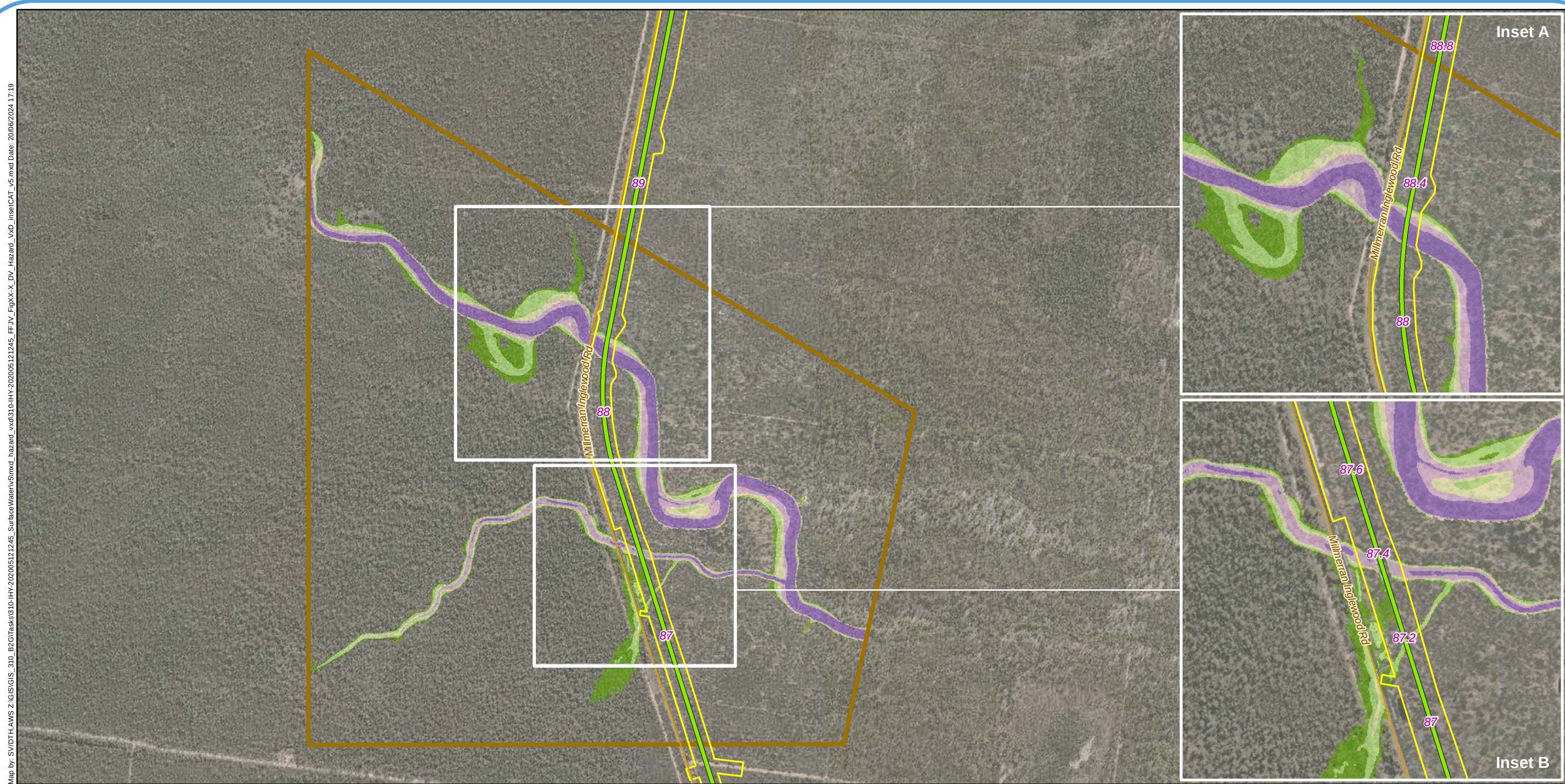
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\ Hazard_Vad_insetCAT_v5.mxd Date: 20/06/2024 17:19

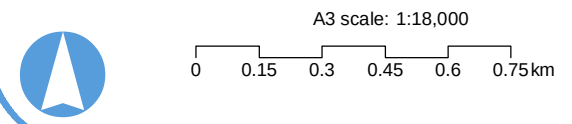


Legend

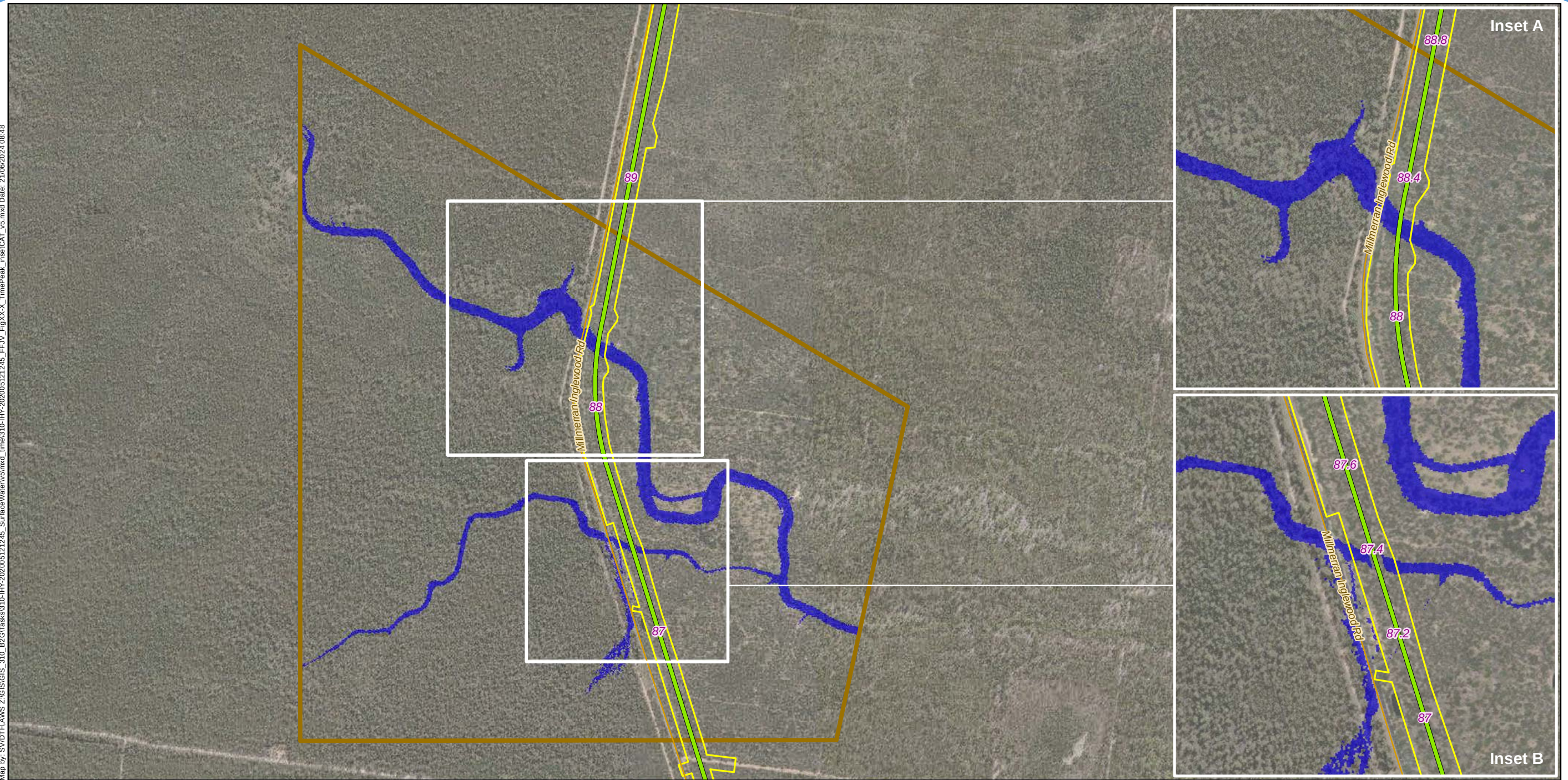
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\J_V_Fig\XX-X_TimePeak_InsetCAT_v5.mxd Date: 21/06/2024 08:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



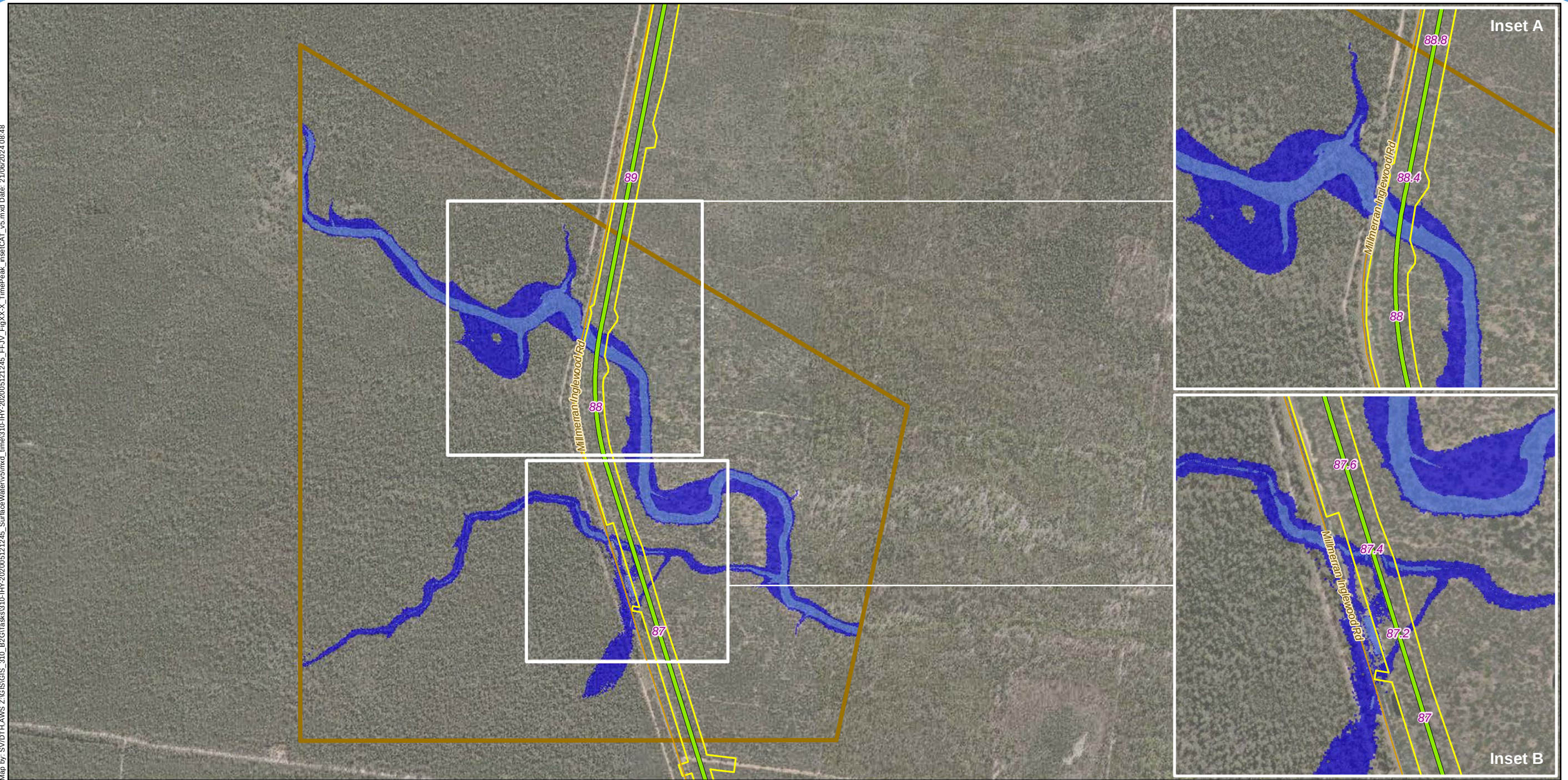
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H3-G:

20% AEP Event - Peak Time of Inundation - Developed Case - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_time\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_InsetCAT_v5.mxd Date: 21/06/2024 08:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_afluc310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_InsetCAT_v5.mxd Date: 20/06/2024 17:06



Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H4-A:

20% AEP Event - Afflux - Cattle Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF_IV_FigXX-X_Afflux_InsetCAT_v5.mxd Date: 20/06/2024 17:06



Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

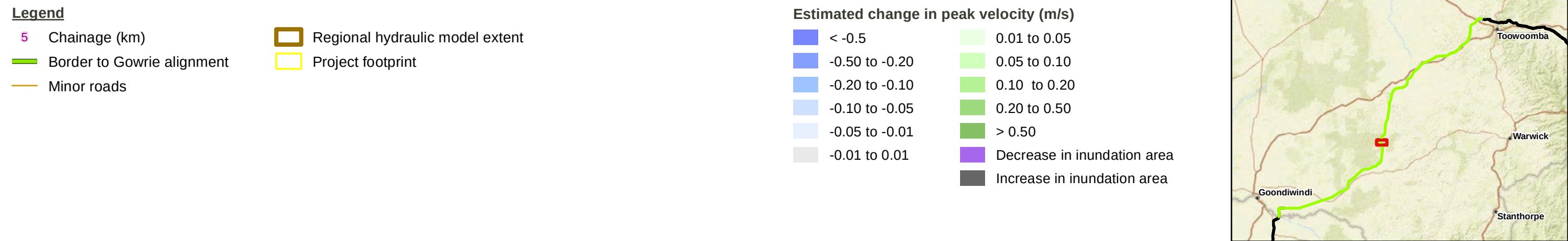
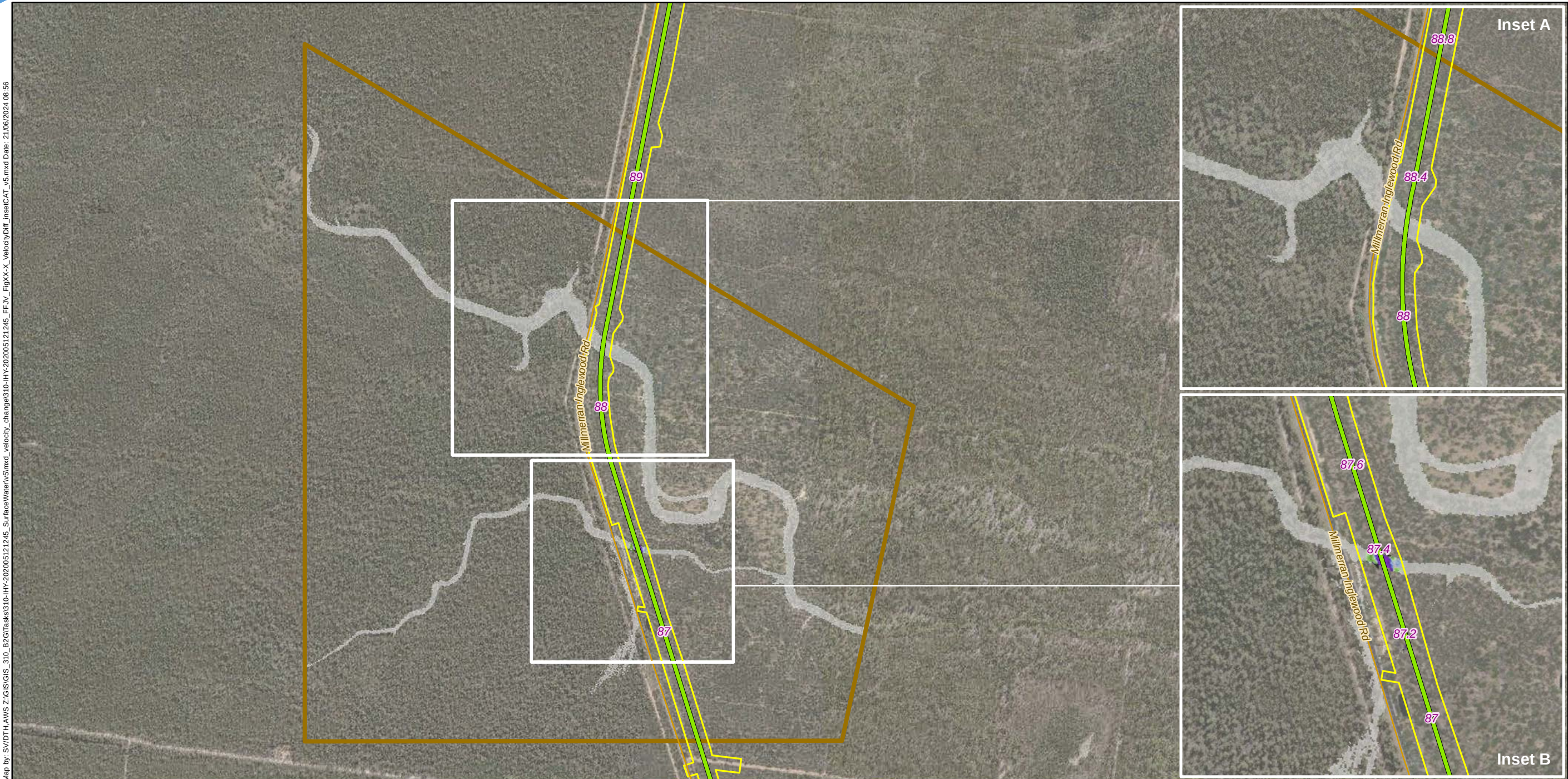
Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_inseCAT_v5.mxd Date: 21/06/2024 08:56



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\md_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_inseCAT_v5.mxd Date: 21/06/2024 08:57



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H4-D:

1% AEP Event - Change in Velocity - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_hazard_lyrd_change\310-IHY-2020\05121245_FF3V_FigXX-X_HazardDiff_InsetCAT_v6.mxd Date: 20/06/2024 17:40



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

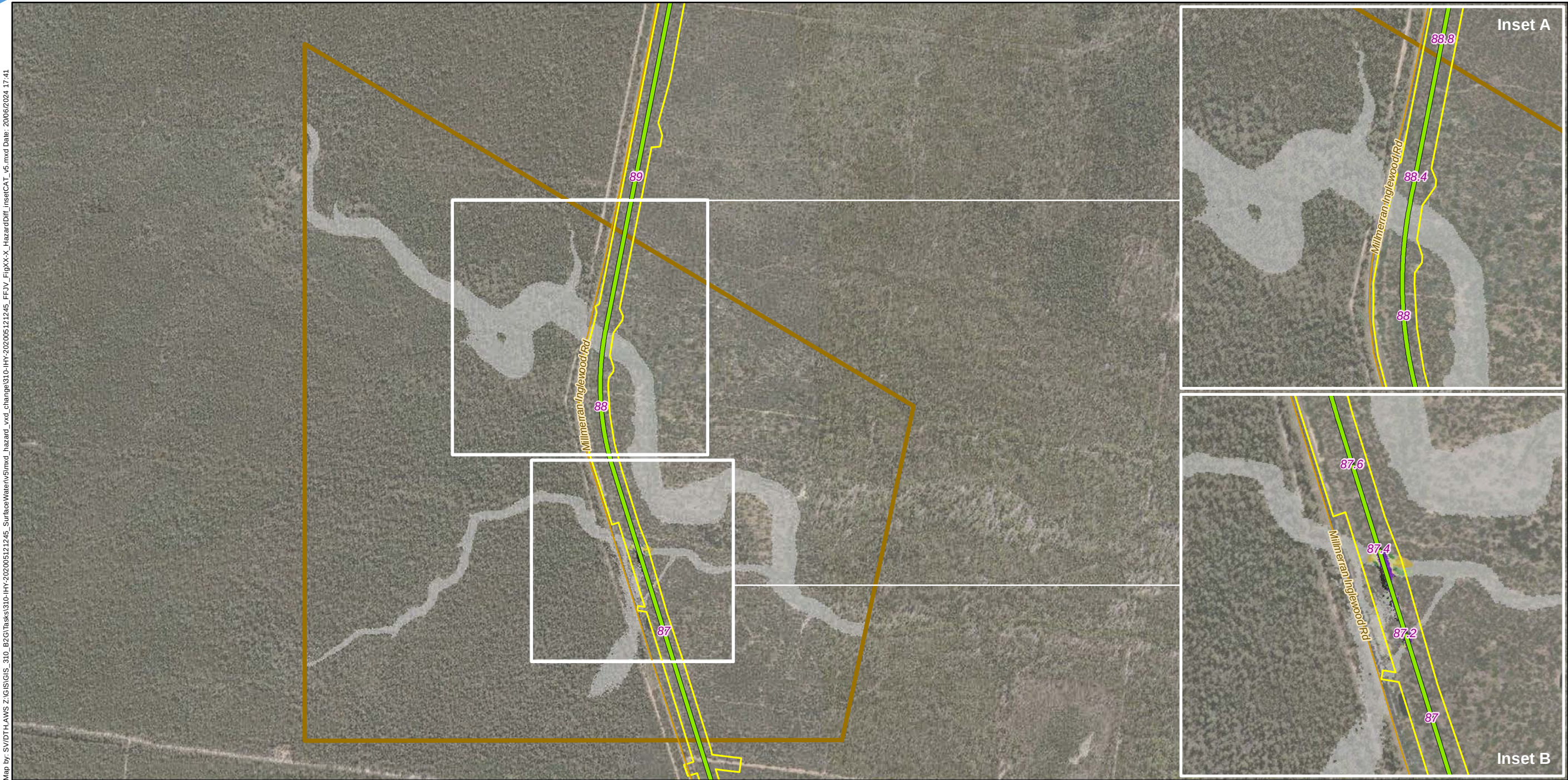
Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5rmed_hazard_lyrd_change\310-IHY-2020\05121245_FF3V_FigXX-X_HazardDiff_InsetCAT_v6.mxd Date: 2006/2024 17:41



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

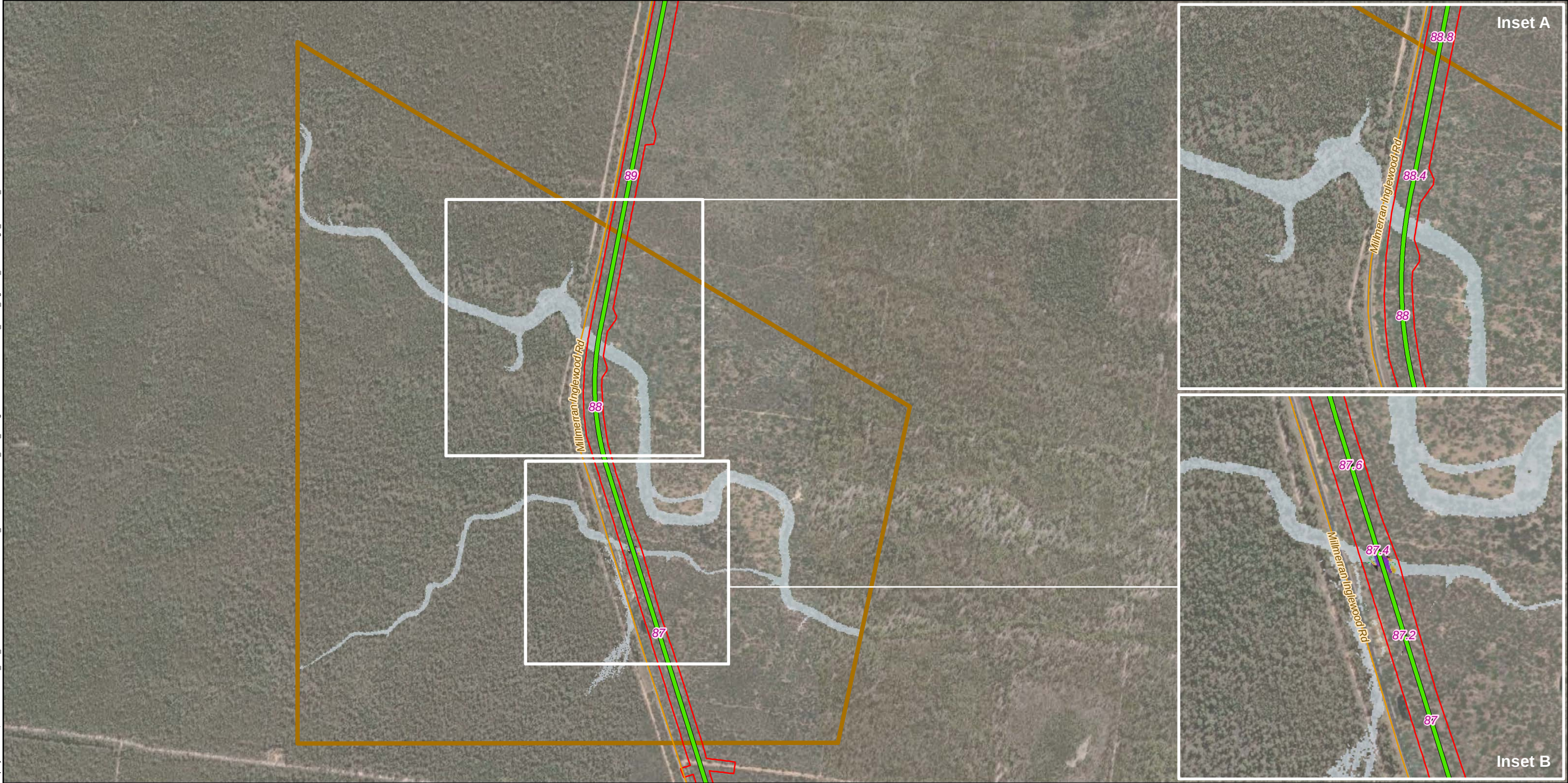
Estimated change in velocity x depth product (m²/s)

< -0.10	0.01 to 0.05
-0.10 to -0.05	0.05 to 0.10
-0.05 to -0.01	> 0.10
-0.01 to 0.01	Decrease in inundation area
	Increase in inundation area



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Task\310-HY-2020\05121245_SurfaceWater\6mxd_FFJV_FigXX-X_TimeChange_insetCAT_v6.mxd Date: 16/04/2025 21:25



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- Over 10 hour decrease
- Up to 10 hour decrease
- Up to 5 hour decrease
- Up to 2 hour decrease
- Up to 1 hour decrease
- Up to 0.5 hour decrease
- Within 15 minutes
- Up to 0.5 hour increase
- Up to 1 hour increase
- Up to 2 hour increase
- Up to 5 hour increase
- Up to 10 hour increase
- Over 10 hour increase
- Decrease in inundation area
- Increase in inundation area



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75 km



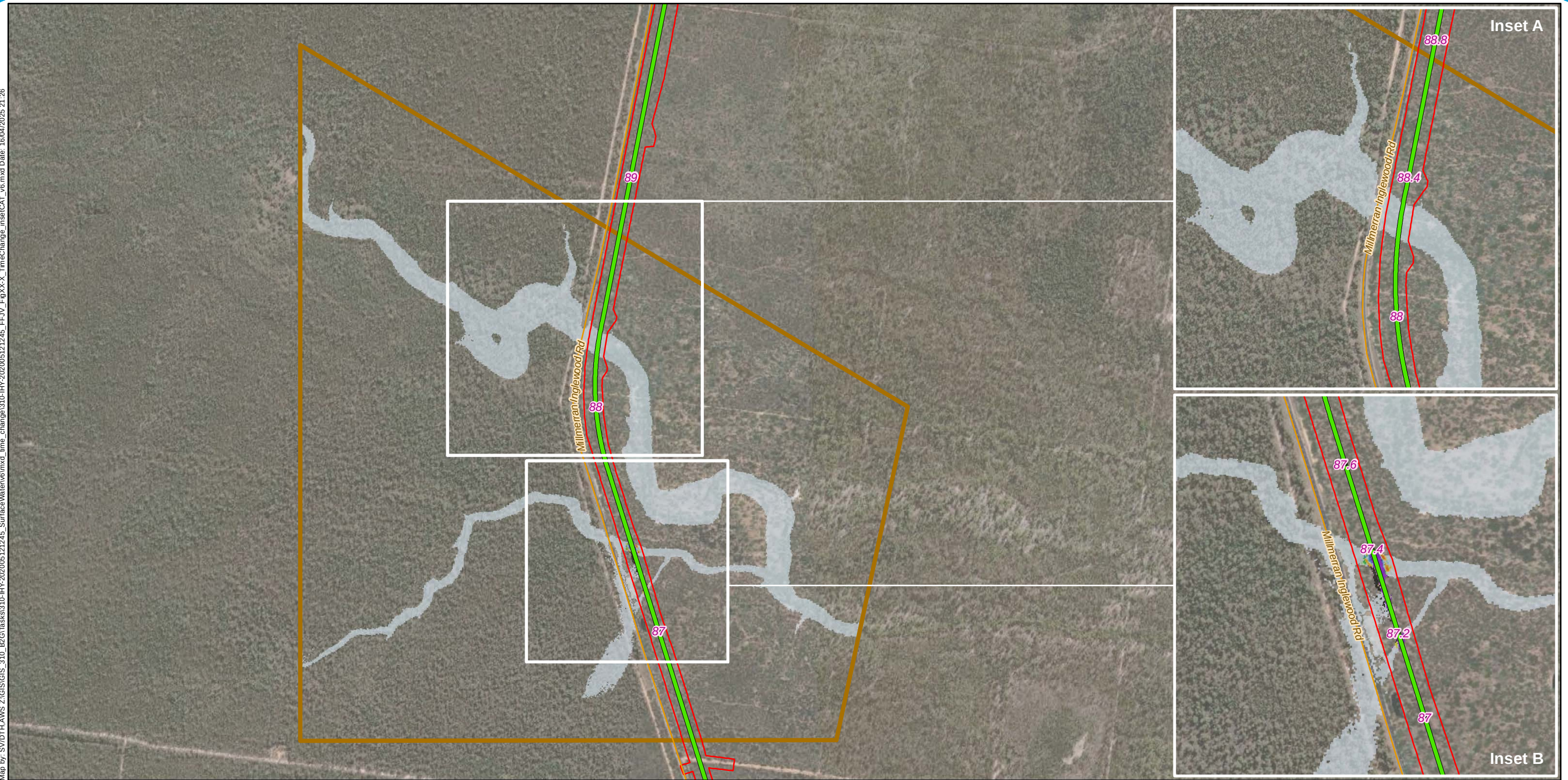
Issue date: 16/04/2025 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H4-G:

20% AEP Event - Change in Time of Inundation - Cattle Creek

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\6mxd_FFJV_FigXX-X_TimeChange_InsetCAT_v6.mxd Date: 16/04/2025 21:26

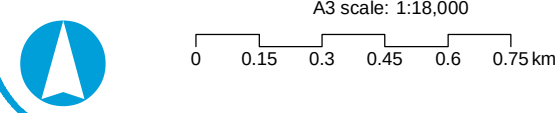


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- Over 10 hour decrease
- Up to 10 hour decrease
- Up to 5 hour decrease
- Up to 2 hour decrease
- Up to 1 hour decrease
- Up to 0.5 hour decrease
- Within 15 minutes
- Up to 0.5 hour increase
- Up to 1 hour increase
- Up to 2 hour increase
- Up to 5 hour increase
- Up to 10 hour increase
- Over 10 hour increase
- Decrease in inundation area
- Increase in inundation area



Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_change\310-HY-2020\5121245_FF_V_FigXX-X_VelocityDiff_FIO_InsetCAT_v5.mxd Date: 21/06/2024 08:53



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

< -0.5	0.01 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.50
-0.05 to -0.01	> 0.50
-0.01 to 0.01	

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_change\310-HY-2020\5121245_FF_V_FigXX-X_VelocityDiff_FIO_InsetCAT_v5.mxd Date: 21/06/2024 08:53



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|--------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | |

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



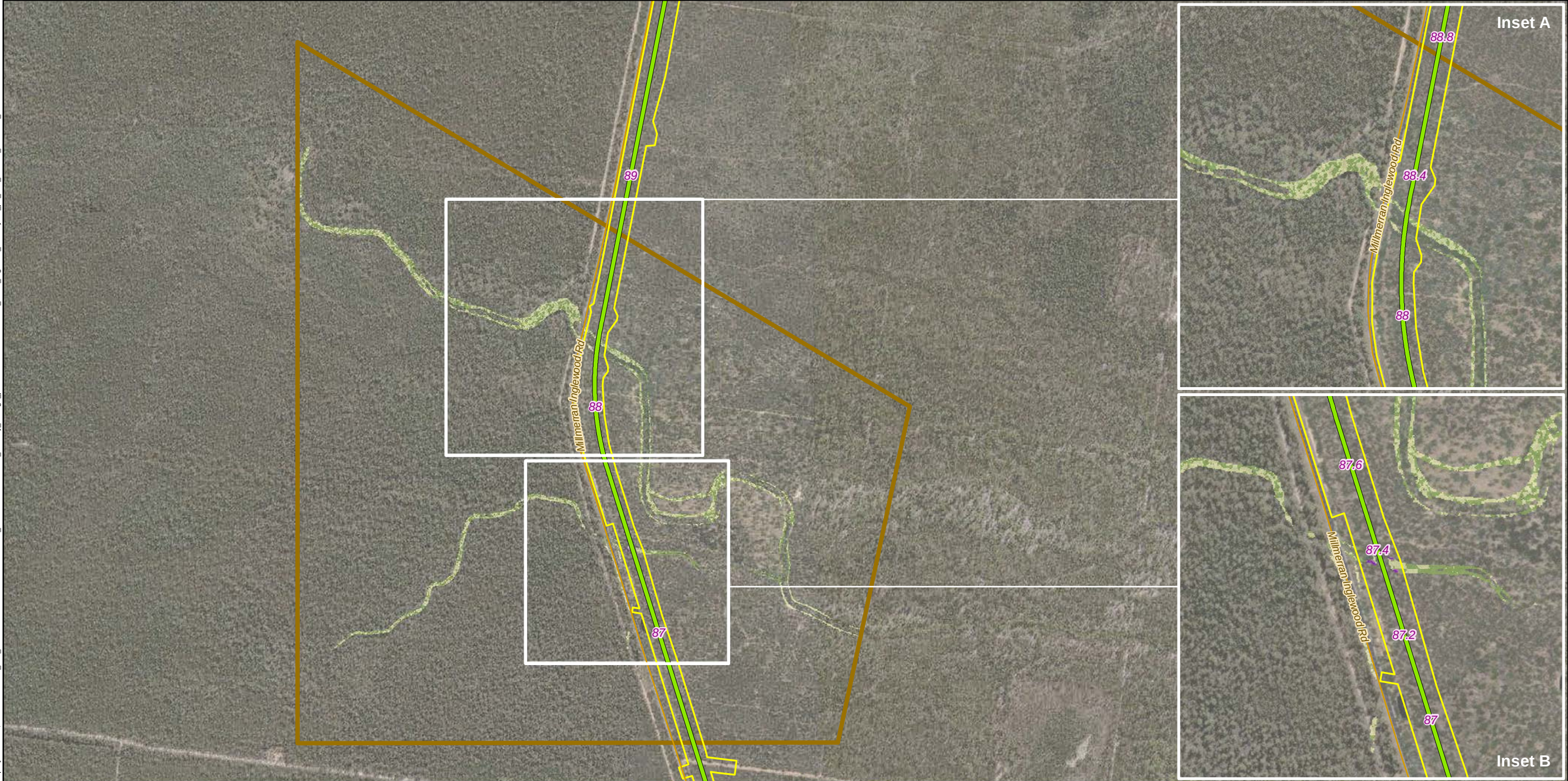
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H5-B:

1% AEP Event - Change in Velocity (<0.5m/s cutoff) - Cattle Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\md_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_0501m_insetCAT_v6.mxd Date: 21/06/2024 09:00



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure H5-C:
20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Cattle Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\med_velocity_change_pc310-IHY-2020\05121245_FF\3V_FigXX-X_VelocityDiff_pc_FIO_0501m_insetCAT_v6.mxd Date: 21/06/2024 09:00



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure H5-D:
1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\med_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_insetCAT_v5.mxd Date: 21/06/2024 09:03



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



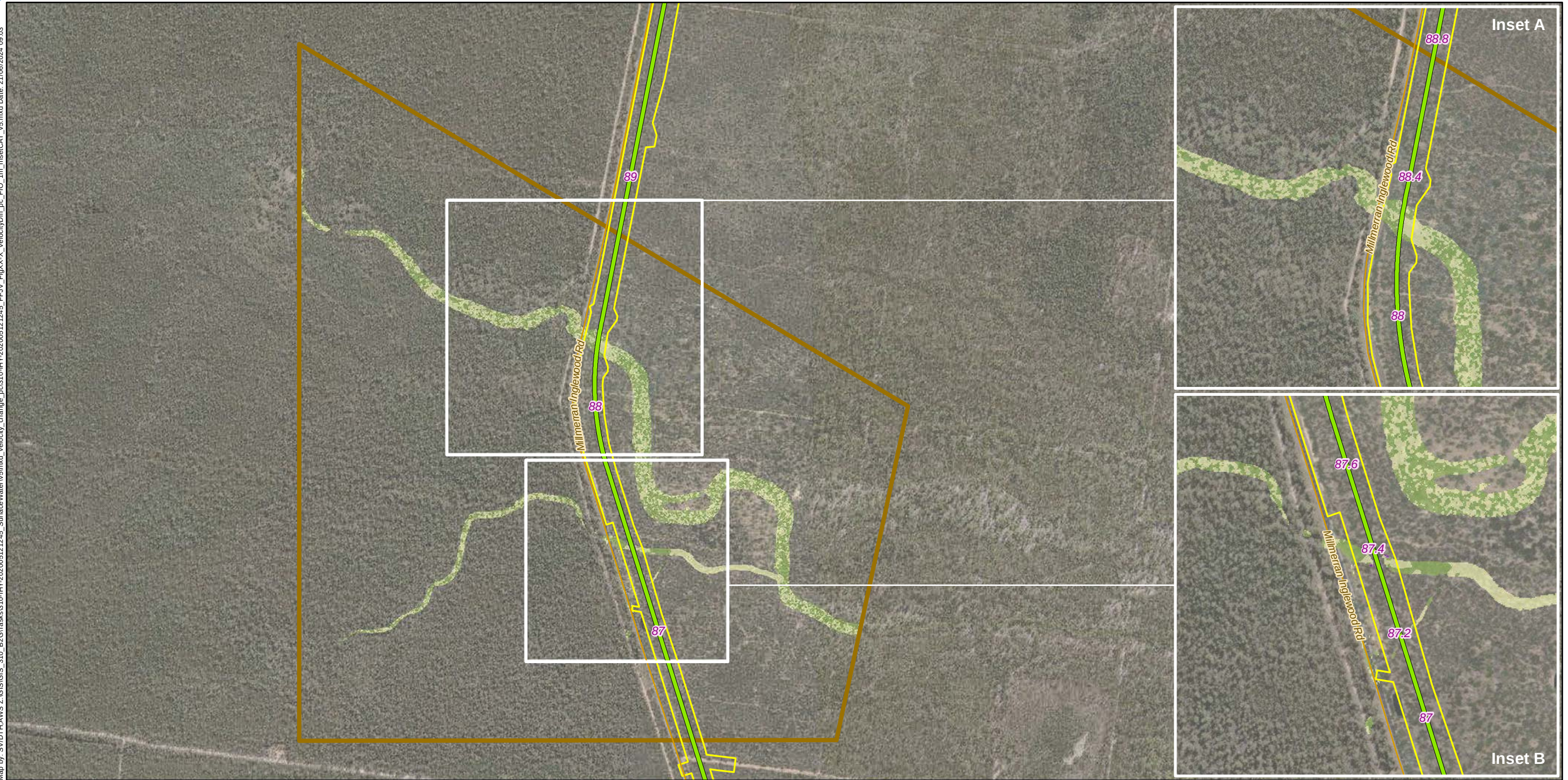
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H5-E:

20% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\med_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_insetCAT_v5.mxd Date: 21/06/2024 09:03



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



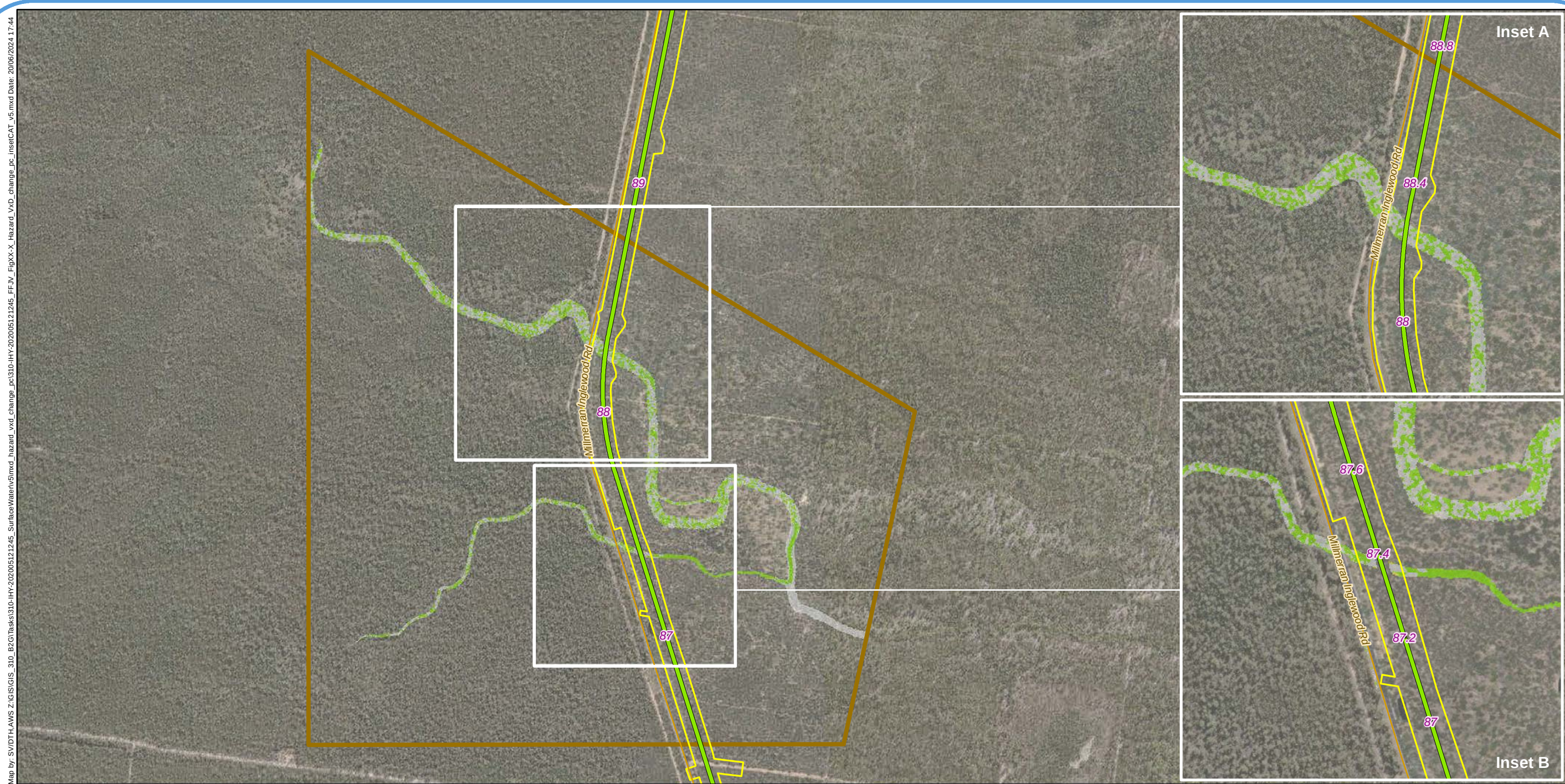
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H5-F:

1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_hazard_vxd_change_pc\310-HY-2020\05121245_FF3V_FigXX-X_Hazard_VxD_change_pc_InsetCAT_v5.mxd Date: 20/06/2024 17:44



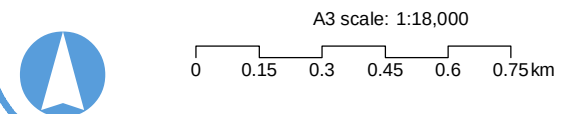
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



Border to Gowrie
Figure H6-A:
20% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_hazard_vxd_change_pc\310-HY-2020\05121245_FF3V_FigXX-X_Hazard_VxD_change_pc_InsetCAT_v5.mxd Date: 20/06/2024 17:44



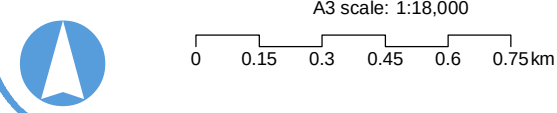
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



Border to Gowrie
Figure H6-B:
1% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_time_change_pcd310-HY-2020\05121245_FF\X-X_TimeDiff_percent_insetCAT_v5.mxd Date: 21/06/2024 08:43



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- < -50%
- 50% to -40%
- 40% to -30%
- 30% to -20%
- 20% to -10%
- 10% to -5%
- 5% to 5%
- 5% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- >100%
- Decrease in inundation area
- Increase in inundation area



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H7-A:

20% AEP Event - Percentage Change in Time of Inundation - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_time_change_pct310-HY-2020\05121245_FF\X-X_TimeDiff_percent_insetCAT_v5.mxd Date: 21/06/2024 08:44



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- < -50%
- 50% to -40%
- 40% to -30%
- 30% to -20%
- 20% to -10%
- 10% to -5%
- 5% to 5%
- 5% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- >100%
- Decrease in inundation area
- Increase in inundation area



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

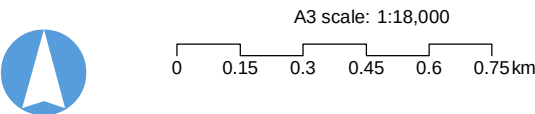
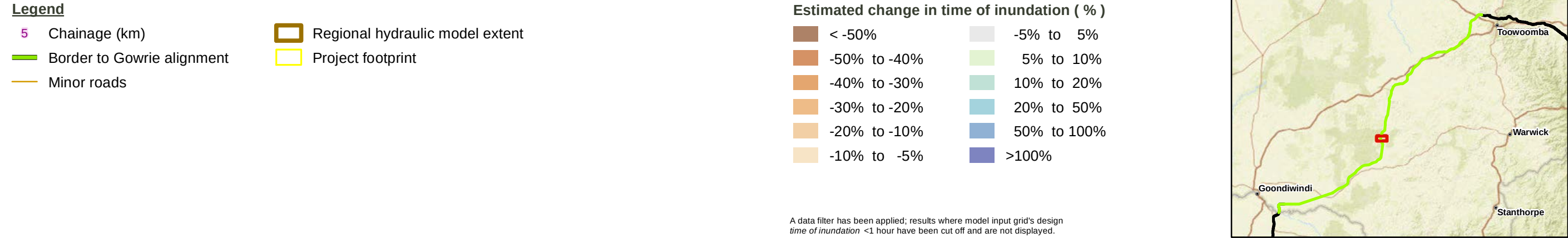
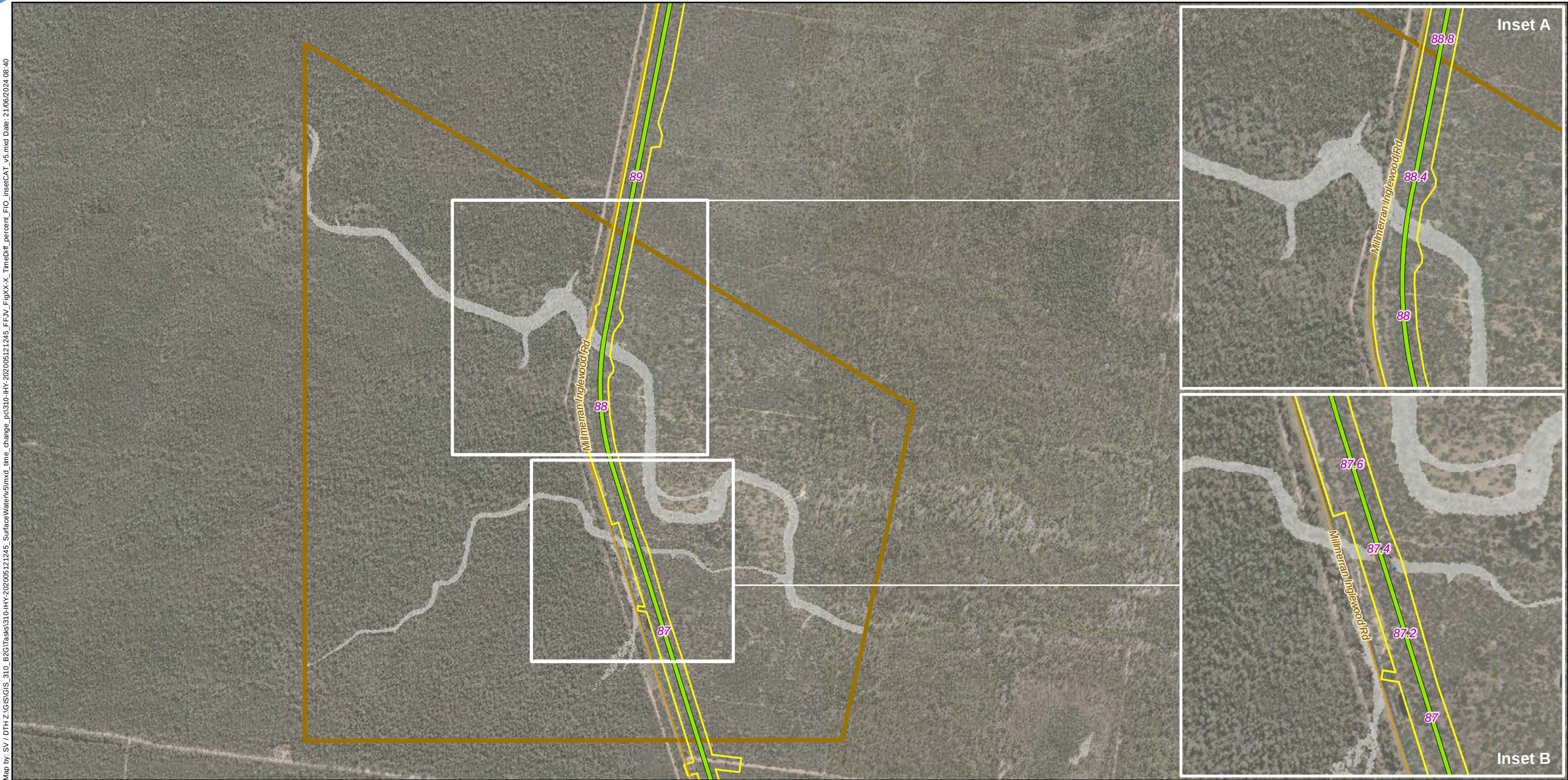


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H7-B:

1% AEP Event - Percentage Change in Time of Inundation - Cattle Creek



Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\310mxd_tme_change_percent_FIO_InsetCAT_v5.mxd Date: 21/06/2024 08:40



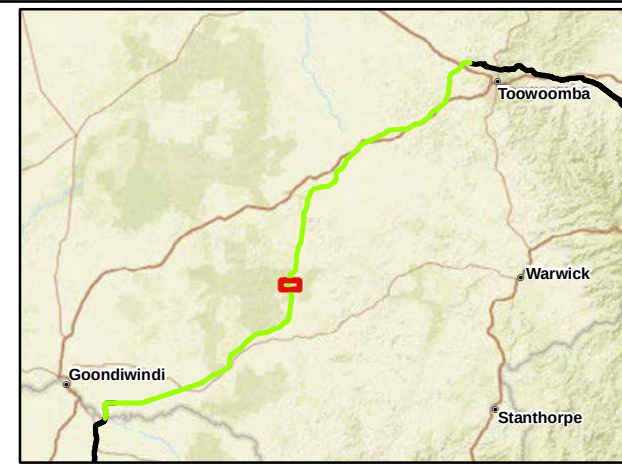
Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF_IV_FigXX-X_Afflux_InsetCAT_v5.mxd Date: 20/06/2024 17:06



Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H8-A:

1% AEP Event - Sensitivity - 0% Blockage - Cattle Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_afluc310-IHY-2020\05121245_FF_IV_FigXX-X_Afluc_InsetCAT_v5.mxd Date: 20/06/2024 17:06



Legend

- Flood sensitive receptor
- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

< -0.5	0.02 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.30
-0.05 to -0.01	0.30 to 0.40
-0.01 to 0.01	0.40 to 0.50
0.01 to 0.02	> 0.5
	Decrease in inundation area
	Increase in inundation area



A3 scale: 1:18,000
0 0.15 0.3 0.45 0.6 0.75km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF_IV_FigXX-X_Afflux_InsetCAT_v5.mxd Date: 20/06/2024 17:07



Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|---|--|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:18,000
 0 0.15 0.3 0.45 0.6 0.75km



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 Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure H8-C:

1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Cattle Creek

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix I Pariagara Creek flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix I

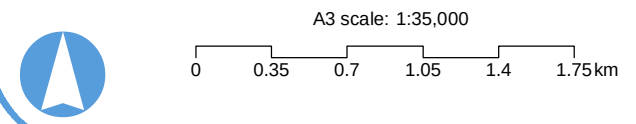
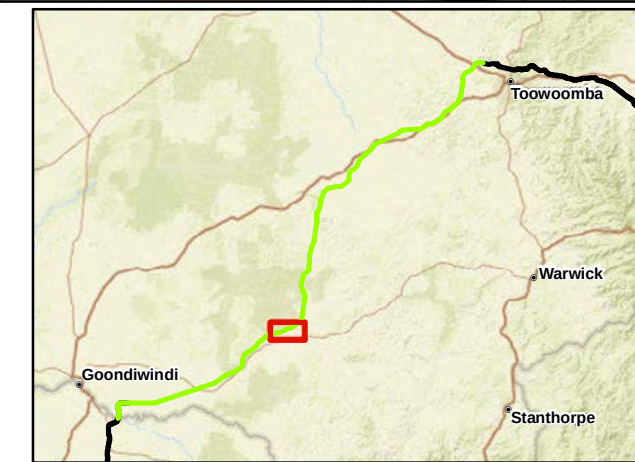
Pariagara Creek Flood Maps

Figure I1-A	Locality Plan
Figure I1-B	Survey Data
Figure I1-C	Hydrologic Model Setup
Figure I1-D	Hydraulic Model Setup
Figure I1-E	Landuse Classifications
Figure I1-F	Proposed Design Structures
Figure I2-A	20% AEP Event - Peak Water Levels - Existing Case
Figure I2-B	1% AEP Event - Peak Water Levels - Existing Case
Figure I2-C	20% AEP Event - Peak Velocity - Existing Case
Figure I2-D	1% AEP Event - Peak Velocity - Existing Case
Figure I2-E	20% AEP Event - Peak Hazard - Existing Case
Figure I2-F	1% AEP Event - Peak Hazard - Existing Case
Figure I2-G	20% AEP Event - Peak Time of Inundation - Existing Case
Figure I2-H	1% AEP Event - Peak Time of Inundation - Existing Case
Figure I3-A	20% AEP Event - Peak Water Levels - Developed Case
Figure I3-B	1% AEP Event - Peak Water Levels - Developed Case
Figure I3-C	20% AEP Event - Peak Velocity - Developed Case
Figure I3-D	1% AEP Event - Peak Velocity - Developed Case
Figure I3-E	20% AEP Event - Peak Hazard - Developed Case
Figure I3-F	1% AEP Event - Peak Hazard - Developed Case
Figure I3-G	20% AEP Event - Peak Time of Inundation - Developed Case
Figure I3-H	1% AEP Event - Peak Time of Inundation - Developed Case
Figure I4-A	20% AEP Event - Afflux
Figure I4-B	1% AEP Event - Afflux
Figure I4-C	20% AEP Event - Change in Velocity
Figure I4-D	1% AEP Event - Change in Velocity
Figure I4-E	20% AEP Event - Change in Hazard
Figure I4-F	1% AEP Event - Change in Hazard
Figure I4-G	20% AEP Event - Change in Time of Inundation
Figure I4-H	1% AEP Event - Change in Time of Inundation
Figure I5-A	20% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure I5-B	1% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure I5-C	20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure I5-D	1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure I5-E	20% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure I5-F	1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure I6-A	20% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m ² /s cutoff applied)
Figure I6-B	1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m ² /s cutoff applied)
Figure I7-A	20% AEP Event - Percentage Change in Time of Inundation
Figure I7-B	1% AEP Event - Percentage Change in Time of Inundation
Figure I7-C	20% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
Figure I7-D	1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
Figure I8-A	1% AEP Event - Sensitivity - 0% Blockage
Figure I8-B	1% AEP Event - Sensitivity - 50% Blockage
Figure I8-C	1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels

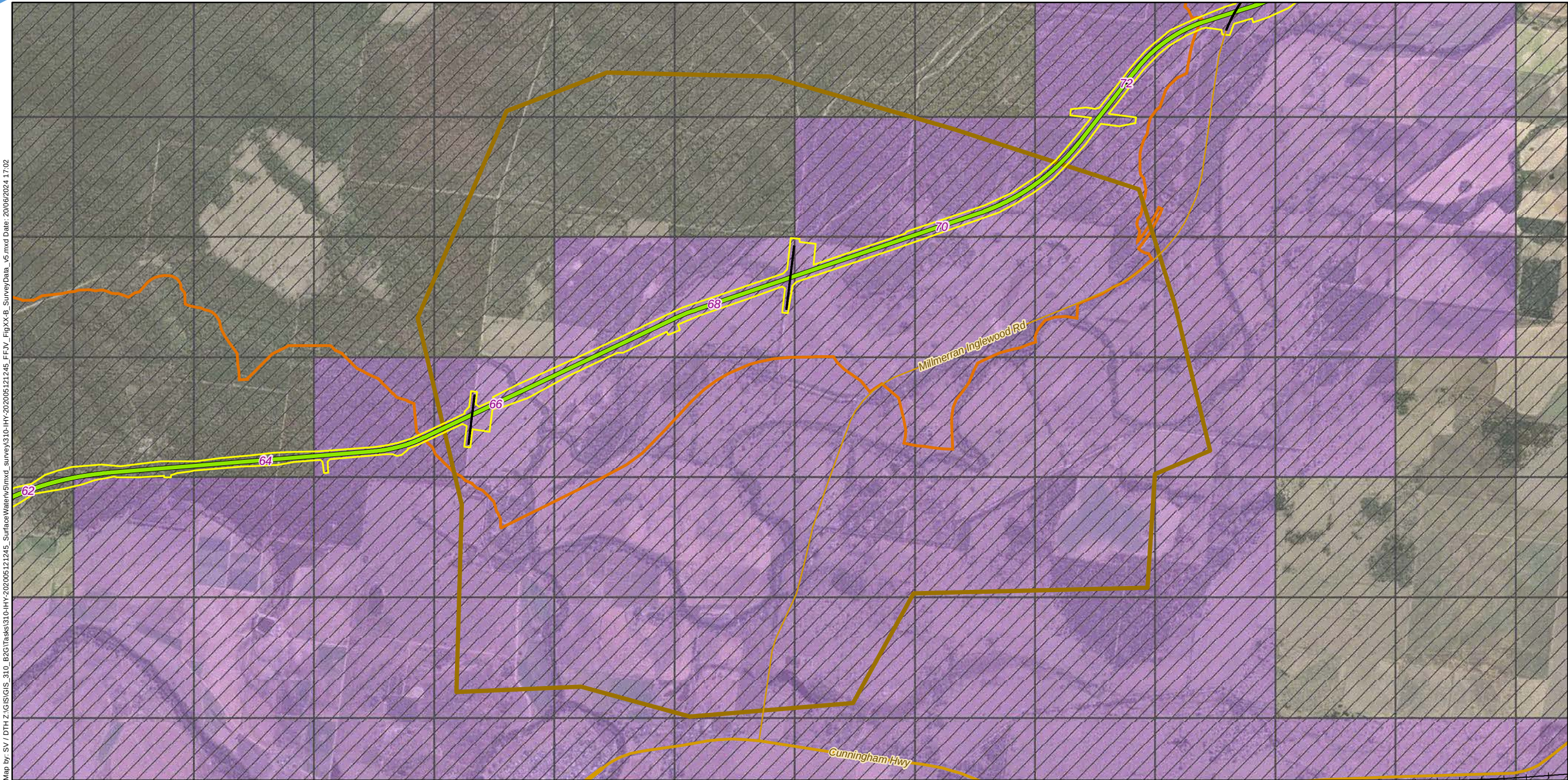
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- Legend**
- 5 Chainage (km)
 - Existing rail (operational)
 - Border to Gowrie alignment
 - Watercourses
 - Major roads
 - Minor roads
 - Project road design
 - Regional hydraulic model extent
 - Project footprint



Border to Gowrie
Figure I1-A:
Locality Plan - Pariagara Creek



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Project footprint
- Hydrologic model extent
- Regional hydraulic model extent

LiDAR datasets (1m grid)

- Inland Towns Stage 2 2011
- 2015 ARTC LiDAR 1m



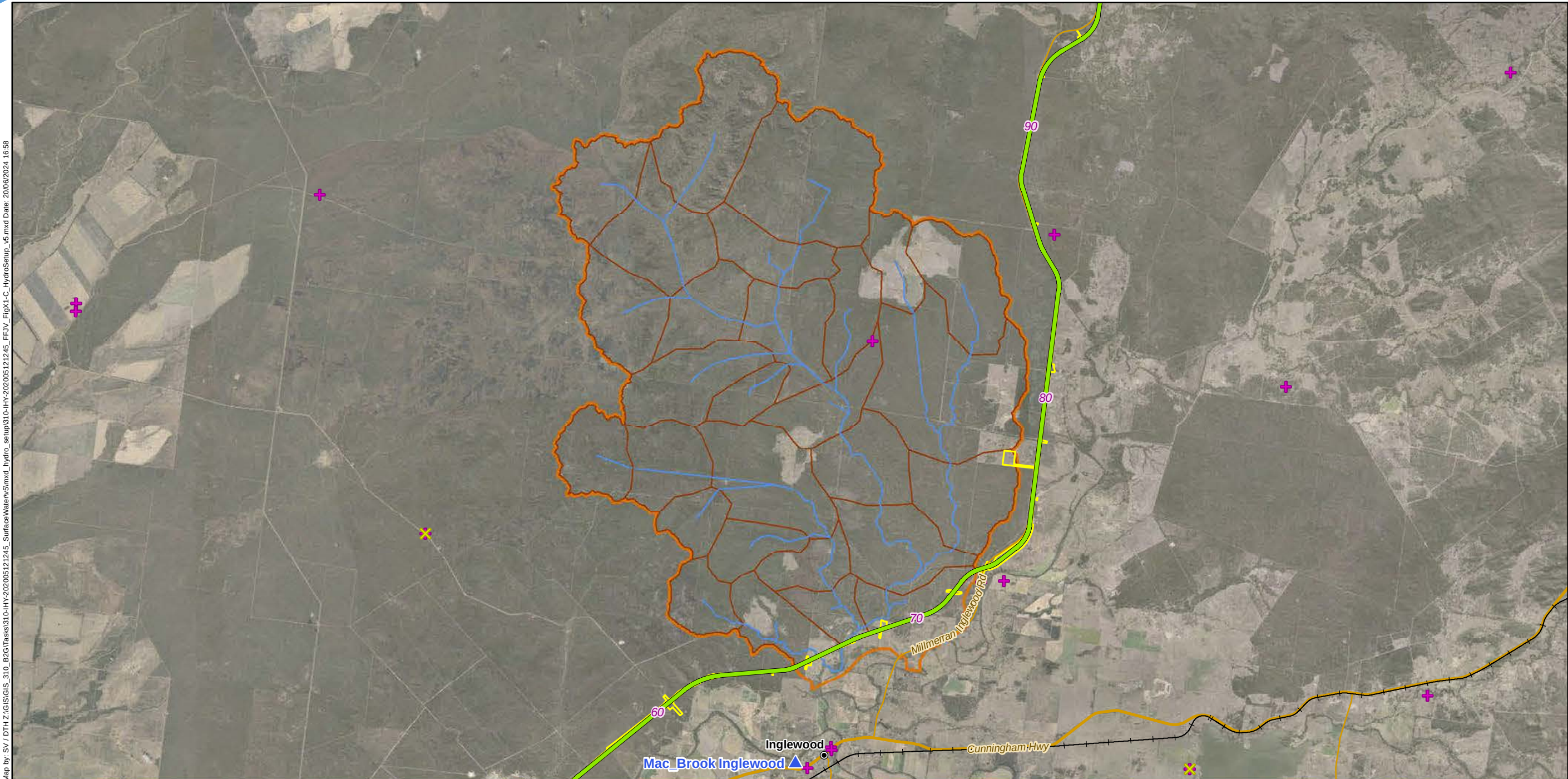
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0 0.35 0.7 1.05 1.4 1.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

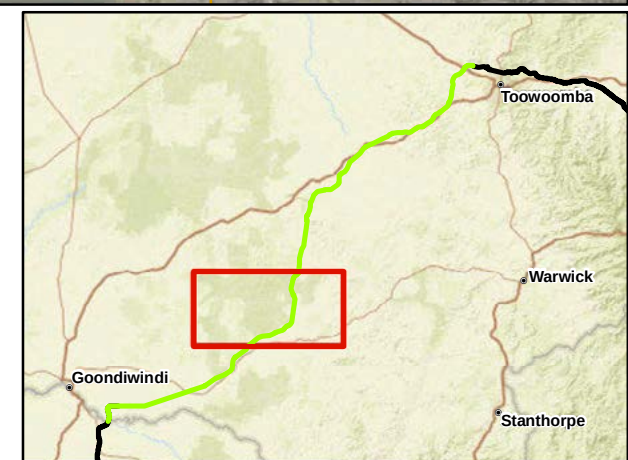
Border to Gowrie
Figure I1-B:
Survey Data - Pariagara Creek

Map by: SV / DTH 2:GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\310-HY-202005121245_FF\IV_Fig1-C_HydroSetup_v5.mxd Date: 20/06/2024 16:58



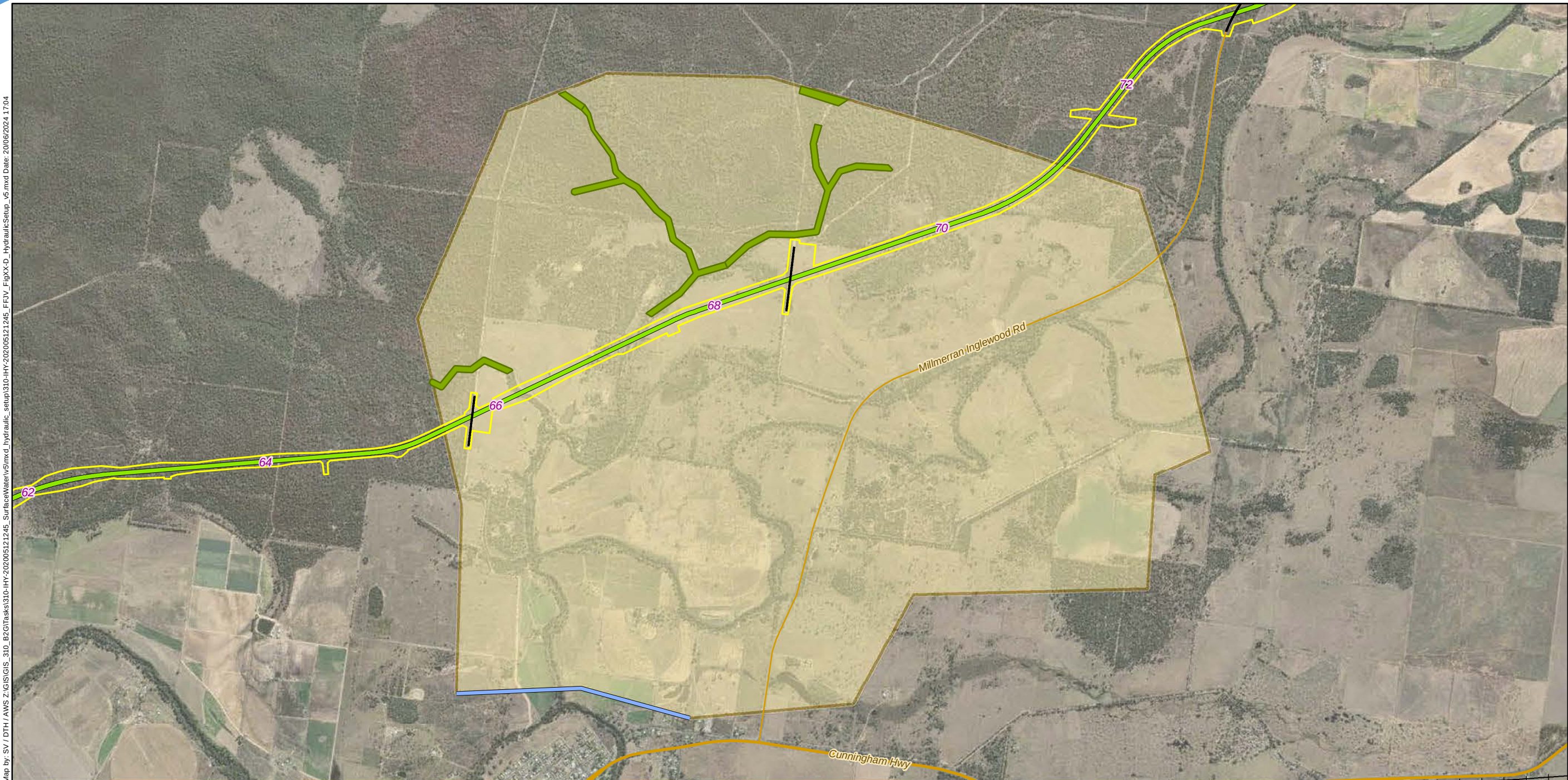
Legend

- | | | | |
|-----------------------------|-------------------|-------------------------|-------------------------|
| 5 Chainage (km) | Major roads | Catchment links | Pluviograph stations |
| Localities | Minor roads | Sub-catchments | Daily rainfall stations |
| Existing rail (operational) | Project footprint | Hydrologic model extent | Stream gauge locations |
| Border to Gowrie alignment | | | |



A3 scale: 1:150,000
0 1.5 3 4.5 6 7.5km

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Hydraulic_setup\310-IHY-202005121245_FFIV_FigX-D_HydraulicSetup_v5.mxd Date: 20/06/2024 17:04



Legend

- | | | |
|-----------------------------|---------------------|---------------------------------|
| 5 Chainage (km) | Major roads | Regional hydraulic model extent |
| Existing rail (operational) | Minor roads | Outflow boundary |
| Border to Gowrie alignment | Project road design | Inflow boundary |
| | Project footprint | |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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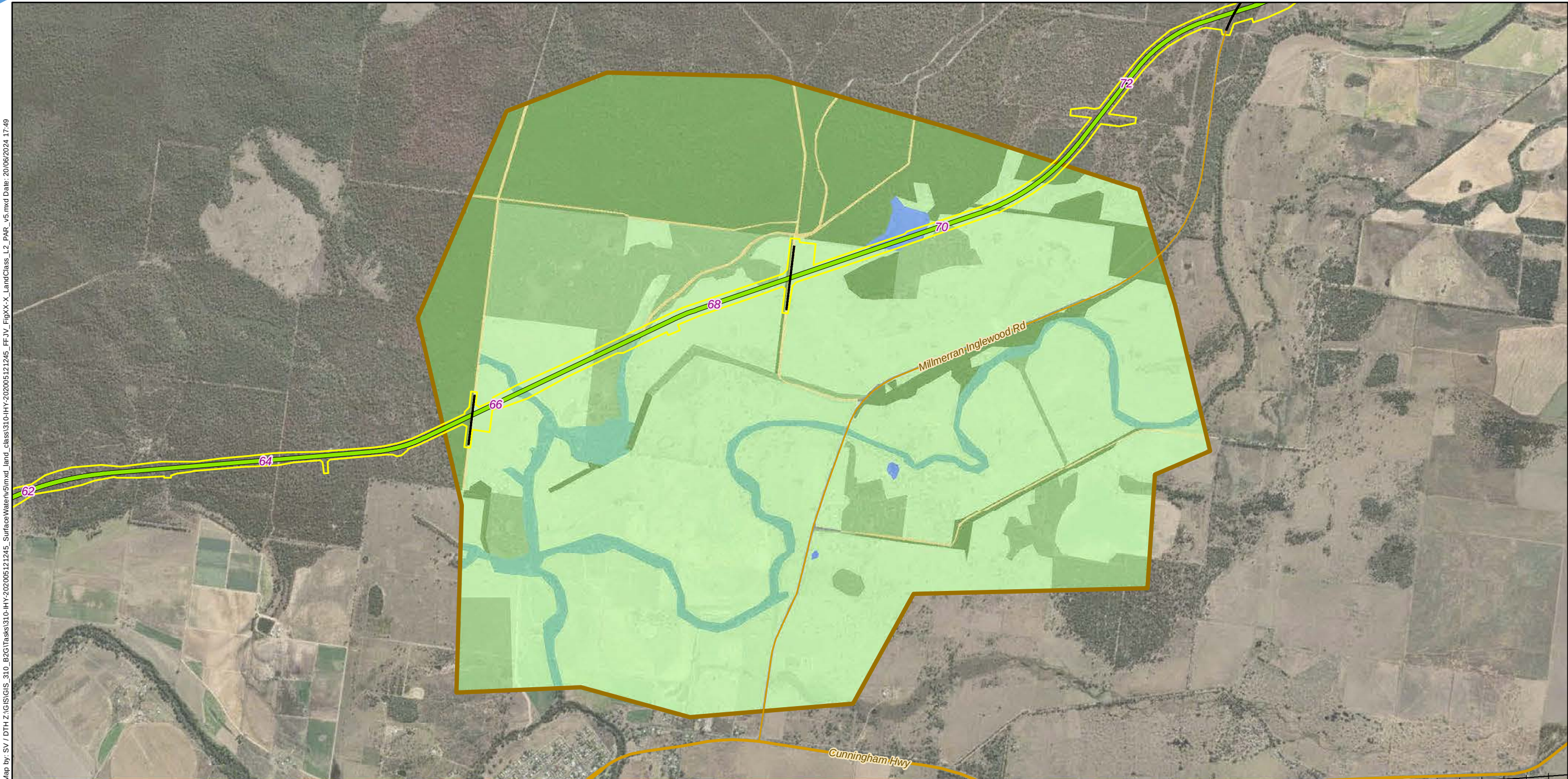
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I1-D:

Hydraulic Model Setup - Pariagara Creek

Map by: SV / DTH 2:GIS/GIS 310_B2G1Tasks/310-IHY-202005121245_SurfaceWater/v3mxd_lend_class/310-IHY-202005121245_FF JV_FigXX-X_LandClass_L2_PAR_v5.mxd Date: 20/06/2024 17:49



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Landuse classification

- | | |
|--------------------------------------|---------------------------------------|
| River (n = 0.035) | Open Space - Moderate Veg (n = 0.055) |
| Sealed Road Corridor (n = 0.015) | Open Space - Heavy Veg (n = 0.065) |
| Unsealed Road Corridor (n = 0.025) | Open Water (n = 0.025) |
| Rural Residential (n = 0.09) | Rail (n = 0.025) |
| Urban Residential (n = 0.1) | Riparian (n = 0.04) |
| Commercial (n = 0.06) | Crop (n = 0.1085) |
| Open Space - Minimum Veg (n = 0.045) | |



A3 scale: 1:35,000

0 0.35 0.7 1.05 1.4 1.75 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

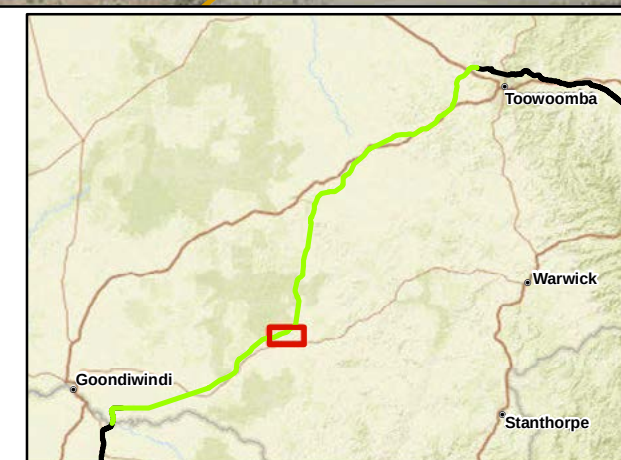
Figure I1-E:

Landuse classifications - Pariagara Creek



Legend

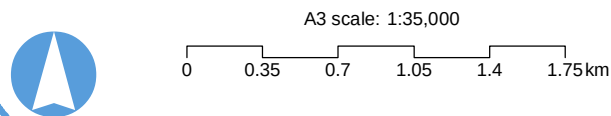
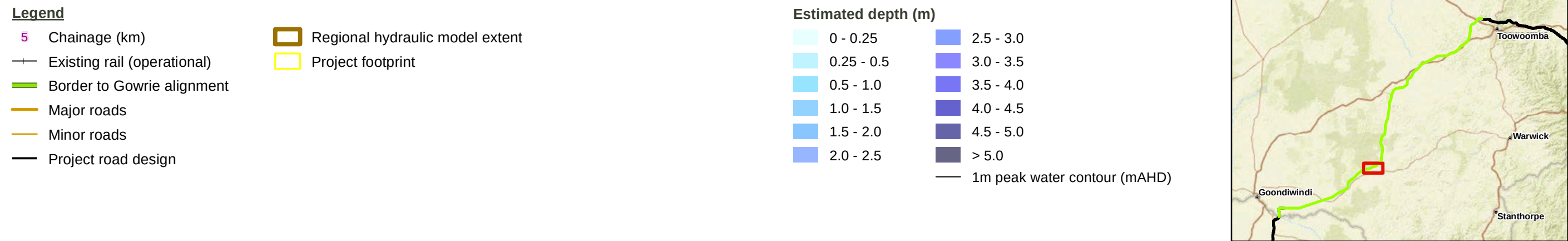
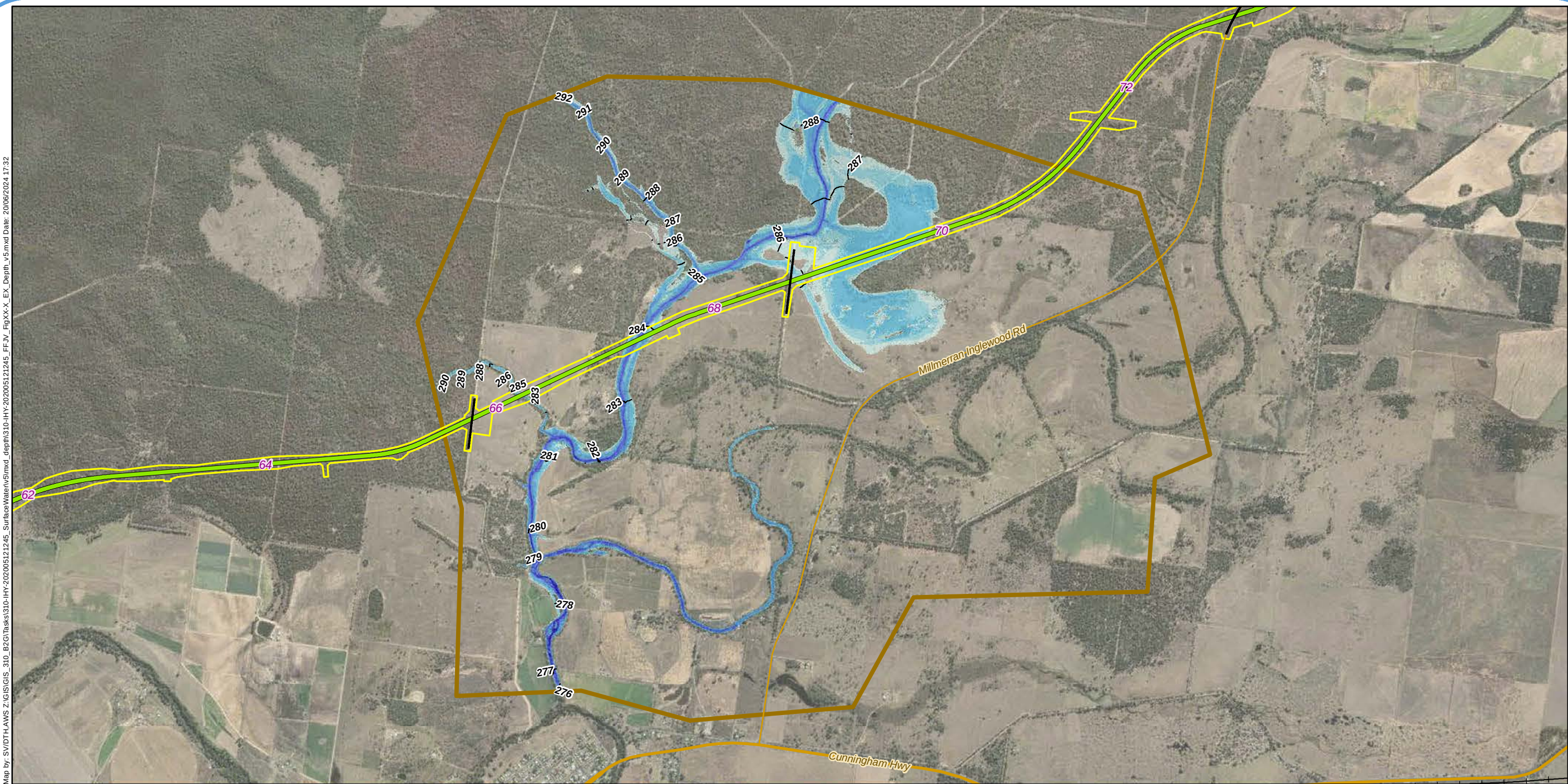
- Legend**
- | | |
|----------------------------|---------------------------------|
| 5 Chainage (km) | — Project road design |
| Border to Gowrie alignment | — Bridges |
| Major roads | Regional hydraulic model extent |
| Minor roads | Project footprint |

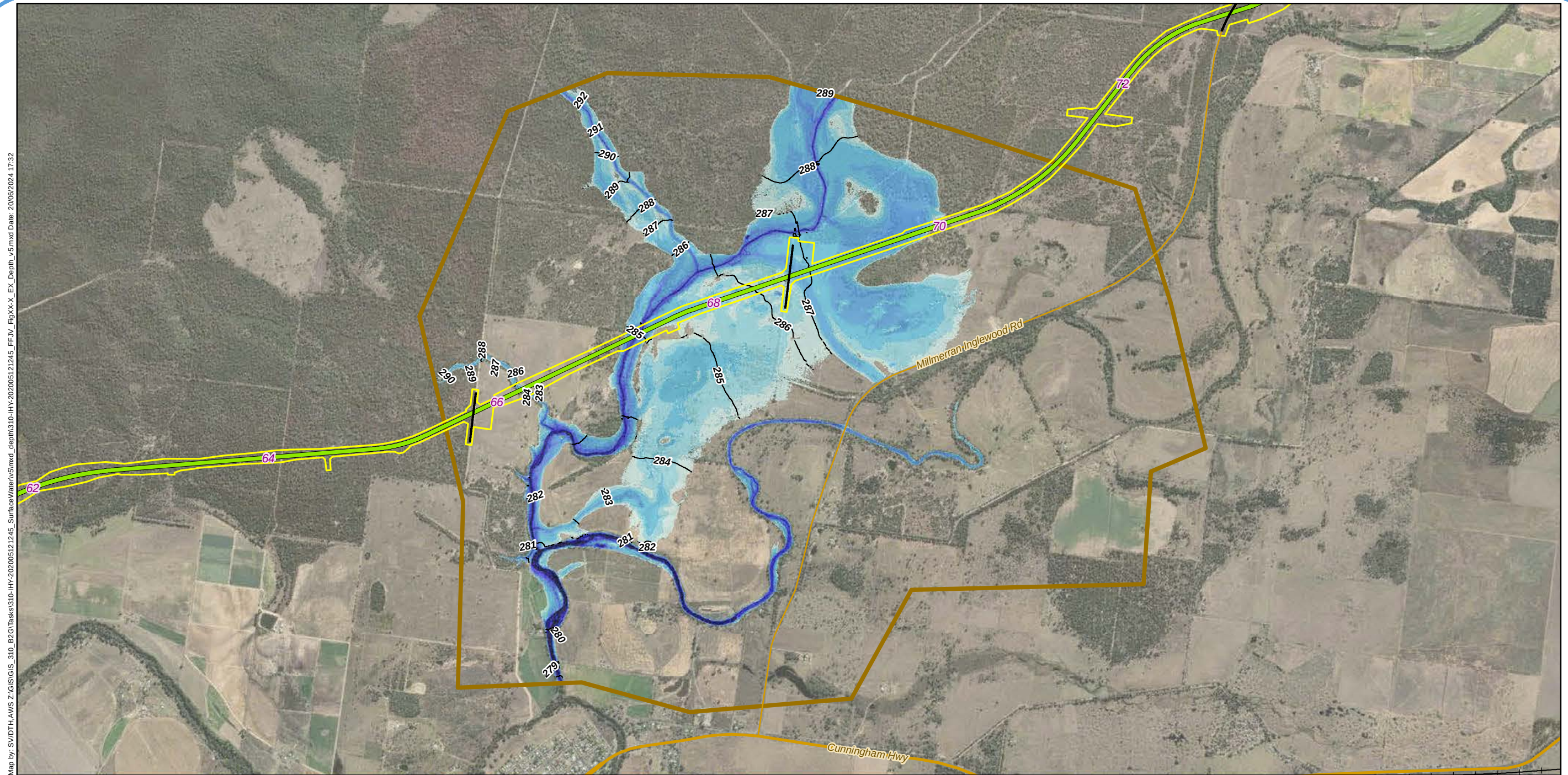


Border to Gowrie

Figure I1-F:

Proposed Design Structures - Pariagara Creek



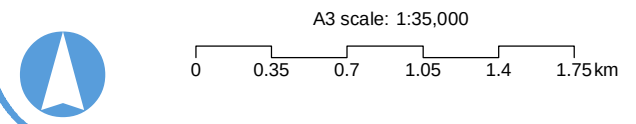


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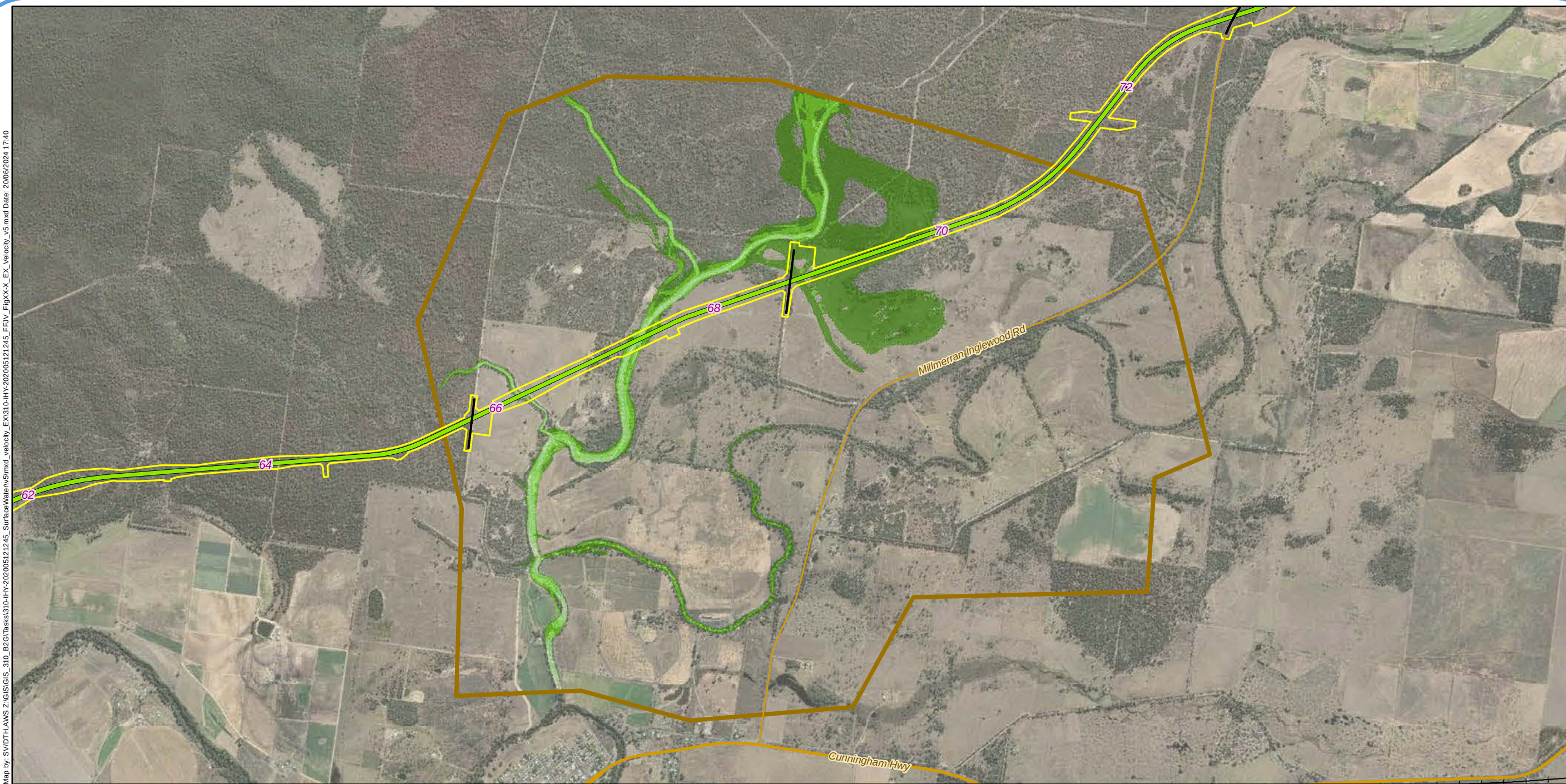
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_EX\310-HY-2020\05121245_FF3V_FigXX-X_EX_Velocity_v5.mxd Date: 2006/2024 17:40



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



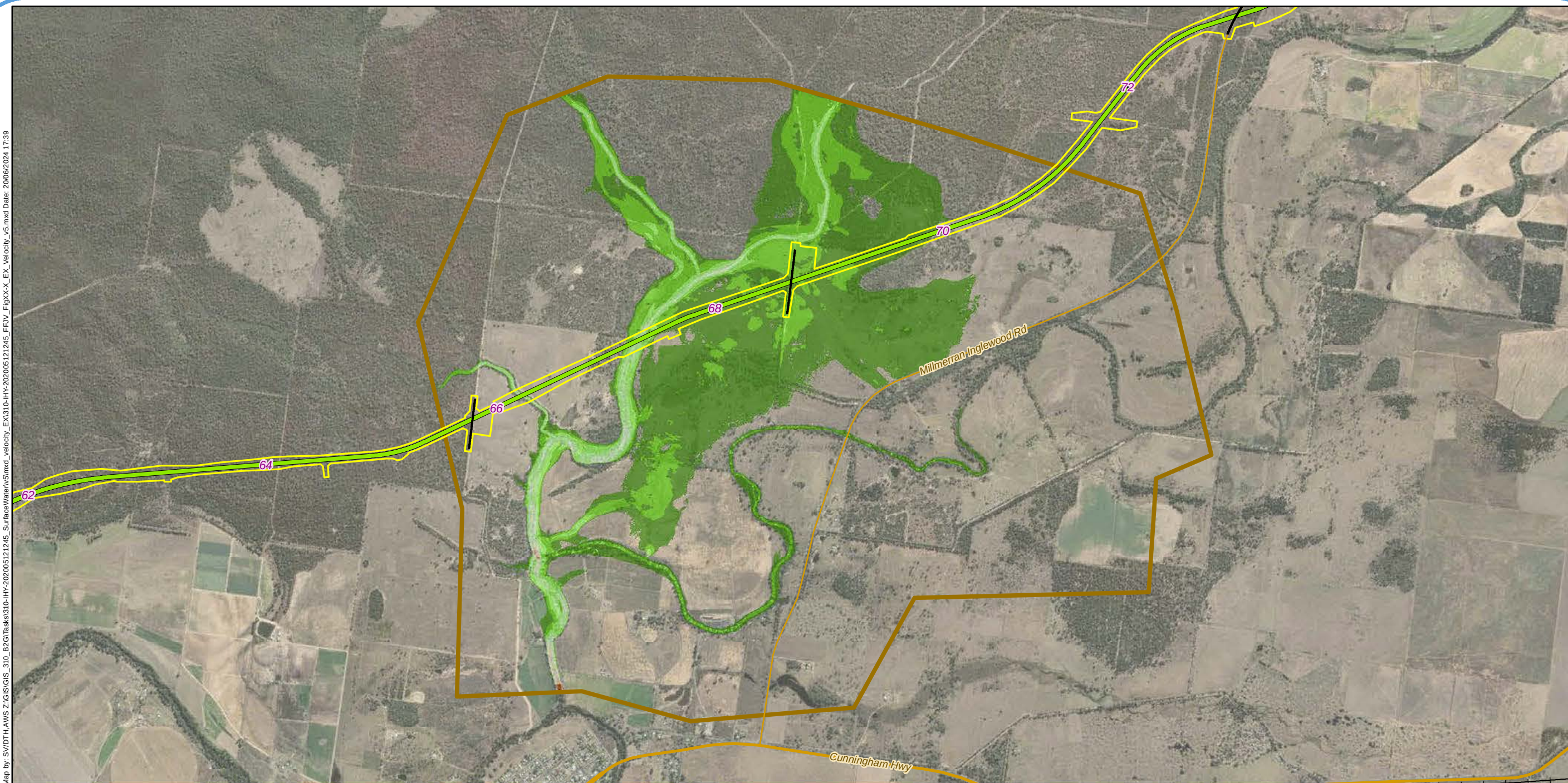
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I2-C:

20% AEP Event - Peak Velocity - Existing Case - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_EX\310-HY-2020\05121245_FF3V_FigXX-X_EX_Velocity_v5.mxd Date: 2006/2024 17:39



Legend

- | | |
|-----------------------------|---------------------------------|
| 5 Chainage (km) | Regional hydraulic model extent |
| Existing rail (operational) | Project footprint |
| Border to Gowrie alignment | |
| Major roads | |
| Minor roads | |
| Project road design | |

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



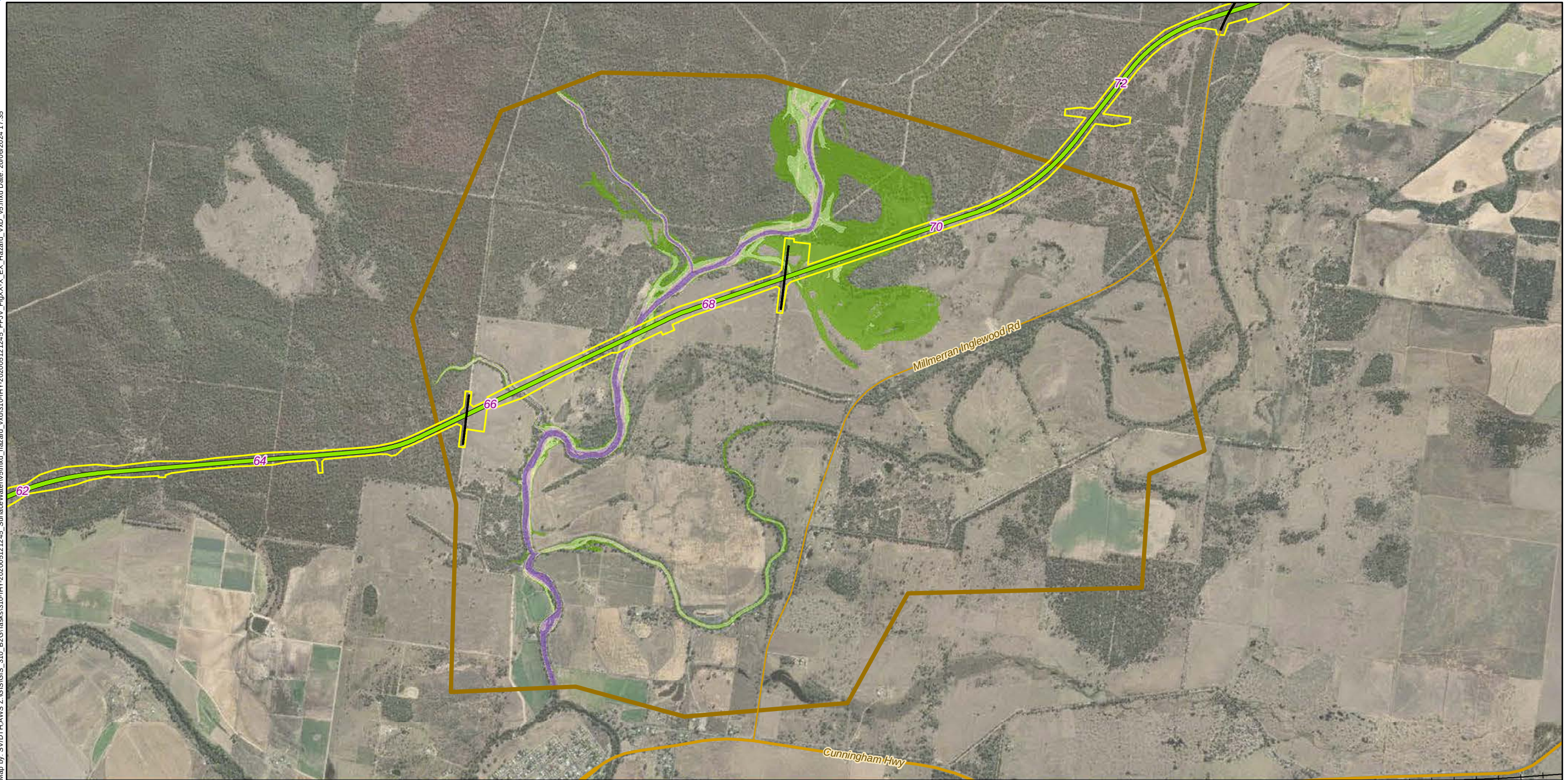
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I2-D:

1% AEP Event - Peak Velocity - Existing Case - Pariagara Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_Hazard_Vrd0310-HY-2020\05121245_FF3V_FigXX-X_EX_Hazard_Vrd_20\06\2024 17:35



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



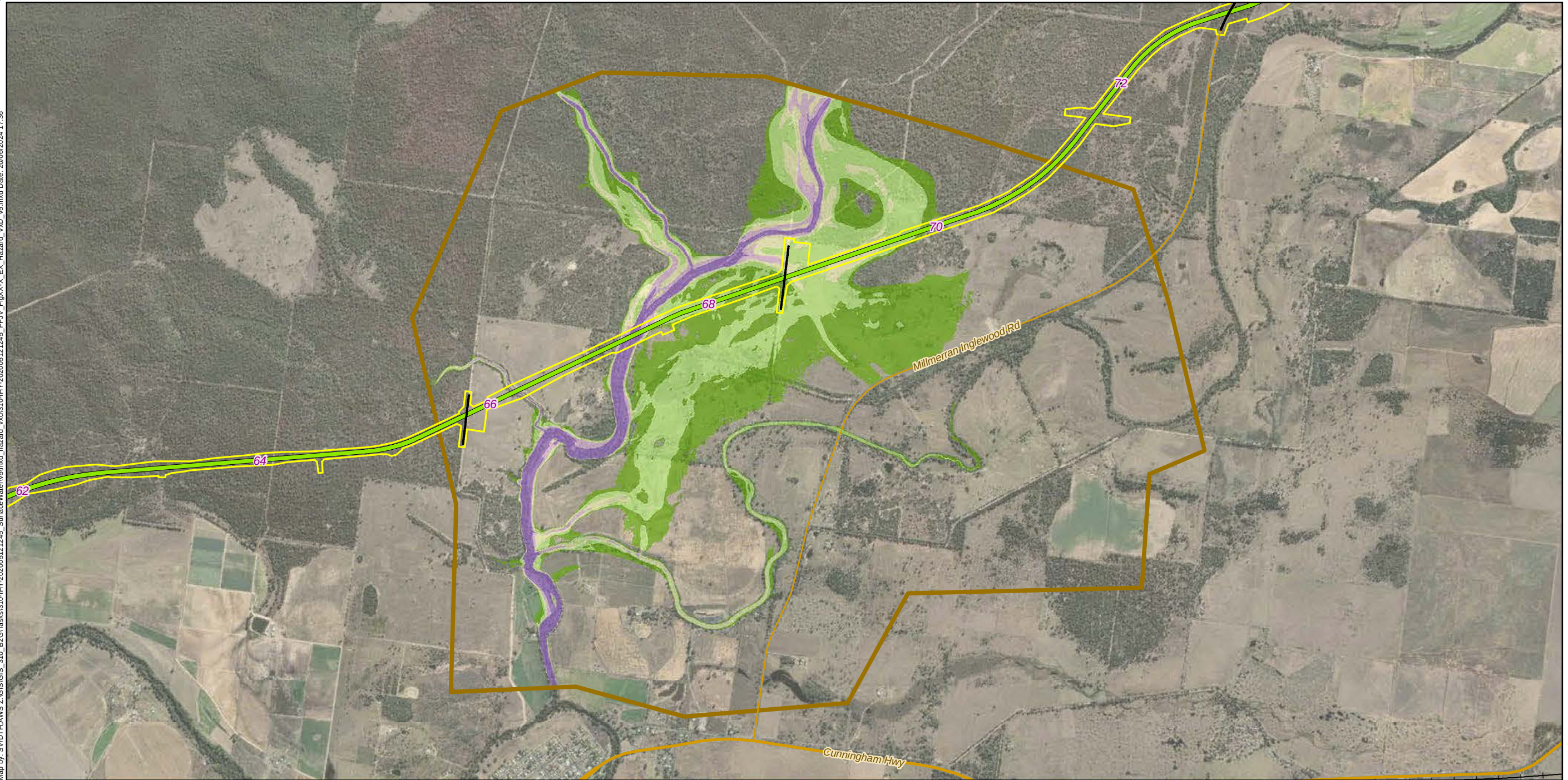
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I2-E:

20% AEP Event - Peak Hazard - Existing Case - Pariagara Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_Hazard_Lyrd\310-HY-2020\05121245_FF3V_FigX-X_EX_Hazard_VaD_v5.mxd Date: 20/06/2024 17:36



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



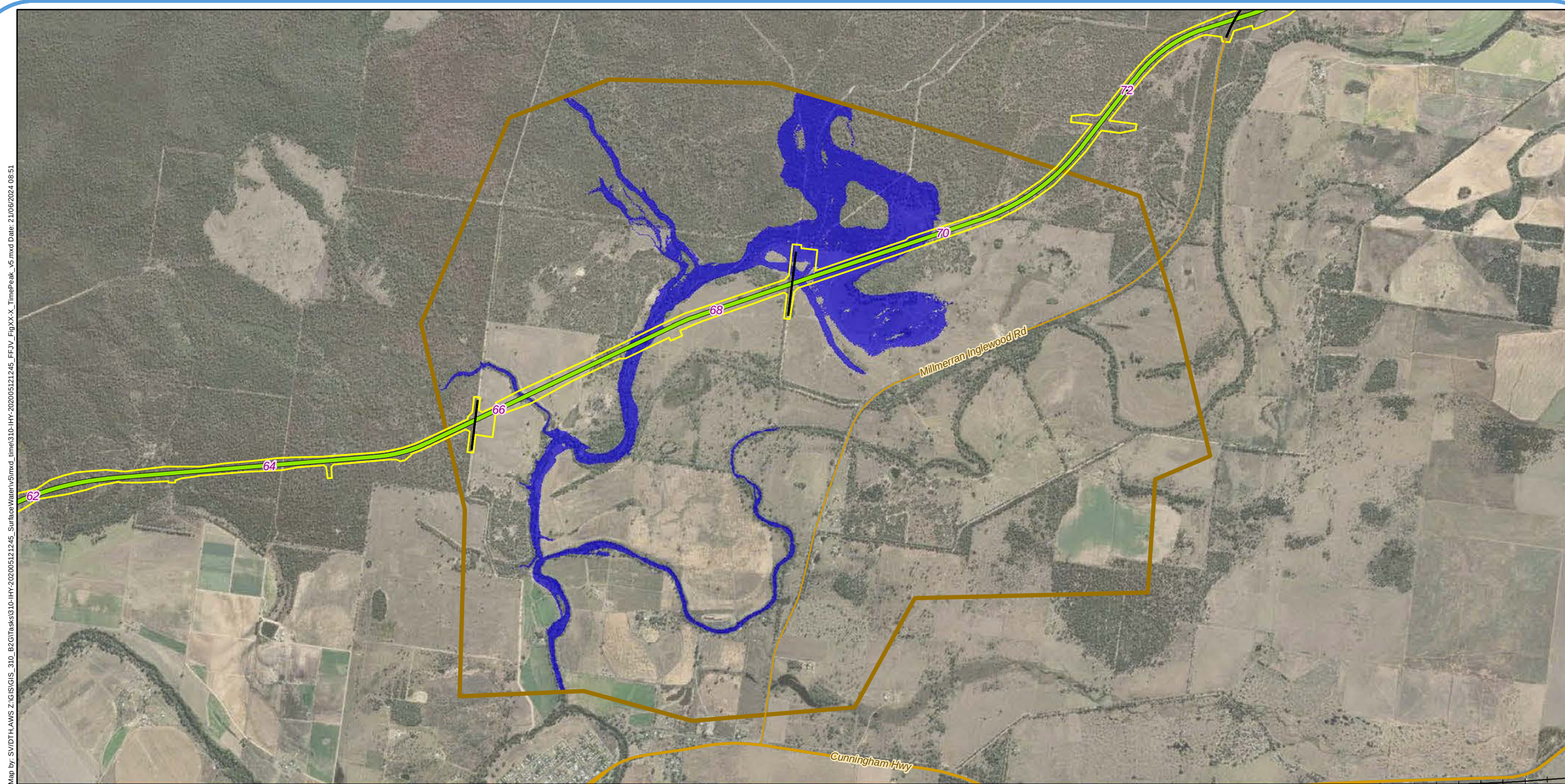
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I2-F:

1% AEP Event - Peak Hazard - Existing Case - Pariagara Creek

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_FF\V_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51

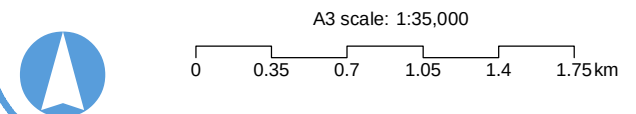
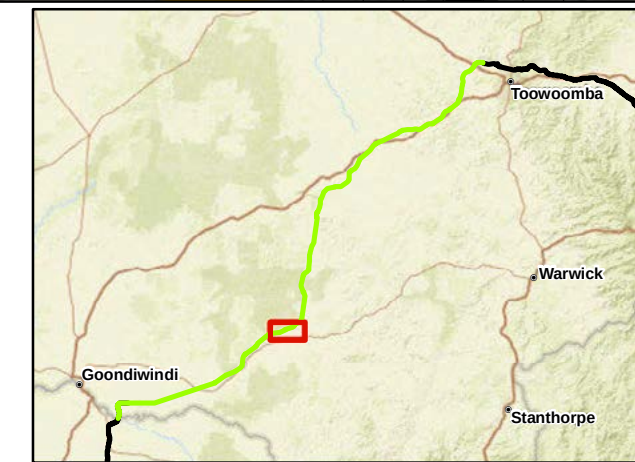


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

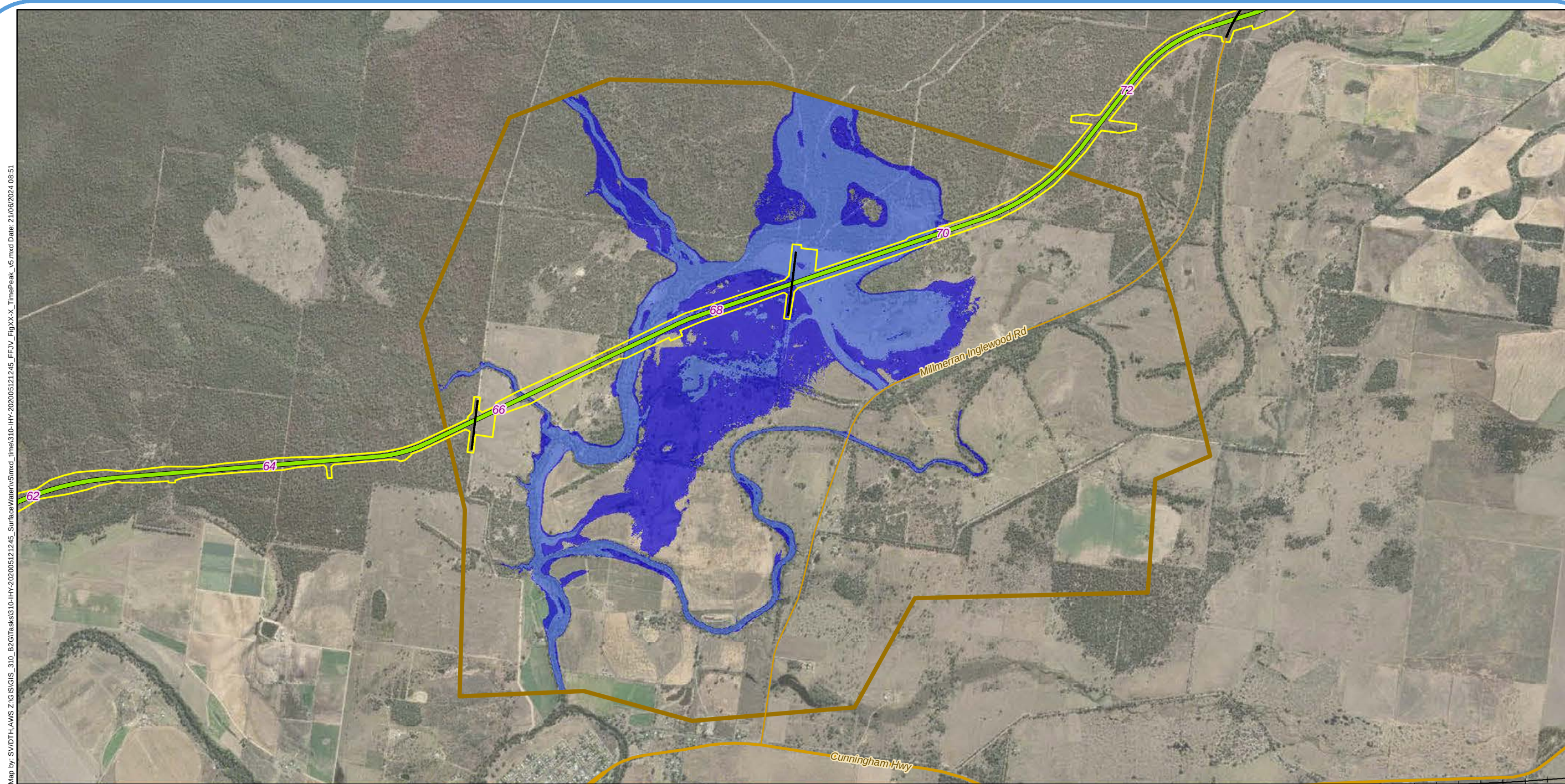
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



Border to Gowrie
Figure I2-G:
20% AEP Event - Peak Time of Inundation - Existing Case - Pariagara Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_FF\V_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51

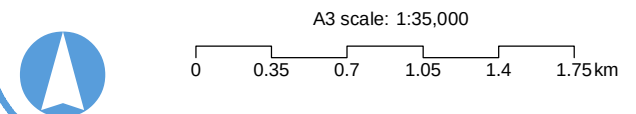
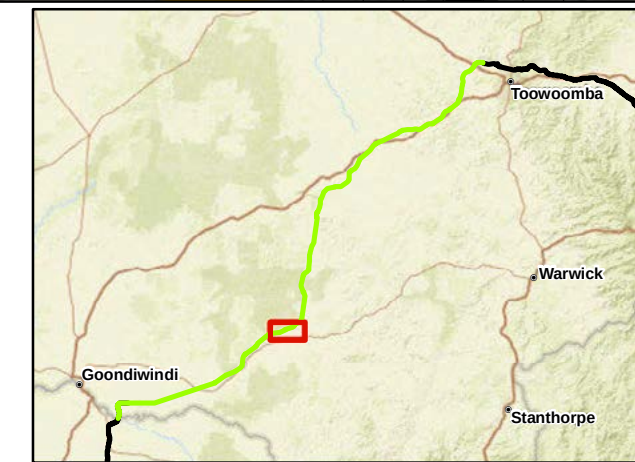


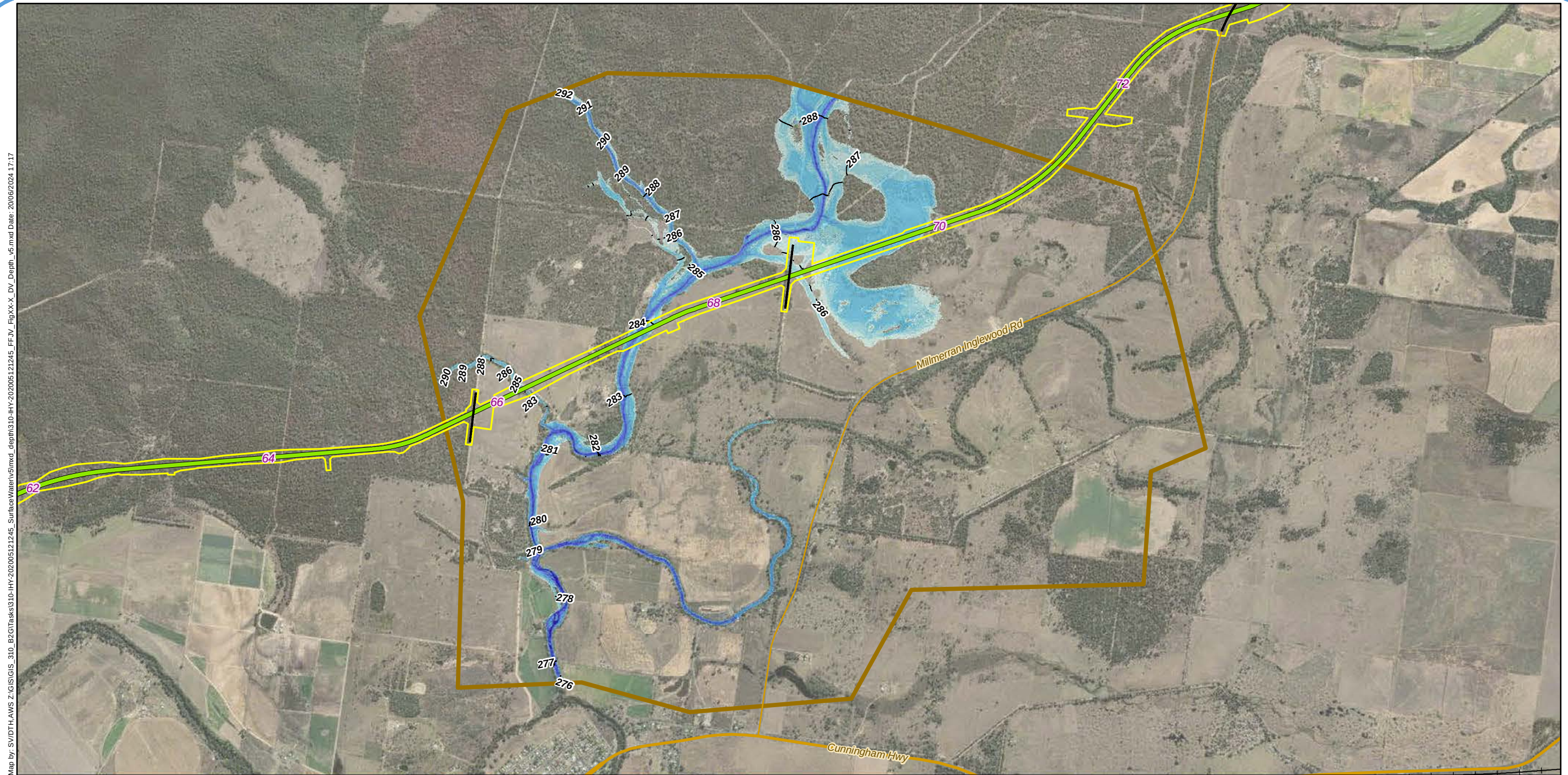
Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



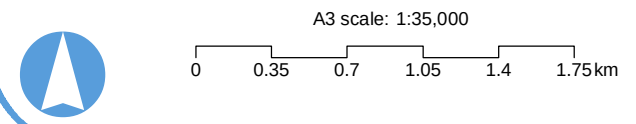


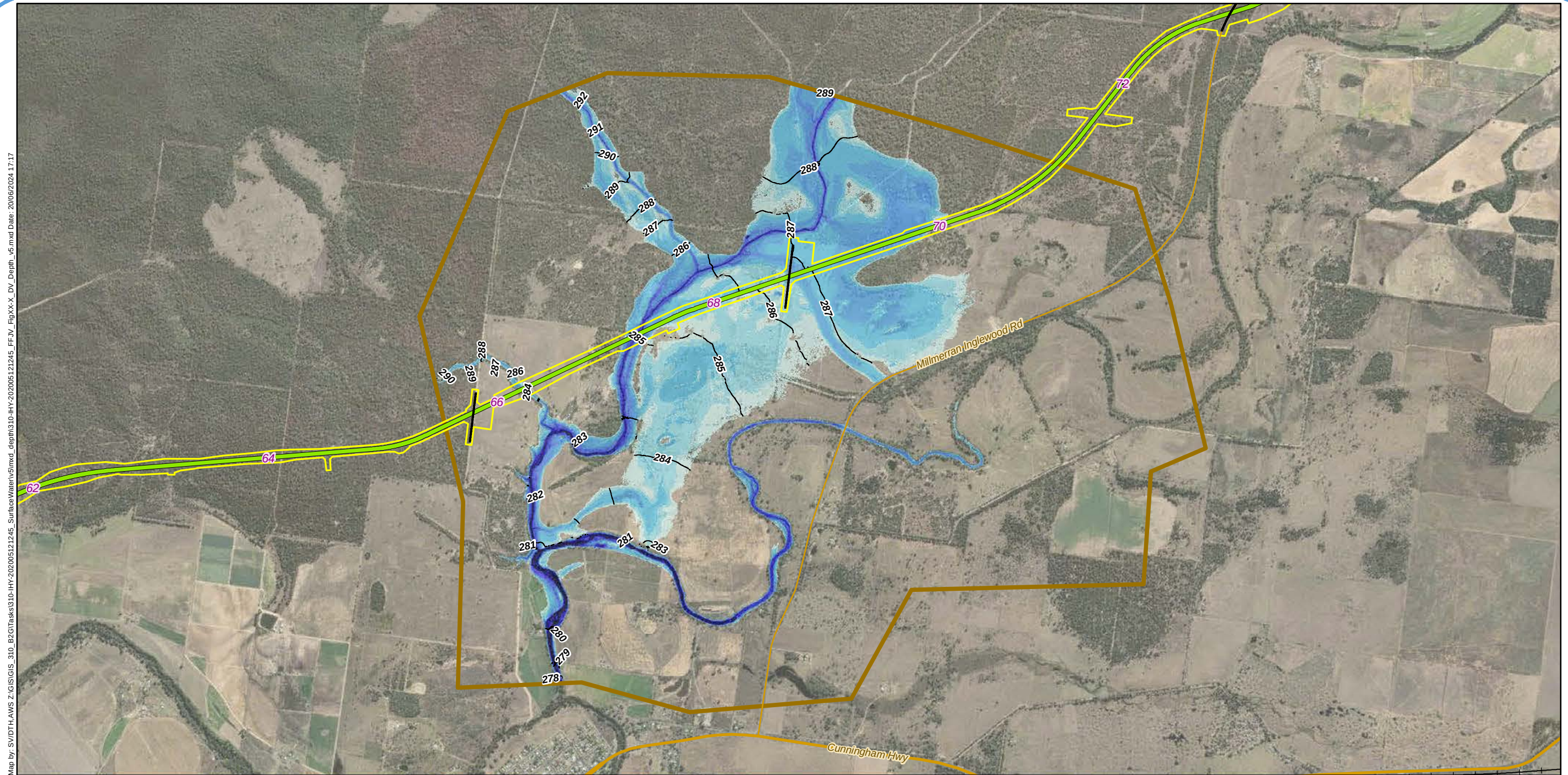
Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



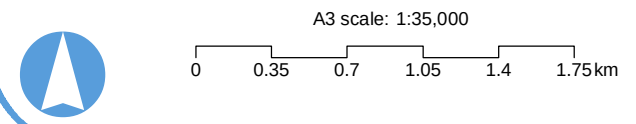


Legend

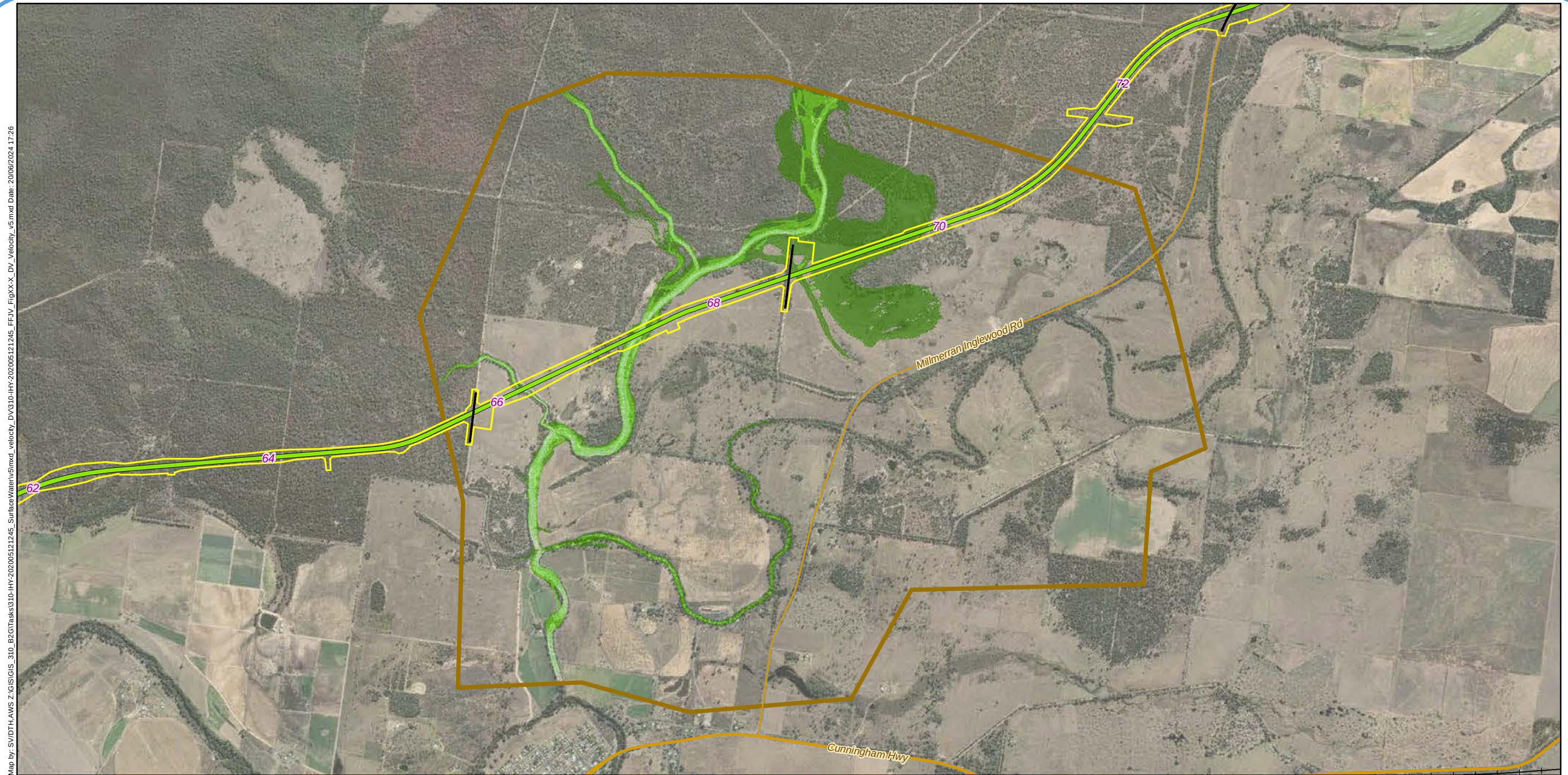
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\5121245_SurfaceWater\5mxd_velocity_DV310-HY-2020\5121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:26



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

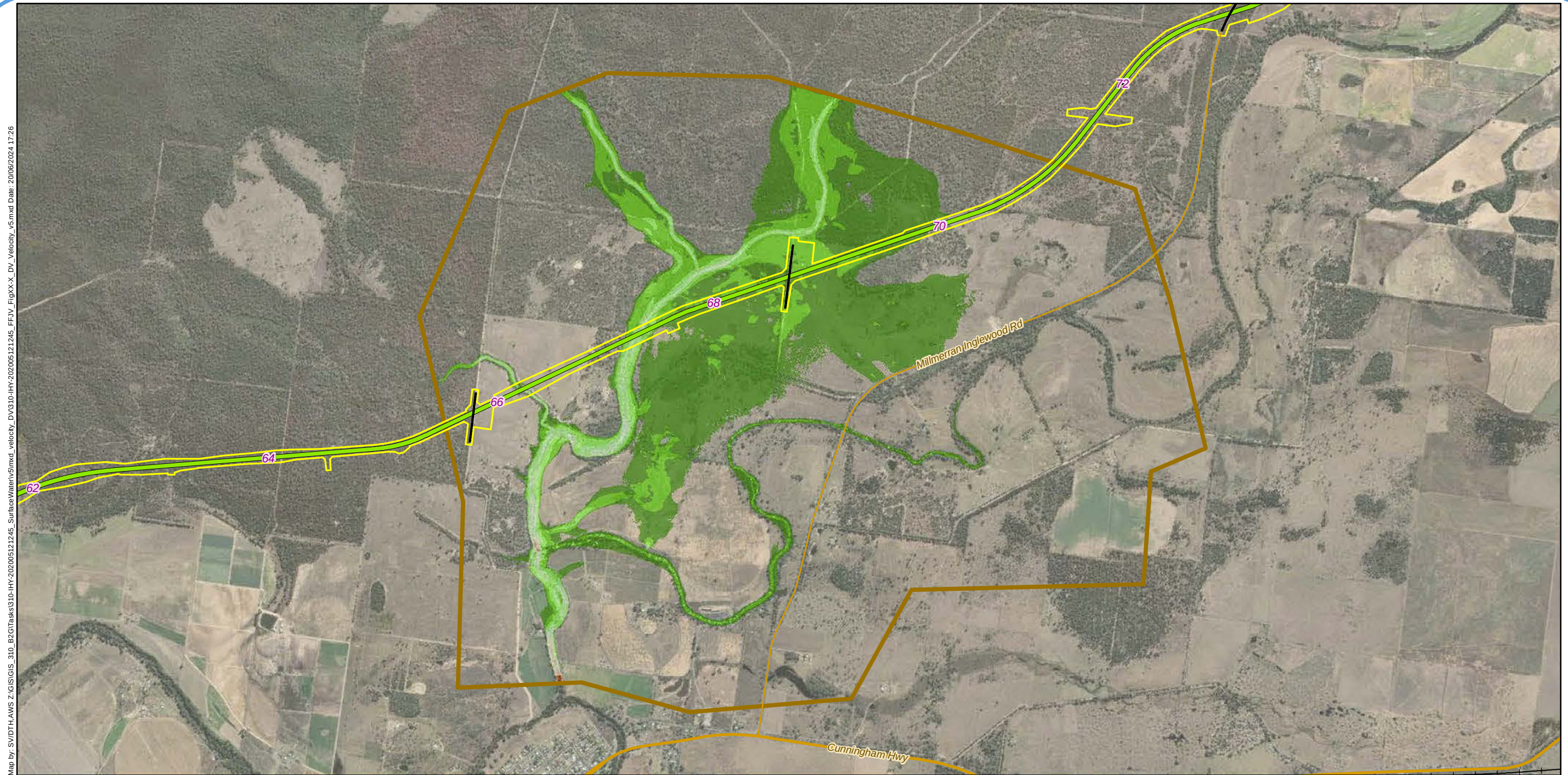
Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

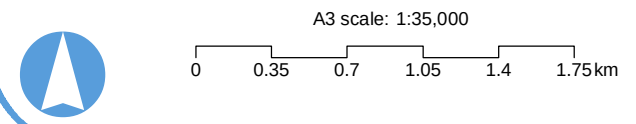
Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_DV310-HY-2020\05121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:26



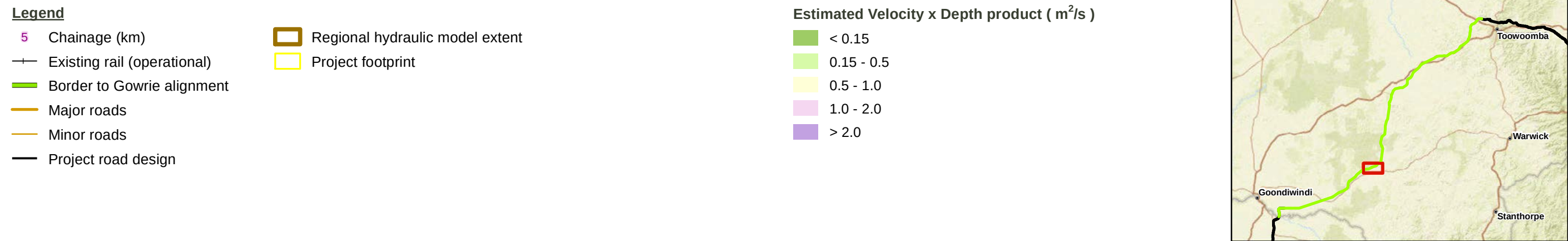
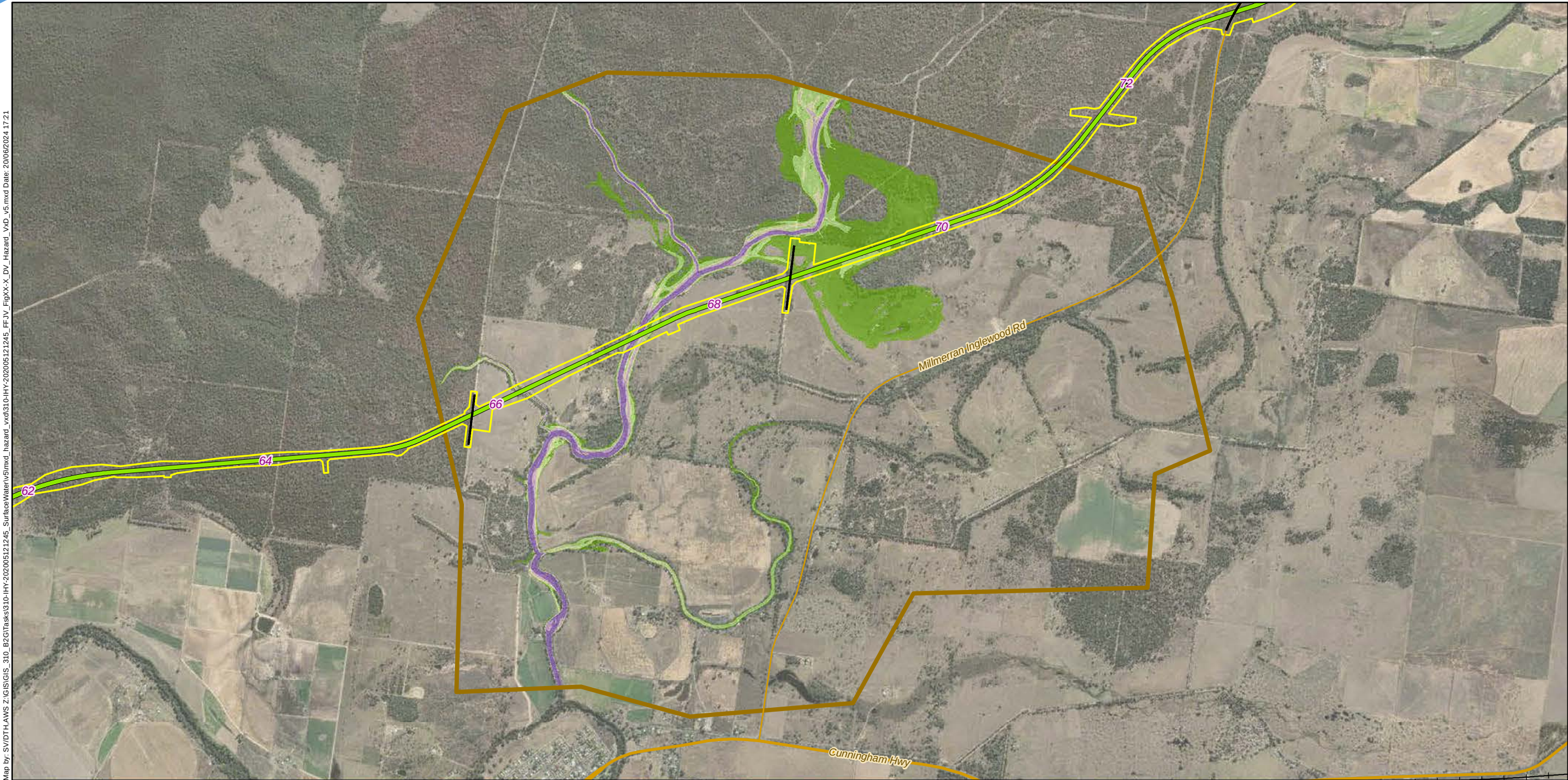
Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)			
0.0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0
2.0 - 2.5	2.5 - 3.0	3.0 - 3.5	3.5 - 4.0
4.0 - 4.5	4.5 - 5.0	> 5.0	



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_Hazard_VAD_v5.mxd Date: 20/06/2024 17:21



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



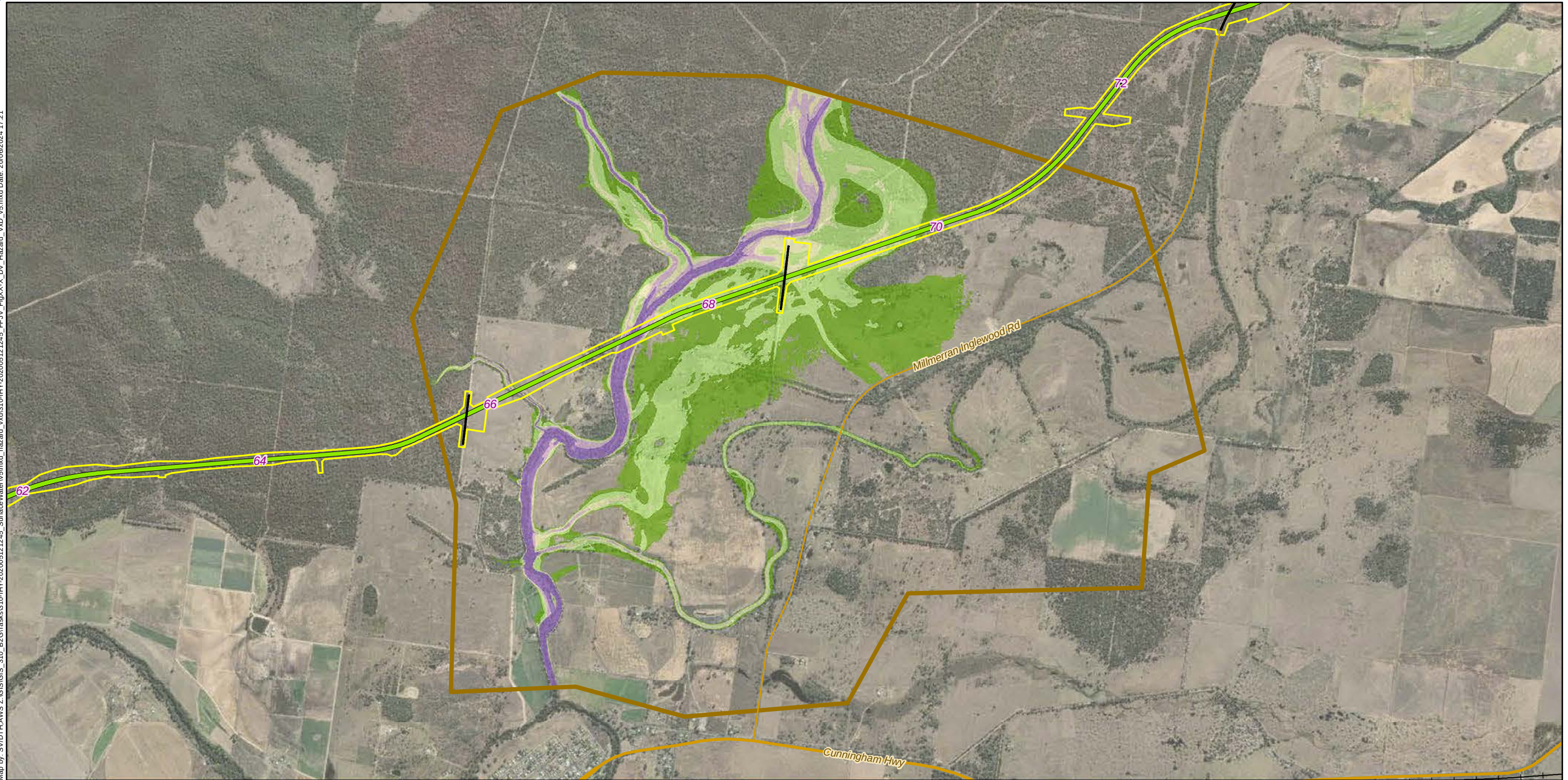
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I3-E:

20% AEP Event - Peak Hazard - Developed Case - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_Hazard_Vrd_v5.mxd Date: 20/06/2024 17:21



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



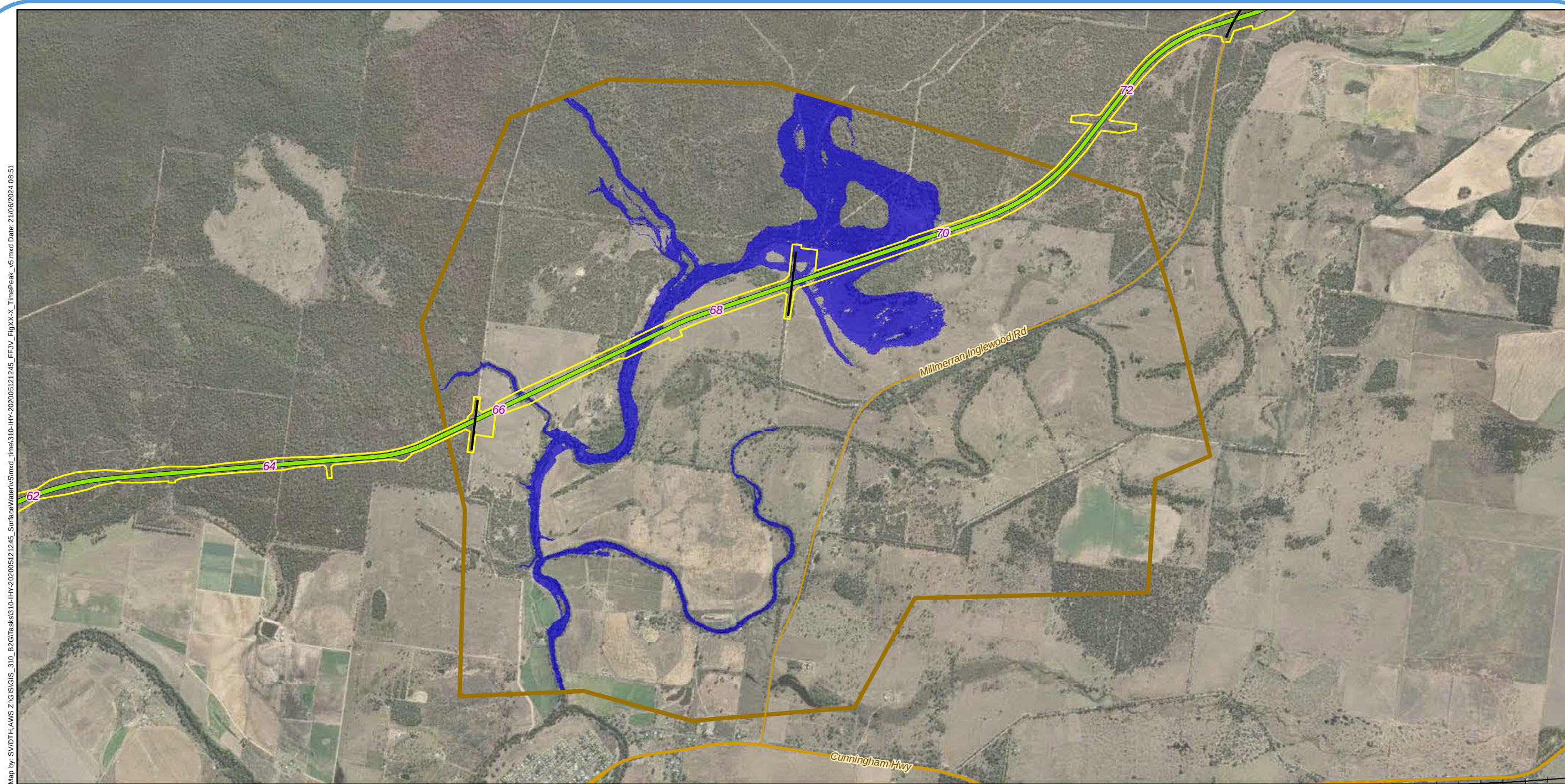
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I3-F:

1% AEP Event - Peak Hazard - Developed Case - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_FFI_V_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51

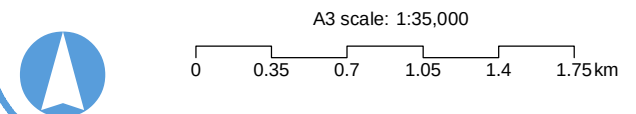
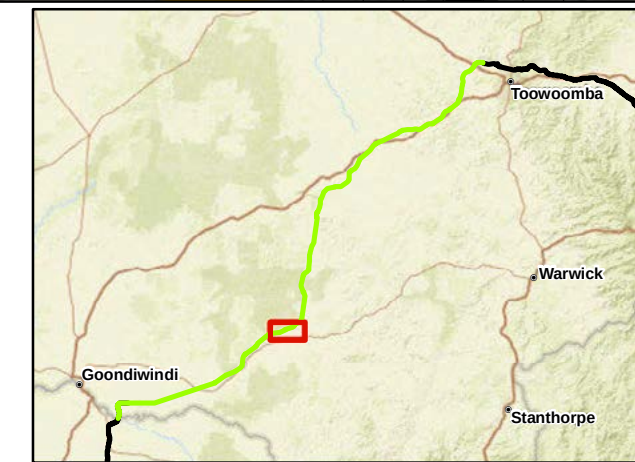


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

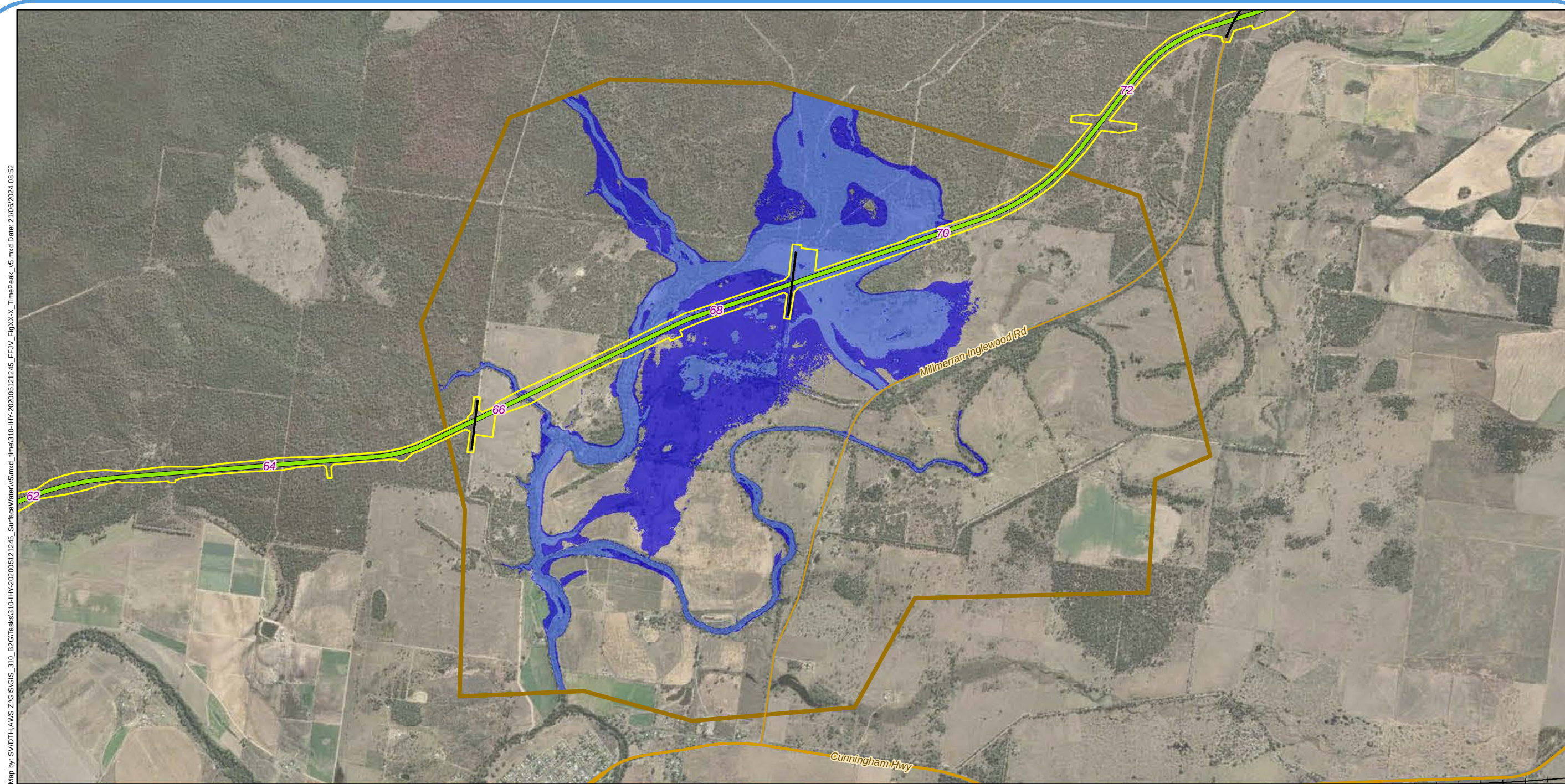
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



Border to Gowrie
Figure I3-G:
20% AEP Event - Peak Time of Inundation - Developed Case - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_FF\V_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:52

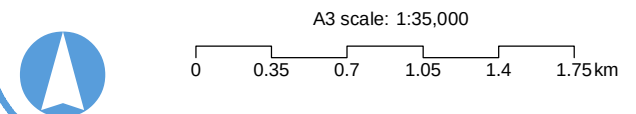
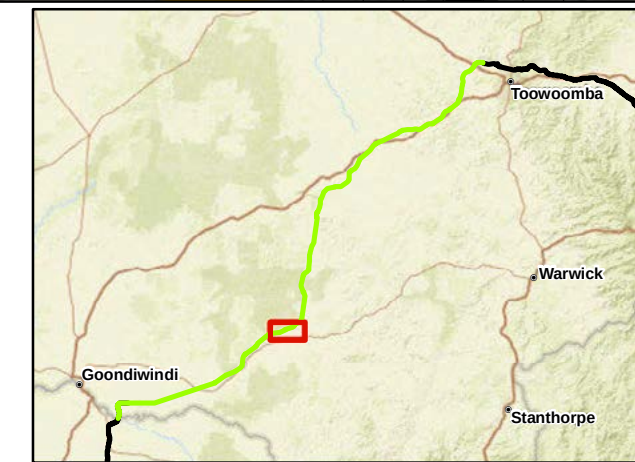


Legend

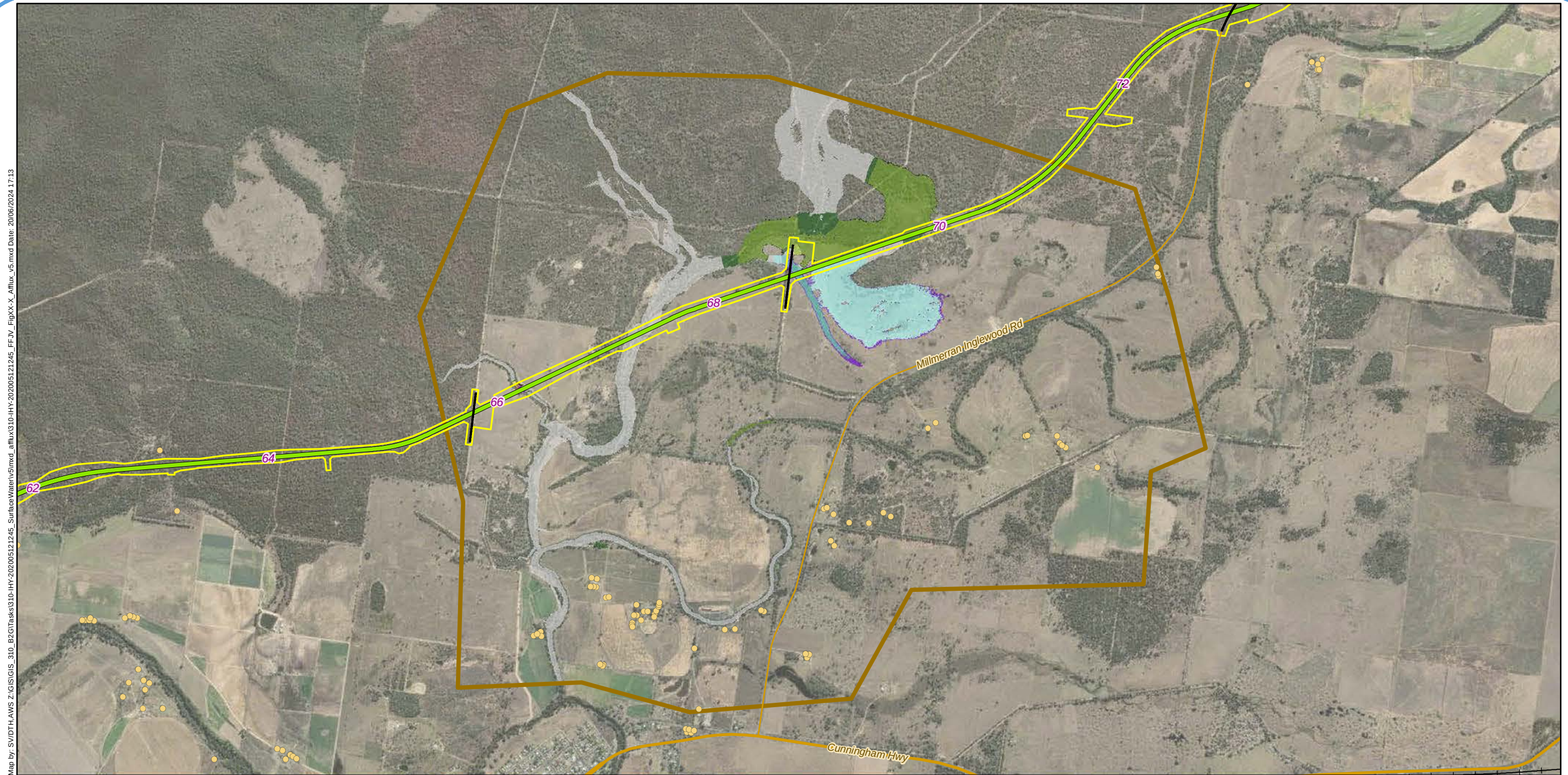
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



Border to Gowrie
Figure I3-H:
1% AEP Event - Peak Time of Inundation - Developed Case - Pariagara Creek



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5mxd Afflux\310-IHY-2020\5121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13

Legend

- Flood sensitive receptor
- Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

< -0.5	0.02 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.30
-0.05 to -0.01	0.30 to 0.40
-0.01 to 0.01	0.40 to 0.50
0.01 to 0.02	> 0.5
	Decrease in inundation area
	Increase in inundation area



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



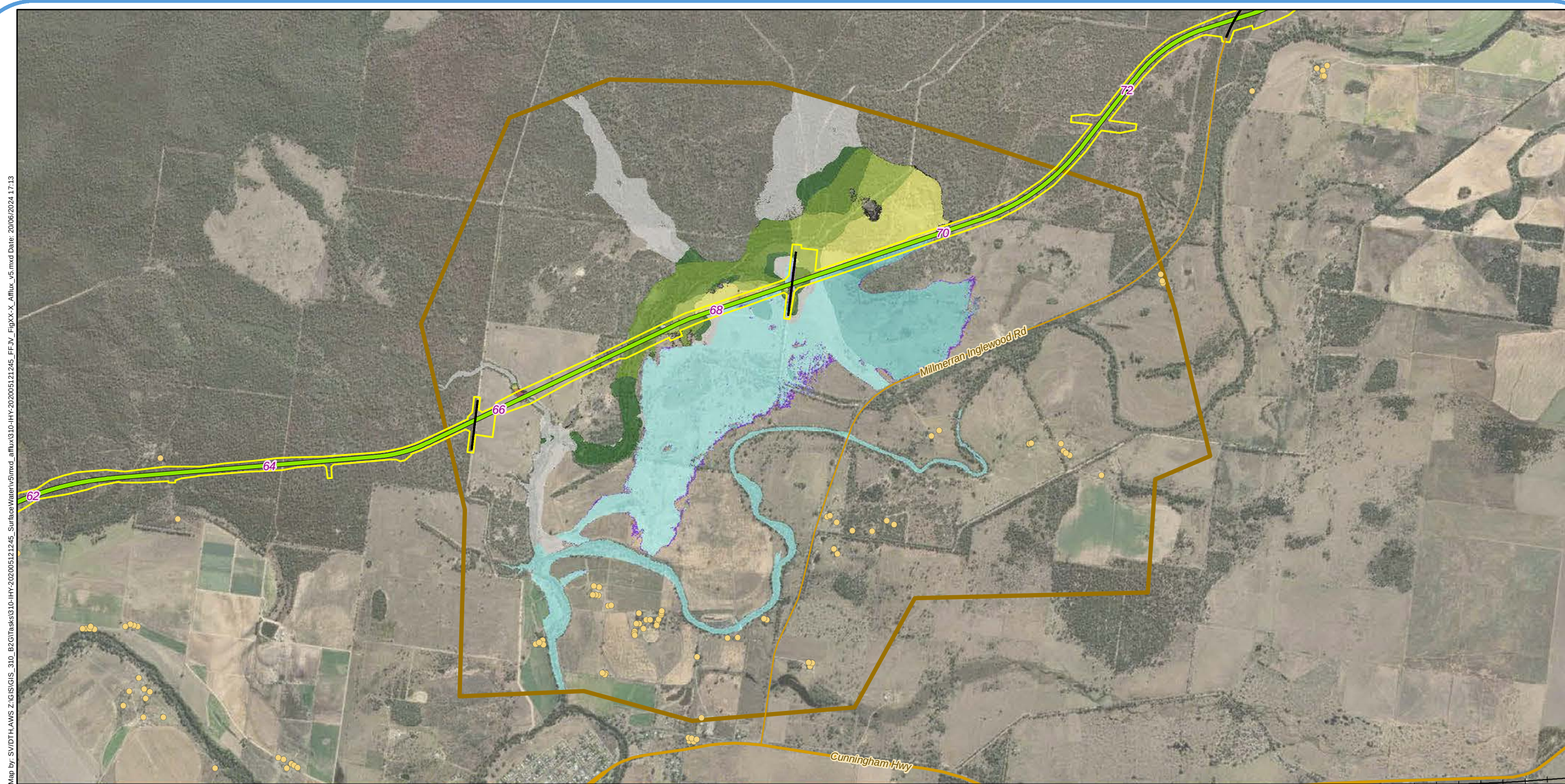
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I4-A:

20% AEP Event - Afflux - Pariagara Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5mxd Afflux\310-IHY-2020\5121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13

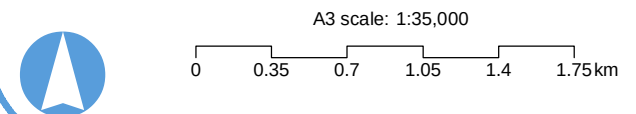


Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

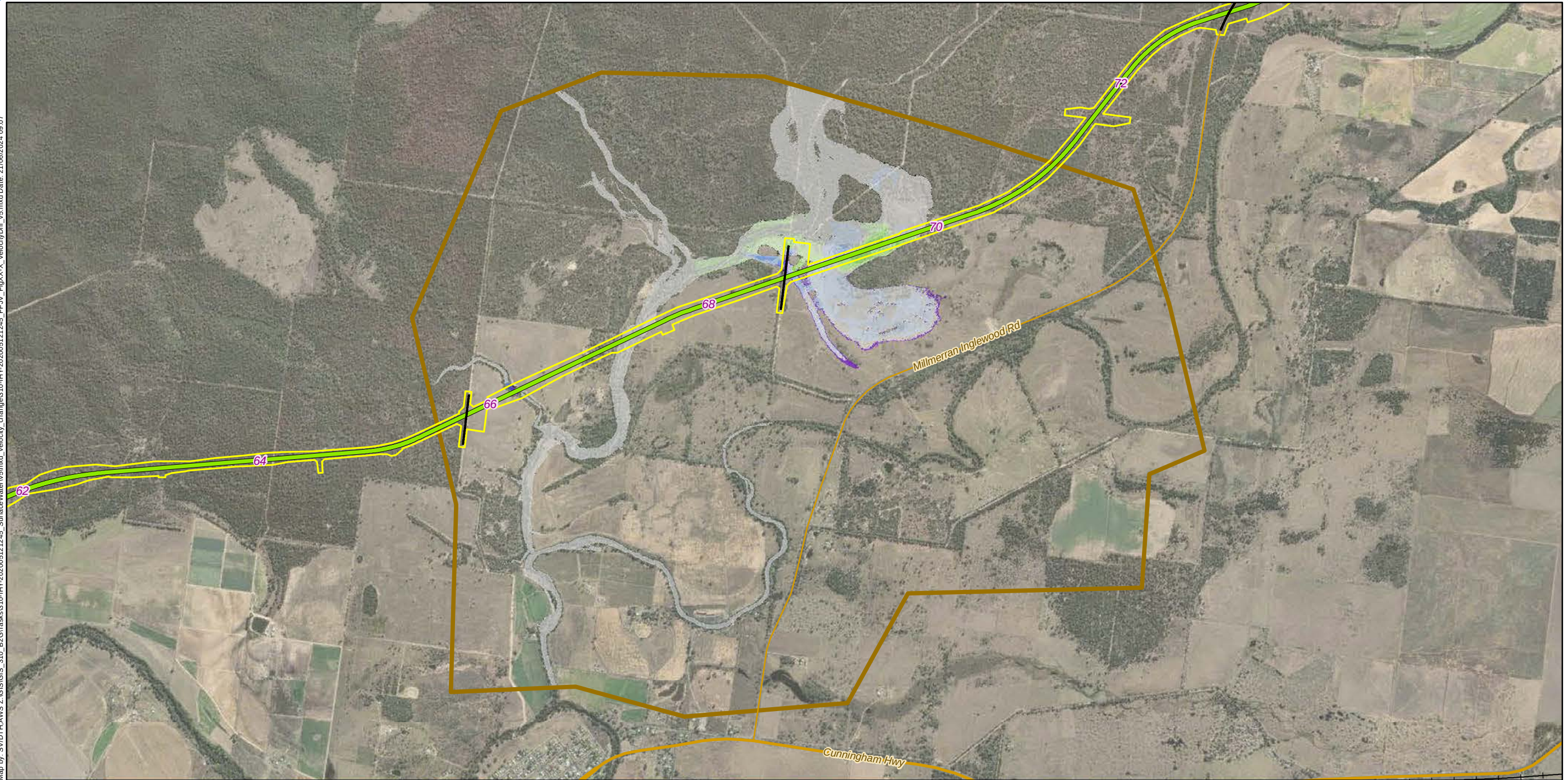
Estimated change in peak water levels (m)

< -0.5	0.02 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.30
-0.05 to -0.01	0.30 to 0.40
-0.01 to 0.01	0.40 to 0.50
0.01 to 0.02	> 0.5
	Decrease in inundation area
	Increase in inundation area



Border to Gowrie
Figure I4-B:
1% AEP Event - Afflux - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:07

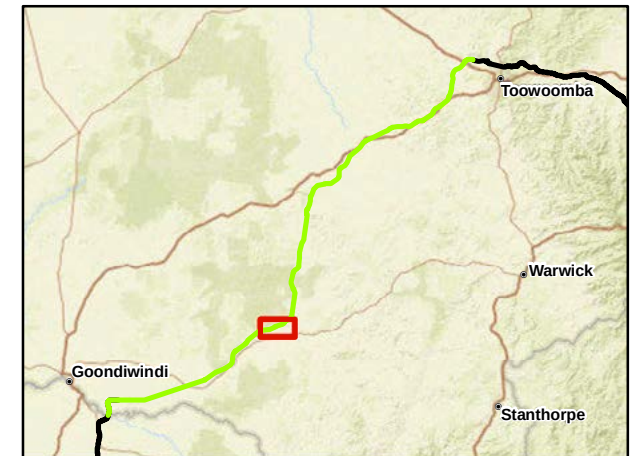


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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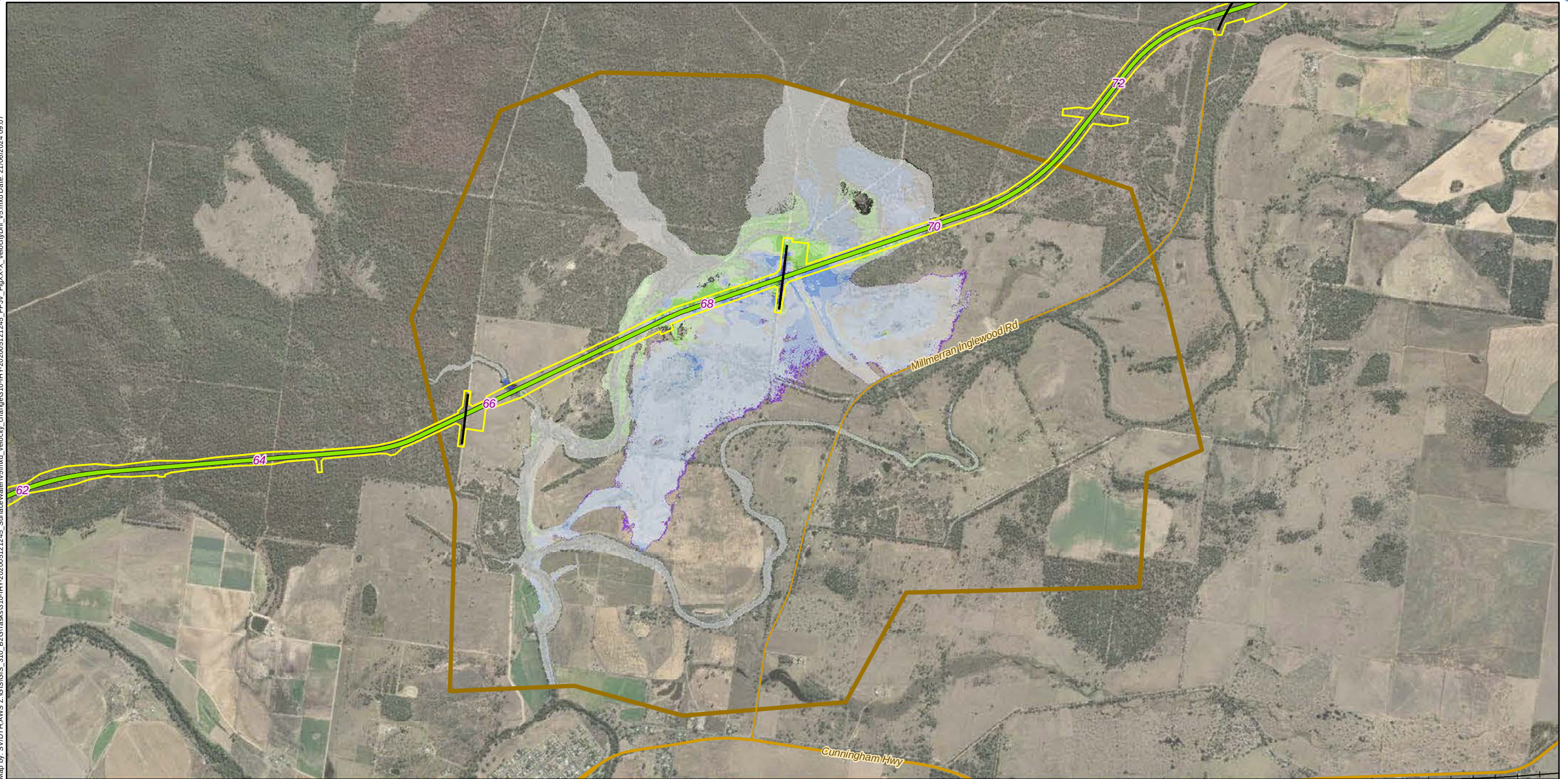
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I4-C:

20% AEP Event - Change in Velocity - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:07



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

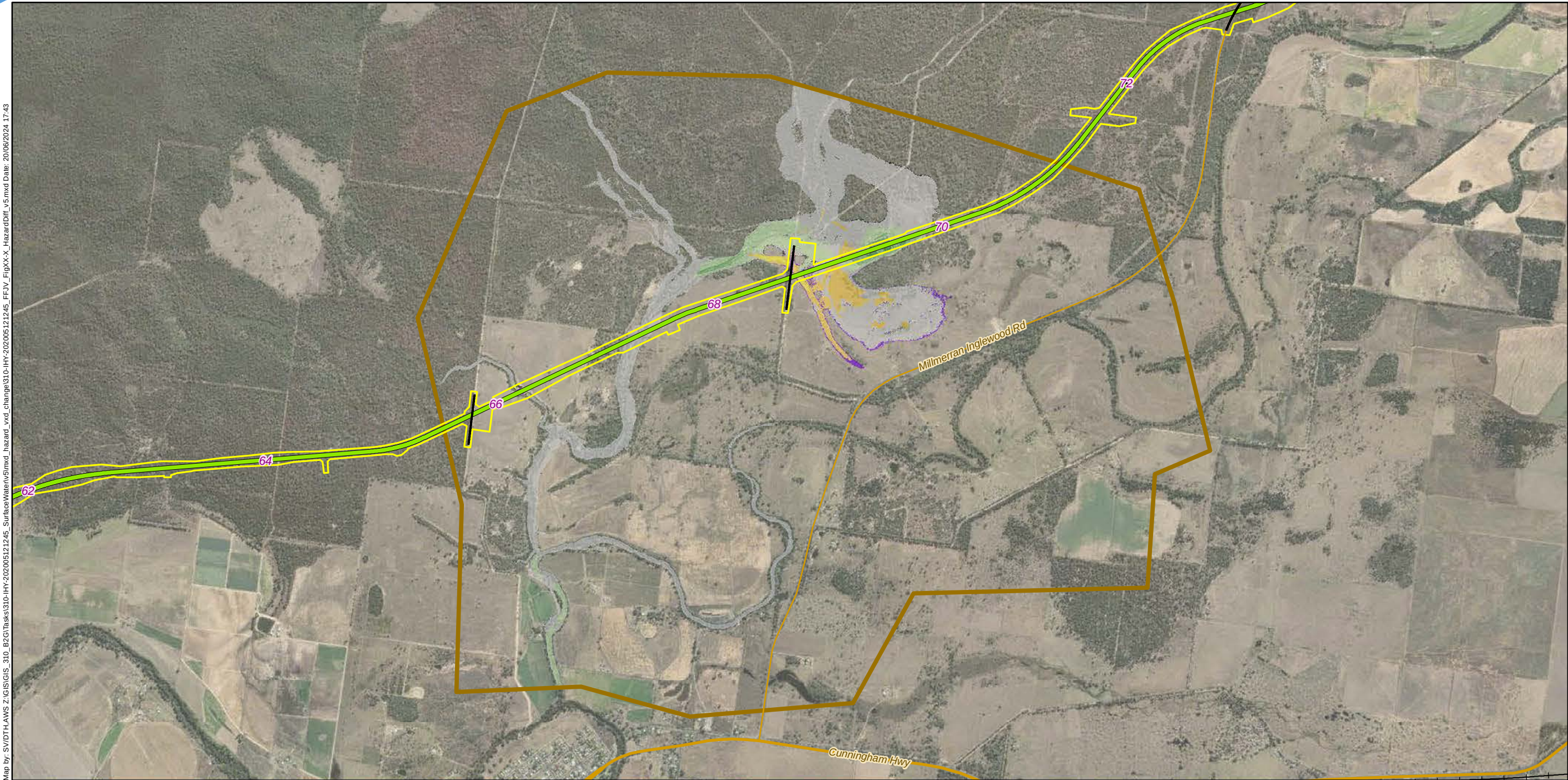
Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_Hazard_Lyrd_change\310-HY-2020\05121245_FF3V_FigXX-X_HazardDiff_v5.mxd Date: 20/06/2024 17:43



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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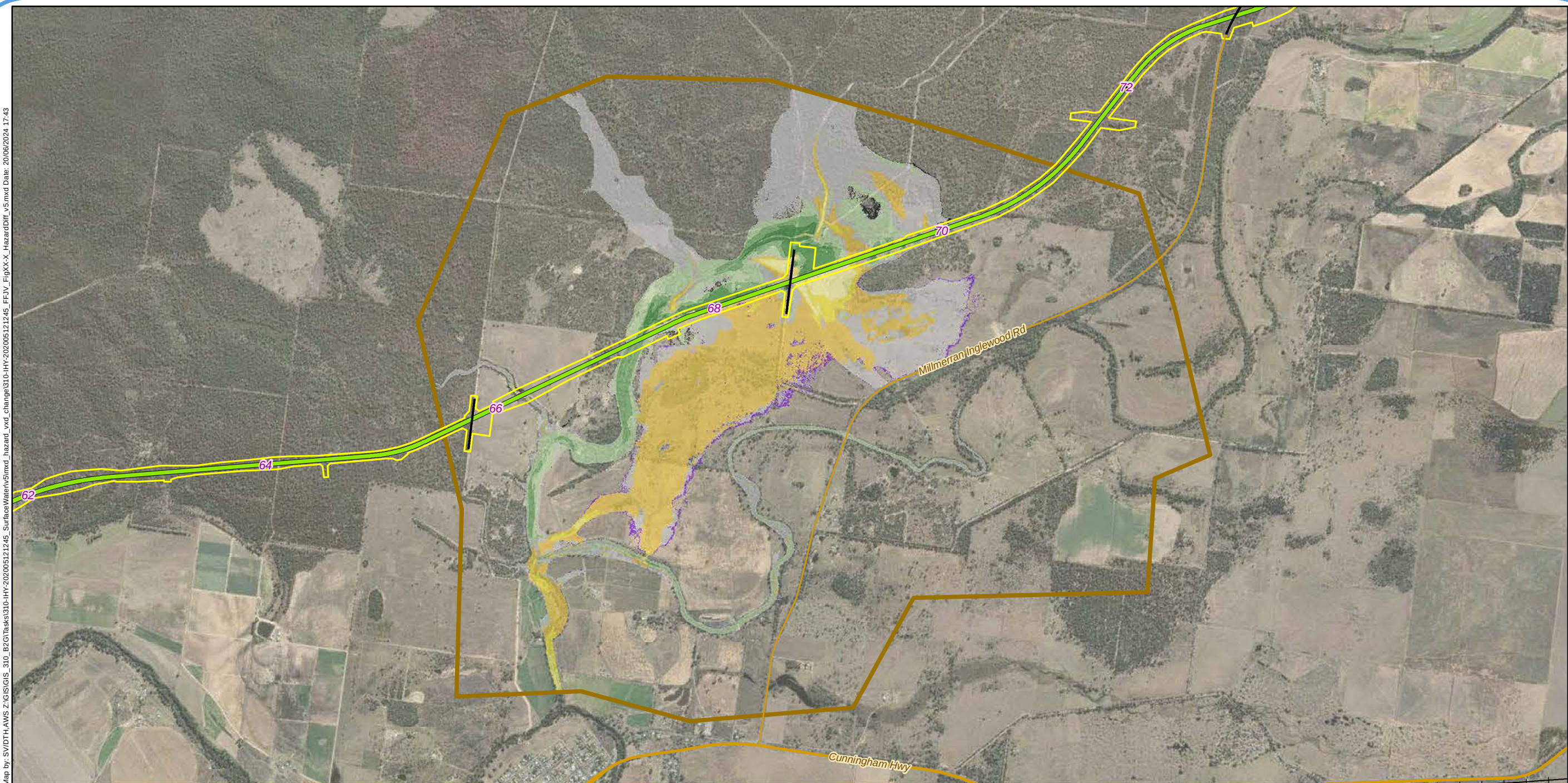
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I4-E:

20% AEP Event - Change in Hazard - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_Hazard_Diff_v5.mxd Date: 20/06/2024 17:43



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

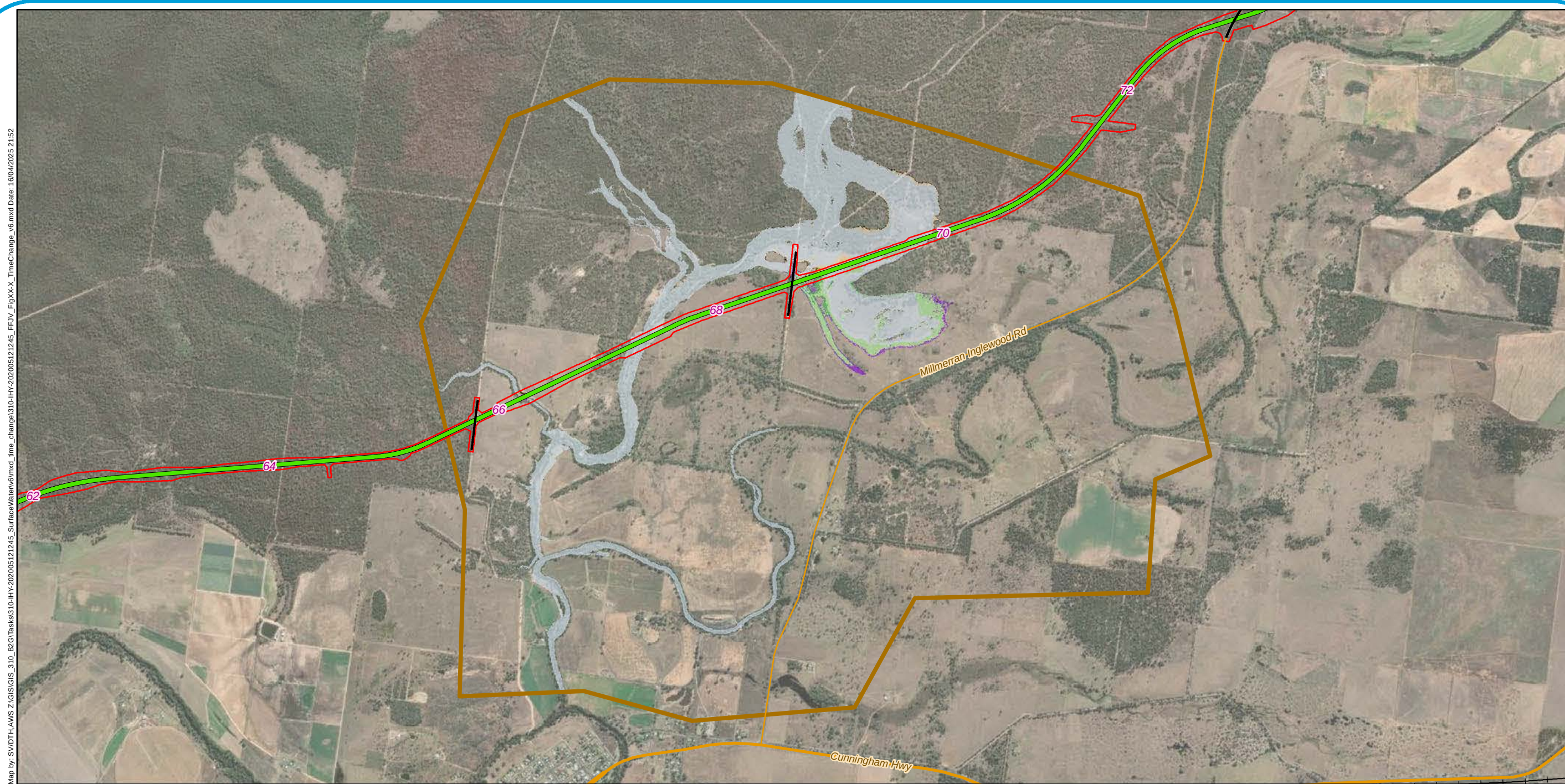
Estimated change in velocity x depth product (m^2/s)

< -0.10	0.01 to 0.05
-0.10 to -0.05	0.05 to 0.10
-0.05 to -0.01	> 0.10
-0.01 to 0.01	Decrease in inundation area
	Increase in inundation area



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Task\310-HY-2020\05121245_SurfaceWater\6mxd_FFJV_FigXX-X_TimeChange_v6.mxd Date: 16/04/2025 21:52

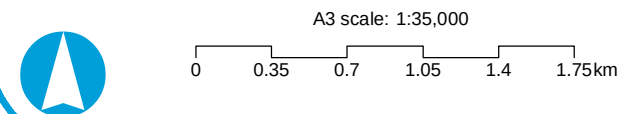
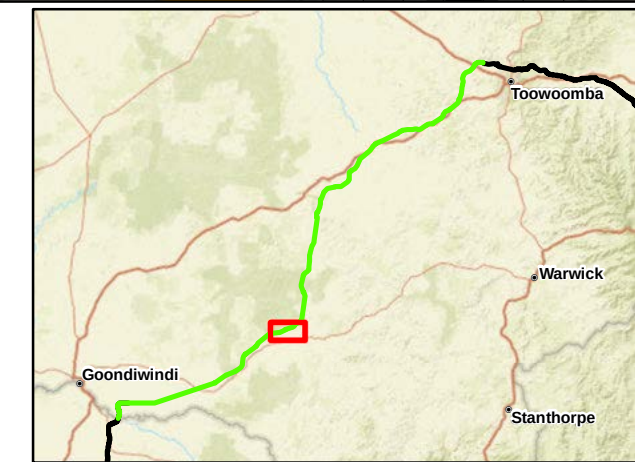


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

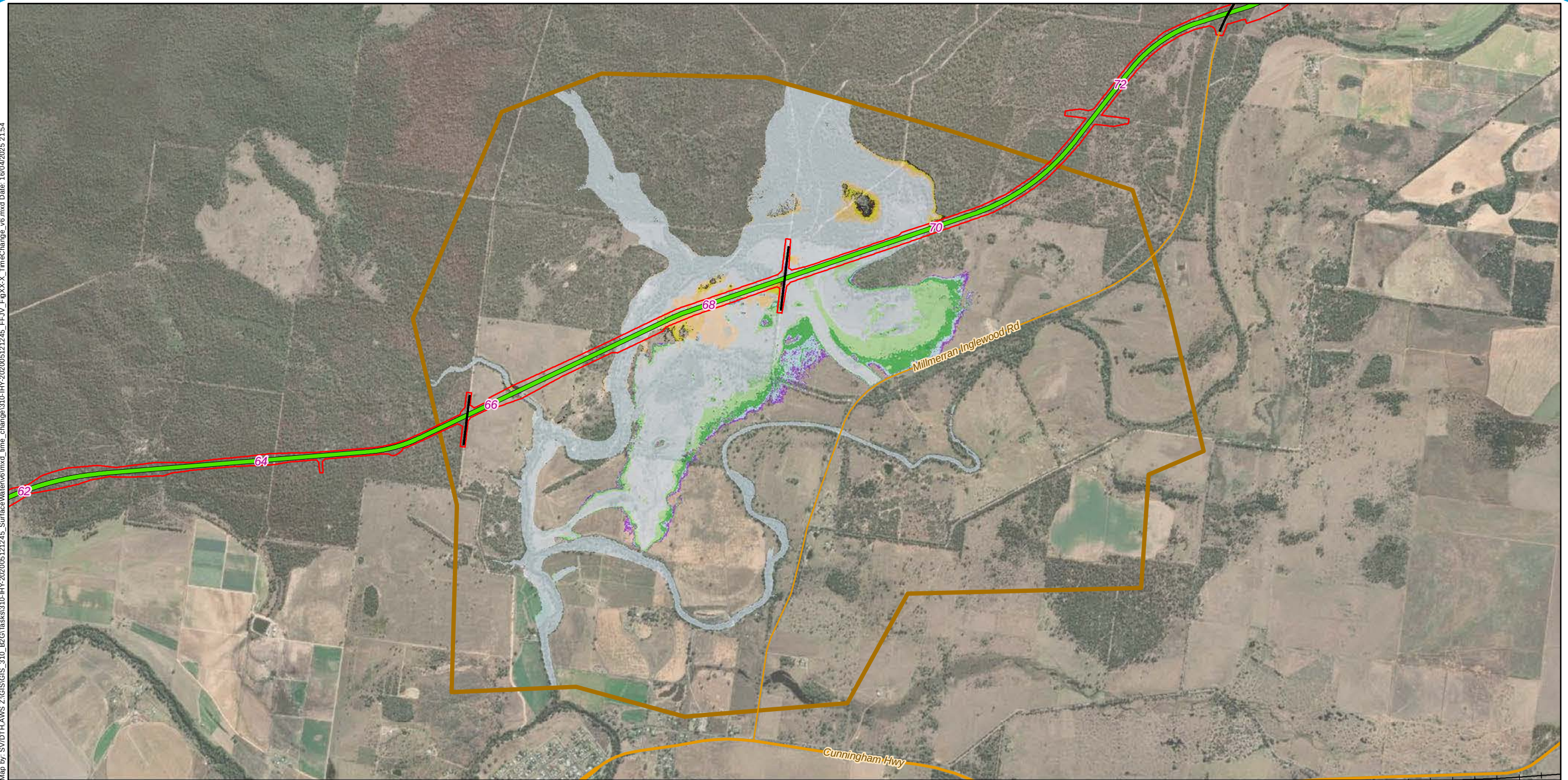
Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



Border to Gowrie
Figure I4-G:
20% AEP Event - Change in Time of Inundation - Pariagara Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Task\310-HY-2020\05121245_SurfaceWater\6mxd_FFJV_FigXX-X_TimeChange_v6.mxd Date: 16/04/2025 21:54



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_FIO_v5.mxd Date: 21/06/2024 08:55



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|--------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | |

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



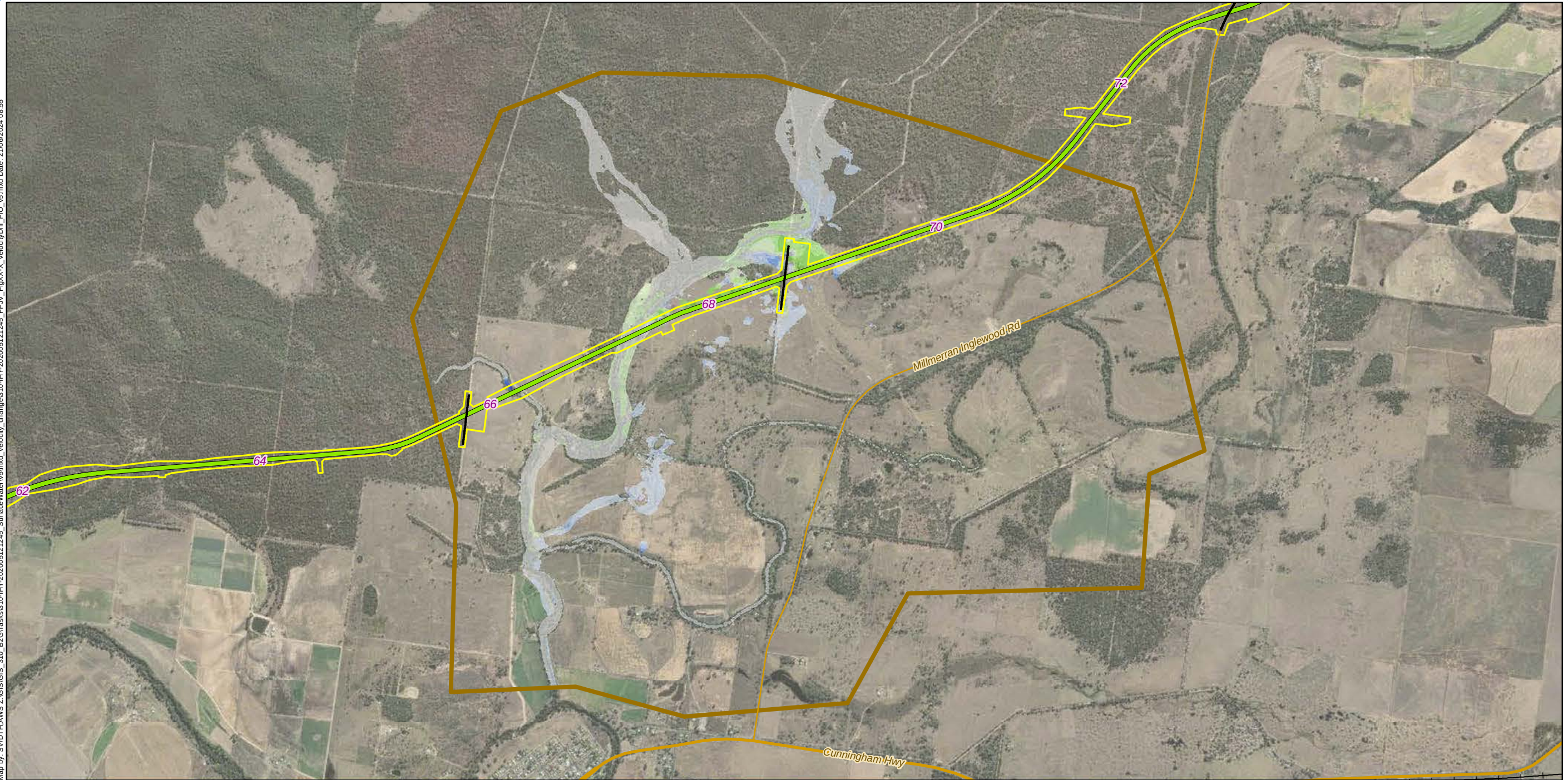
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I5-A:

20% AEP Event - Change in Velocity (<0.5m/s cutoff) - Pariagara Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_FIO_v5.mxd Date: 21/06/2024 08:55



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|--------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | |

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I5-B:

1% AEP Event - Change in Velocity (<0.5m/s cutoff) - Pariagara Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_0501m_5.mxd Date: 21/06/2024 09:02



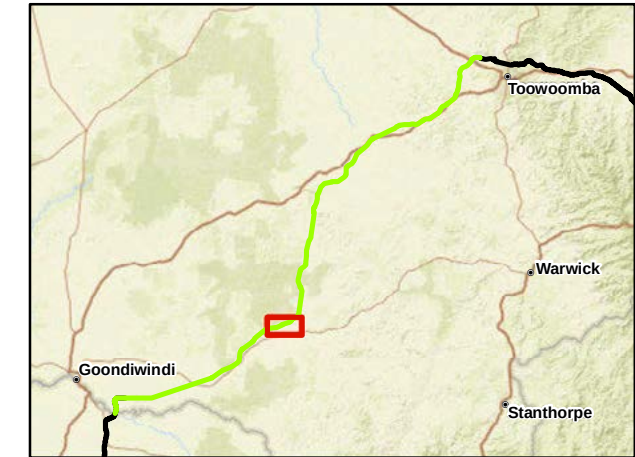
Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I5-C:

20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Pariagara Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_0501m_5.mxd Date: 21/06/2024 09:02



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I5-D:

1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mvd_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_v5.mxd Date: 21/06/2024 09:06



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



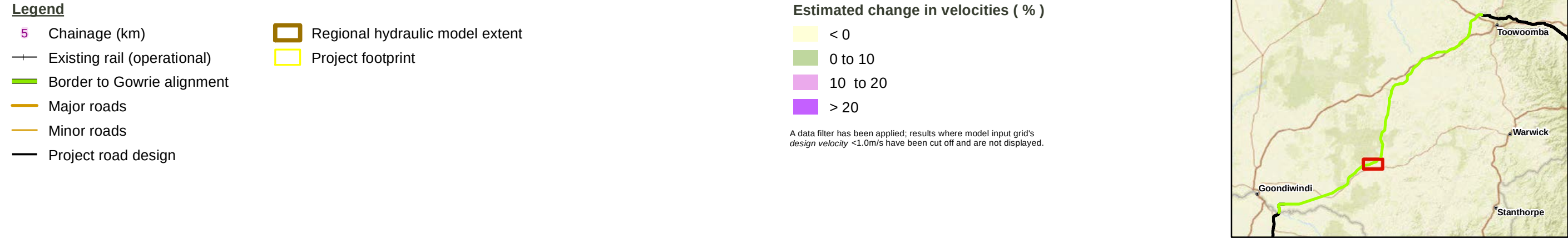
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I5-E:

20% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\med_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_v5.mxd Date: 21/06/2024 09:06



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

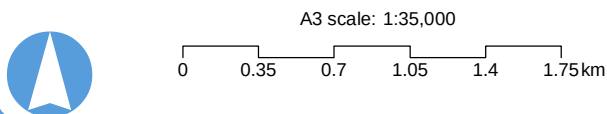
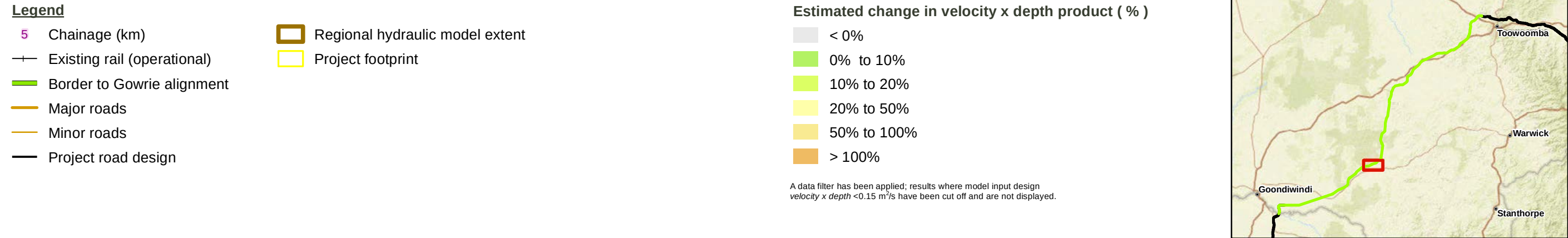


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Coordinate System: GDA 1994 MGA Zone 56

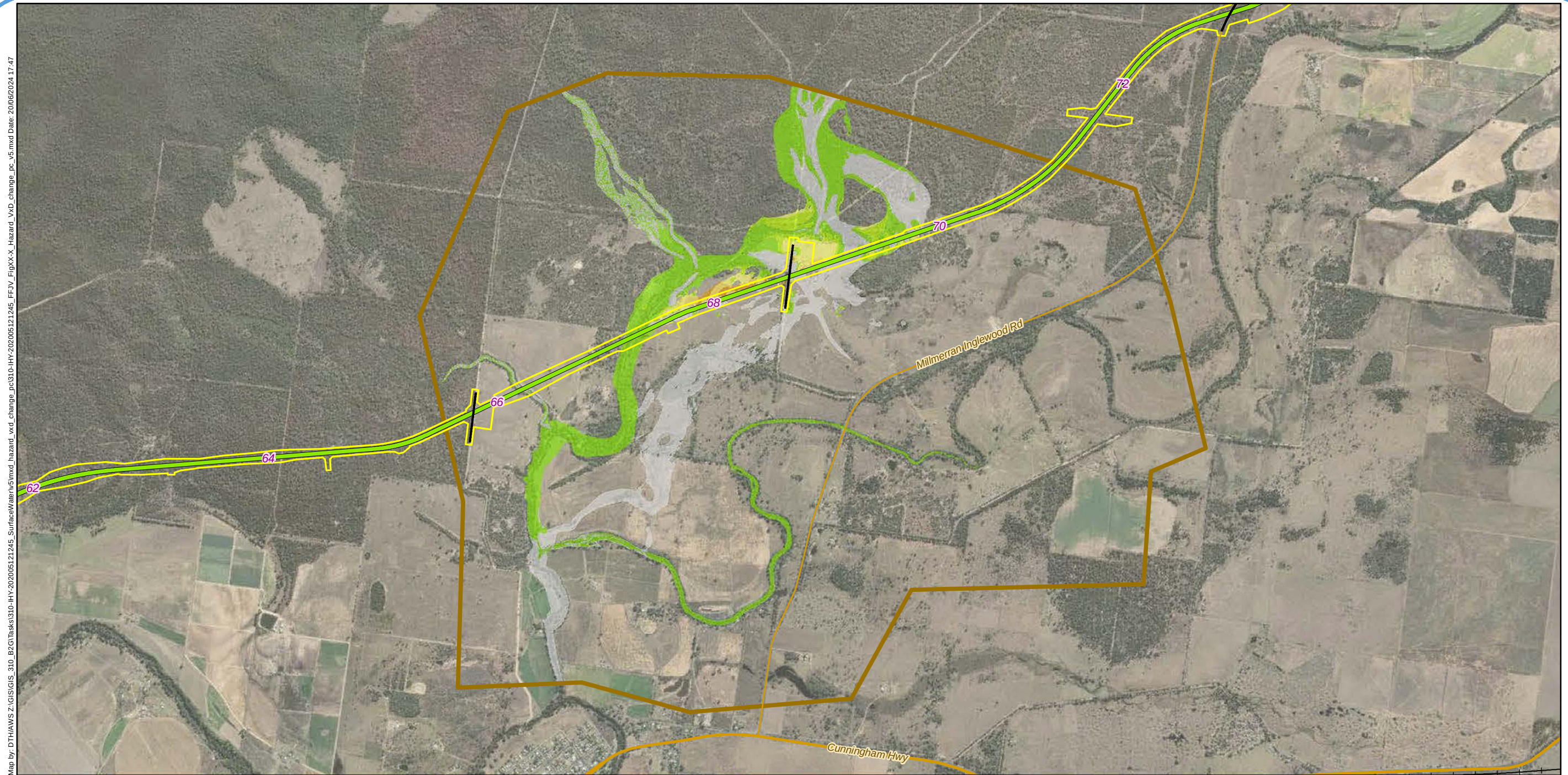
Border to Gowrie

Figure I5-F:

1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Pariagara Creek



Border to Gowrie
Figure I6-A:
20% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Pariagara Creek



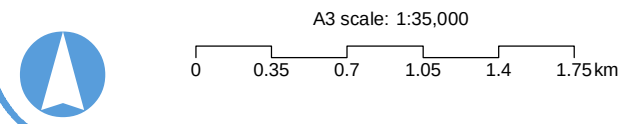
Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

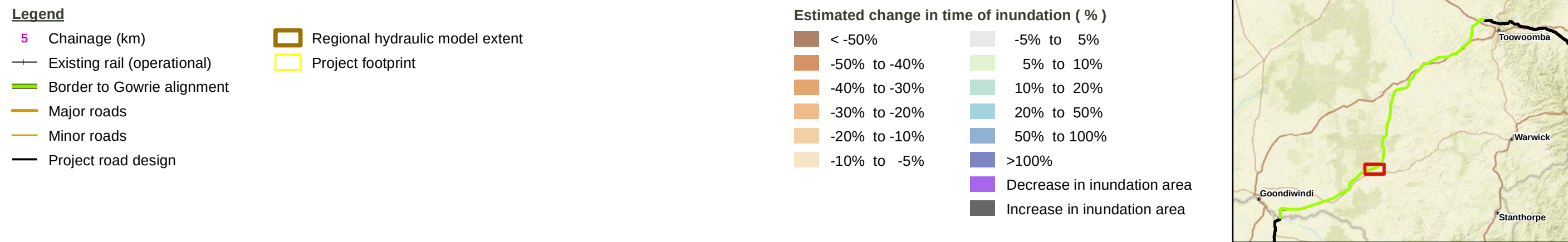
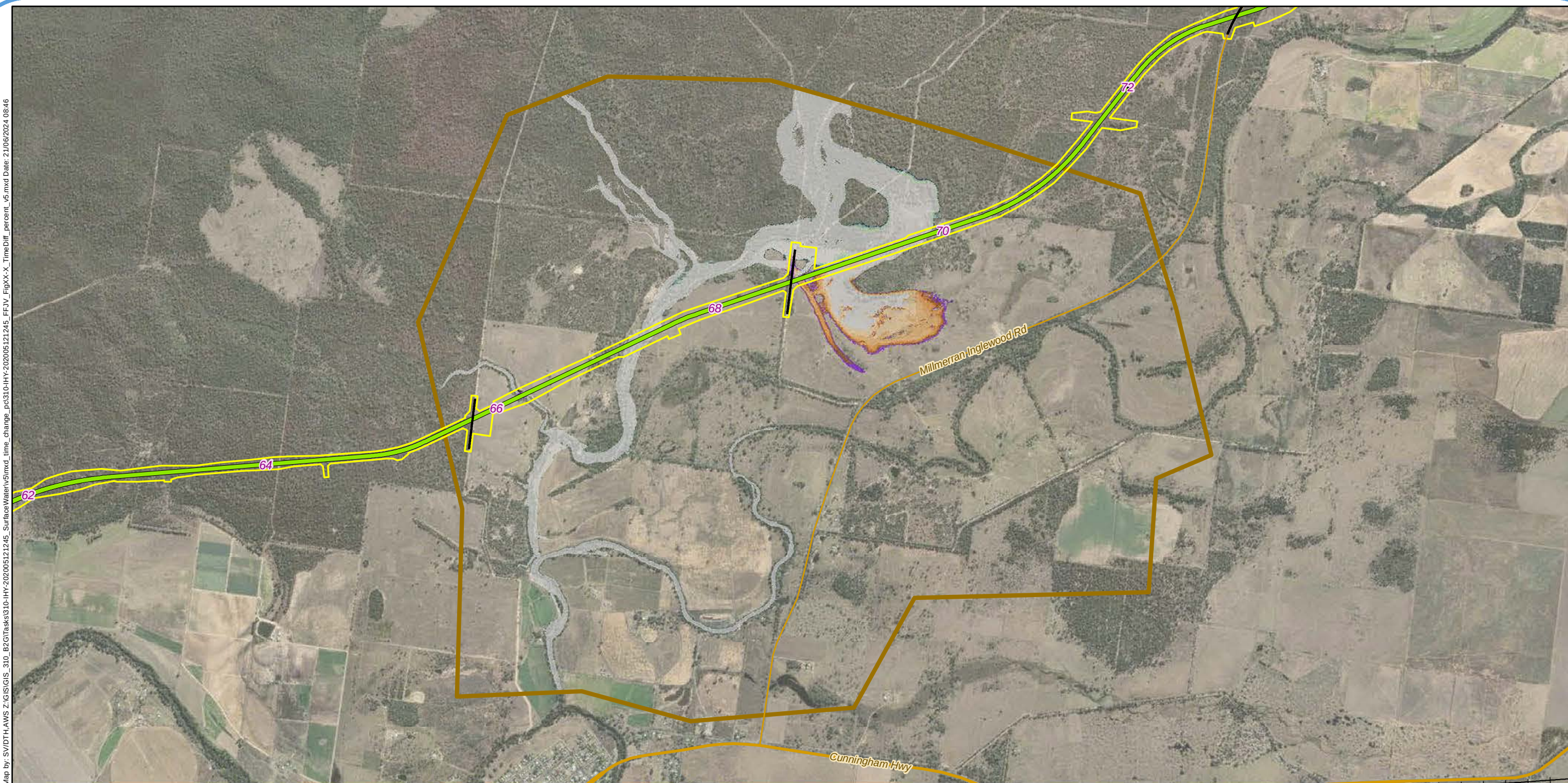
Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_line_change_pcd310-HY-2020\05121245_FF\3V_FigXX-X_TimeDiff_percent_v5.mxd Date: 21/06/2024 08:46



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_line_change_pcd310-HY-2020\05121245_FF3V_FigXX-X_TimeDiff_percent_v5.mxd Date: 21/06/2024 08:46



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- < -50%
- 50% to -40%
- 40% to -30%
- 30% to -20%
- 20% to -10%
- 10% to -5%
- 5% to 5%
- 5% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- >100%
- Decrease in inundation area
- Increase in inundation area



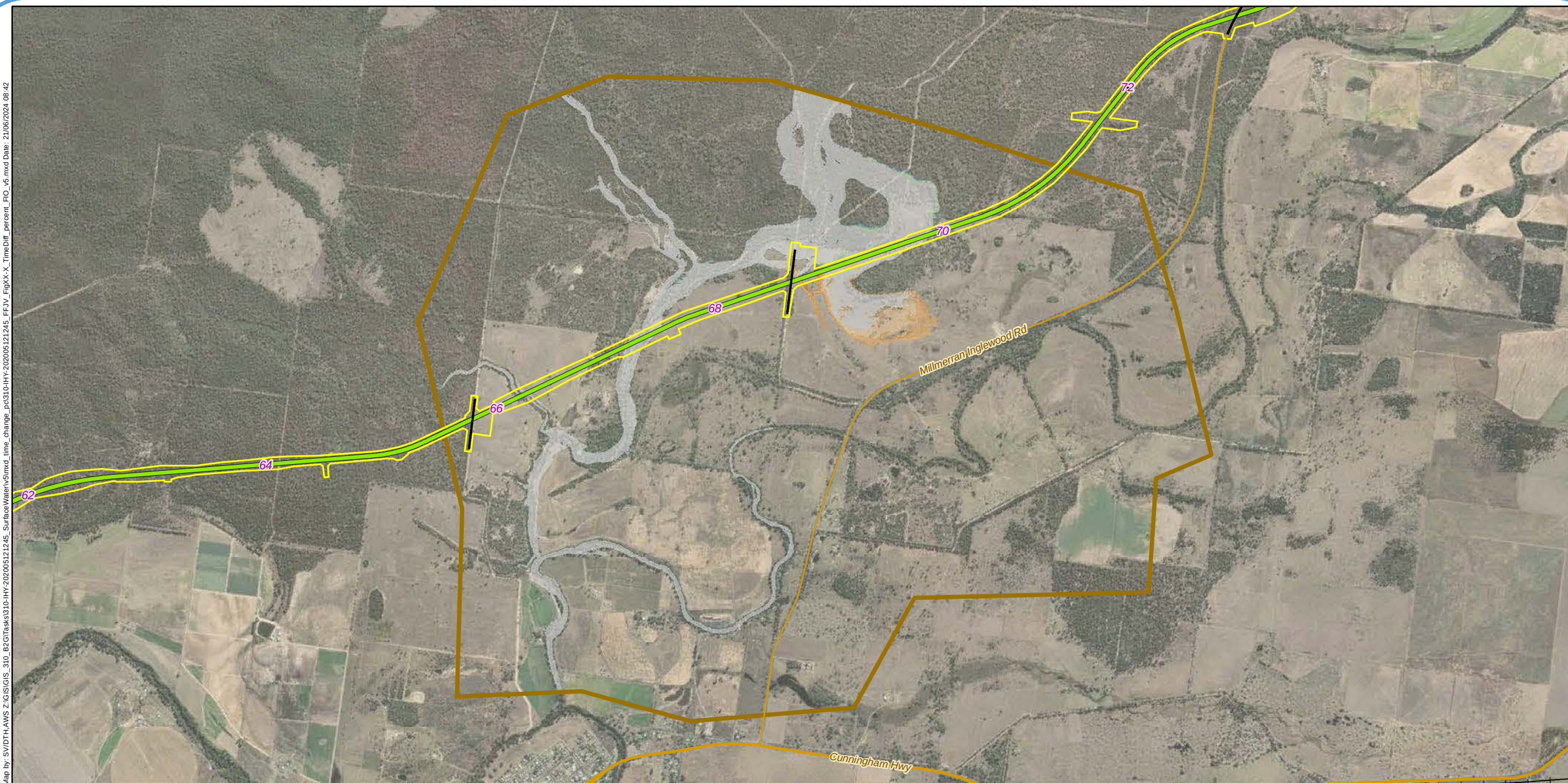
A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure I7-B:
1% AEP Event - Percentage Change in Time of Inundation - Pariagara Creek

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_line_change_pcd310-HY-2020\05121245_FF\3V_FigXX-X_TimeDiff_percent_FIO_v5.mxd Date: 21/06/2024 08:42



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



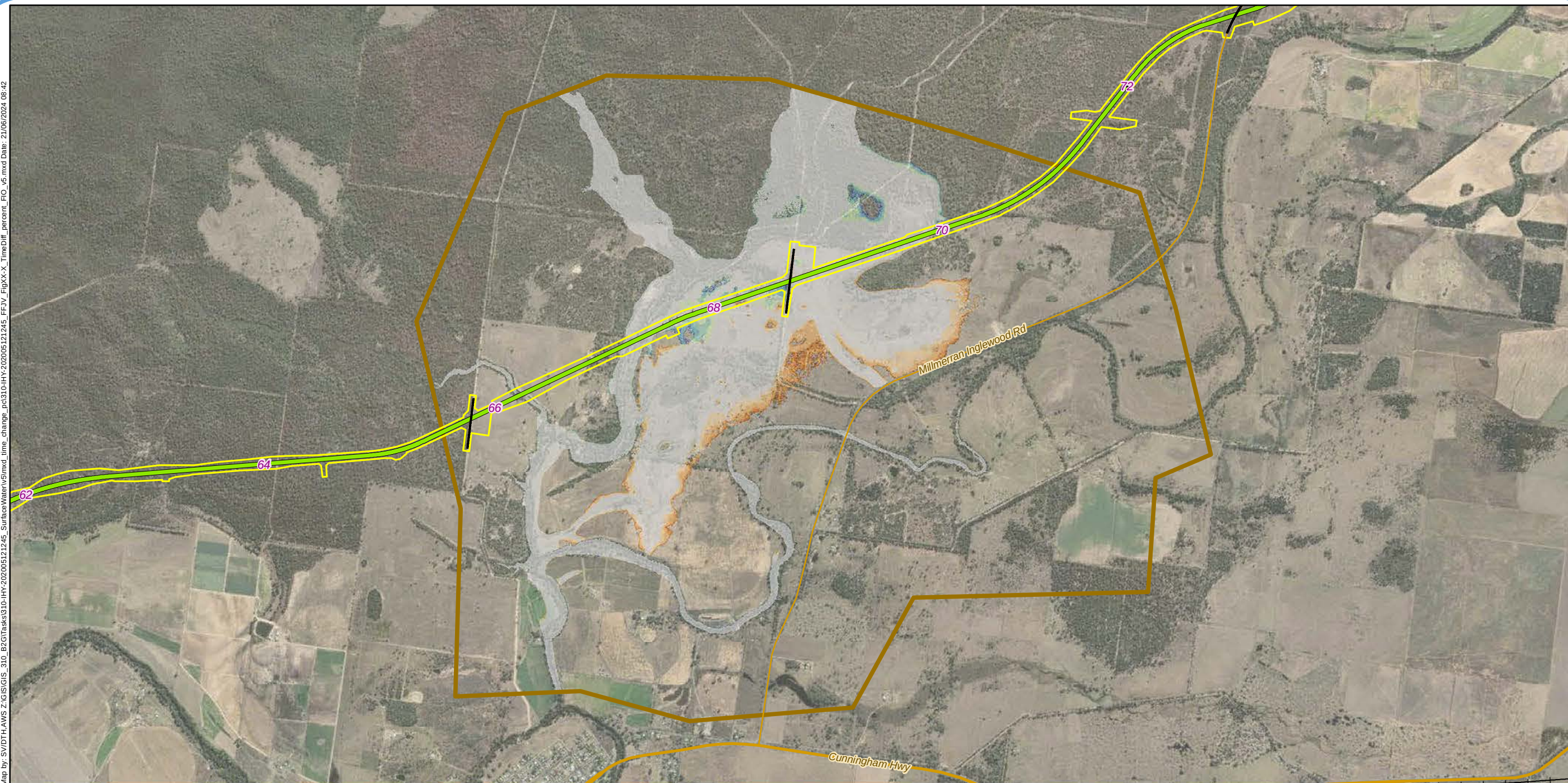
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I7-C:

20% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Pariagara Creek

Map by: S:\DTH\AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_line_change_pcd310-HY-2020\05121245_FF\3V_FigXX-X_TimeDiff_percent_FIO_v5.mxd Date: 21/06/2024 08:42



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:35,000

0 0.35 0.7 1.05 1.4 1.75 km



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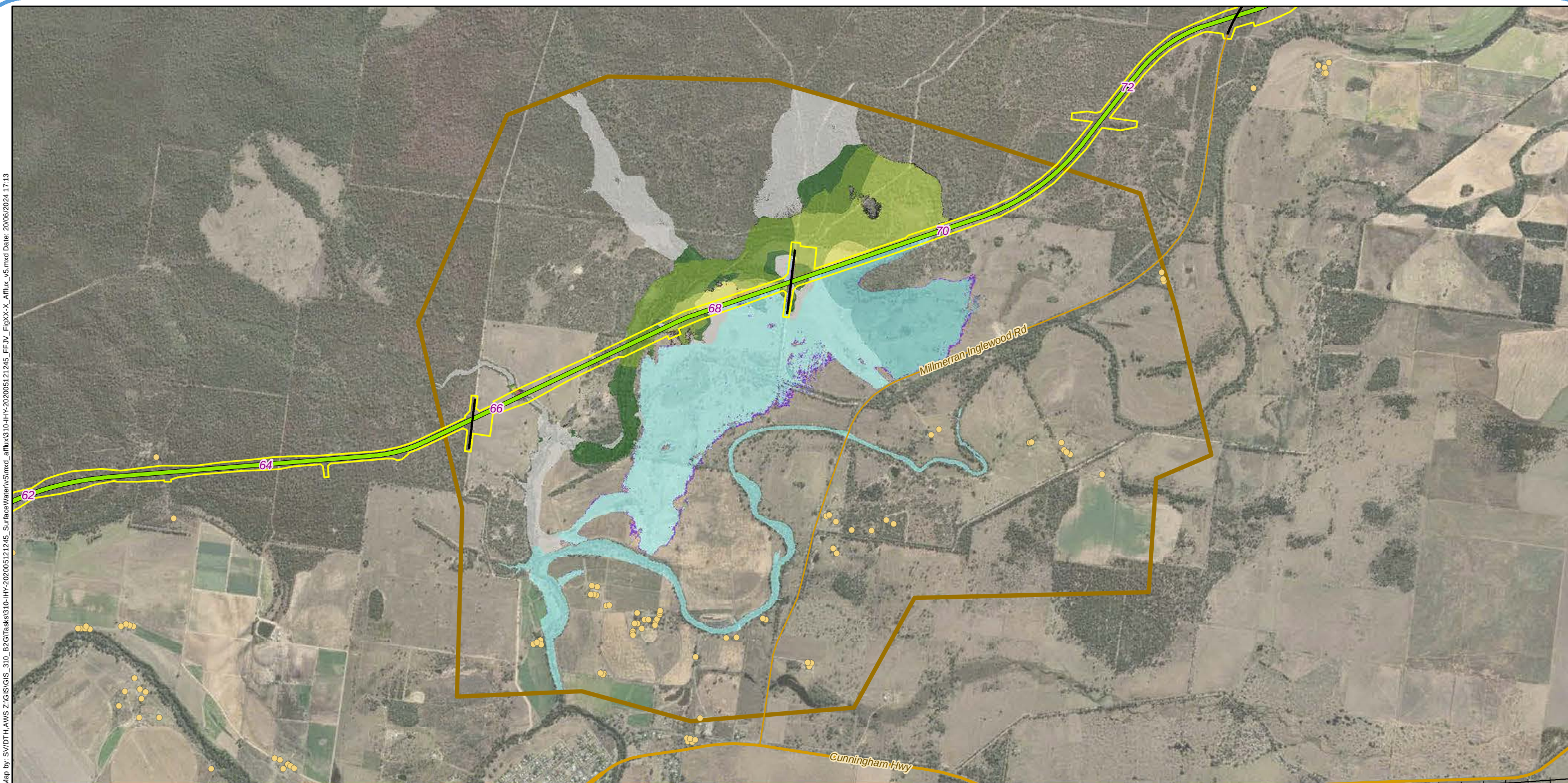
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I7-D:

1% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd Afflux\310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13



Legend

- Flood sensitive receptor
- Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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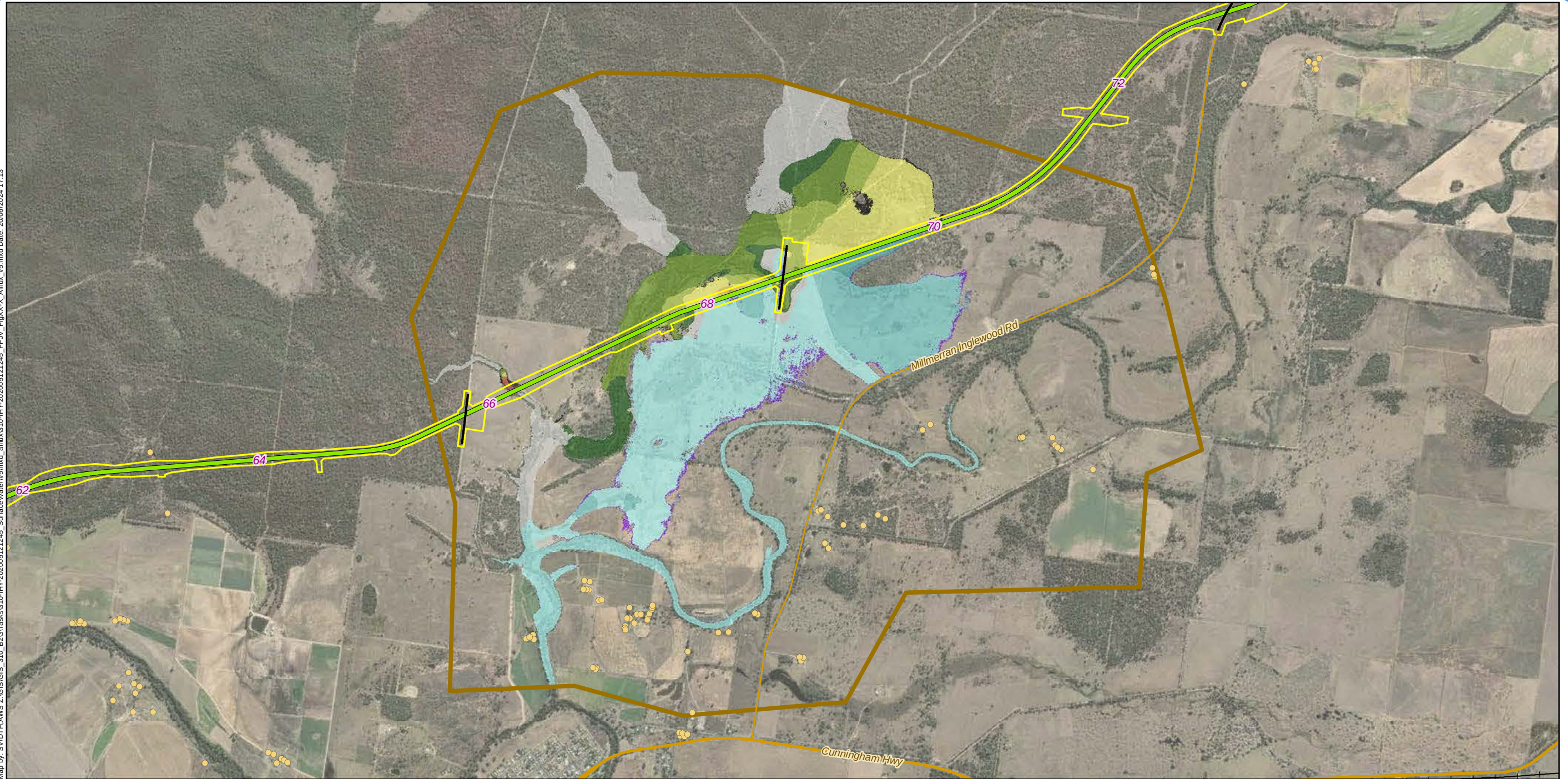
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I8-A:

1% AEP Event - Sensitivity - 0% Blockage - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd, afflux\310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13



Legend

- Flood sensitive receptor
- Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



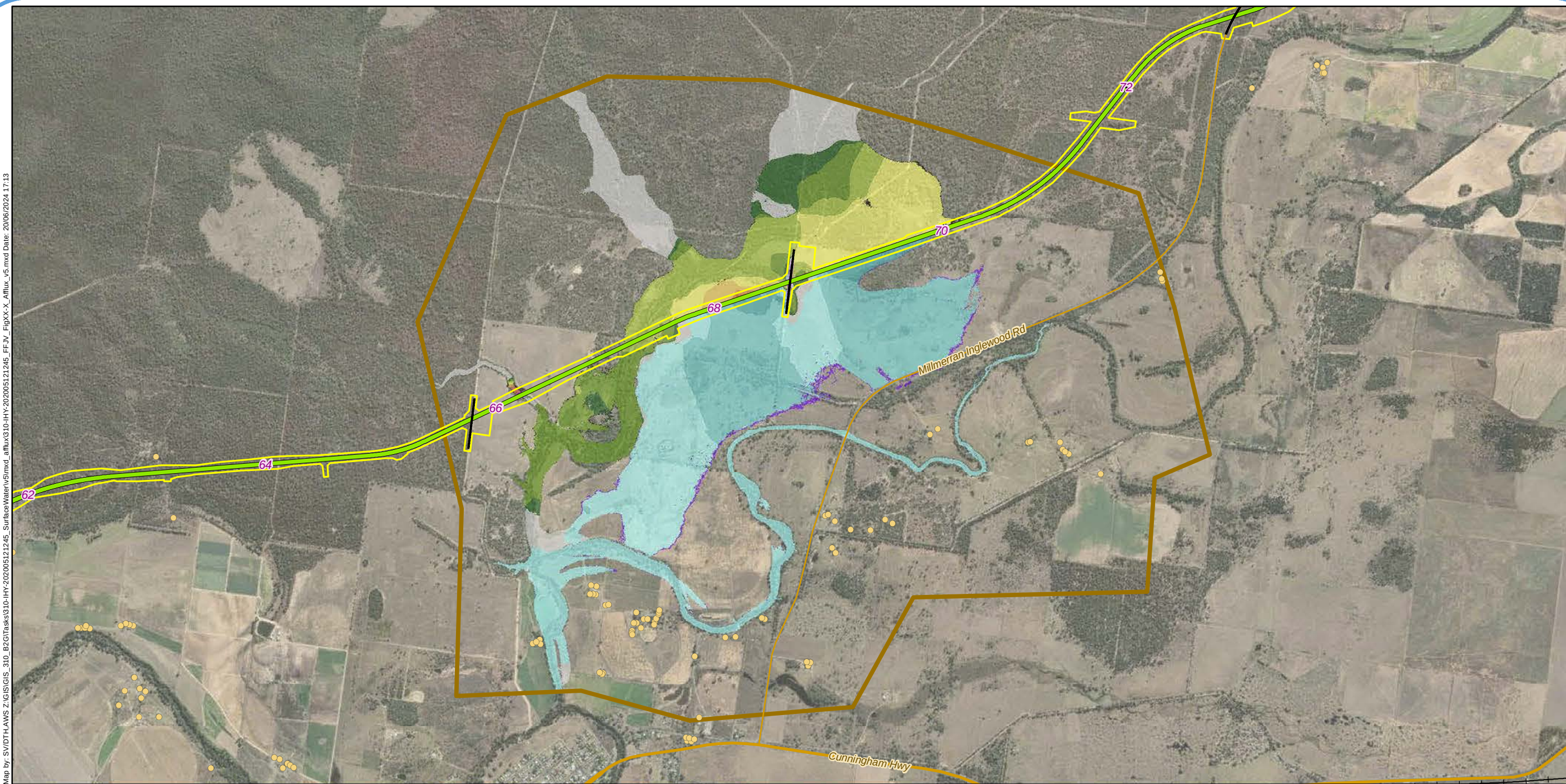
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I8-B:

1% AEP Event - Sensitivity - 50% Blockage - Pariagara Creek

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd Afflux\310-IHY-2020\05121245_FF_IV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13



Legend

- Flood sensitive receptor
- Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure I8-C:

1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Pariagara Creek

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix J Macintyre Brook— Yelarbon to Inglewood flood maps

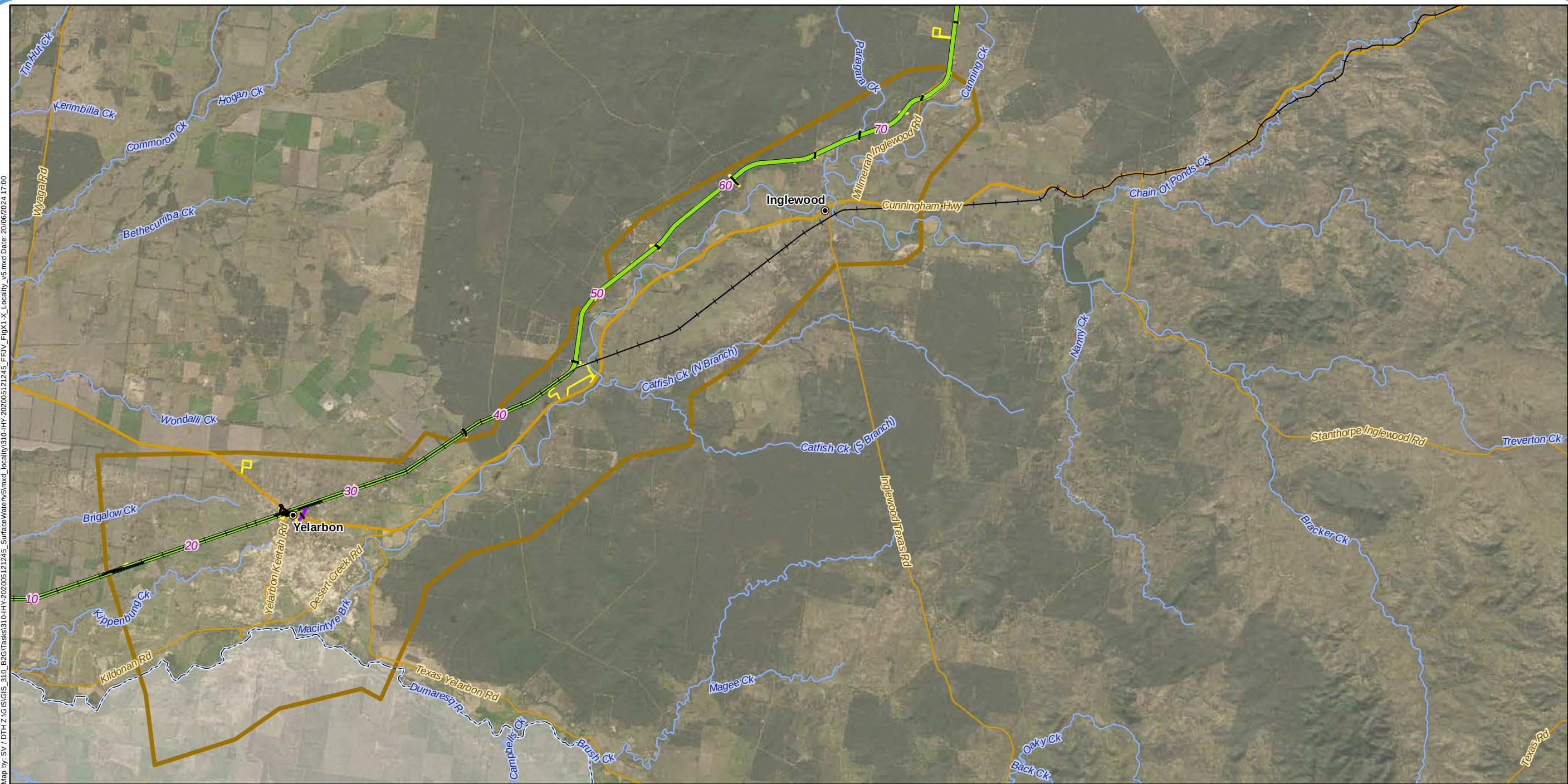
BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix J

Macintyre Brook – Yelarbon to Inglewood Flood Maps

Figure J1-A	Locality Plan
Figure J1-B	Survey Data
Figure J1-C	Hydrologic Model Setup
Figure J1-D	Hydraulic Model Setup
Figure J1-E	Landuse Classifications
Figure J1-F	Proposed Design Structures
Figure J1-G	Proposed Design Structures
Figure J1-H	Proposed Design Structures
Figure J2-A	1976 Calibration Event: Inundation Extent
Figure J2-B	1996 Calibration Event: Inundation Extent
Figure J2-C	2011 Calibration Event: Inundation Extent
Figure J2-D	2021 Validation Event: Inundation Extent
Figure J3-A	20% AEP Event - Peak Water Levels - Existing Case
Figure J3-B	1% AEP Event - Peak Water Levels - Existing Case
Figure J3-C	20% AEP Event - Peak Velocity - Existing Case
Figure J3-D	1% AEP Event - Peak Velocity - Existing Case
Figure J3-E	20% AEP Event - Peak Hazard - Existing Case
Figure J3-F	1% AEP Event - Peak Hazard - Existing Case
Figure J3-G	20% AEP Event - Peak Time of Inundation - Existing Case
Figure J3-H	1% AEP Event - Peak Time of Inundation - Existing Case
Figure J4-A	20% AEP Event - Peak Water Levels - Developed Case
Figure J4-B	1% AEP Event - Peak Water Levels - Developed Case
Figure J4-C	20% AEP Event - Peak Velocity - Developed Case
Figure J4-D	1% AEP Event - Peak Velocity - Developed Case
Figure J4-E	20% AEP Event - Peak Hazard - Developed Case
Figure J4-F	1% AEP Event - Peak Hazard - Developed Case
Figure J4-G	20% AEP Event - Peak Time of Inundation - Developed Case
Figure J4-H	1% AEP Event - Peak Time of Inundation - Developed Case
Figure J5-A	20% AEP Event - Afflux
Figure J5-B	1% AEP Event - Afflux
Figure J5-C	20% AEP Event - Change in Velocity
Figure J5-D	1% AEP Event - Change in Velocity
Figure J5-E	20% AEP Event - Change in Hazard
Figure J5-F	1% AEP Event - Change in Hazard
Figure J5-G	20% AEP Event - Change in Time of Inundation
Figure J5-H	1% AEP Event - Change in Time of Inundation
Figure J6-A	20% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure J6-B	1% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure J6-C	20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure J6-D	1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure J6-E	20% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure J6-F	1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure J7-A	20% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m ² /s cutoff applied)
Figure J7-B	1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m ² /s cutoff applied)
Figure J8-A	20% AEP Event - Percentage Change in Time of Inundation
Figure J8-B	1% AEP Event - Percentage Change in Time of Inundation
Figure J8-C	20% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
Figure J8-D	1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)

Figure J9-A 1% AEP Event - Sensitivity - 0% Blockage
Figure J9-B 1% AEP Event - Sensitivity - 50% Blockage
Figure J9-C 1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Watercourses
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

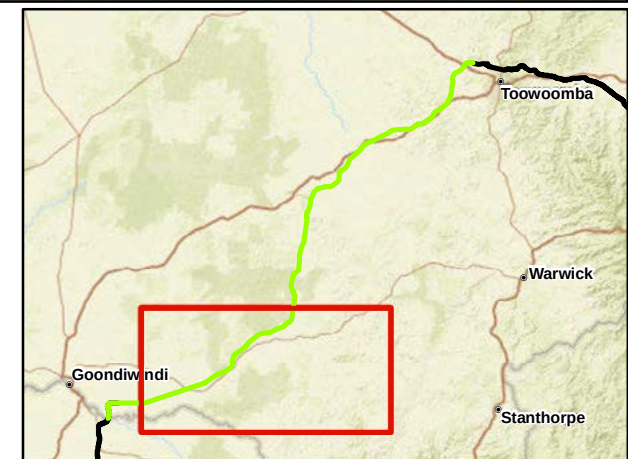


A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



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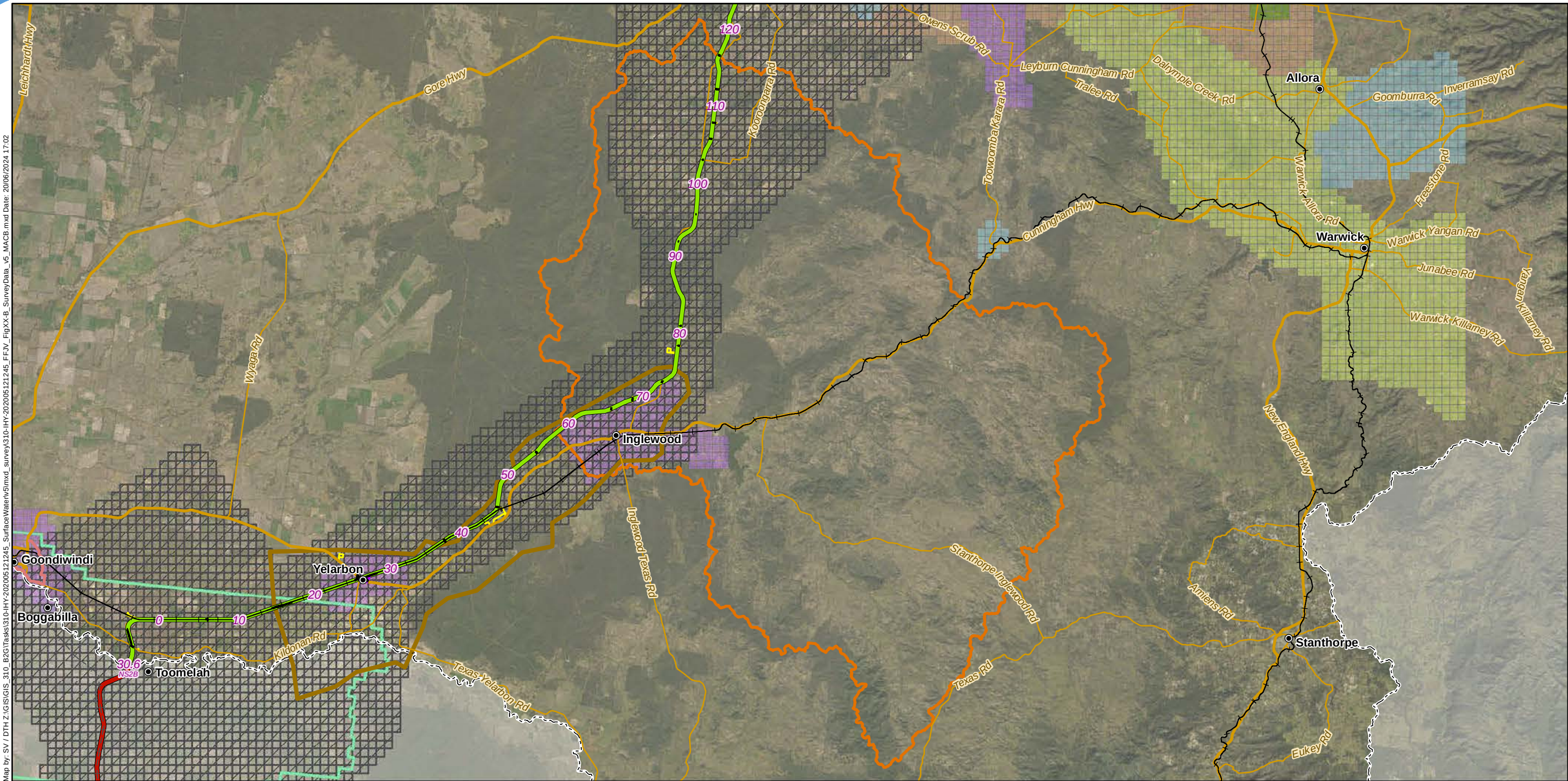
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56



Border to Gowrie

Figure J1-A:

Locality Plan - Macintyre Brook - Yelarbon to Inglewood



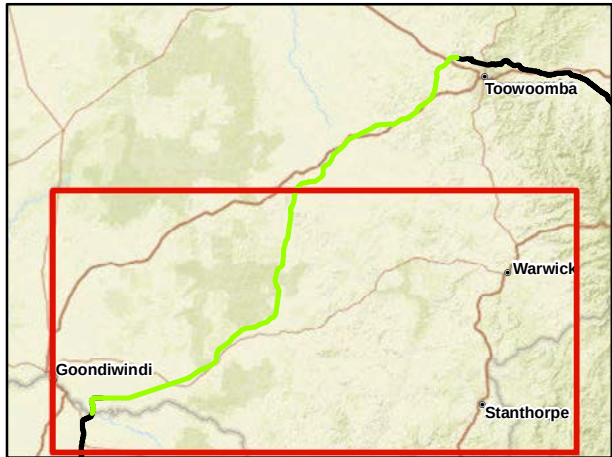
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment

- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Goondiwindi levee
- Hydrologic model extent
- Regional hydraulic model extent
- Project footprint

LiDAR datasets (1m grid)

- Inland Towns Stage 2 2011
- Inland Towns Stage 4 2012
- Inland Towns Stage 6 2014
- Southern Downs 2010
- Toowoomba 2010
- 2015 ARTC LiDAR 1m
- Macintyre LiDAR 2013 (Geoscience Australia)



A3 scale: 1:525,000
0 5 10 15 20 25km

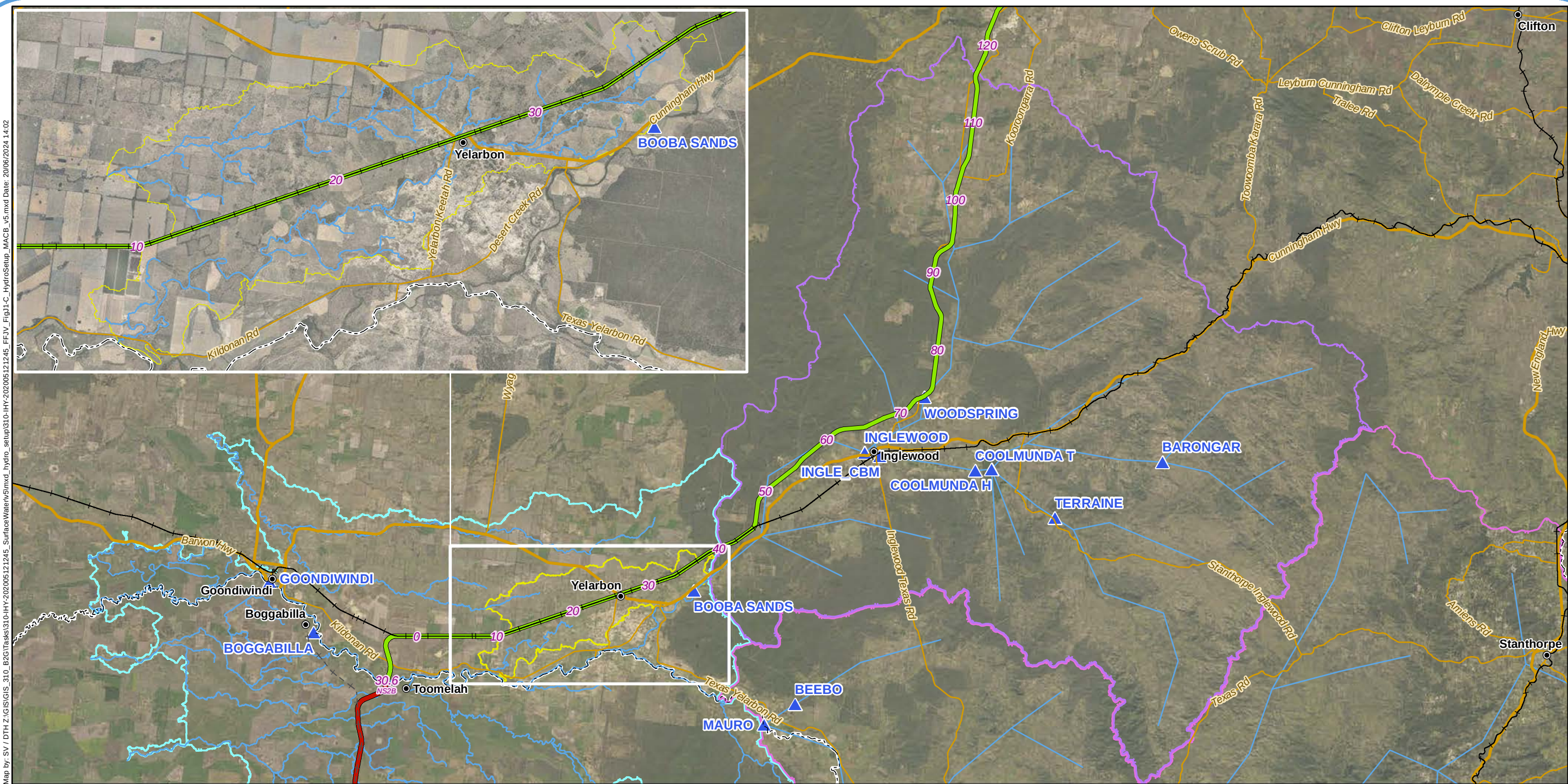


Issue date: 20/06/2024 Version: 5
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Border to Gowrie

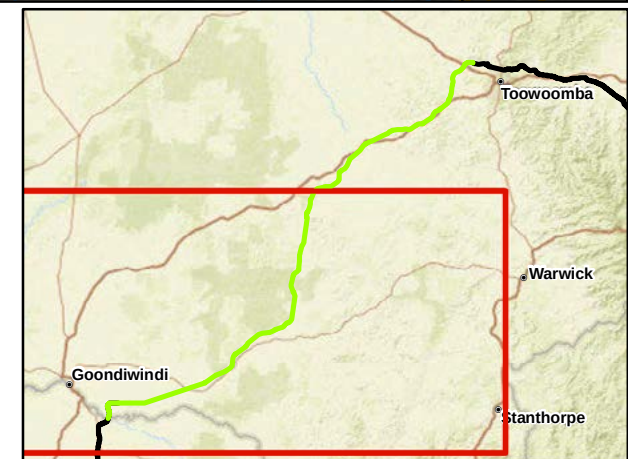
Figure J1-B:

Survey Data - Macintyre Brook - Yelarbon to Inglewood



Legend

- | | | |
|--|----------------|---|
| 5 Chainage (km) | Major roads | Stream gauge locations |
| Localities | Minor roads | Catchment links |
| Existing rail (operational) | NSW/QLD border | Catchments [Macintyre Brook] |
| Border to Gowrie alignment | | Catchments [Lower Macintyre River] |
| North Star to NSW/QLD border alignment | | Catchments [Kippenbung and Brigalow Creeks] |
| | | Catchments [Dumaresq River] |



A3 scale: 1:525,000
0 5 10 15 20 25km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

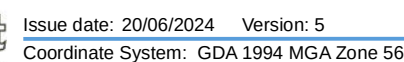
Border to Gowrie

Figure J1-C:

Hydrologic Model Setup - Macintyre Brook - Yelarbon to Inglewood



-

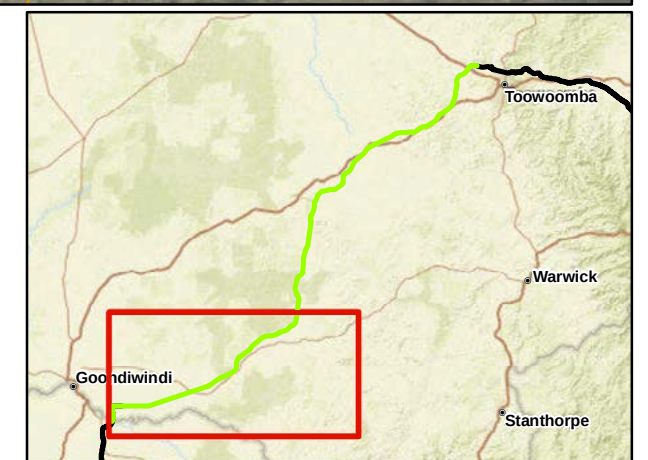


Hydraulic Model Setup - Macintyre Brook - Yelarbon to Inglewood

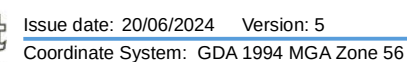


-  Regional hydraulic model extent
 Project footprint
 Yelarbon levee

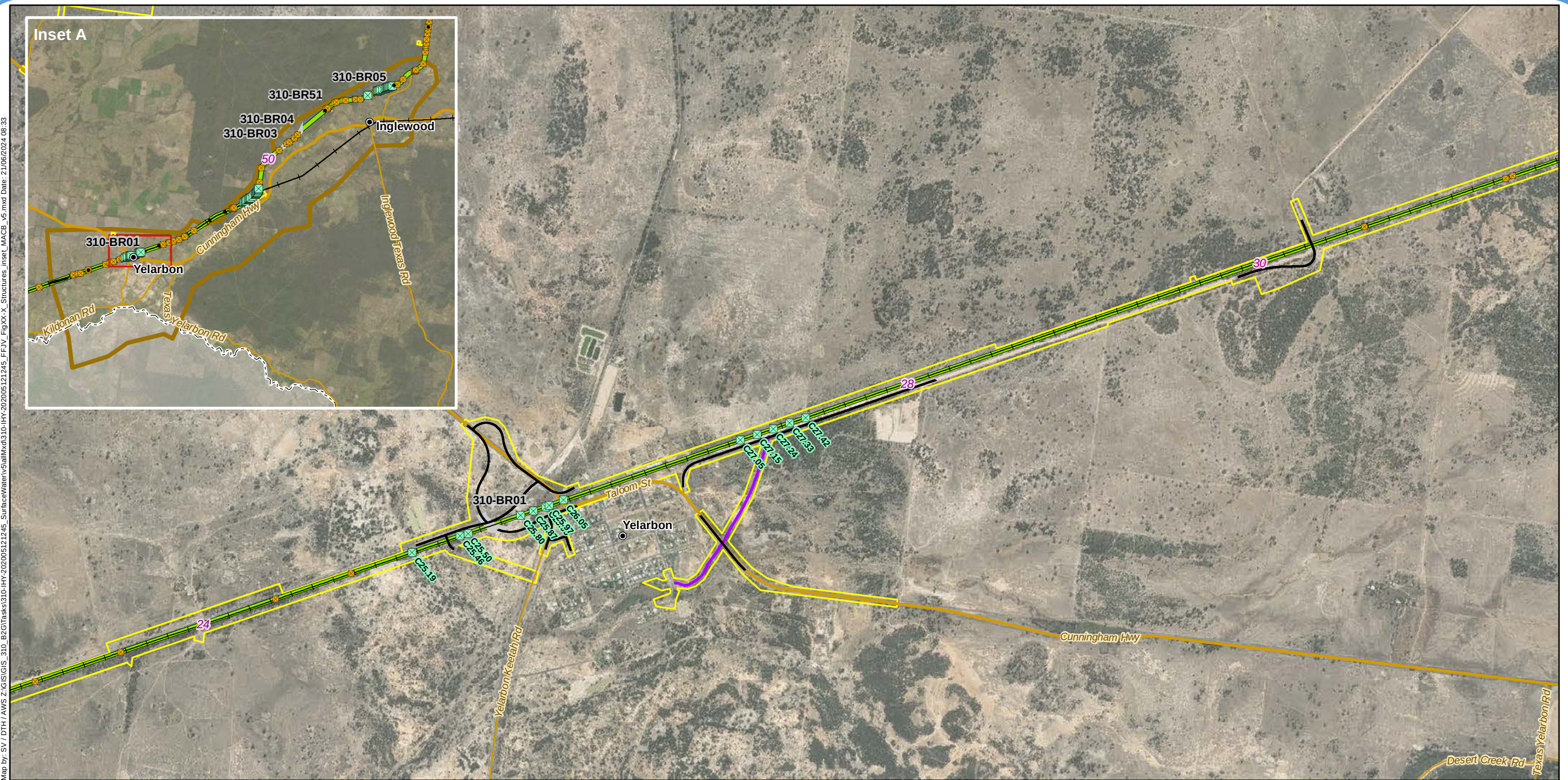
- River Channel (n = 0.03)
- Flood Plain 1 (n = 0.06)
- Flood Plain 3 (n = 0.08)
- Dense Vegetation (n = 0.08)
- Pasture/Open Grassland/Sparse Veg (n = 0.06)
- Waterbodies (n = 0.02)
- Buildings (n = 0.4)



A horizontal number line representing distance in kilometers. It has tick marks at 0, 2.5, 5, 7.5, 10, and 12.5 km. The line is divided into four equal segments of 2.5 km each.



Landuse classifications - Macintyre Brook



Legend

- | | |
|-------------------------------|-----------------------------------|
| 5 Chainage (km) | — Project road design |
| ● Localities | — Bridges |
| ▣ Floodplain culvert | ▣ Regional hydraulic model extent |
| ▣ Local drainage culvert | ▣ Project footprint |
| — Existing rail (operational) | |
| — Border to Gowrie alignment | |
| — Major roads | |
| — Minor roads | |
| — Yelarbon levee | |



A3 scale: 1:22,500
0 0.2 0.4 0.6 0.8 1 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

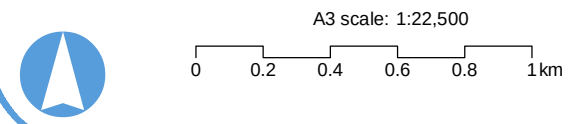
Border to Gowrie

Figure J1-F:

Proposed Design Structures - Macintyre Brook - Yelarbon to Inglewood



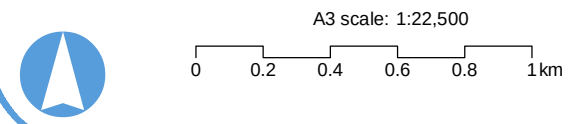
- Legend**
- 5 Chainage (km)
 - Floodplain culvert
 - Local drainage culvert
 - Existing rail (operational)
 - Border to Gowrie alignment
 - Major roads
 - Project road design
 - Regional hydraulic model extent
 - Project footprint

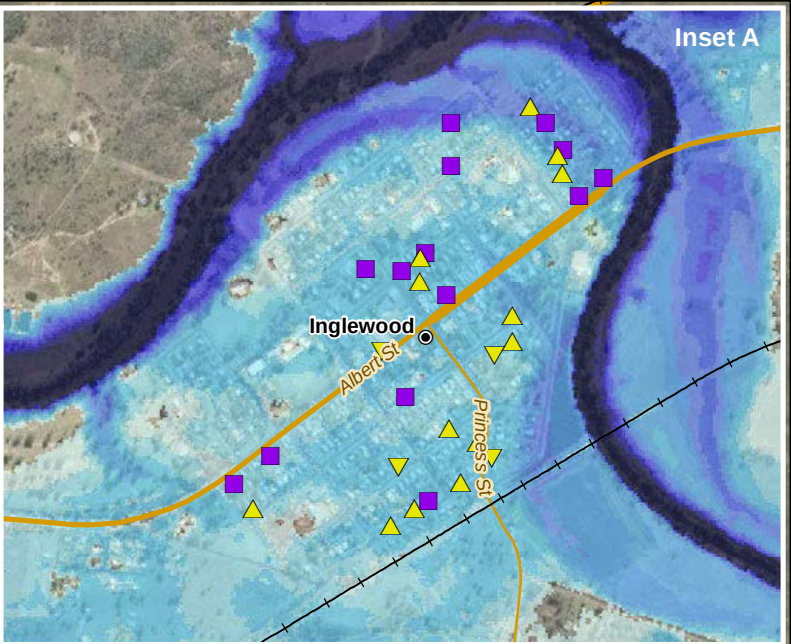
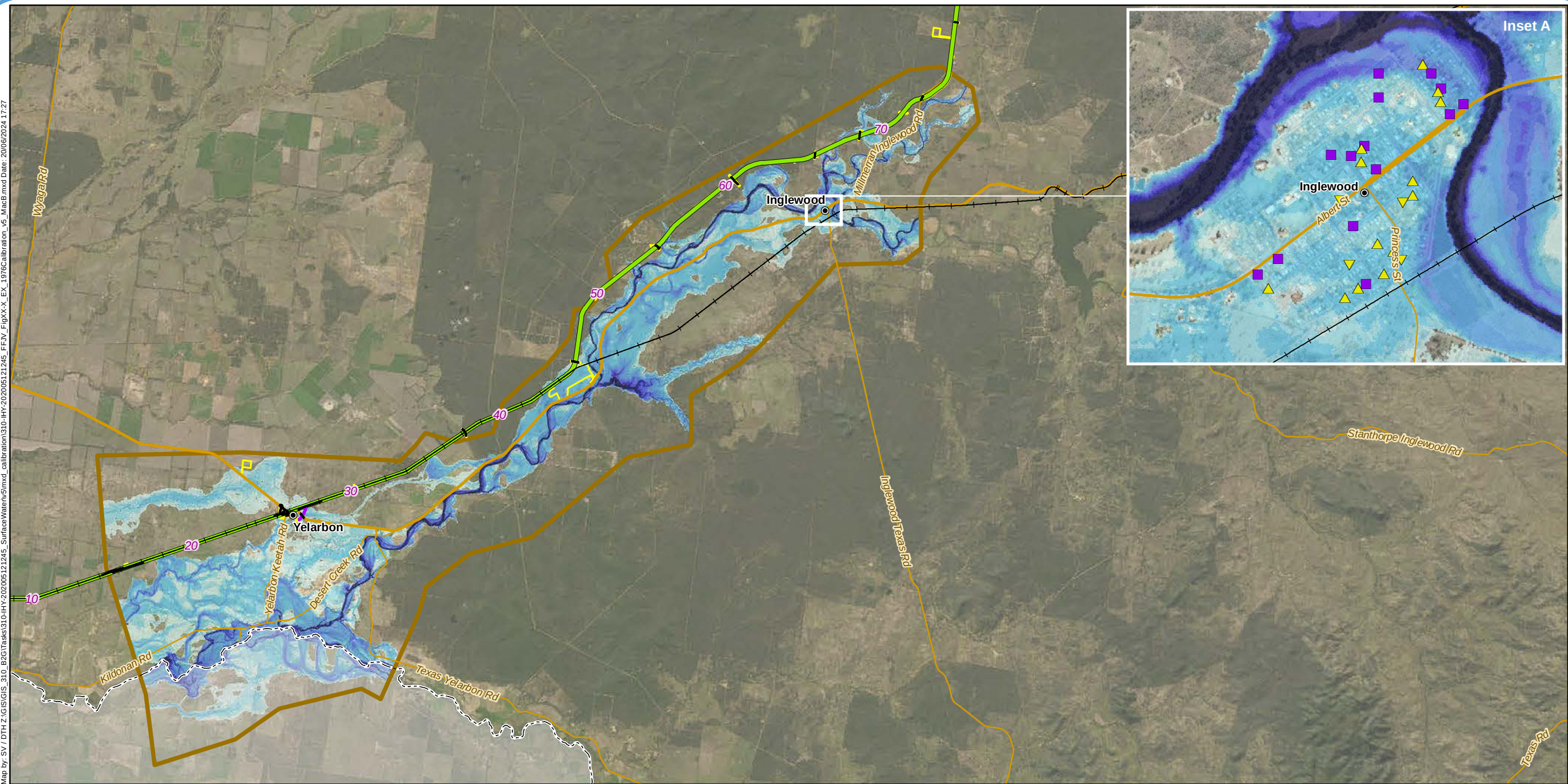


Border to Gowrie
Figure J1-G:
Proposed Design Structures - Macintyre Brook - Yelarbon to Inglewood



- Legend**
- | | |
|------------------------------|-----------------------------------|
| 5 Chainage (km) | — Project road design |
| ▣ Floodplain culvert | ▬ Bridges |
| ▣ Local drainage culvert | ▭ Regional hydraulic model extent |
| ▬ Border to Gowrie alignment | ▭ Project footprint |
| ▬ Minor roads | |





Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border

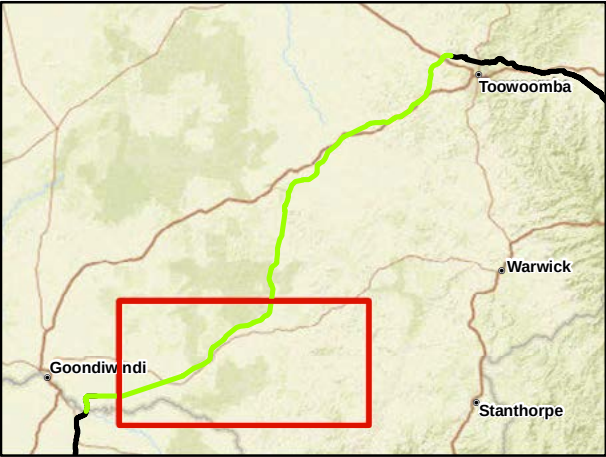
- Project footprint
- Regional hydraulic model extent
- Yelarbon levee

Stream gauges and observed floodmarks

- > 0.3m
- 0.3m to 0.3m
- < -0.3m

Depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |



A3 scale: 1:250,000

0 2.5 5 7.5 10 12.5 km



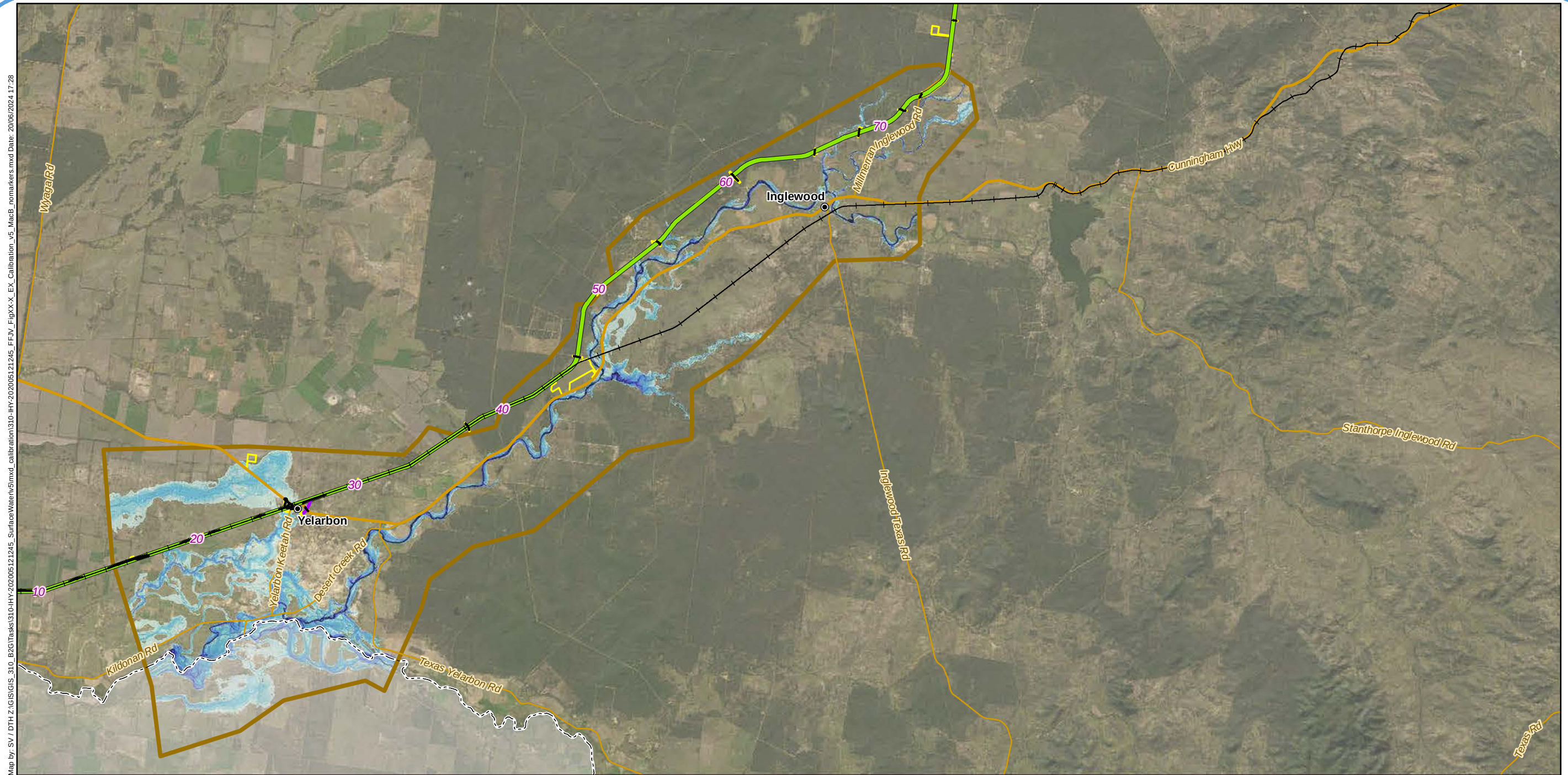
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Border to Gowrie

Figure J2-A:

1976 Calibration Event: Inundation Extent - Macintyre Brook - Yelarbon to Inglewood

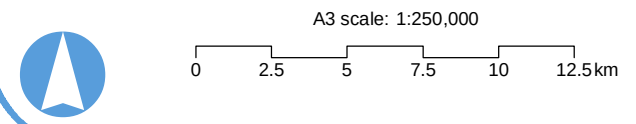
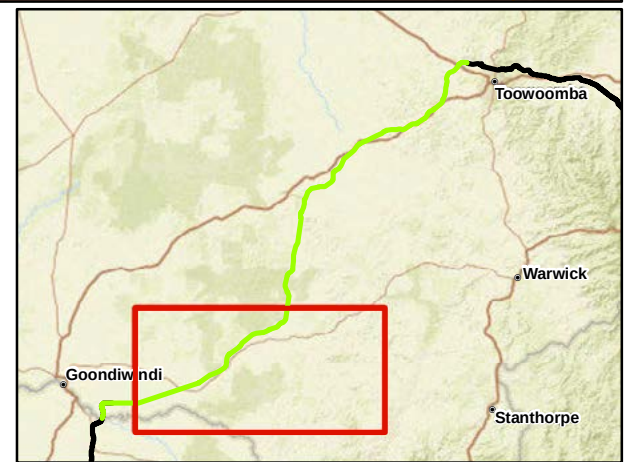


Legend

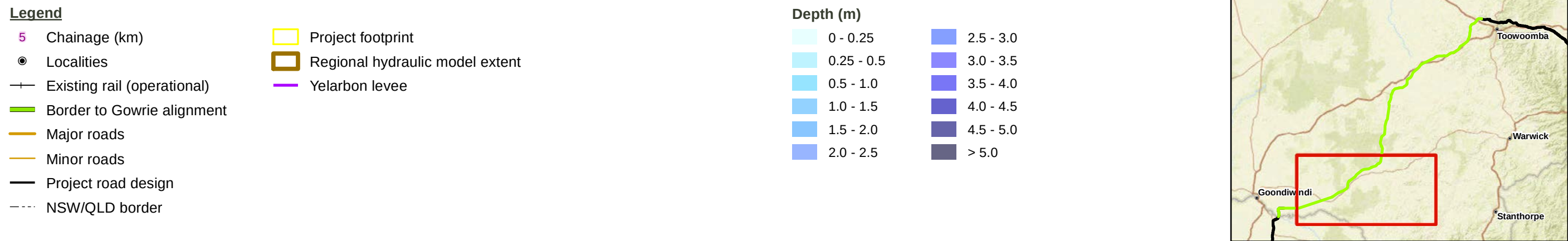
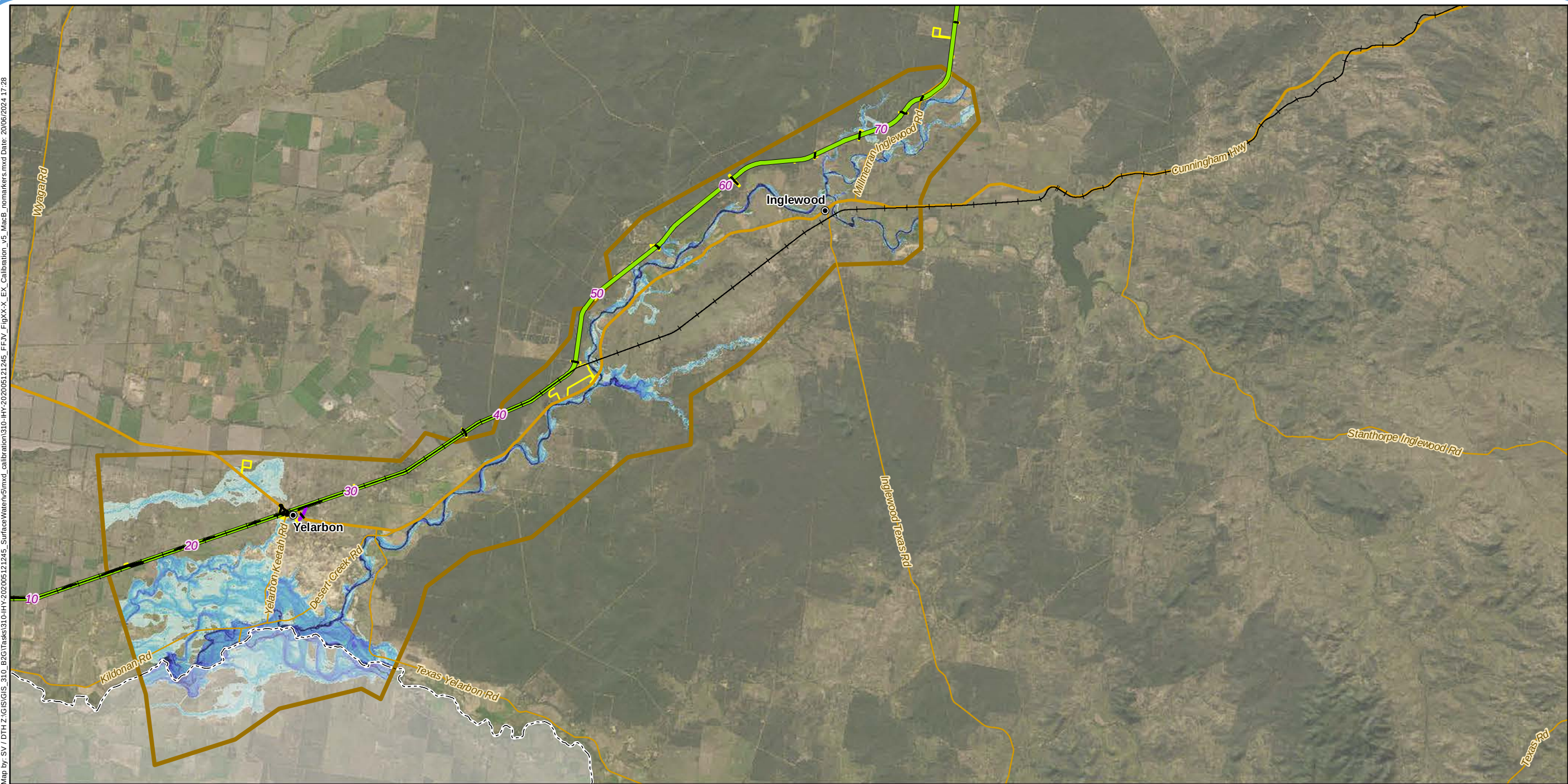
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Project footprint
- Regional hydraulic model extent
- Yelarbon levee

Depth (m)

0 - 0.25	2.5 - 3.0
0.25 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0



Border to Gowrie
Figure J2-B:
1996 Calibration Event: Inundation Extent - Macintyre Brook - Yelarbon to Inglewood



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



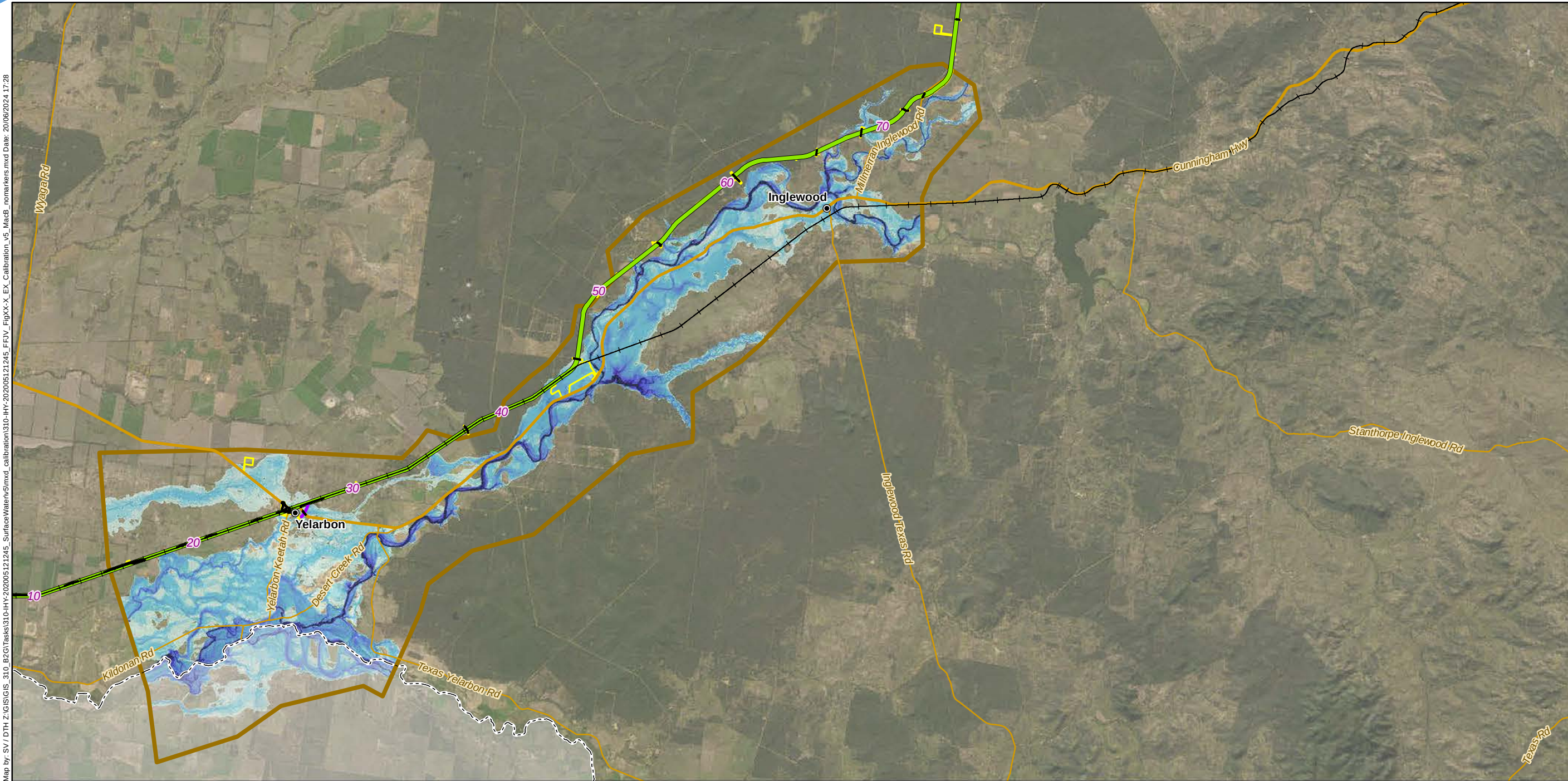
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Border to Gowrie

Figure J2-C:

2011 Calibration Event: Inundation Extent - Macintyre Brook - Yelarbon to Inglewood

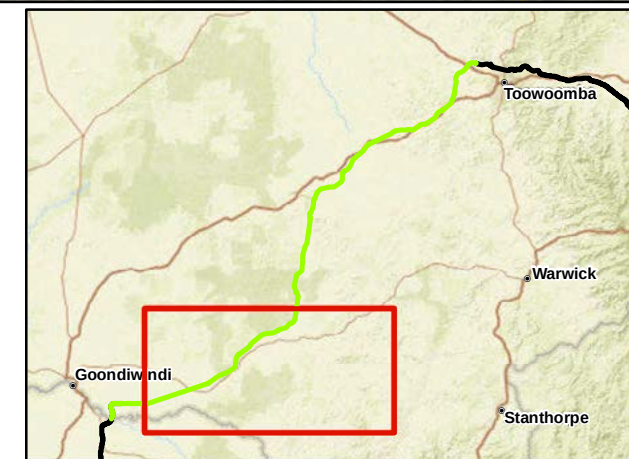


Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Project footprint
- Regional hydraulic model extent
- Yelarbon levee

Depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



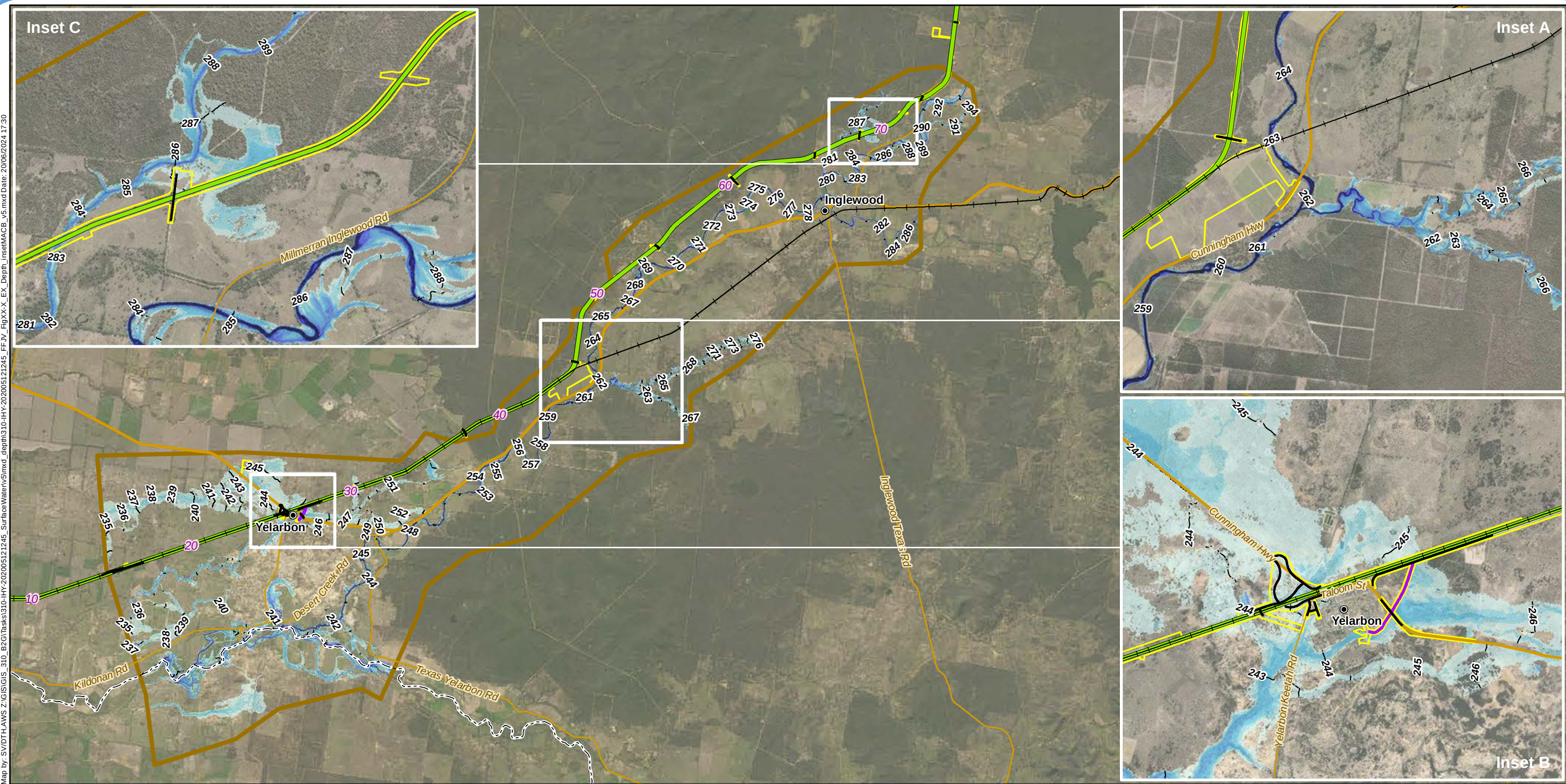
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Border to Gowrie

Figure J2-D:

2021 Validation Event: Inundation Extent - Macintyre Brook - Yelarbon to Inglewood

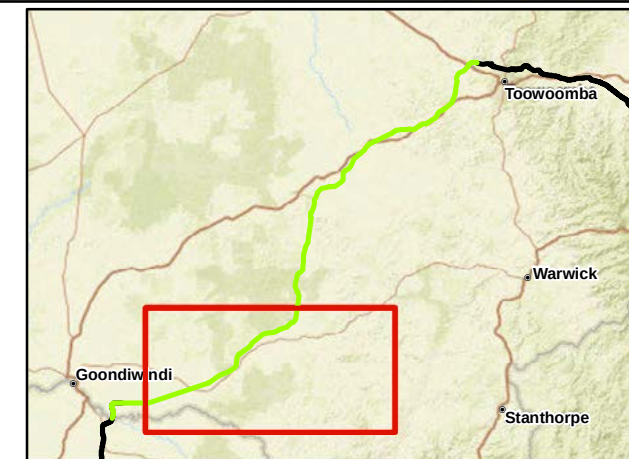


Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------------------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 1m peak water contour (mAHD) | |



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



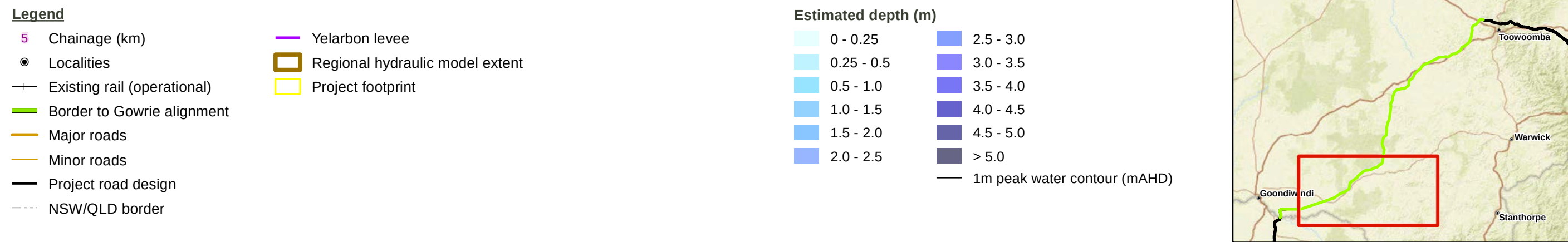
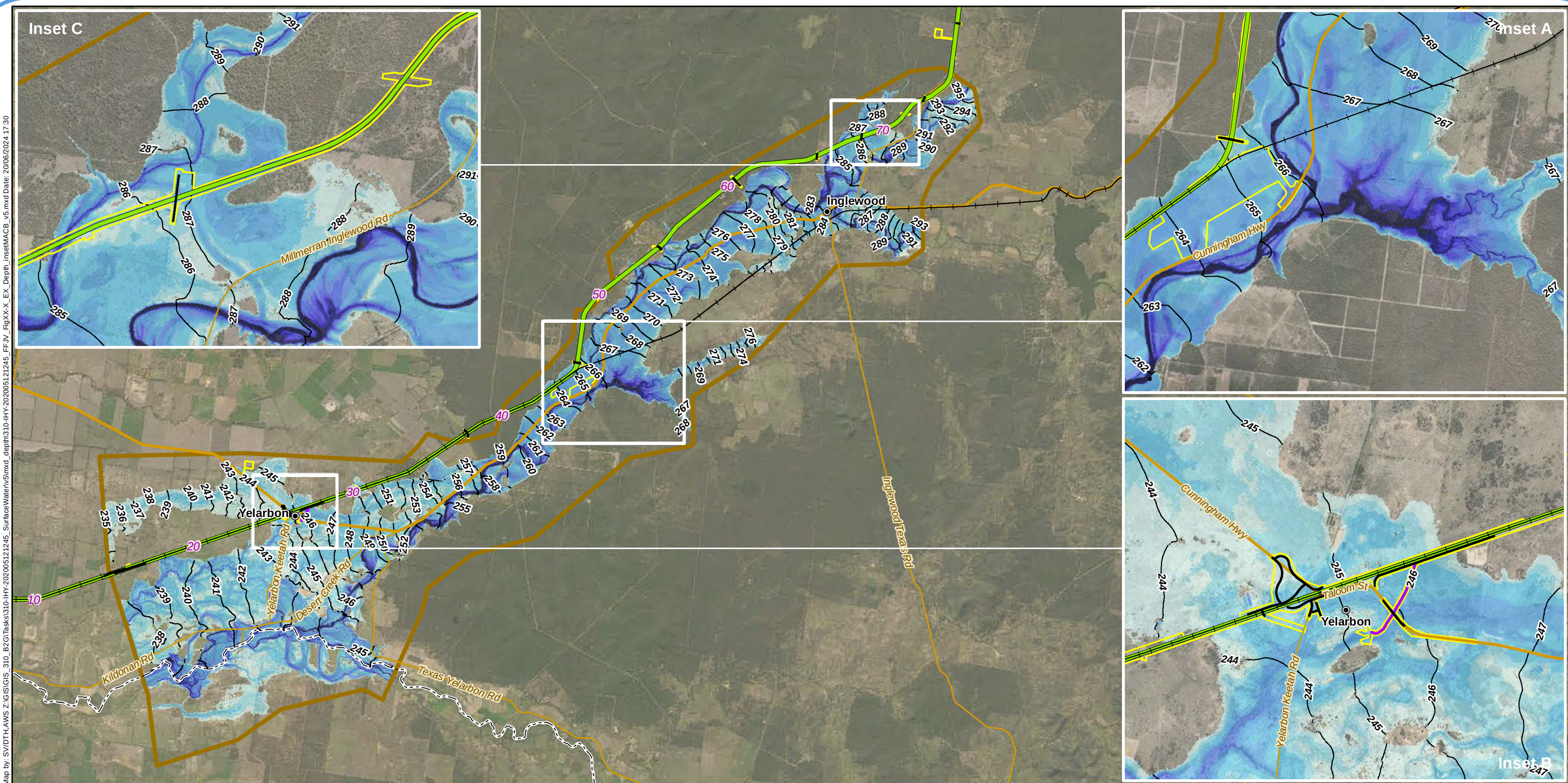
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J3-A:

20% AEP Event - Peak Water Levels - Existing Case - Macintyre Brook - Yelarbon to Inglewood



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



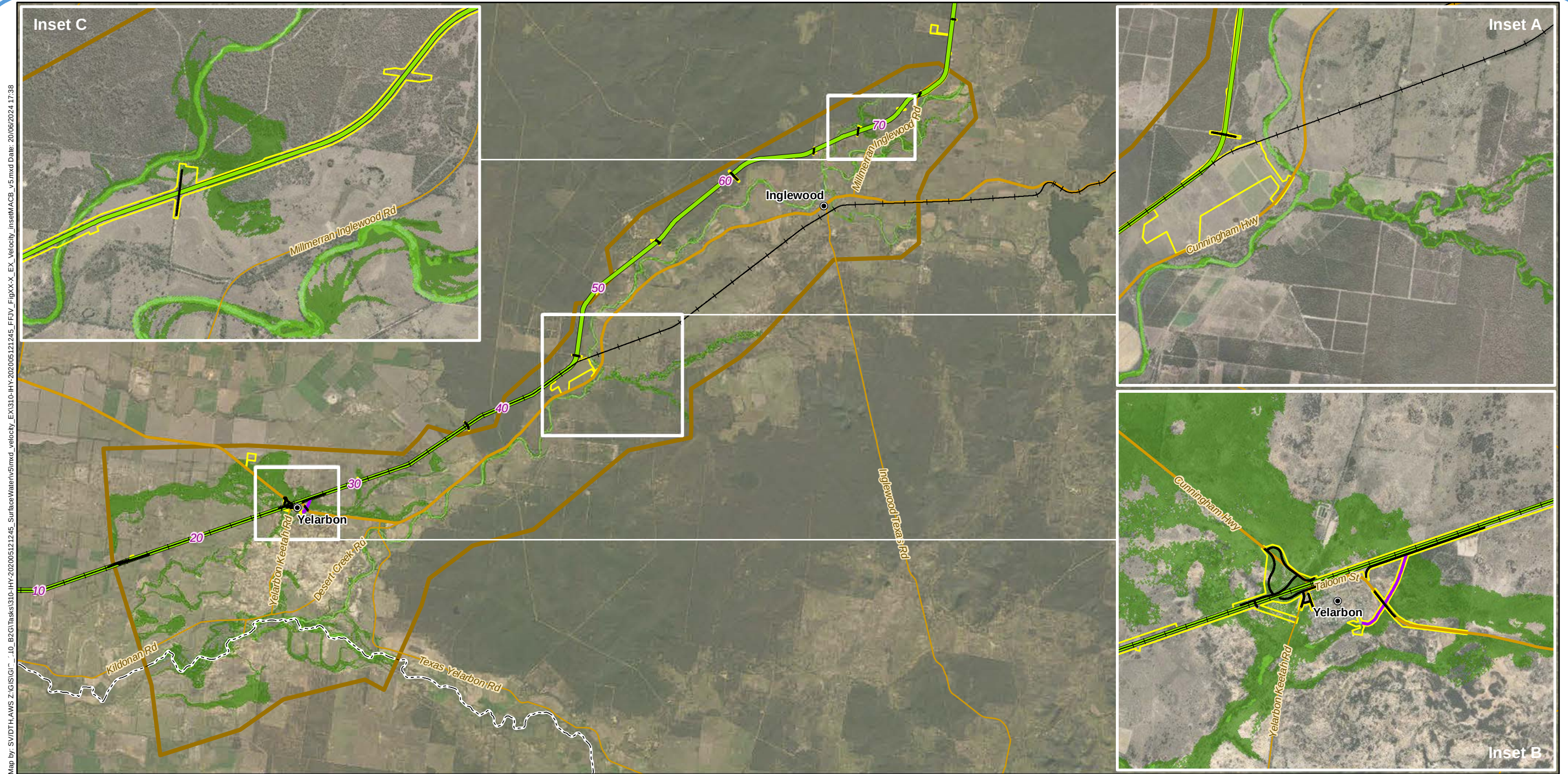
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Border to Gowrie

Figure J3-B:

1% AEP Event - Peak Water Levels - Existing Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



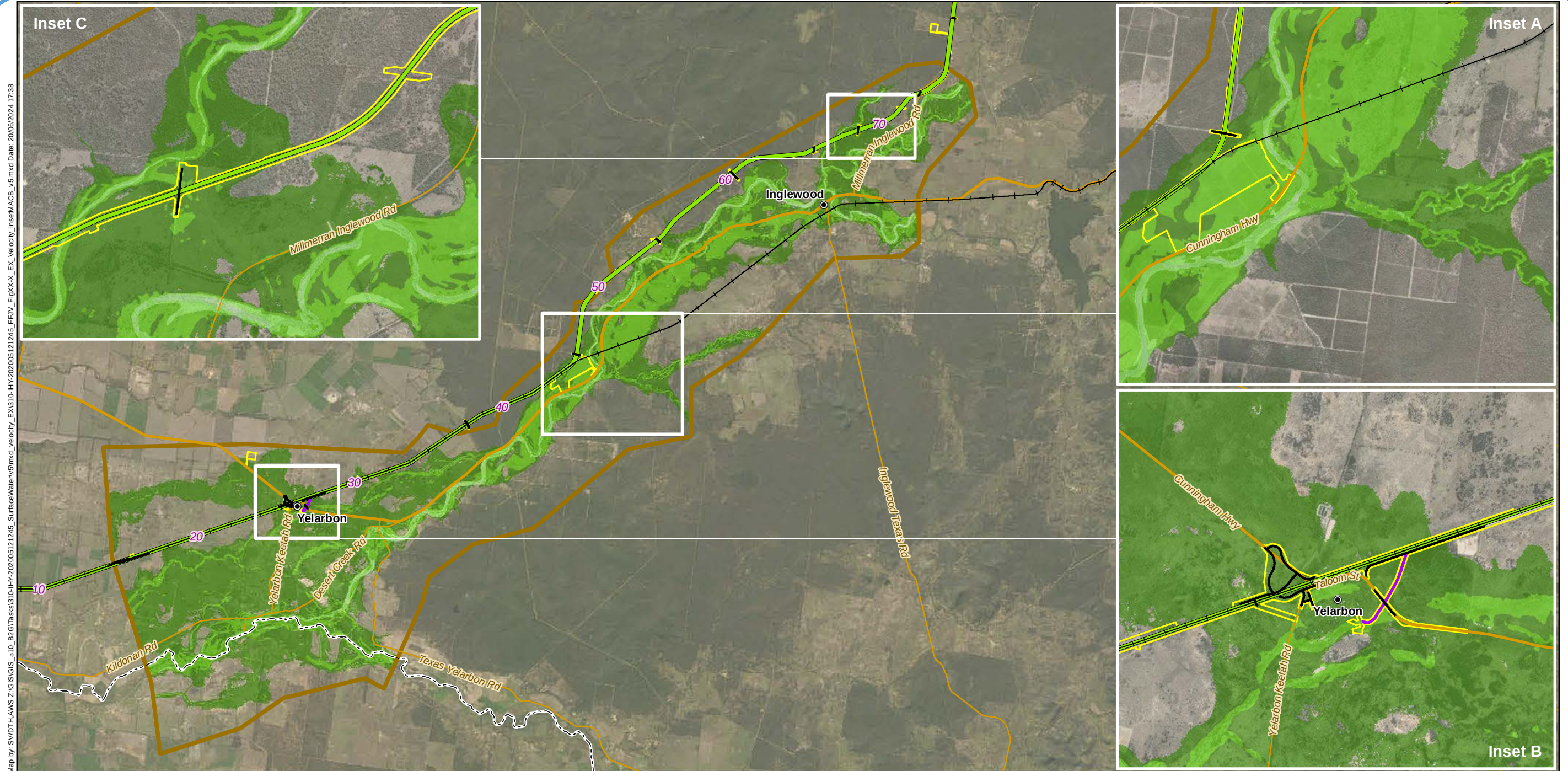
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Border to Gowrie

Figure J3-C:

20% AEP Event - Peak Velocity - Existing Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



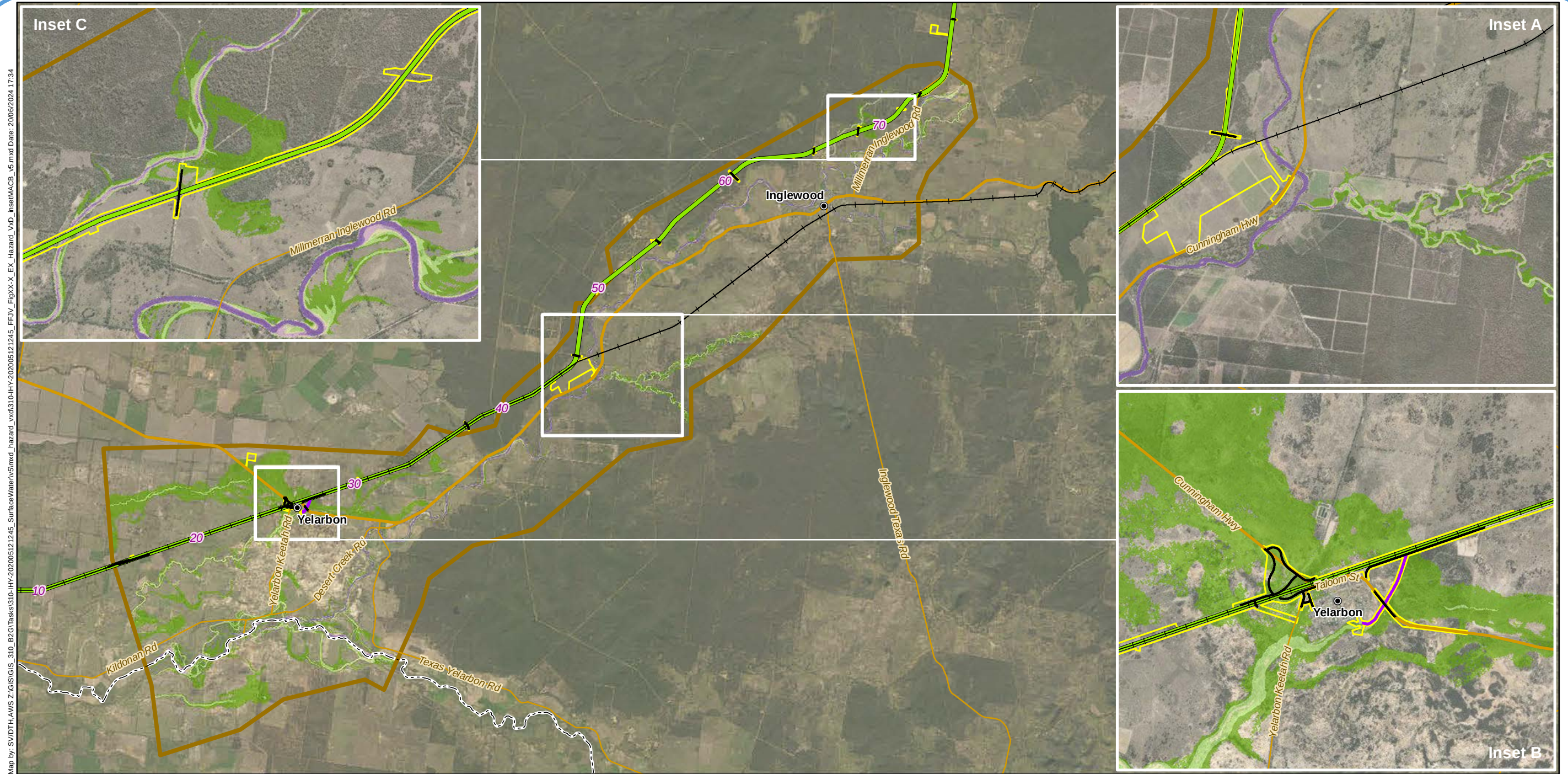
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Border to Gowrie

Figure J3-D:

1% AEP Event - Peak Velocity - Existing Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:250,000
 0 2.5 5 7.5 10 12.5 km



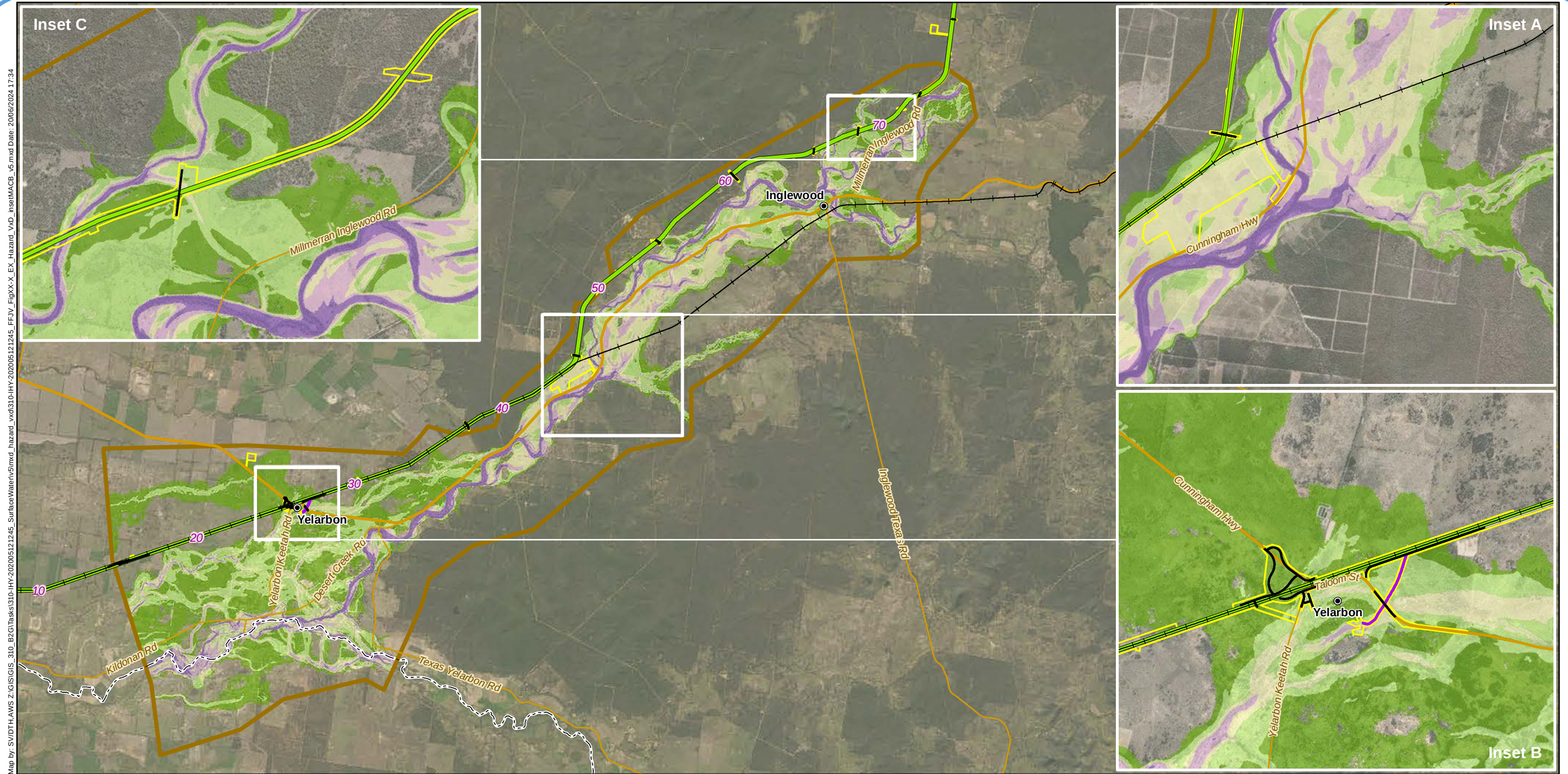
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Border to Gowrie

Figure J3-E:

20% AEP Event - Peak Hazard - Existing Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



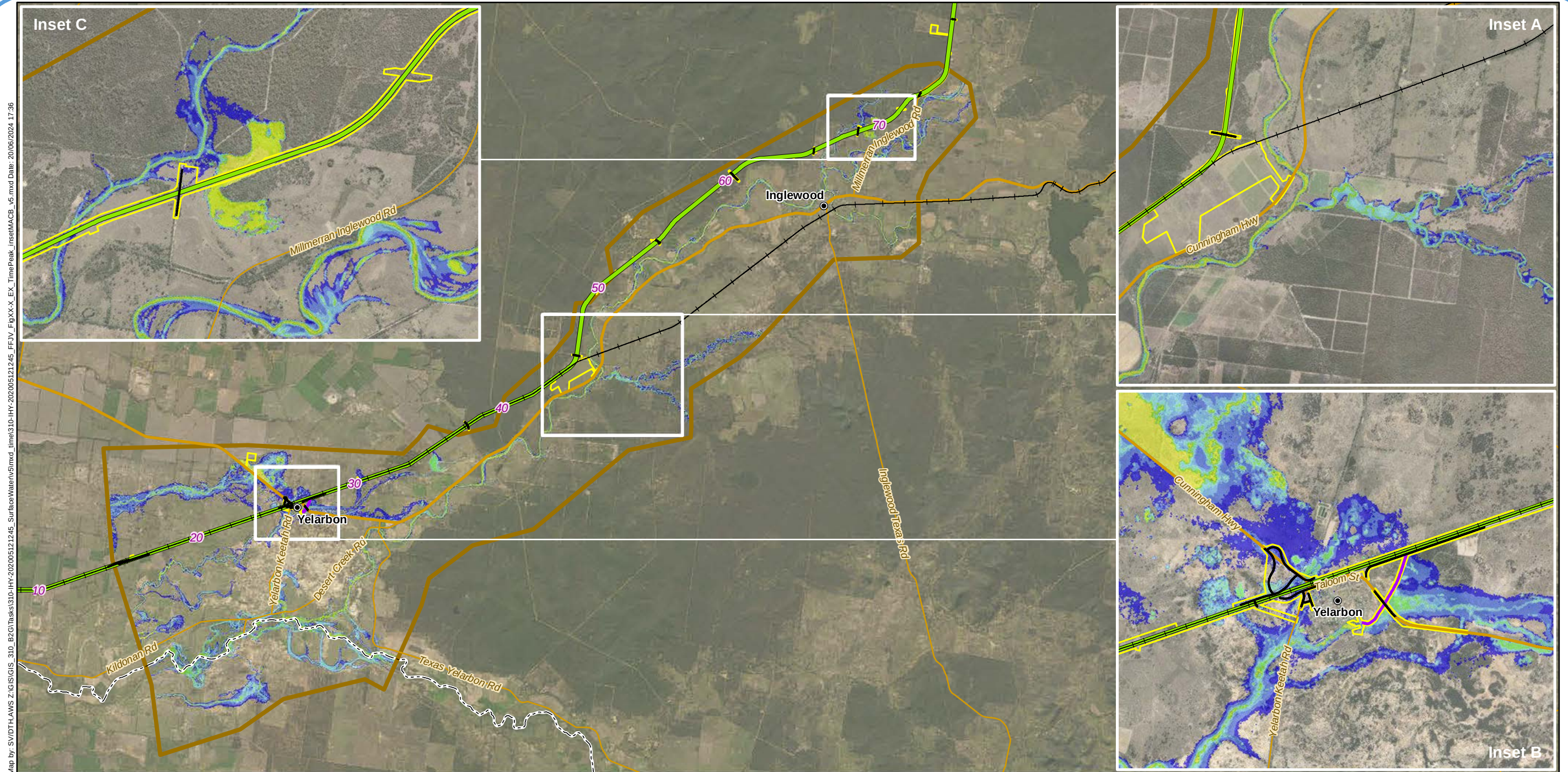
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Border to Gowrie

Figure J3-F:

1% AEP Event - Peak Hazard - Existing Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

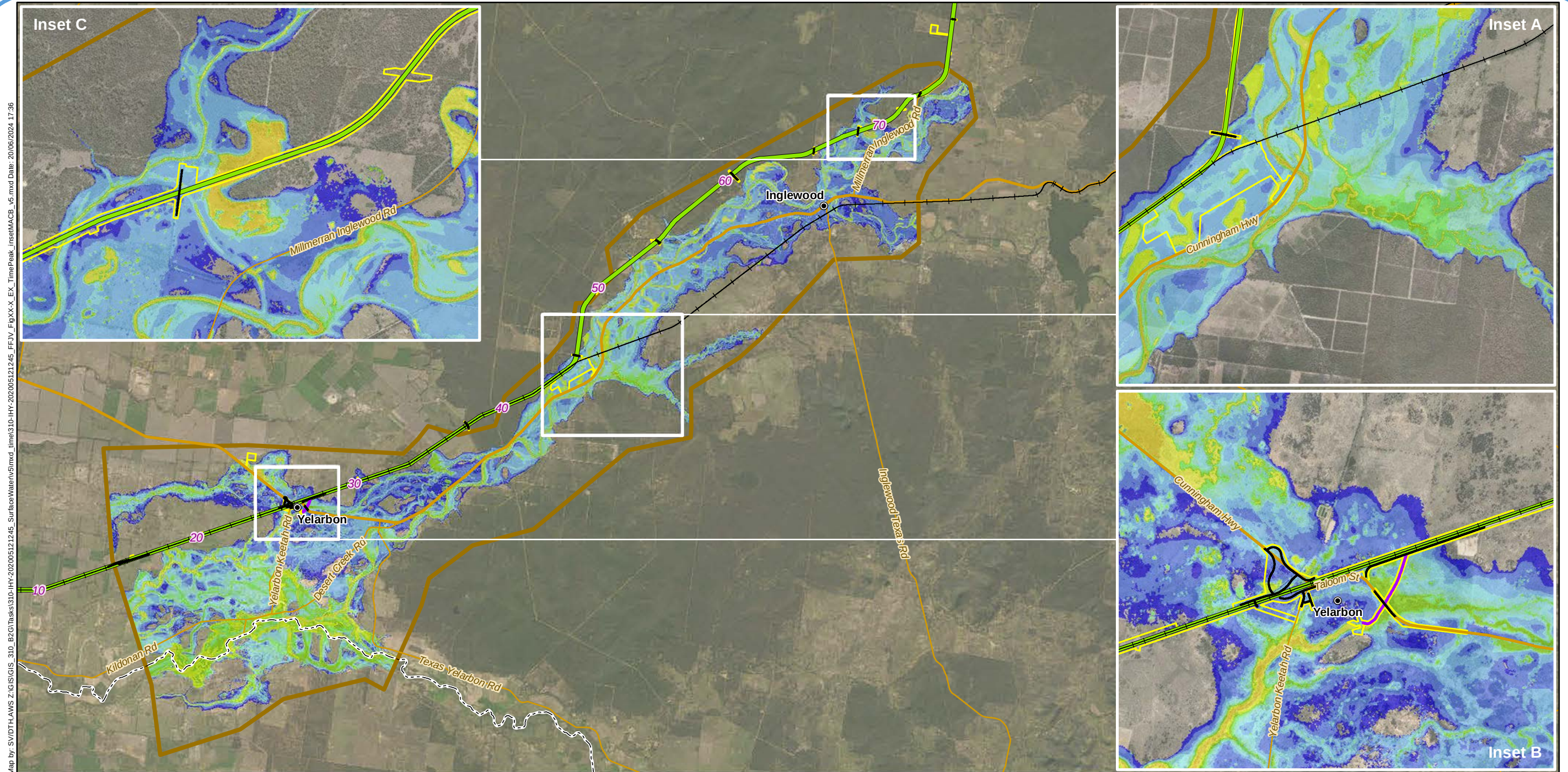
- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



Border to Gowrie

Figure J3-G:

20% AEP Event - Peak Time of Inundation - Existing Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



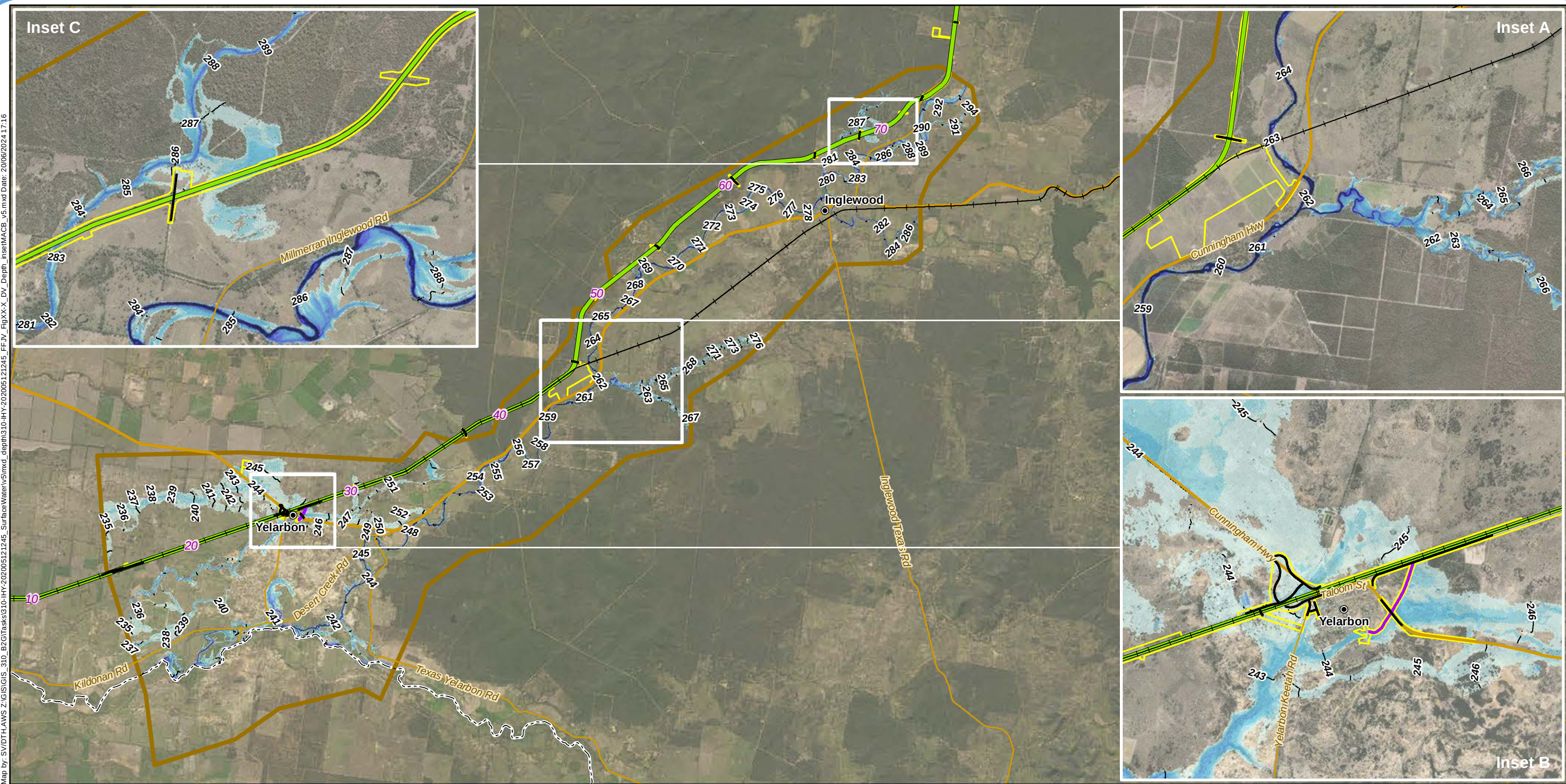
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Border to Gowrie

Figure J3-H:

1% AEP Event - Peak Time of Inundation - Existing Case - Macintyre Brook - Yelarbon to Inglewood



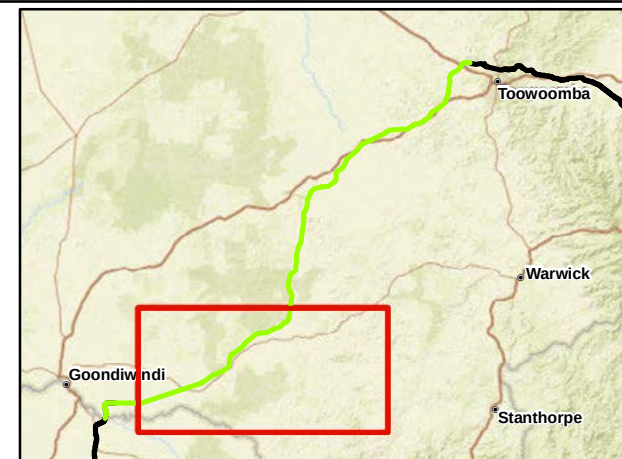
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------------------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 1m peak water contour (mAHD) | |

Macintyre Brook - Yelarbon to Inglewood
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km

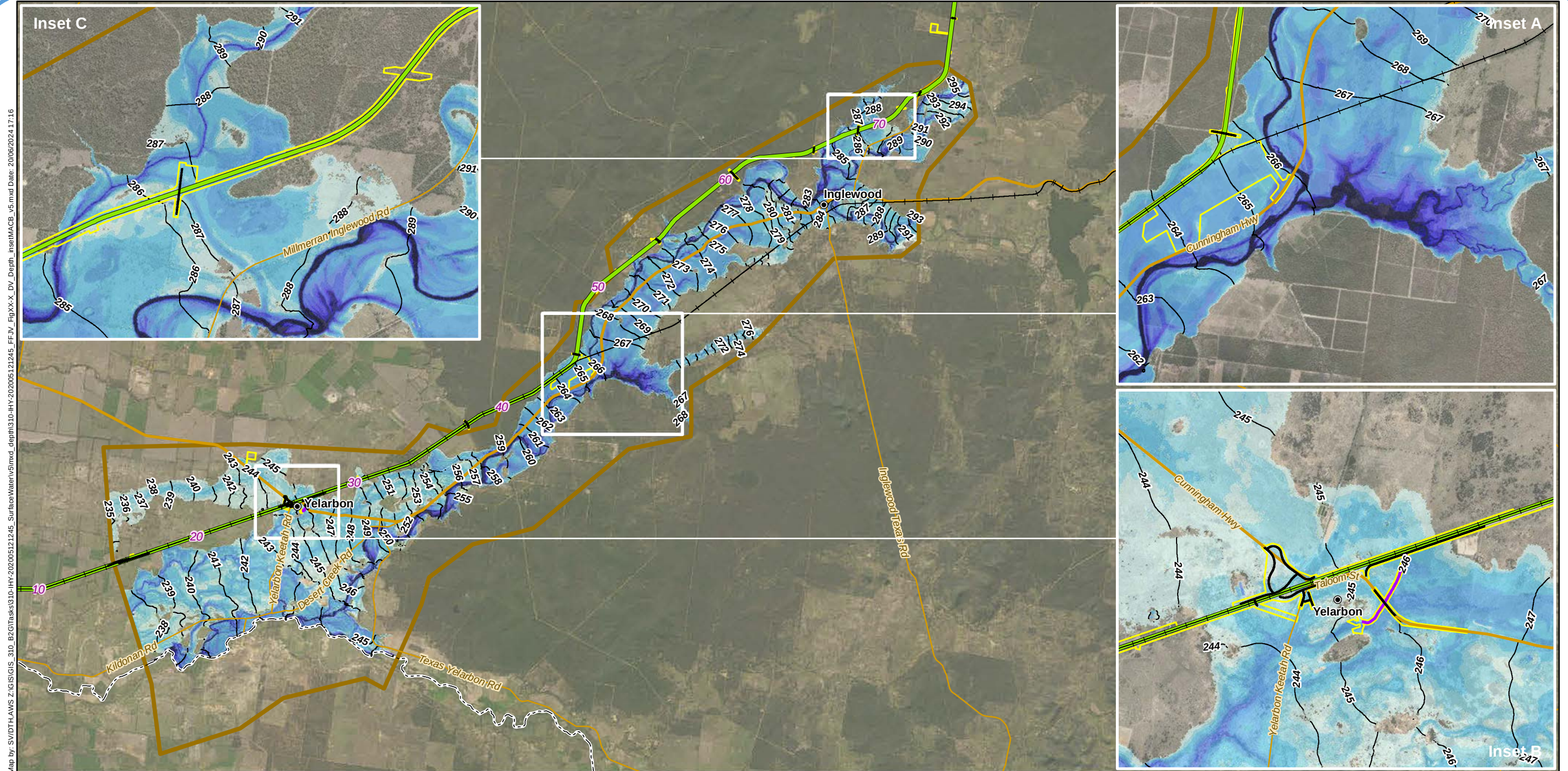


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Border to Gowrie

Figure J4-A:

20% AEP Event - Peak Water Levels - Developed Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|------------------------------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| | 1m peak water contour (mAHD) |

Macintyre Brook - Yelarbon to Inglewood
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:250,000

0 2.5 5 7.5 10 12.5 km



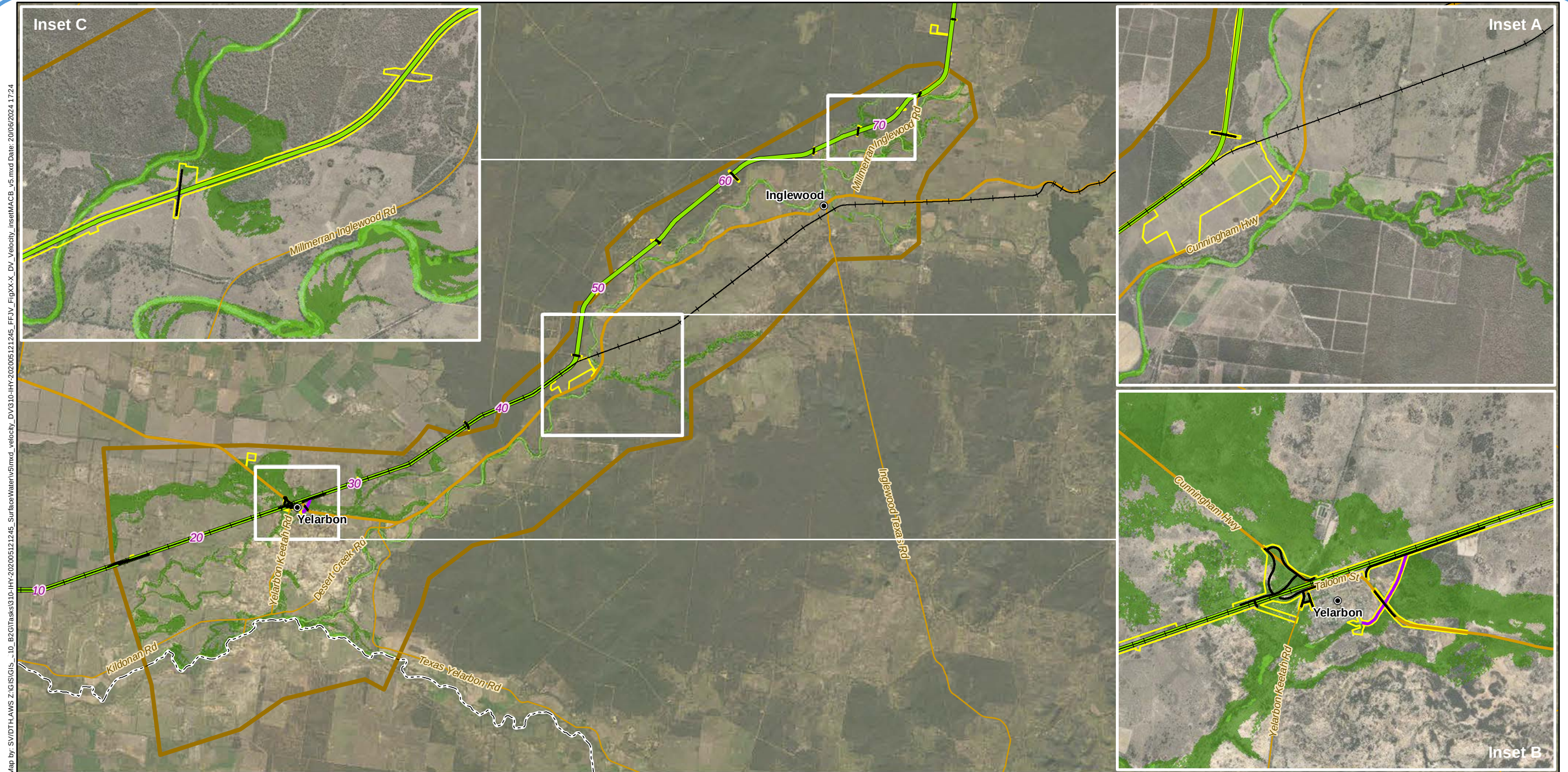
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Border to Gowrie

Figure J4-B:

1% AEP Event - Peak Water Levels - Developed Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	

Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



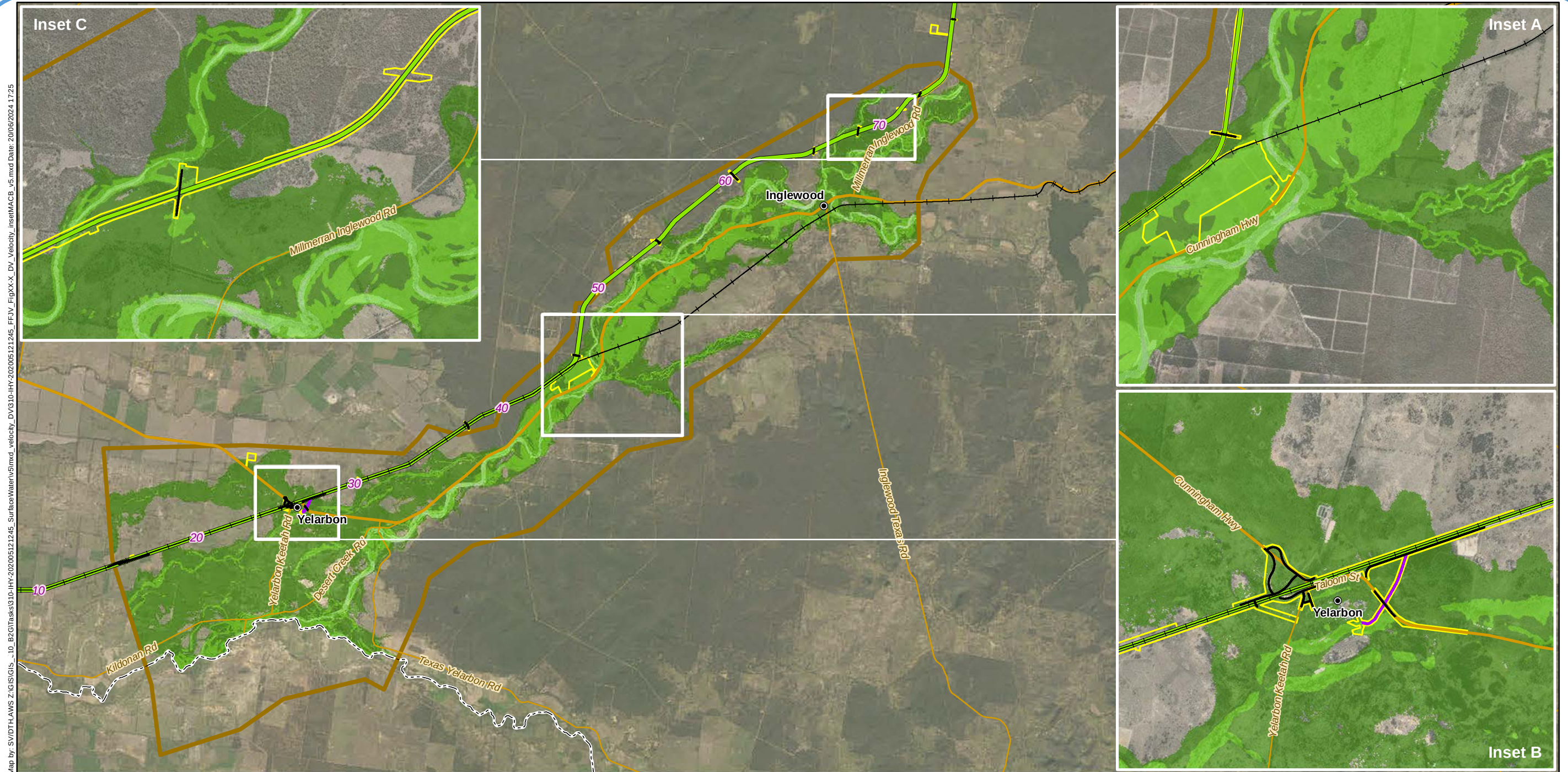
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Border to Gowrie

Figure J4-C:

20% AEP Event - Peak Velocity - Developed Case - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	

Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



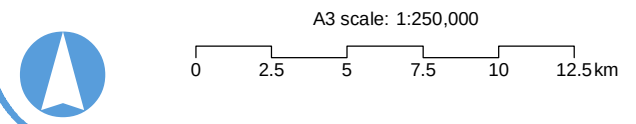
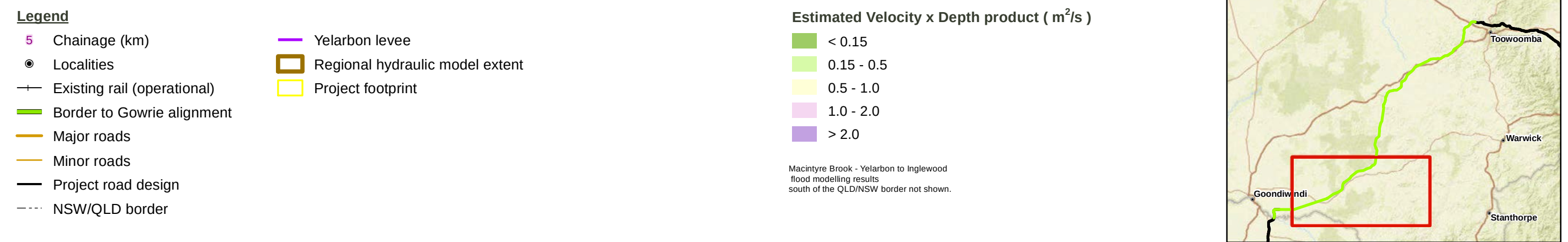
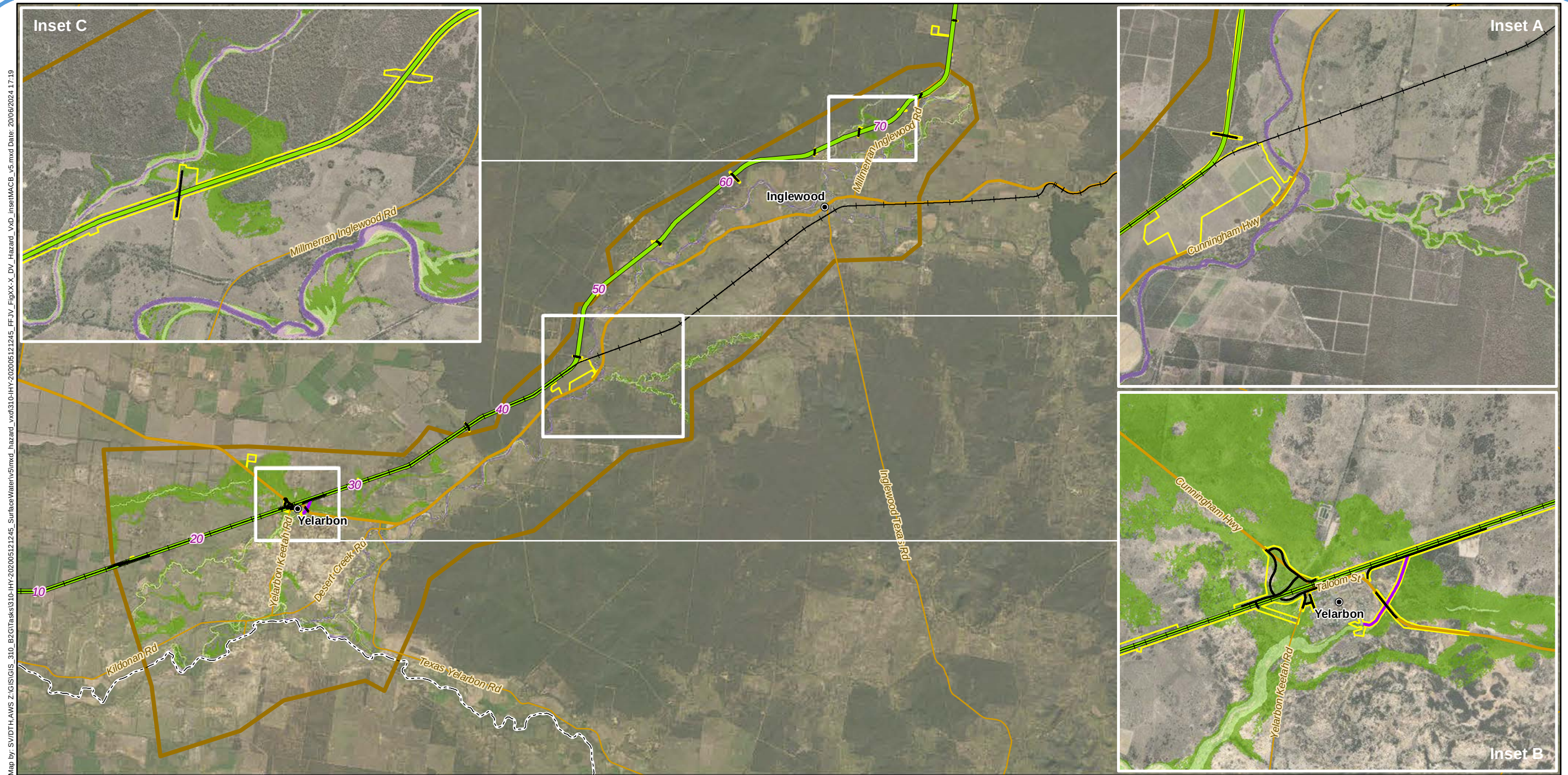
Future Freight
Integrating Community, Environment and Engineering

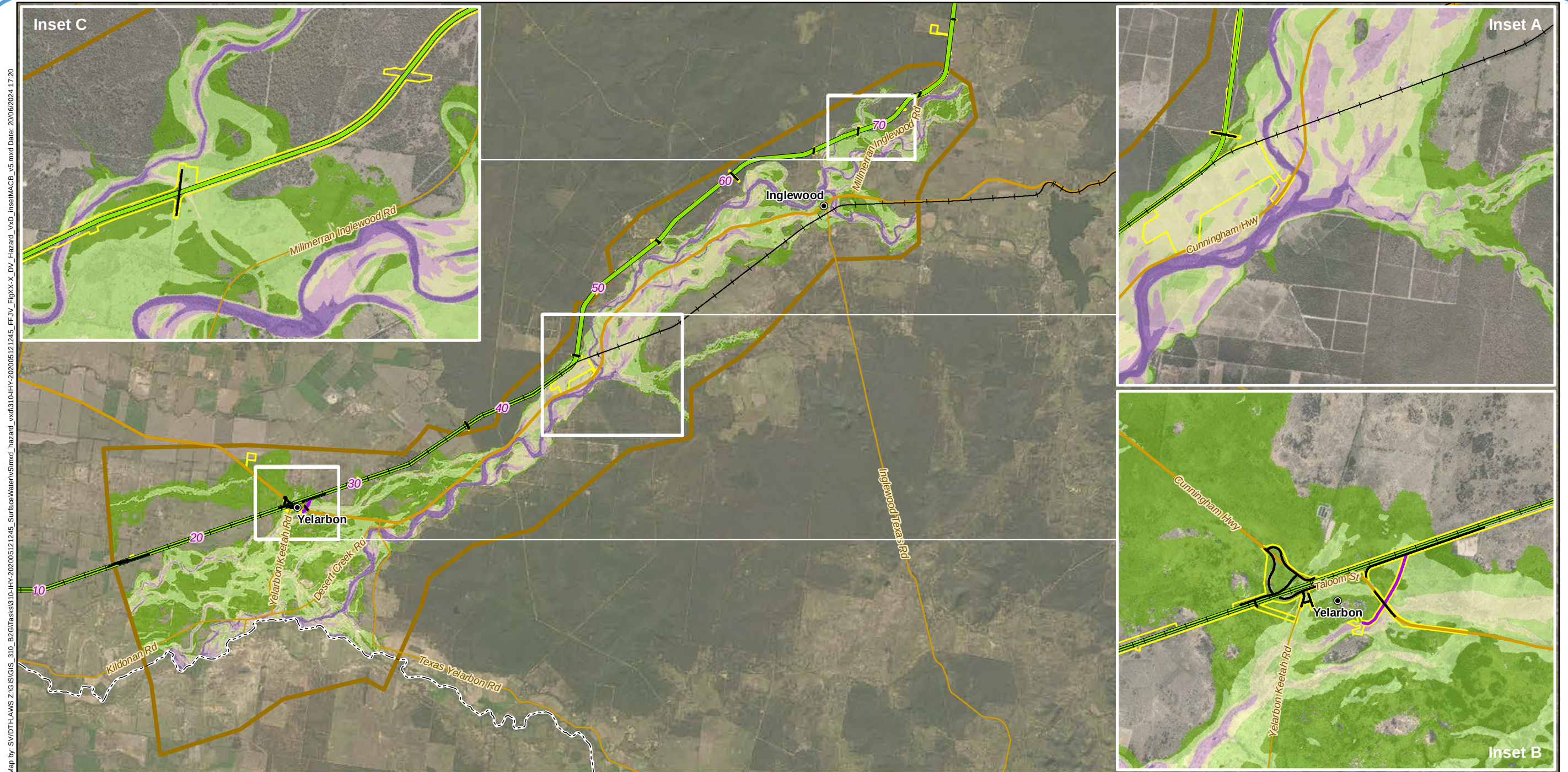
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Border to Gowrie

Figure J4-D:

1% AEP Event - Peak Velocity - Developed Case - Macintyre Brook - Yelarbon to Inglewood





Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m^2/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0

Macintyre Brook - Yelarbon to Inglewood
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



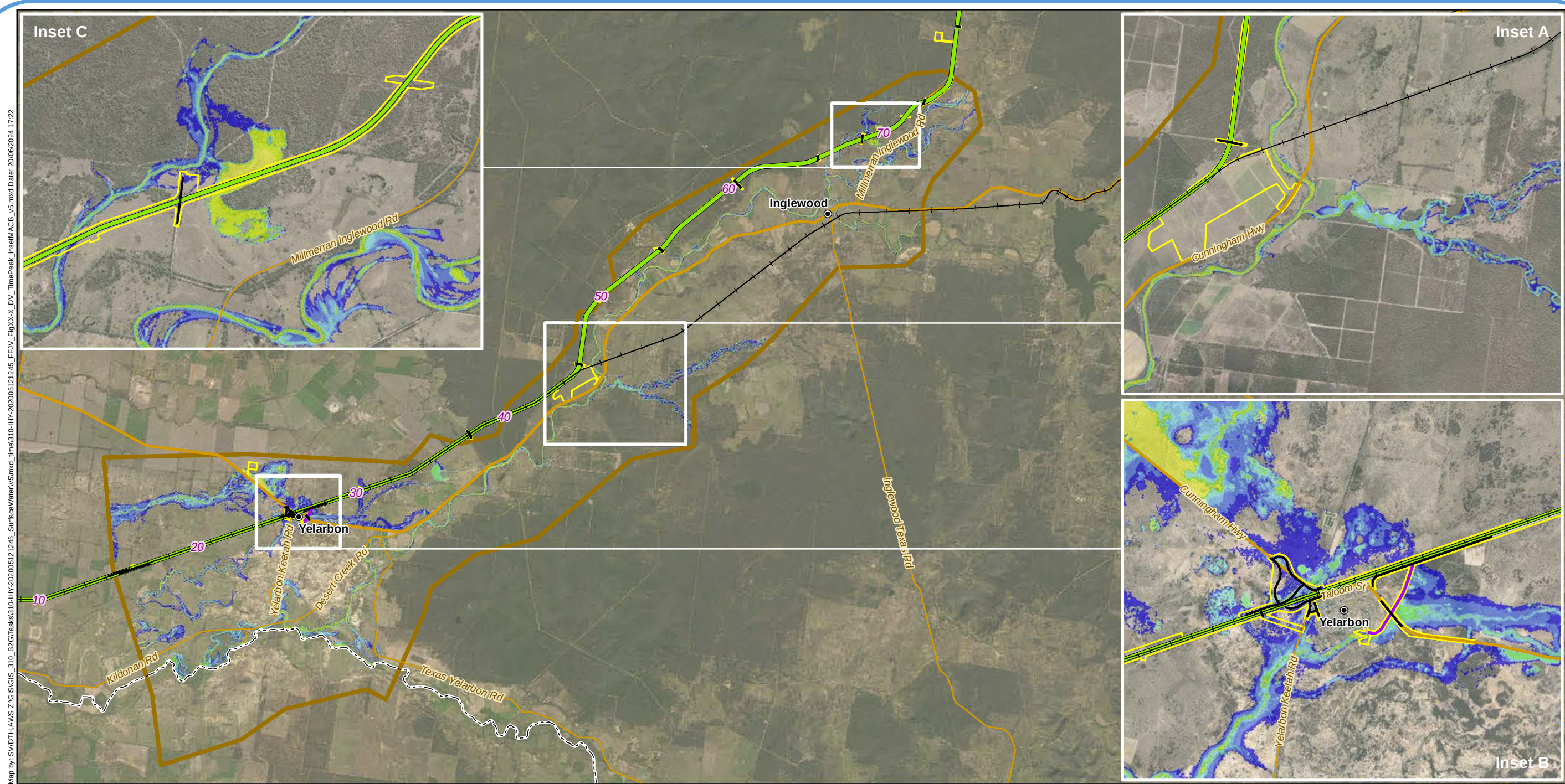
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J4-F:

1% AEP Event - Peak Hazard - Developed Case - Macintyre Brook - Yelarbon to Inglewood

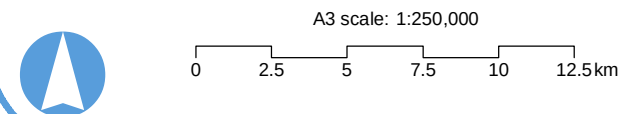
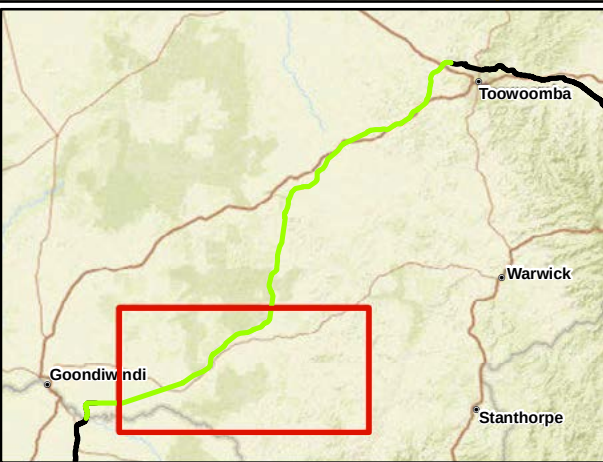


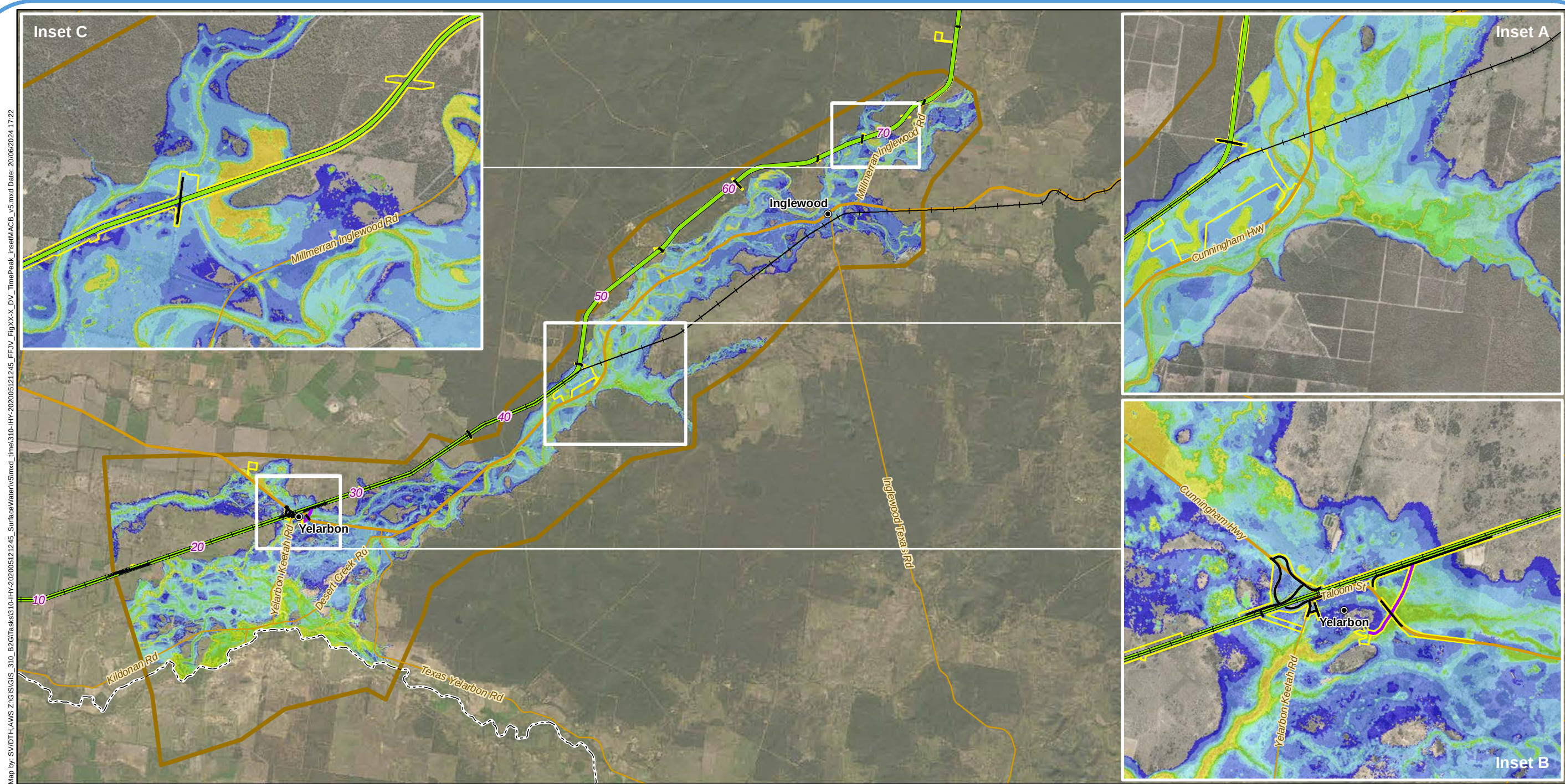
- Legend**
- 5 Chainage (km)
 - Localities
 - Existing rail (operational)
 - Border to Gowrie alignment
 - Major roads
 - Minor roads
 - Project road design
 - NSW/QLD border
 - Yelarbon levee
 - Regional hydraulic model extent
 - Project footprint

Estimated time of inundation (hours)

0 - 10	60 - 70
10 - 20	70 - 80
20 - 30	80 - 90
30 - 40	90 - 100
40 - 50	> 100
50 - 60	

Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



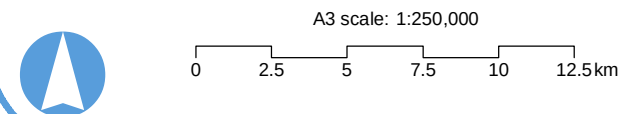
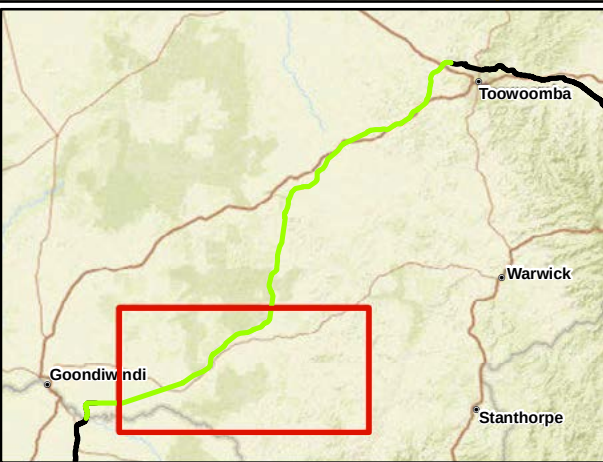


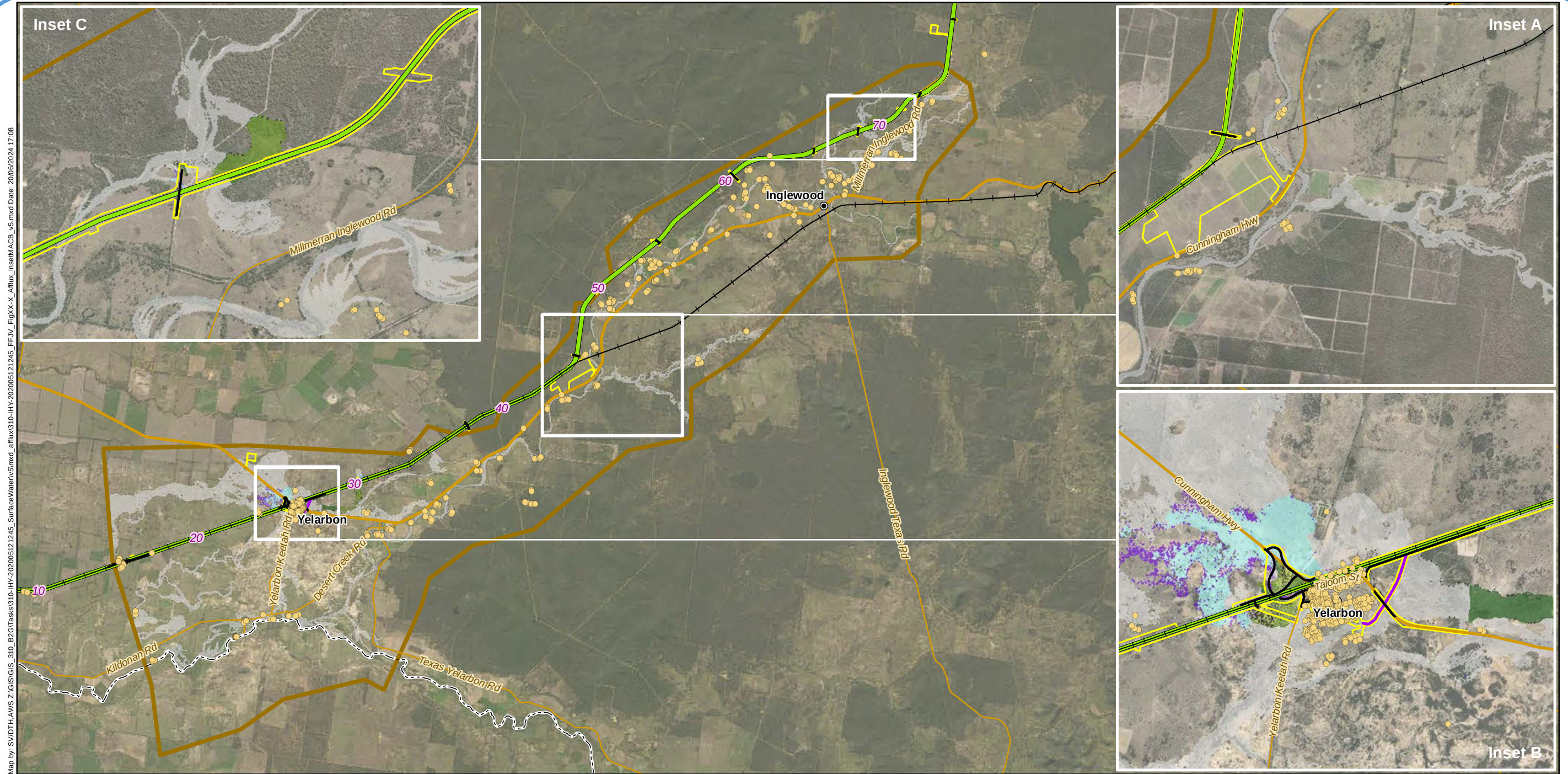
- Legend**
- 5 Chainage (km)
 - Localities
 - Existing rail (operational)
 - Border to Gowrie alignment
 - Major roads
 - Minor roads
 - Project road design
 - NSW/QLD border
 - Yelarbon levee
 - Regional hydraulic model extent
 - Project footprint

Estimated time of inundation (hours)

0 - 10	60 - 70
10 - 20	70 - 80
20 - 30	80 - 90
30 - 40	90 - 100
40 - 50	> 100
50 - 60	

Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.





Legend

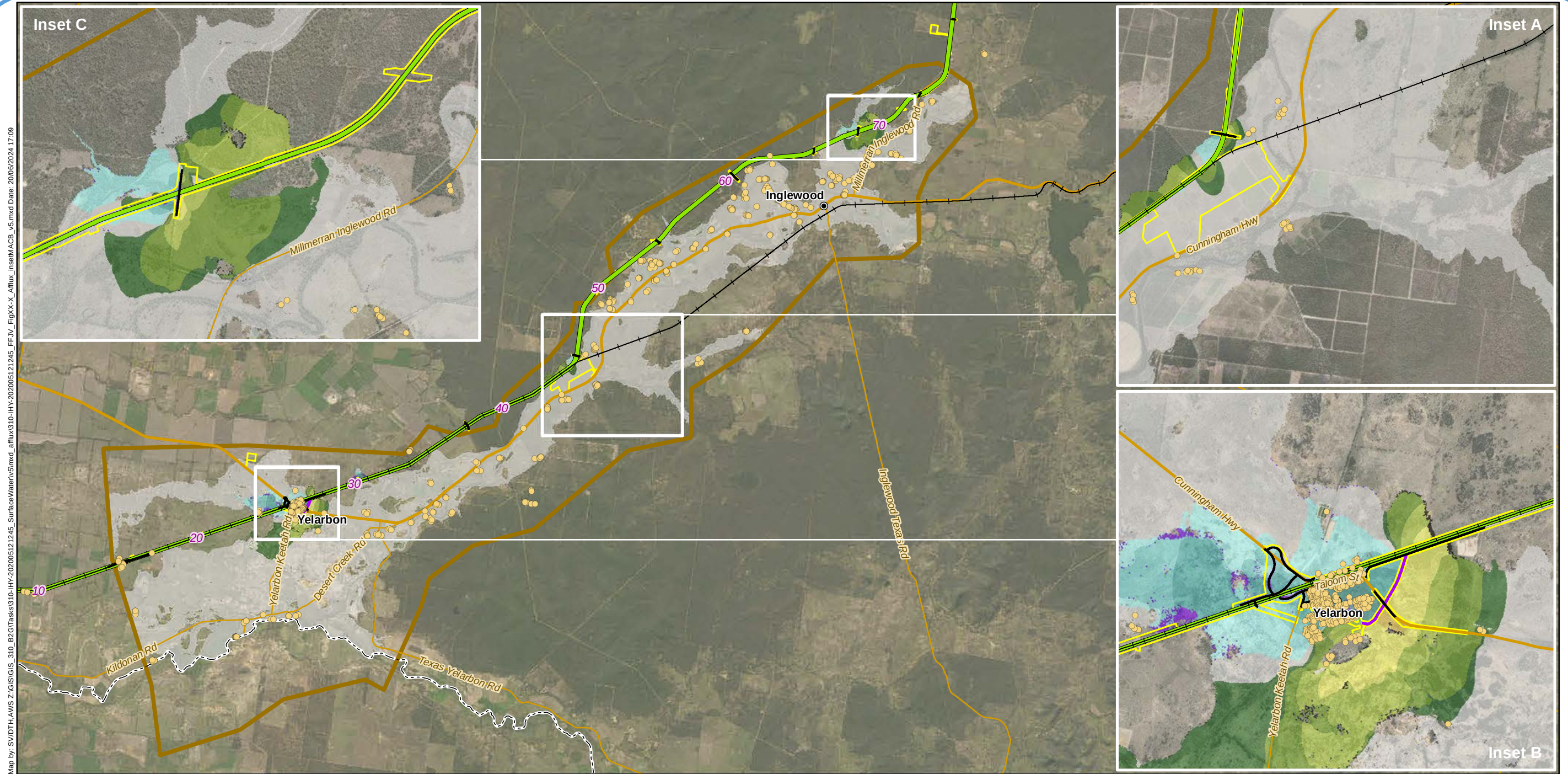
- Flood sensitive receptor
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

■ < -0.5	■ 0.02 to 0.05
■ -0.50 to -0.20	■ 0.05 to 0.10
■ -0.20 to -0.10	■ 0.10 to 0.20
■ -0.10 to -0.05	■ 0.20 to 0.30
■ -0.05 to -0.01	■ 0.30 to 0.40
■ -0.01 to 0.01	■ 0.40 to 0.50
■ 0.01 to 0.02	■ > 0.5
Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.	
■ Decrease in inundation area	■ Increase in inundation area



A3 scale: 1:250,000
 0 2.5 5 7.5 10 12.5 km



Legend

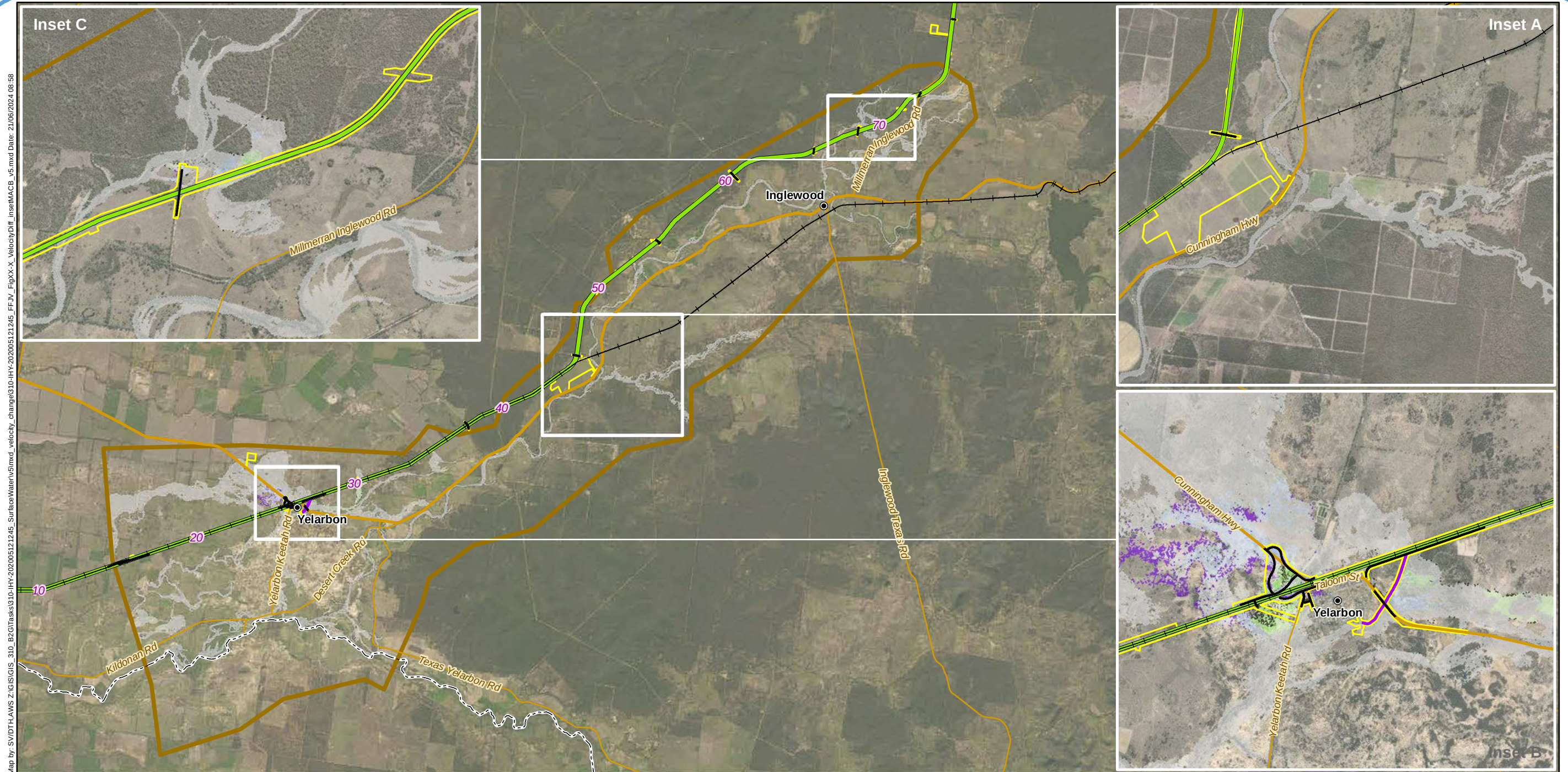
- Flood sensitive receptor
- Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|--------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
- Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.
- Decrease in inundation area
 - Increase in inundation area



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

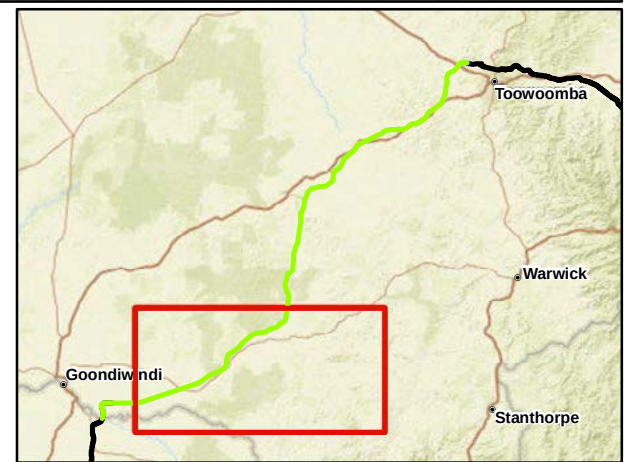
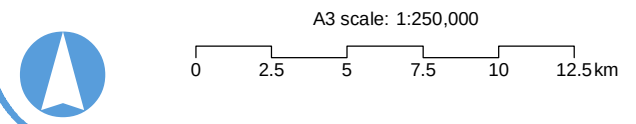
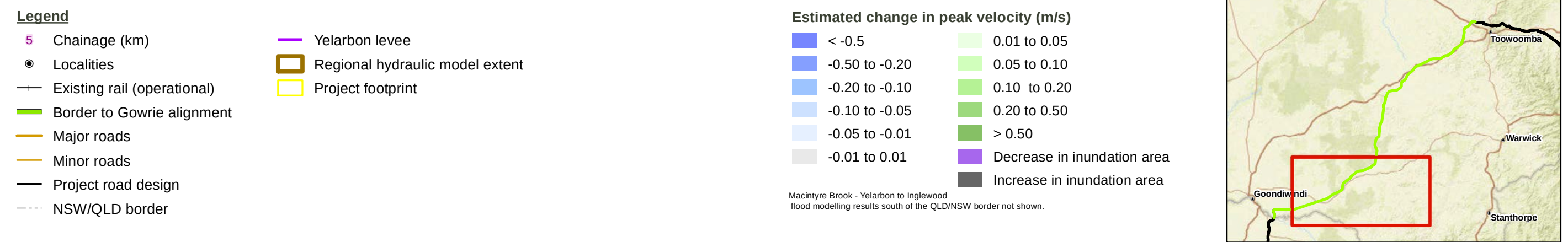
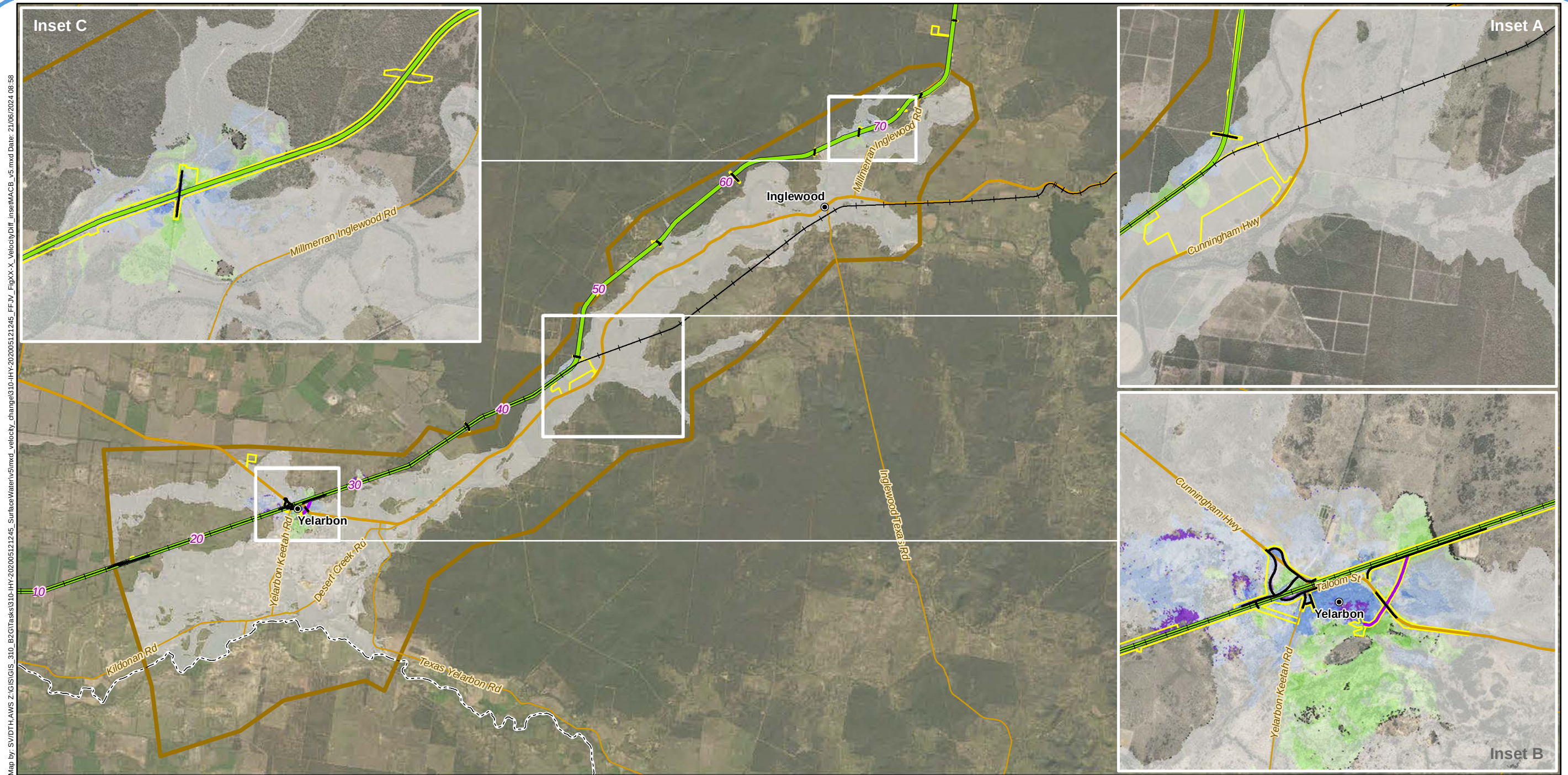
Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |

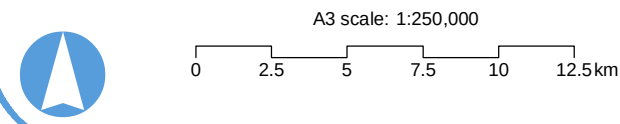
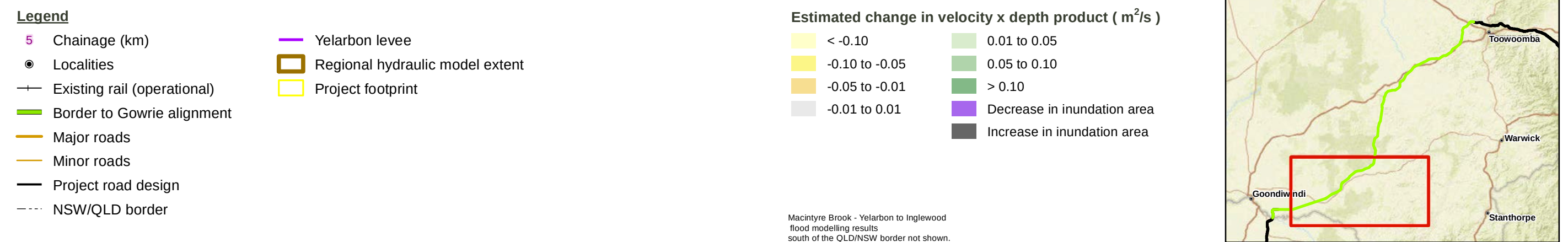
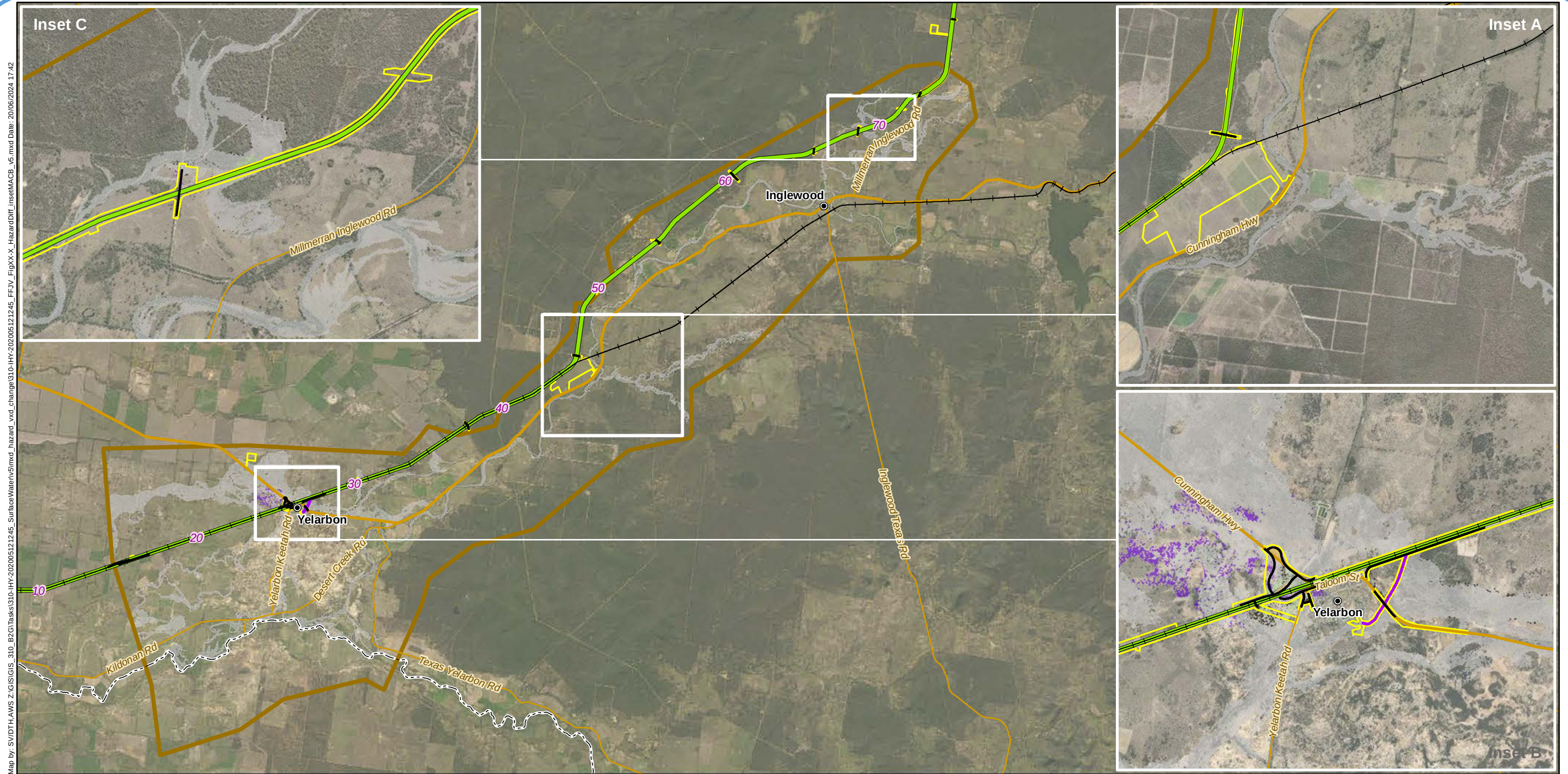
Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.

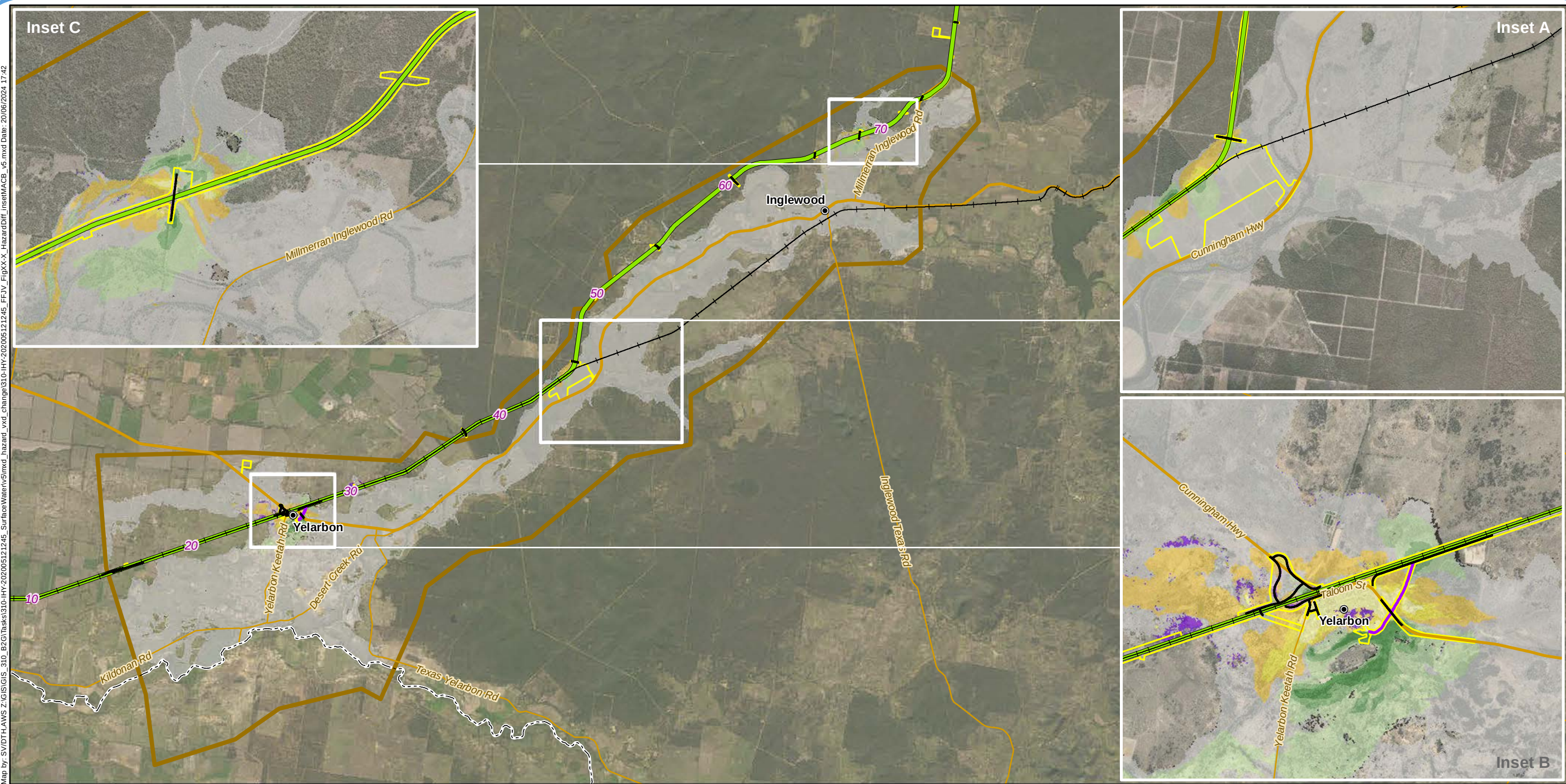


A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



Border to Gowrie
Figure J5-D:
1% AEP Event - Change in Velocity - Macintyre Brook - Yelarbon to Inglewood





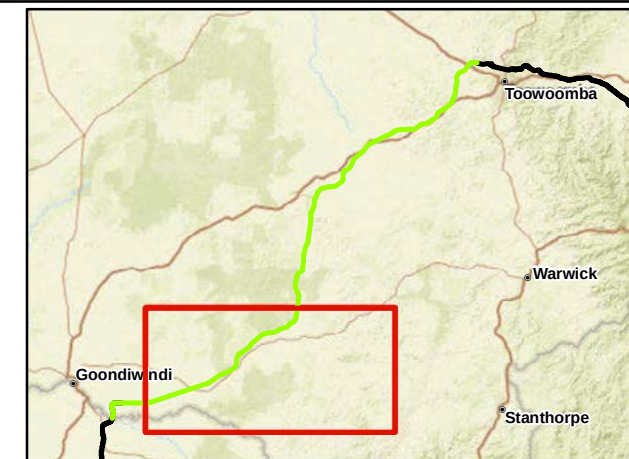
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m²/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |

Macintyre Brook - Yelarbon to Inglewood
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km

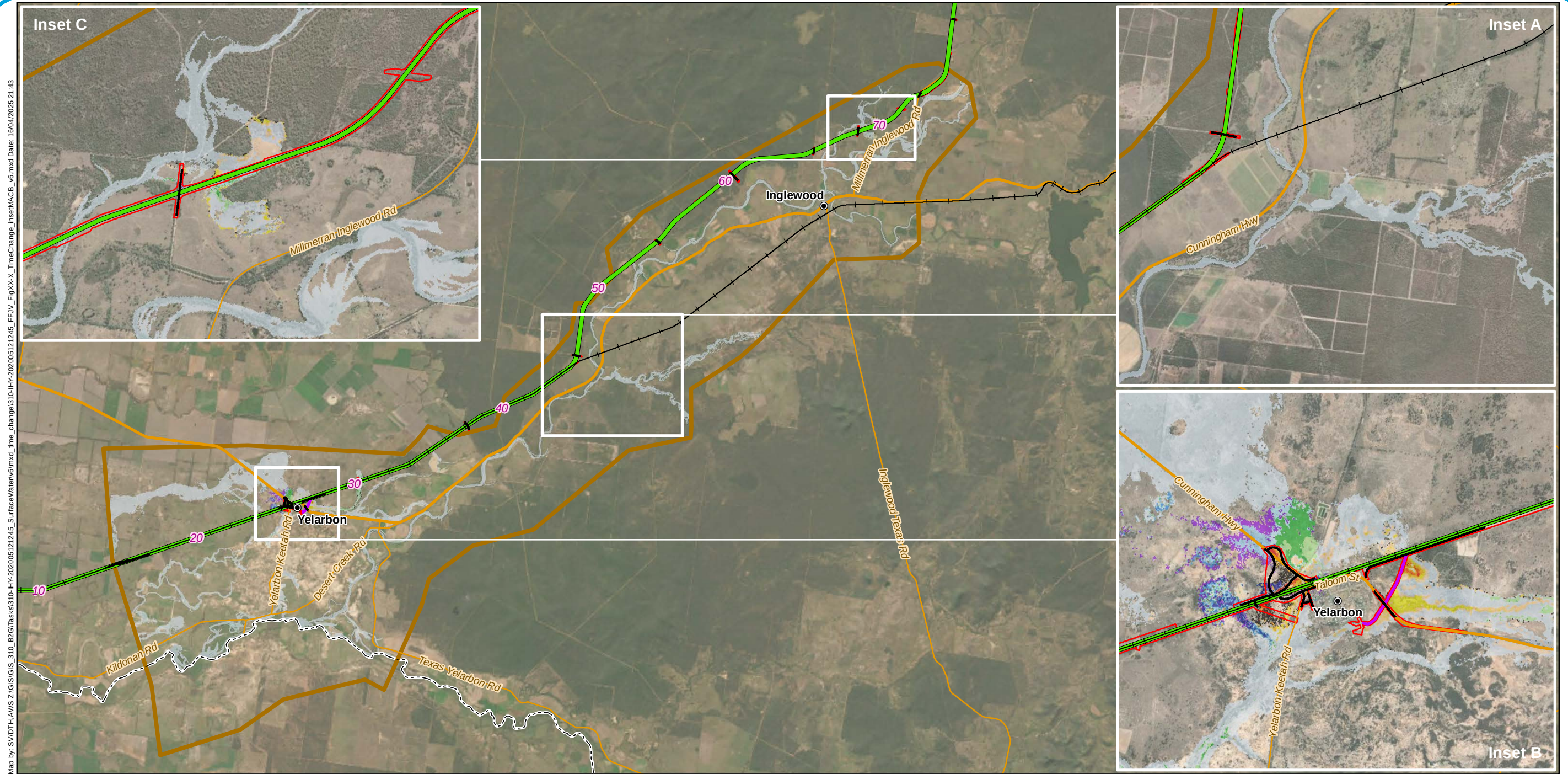


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Border to Gowrie

Figure J5-F:

1% AEP Event - Change in Hazard - Macintyre Brook - Yelarbon to Inglewood



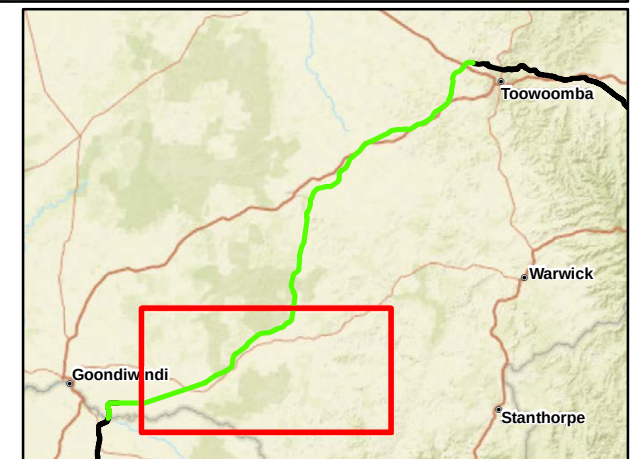
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- Over 10 hour decrease
- Up to 10 hour decrease
- Up to 5 hour decrease
- Up to 2 hour decrease
- Up to 1 hour decrease
- Up to 0.5 hour decrease
- Within 15 minutes
- Up to 0.5 hour increase
- Up to 1 hour increase
- Up to 2 hour increase
- Up to 5 hour increase
- Up to 10 hour increase
- Over 10 hour increase
- Decrease in inundation area
- Increase in inundation area

Macintyre Brook - Yelarbon to Inglewood
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



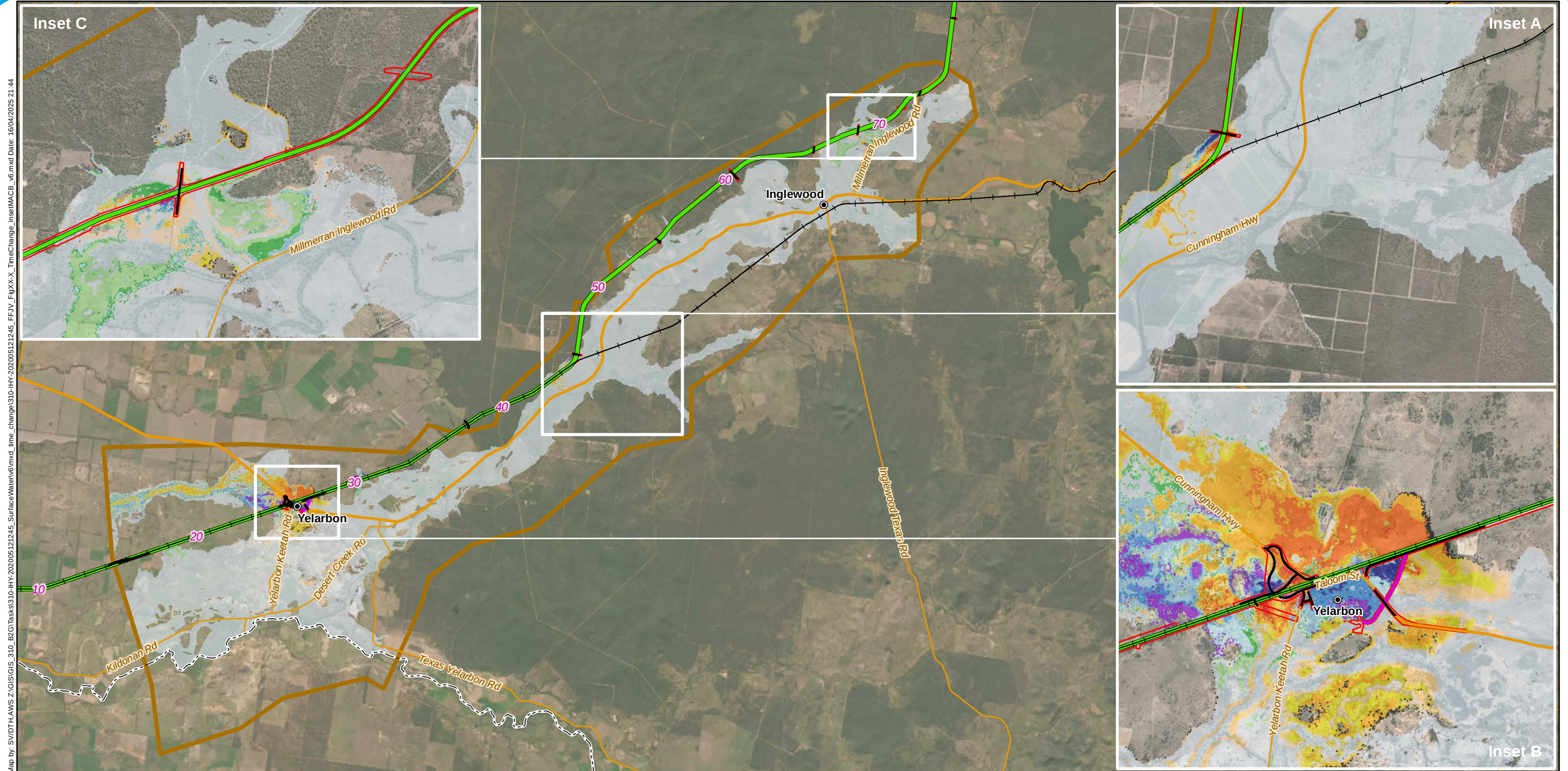
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J5-G:

20% AEP Event - Change in Time of Inundation - Macintyre Brook - Yelarbon to Inglewood



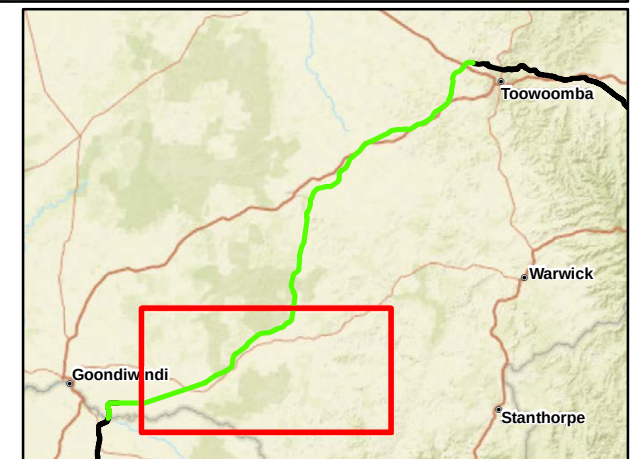
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

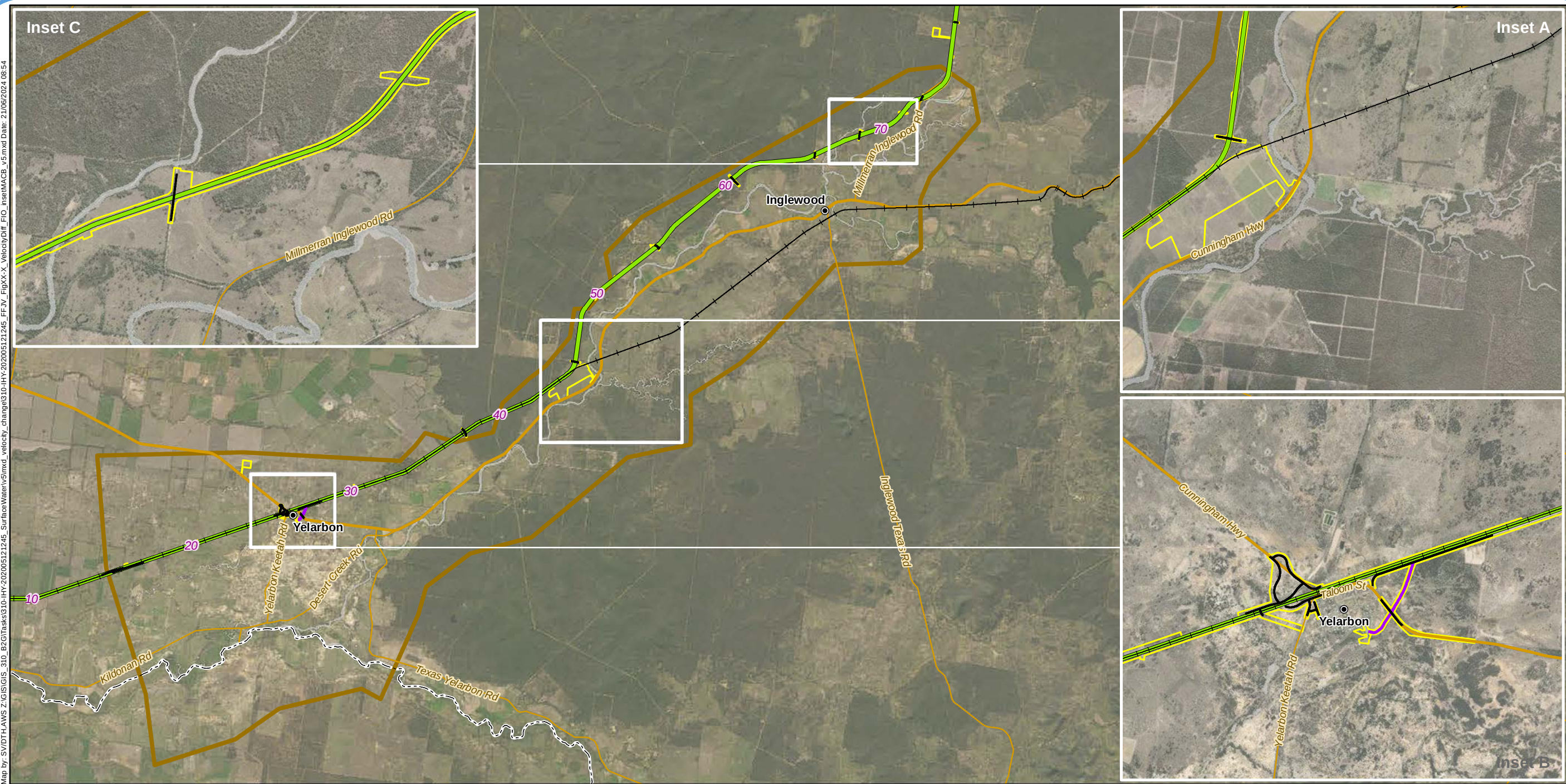
- Over 10 hour decrease
- Up to 10 hour decrease
- Up to 5 hour decrease
- Up to 2 hour decrease
- Up to 1 hour decrease
- Up to 0.5 hour decrease
- Within 15 minutes
- Up to 0.5 hour increase
- Up to 1 hour increase
- Up to 2 hour increase
- Up to 5 hour increase
- Up to 10 hour increase
- Over 10 hour increase
- Decrease in inundation area
- Increase in inundation area

Macintyre Brook - Yelarbon to Inglewood
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:250,000

0 2.5 5 7.5 10 12.5 km



Legend

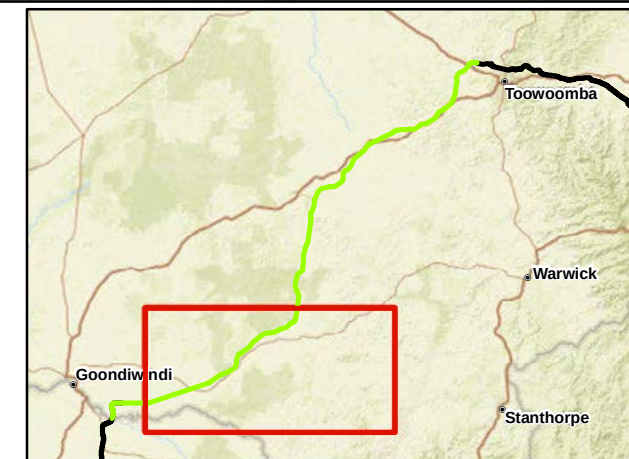
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

< -0.5	0.01 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.50
-0.05 to -0.01	> 0.50
-0.01 to 0.01	

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.

Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km

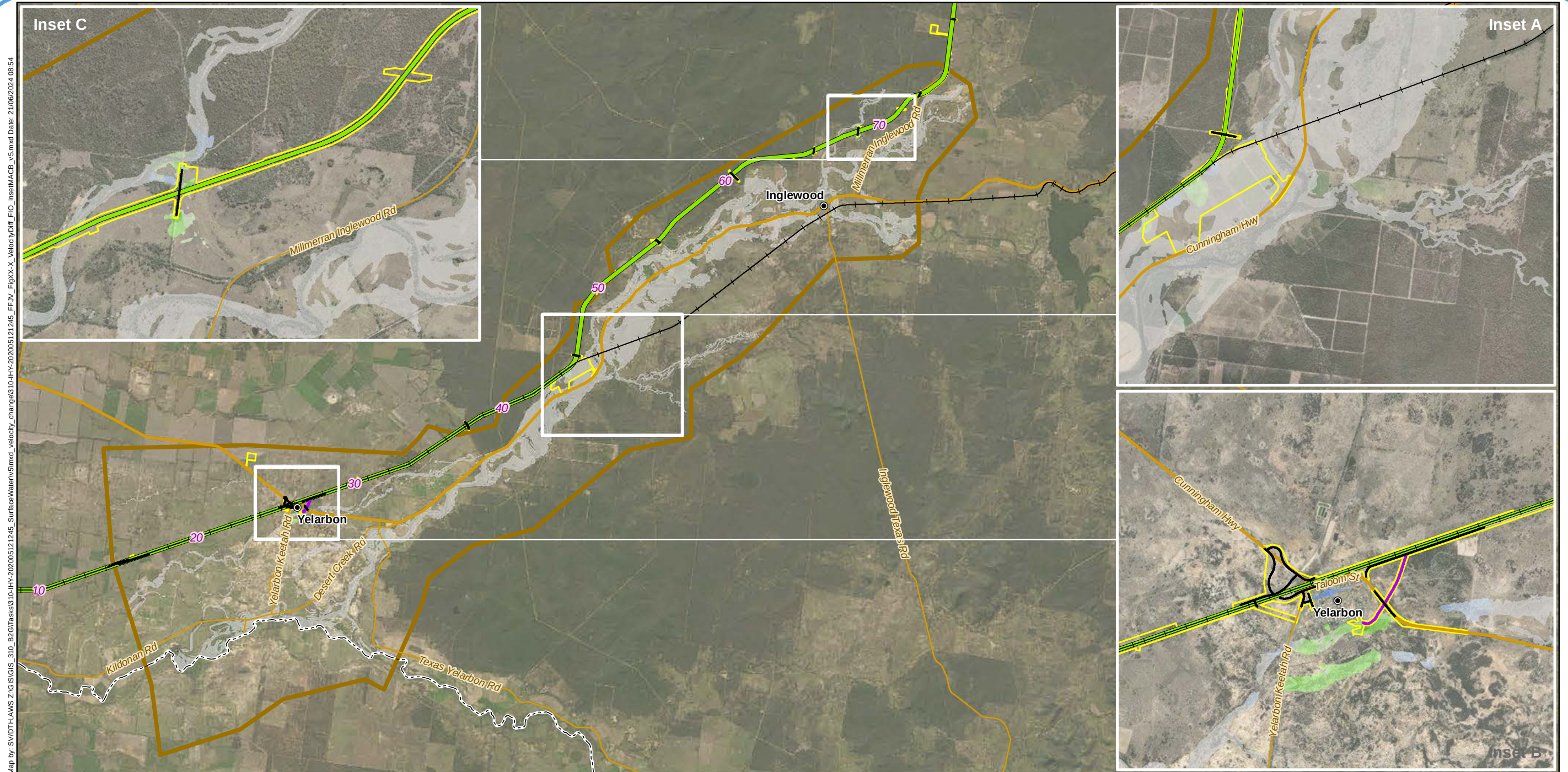


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J6-A:

20% AEP Event - Change in Velocity (<0.5m/s cutoff) - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

< -0.5	0.01 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.50
-0.05 to -0.01	> 0.50
-0.01 to 0.01	

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.

Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



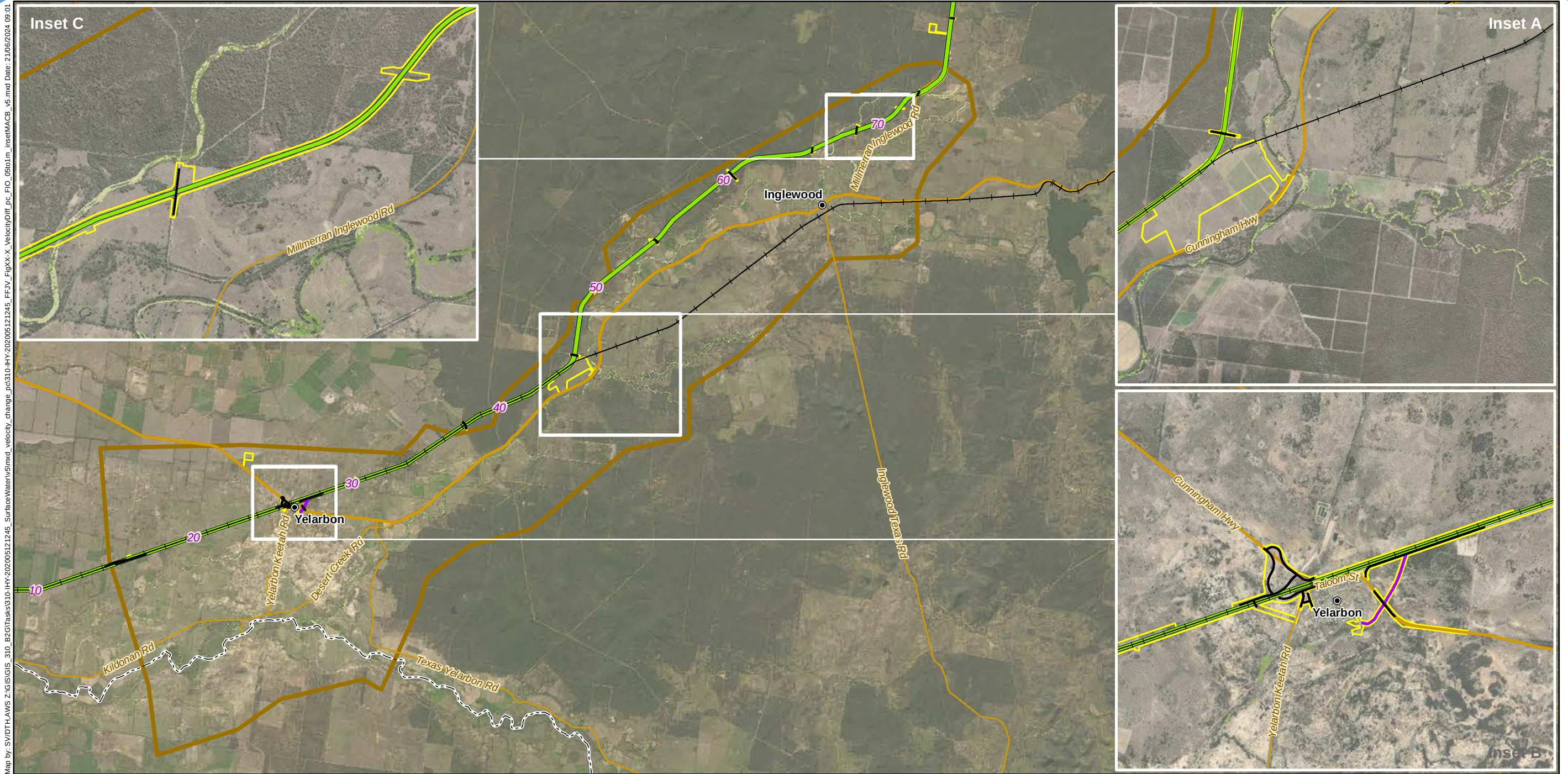
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Border to Gowrie

Figure J6-B:

1% AEP Event - Change in Velocity (<0.5m/s cutoff) - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.
Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



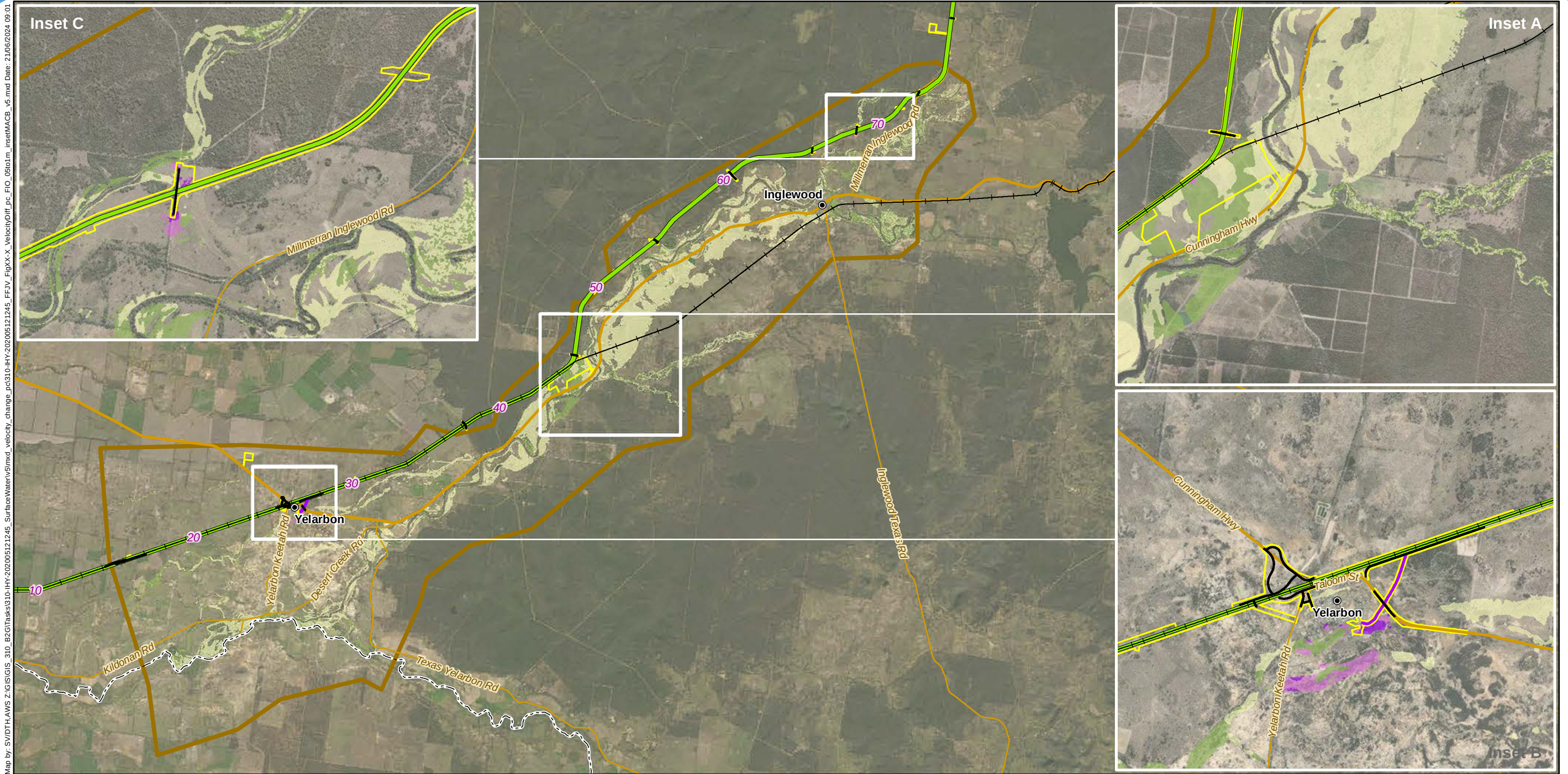
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J6-C:

20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.
Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



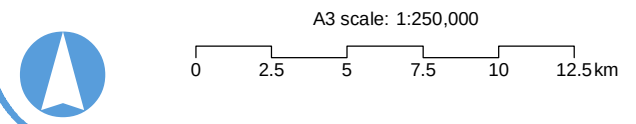
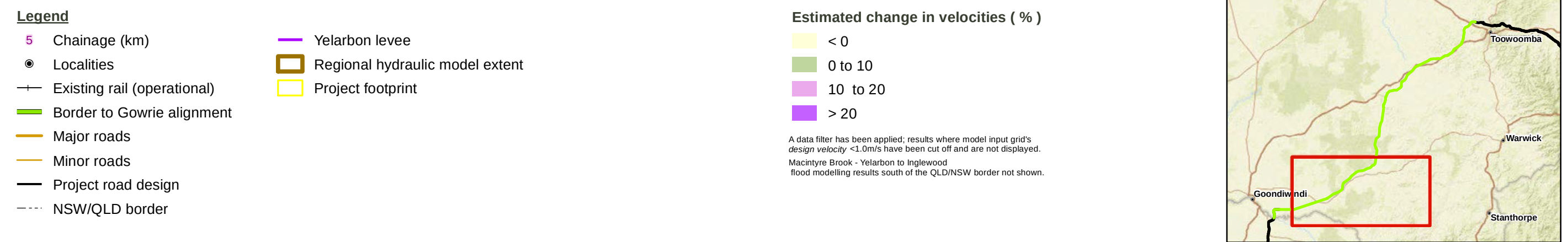
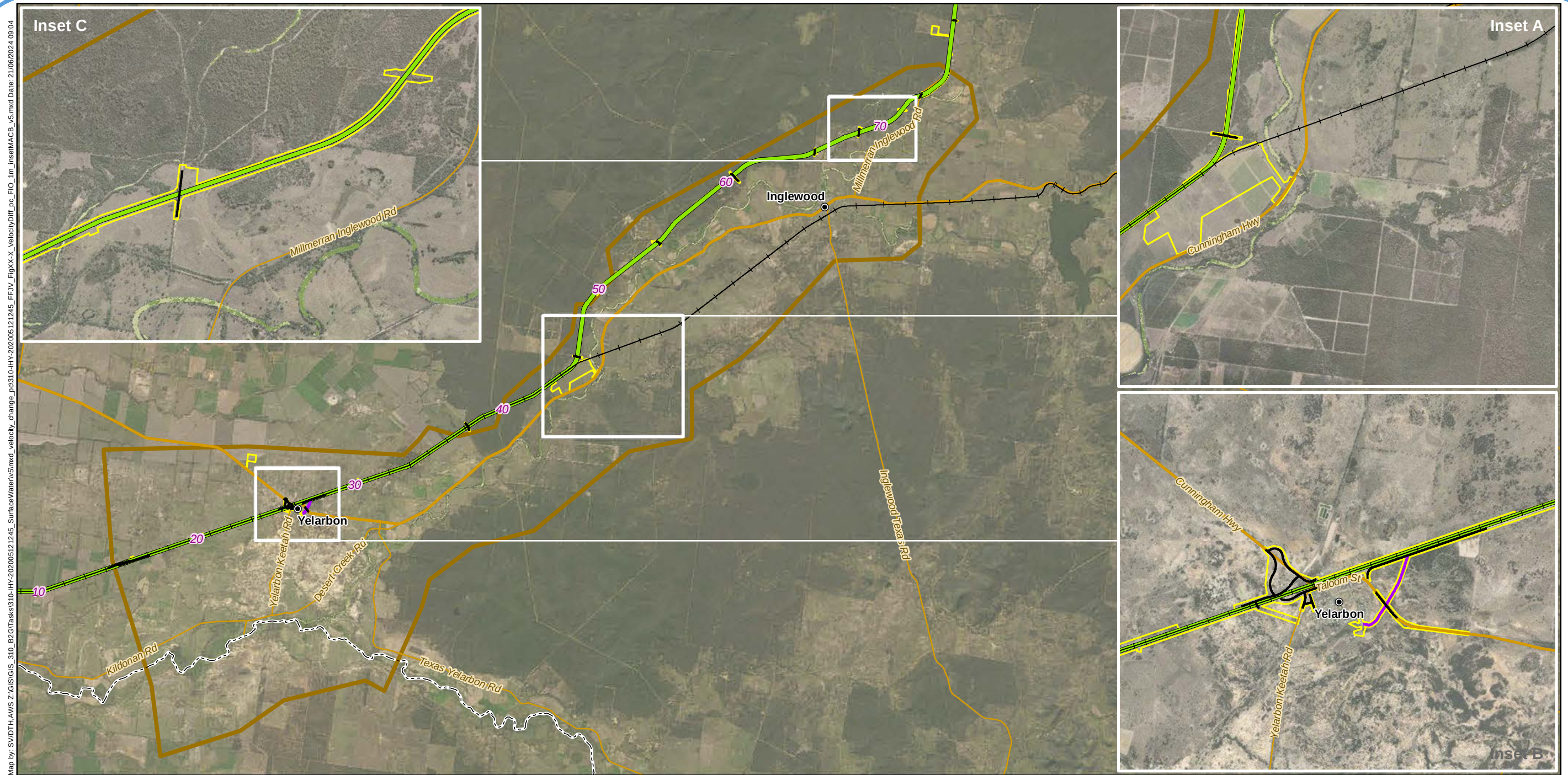
Future Freight
Integrating Community, Environment and Engineering

Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

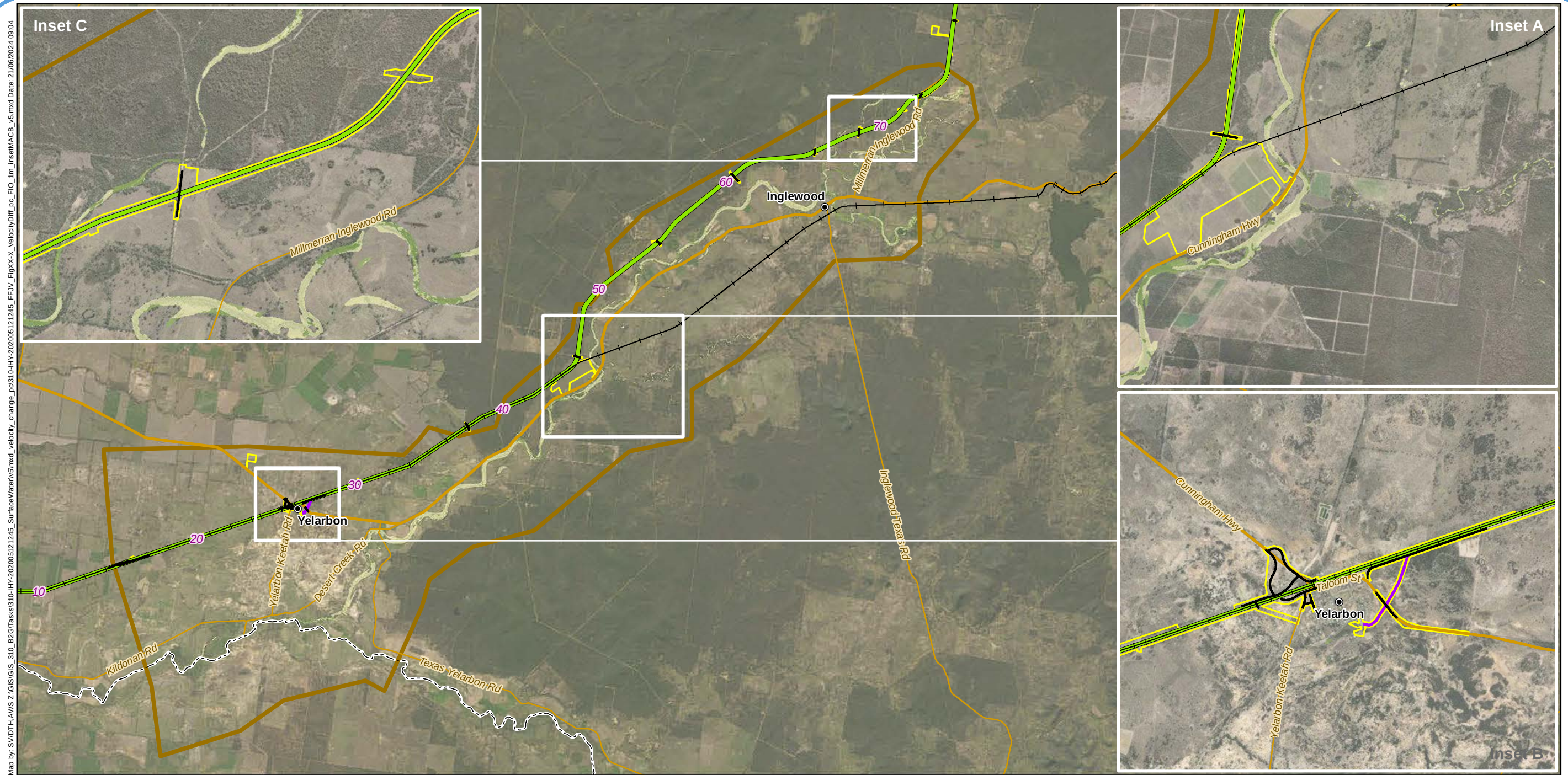
Border to Gowrie

Figure J6-D:

1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Macintyre Brook - Yelarbon to Inglewood



Border to Gowrie
Figure J6-E:
20% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Macintyre Brook - Yelarbon to Inglewood



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.
Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km

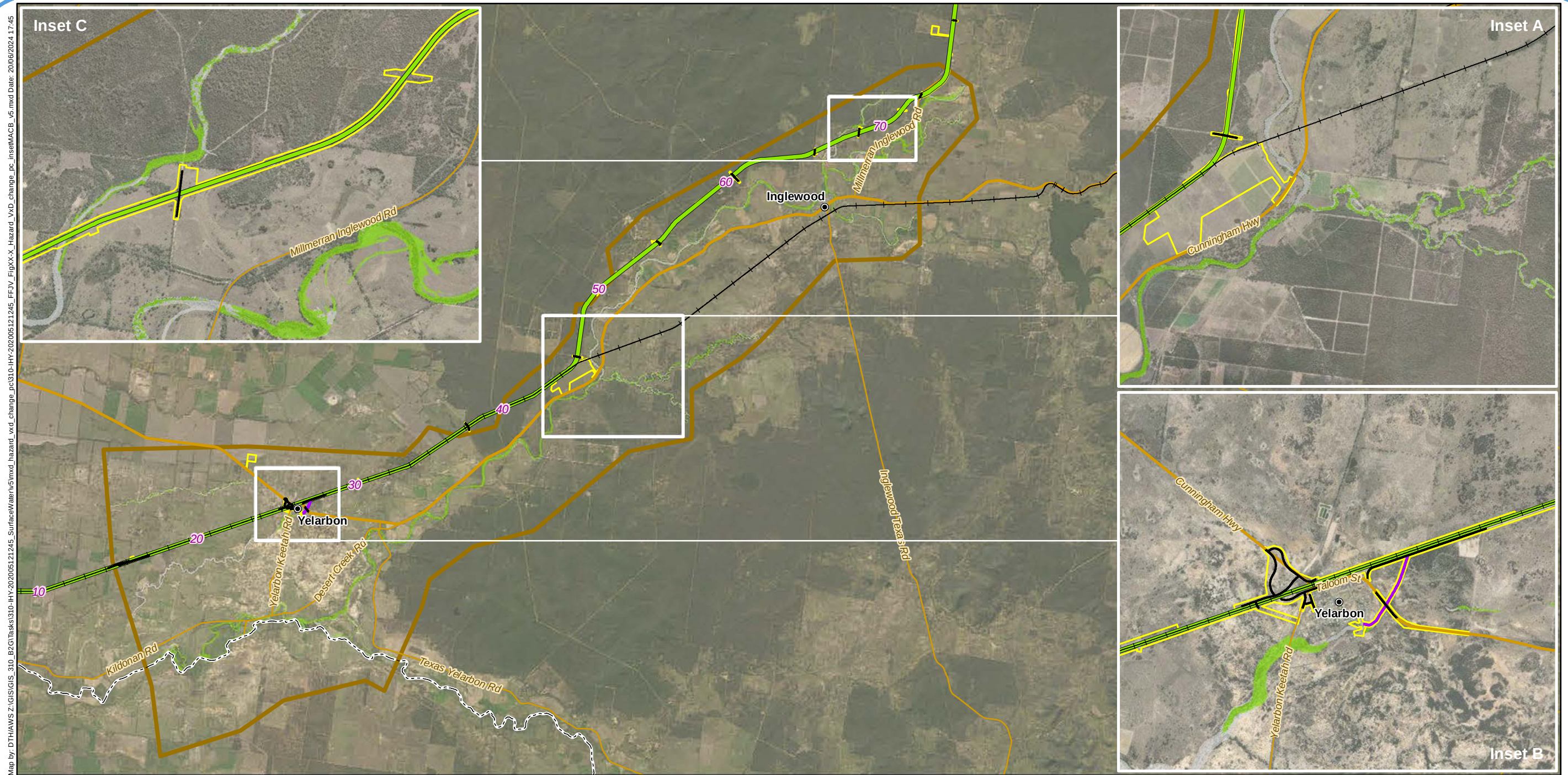


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J6-F:

1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Macintyre Brook - Yelarbon to Inglewood



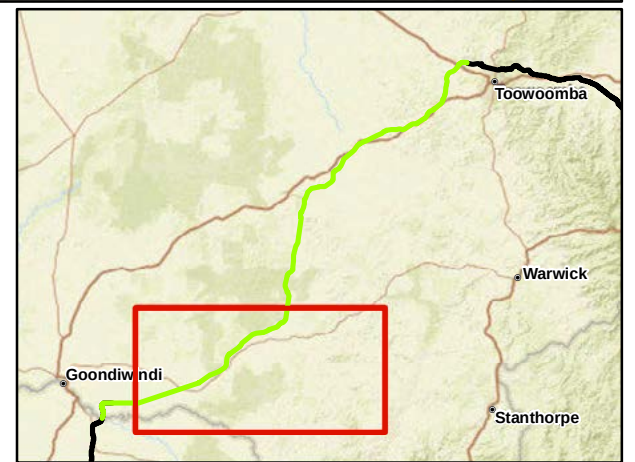
Legend

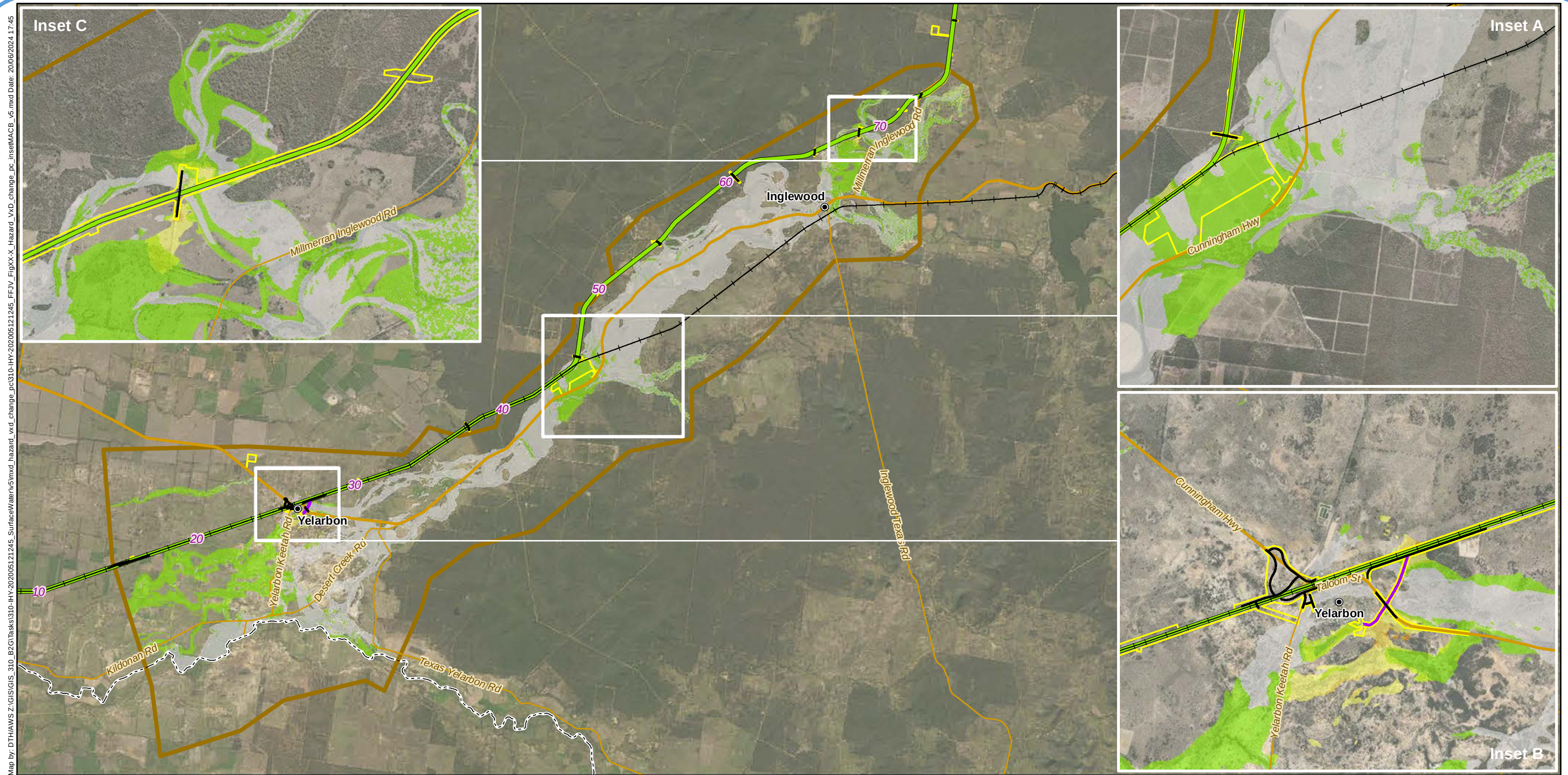
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.
Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.





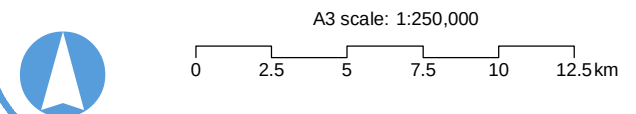
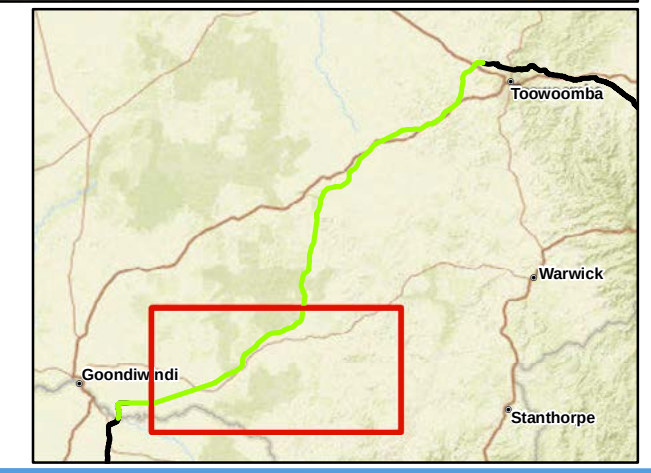
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

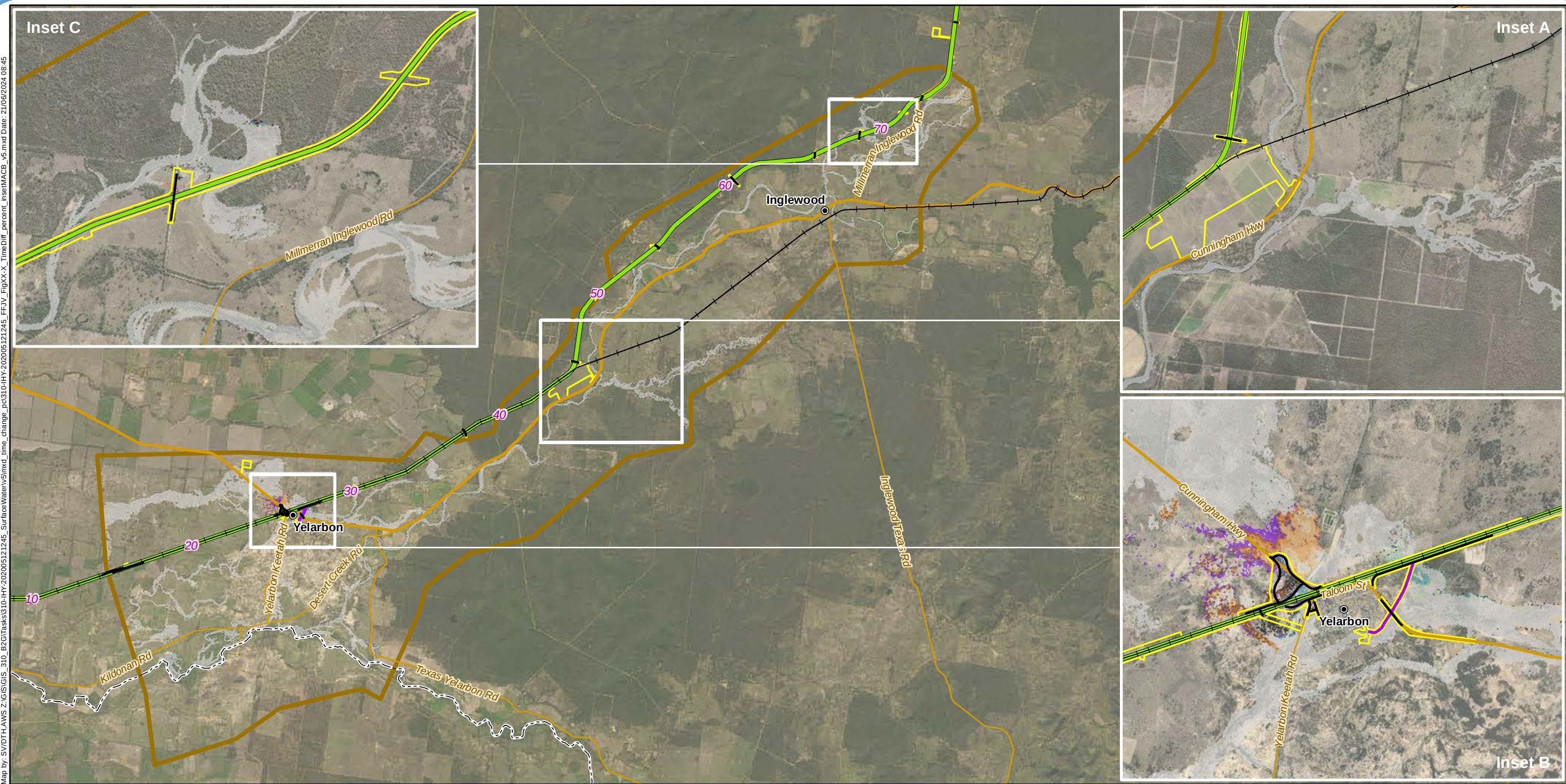
Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.
Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.



Border to Gowrie
Figure J7-B:
1% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Macintyre Brook - Yelarbon to Inglewood



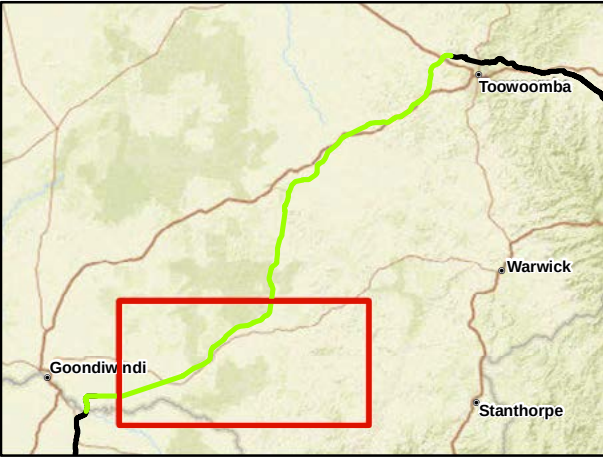
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- < -50%
- 50% to -40%
- 40% to -30%
- 30% to -20%
- 20% to -10%
- 10% to -5%
- 5% to 5%
- 5% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- >100%
- Decrease in inundation area
- Increase in inundation area

Macintyre Brook - Yelarbon to Inglewood
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000

0 2.5 5 7.5 10 12.5 km

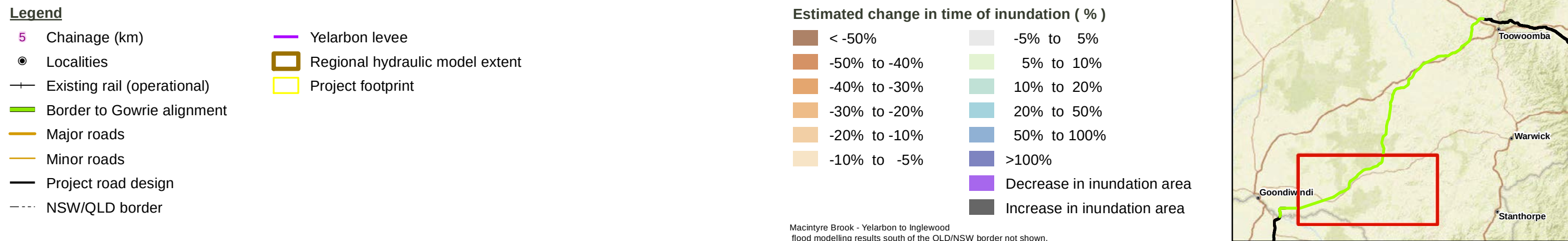
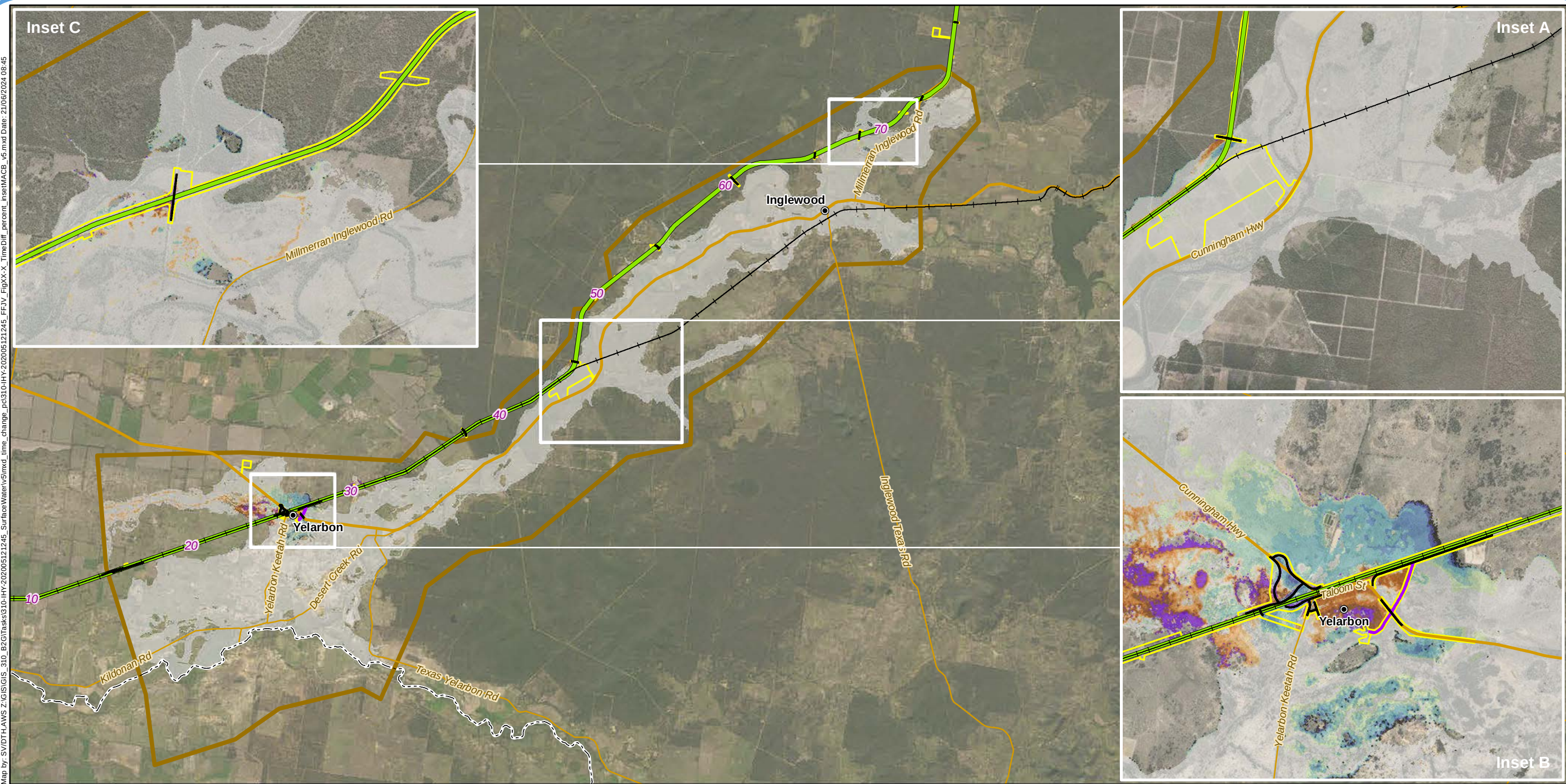


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J8-A:

20% AEP Event - Percentage Change in Time of Inundation - Macintyre Brook - Yelarbon to Inglewood



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km

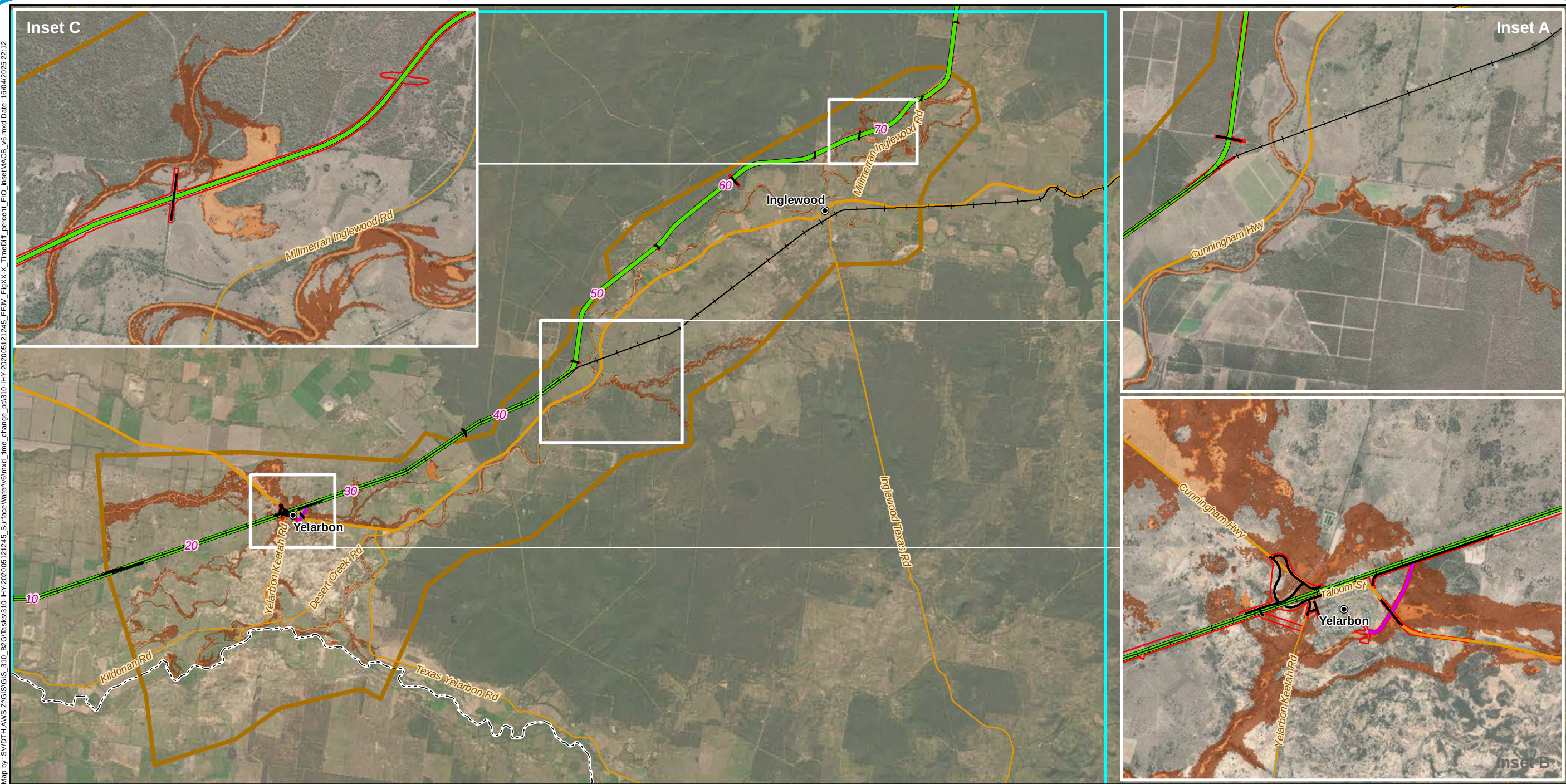


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J8-B:

1% AEP Event - Percentage Change in Time of Inundation - Macintyre Brook - Yelarbon to Inglewood



Legend

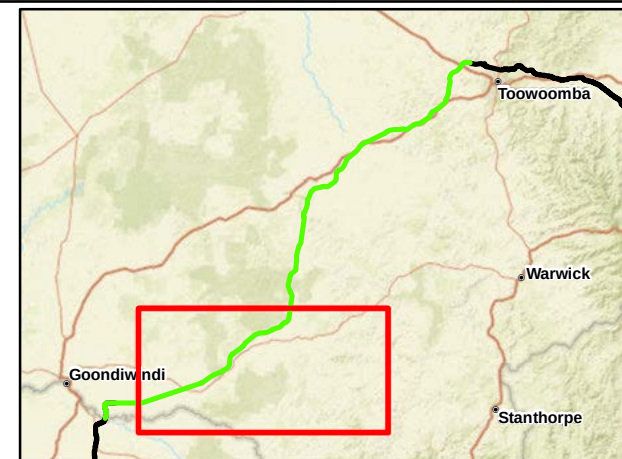
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.

Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km

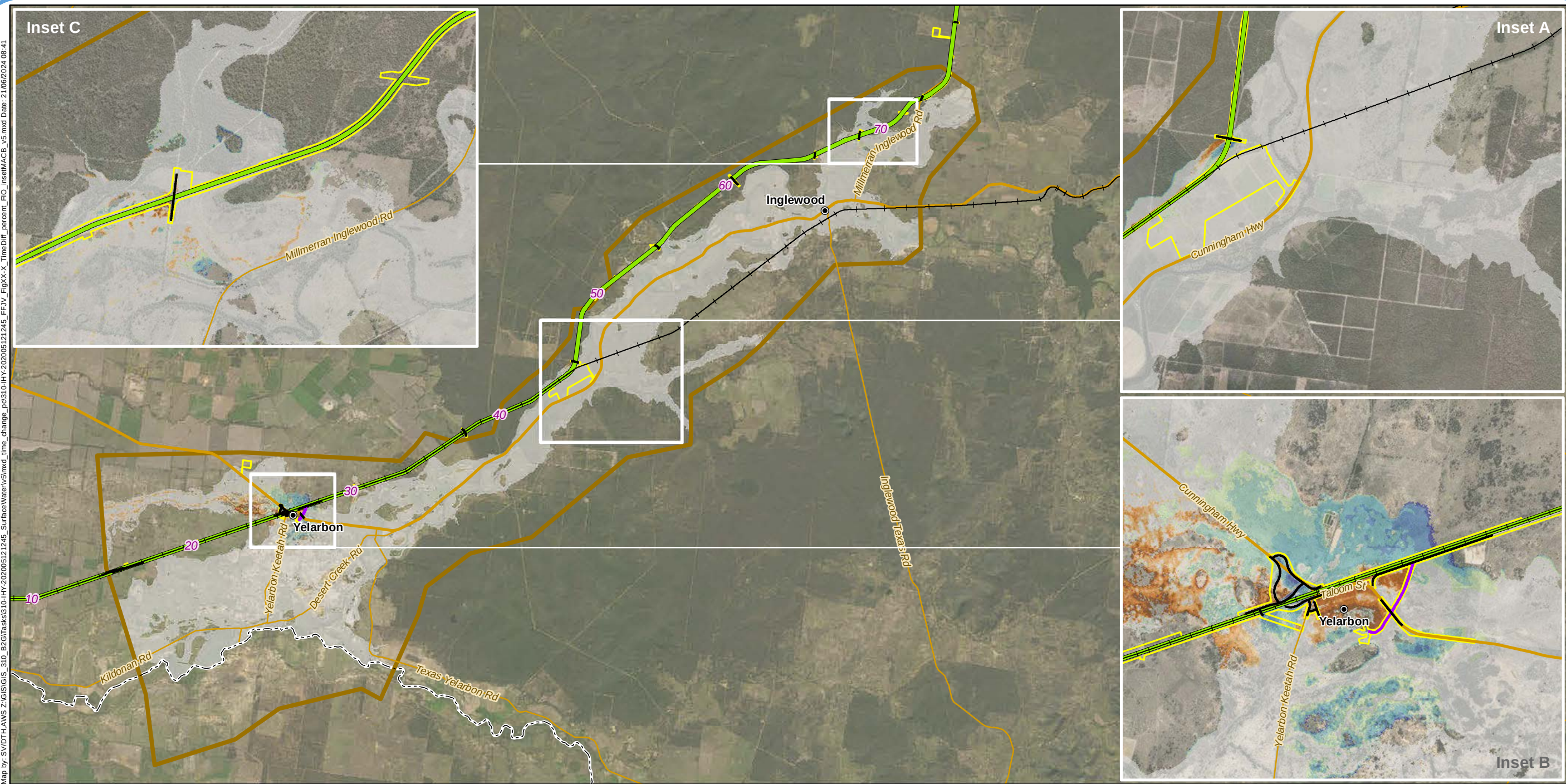


Issue date: 16/04/2025 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J8-C:

20% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Macintyre Brook - Yelarbon to Inglewood



Legend

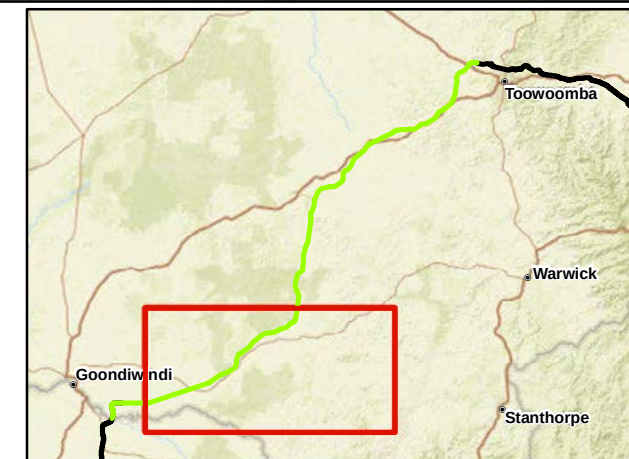
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.

Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km

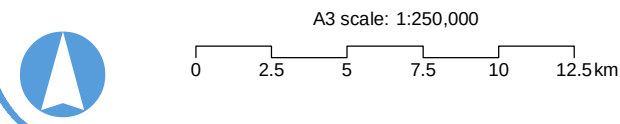
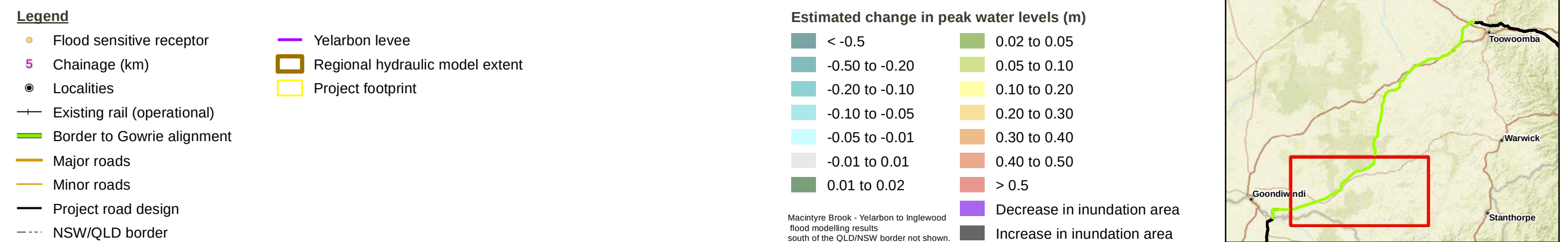
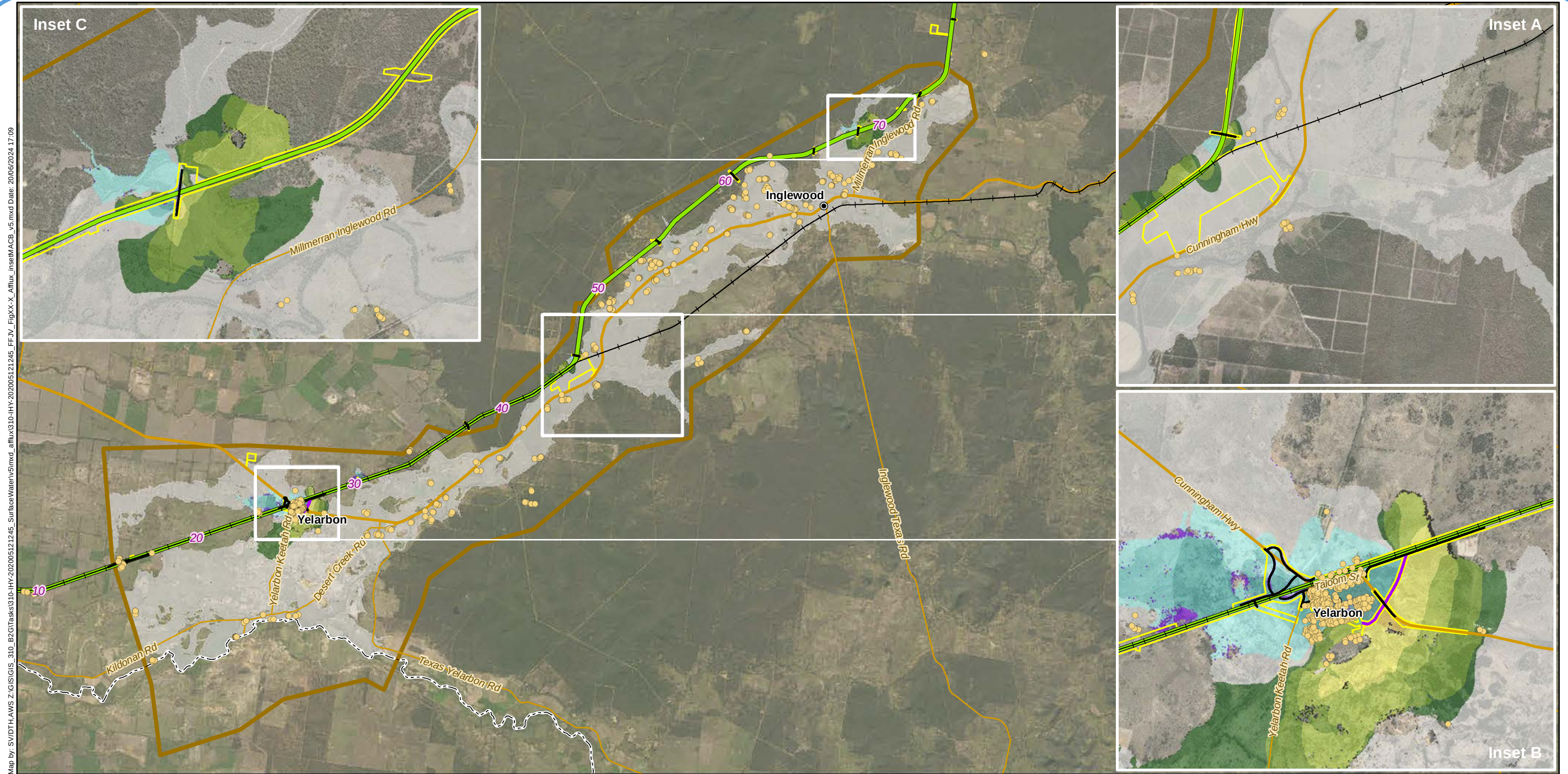


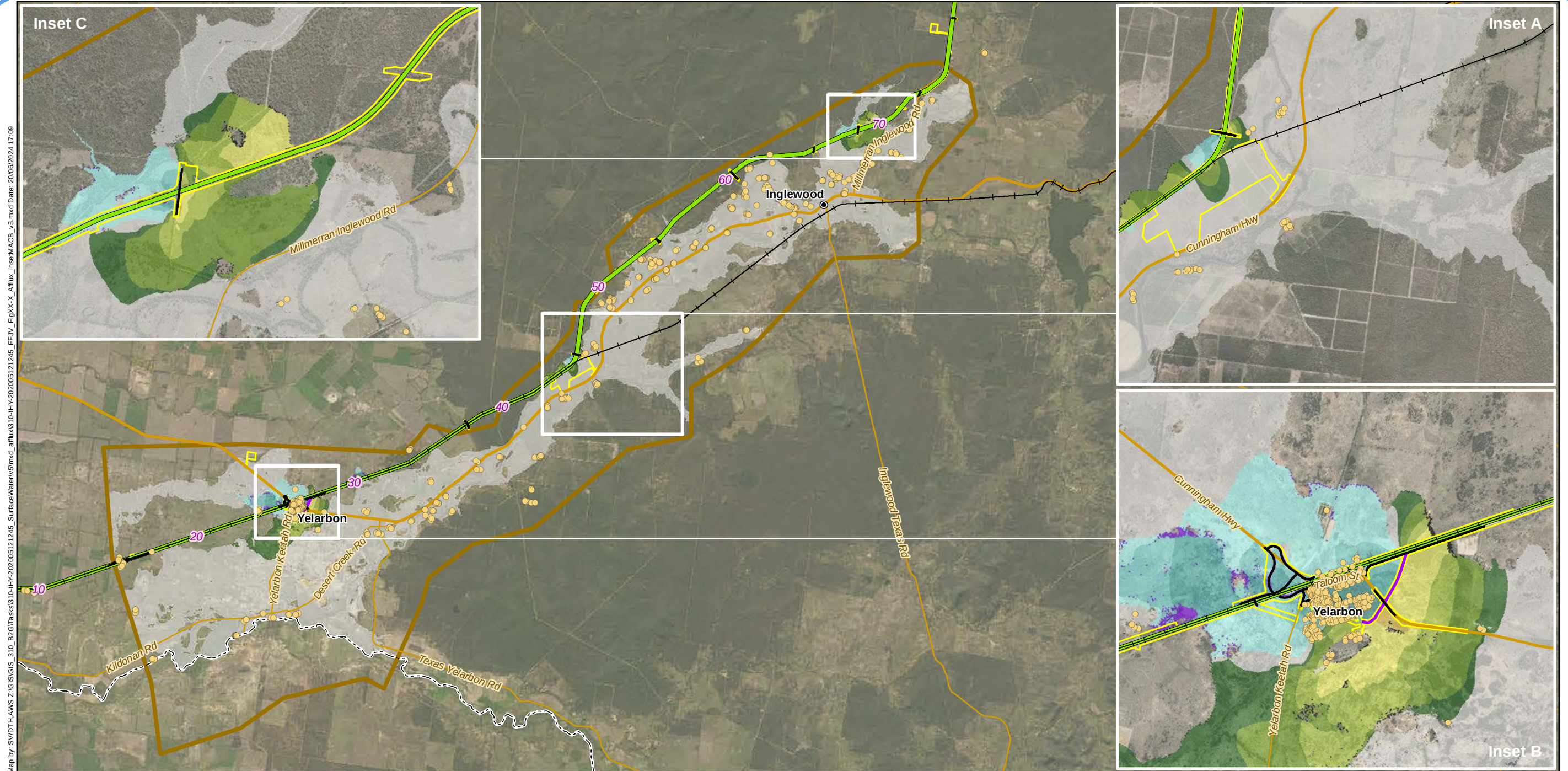
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J8-D:

1% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Macintyre Brook - Yelarbon to Inglewood





Legend

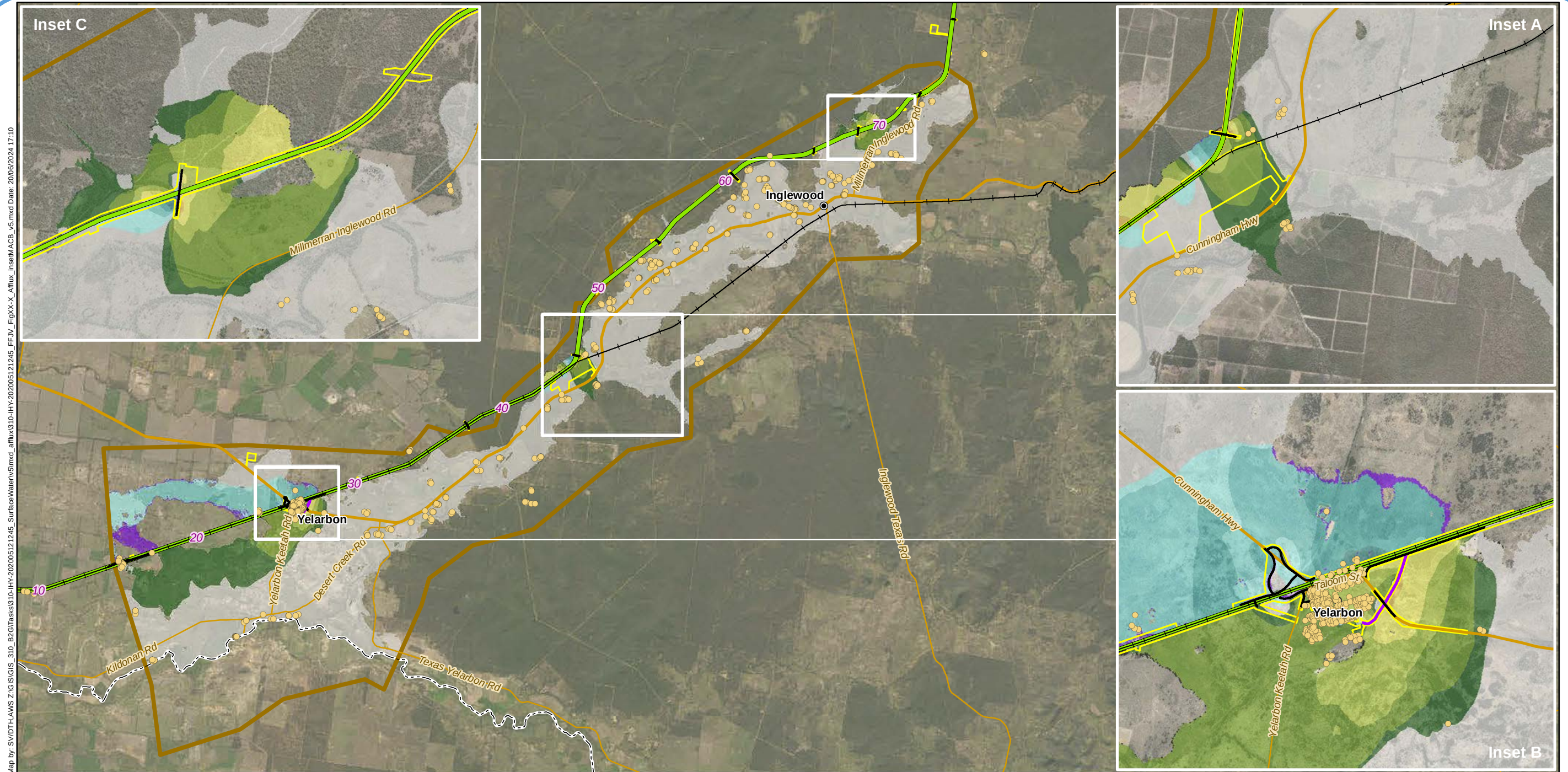
- Flood sensitive receptor
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

■ < -0.5	■ 0.02 to 0.05
■ -0.50 to -0.20	■ 0.05 to 0.10
■ -0.20 to -0.10	■ 0.10 to 0.20
■ -0.10 to -0.05	■ 0.20 to 0.30
■ -0.05 to -0.01	■ 0.30 to 0.40
■ -0.01 to 0.01	■ 0.40 to 0.50
■ 0.01 to 0.02	■ > 0.5
Macintyre Brook - Yelarbon to Inglewood flood modelling results south of the QLD/NSW border not shown.	
■ Decrease in inundation area	■ Increase in inundation area



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



Legend

- Flood sensitive receptor
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |

Macintyre Brook - Yelarbon to Inglewood
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:250,000
0 2.5 5 7.5 10 12.5 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure J9-C:

1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Macintyre Brook - Yelarbon to Inglewood

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix K Macintyre Brook at Bybera Road flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix K

Macintyre Brook at Bybera Road Flood Maps

Figure K1-A Locality Plan
Figure K1-B Survey Data
Figure K1-C Hydrologic Model Setup
Figure K1-D Hydraulic Model Setup
Figure K1-E Landuse Classifications
Figure K1-F Proposed Design Structures

Figure K2-A 20% AEP Event - Peak Water Levels - Existing Case
Figure K2-B 1% AEP Event - Peak Water Levels - Existing Case
Figure K2-C 20% AEP Event - Peak Velocity - Existing Case
Figure K2-D 1% AEP Event - Peak Velocity - Existing Case
Figure K2-E 20% AEP Event - Peak Hazard - Existing Case
Figure K2-F 1% AEP Event - Peak Hazard - Existing Case
Figure K2-G 20% AEP Event - Peak Time of Inundation - Existing Case
Figure K2-H 1% AEP Event - Peak Time of Inundation - Existing Case

Figure K3-A 20% AEP Event - Peak Water Levels - Developed Case
Figure K3-B 1% AEP Event - Peak Water Levels - Developed Case
Figure K3-C 20% AEP Event - Peak Velocity - Developed Case
Figure K3-D 1% AEP Event - Peak Velocity - Developed Case
Figure K3-E 20% AEP Event - Peak Hazard - Developed Case
Figure K3-F 1% AEP Event - Peak Hazard - Developed Case
Figure K3-G 20% AEP Event - Peak Time of Inundation - Developed Case
Figure K3-H 1% AEP Event - Peak Time of Inundation - Developed Case

Figure K4-A 20% AEP Event - Afflux
Figure K4-B 1% AEP Event - Afflux
Figure K4-C 20% AEP Event - Change in Velocity
Figure K4-D 1% AEP Event - Change in Velocity
Figure K4-E 20% AEP Event - Change in Hazard
Figure K4-F 1% AEP Event - Change in Hazard
Figure K4-G 20% AEP Event - Change in Time of Inundation
Figure K4-H 1% AEP Event - Change in Time of Inundation

Figure K5-A 20% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure K5-B 1% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure K5-C 20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure K5-D 1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure K5-E 20% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure K5-F 1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)

Figure K6-A 20% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)
Figure K6-B 1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)

Figure K7-A 20% AEP Event - Percentage Change in Time of Inundation
Figure K7-B 1% AEP Event - Percentage Change in Time of Inundation
Figure K7-C 20% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
Figure K7-D 1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)

Figure K8-A 1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\310-IHY-202005121245_FF\FF_V5.mxd Date: 20/06/2024 17:00



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Watercourses
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

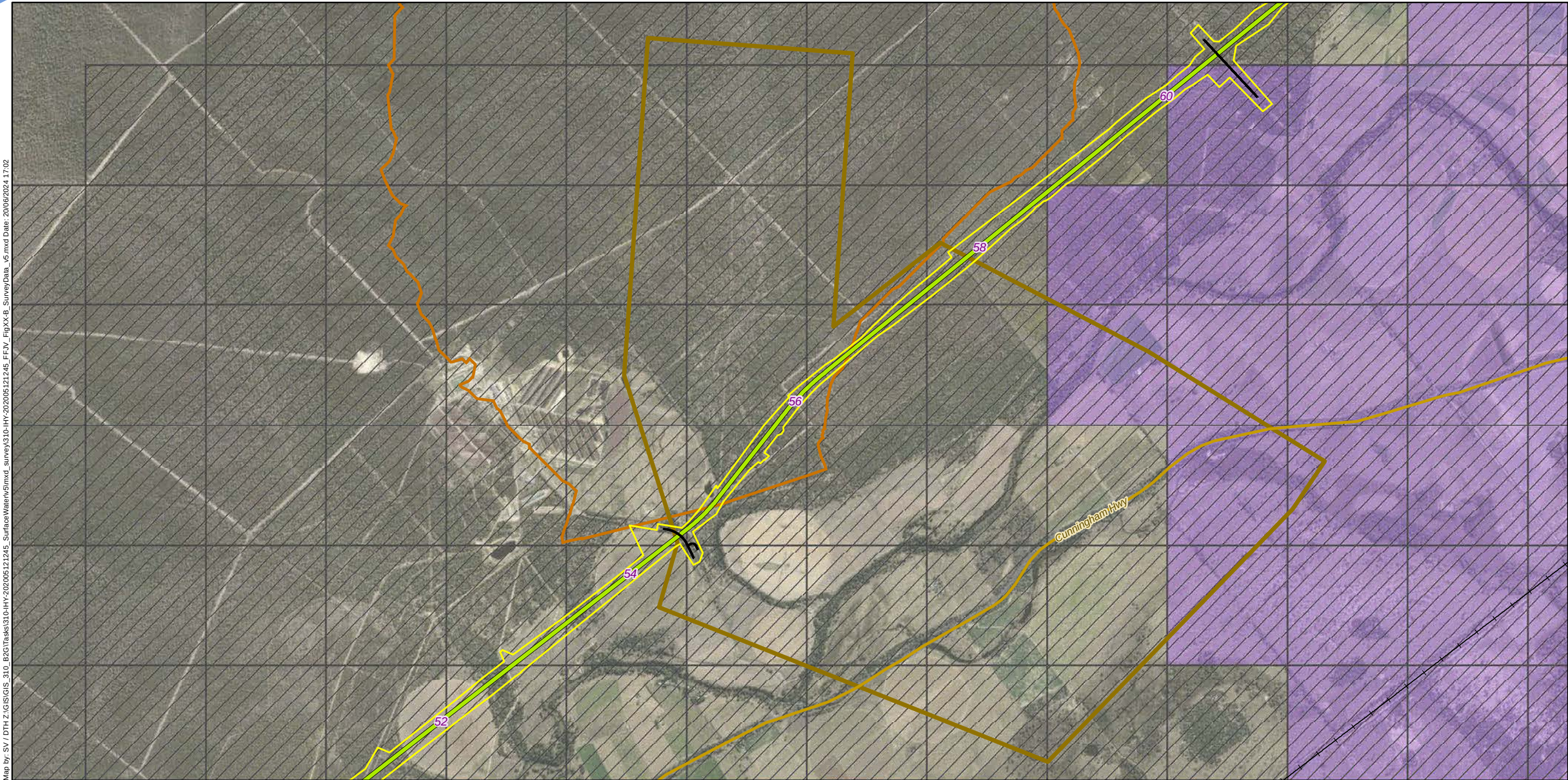


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Border to Gowrie
Figure K1-A:
Locality Plan - Bybera Road

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\310mxd Survey Date: 20/06/2024 17:02



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Project footprint
- Hydrologic model extent
- Regional hydraulic model extent

LiDAR datasets (1m grid)

- Inland Towns Stage 2 2011
- 2015 ARTC LiDAR 1m



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km

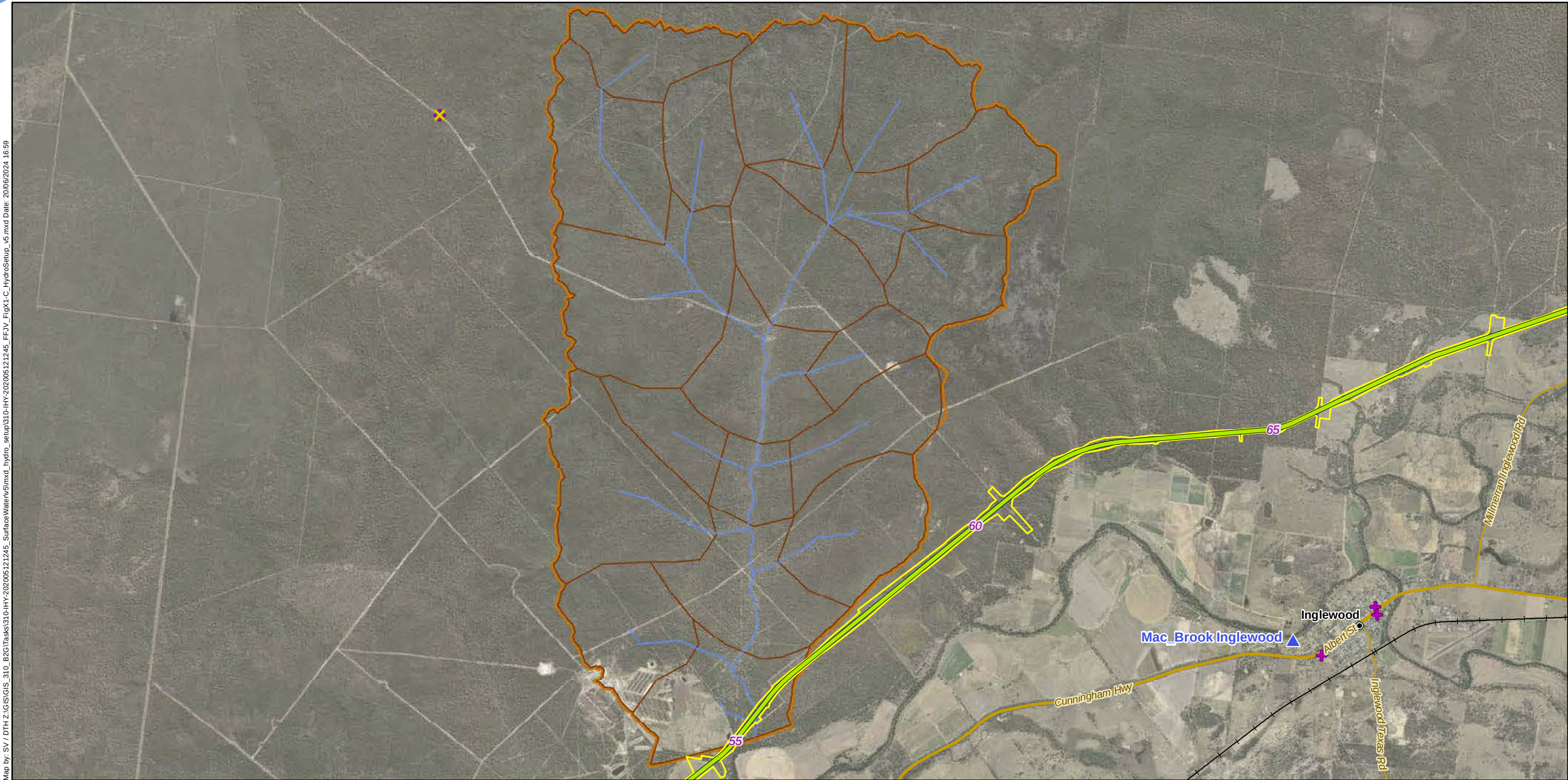


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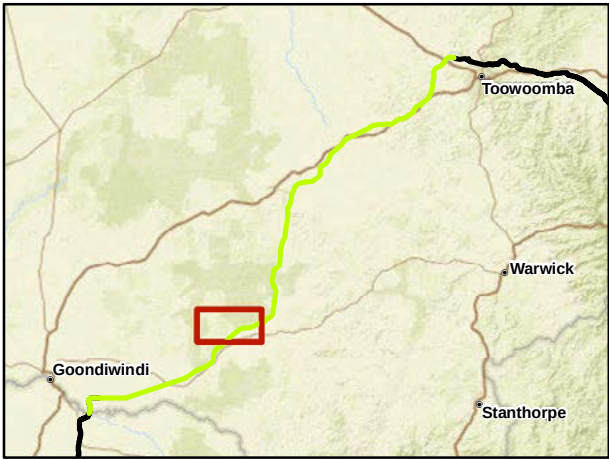
Border to Gowrie
Figure K1-B:
Survey Data - Bybera Road

Map by: SV / DTH 2:GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\mxd_hydro_setup\310-HY-202005121245_FF\JV_FigK1-C_HydroSetup_v5.mxd Date: 20/06/2024 16:59



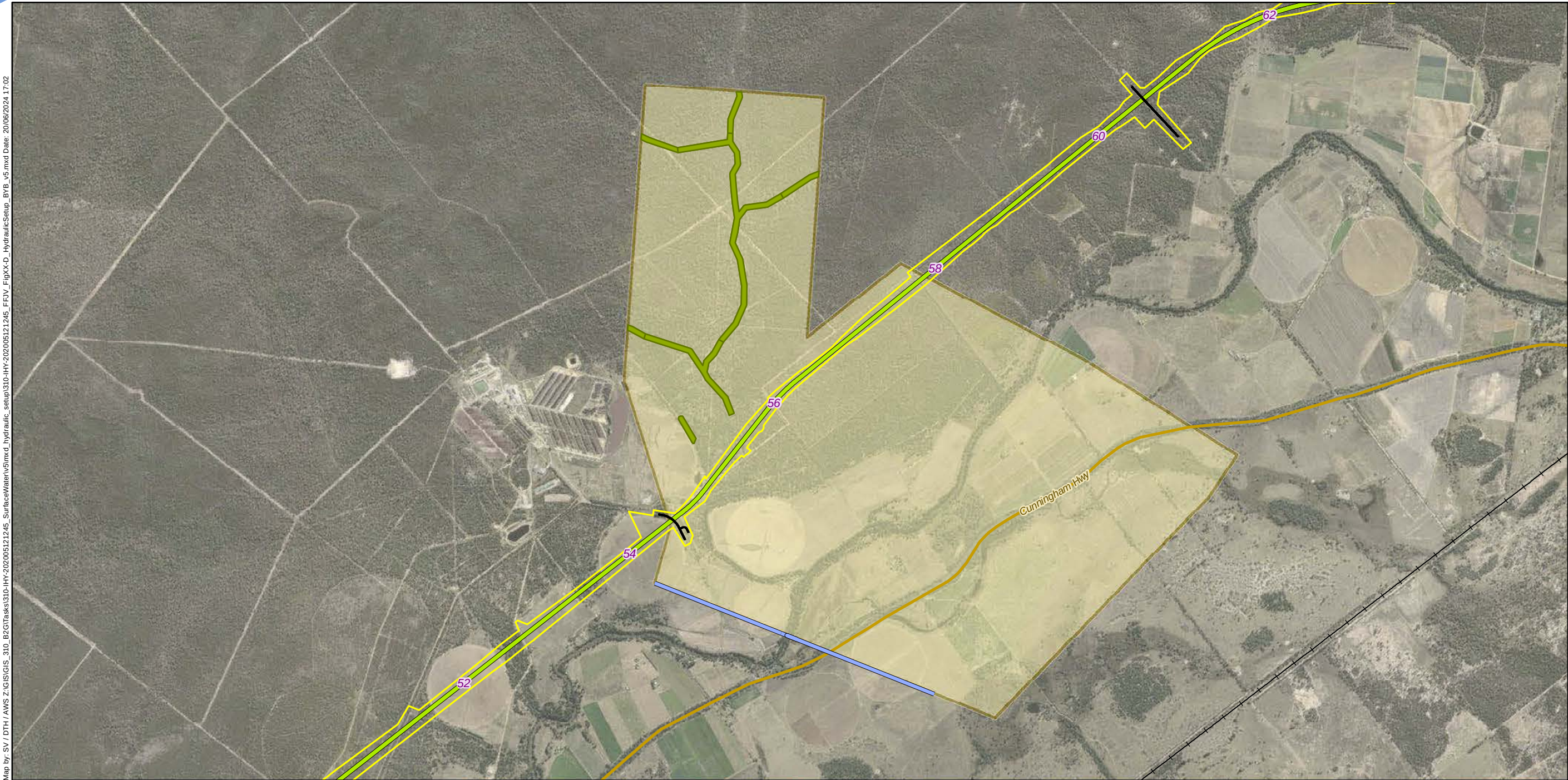
Legend

- | | | | |
|-----------------------------|-------------------|-------------------------|-------------------------|
| 5 Chainage (km) | Major roads | Catchment links | Pluviograph stations |
| Localities | Minor roads | Sub-catchments | Daily rainfall stations |
| Existing rail (operational) | Project footprint | Hydrologic model extent | Stream gauge locations |
| Border to Gowrie alignment | | | |



A3 scale: 1:65,000
0 0.65 1.3 1.95 2.6 3.25 km

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_hydraulic_setup\310-IHY-202005121245_FFIV_FigXX-D_HydraulicSetup_BYB_v5.mxd Date: 20/06/2024 17:02



Legend

- | | | |
|-----------------------------|---------------------|---------------------------------|
| 5 Chainage (km) | Major roads | Regional hydraulic model extent |
| Existing rail (operational) | Project road design | Outflow boundary |
| Border to Gowrie alignment | Project footprint | Inflow boundary |



A3 scale: 1:40,000
0 0.4 0.8 1.2 1.6 2km



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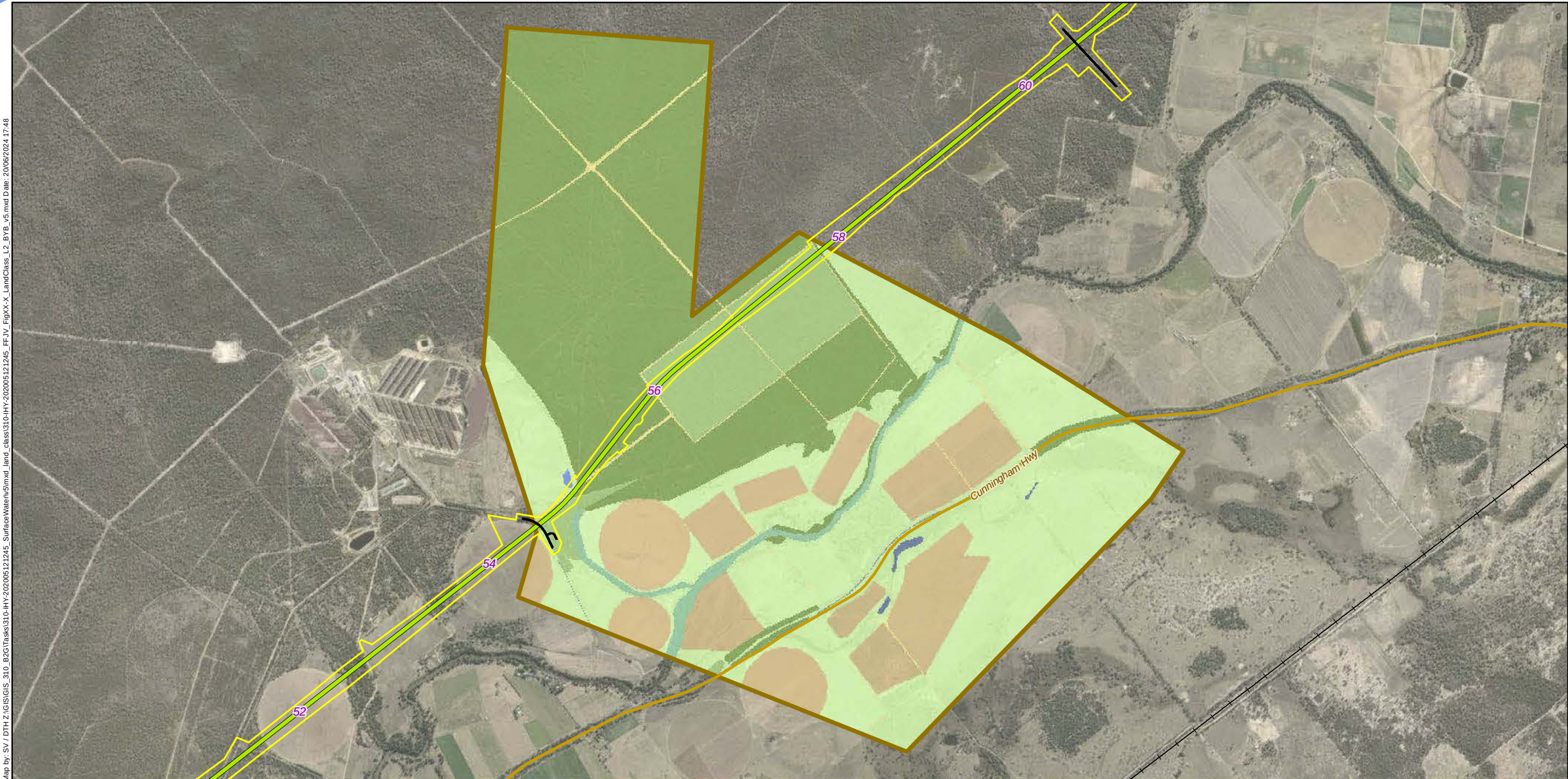
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K1-D:

Hydraulic Model Setup - Bybera Road

Map by: SV / DTH 2:GIS\GIS_310_B2G1Tasks\310-IHY-202005121245_SurfaceWater\310-IHY-202005121245_FFJV_FigXX-X_LandClass_L2_BYB_v5.mxd Date: 20/06/2024 17:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Landuse classification

- River (n = 0.035)
- Sealed Road Corridor (n = 0.015)
- Unsealed Road Corridor (n = 0.025)
- Rural Residential (n = 0.09)
- Urban Residential (n = 0.1)
- Commercial (n = 0.06)
- Open Space - Minimum Veg (n = 0.045)
- Open Space - Moderate Veg (n = 0.055)
- Open Space - Heavy Veg (n = 0.065)
- Open Water (n = 0.025)
- Rail (n = 0.025)
- Riparian (n = 0.04)
- Crop (n = 0.1085)



A3 scale: 1:35,000
0 0.35 0.7 1.05 1.4 1.75 km



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Border to Gowrie

Figure K1-E:

Landuse classifications - Bybera Road

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Structures_v5.mxd Date: 21/06/2024 08:35



Legend

- | | |
|-----------------------------|---------------------------------|
| 5 Chainage (km) | — Project road design |
| Local drainage culvert | — Bridges |
| Existing rail (operational) | Regional hydraulic model extent |
| Border to Gowrie alignment | Project footprint |
| Major roads | |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Border to Gowrie

Figure K1-F:

Proposed Design Structures - Bybera Road



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K2-A:

20% AEP Event - Peak Water Levels - Existing Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_depth\310-IHY-2020\05121245_FF\3V_FigX-X_EX_Depth_v5.mxd Date: 20/06/2024 17:32



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K2-B:

1% AEP Event - Peak Water Levels - Existing Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2GTasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_EX\310-HY-2020\05121245_FFEV_FigXX-X_EX_Velocity_v5.mxd Date: 20/06/2024 17:40



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K2-C:

20% AEP Event - Peak Velocity - Existing Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2GTtasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_EX\310-HY-2020\05121245_FFEV_FigXX-X_EX_Velocity_v5.mxd Date: 20/06/2024 17:39



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K2-D:

1% AEP Event - Peak Velocity - Existing Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\ Hazard_Vad_v5.mxd Date: 20/06/2024 17:35



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K2-E:

20% AEP Event - Peak Hazard - Existing Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\ Hazard_Vrd_v5.mxd Date: 20/06/2024 17:36



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Future Freight
Integrating Community, Environment and Engineering

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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K2-F:

1% AEP Event - Peak Hazard - Existing Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51

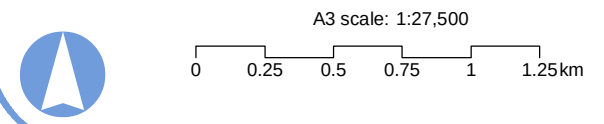


Legend

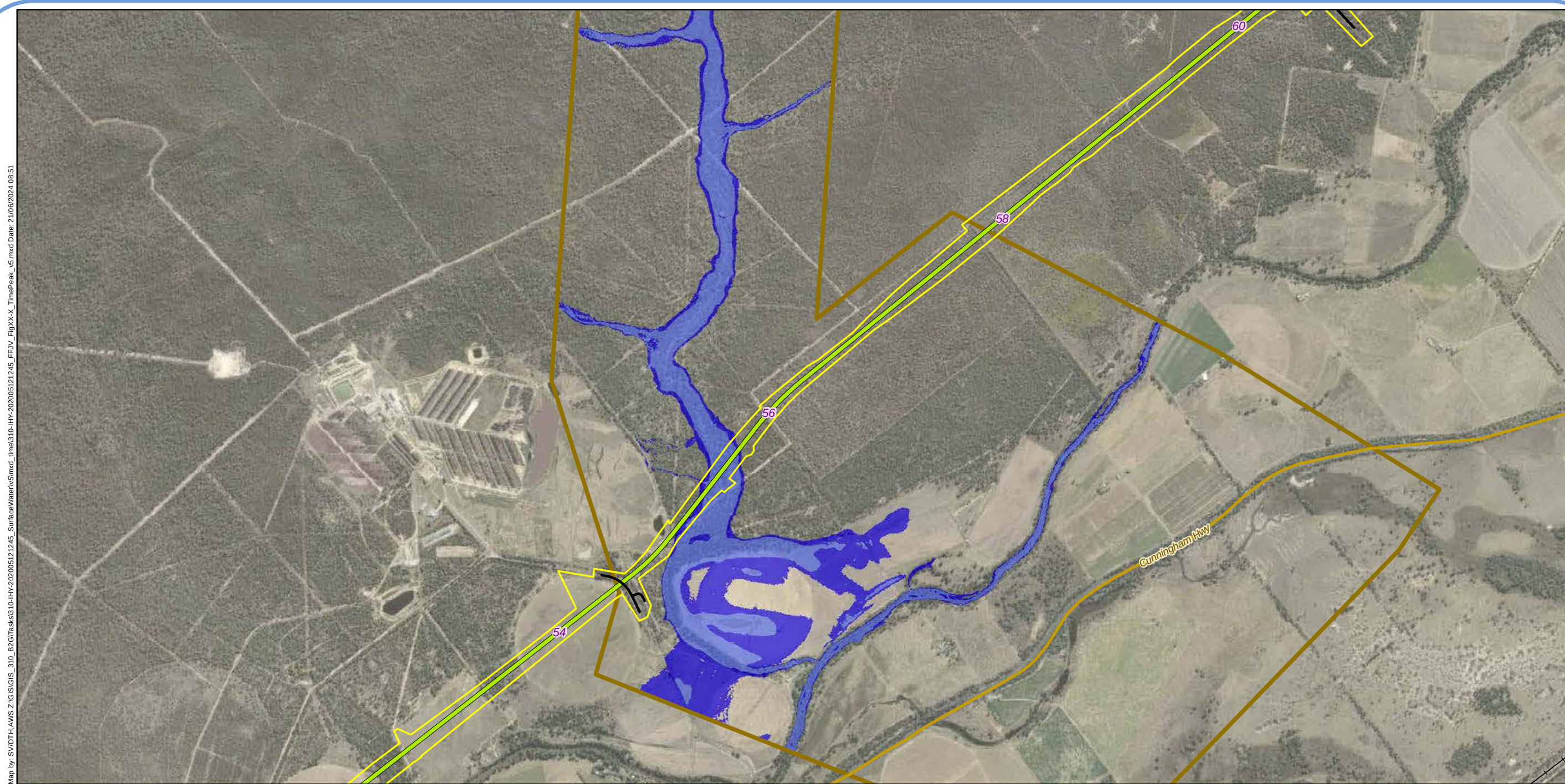
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



Map by: SV\DT\H.AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_Fig\XX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51

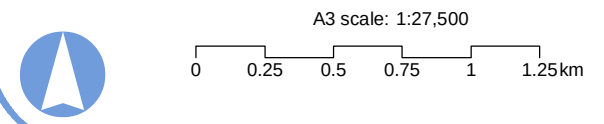


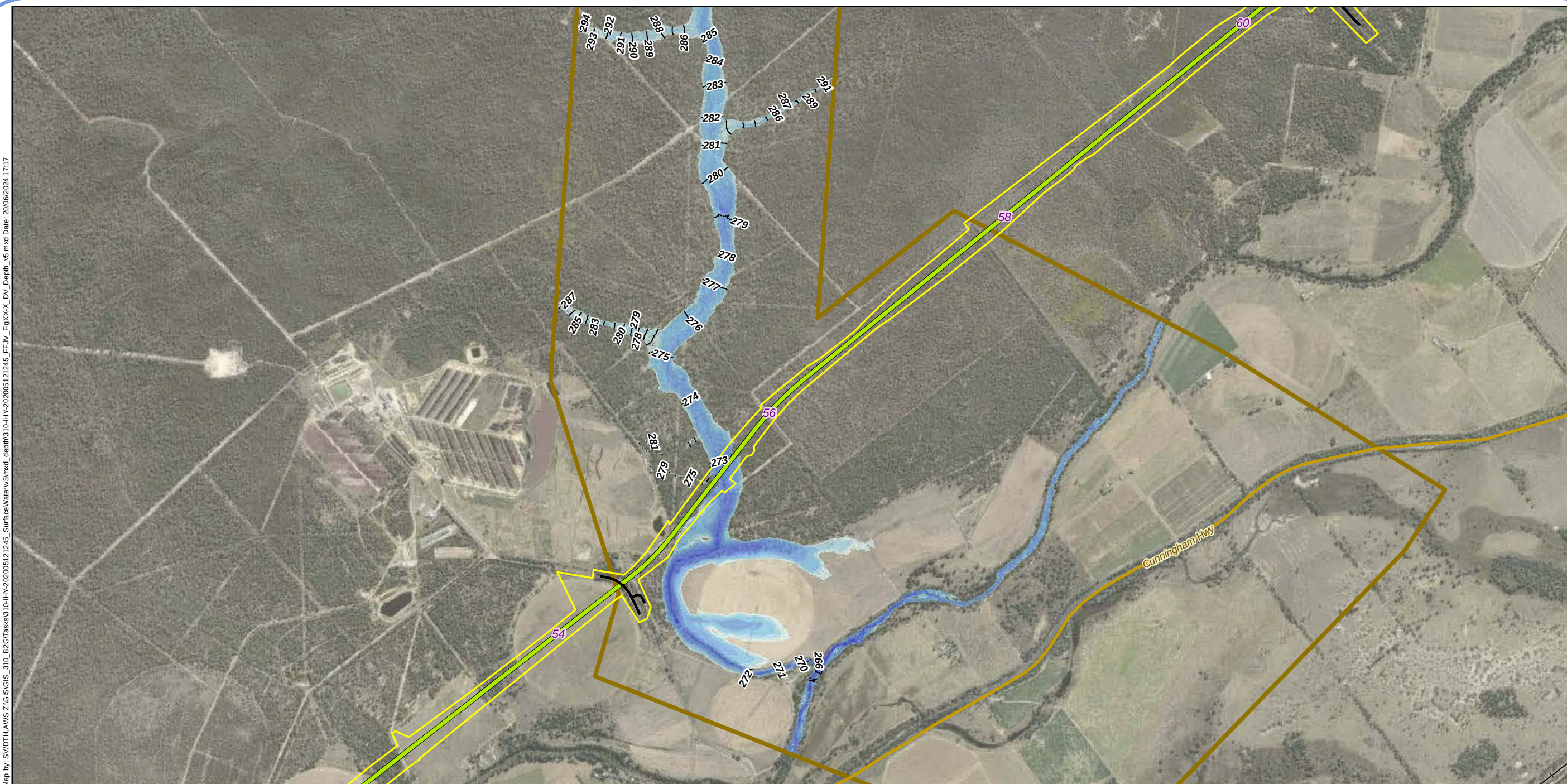
Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

0 - 10	60 - 70
10 - 20	70 - 80
20 - 30	80 - 90
30 - 40	90 - 100
40 - 50	> 100
50 - 60	





5 Chainage (km)

— Existing rail (operational)

— Border to Gowrie alignment

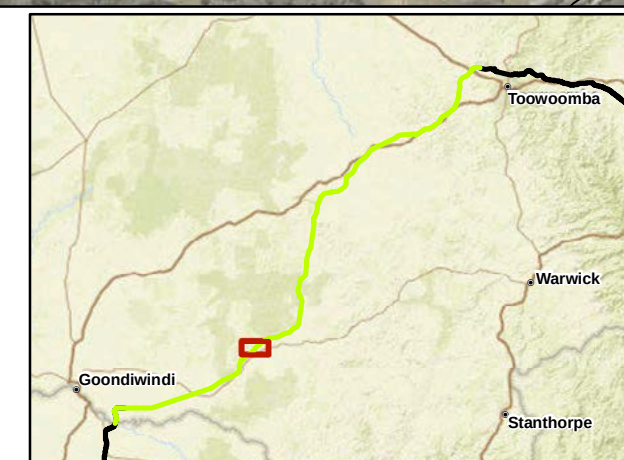
— Major roads

— Project road design

 Regional hydraulic model extent
 Project footprint

0 - 0.25	2.5 - 3.0
0.25 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0

— 1m peak water contour (mAHD)

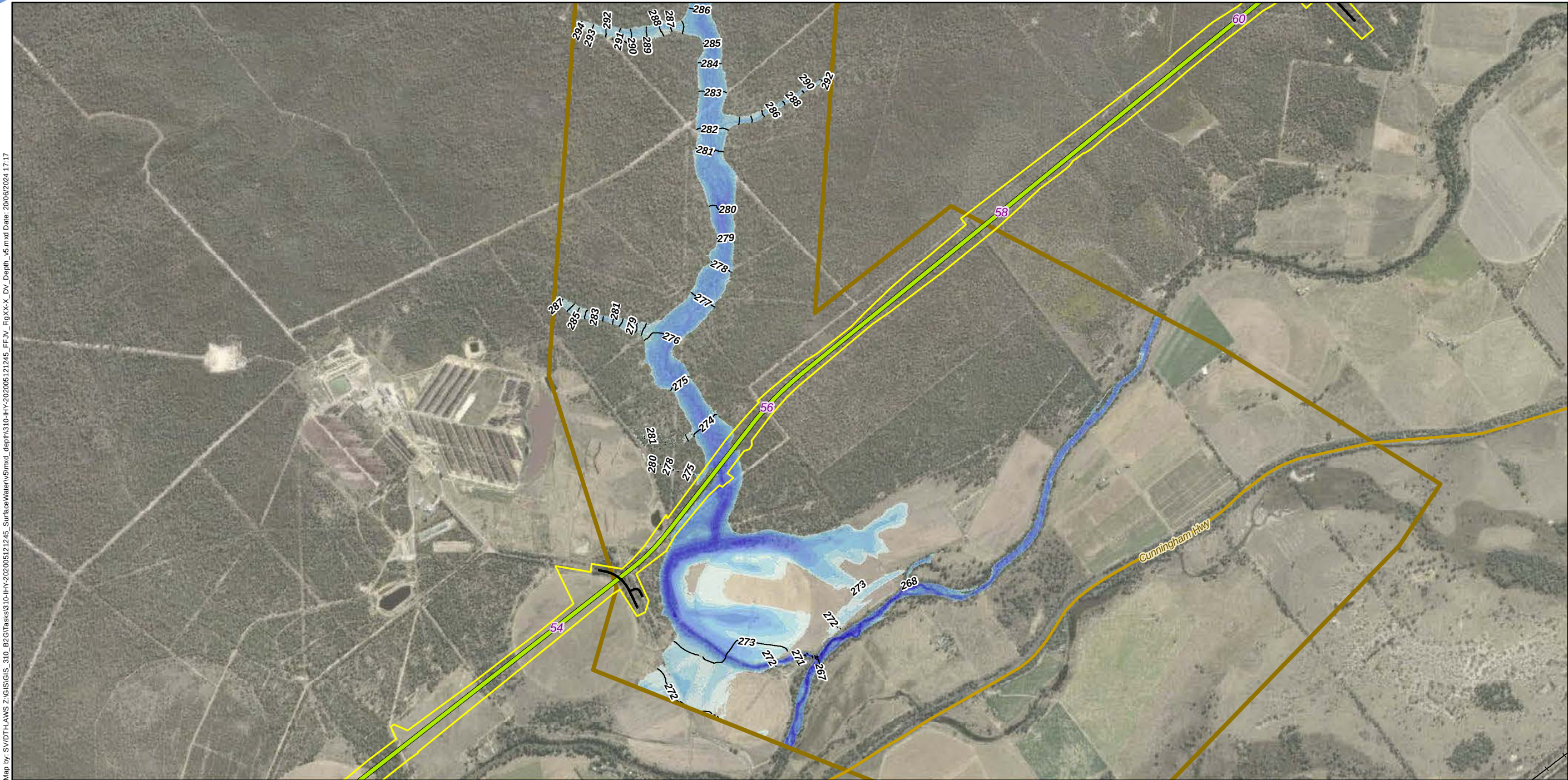


Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Figure K3-A:

20% AEP Event - Peak Water Levels - Developed Case - Bybera Road



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated depth (m)

- | | |
|------------|-----------|
| 0 - 0.25 | 2.5 - 3.0 |
| 0.25 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
- 1m peak water contour (mAHD)



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K3-B:

1% AEP Event - Peak Water Levels - Developed Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\5121245_SurfaceWater\5121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:26



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\5121245_SurfaceWater\5121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:26



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km

Map by: S:\DTH\AWS Z\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_hazard_lyr\310-HY-2020\05121245_FF3V_FigX-X_DV_Hazard_VAD_v5.mxd Date: 20/06/2024 17:21



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K3-E:

20% AEP Event - Peak Hazard - Developed Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_hazard_lyr\310-HY-2020\05121245_FF3V_FigX-X_OV_Hazard_VAD_v5.mxd Date: 20/06/2024 17:21



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- < 0.15
- 0.15 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- > 2.0



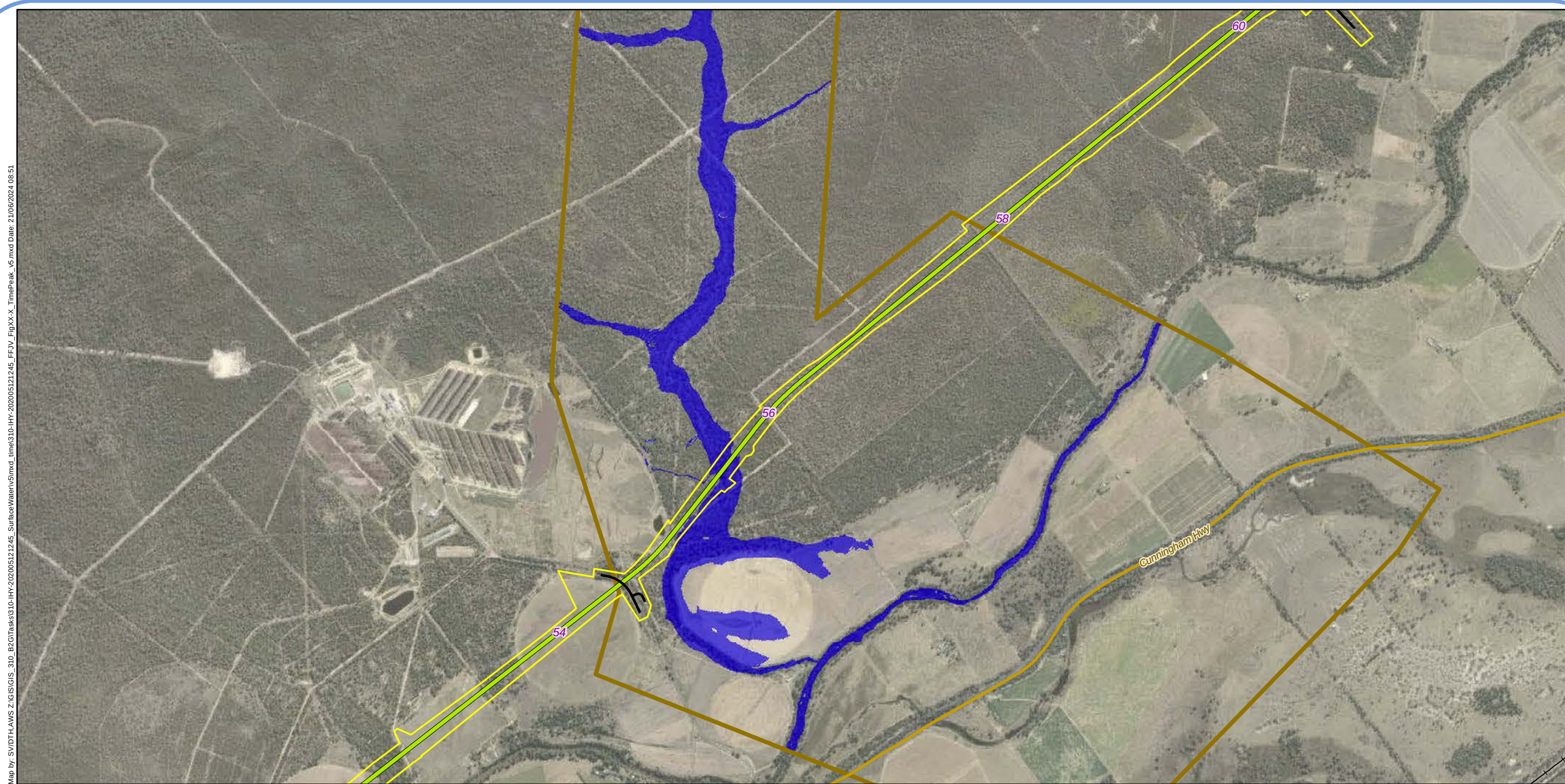
A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure K3-F:
1% AEP Event - Peak Hazard - Developed Case - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:51



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

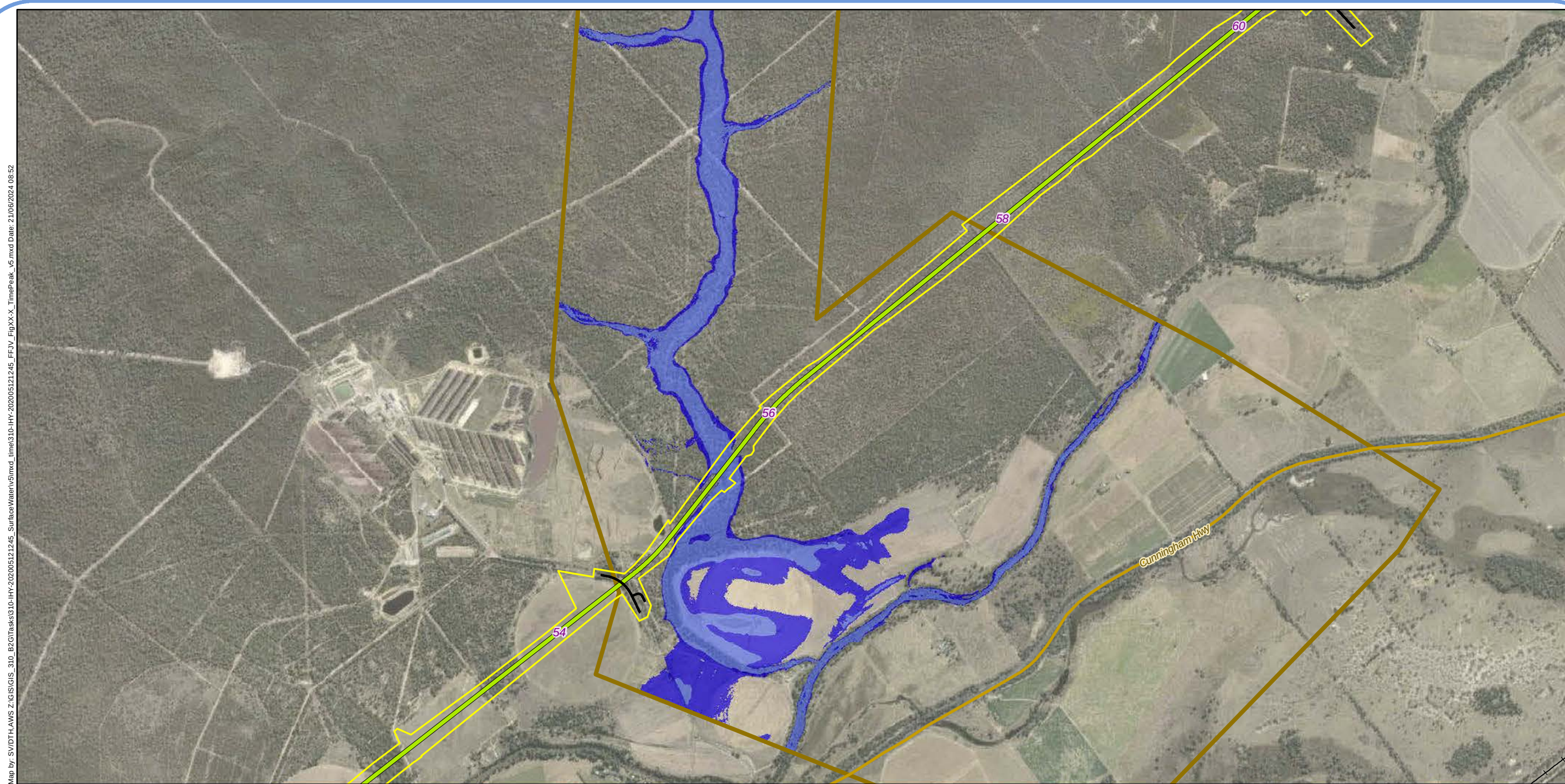
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km

Map by: SV\DT\H.AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mrd_lime\310-IHY-2020\05121245_FF\JV_FigXX-X_TimePeak_v5.mxd Date: 21/06/2024 08:52

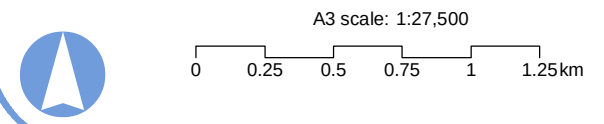


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

0 - 10	60 - 70
10 - 20	70 - 80
20 - 30	80 - 90
30 - 40	90 - 100
40 - 50	> 100
50 - 60	



Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5mrd_afflux\310-IHY-2020\5121245_FF JV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13



Legend

- Flood sensitive receptor
- Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Future Freight
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K4-A:

20% AEP Event - Afflux - Bybera Road

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5mrd_afflux\310-IHY-2020\5121245_FF JV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13

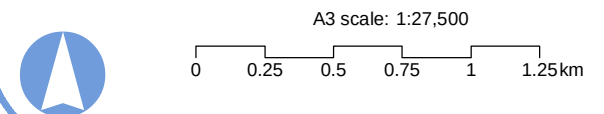


Legend

- Flood sensitive receptor
- Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

< -0.5	0.02 to 0.05
-0.50 to -0.20	0.05 to 0.10
-0.20 to -0.10	0.10 to 0.20
-0.10 to -0.05	0.20 to 0.30
-0.05 to -0.01	0.30 to 0.40
-0.01 to 0.01	0.40 to 0.50
0.01 to 0.02	> 0.5
	Decrease in inundation area
	Increase in inundation area



Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:07



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Future Freight
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Border to Gowrie

Figure K4-C:

20% AEP Event - Change in Velocity - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:07



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_Hazard\Diff_v5.mxd Date: 20/06/2024 17:43



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K4-E:

20% AEP Event - Change in Hazard - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_hazard_lyrd_change\310-IHY-2020\05121245_FF3V_FigXX-X_hazardDiff_v5.mxd Date: 20/06/2024 17:43



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (m^2/s)

- | | |
|----------------|-----------------------------|
| < -0.10 | 0.01 to 0.05 |
| -0.10 to -0.05 | 0.05 to 0.10 |
| -0.05 to -0.01 | > 0.10 |
| -0.01 to 0.01 | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



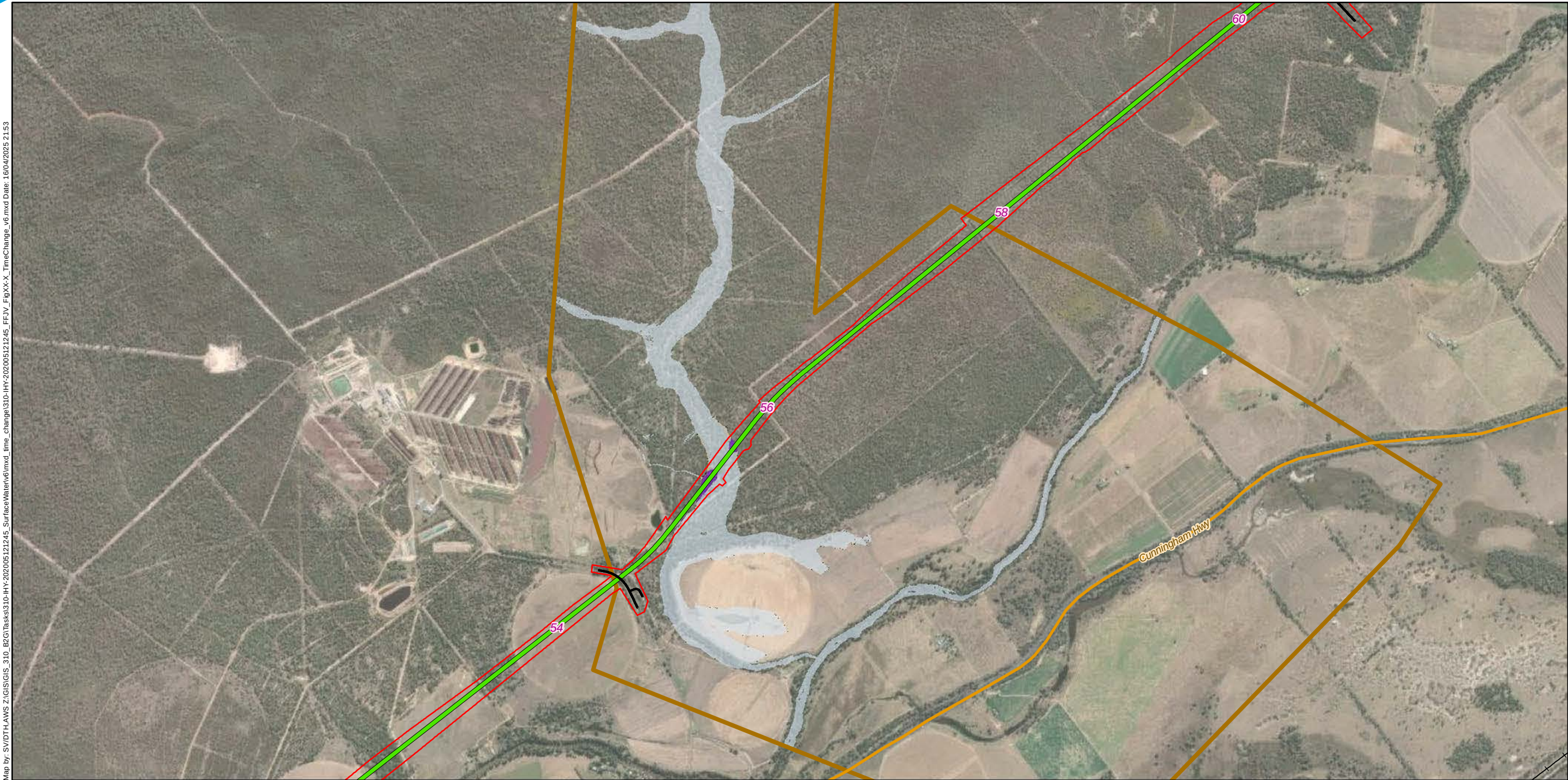
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K4-F:

1% AEP Event - Change in Hazard - Bybera Road

Map by: SV\DT\H\AWS_Z\GIS\GIS_310_B2G\Task\310-HY-2020\05121245_Surface\Water\6mxd_time_change\310-HY-2020\05121245_FF\JV_Fig\XX-X_TimeChange_v6.mxd Date: 16/04/2025 21:53



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Future Freight
Integrating Community, Environment and Engineering

Issue date: 16/04/2025 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K4-G:

20% AEP Event - Change in Time of Inundation - Bybera Road

Map by: SV\DT\H\AWS_Z\GIS\GIS_310_B2G\Task\310-HY-202005121245_Surface\Water\6mrd_time_change\310-HY-202005121245_FF\JV_Fig\XX-X_TimeChange_v6.mxd Date: 16/04/2025 21:55



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Impact assessment area**
- Permanent footprint

Estimated change in time of inundation (hours)

- | | |
|-------------------------|-----------------------------|
| Over 10 hour decrease | Up to 0.5 hour increase |
| Up to 10 hour decrease | Up to 1 hour increase |
| Up to 5 hour decrease | Up to 2 hour increase |
| Up to 2 hour decrease | Up to 5 hour increase |
| Up to 1 hour decrease | Up to 10 hour increase |
| Up to 0.5 hour decrease | Over 10 hour increase |
| Within 15 minutes | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_FIO_v5.mxd Date: 21/06/2024 08:55



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|--------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | |

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mrd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_FIO_v5.mxd Date: 21/06/2024 08:55



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak velocity (m/s)

- | | |
|----------------|--------------|
| < -0.5 | 0.01 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.50 |
| -0.05 to -0.01 | > 0.50 |
| -0.01 to 0.01 | |

A data filter has been applied; results where model input grid's design velocity < 0.5 m/s have been cut off and are not displayed.



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Border to Gowrie

Figure K5-B:

1% AEP Event - Change in Velocity (<0.5m/s cutoff) - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\med_velocity_change_pc310-IHY-2020\05121245_FF\3V_FigXX-X_VelocityDiff_pc_FIO_0501m_5.mxd Date: 21/06/2024 09:02



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.



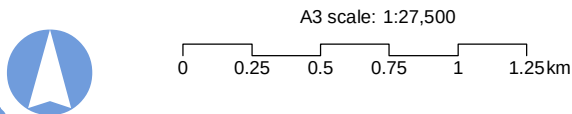
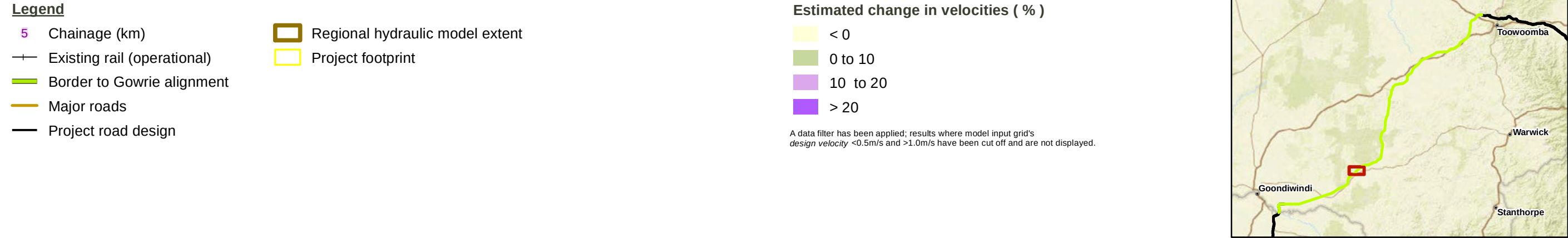
A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure K5-C:
20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Bybera Road



Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mvd_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_v5.mxd Date: 21/06/2024 09:06



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure K5-E:
20% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Bybera Road

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mvd_velocity_change_pc310-IHY-2020\05121245_FF\IV_FigXX-X_VelocityDiff_pc_FIO_1m_v5.mxd Date: 21/06/2024 09:06



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

- < 0
- 0 to 10
- 10 to 20
- > 20

A data filter has been applied; results where model input grid's design velocity <1.0m/s have been cut off and are not displayed.



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure K5-F:
1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Bybera Road



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in velocity x depth product (%)

- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

A data filter has been applied; results where model input design velocity x depth < 0.15 m²/s have been cut off and are not displayed.



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



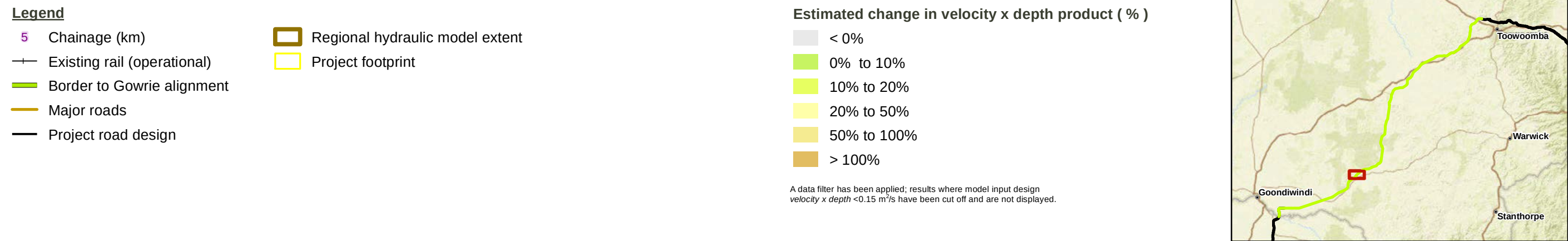
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K6-A:

20% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Bybera Road



A3 scale: 1:27,500

0 0.25 0.5 0.75 1 1.25 km



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Border to Gowrie

Figure K6-B:

1% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5mxd_time_change_pct310-HY-2020\05121245_FF\3V_FigXX-X_TimeDiff_percent_v5.mxd Date: 21/06/2024 08:46



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K7-A:

20% AEP Event - Percentage Change in Time of Inundation - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\med_time_change_pcd310-HY-2020\05121245_FF\X-X_TimeDiff_percent_v5.mxd Date: 21/06/2024 08:47



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

- | | |
|--------------|-----------------------------|
| < -50% | -5% to 5% |
| -50% to -40% | 5% to 10% |
| -40% to -30% | 10% to 20% |
| -30% to -20% | 20% to 50% |
| -20% to -10% | 50% to 100% |
| -10% to -5% | >100% |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



Future Freight
Integrating Community, Environment and Engineering

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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K7-B:

1% AEP Event - Percentage Change in Time of Inundation - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\mxd_time_change_pct310-HY-2020\05121245_FF\FF_V_FigXX-X_TimeDiff_percent_FIO_v5.mxd Date: 21/06/2024 08:42



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure K7-C:

20% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Bybera Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\5m\mxd_time_change_pct310-HY-2020\05121245_FF\FF_V_FigXX-X_TimeDiff_percent_FIO_v5.mxd Date: 21/06/2024 08:43



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in time of inundation (%)

< -50%	-5% to 5%
-50% to -40%	5% to 10%
-40% to -30%	10% to 20%
-30% to -20%	20% to 50%
-20% to -10%	50% to 100%
-10% to -5%	>100%

A data filter has been applied; results where model input grid's design time of inundation <1 hour have been cut off and are not displayed.



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Border to Gowrie
Figure K7-D:
1% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Bybera Road

Map by: S:\DTH\AWS_Z\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF\JV_FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13



Legend

- Flood sensitive receptor
- Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

- | | |
|----------------|-----------------------------|
| < -0.5 | 0.02 to 0.05 |
| -0.50 to -0.20 | 0.05 to 0.10 |
| -0.20 to -0.10 | 0.10 to 0.20 |
| -0.10 to -0.05 | 0.20 to 0.30 |
| -0.05 to -0.01 | 0.30 to 0.40 |
| -0.01 to 0.01 | 0.40 to 0.50 |
| 0.01 to 0.02 | > 0.5 |
| | Decrease in inundation area |
| | Increase in inundation area |



A3 scale: 1:27,500
0 0.25 0.5 0.75 1 1.25 km



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Border to Gowrie

Figure K8-A:

1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Bybera Road