

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Part 3 of 8

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix L Macintyre Brook at Cremascos Road flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix L

Macintyre Brook at Cremascos Road Flood Maps

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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
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint



A3 scale: 1:22,500
0 0.2 0.4 0.6 0.8 1 km



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Border to Gowrie
Figure L1-A:
Locality Plan - Cremascos Road



Legend

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

LiDAR datasets (1m grid)

- 2015 ARTC LiDAR 1m



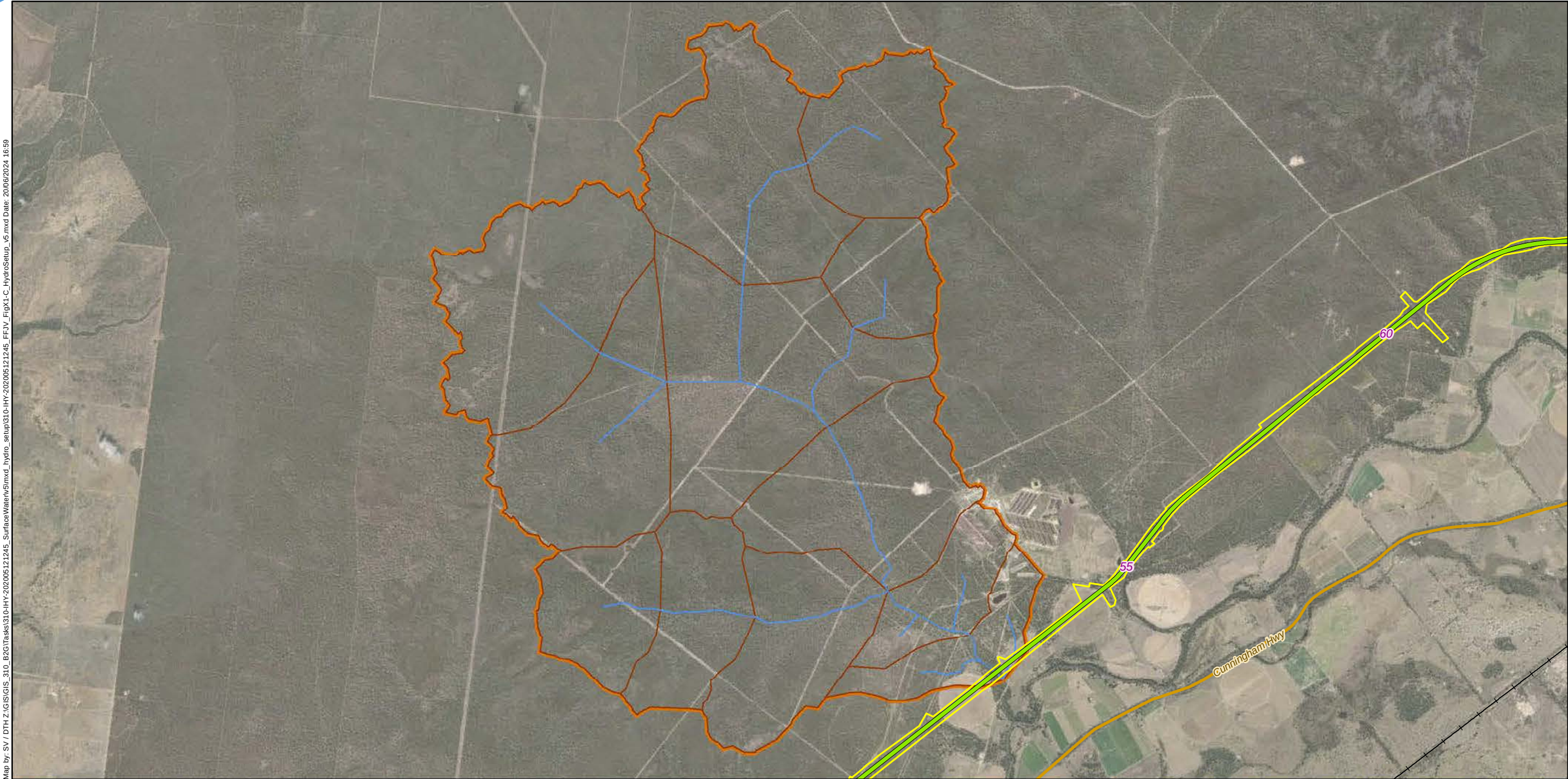
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Border to Gowrie
Figure L1-B:
Survey Data - Cremascos Road

Map by: SV / DTH 2:\GIS\GIS_310_B2G1Tasks\310-HY-202005121245_SurfaceWater\mxd_hydro_setup\310-HY-202005121245_FF\JIV_FigL1-C_HydroSetup_v5.mxd Date: 20/06/2024 16:59



Legend

- | | | |
|-----------------------------|-------------------|-------------------------|
| 5 Chainage (km) | Major roads | Catchment links |
| Localities | Project footprint | Sub-catchments |
| Existing rail (operational) | | Hydrologic model extent |
| Border to Gowrie alignment | | |



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



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Border to Gowrie

Figure L1-C:

Hydrologic Model Setup - Cremascos Road

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5\mxd_hydraulic_setup\310-IHY-202005121245_FFIV_FigXX-D_HydraulicSetup_CRE_V5.mxd Date: 20/06/2024 17:03



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



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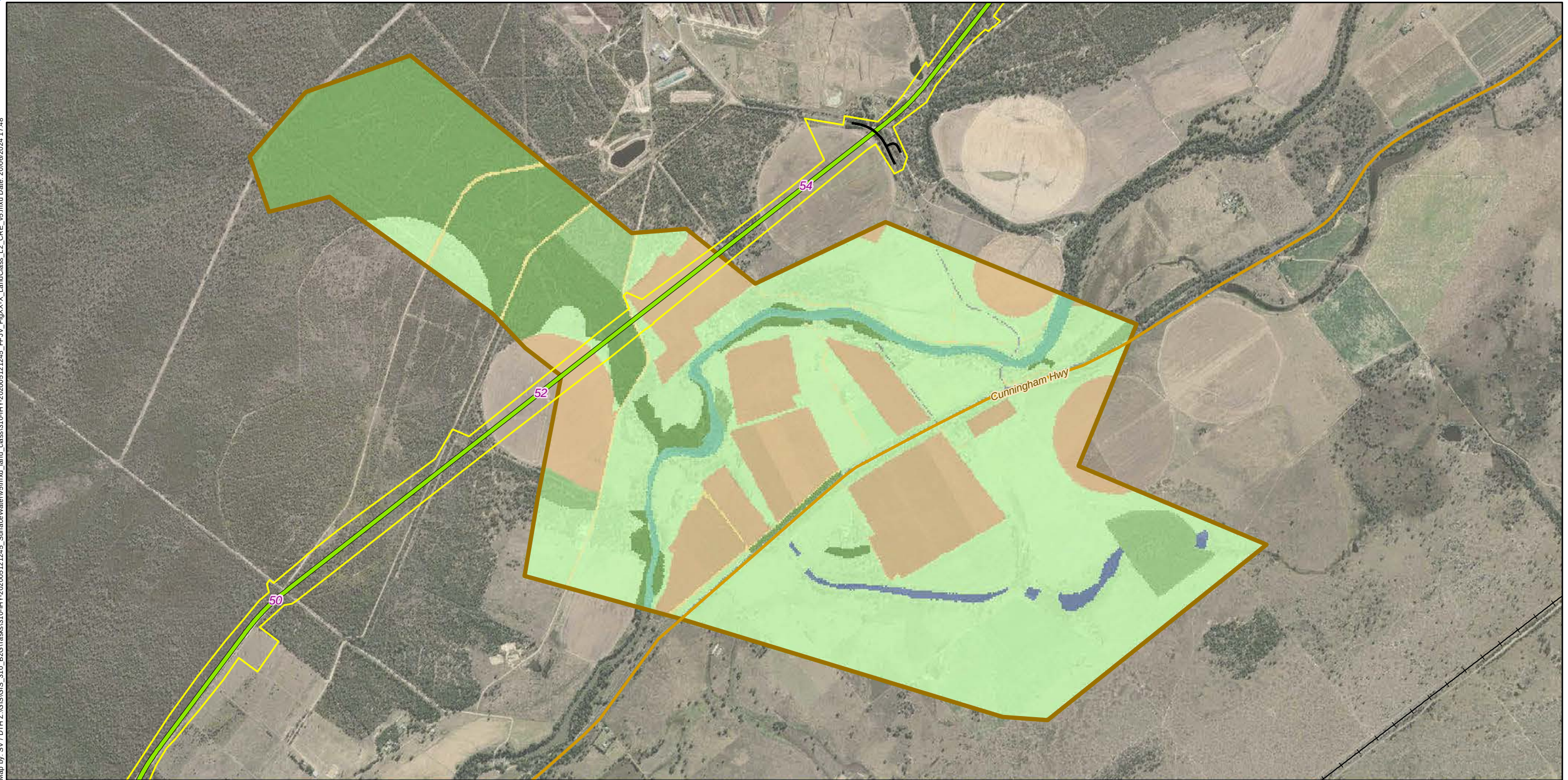
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L1-D:

Hydraulic Model Setup - Cremascos Road

Map by: SV / DTH Z:\GIS\GIS_310_B2G\Tasks\310-HY-202005121245_SurfaceWater\310-HY-202005121245_FF JV_FigXX-X_LandClass_L2_CRE_v6.mxd Date: 20/06/2024 17:48



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major 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: 1:25,000
0 0.25 0.5 0.75 1 1.25 km



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Border to Gowrie

Figure L1-E:

Landuse classifications - Cremascos Road

Map by: SV / DTH / AWS Z:\GIS\GIS_310_B2\GIS\310-IHY-202005121245_SurfaceWater\5mxd_Surfaces\FigX-X_Structures_v5.mxd Date: 21/06/2024 08:35

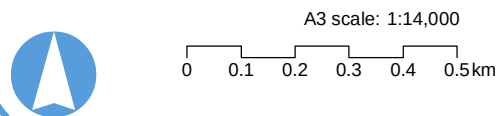
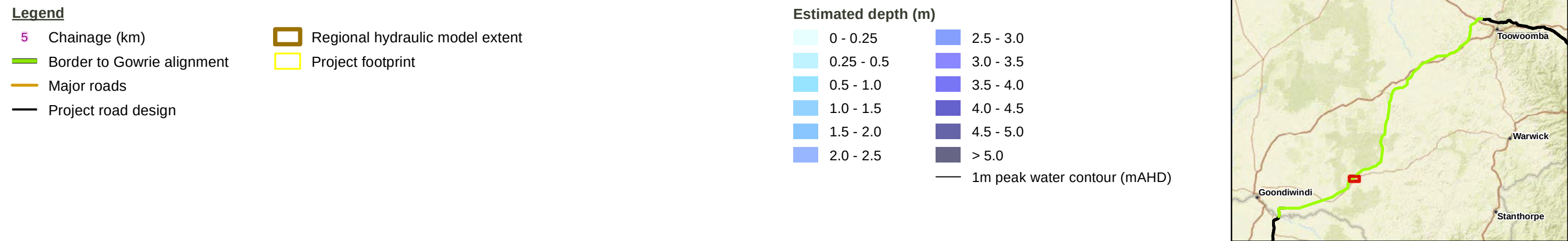
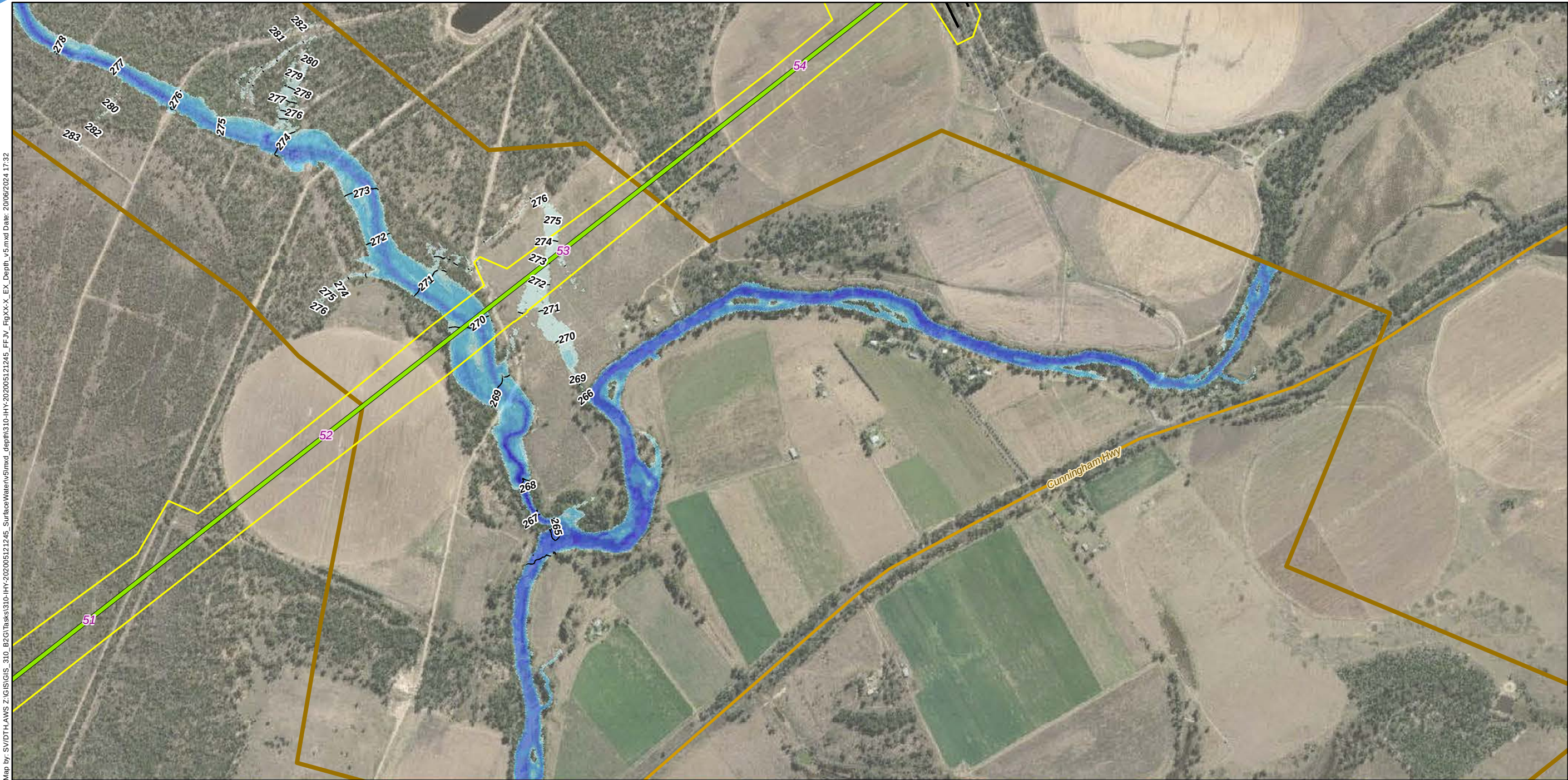


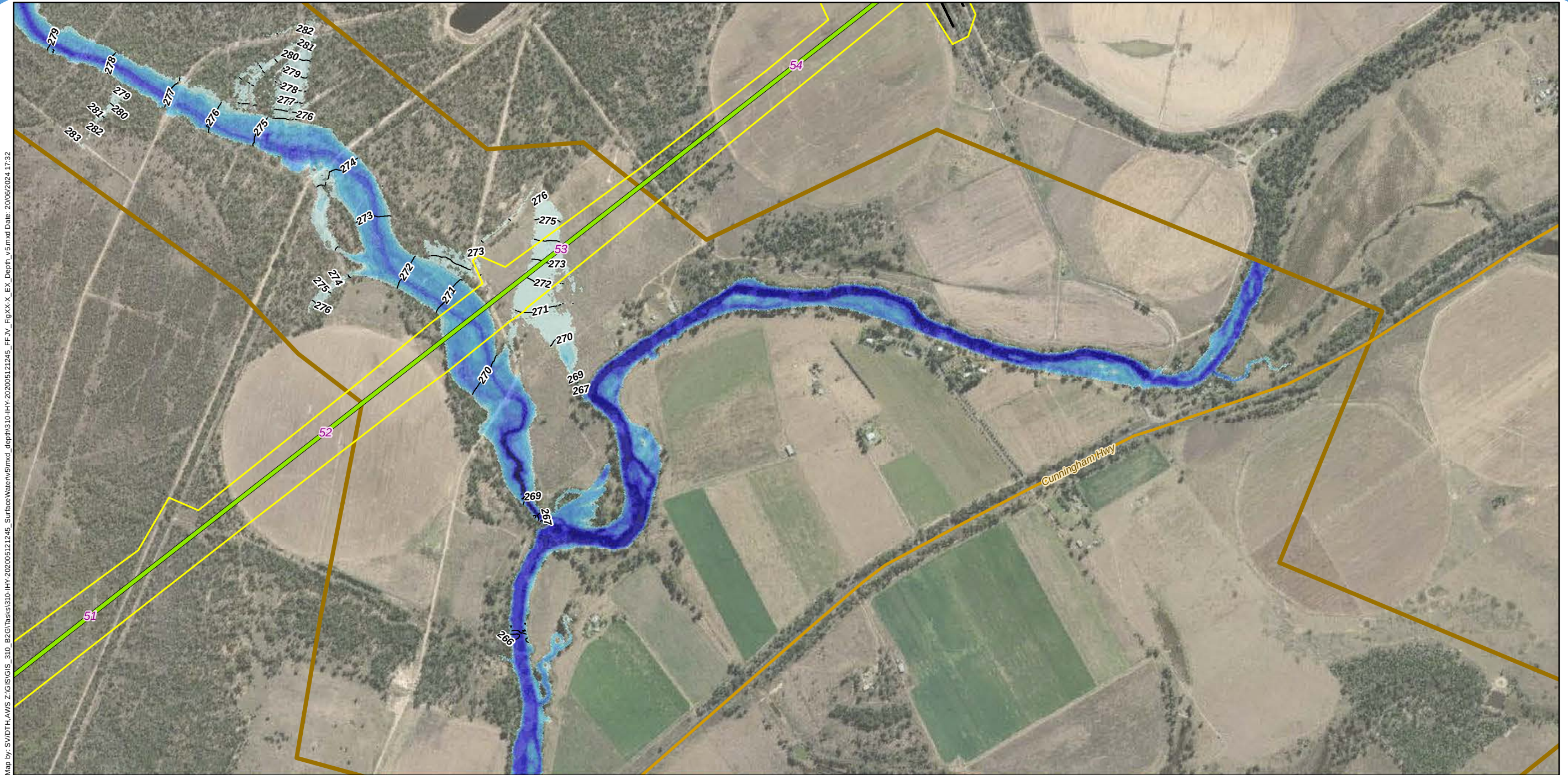
Legend

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



A3 scale: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km





Legend

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

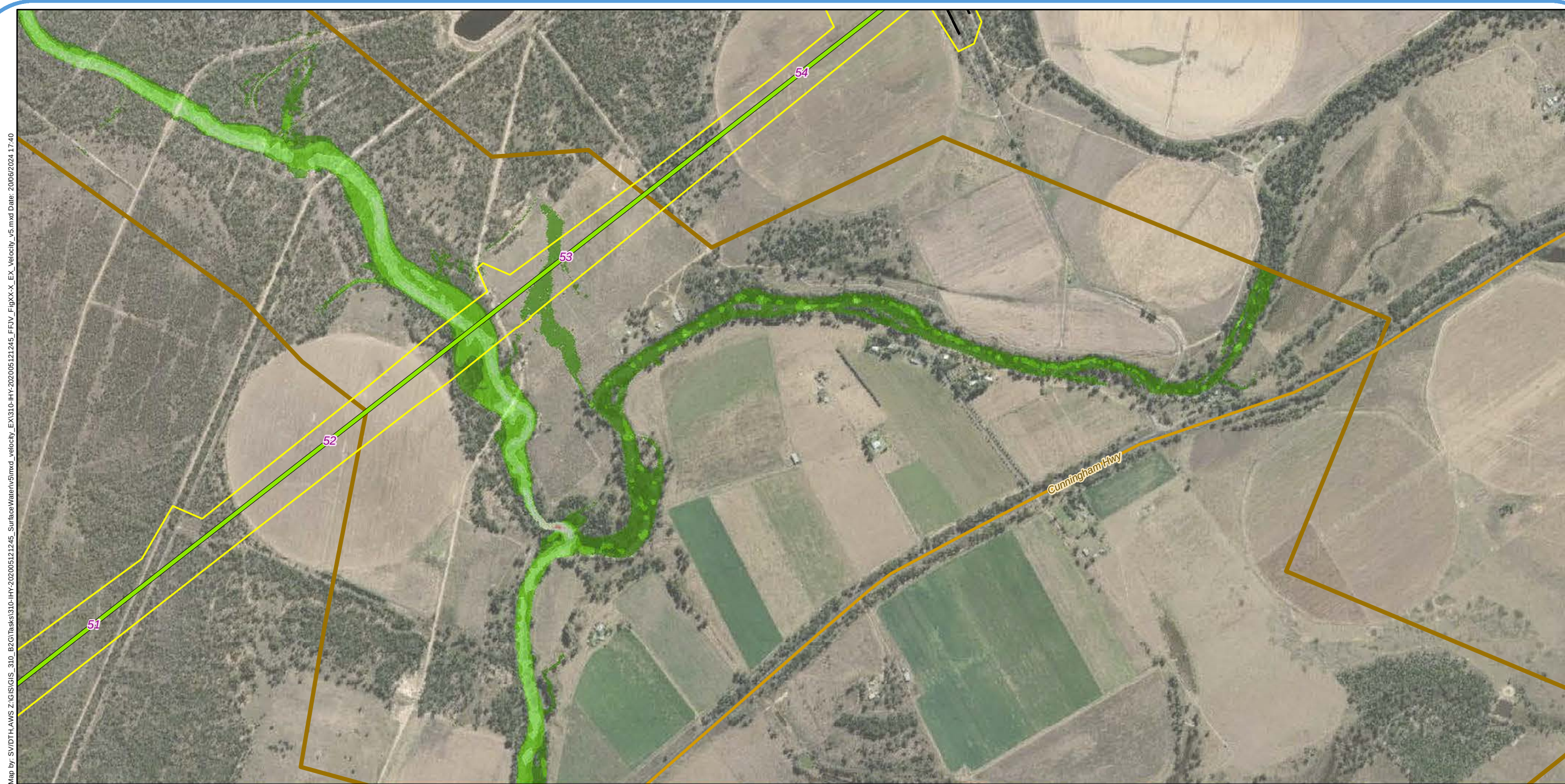
Estimated depth (m)

- | | |
|------------|-----------|
| 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km

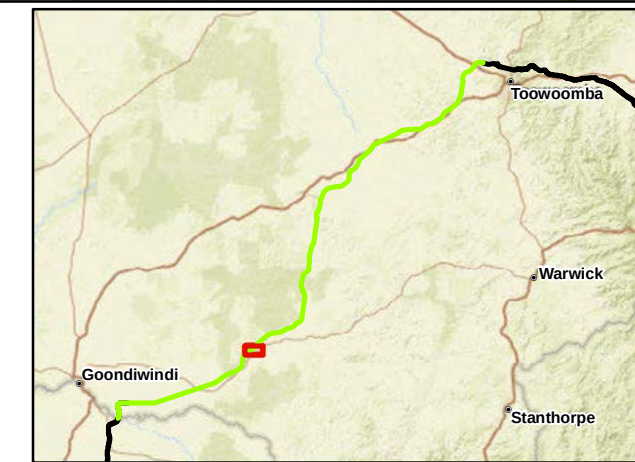
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Legend

- 5 Chainage (km)
- 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	



Border to Gowrie
Figure L2-C:
20% AEP Event - Peak Velocity - Existing Case - Cremascos Road



Legend

- 5 Chainage (km)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



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Border to Gowrie

Figure L2-D:

1% AEP Event - Peak Velocity - Existing Case - Cremascos Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\ Hazard_Lyrd310-IHY-2020\05121245_FF3V_FigXX-X_EX_Hazard_VaD_v5.mxd Date: 20/06/2024 17:36



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major 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: 1:14,000
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 L2-E:

20% AEP Event - Peak Hazard - Existing Case - Cremascos Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_Hazard_Vxd310-IHY-2020\05121245_FF3V_FigXX-X_EX_Hazard_Vxd_20\06\2024 17.36



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km

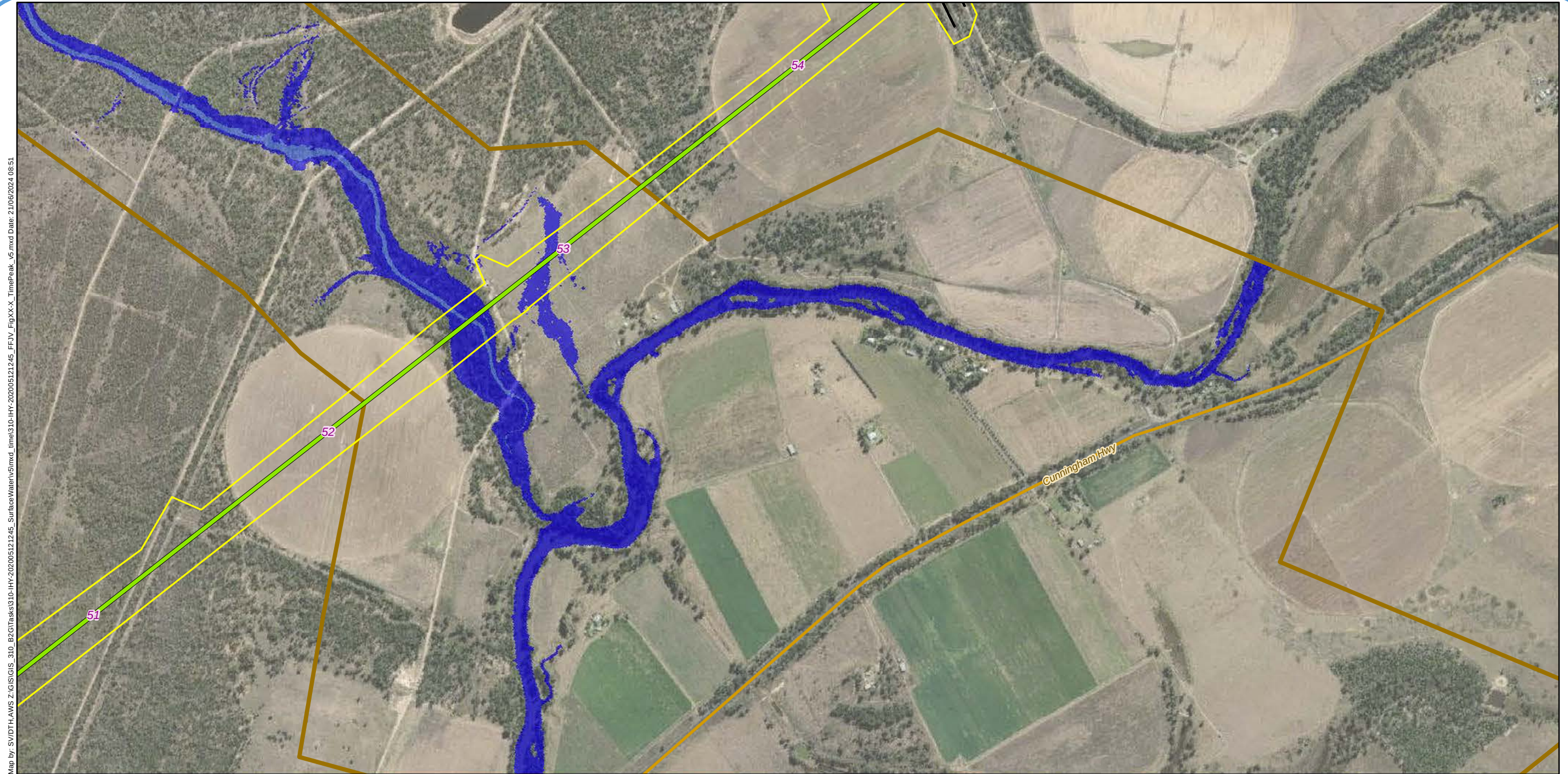


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L2-F:

1% AEP Event - Peak Hazard - Existing Case - Cremascos Road



Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd _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
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km

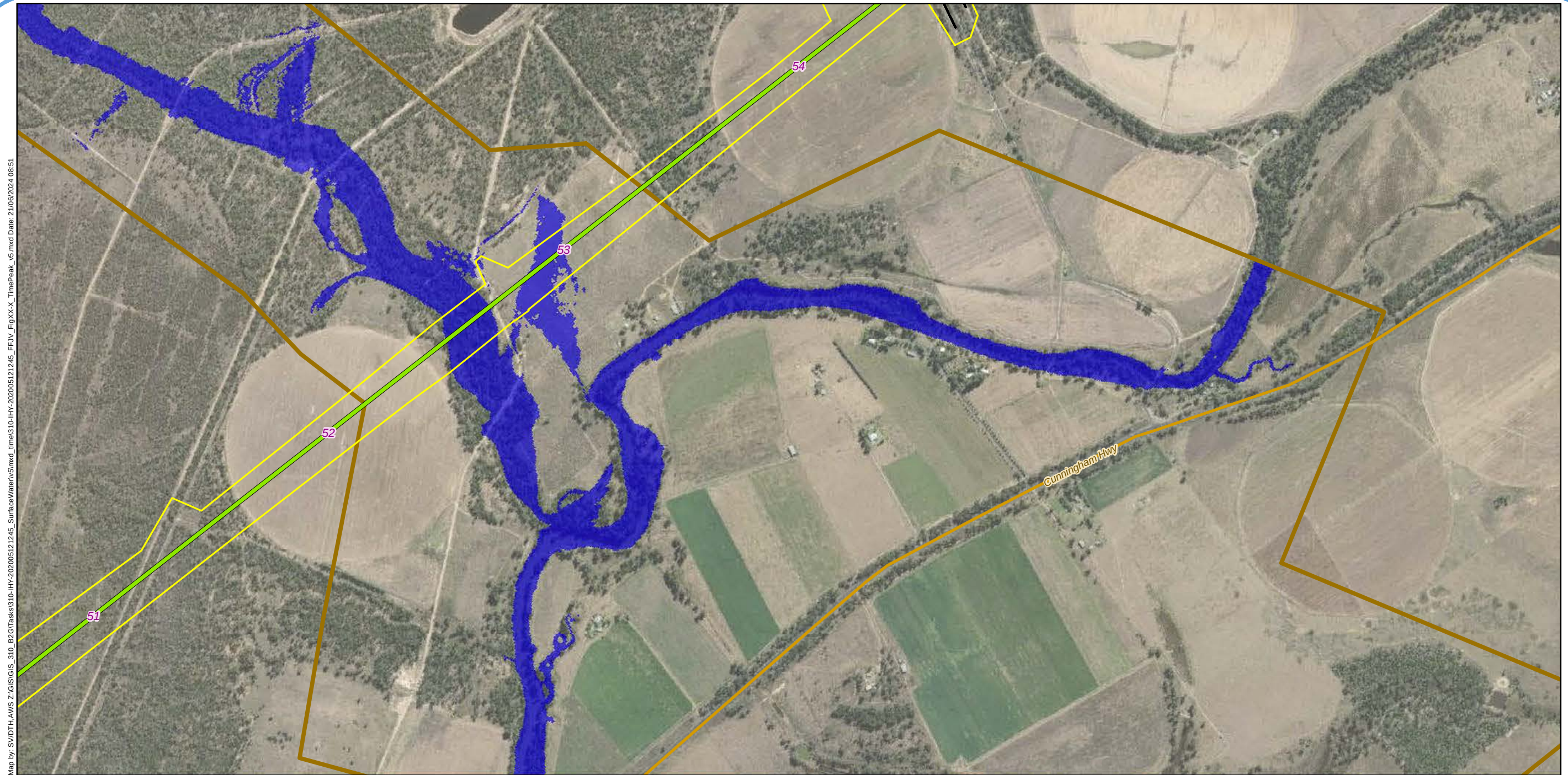


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L2-G:

20% AEP Event - Peak Time of Inundation - Existing Case - Cremascos Road



Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd _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
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km

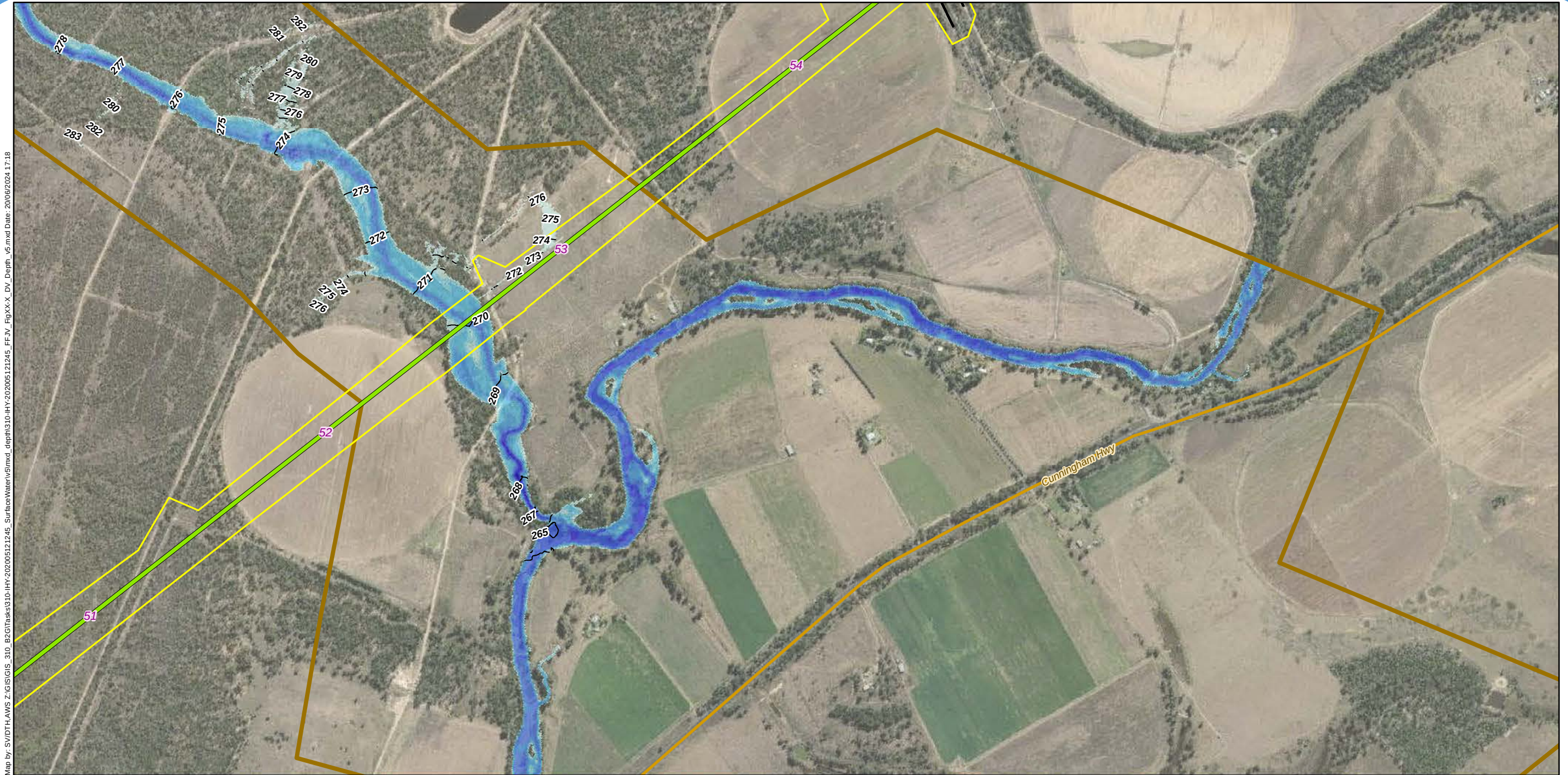


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L2-H:

1% AEP Event - Peak Time of Inundation - Existing Case - Cremascos Road

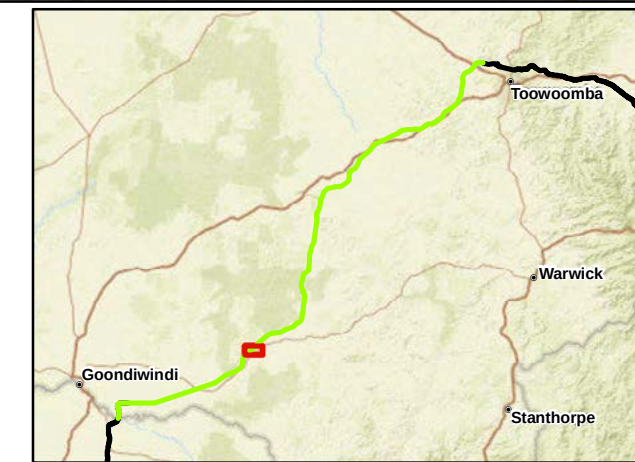


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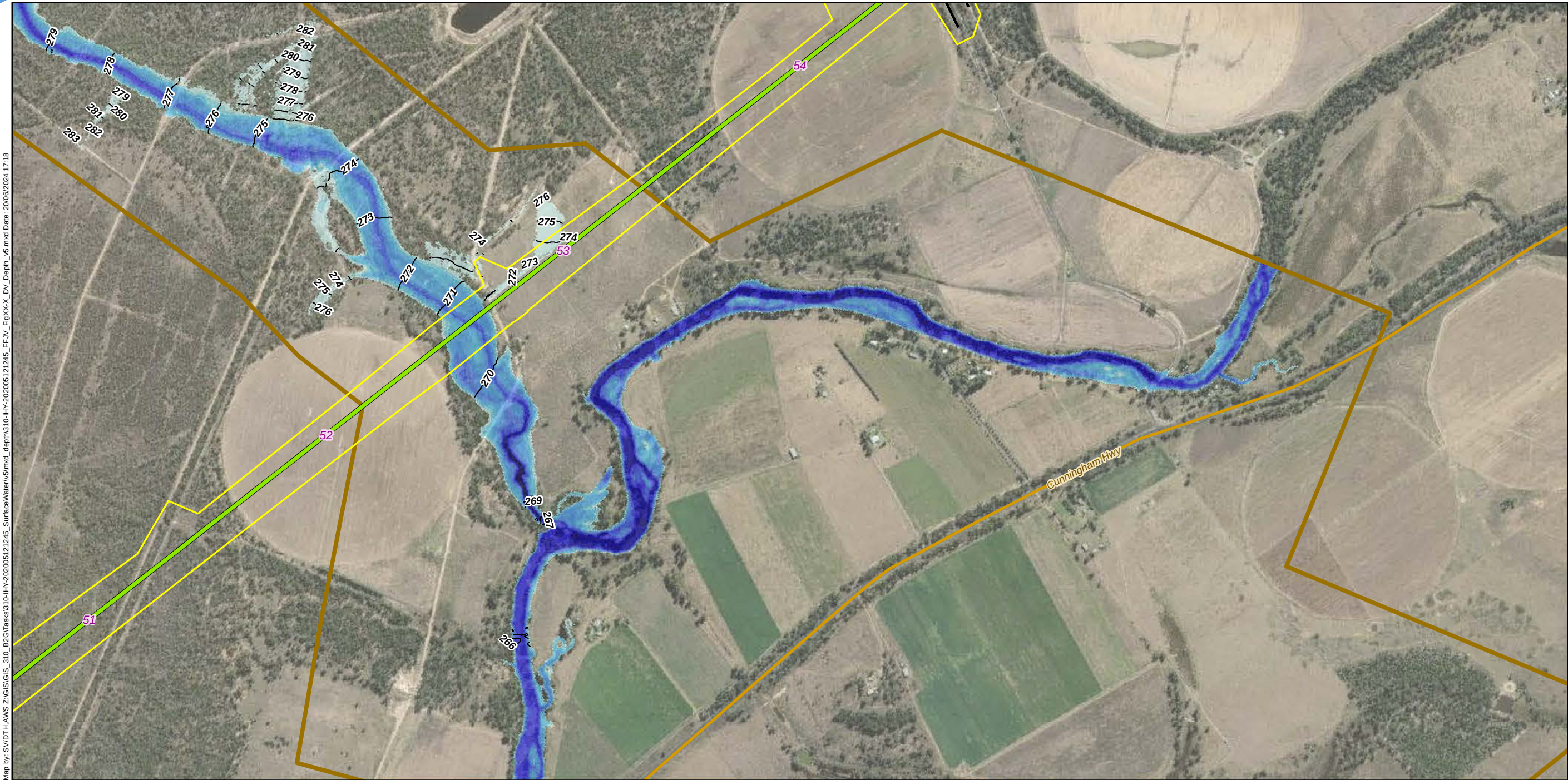
- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

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)	



Border to Gowrie
Figure L3-A:
20% AEP Event - Peak Water Levels - Developed Case - Cremascos Road



Legend

- 5 Chainage (km)
- 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: 1:14,000
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\5121245_SurfaceWater\51mxd_velocity_DV310-HY-2020\5121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:27



Legend

- 5 Chainage (km)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



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Border to Gowrie

Figure L3-C:

20% AEP Event - Peak Velocity - Developed Case - Cremascos Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\51mxd_velocity_DV310-IHY-2020\5121245_FF3V_FigXX-X_DV_Velocity_v5.mxd Date: 20/06/2024 17:27



Legend

- 5 Chainage (km)
- 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: 1:14,000
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_Vxd310-IHY-2020\05121245_FF3V_FigXX-X_DV_Hazard_VAD_v5.mxd Date: 20/06/2024 17:21



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



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Border to Gowrie

Figure L3-E:

20% AEP Event - Peak Hazard - Developed Case - Cremascos Road

Map by: SV\DT\H.AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5m\ Hazard_VAD_v5.mxd Date: 20/06/2024 17:21



Legend

- 5 Chainage (km)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



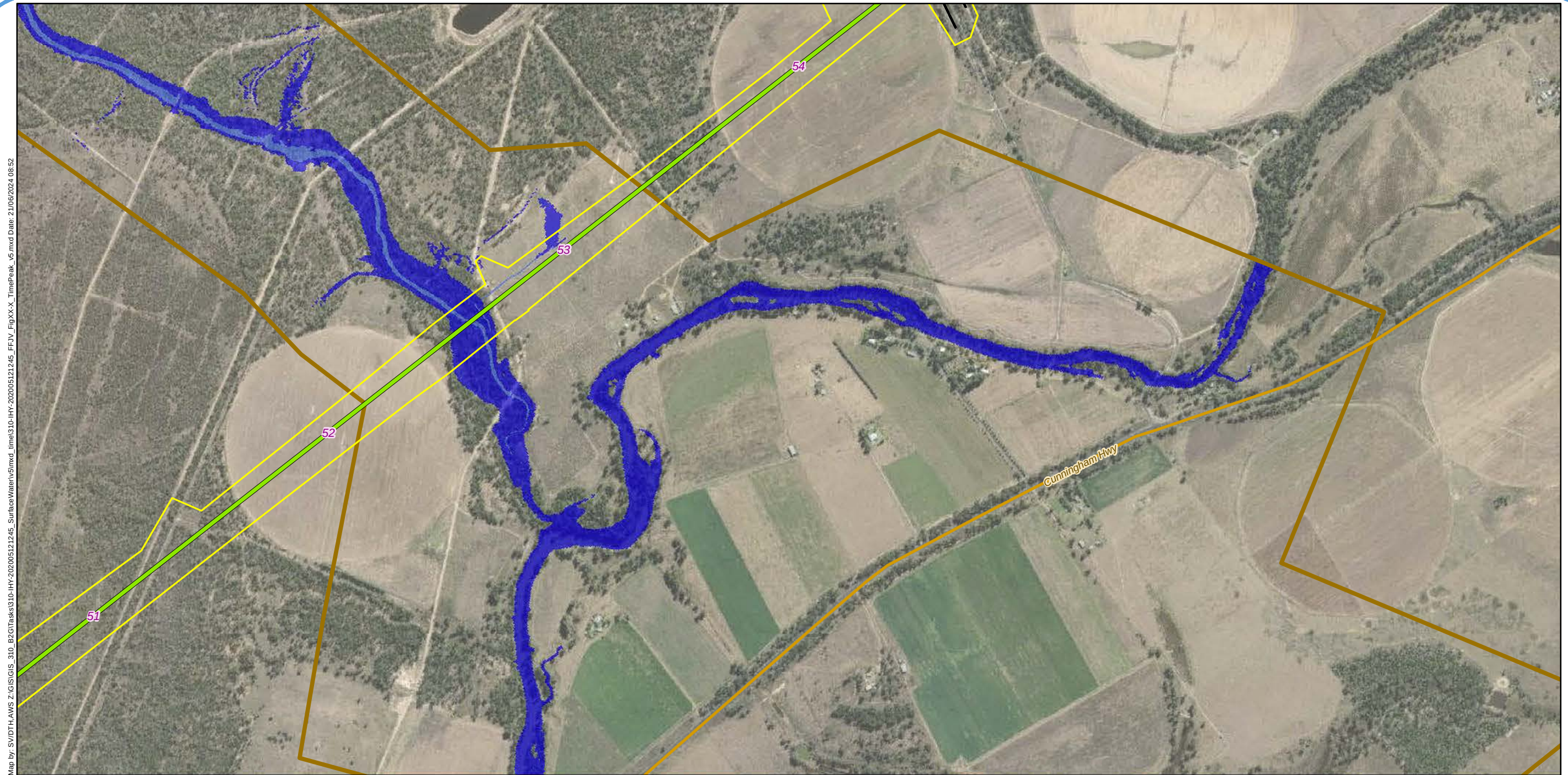
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Border to Gowrie

Figure L3-F:

1% AEP Event - Peak Hazard - Developed Case - Cremascos Road



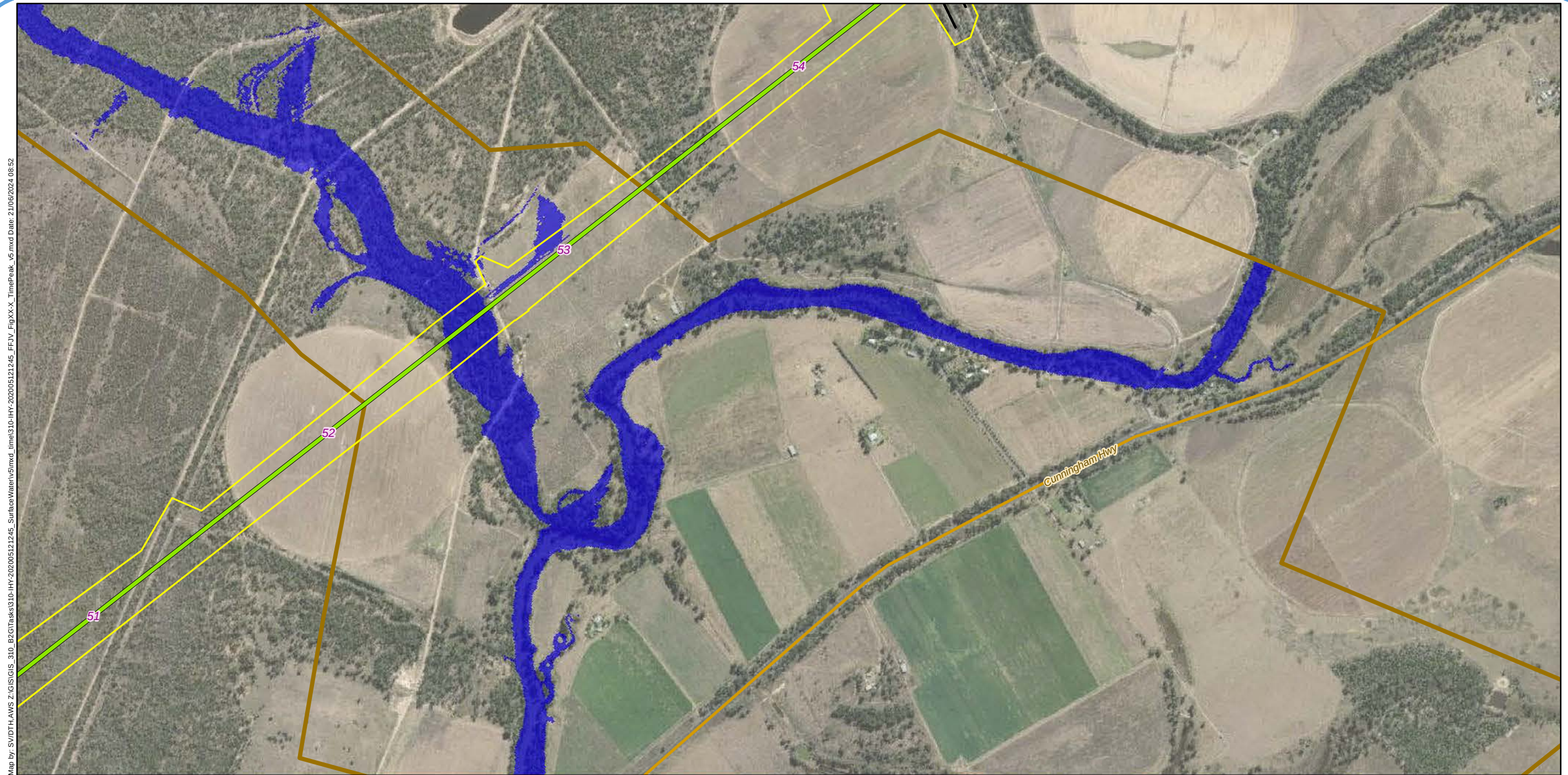
Legend

- 5 Chainage (km)
- 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/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 08:52

Legend

- 5 Chainage (km)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km

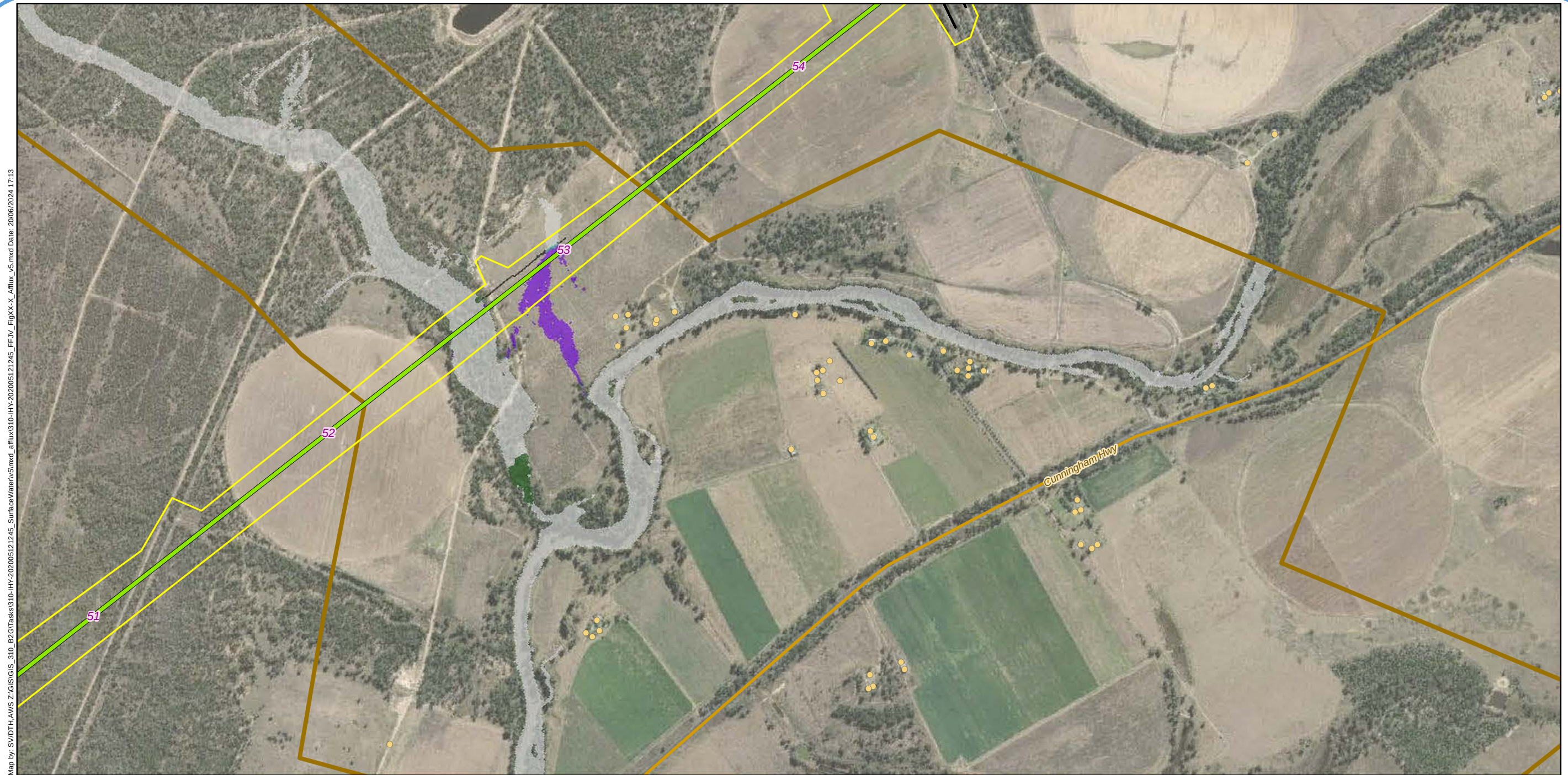


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L3-H:

1% AEP Event - Peak Time of Inundation - Developed Case - Cremascos Road



Map by: SV/DTH/AWS Z:GIS/GIS_310_B2GTrask310-IHY-202005121245_SurfaceWaterV5.mxd, afflux310-IHY-202005121245_FF JV, FigXX-X_Afflux_V5.mxd Date: 20/06/2024 17:13

Legend

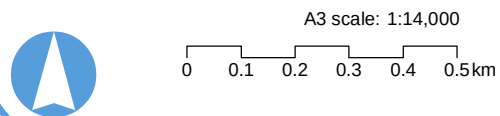
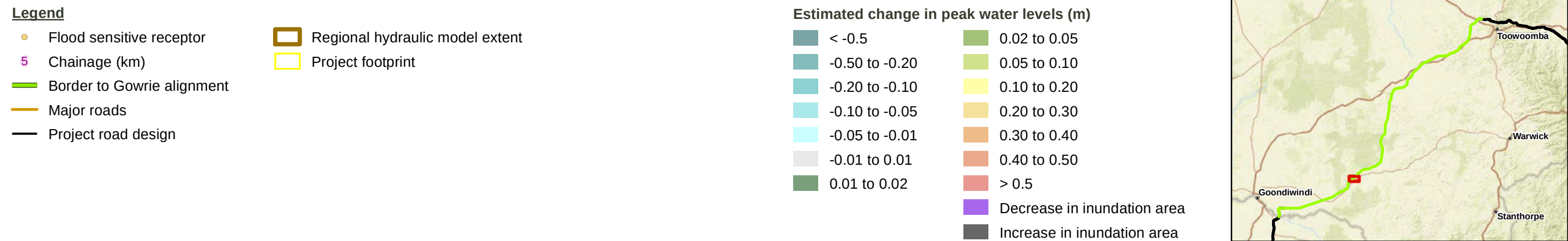
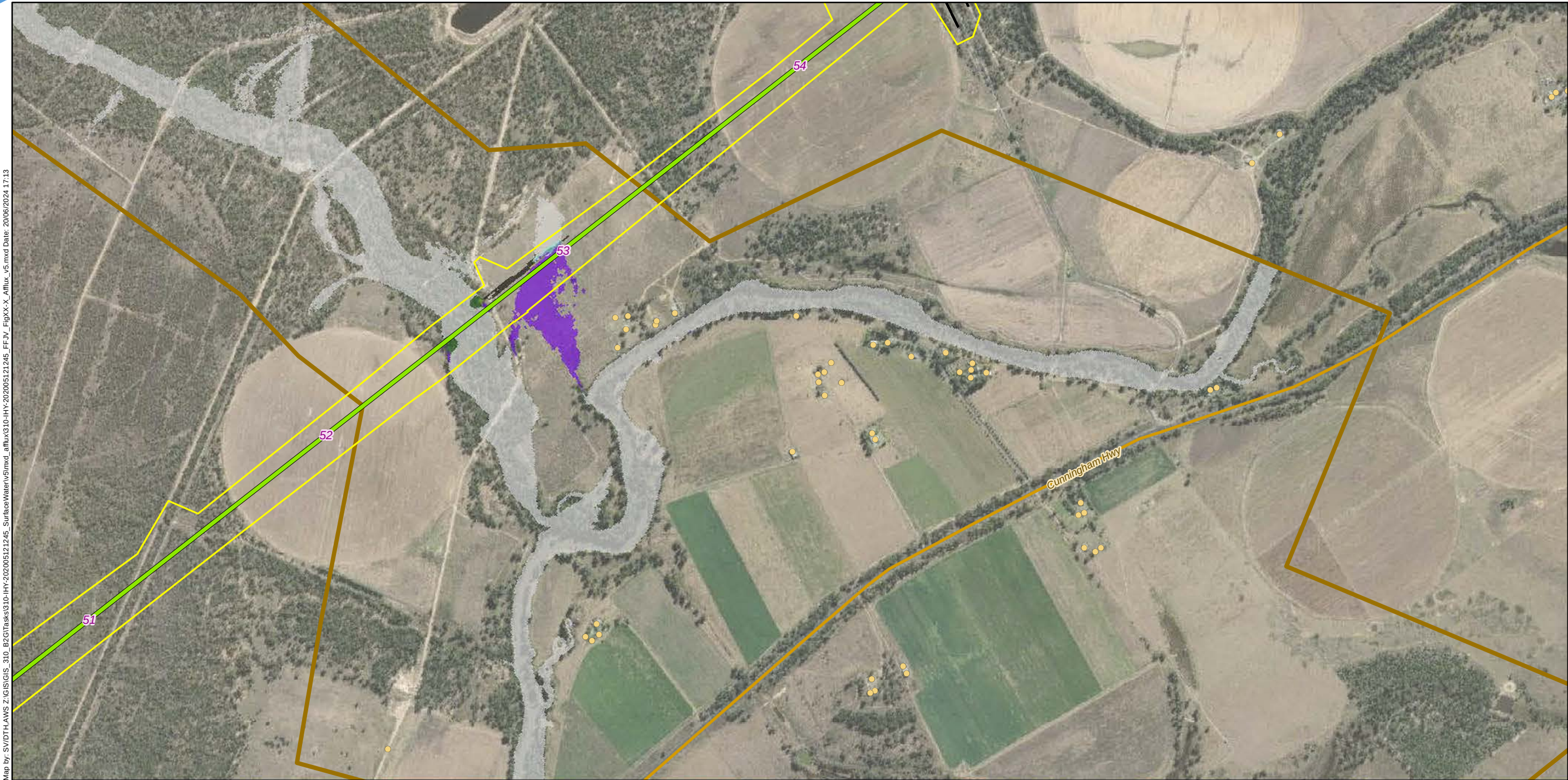
- Flood sensitive receptor
- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

Estimated change in peak water levels (m)

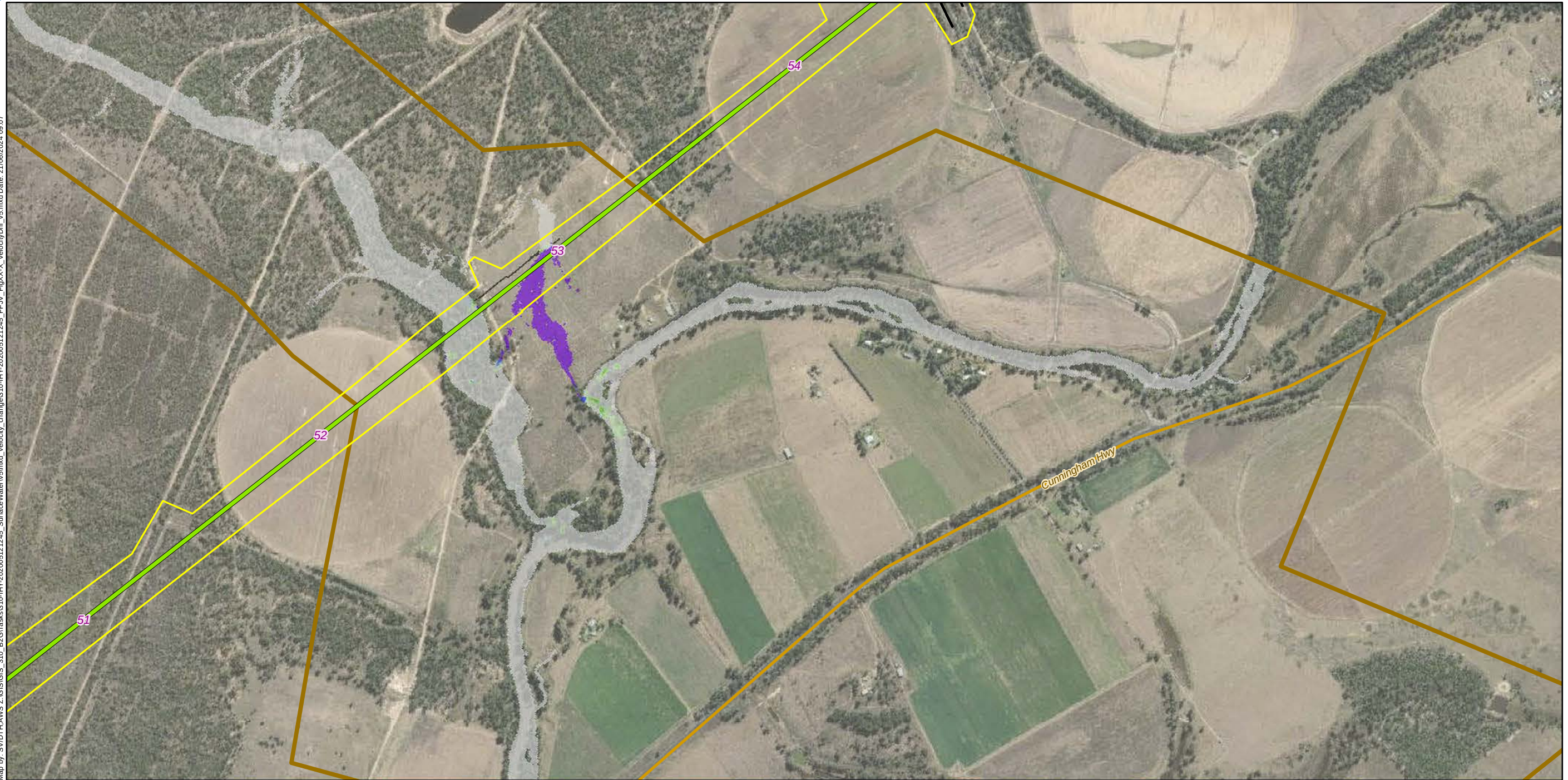
 < -0.5	 0.02 to 0.05
 -0.50 to -0.20	 0.05 to 0.10
 -0.20 to -0.10	 0.10 to 0.20
 -0.10 to -0.05	 0.20 to 0.30
 -0.05 to -0.01	 0.30 to 0.40
 -0.01 to 0.01	 0.40 to 0.50
 0.01 to 0.02	 > 0.5
	 Decrease in inundation area
	 Increase in inundation area



A3 scale: 1:14,000
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\51mxd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:07



Legend

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

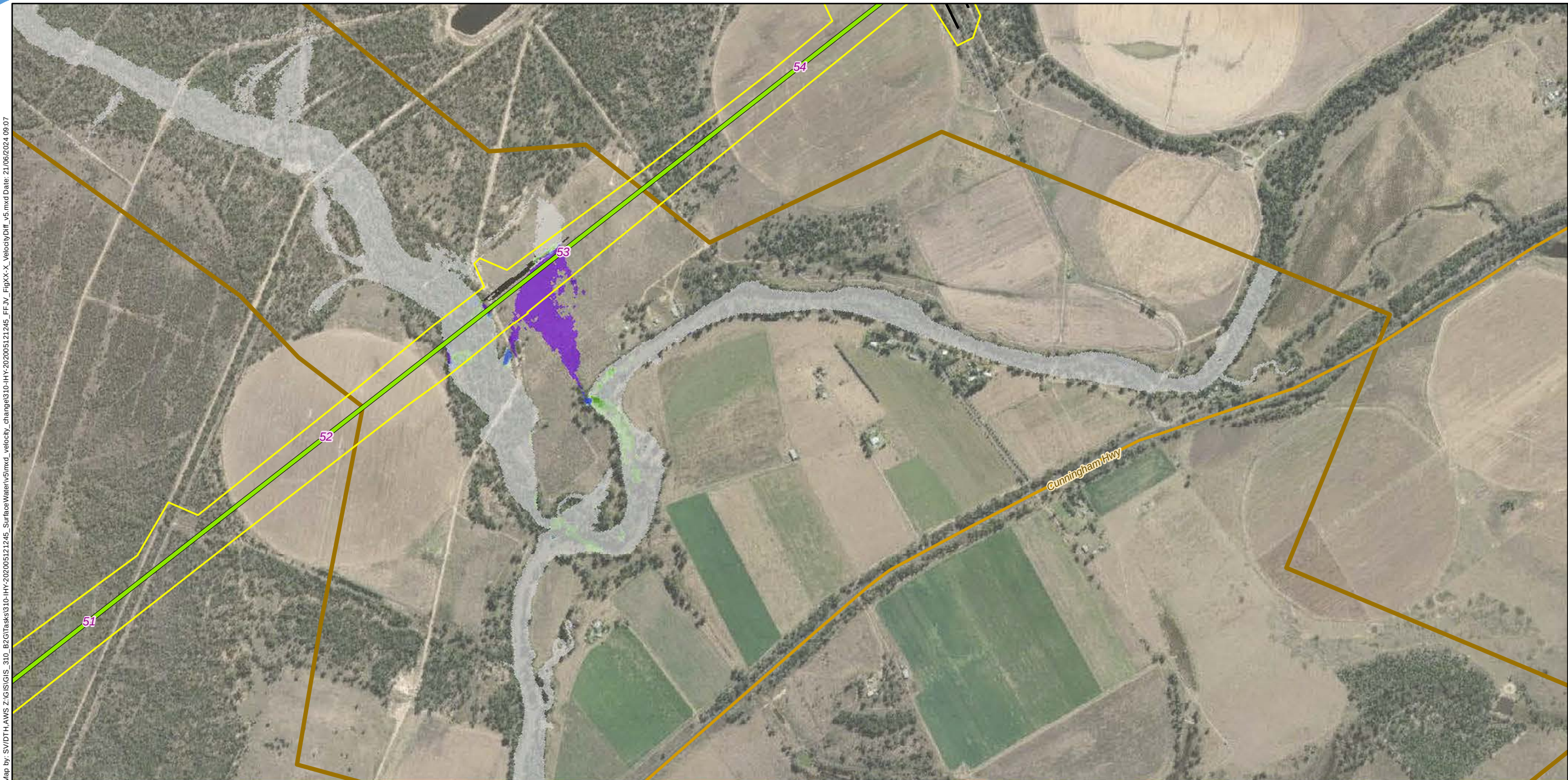
Estimated change in peak velocity (m/s)

- | | |
|----------------|-----------------------------|
| < -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: 1:14,000
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\vd_velocity_change\310-HY-2020\05121245_FF_V_FigXX-X_VelocityDiff_v5.mxd Date: 21/06/2024 09:07



Legend

- 5 Chainage (km)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



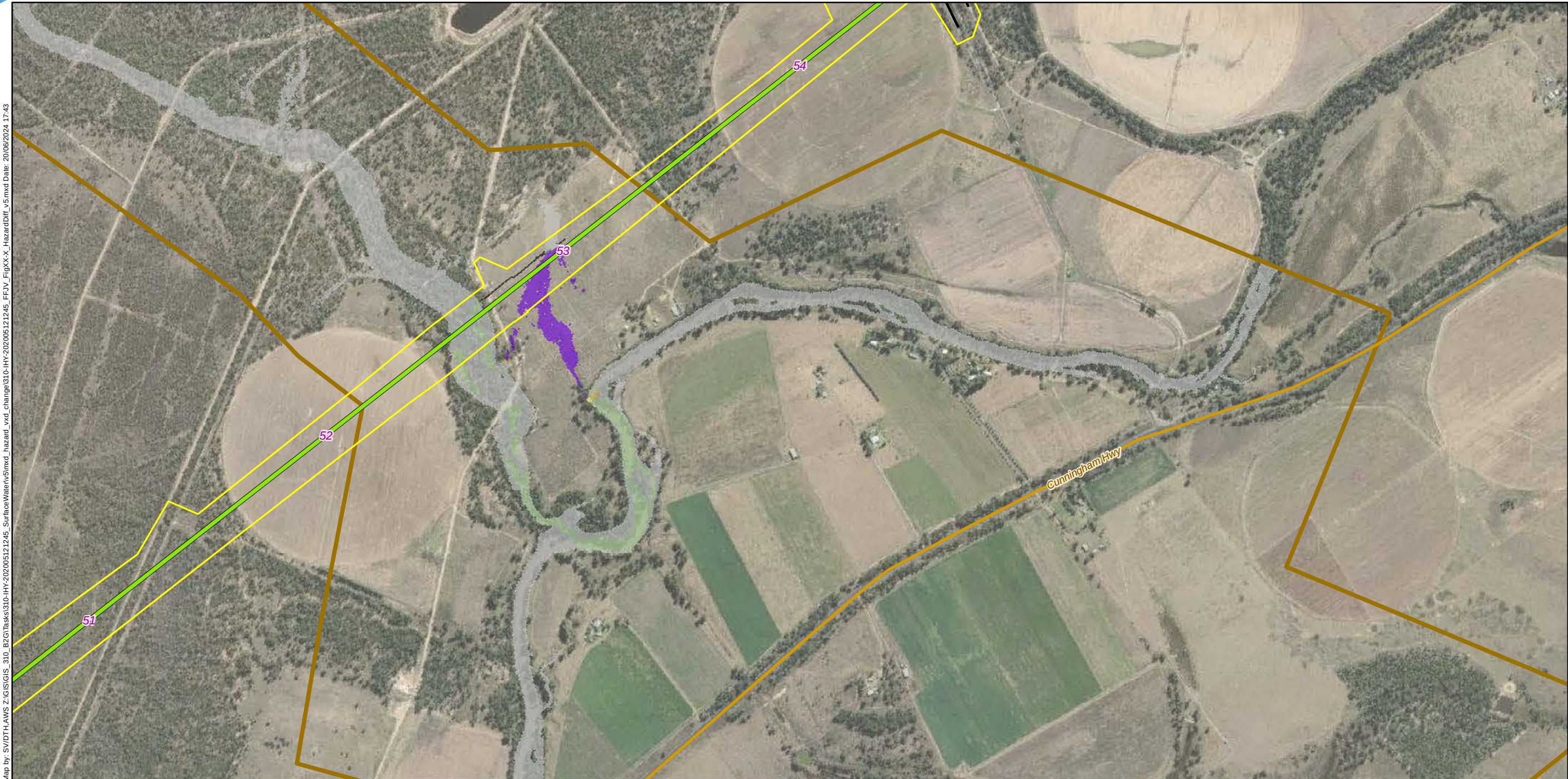
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L4-D:

1% AEP Event - Change in Velocity - Cremascos Road

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)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



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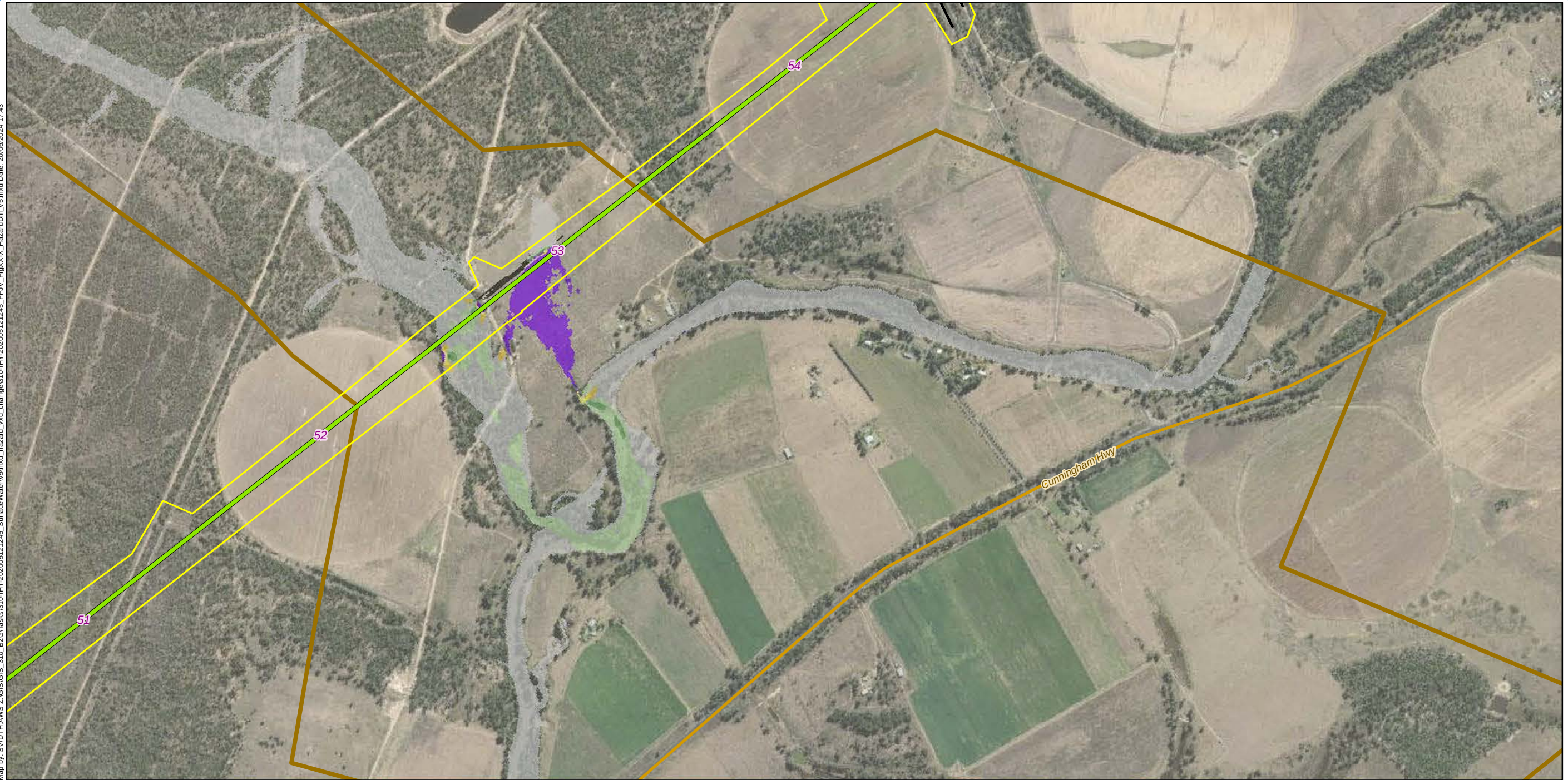
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L4-E:

20% AEP Event - Change in Hazard - Cremascos Road

Map by: SV/DTH-AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\05121245_SurfaceWater\5mxd_Hazard_v5.mxd Date: 20/06/2024 17:43



Legend

- 5 Chainage (km)
- 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
- 0.10 to -0.05
- 0.05 to -0.01
- 0.01 to 0.01
- 0.01 to 0.05
- 0.05 to 0.10
- > 0.10
- Decrease in inundation area
- Increase in inundation area



A3 scale: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



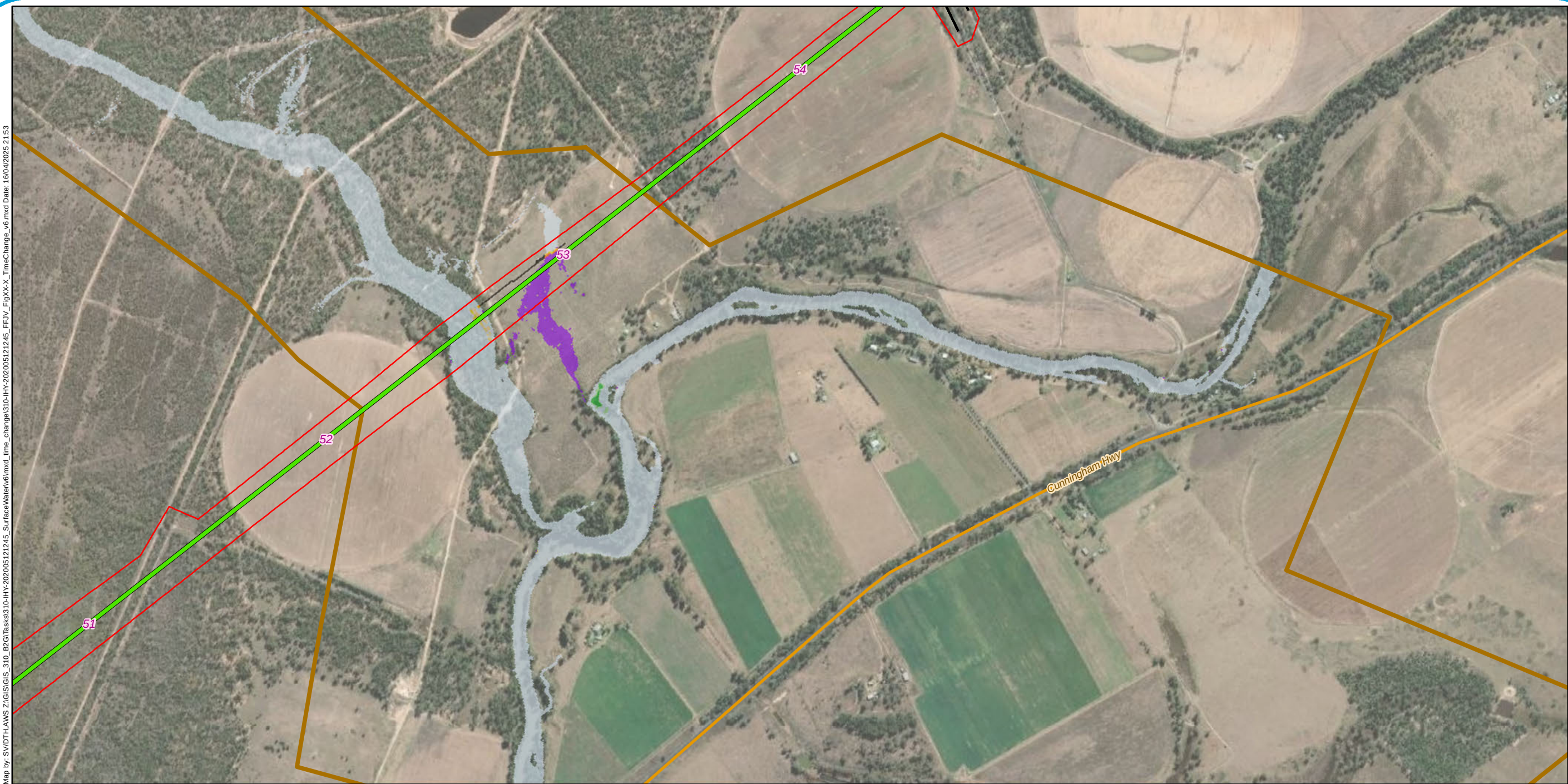
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L4-F:

1% AEP Event - Change in Hazard - Cremascos Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\6mxd_FF\FF_FigXX-X_TimeChange_v6.mxd Date: 16/04/2025 21:53



Legend

- 5 Chainage (km)
- 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 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



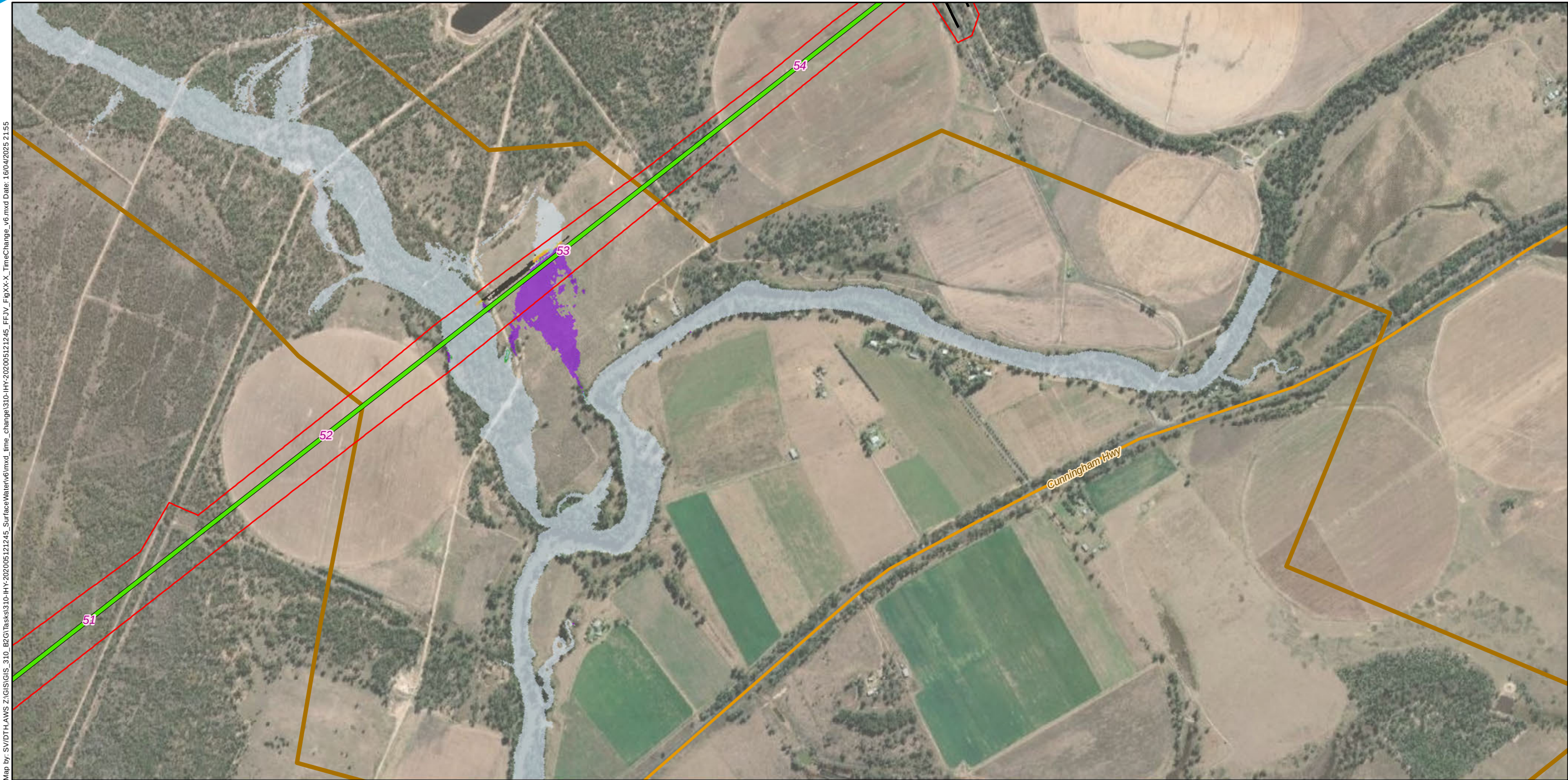
Issue date: 16/04/2025 Version: 6
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L4-G:

20% AEP Event - Change in Time of Inundation - Cremascos Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\6mxd_FFJV_FigXX-X_TimeChange_v6.mxd Date: 16/04/2025 21:55

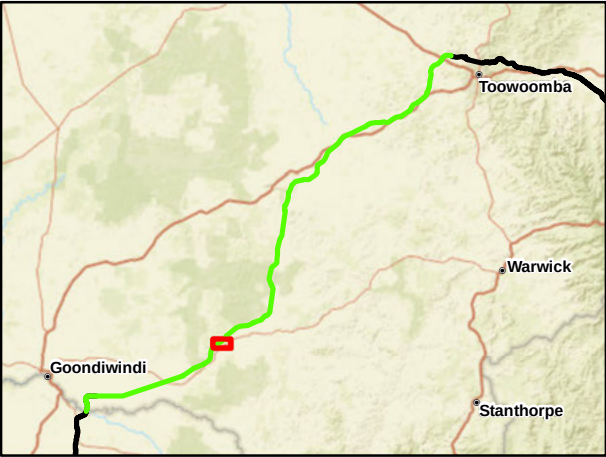


Legend

- 5 Chainage (km)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



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

Border to Gowrie

Figure L4-H:

1% AEP Event - Change in Time of Inundation - Cremascos Road

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
- 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: 1:14,000

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 L5-A:

20% AEP Event - Change in Velocity (<0.5m/s cutoff) - Cremascos Road

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-HY-2020\05121245_SurfaceWater\51mxd_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
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km



Legend

- 5 Chainage (km)
- 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: 1:14,000
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 L5-C:

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



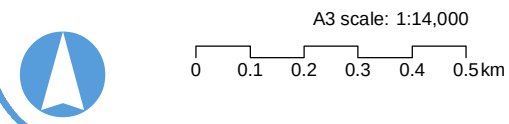
Legend

- 5 Chainage (km)
- 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.



Border to Gowrie
Figure L5-D:
1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Cremascos 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)
- 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: 1:14,000
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 L5-E:

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

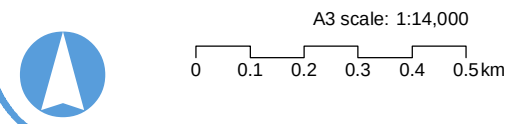


- Legend**
- 5 Chainage (km)
 - Border to Gowrie alignment
 - Major roads
 - Project road design
 - Regional hydraulic model extent
 - Project footprint

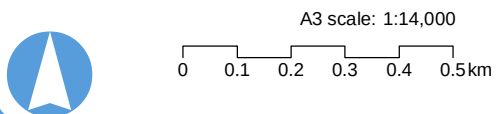
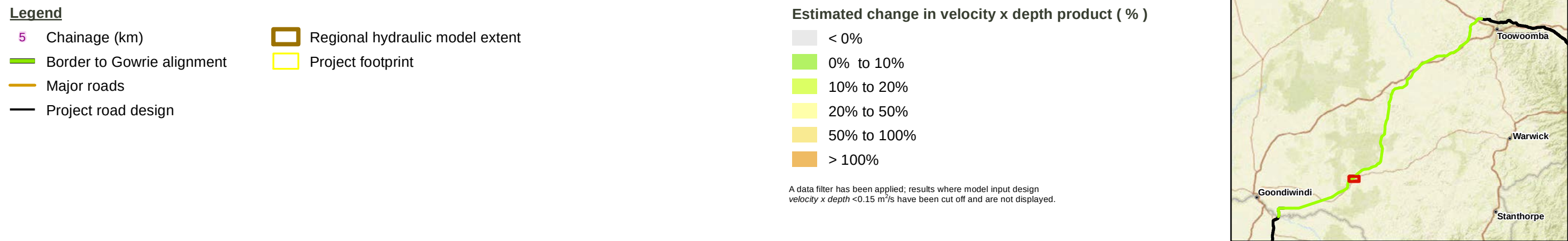
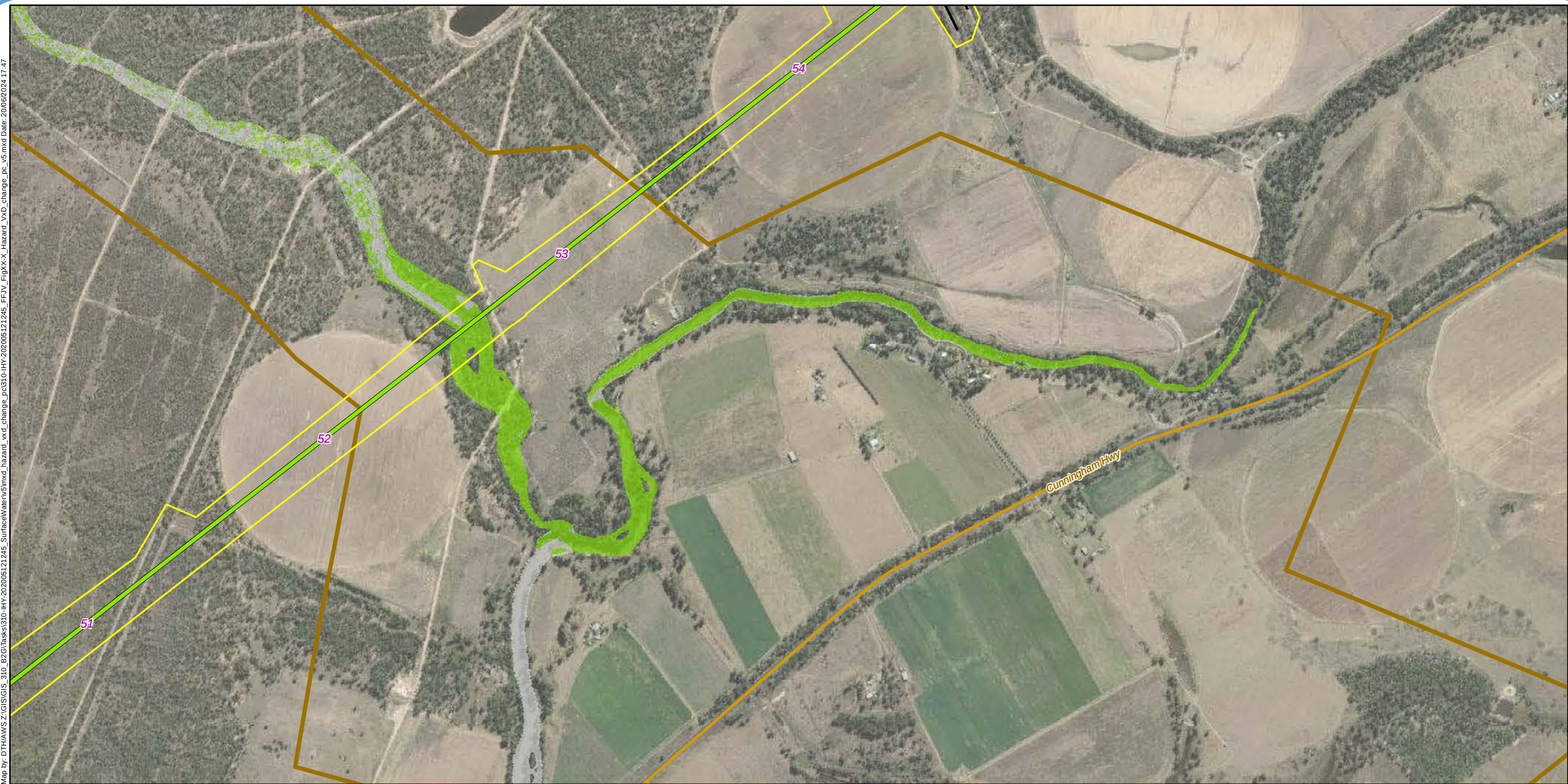
Estimated change in velocities (%)

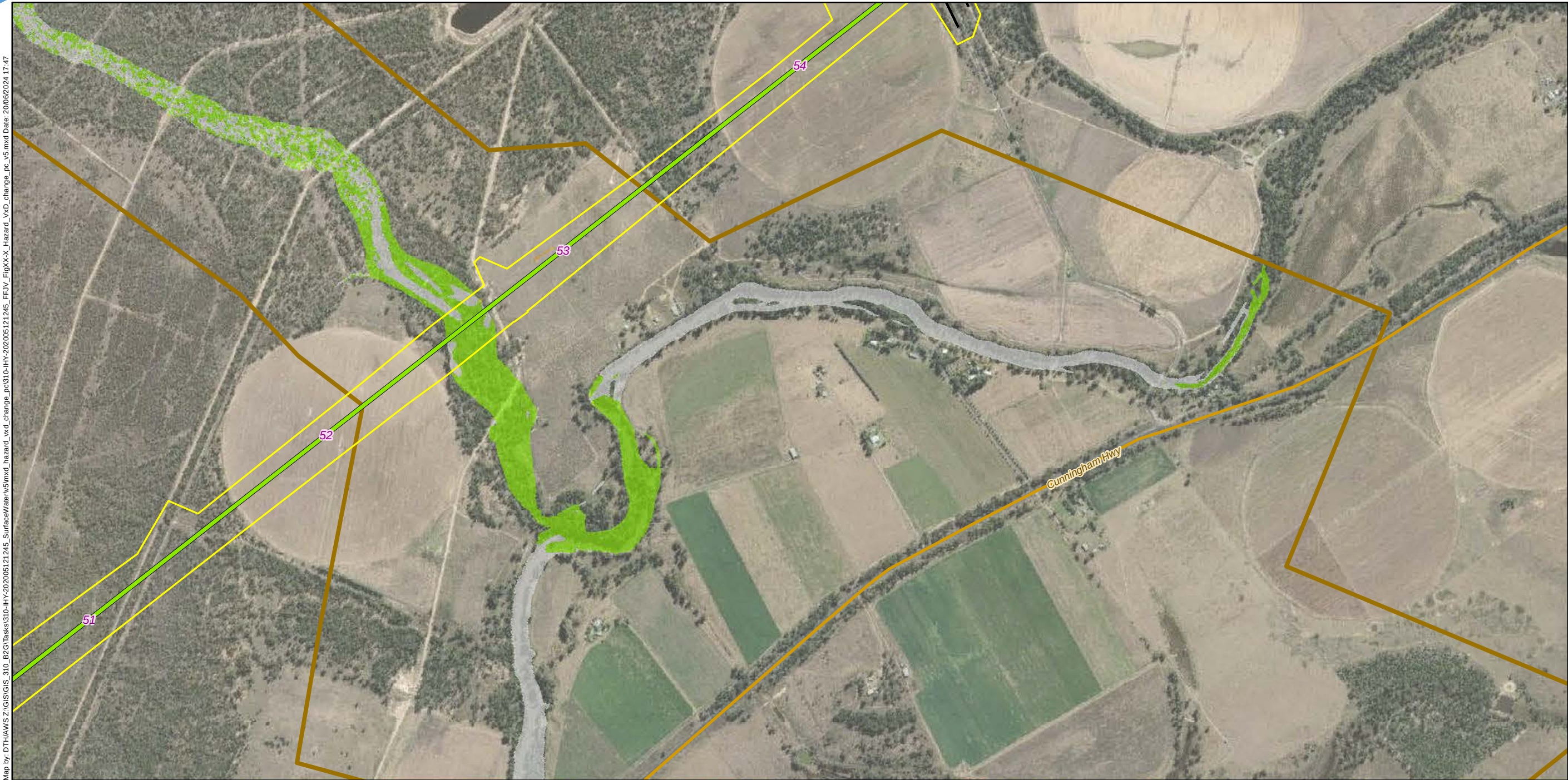
- < 0
- 0 to 10
- 10 to 20
- > 20

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.



Border to Gowrie
Figure L5-F:
1% AEP Event - Percentage Change in Velocity (1.0m/s cutoff) - Cremascos Road





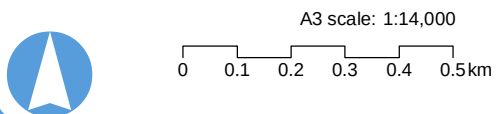
Legend

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

Estimated change in velocity x depth product (%)

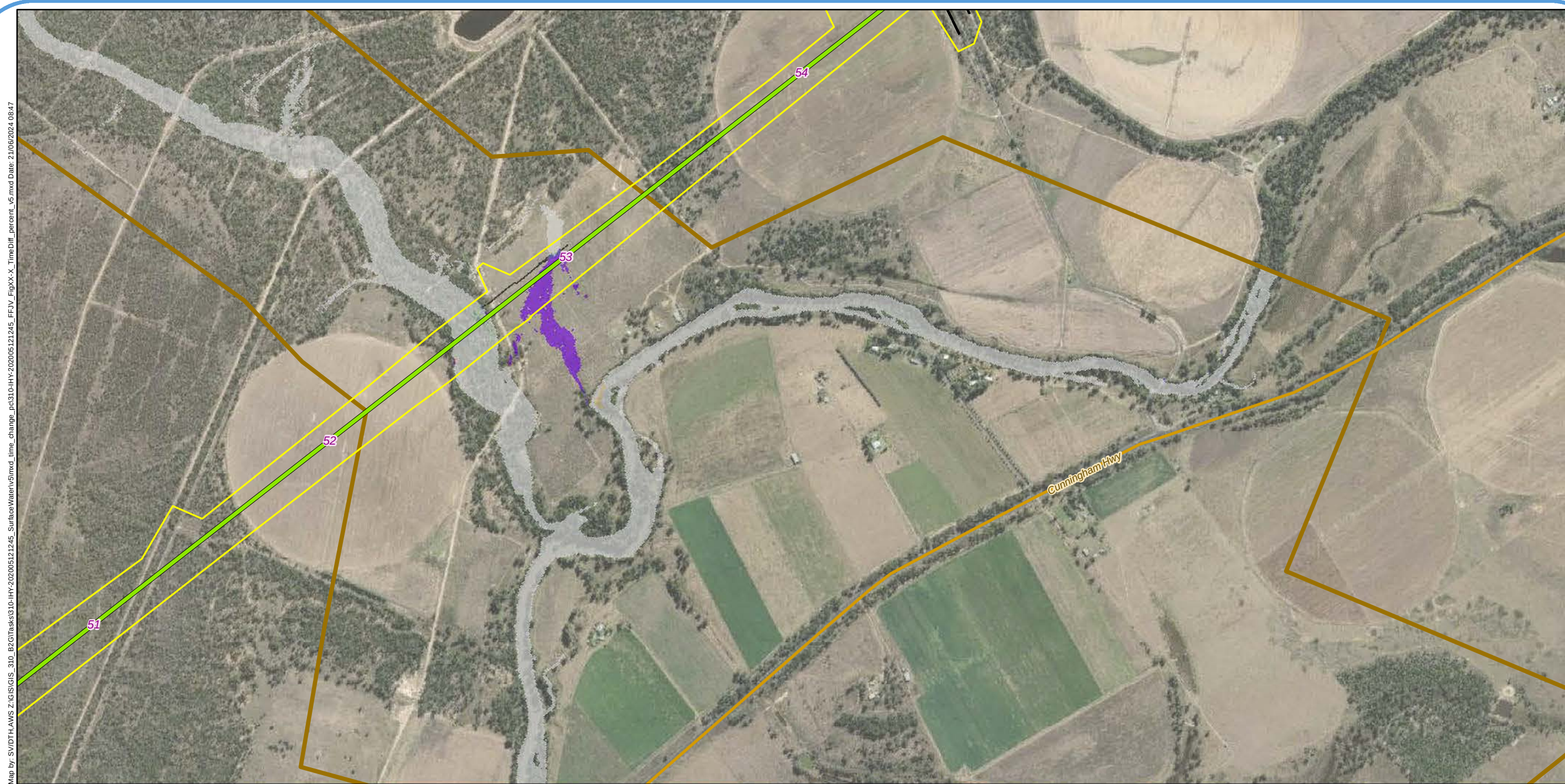
- < 0%
- 0% to 10%
- 10% to 20%
- 20% to 50%
- 50% to 100%
- > 100%

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.



Border to Gowrie
Figure L6-B:
1% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Cremascos 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\FF_V_FigXX-X_TimeDiff_percent_v5.mxd Date: 21/06/2024 08:47

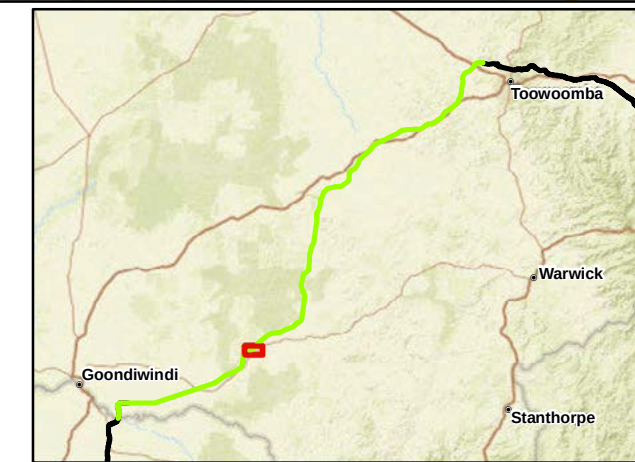


Legend

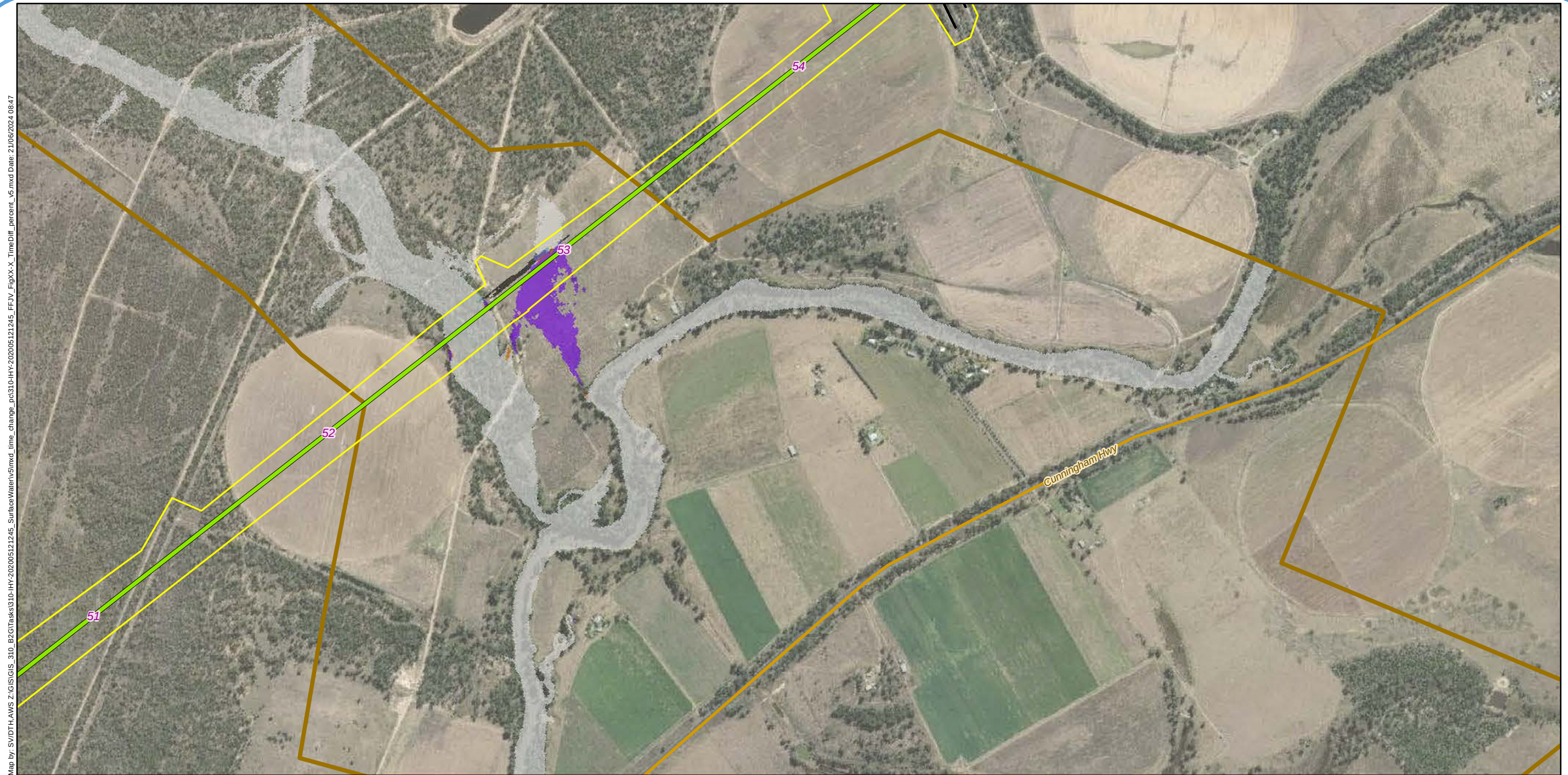
- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Regional hydraulic model extent
- Project footprint

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 |



Border to Gowrie
Figure L7-A:
20% AEP Event - Percentage Change in Time of Inundation - Cremascos Road

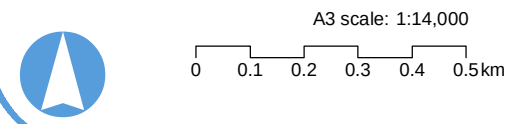


Legend

- 5 Chainage (km)
- 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 |



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\X-X_TimeDiff_percent_FIO_v5.mxd Date: 21/06/2024 08:43



Legend

- 5 Chainage (km)
- 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: 1:14,000
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 L7-C:

20% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Cremascos 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\X-X_TimeDiff_percent_FIO_v5.mxd Date: 21/06/2024 08:43



Legend

- 5 Chainage (km)
- 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: 1:14,000
0 0.1 0.2 0.3 0.4 0.5km

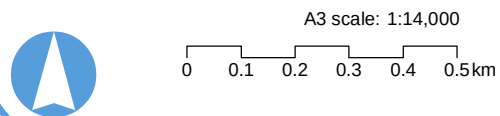
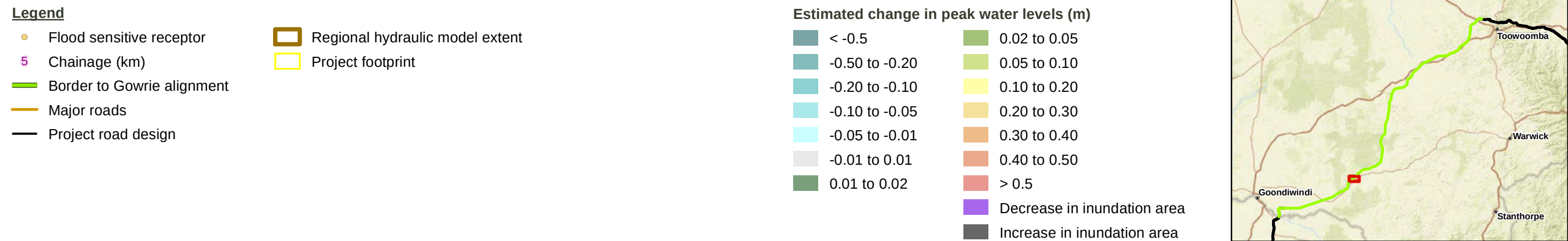
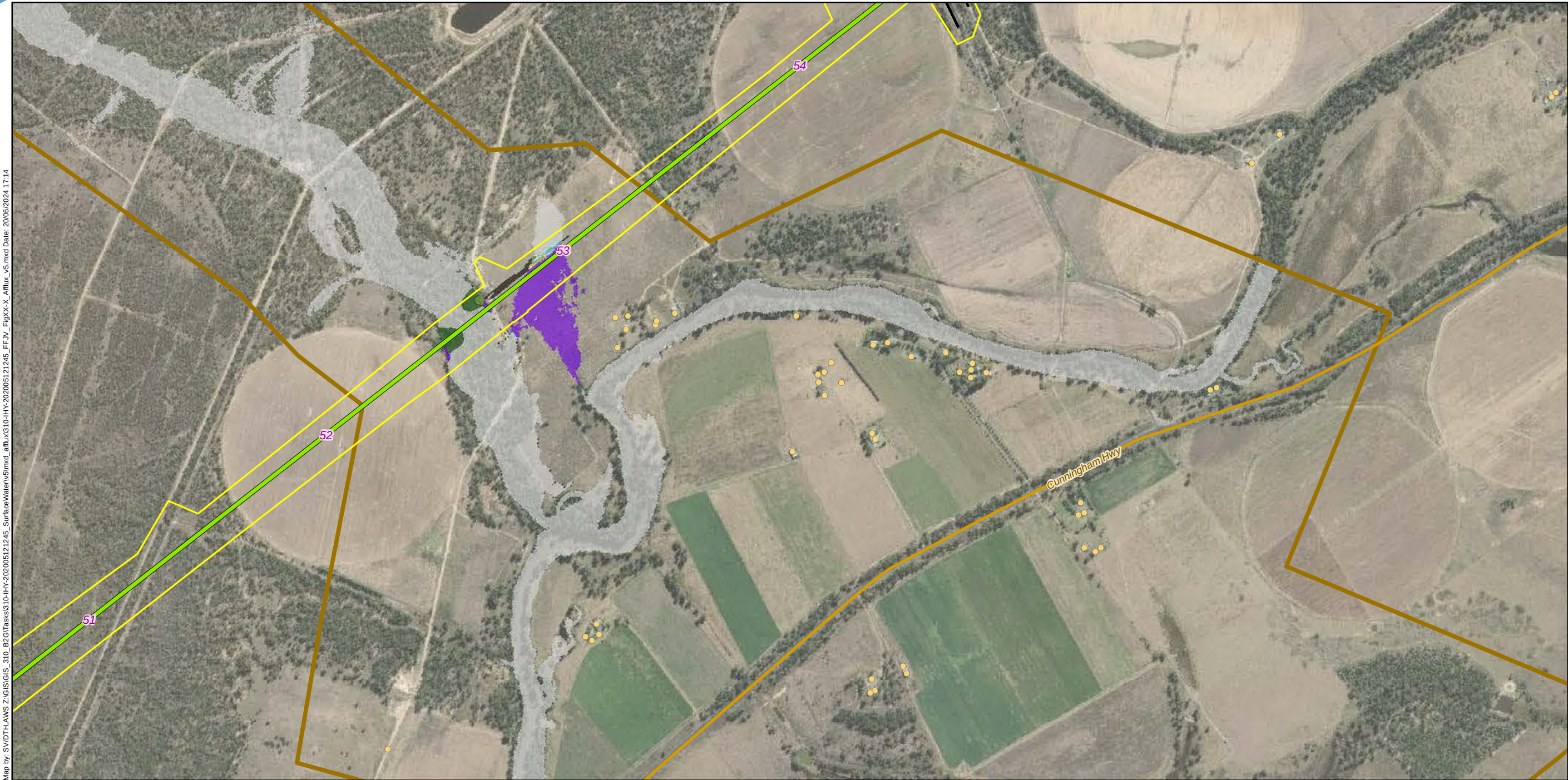


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure L7-D:

1% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Cremascos Road



APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix M Macintyre River flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix M

Macintyre River Flood Maps

Figure M1-A Locality Plan
 Figure M1-B Survey Data
 Figure M1-C Hydrologic Model Setup
 Figure M1-D Hydraulic Model Setup
 Figure M1-E Landuse Classifications
 Figure M1-F Proposed Design Structures

Figure M2-A 1976 calibration event: inundation extent
 Figure M2-B 1996 calibration event: inundation extent
 Figure M2-C 2011 calibration event: inundation extent

Figure M3-A 20% AEP Event - Peak Water Levels - Existing Case
 Figure M3-B 1% AEP Event - Peak Water Levels - Existing Case
 Figure M3-C 20% AEP Event - Peak Velocity - Existing Case
 Figure M3-D 1% AEP Event - Peak Velocity - Existing Case
 Figure M3-E 20% AEP Event - Peak Hazard - Existing Case
 Figure M3-F 1% AEP Event - Peak Hazard - Existing Case
 Figure M3-G 20% AEP Event - Peak Time of Inundation - Existing Case
 Figure M3-H 1% AEP Event - Peak Time of Inundation - Existing Case

Figure M4-A 20% AEP Event - Peak Water Levels - Developed Case
 Figure M4-B 1% AEP Event - Peak Water Levels - Developed Case
 Figure M4-C 20% AEP Event - Peak Velocity - Developed Case
 Figure M4-D 1% AEP Event - Peak Velocity - Developed Case
 Figure M4-E 20% AEP Event - Peak Hazard - Developed Case
 Figure M4-F 1% AEP Event - Peak Hazard - Developed Case
 Figure M4-G 20% AEP Event - Peak Time of Inundation - Developed Case
 Figure M4-H 1% AEP Event - Peak Time of Inundation - Developed Case

Figure M5-A 20% AEP Event - Afflux
 Figure M5-B 1% AEP Event - Afflux
 Figure M5-C 20% AEP Event - Change in Velocity
 Figure M5-D 1% AEP Event - Change in Velocity
 Figure M5-E 20% AEP Event - Change in Hazard
 Figure M5-F 1% AEP Event - Change in Hazard
 Figure M5-G 20% AEP Event - Change in Time of Inundation
 Figure M5-H 1% AEP Event - Change in Time of Inundation

Figure M6-A 20% AEP Event - Change in Velocity (<0.5m/s cutoff)
 Figure M6-B 1% AEP Event - Change in Velocity (<0.5m/s cutoff)
 Figure M6-C 20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
 Figure M6-D 1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
 Figure M6-E 20% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
 Figure M6-F 1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)

Figure M7-A 20% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)
 Figure M7-B 1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m²/s cutoff applied)

Figure M8-A 20% AEP Event - Percentage Change in Time of Inundation
 Figure M8-B 1% AEP Event - Percentage Change in Time of Inundation
 Figure M8-C 20% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)
 Figure M8-D 1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)

Figure M9-A 1% AEP Event - Sensitivity - 0% Blockage
 Figure M9-B 1% AEP Event - Sensitivity - 50% Blockage
 Figure M9-C 1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels



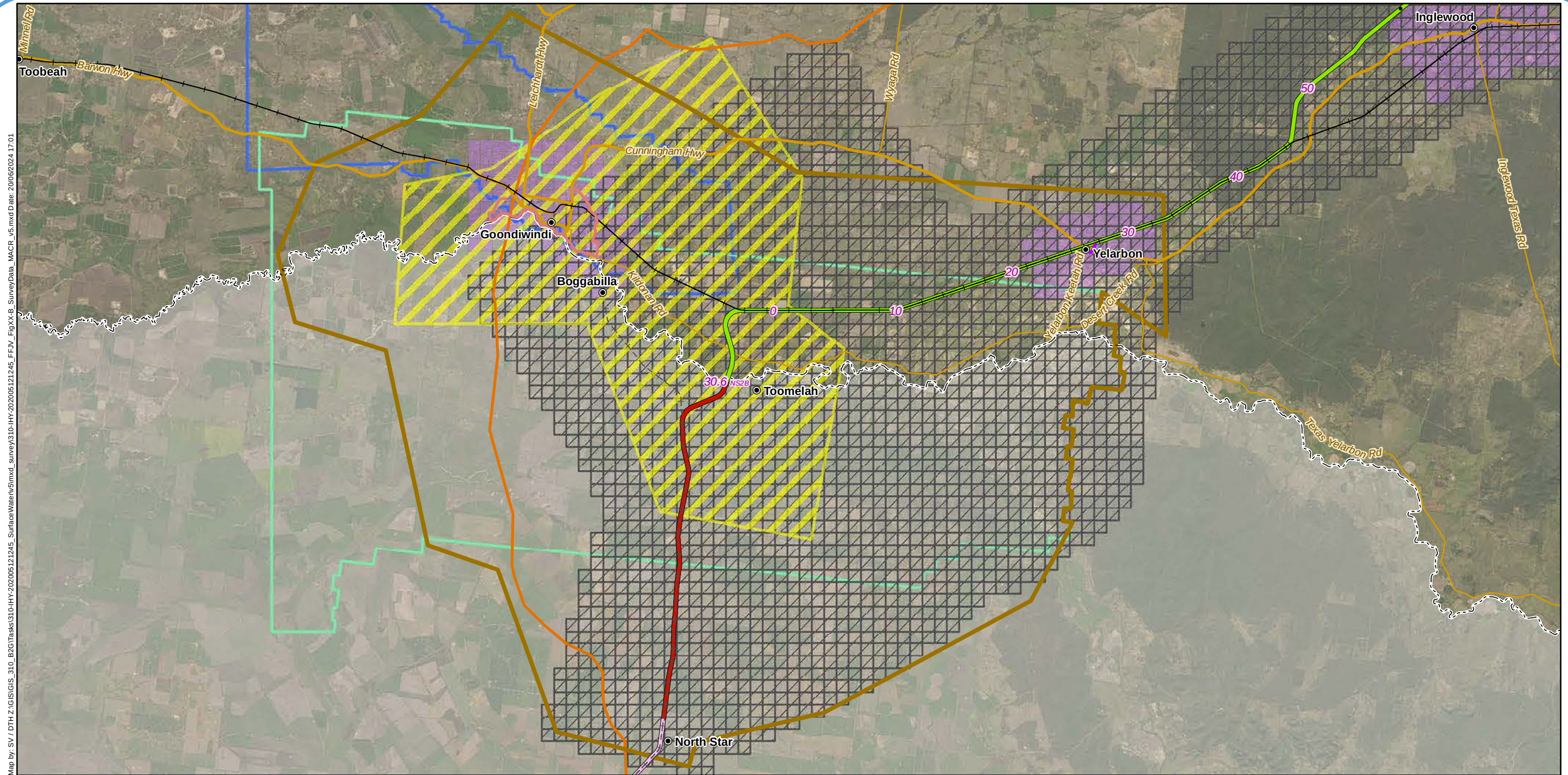
Map by: SV / DTH Z:\GIS\GIS 310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\310-IHY-202005121245_FF\FF_V_FigX1-X_Locality_v5.mxd Date: 20/06/2024 17:00

Legend

- 5 Chainage (km)
 - Localities
 - Existing rail (operational)
 - Border to Gowrie alignment
 - North Star to NSW/QLD border alignment
 - Watercourses
 - Major roads
 - Minor roads
 - Project road design
 - NSW/QLD border
 - Yelarbon levee
 - Regional hydraulic model extent
 - Project footprint
- A3 scale: 1:120,000

0 1 2 3 4 5 km





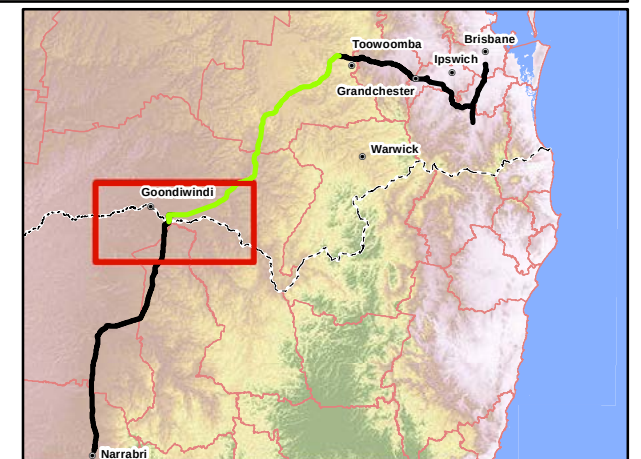
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Narrabri to North Star alignment

- Major roads
- Minor roads
- NSW/QLD border
- Yelarbon levee
- Goondiwindi levee
- Hydrologic model extent

LiDAR datasets (1m grid)

- Inland Towns Stage 2 2011
- 2019 ARTC LiDAR
- 2015 ARTC LiDAR
- Macintyre LiDAR 2013 (Geoscience Australia)
- Macintyre North LiDAR 2017 (Geoscience Australia)

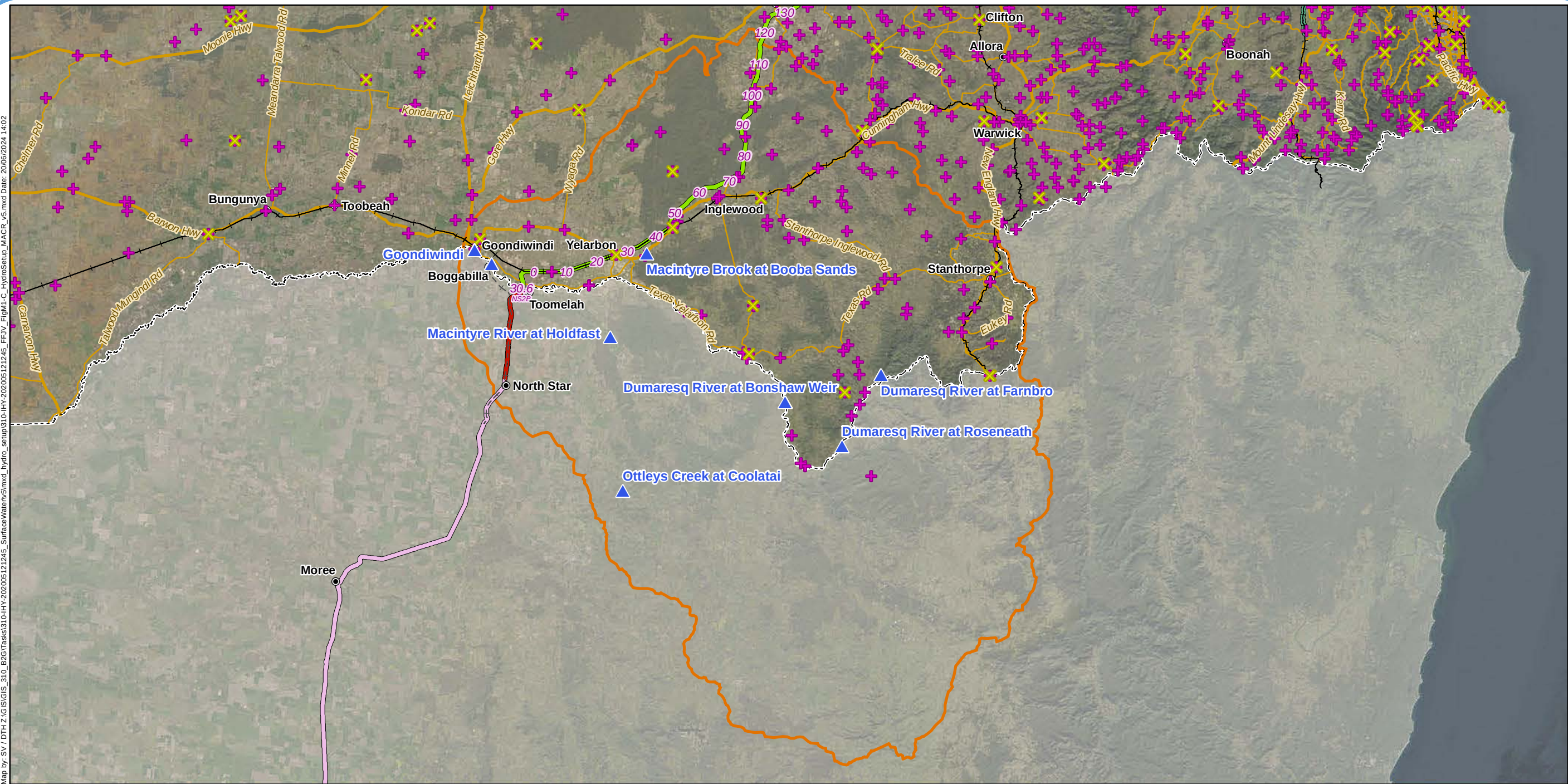


A3 scale: 1:340,000
0 3 6 9 12 15 km



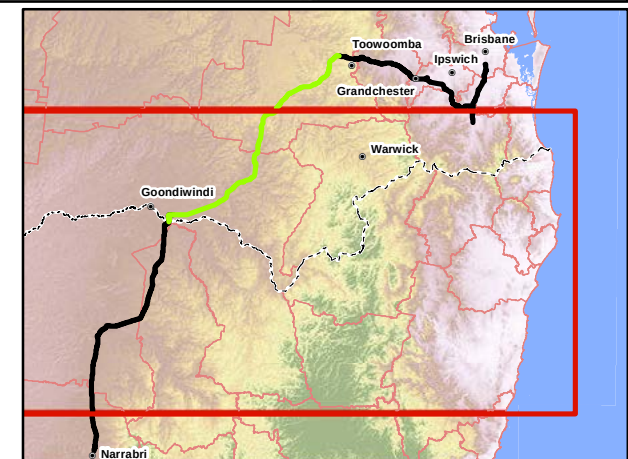
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie
Figure M1-B:
Survey Data - Macintyre River

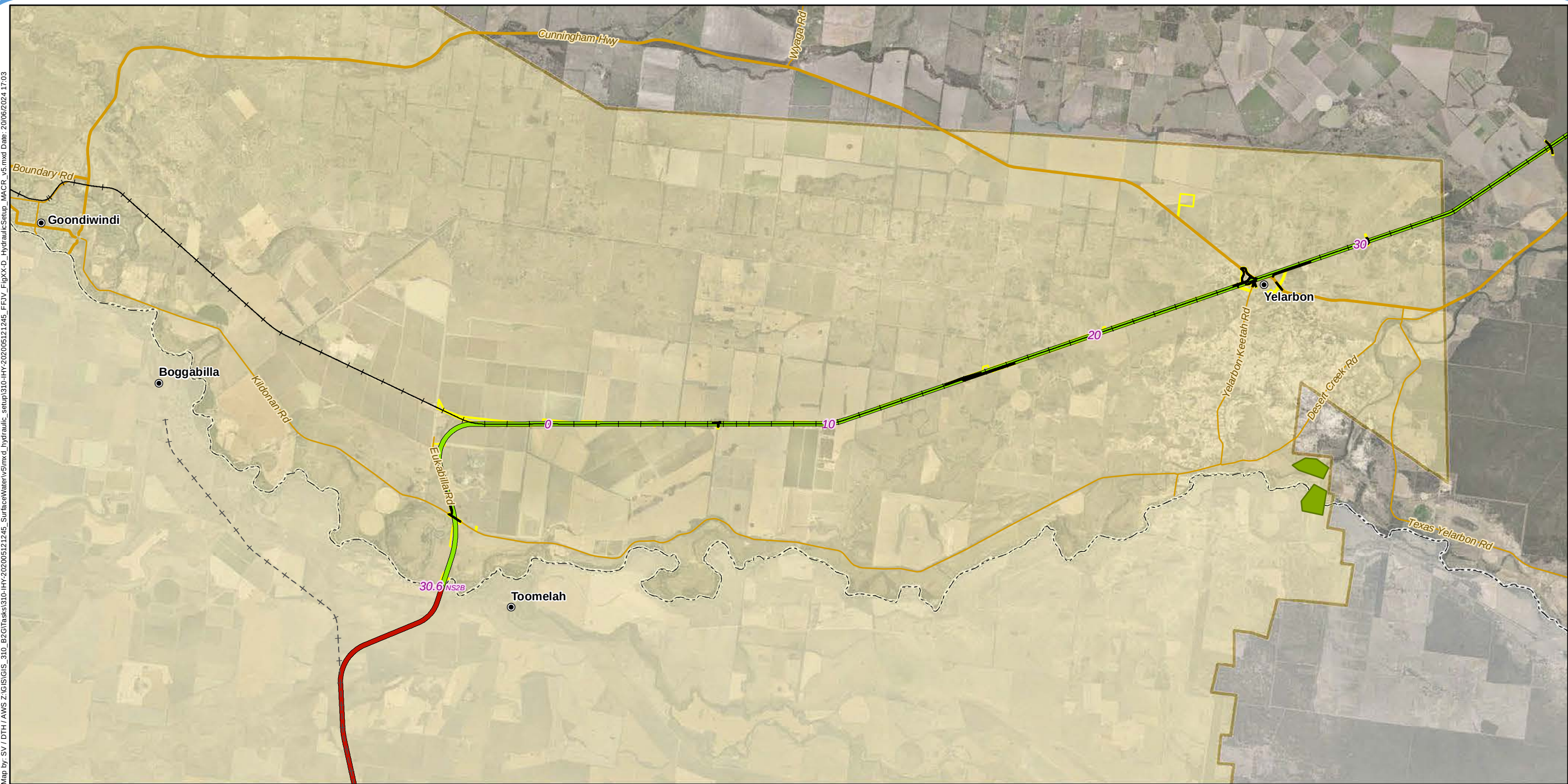


Legend

- | | | |
|--|-------------------------|---------------------------|
| 5 Chainage (km) | Major roads | ✕ Pluviograph stations |
| ● Localities | Minor roads | + Daily rainfall stations |
| — Existing rail (operational) | --- NSW/QLD border | ▲ Stream gauge locations |
| - - - Existing rail (non-operational) | Hydrologic model extent | |
| Border to Gowrie alignment | | |
| North Star to NSW/QLD border alignment | | |
| Narrabri to North Star alignment | | |
| Kagaru to Acacia Ridge/Bromelton alignment | | |

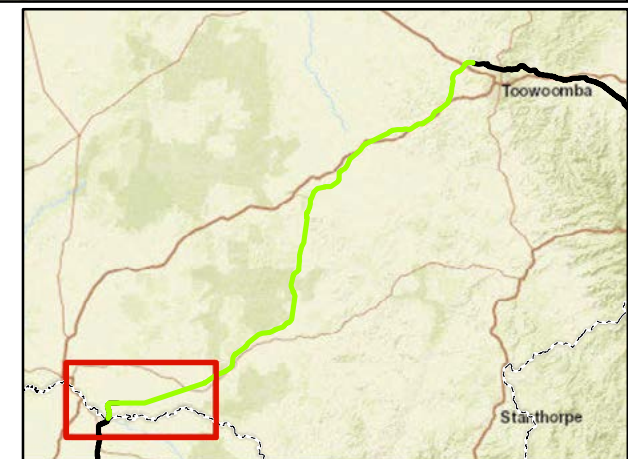


A3 scale: 1:1,300,000
0 10 20 30 40 50 km



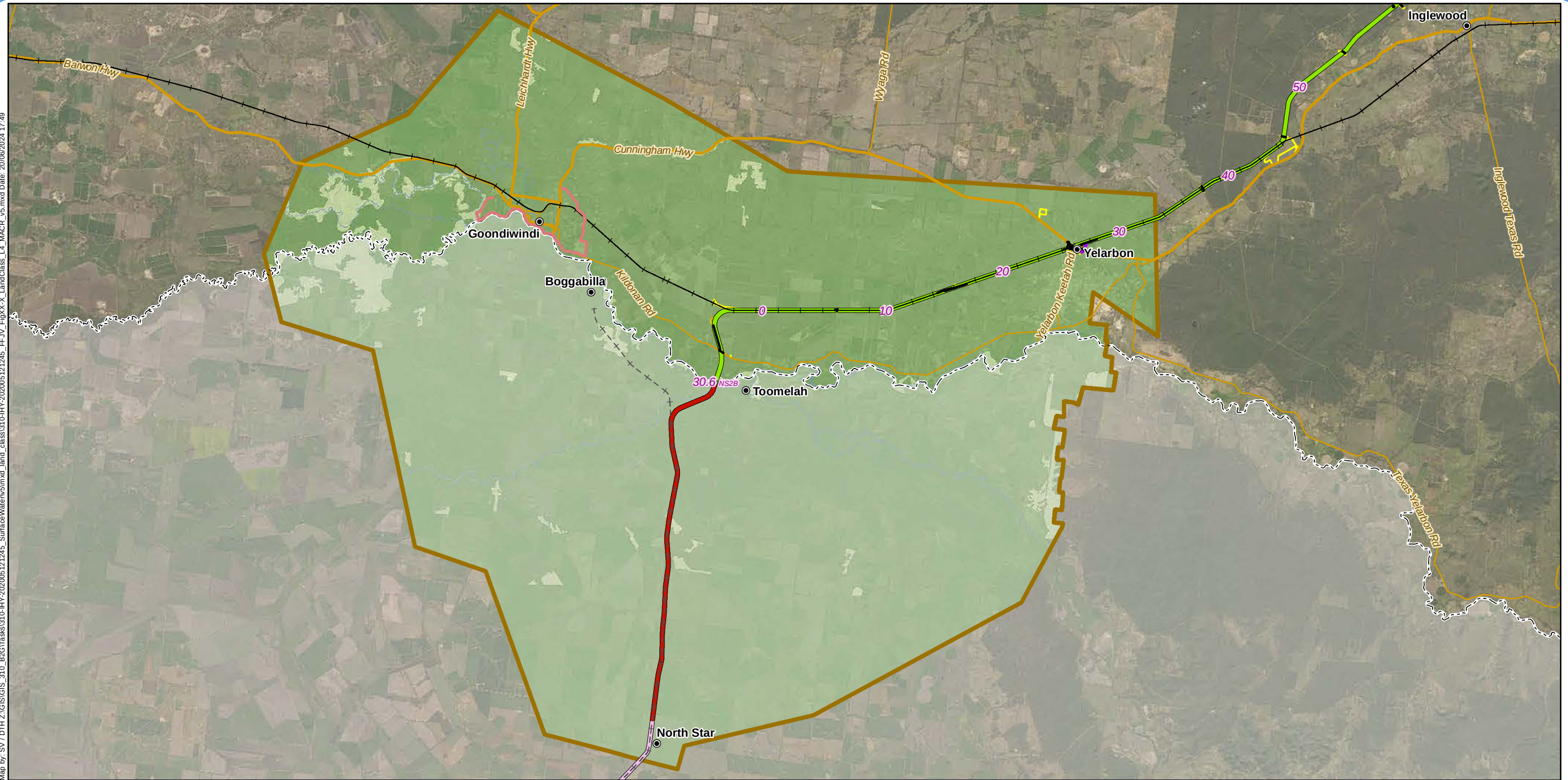
Legend

- | | | |
|--|---------------------|---------------------------------|
| 5 Chainage (km) | Major roads | Regional hydraulic model extent |
| Localities | Minor roads | Outflow boundaries |
| Existing rail (operational) | Project road design | Inflow boundaries |
| Border to Gowrie alignment | NSW/QLD border | |
| North Star to NSW/QLD border alignment | Project footprint | |



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

Map by: SV / DTH Z:\GIS\GIS_310_B2G1Tasks\310-HY-202005121245_SurfaceWater\mxd Land_class\310-HY-202005121245_FF JV_FigXX-X_LandClass_L4_MACR_v5.mxd Date: 20/06/2024 17:49



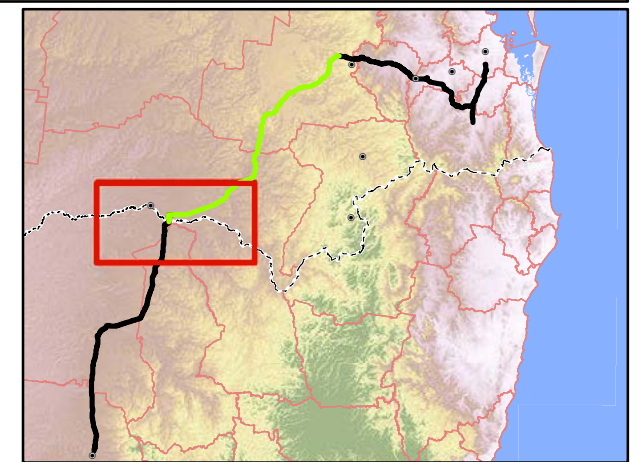
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Narrabri to North Star alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border

- Regional hydraulic model extent
- Project footprint
- Yelarbon levee
- Goondiwindi levee

Landuse classification

- Flood Plain (n = 0.08)
- Vegetated Flood Plain (n = 0.12)
- River Channel (n = 0.03)



A3 scale: 1:340,000
0 3 6 9 12 15 km



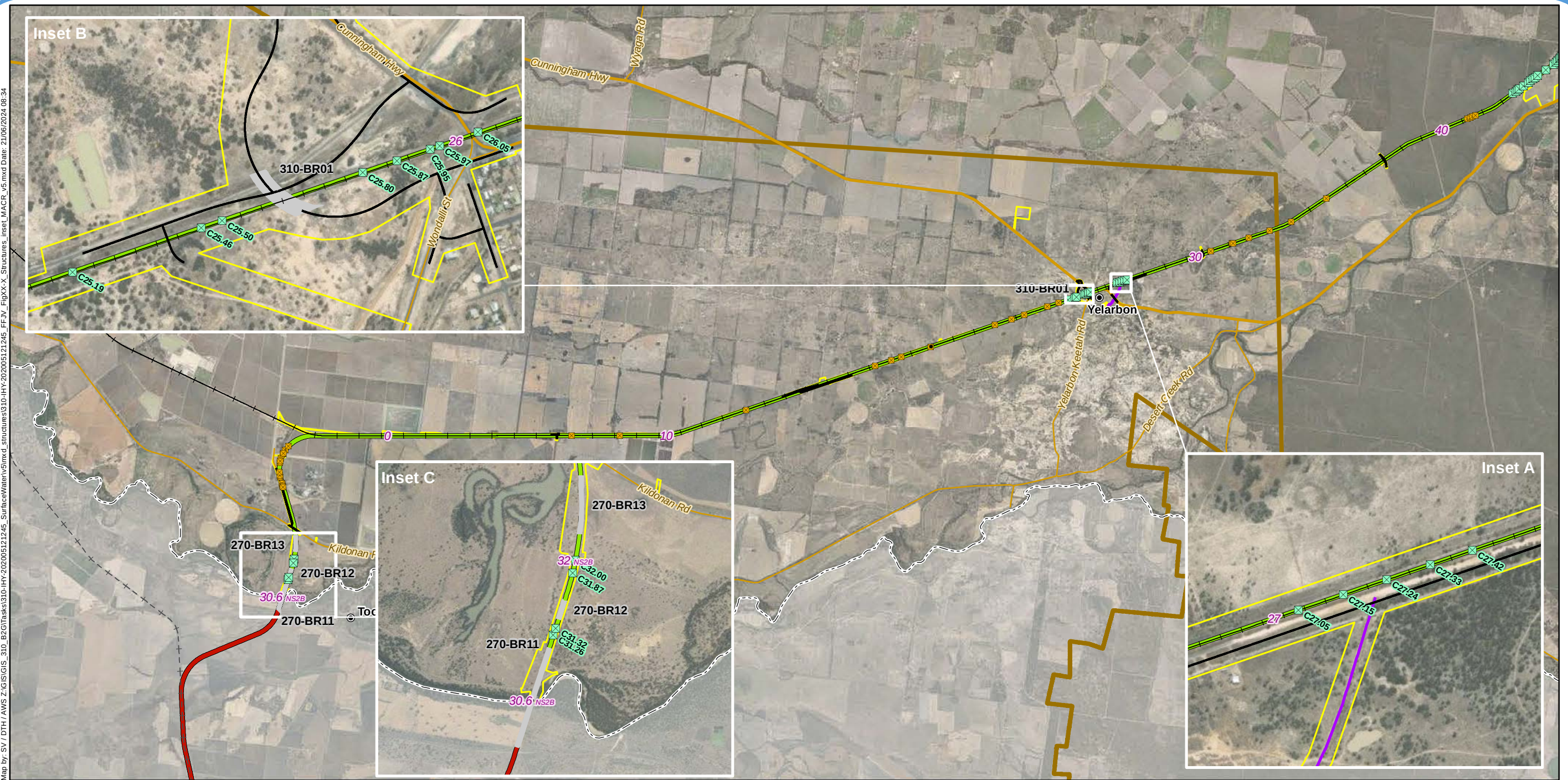
Future Freight
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Border to Gowrie

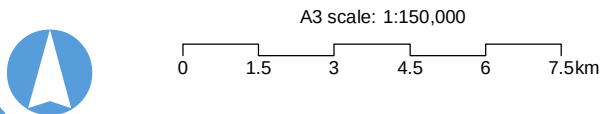
Figure M1-E:

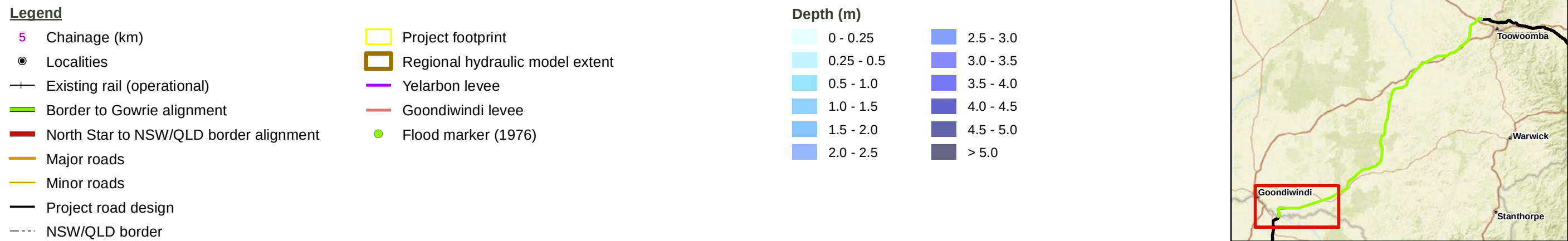
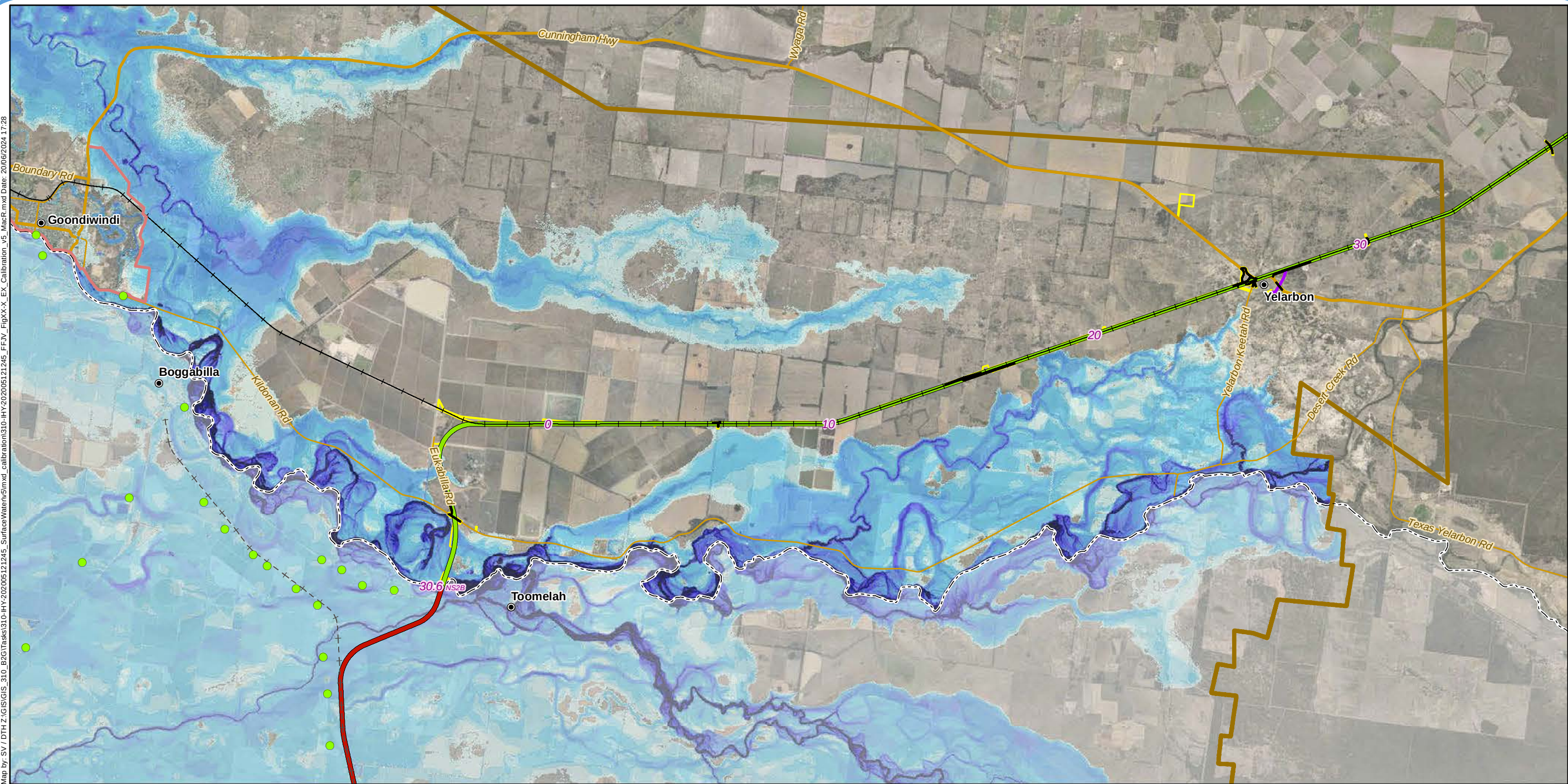
Landuse classifications - Macintyre River



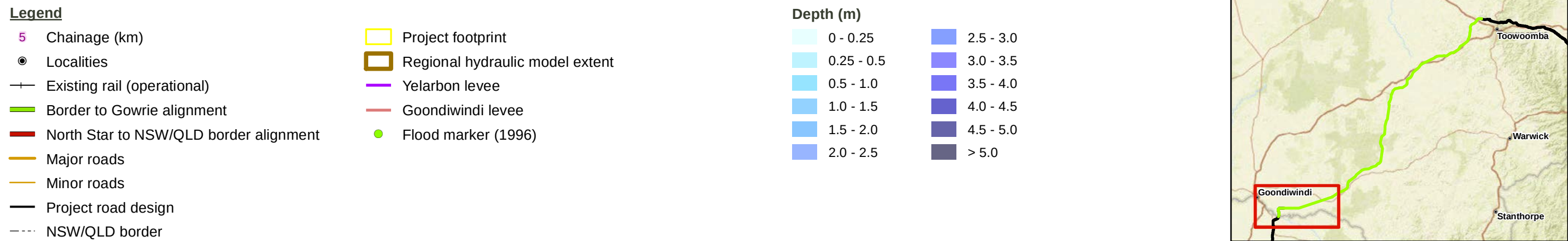
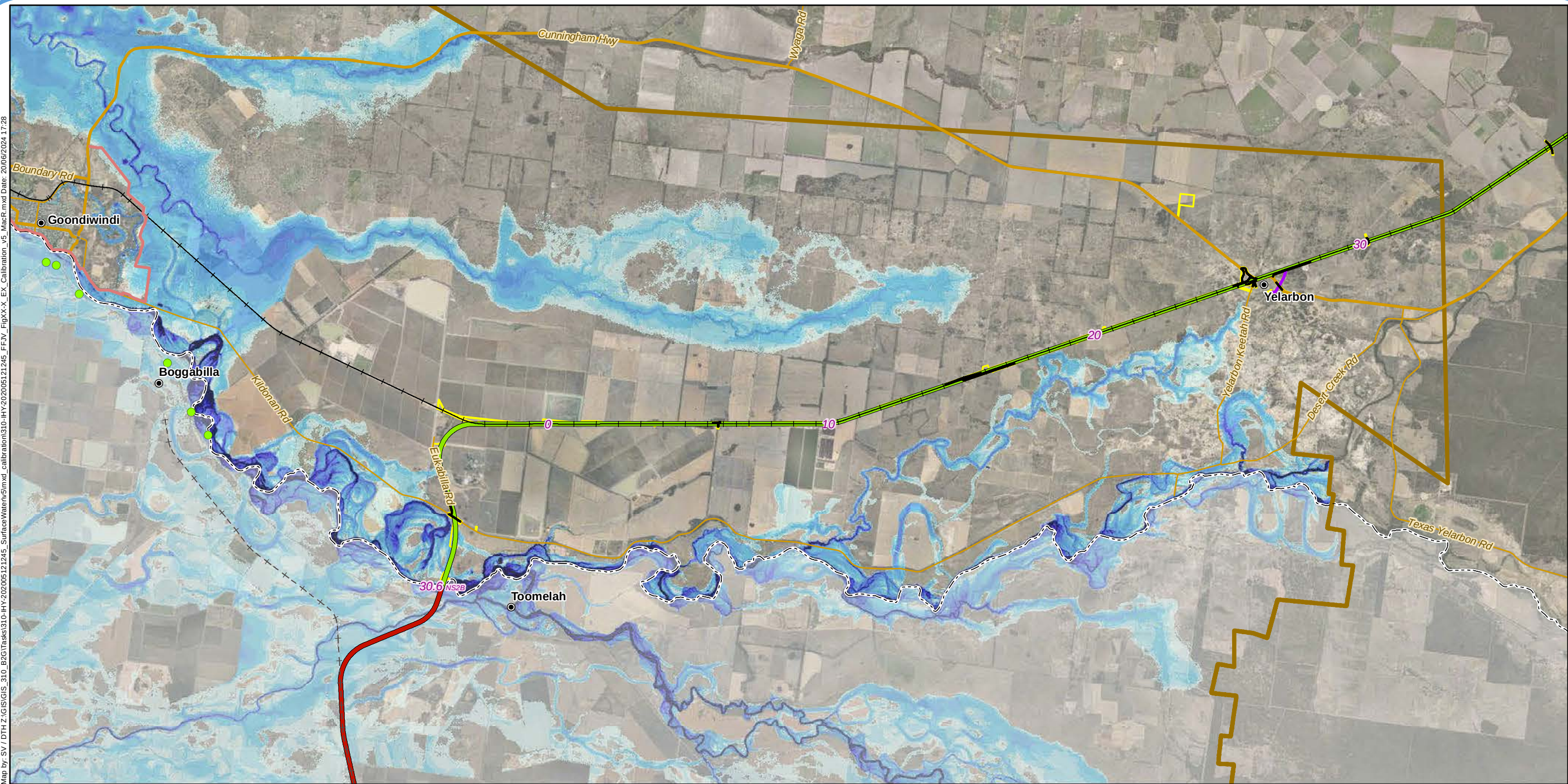
Legend

- 5 Chainage (km)
- Localities
- Floodplain culvert
- Local drainage culvert
- Existing rail (operational)
- Existing rail (non-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
- Bridges
- Regional hydraulic model extent
- Project footprint

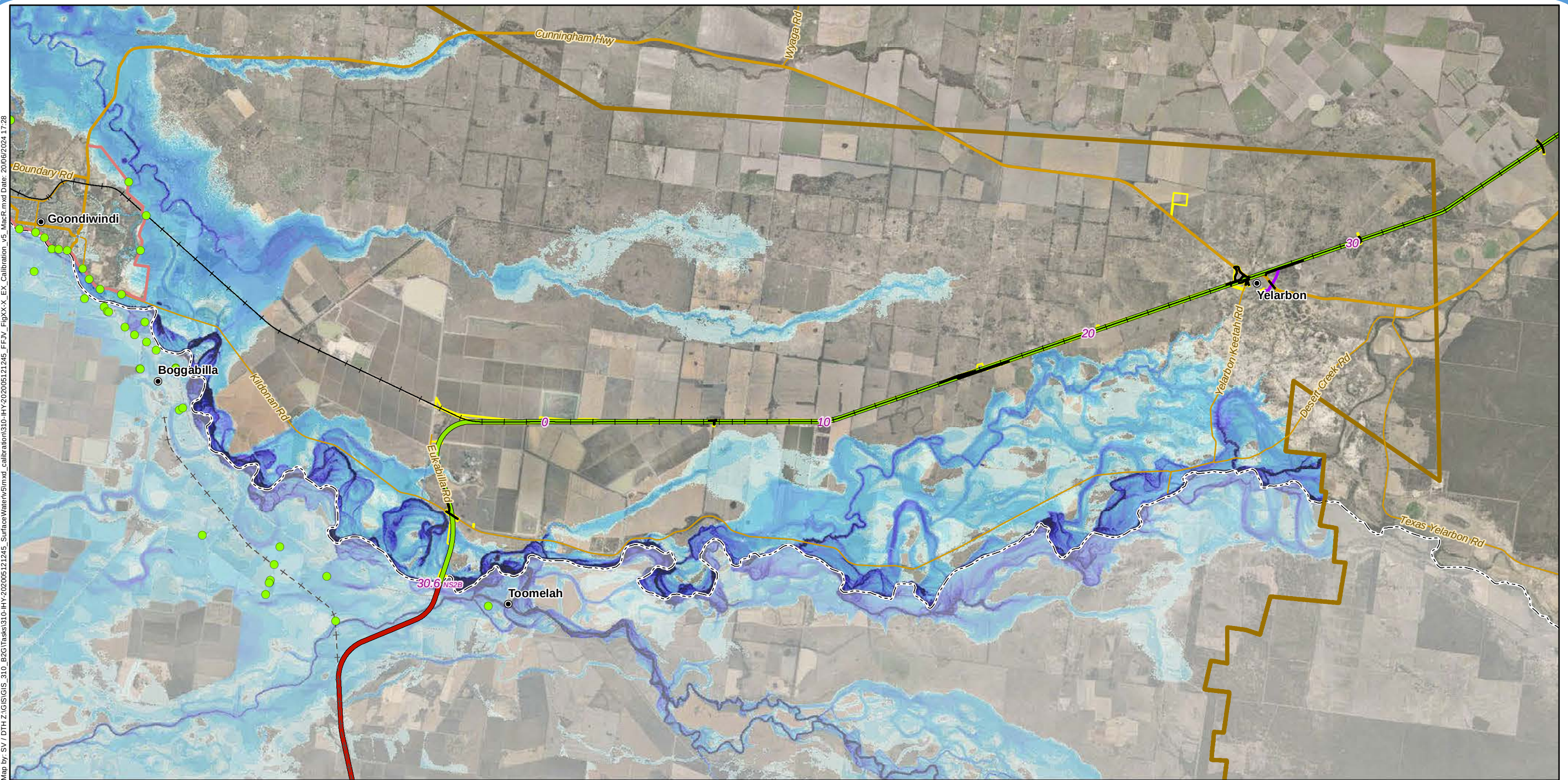




A3 scale: 1:150,000
0 1.5 3 4.5 6 7.5km



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

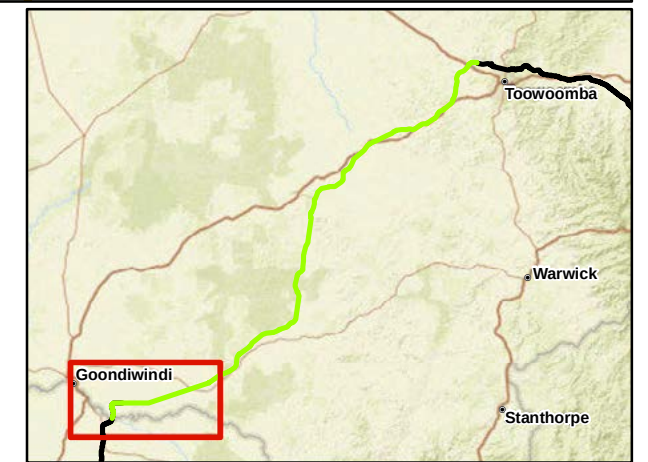


Legend

- | | |
|--|---------------------------------|
| 5 Chainage (km) | Project footprint |
| Localities | Regional hydraulic model extent |
| Existing rail (operational) | Yelarbon levee |
| Border to Gowrie alignment | Goondiwindi levee |
| North Star to NSW/QLD border alignment | Flood marker (2011) |
| Major roads | |
| Minor roads | |
| Project road design | |
| NSW/QLD border | |

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

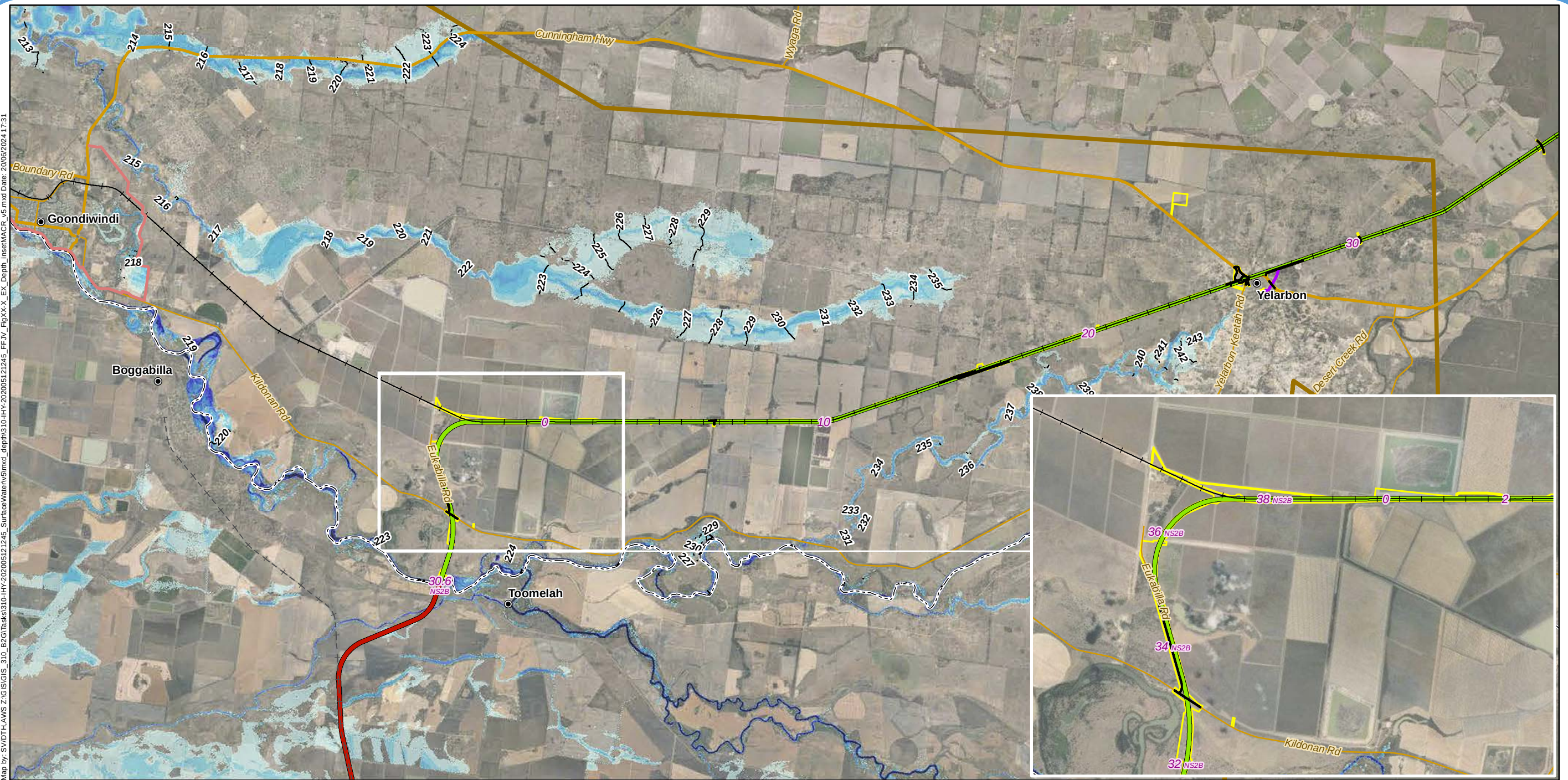


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Border to Gowrie

Figure M2-C:

2011 Calibration Event: Inundation Extent - Macintyre River

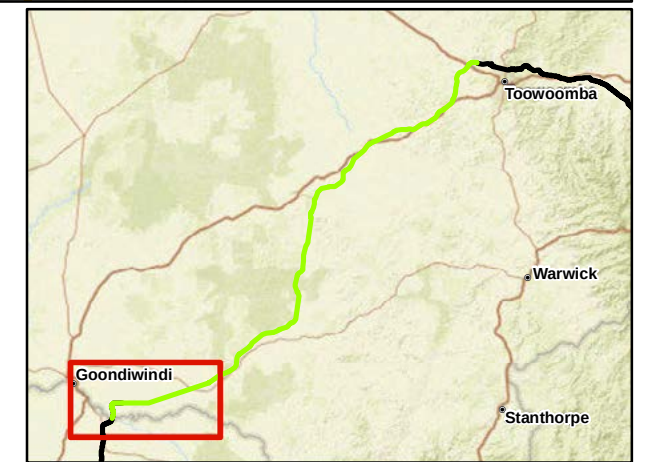


Legend

- 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
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- | | |
|------------|-----------|
| 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: 1:150,000
0 1.5 3 4.5 6 7.5km

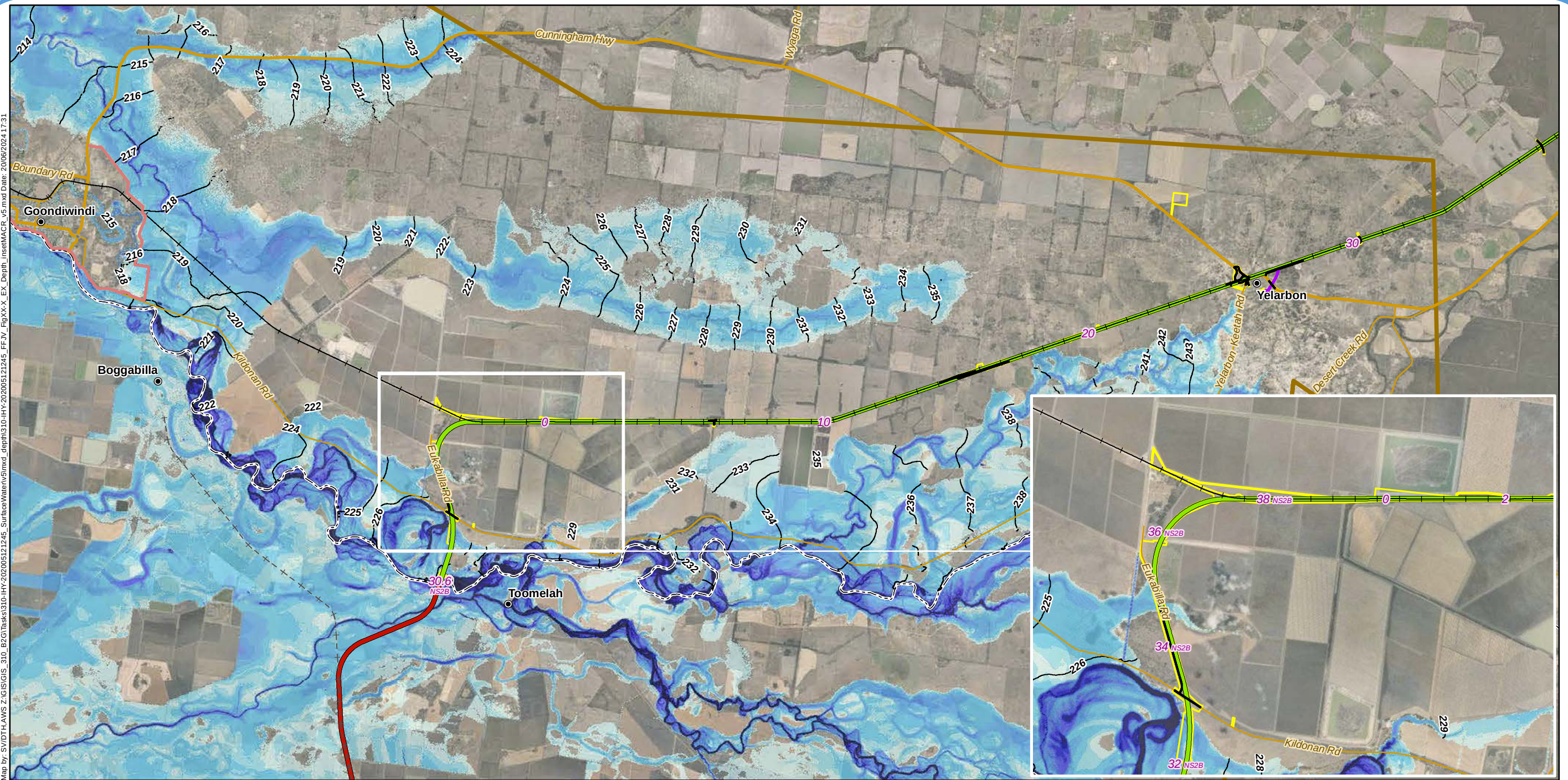


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M3-A:

20% AEP Event - Peak Water Levels - Existing Case - Macintyre River

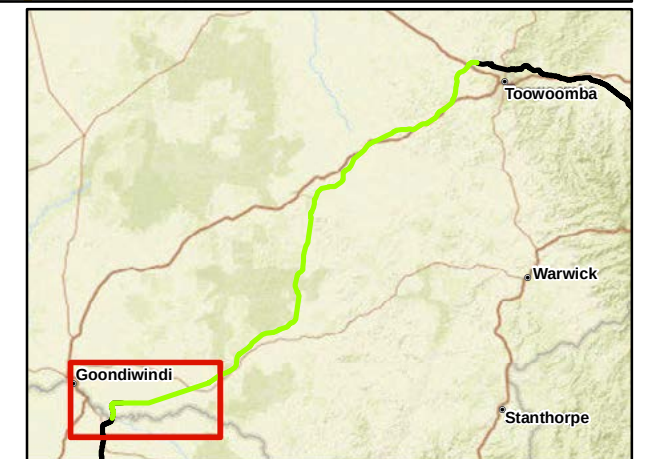


Legend

- 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
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated Velocity x Depth product (m²/s)

- | | |
|------------|-----------|
| 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: 1:150,000
0 1.5 3 4.5 6 7.5km



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

Border to Gowrie

Figure M3-B:

1% AEP Event - Peak Water Levels - Existing Case - Macintyre River

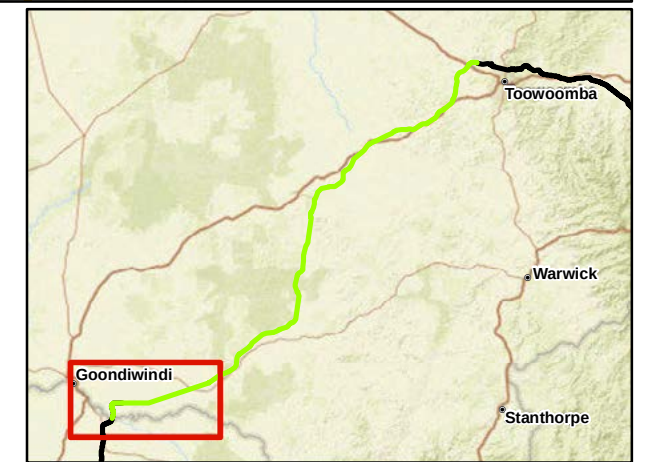


Legend

- 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
- Goondiwindi levee
- 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: 1:150,000
0 1.5 3 4.5 6 7.5km

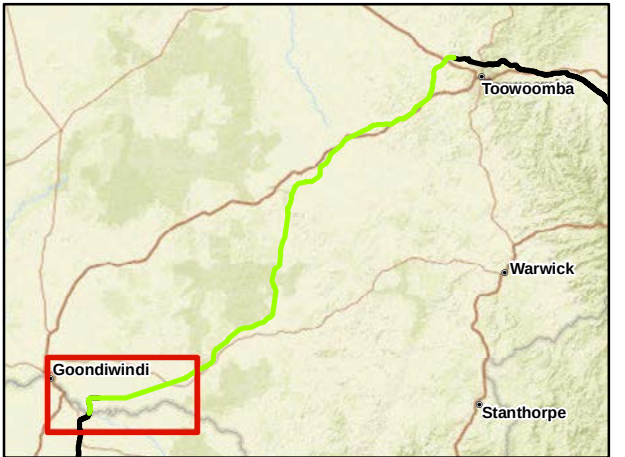


Legend

- 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
- Goondiwindi levee
- 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: 1:150,000
0 1.5 3 4.5 6 7.5km

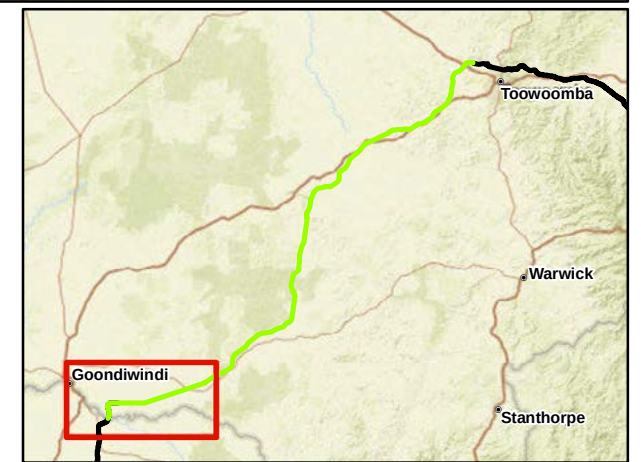


Legend

- 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
- Goondiwindi levee
- 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: 1:150,000
0 1.5 3 4.5 6 7.5km



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Border to Gowrie

Figure M3-E:

20% AEP Event - Peak Hazard - Existing Case - Macintyre River

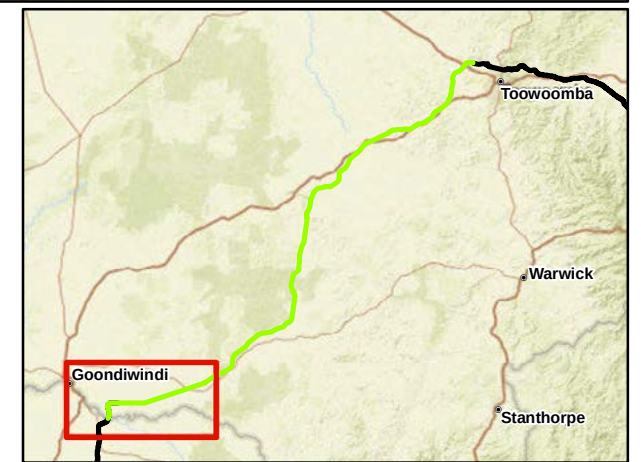


Legend

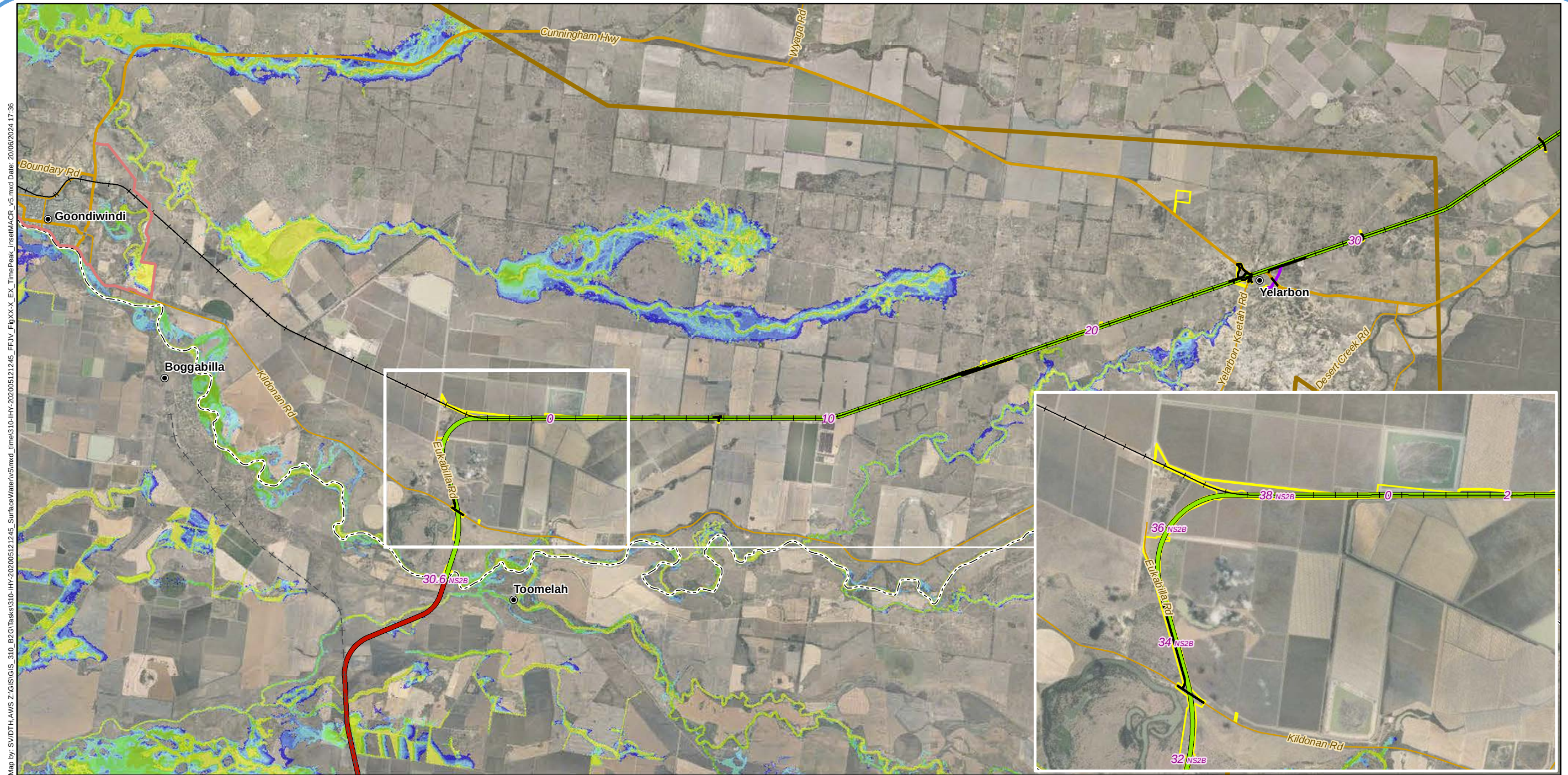
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

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

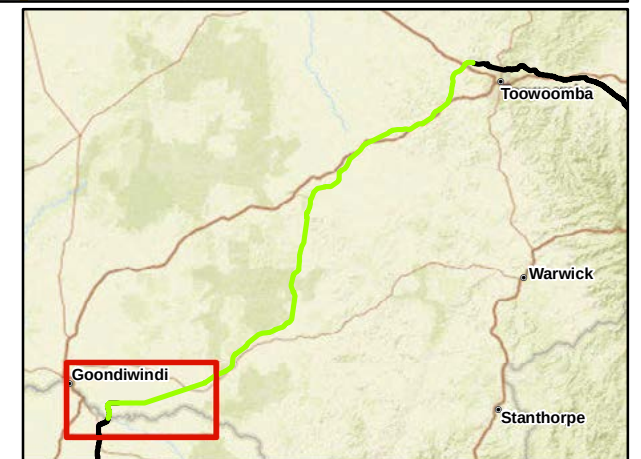


Legend

- 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
- Goondiwindi levee
- 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: 1:150,000
0 1.5 3 4.5 6 7.5km

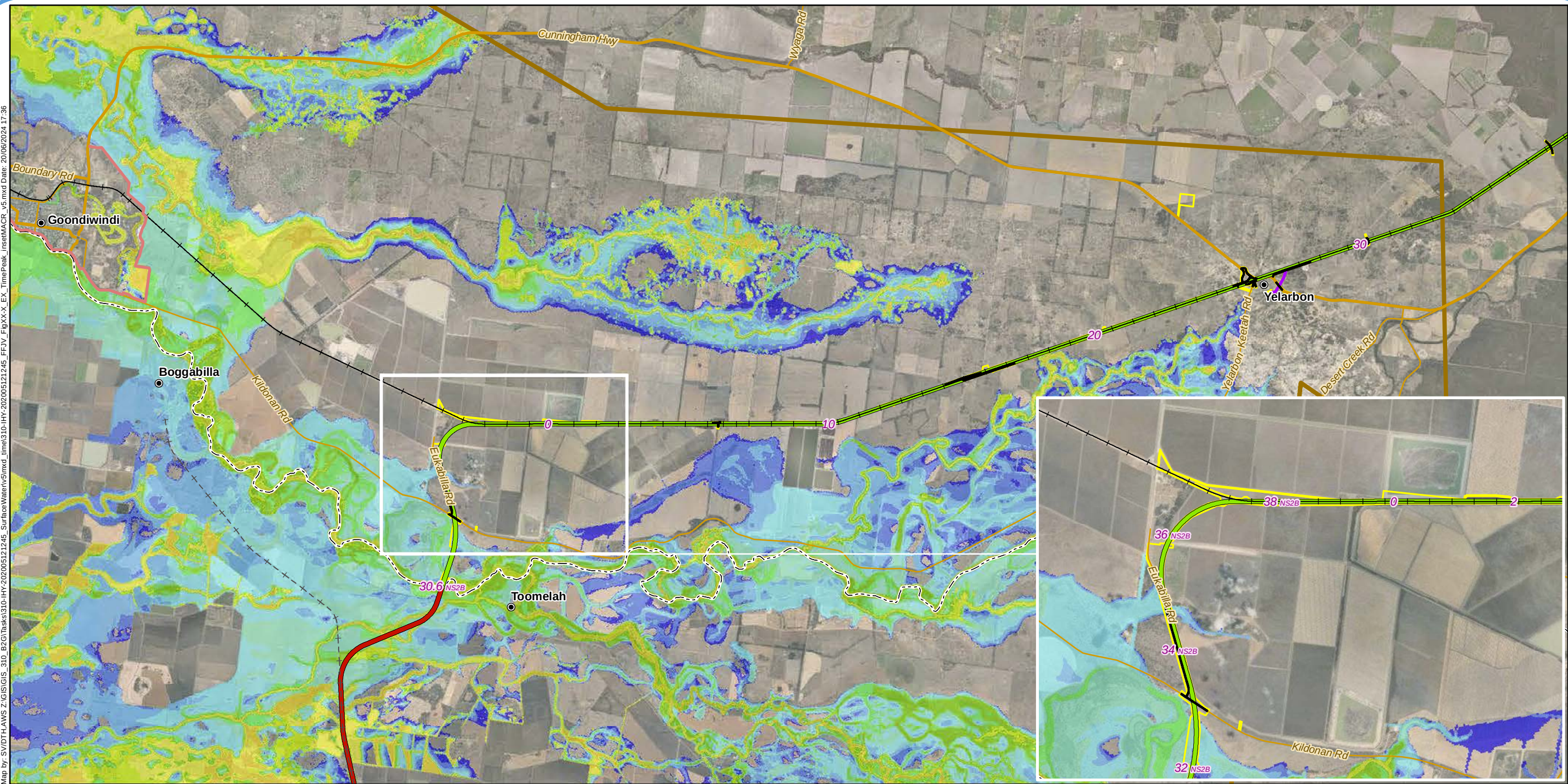


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M3-G:

20% AEP Event - Peak Time of Inundation - Existing Case - Macintyre River

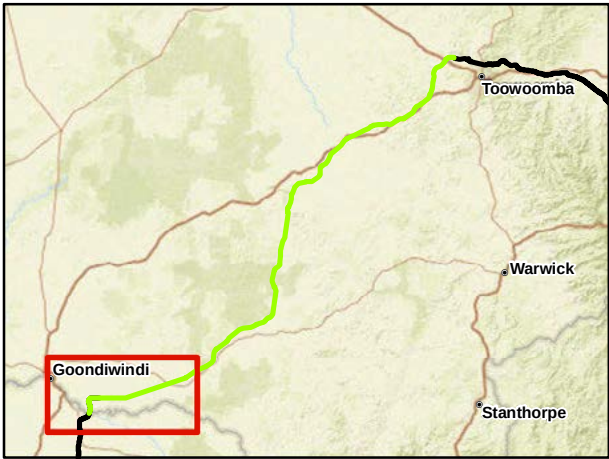


Legend

- 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
- Goondiwindi levee
- 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: 1:150,000
0 1.5 3 4.5 6 7.5km



Future Freight
Integrating Community, Environment and Engineering

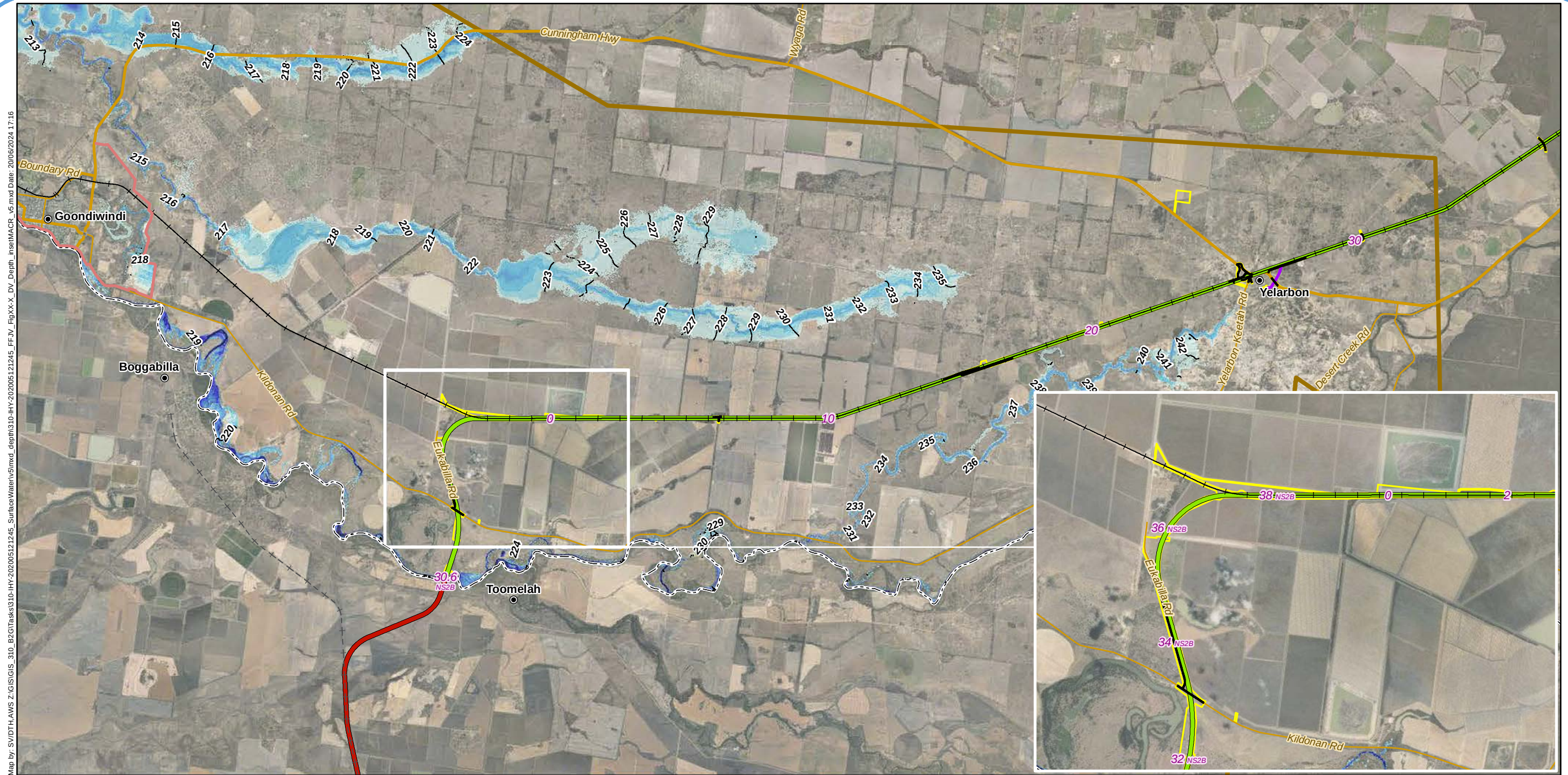
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M3-H:

1% AEP Event - Peak Time of Inundation - Existing Case - Macintyre River

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF\3V_FigX-X_DV_Depth_inset\MACR_v5.mxd Date: 20/06/2024 17:16



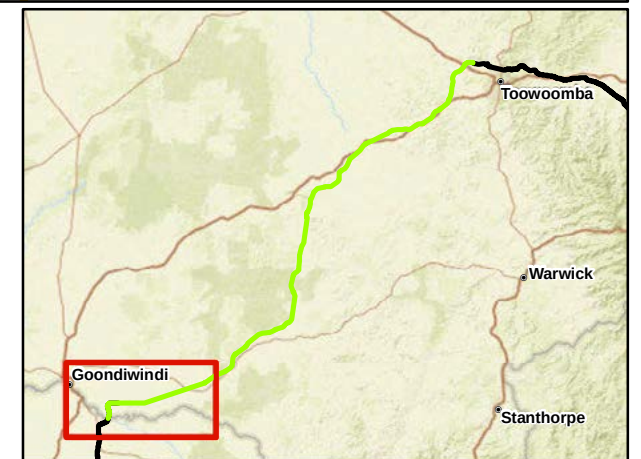
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results
south of the QLD/NSW border not shown.



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

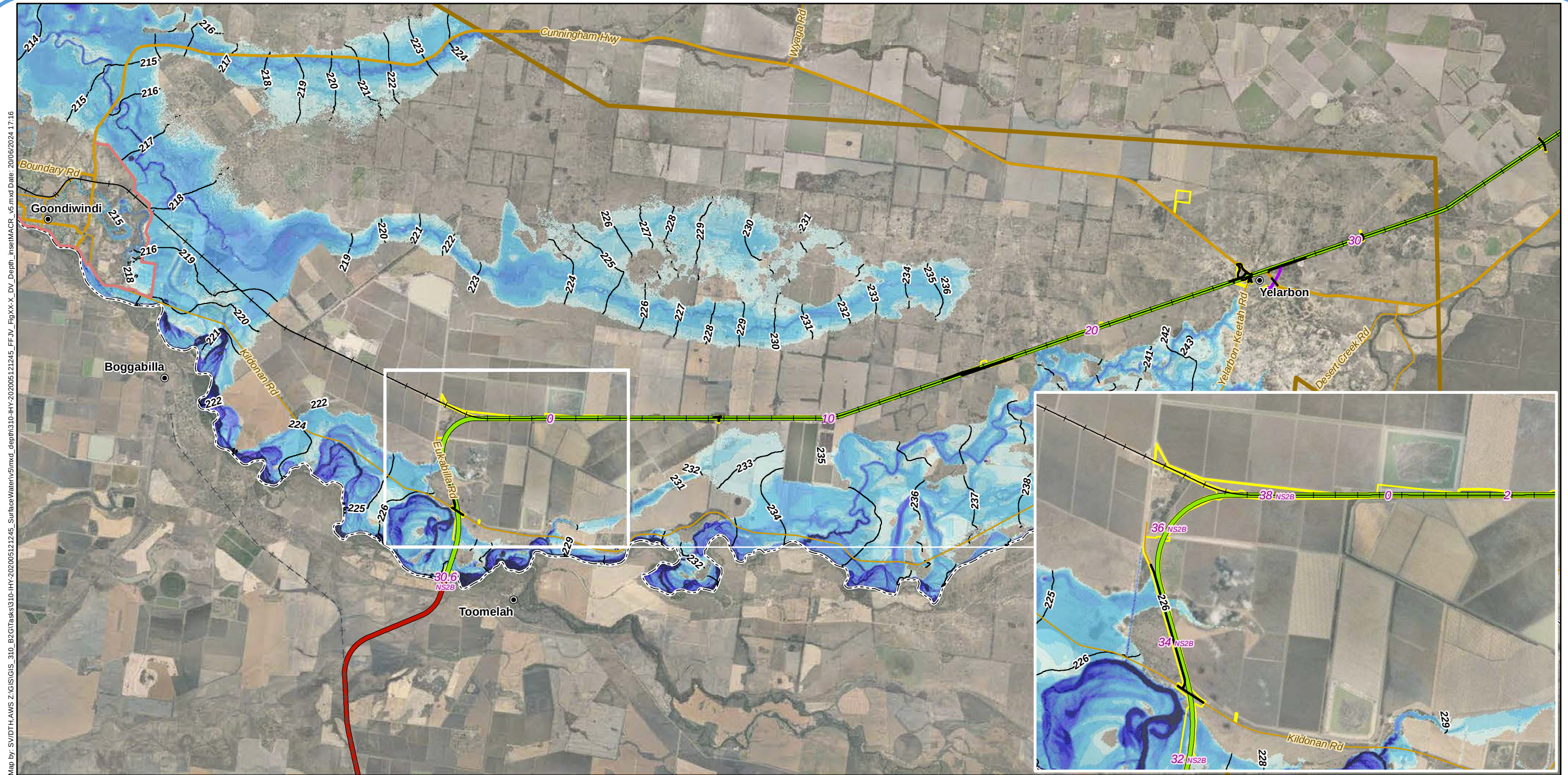


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M4-A:

20% AEP Event - Peak Water Levels - Developed Case - Macintyre River



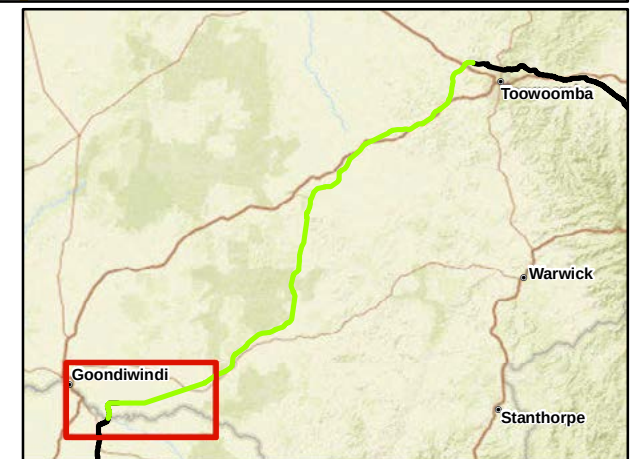
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:150,000

0 1.5 3 4.5 6 7.5km



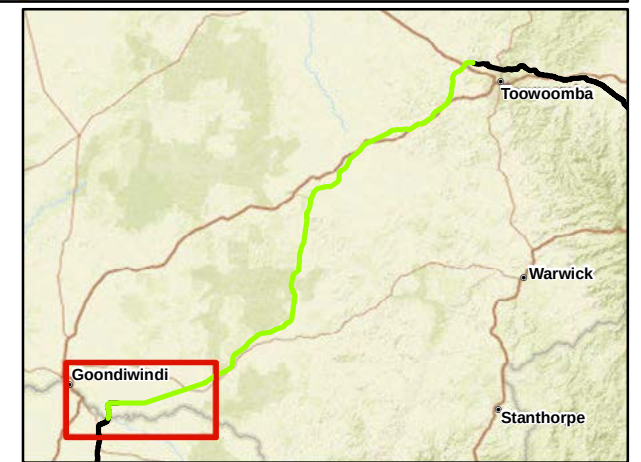
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results south of the QLD/NSW border not shown.



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



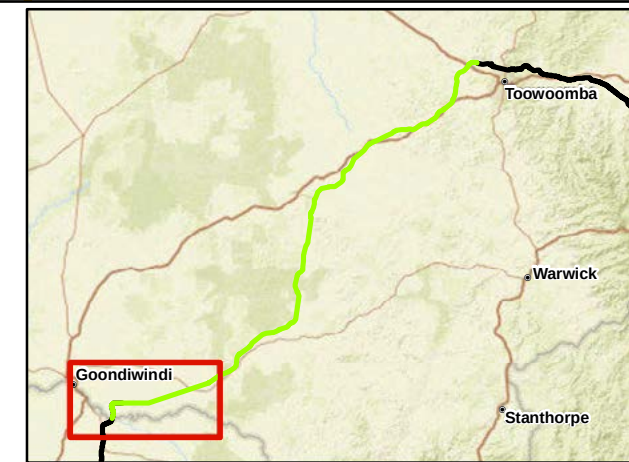
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results south of the QLD/NSW border not shown.



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

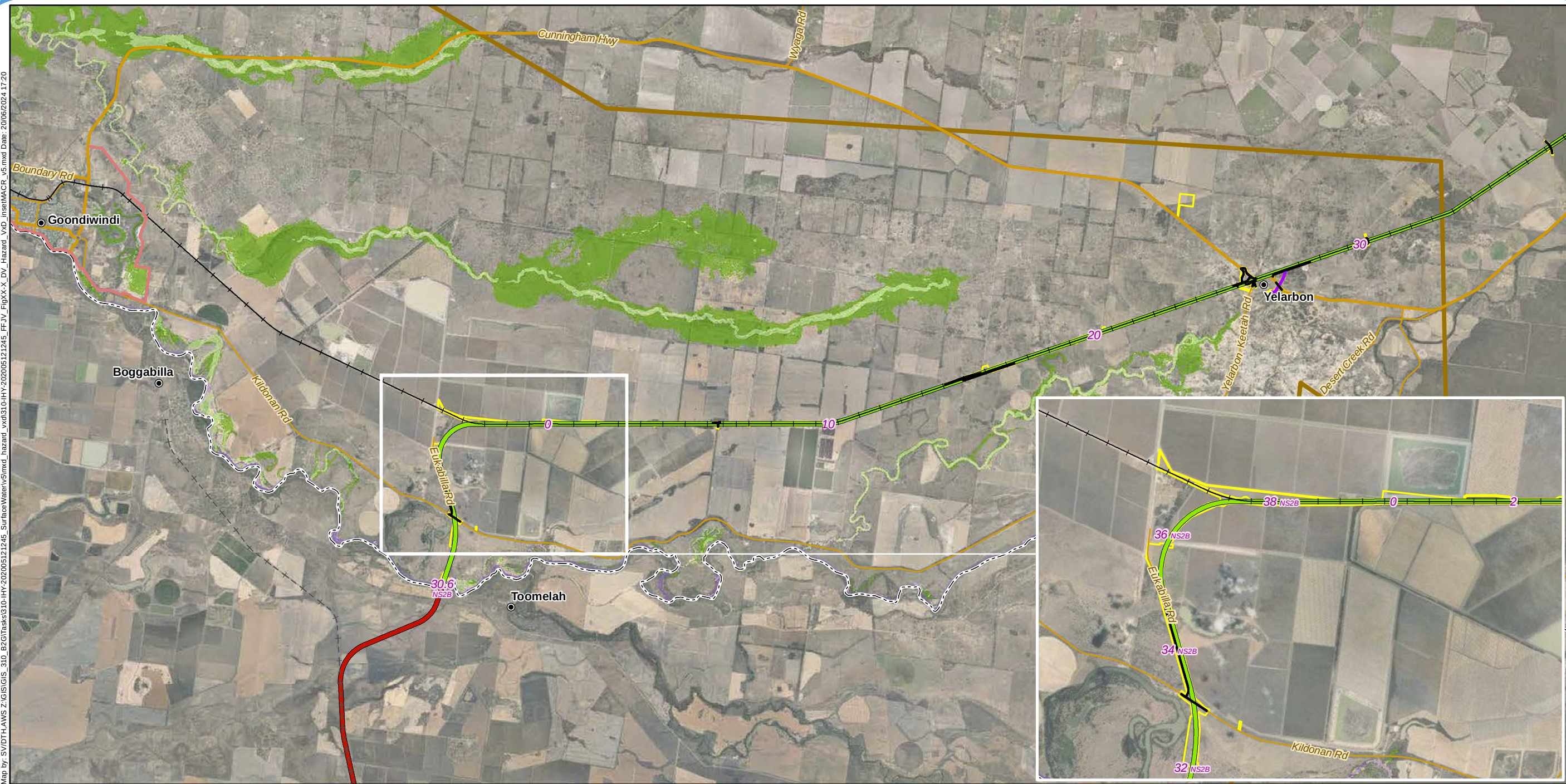


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M4-D:

1% AEP Event - Peak Velocity - Developed Case - Macintyre River



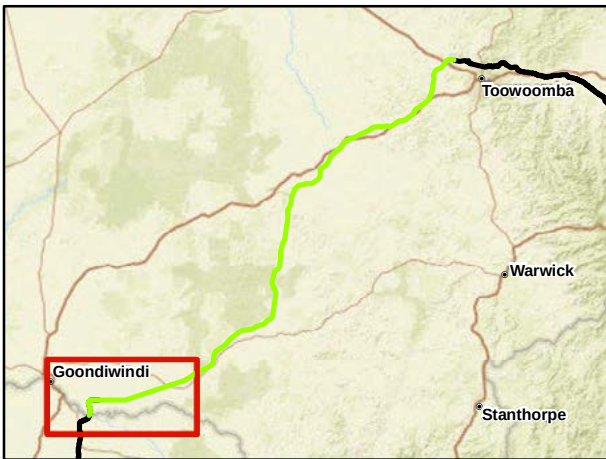
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results
south of the QLD/NSW border not shown.



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

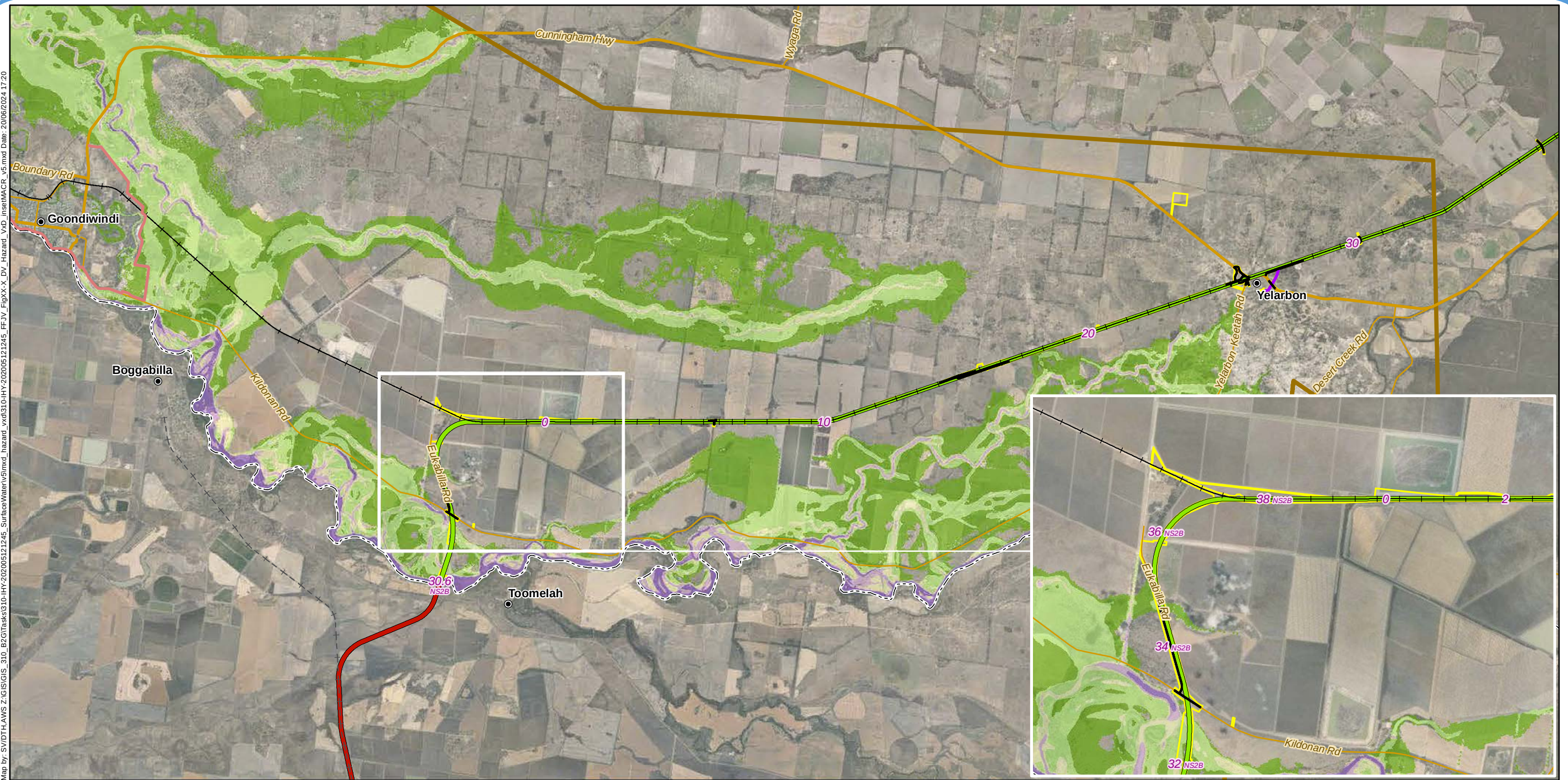


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M4-E:

20% AEP Event - Peak Hazard - Developed Case - Macintyre River



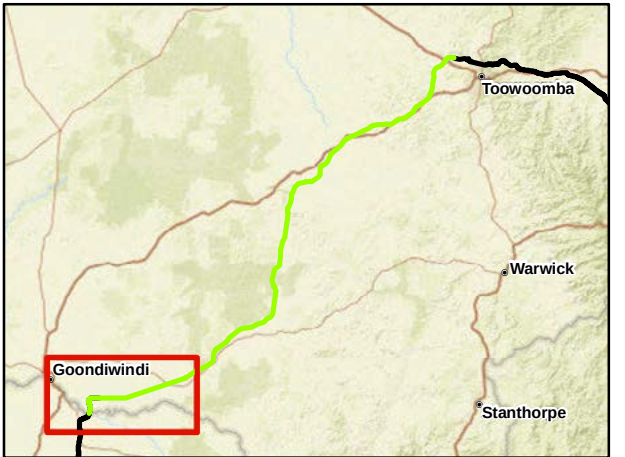
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:150,000

0 1.5 3 4.5 6 7.5km



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 M4-F:

1% AEP Event - Peak Hazard - Developed Case - Macintyre River



- Estimated time of inundation (hours)

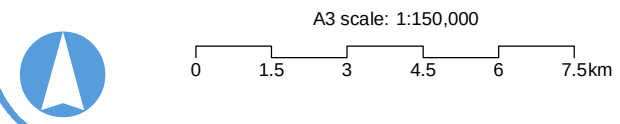
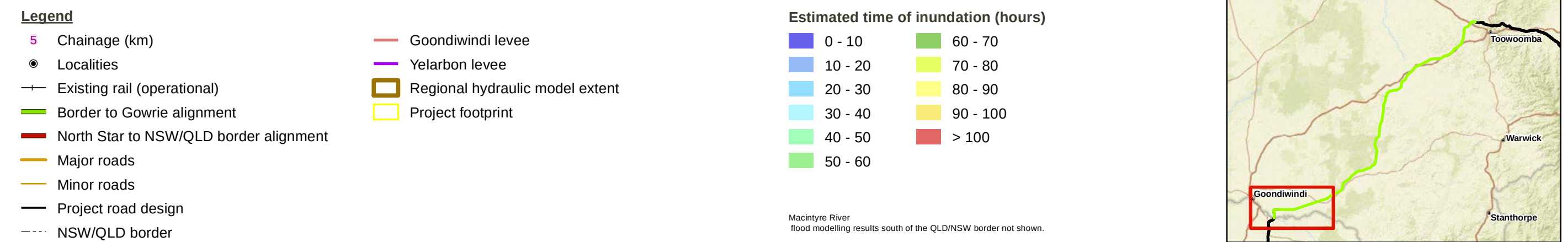
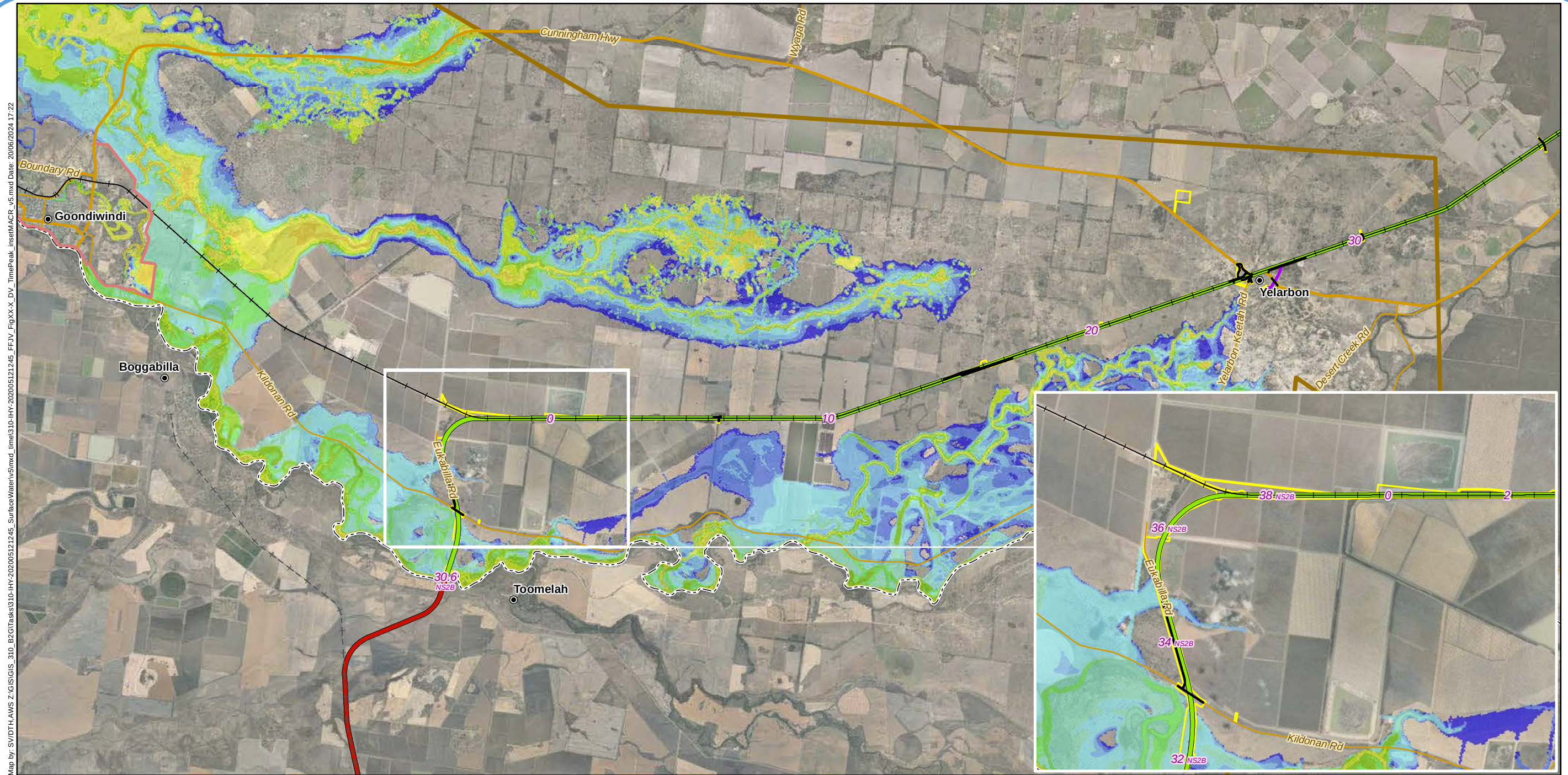
Macintyre River
flood modelling results south of the OLD/NSW border not shown.



Border to Gowrie

Figure M4-G:

20% AEP Event - Peak Time of Inundation - Developed Case - Macintyre River





Legend

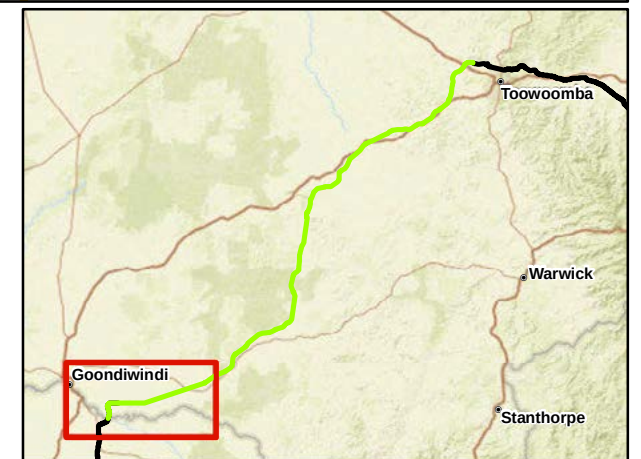
- Flood sensitive receptor
- Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border

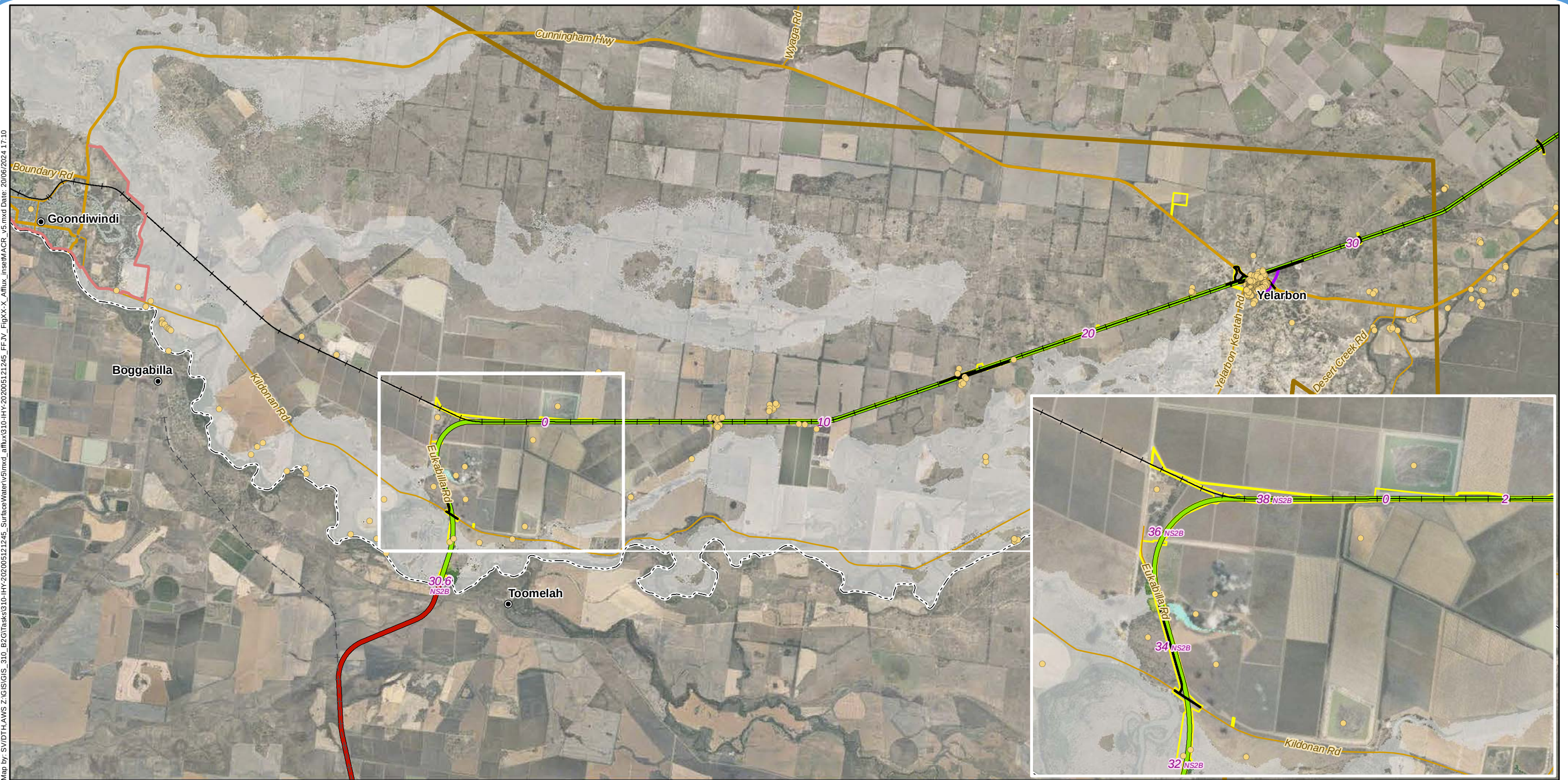
- Yelarbon levee
- Goondiwindi levee
- Regional hydraulic model extent
- Project footprint

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 River
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
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border

- Yelarbon levee
- Goondiwindi 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 River
flood modelling results
south of the QLD/NSW border not shown.



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

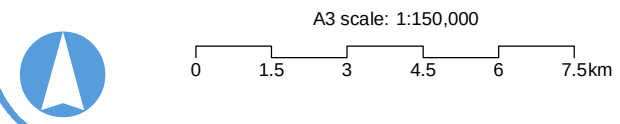
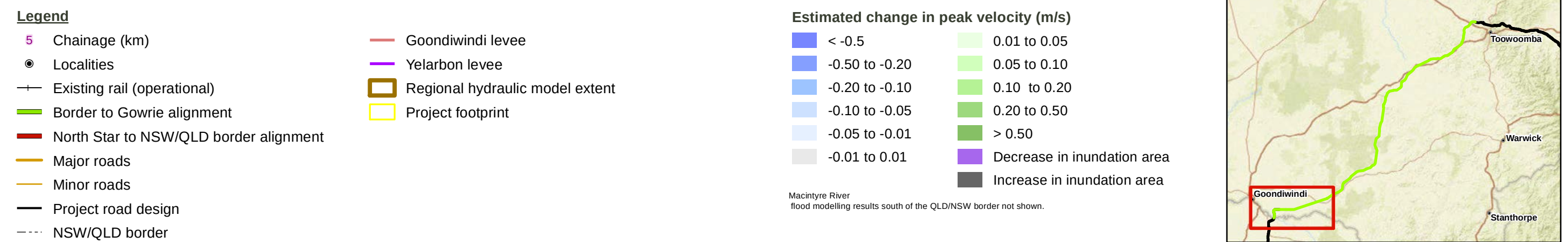


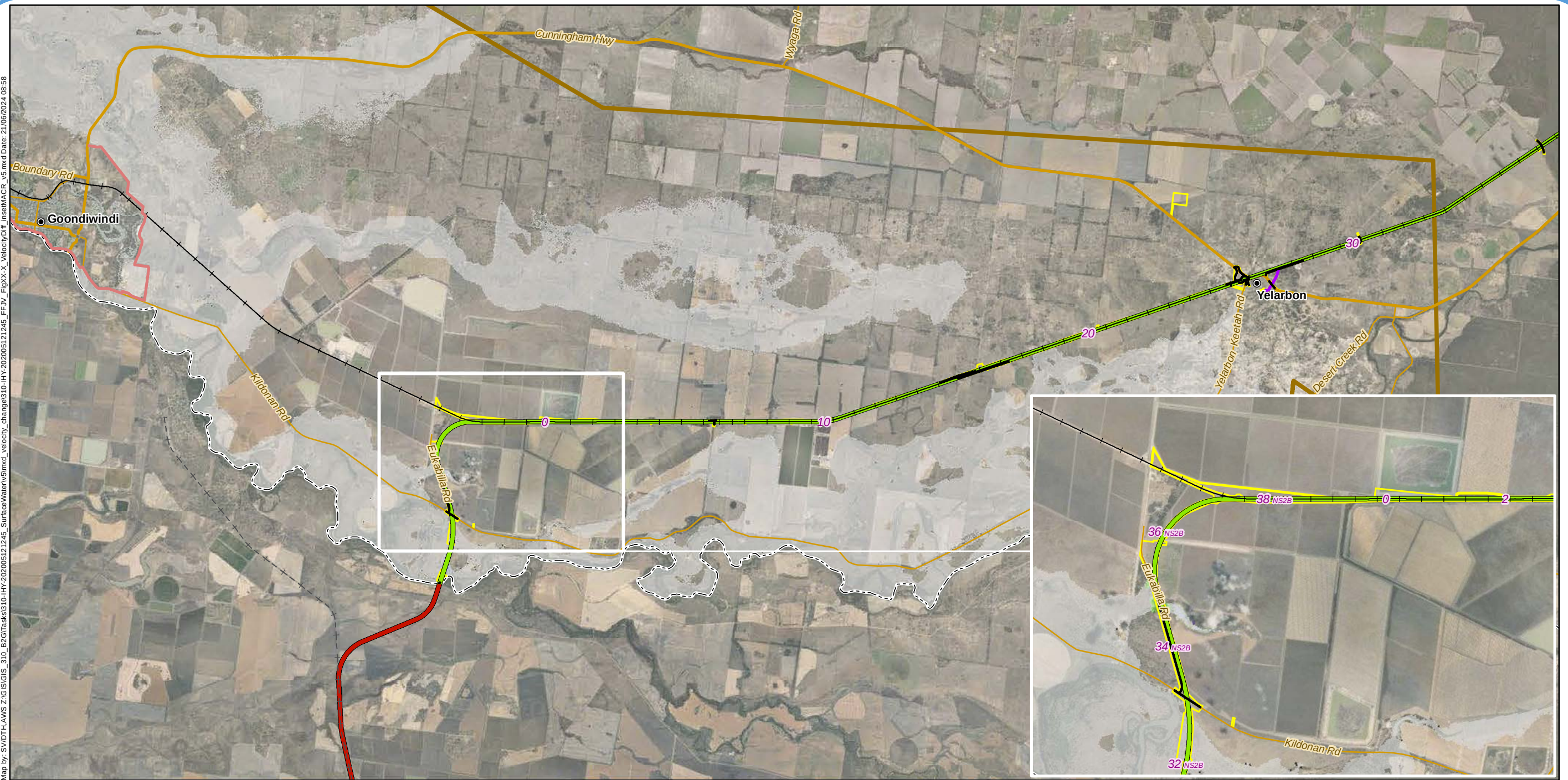
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M5-B:

1% AEP Event - Afflux - Macintyre River





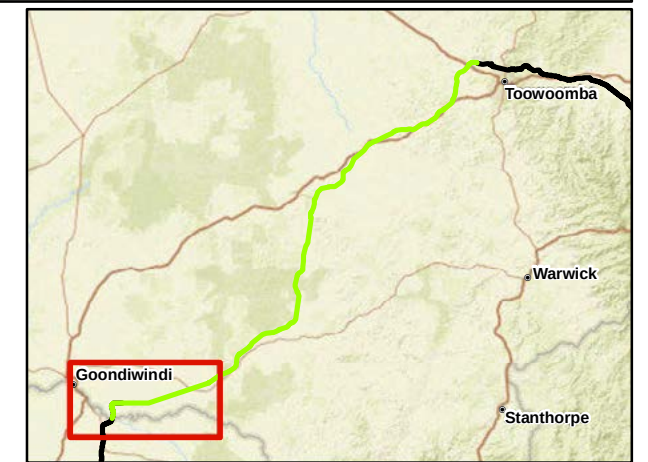
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results south of the QLD/NSW border not shown.



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

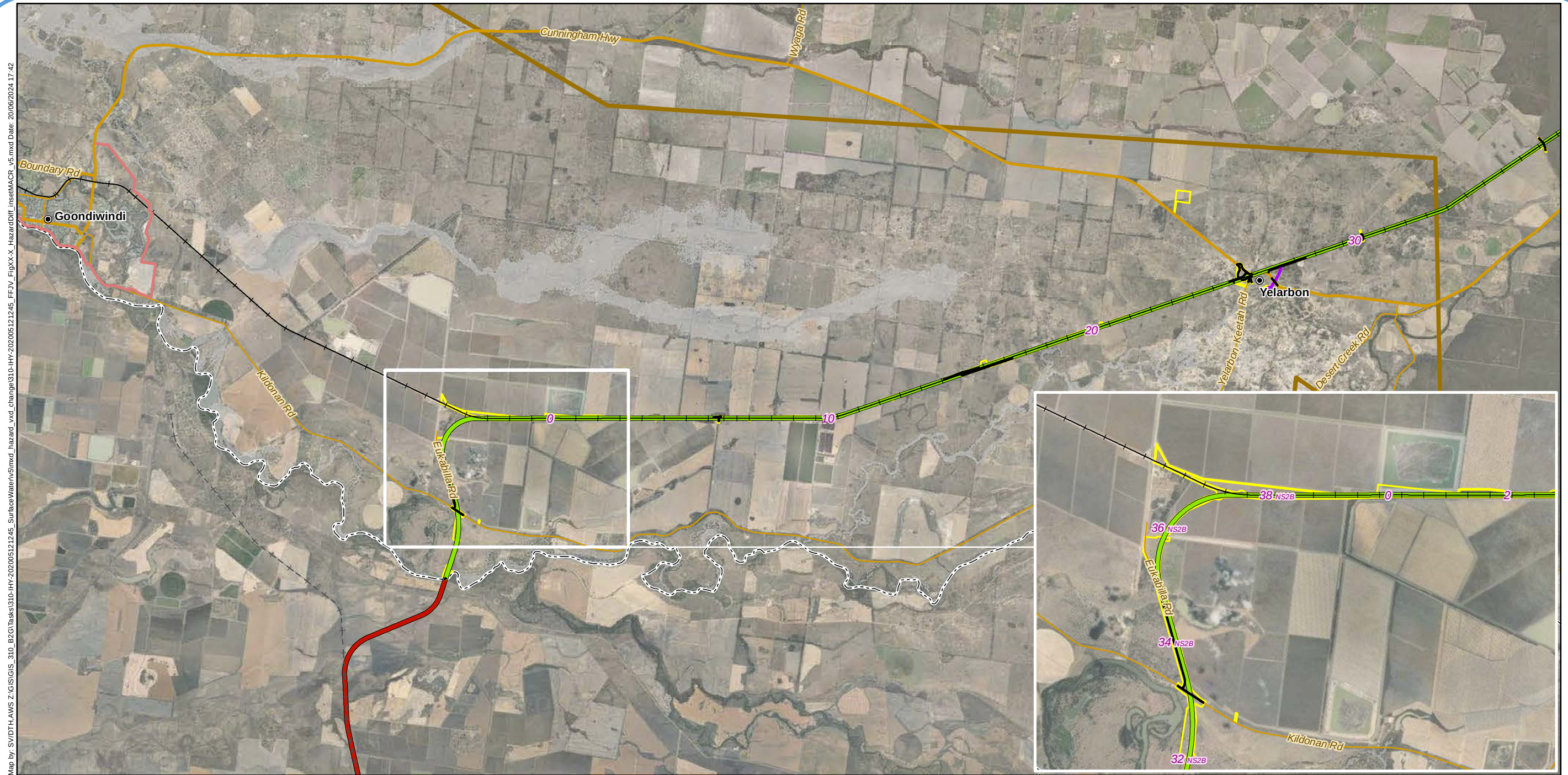


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M5-D:

1% AEP Event - Change in Velocity - Macintyre River



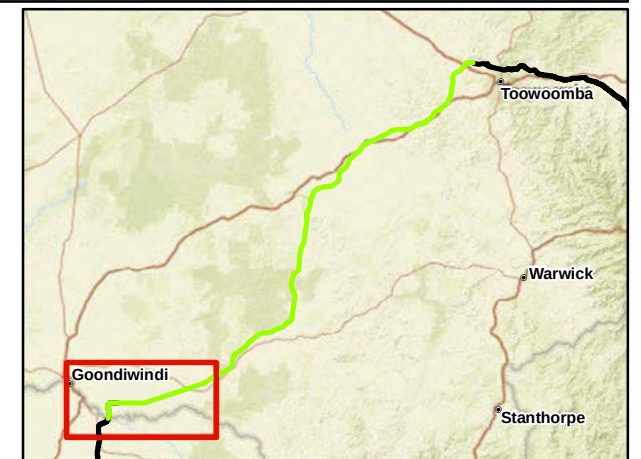
Legend

- 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
- Goondiwindi levee
- Yelarbon levee
- 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 |

Macintyre River
flood modelling results
south of the QLD/NSW border not shown.



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

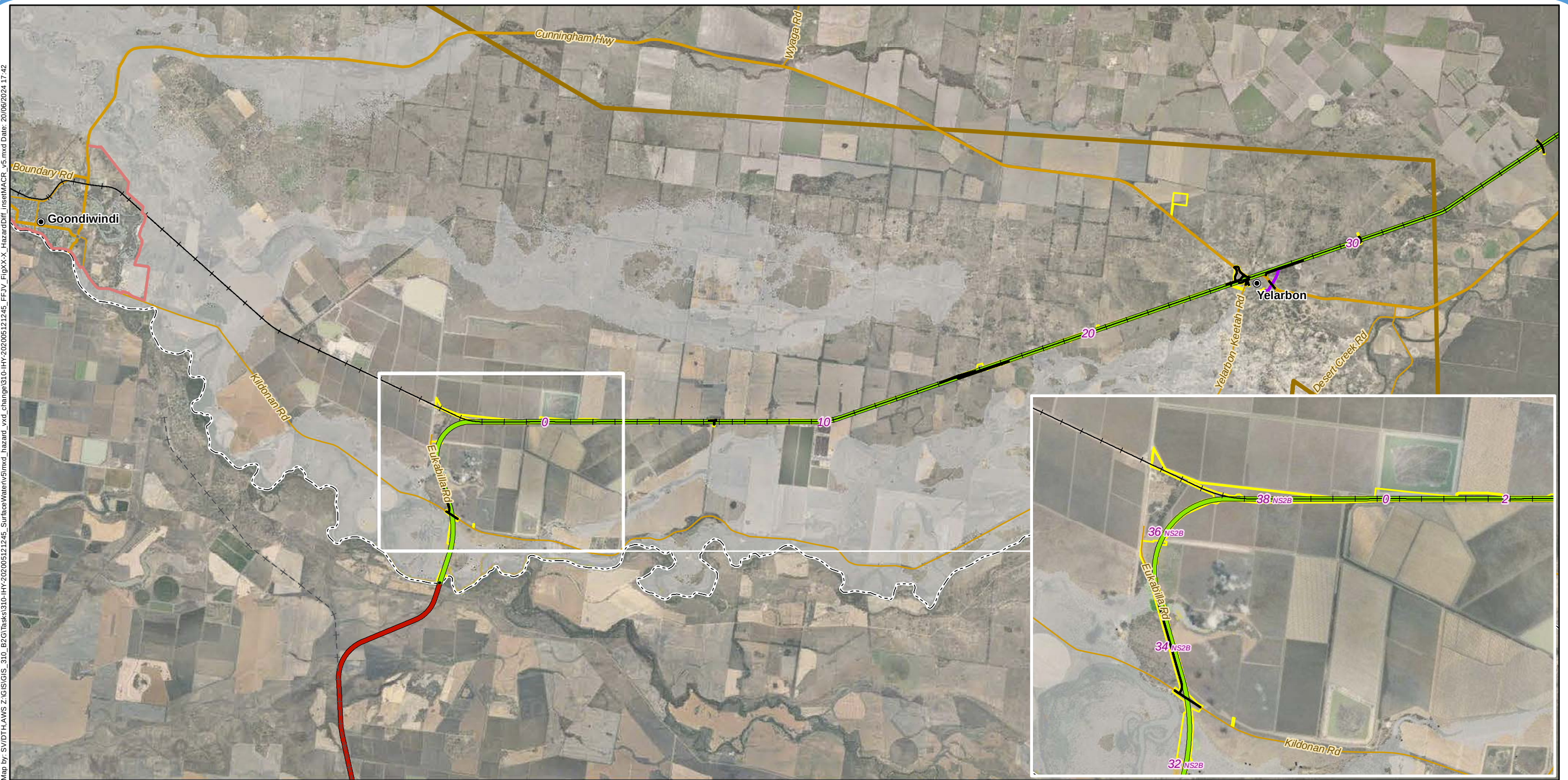


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M5-E:

20% AEP Event - Change in Hazard - Macintyre River



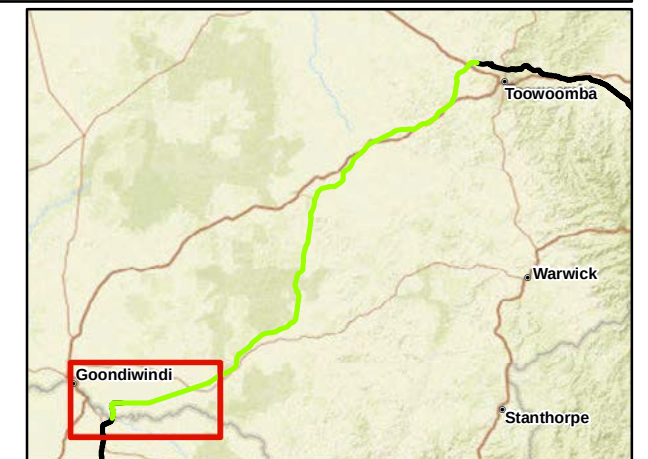
Legend

- 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
- Goondiwindi levee
- Yelarbon levee
- 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 |

Macintyre River
flood modelling results
south of the QLD/NSW border not shown.



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

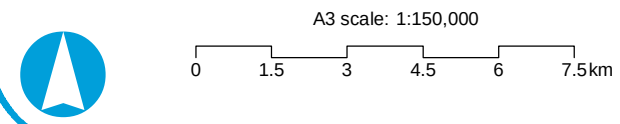
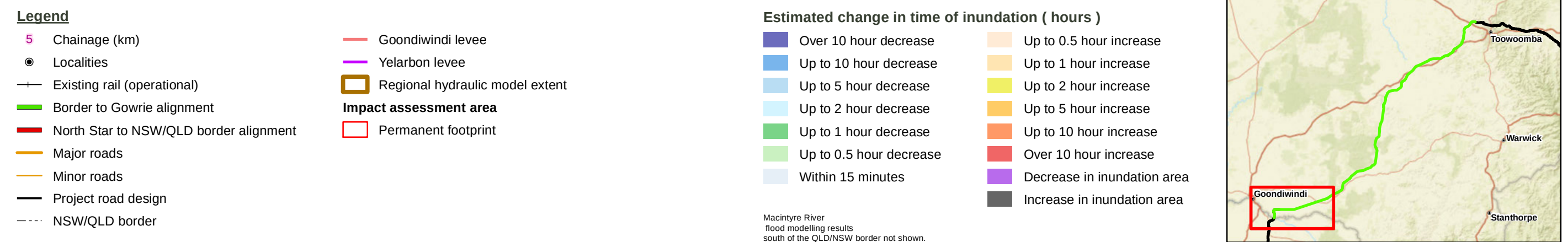


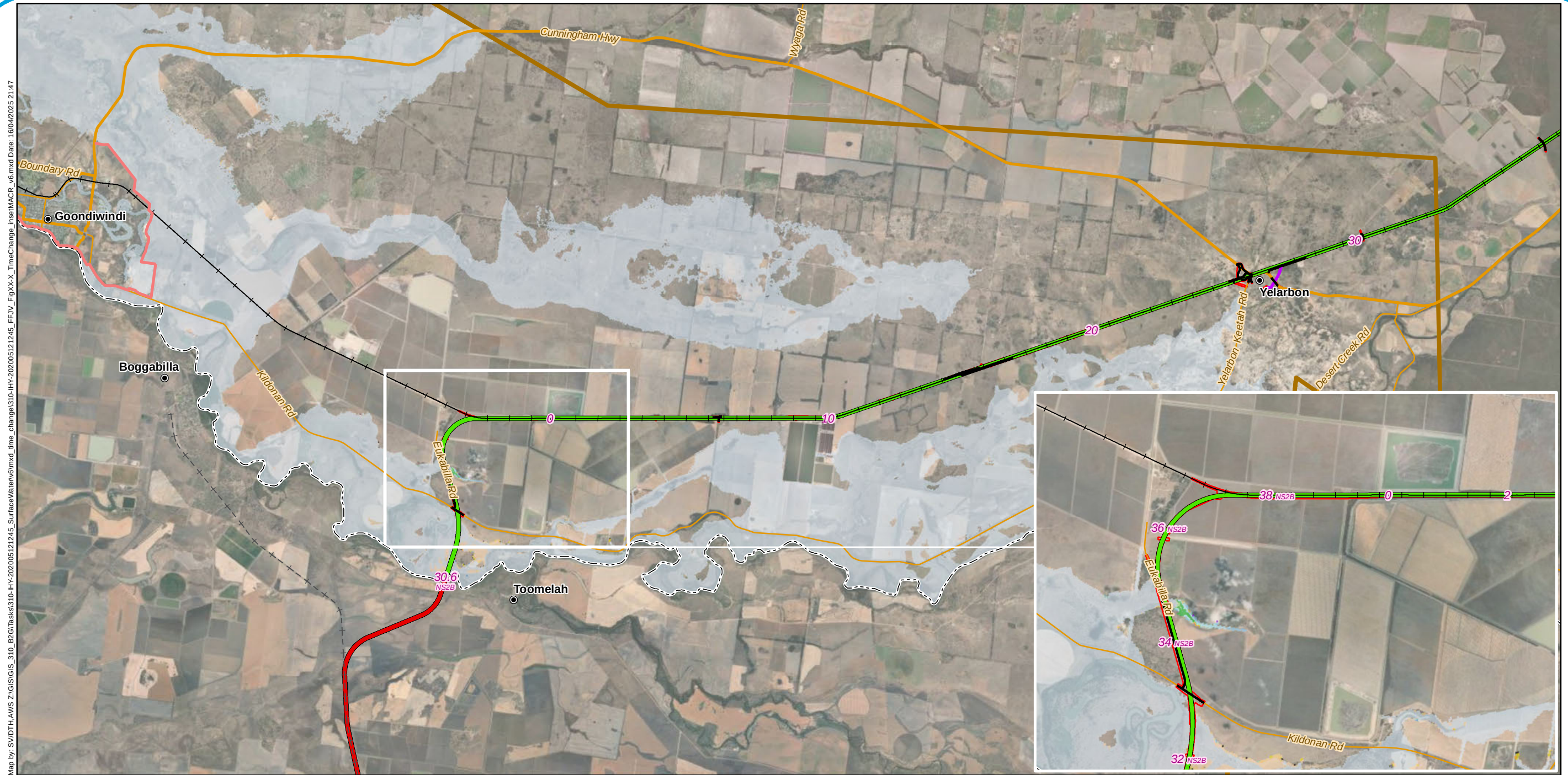
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M5-F:

1% AEP Event - Change in Hazard - Macintyre River





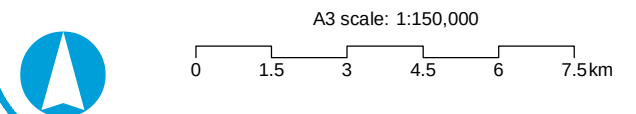
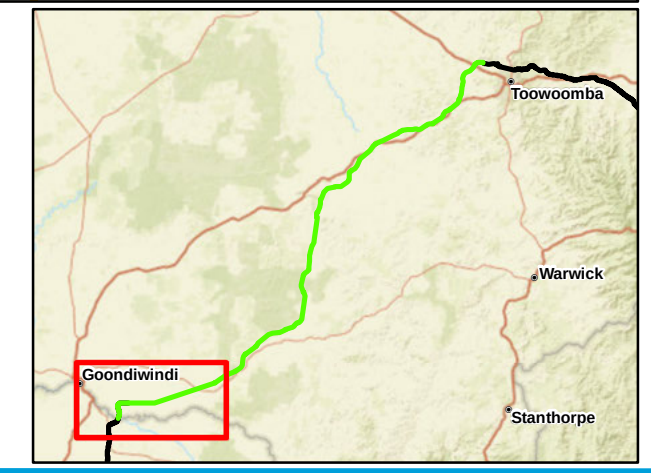
Legend

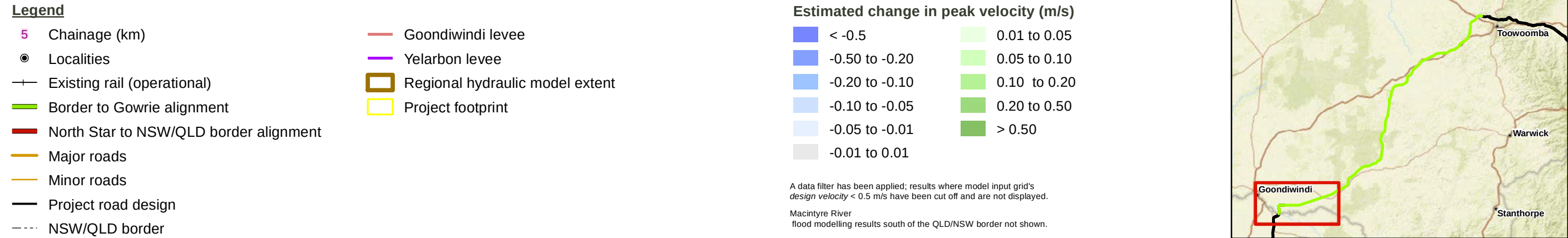
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Impact assessment area
- Permanent footprint

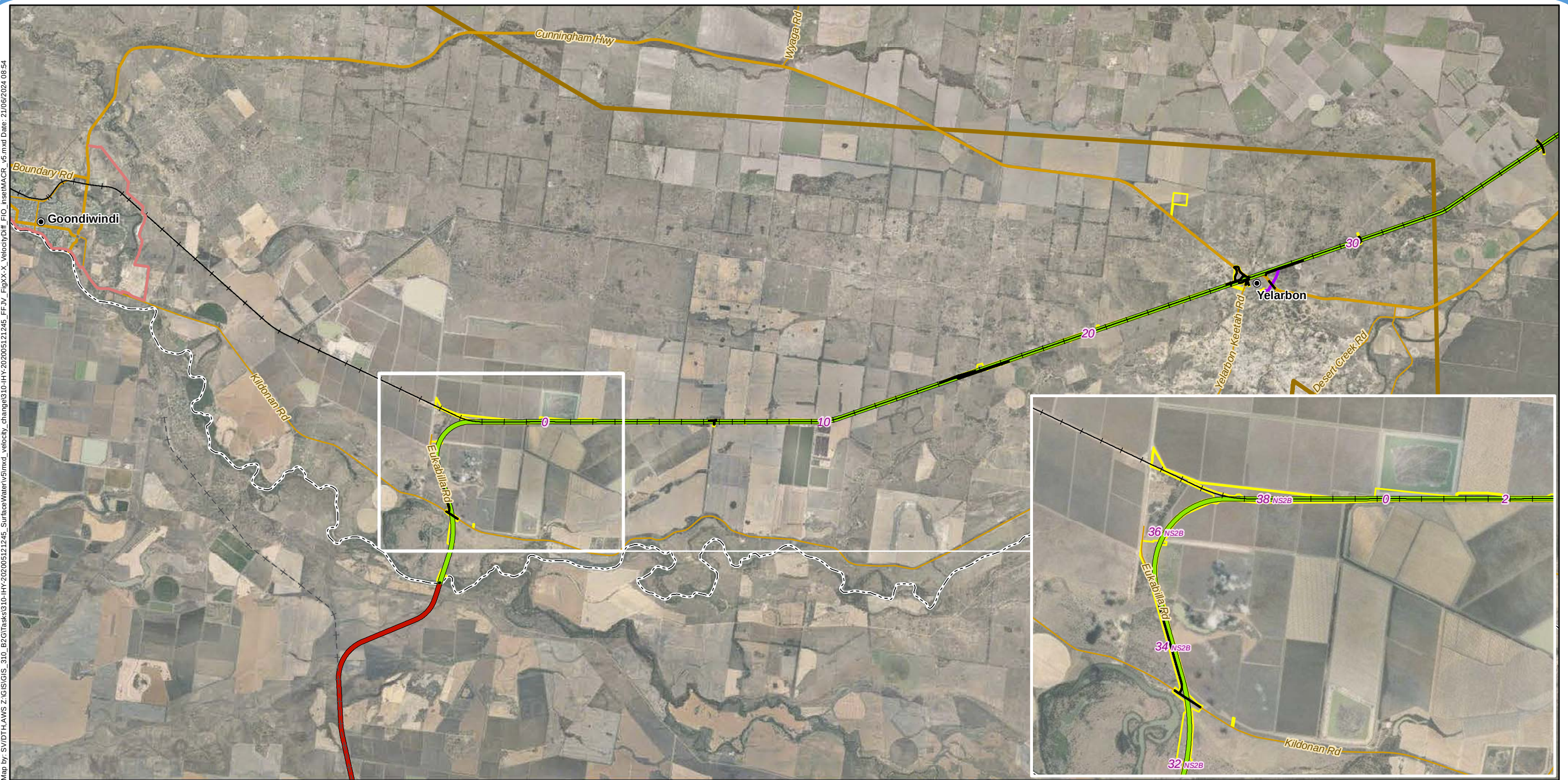
Estimated change in time of inundation (hours)

- 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 River
flood modelling results
south of the QLD/NSW border not shown.







Legend

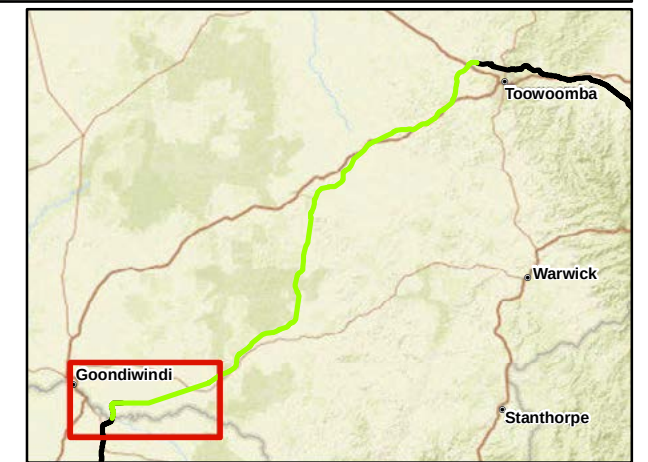
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

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 River flood modelling results south of the QLD/NSW border not shown.



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



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

Border to Gowrie

Figure M6-B:

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

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF\3V_FigXX-X_VelocityDiff_pc_FIO_0501m_insetMACR_v5.mxd Date: 21/06/2024 09:01



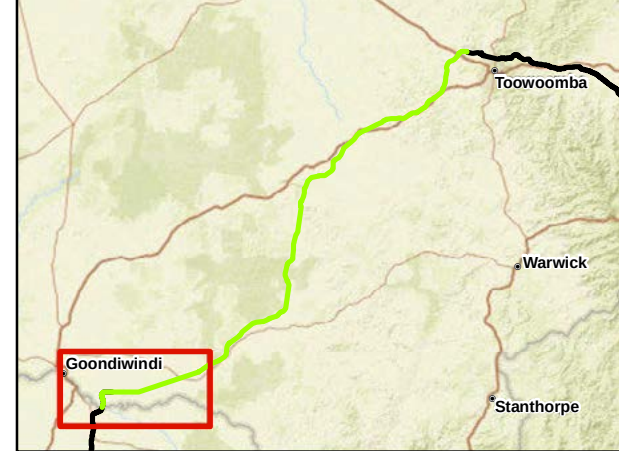
Legend

- 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
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

Estimated change in velocities (%)

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

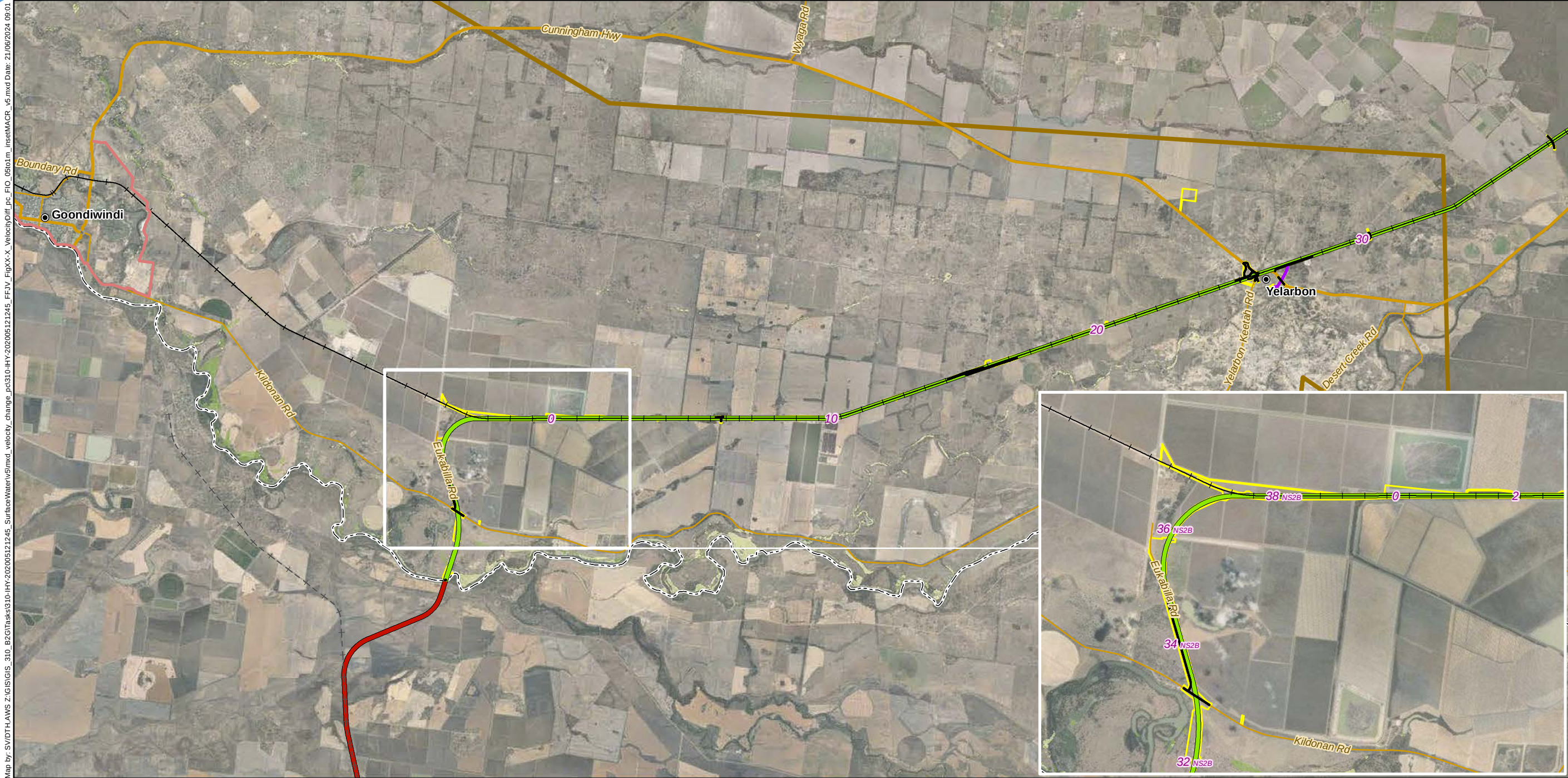
A data filter has been applied; results where model input grid's design velocity <0.5m/s and >1.0m/s have been cut off and are not displayed.
Macintyre River
flood modelling results south of the QLD/NSW border not shown.



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

Border to Gowrie
Figure M6-C:
20% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Macintyre River

Map by: SV/DTH/AWS Z:\GIS\GIS_310_B2G\Tasks\310-IHY-2020\5121245_SurfaceWater\5121245_FF\3V_FigXX-X_VelocityDiff_pc_FIO_0501m_insetMACR_v5.mxd Date: 21/06/2024 09:01



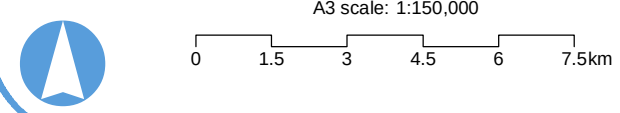
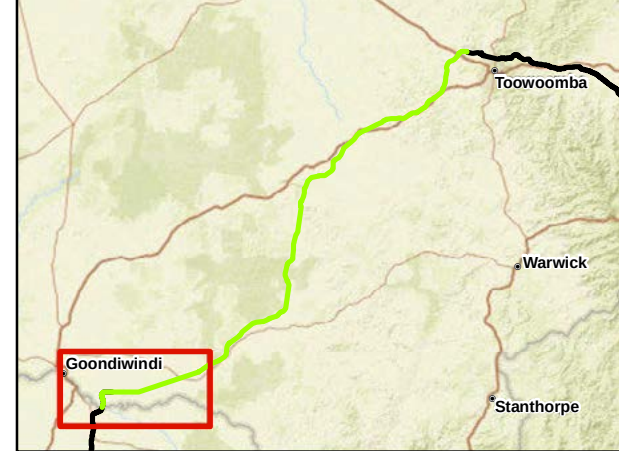
Legend

- 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
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

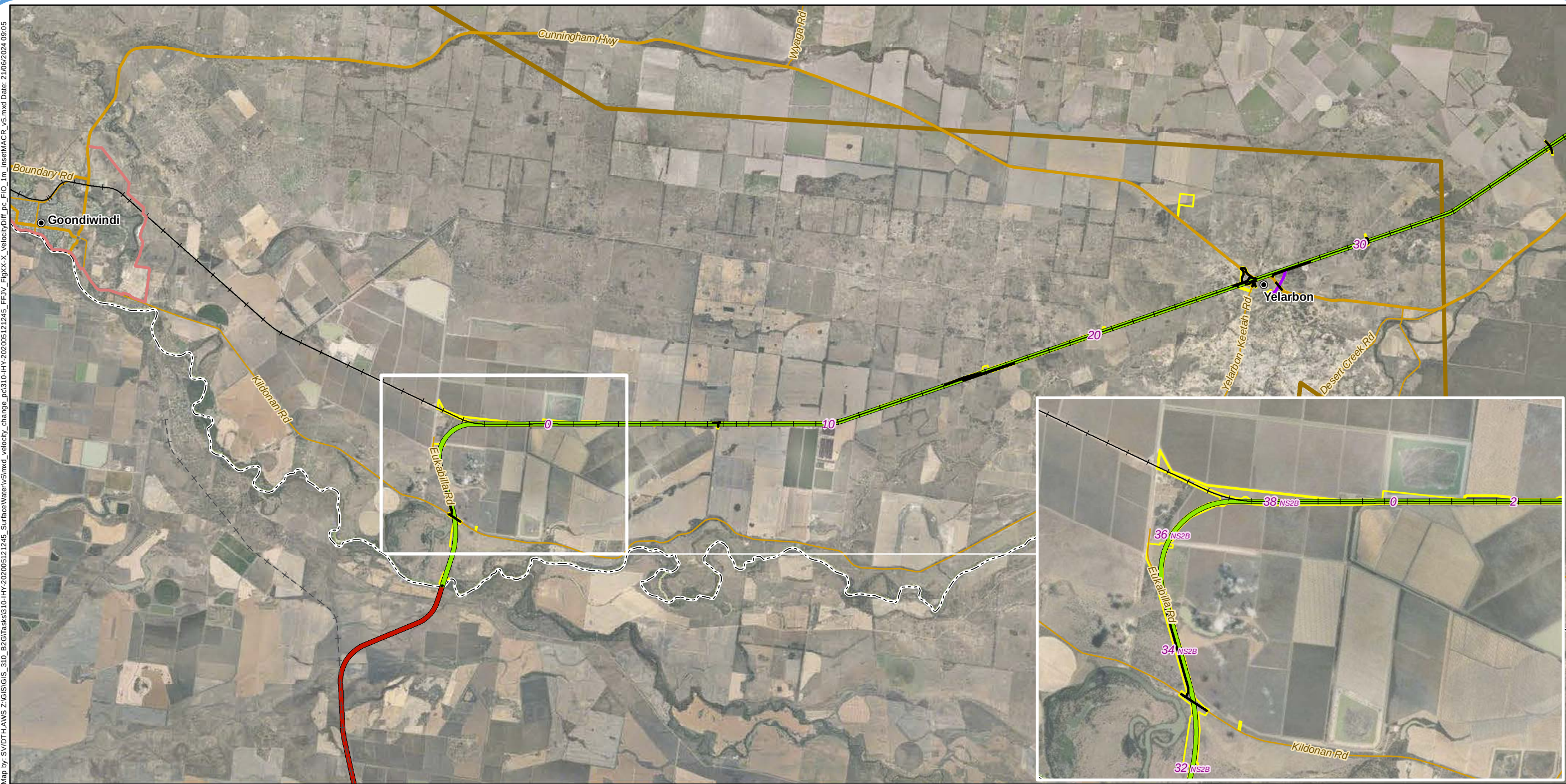
Estimated change in velocities (%)

- < 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 River
flood modelling results south of the QLD/NSW border not shown.



Border to Gowrie
Figure M6-D:
1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff) - Macintyre River



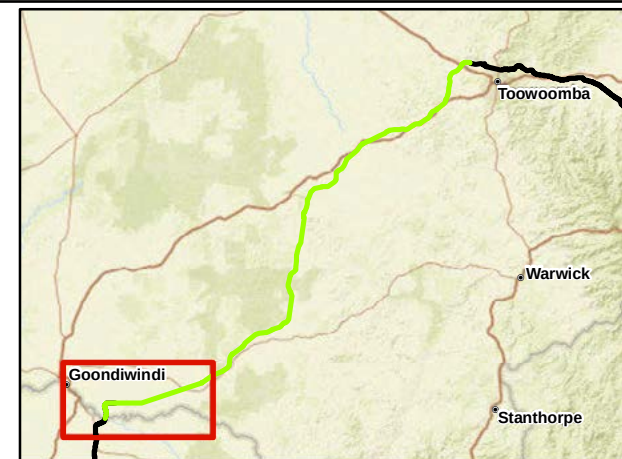
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results south of the QLD/NSW border not shown.



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

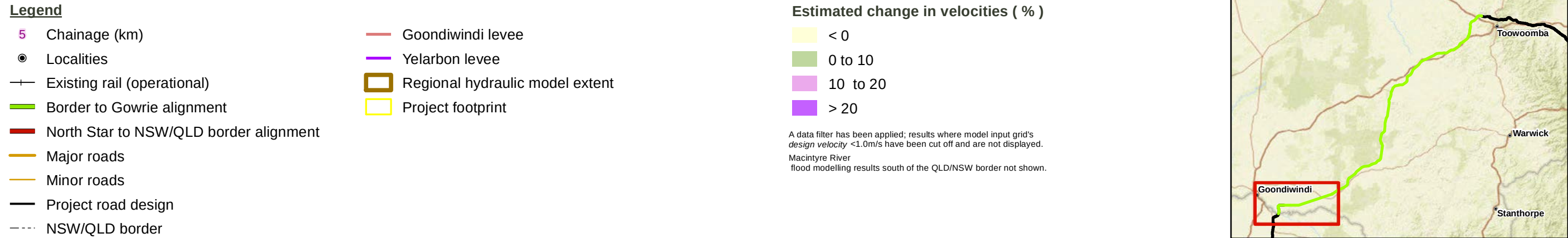
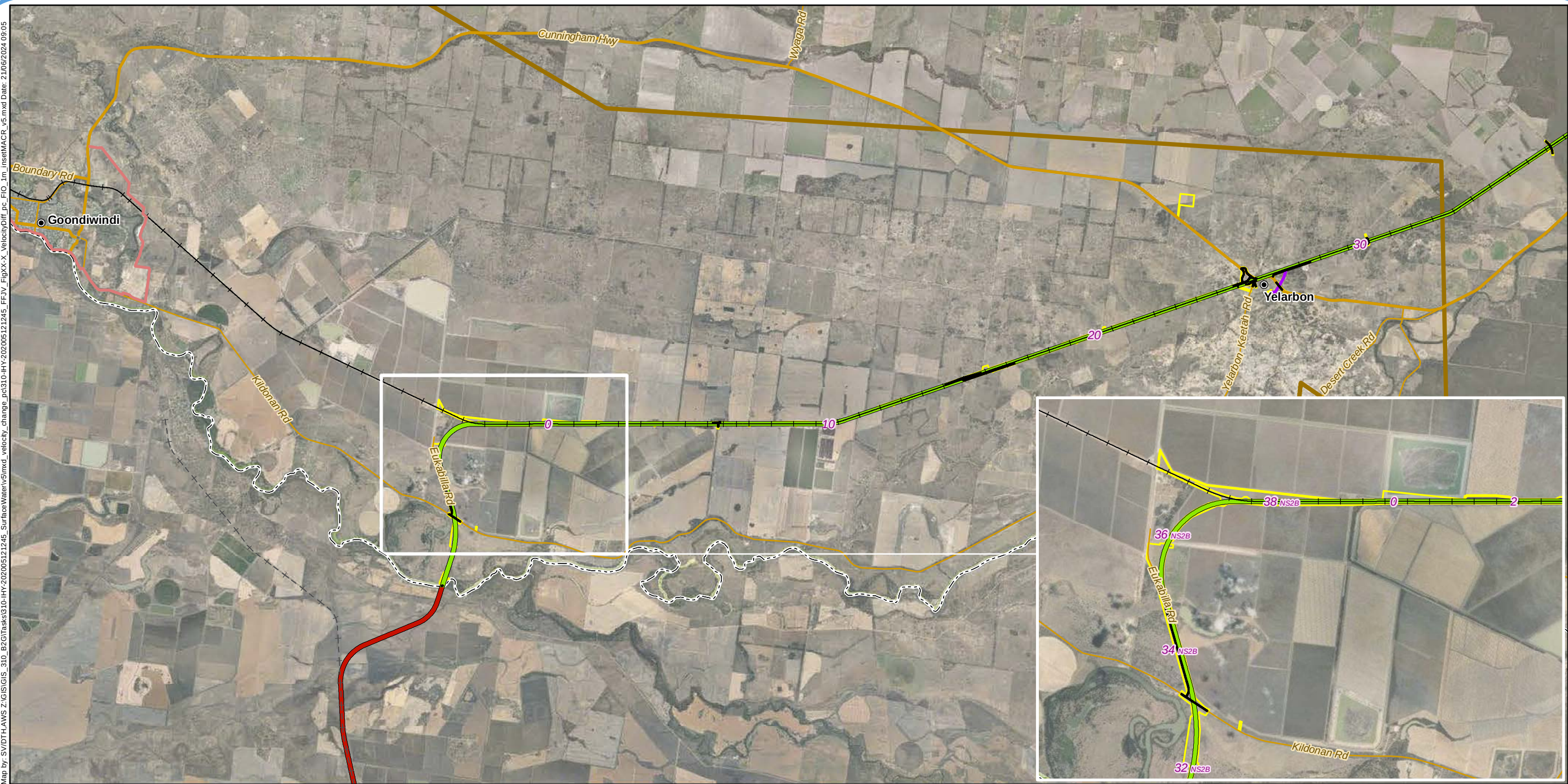


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M6-E:

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



Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_hazard_vxd_change_pc_inset\MACR_v5.mxd Date: 20/06/2024 17:46



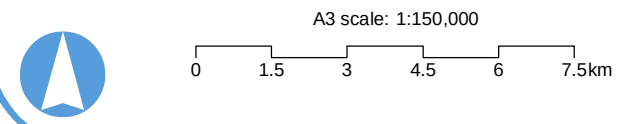
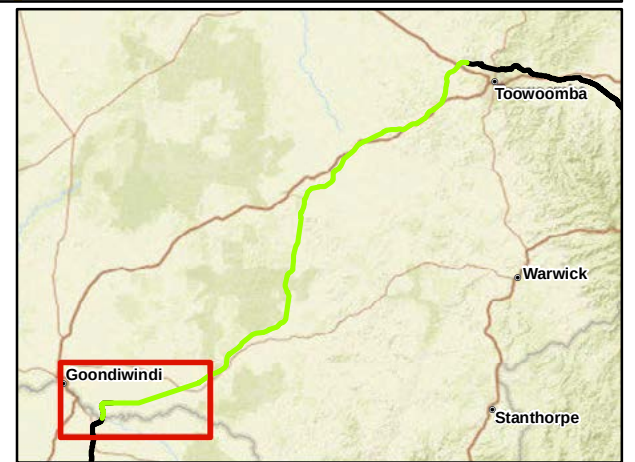
Legend

- 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
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

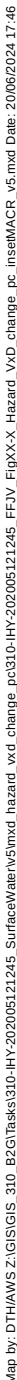
Estimated change in velocity x depth product (%)

- < 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 River flood modelling results south of the QLD/NSW border not shown.



Border to Gowrie
Figure M7-A:
20% AEP Event - Percentage Change in Hazard (v x d) (0.15m²/s cutoff applied) - Macintyre River



Legend

- Legend**

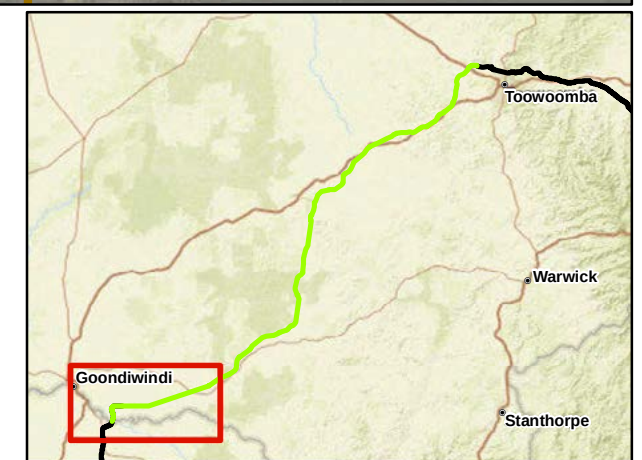
 - 5 Chainage (km)
 - Localities
 - Existing rail (operational)
 - Border to Gowrie alignment
 - North Star to NSW/QLD border alignment
 - Major roads
 - Minor roads
 - Project road design
 - NSW/QLD border
 - Goondiwindi levee
 - Yelarbon levee
 - Regional hydraulic model extent
 - Project footprint

Estimated change in velocity x depth product (%)

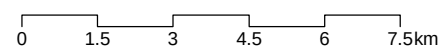
- Estimated change in velocity x depth product (%)**
- < 0%
 - 0% to 10%
 - 10% to 20%
 - 20% to 50%
 - 50% to 100%
 - > 100%

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

Macintyre River
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:150,000



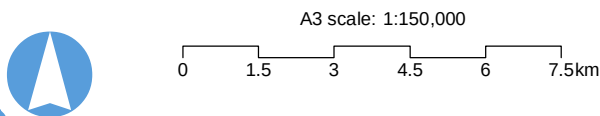
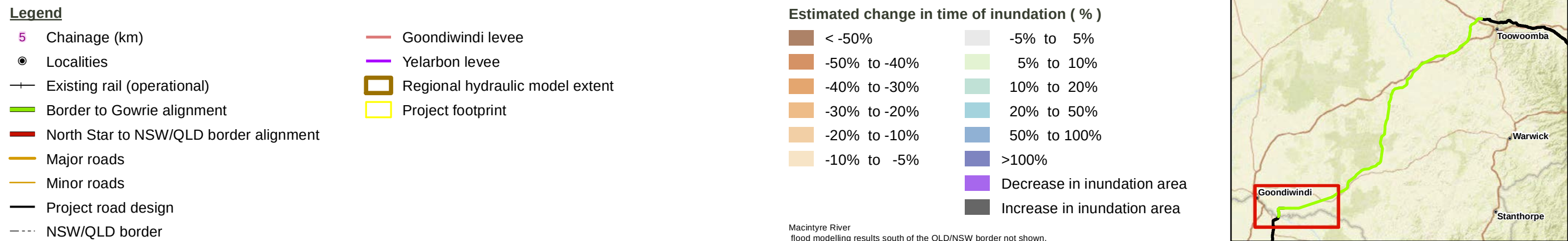
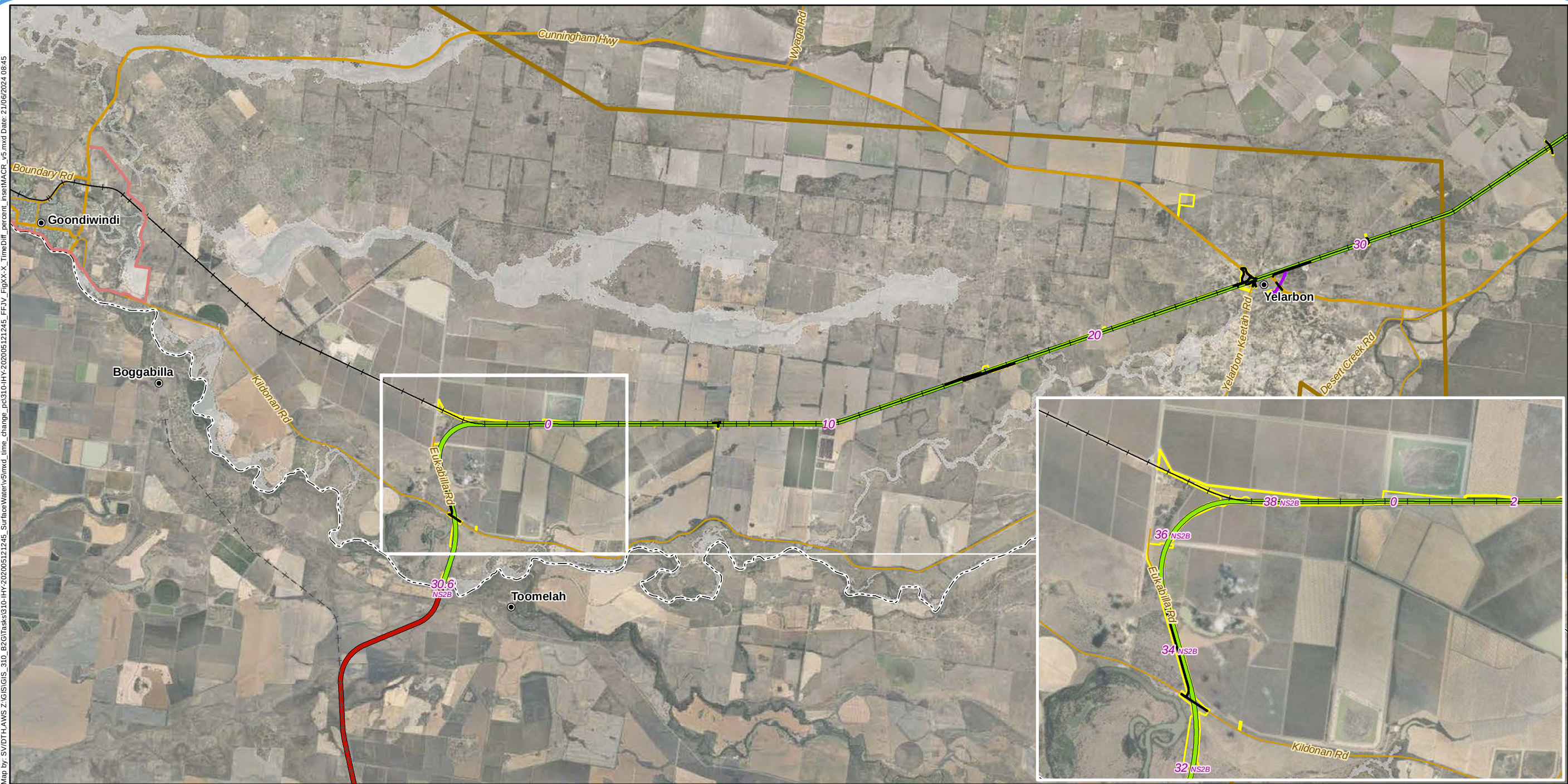
Issue date: 20/06/2024 Version: 5

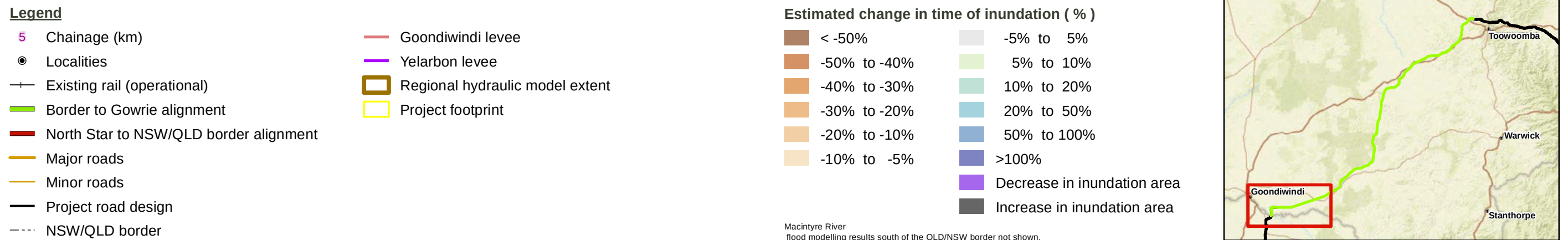
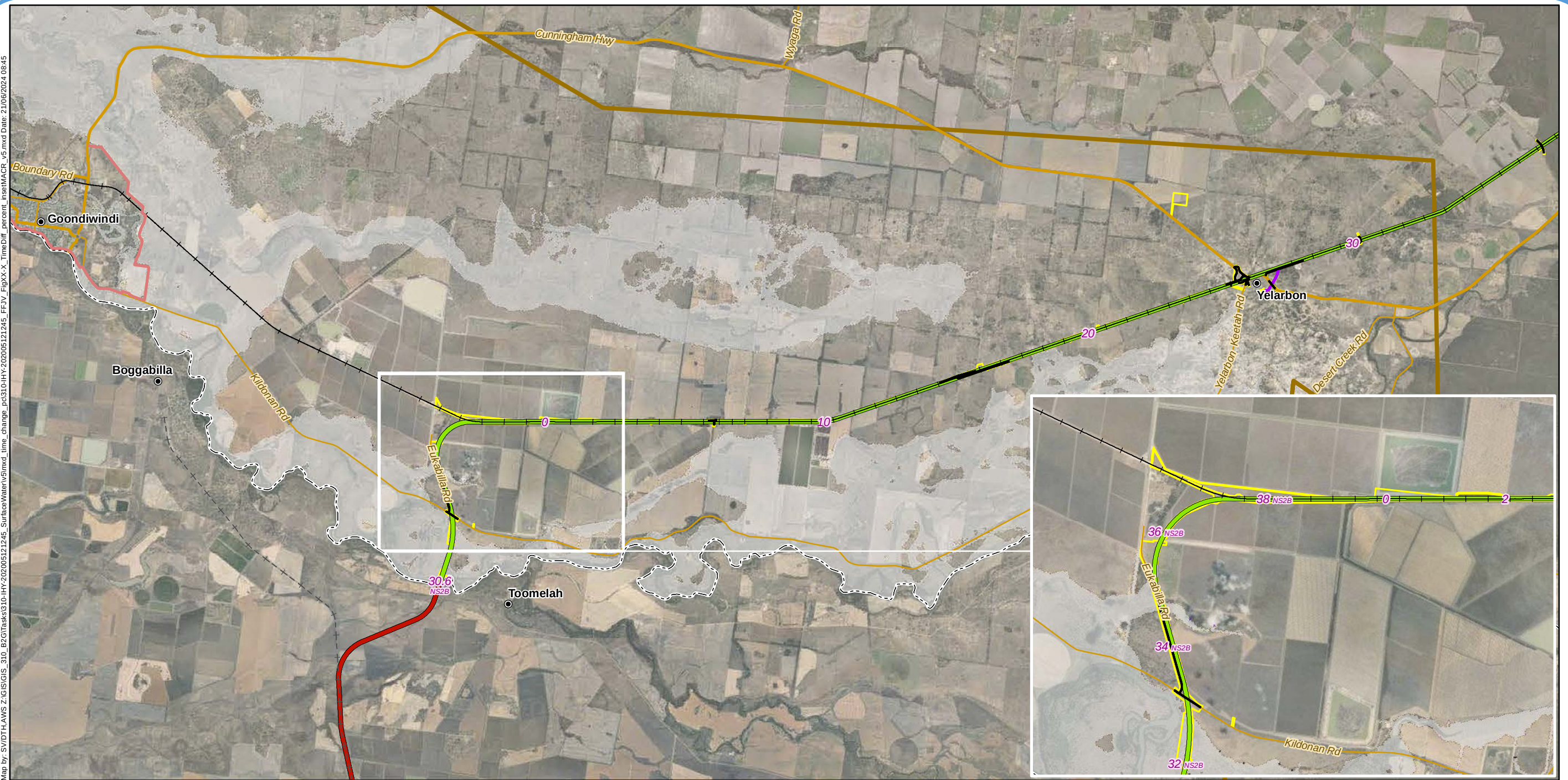
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M7-B:

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



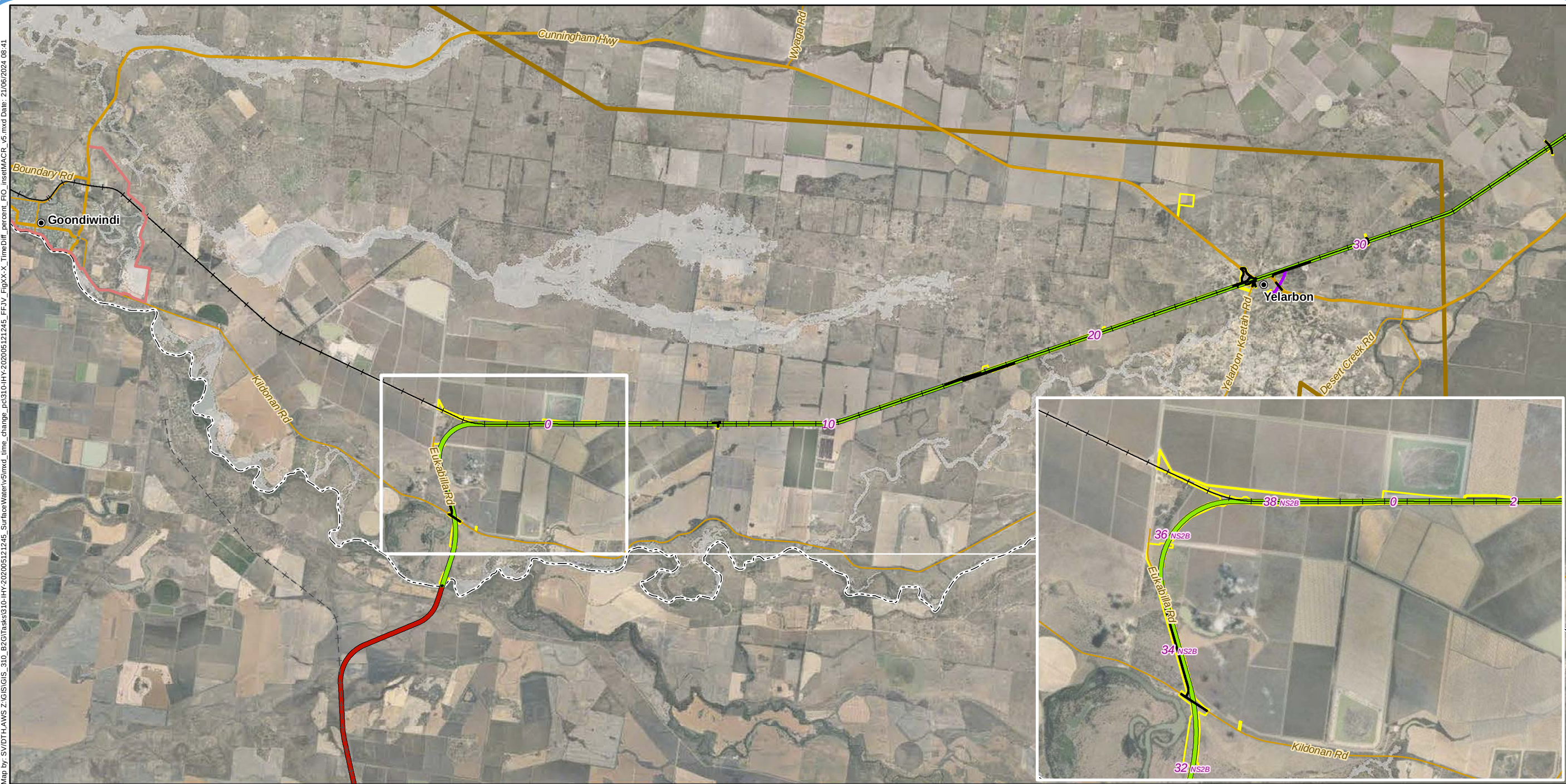


A3 scale: 1:150,000
0 1.5 3 4.5 6 7.5km



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

Border to Gowrie
Figure M8-B:
1% AEP Event - Percentage Change in Time of Inundation - Macintyre River



Legend

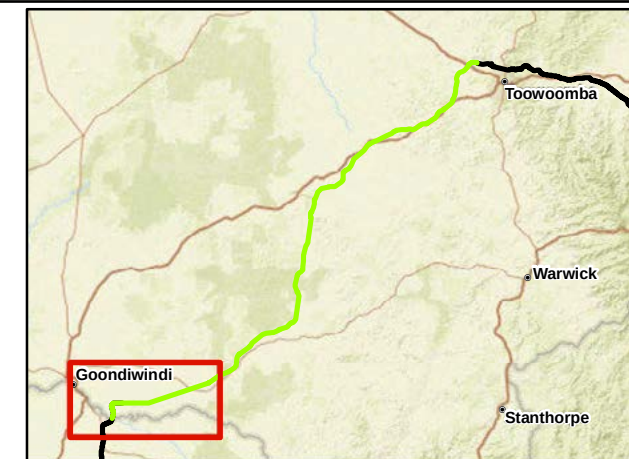
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border
- Goondiwindi levee
- Yelarbon levee
- Regional hydraulic model extent
- Project footprint

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 River flood modelling results south of the QLD/NSW border not shown.



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



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

Border to Gowrie

Figure M8-C:

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



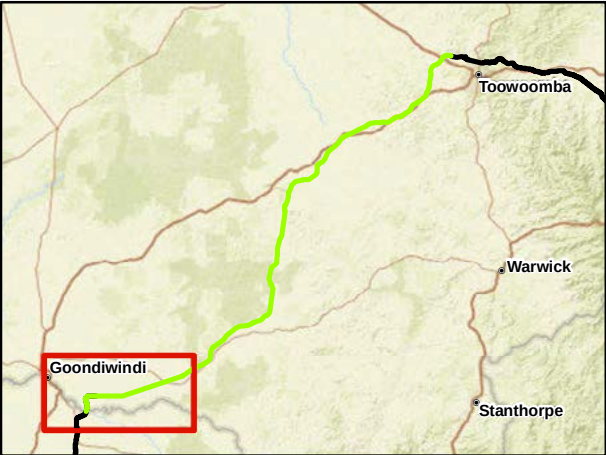
Legend

- 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
- Goondiwindi levee
- 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 River
flood modelling results south of the QLD/NSW border not shown.



A3 scale: 1:150,000

0 1.5 3 4.5 6 7.5km



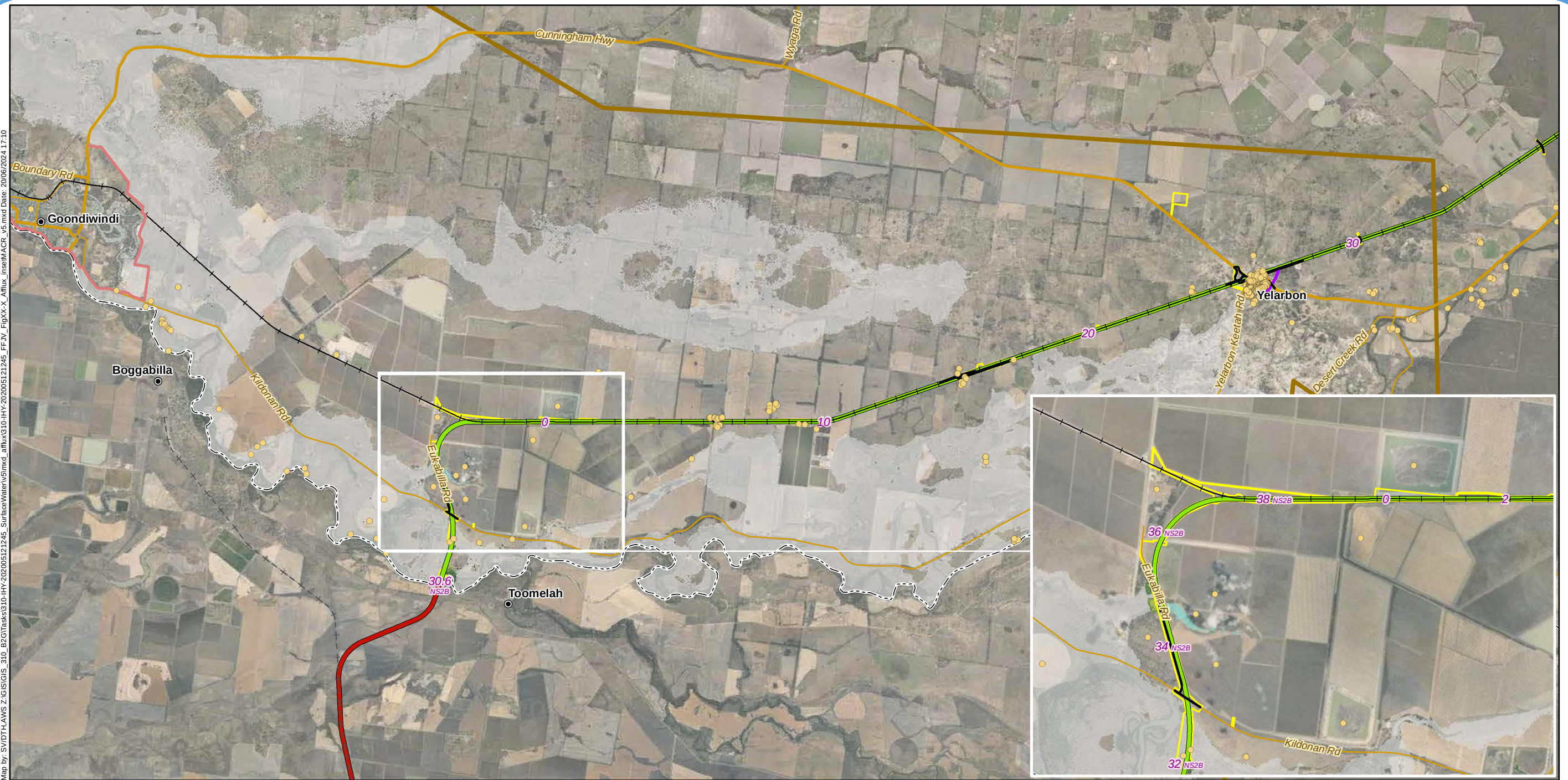
Future Freight
Integrating Community, Environment and Engineering

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

Border to Gowrie

Figure M8-D:

1% AEP Event - Percentage Change in Time of Inundation (< 1 hour cutoff applied) - Macintyre River



Legend

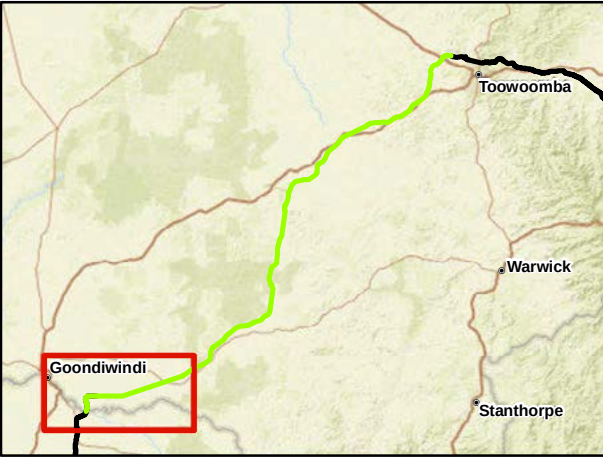
- Flood sensitive receptor
- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- North Star to NSW/QLD border alignment
- Major roads
- Minor roads
- Project road design
- NSW/QLD border

- Yelarbon levee
- Goondiwindi levee
- 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 River
flood modelling results
south of the QLD/NSW border not shown.



A3 scale: 1:150,000

0 1.5 3 4.5 6 7.5km

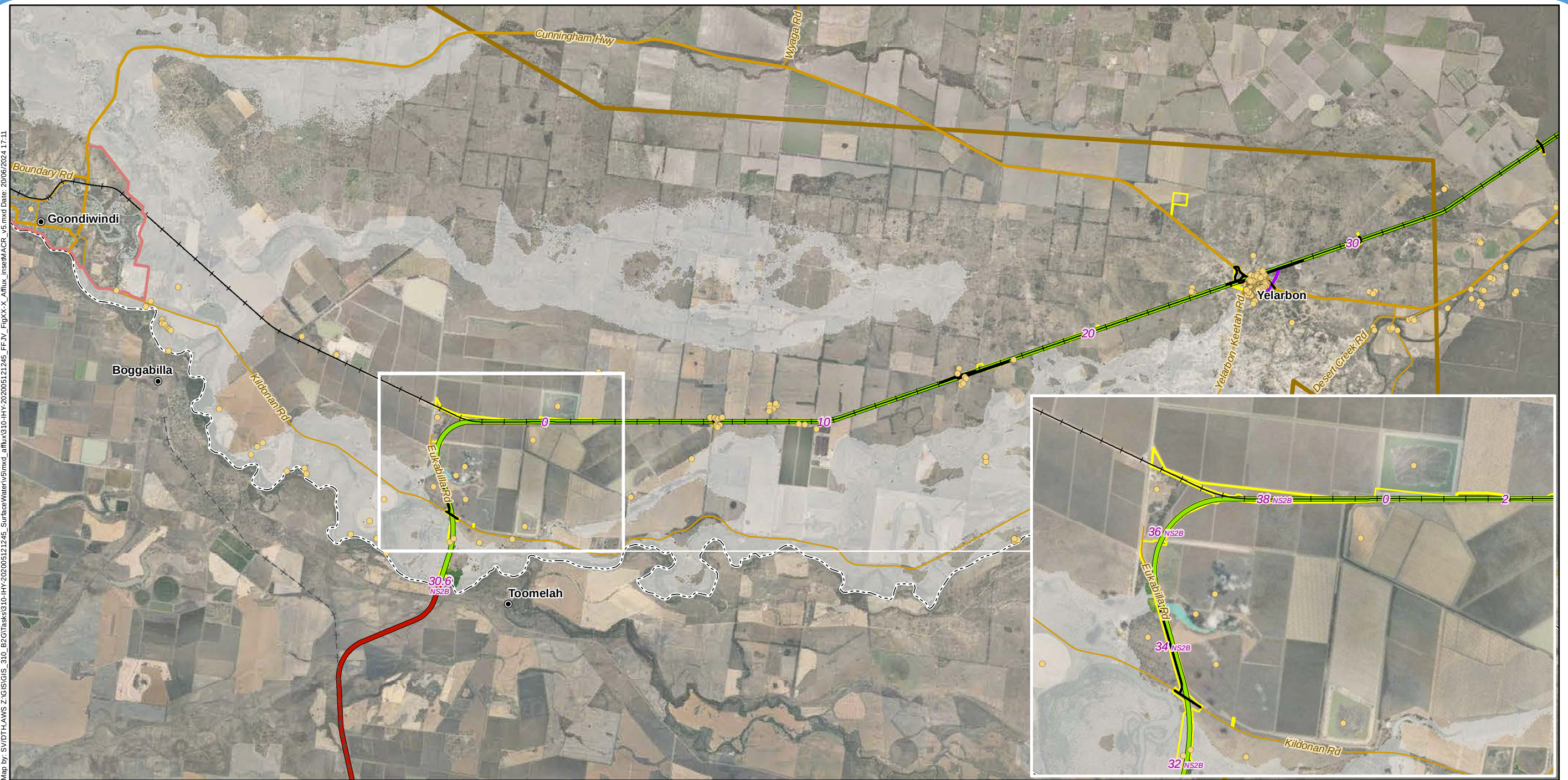


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M9-A:

1% AEP Event - Sensitivity - 0% Blockage - Macintyre River

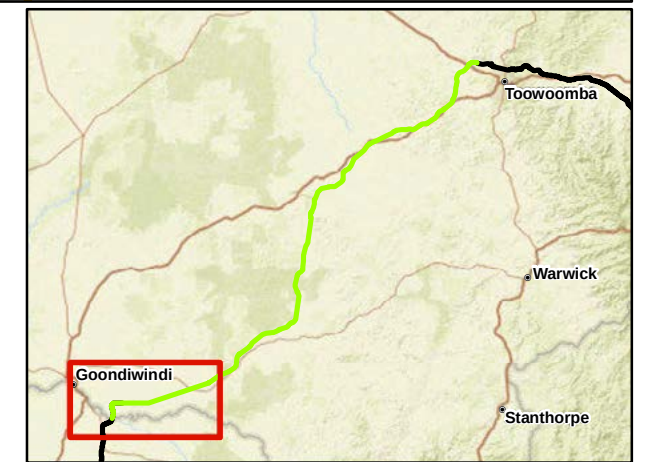


Legend

- Flood sensitive receptor
- 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
- 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 River flood modelling results south of the QLD/NSW border not shown.	Decrease in inundation area
	Increase in inundation area



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

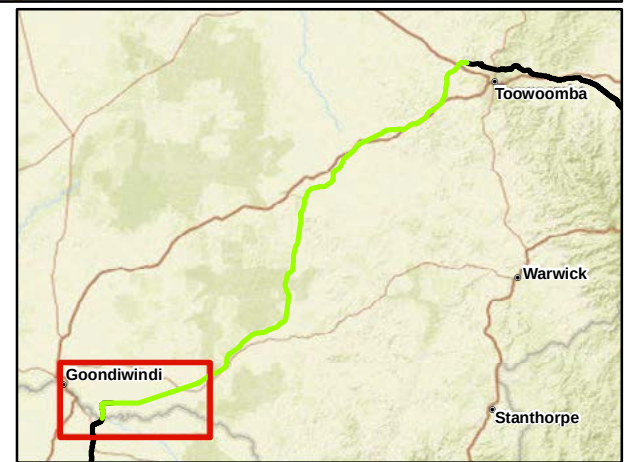
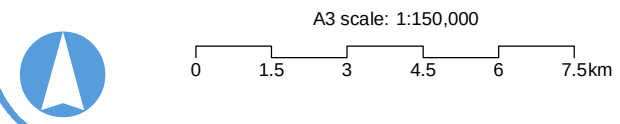
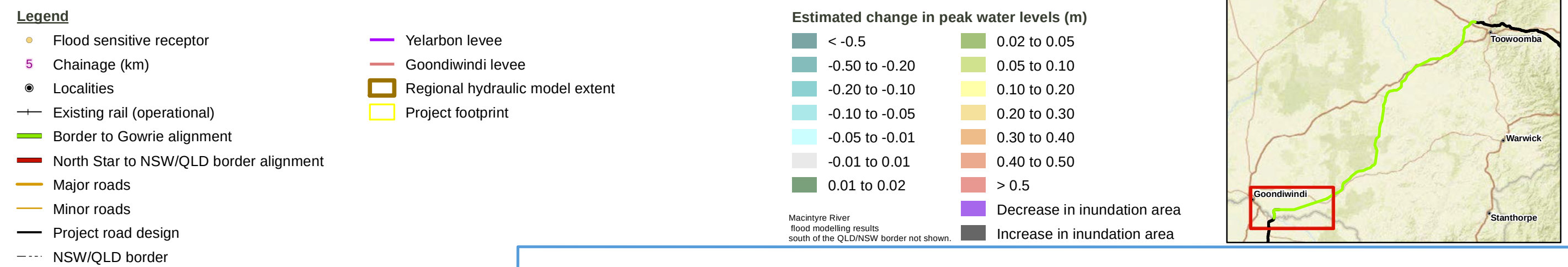
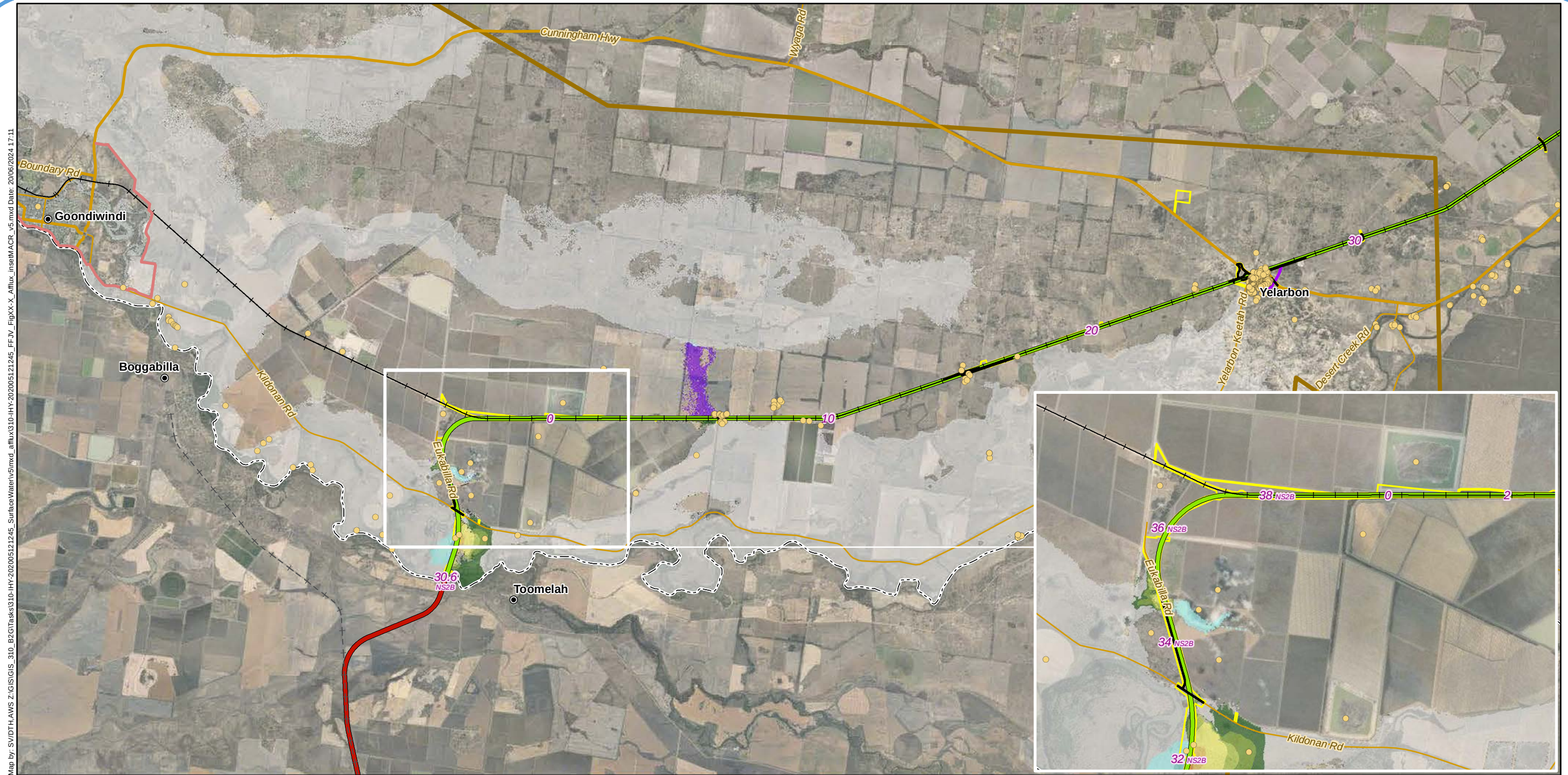


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure M9-B:

1% AEP Event - Sensitivity - 50% Blockage - Macintyre River



Border to Gowrie
Figure M9-C:
1% AEP Event - Sensitivity - Climate Change RCP8.5 - Peak Water Levels - Macintyre River

APPENDIX T2

Hydrology and Flooding Technical Report—Volume 2

Appendix N Local drainage 1% AEP flood maps

BORDER TO GOWRIE REVISED DRAFT ENVIRONMENTAL IMPACT STATEMENT

Appendix N

Local Drainage 1% AEP Flood Maps

Figure N1-1 to 48	1% AEP Event - Peak Water Levels - Existing Case
Figure N2-1 to 48	1% AEP Event - Peak Velocity - Existing Case
Figure N3-1 to 48	1% AEP Event - Peak Hazard - Existing Case
Figure N4-1 to 48	1% AEP Event - Peak Time of Inundation - Existing Case
Figure N5-1 to 48	1% AEP Event - Peak Water Levels - Developed Case
Figure N6-1 to 48	1% AEP Event - Peak Velocity - Developed Case
Figure N7-1 to 48	1% AEP Event - Peak Hazard - Developed Case
Figure N8-1 to 48	1% AEP Event - Peak Time of Inundation - Developed Case
Figure N9-1 to 48	1% AEP Event - Afflux
Figure N10-1 to 48	1% AEP Event - Change in Velocity
Figure N11-1 to 48	1% AEP Event - Change in Hazard
Figure N12-1 to 48	1% AEP Event - Change in Time of Inundation
Figure N13-1 to 48	1% AEP Event - Change in Velocity (<0.5m/s cutoff)
Figure N14-1 to 48	1% AEP Event - Percentage Change in Velocity (<0.5m/s and >1.0m/s cutoff)
Figure N15-1 to 48	1% AEP Event - Percentage Change in Velocity (<1.0m/s cutoff)
Figure N16-1 to 48	1% AEP Event - Percentage Change in Hazard ($v \times d$) (<0.15m ² /s cutoff applied)
Figure N17-1 to 48	1% AEP Event - Percentage Change in Time of Inundation
Figure N18-1 to 48	1% AEP Event - Percentage Change in Time of Inundation (<1 hour cutoff applied)

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:02



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



A3 scale: 1:20,000
0 0.2 0.4 0.6 0.8 1km

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_N1\10-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:03



Legend

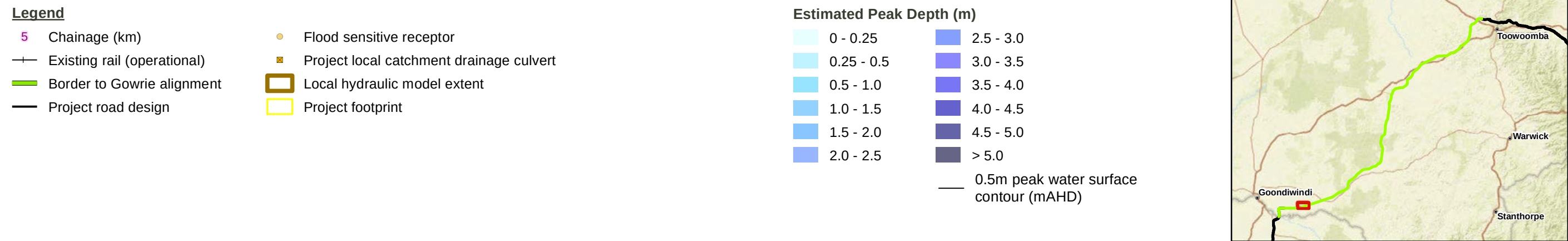
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	

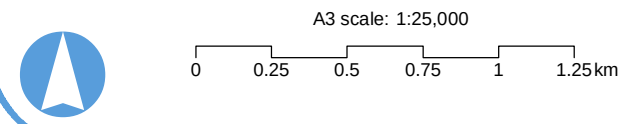
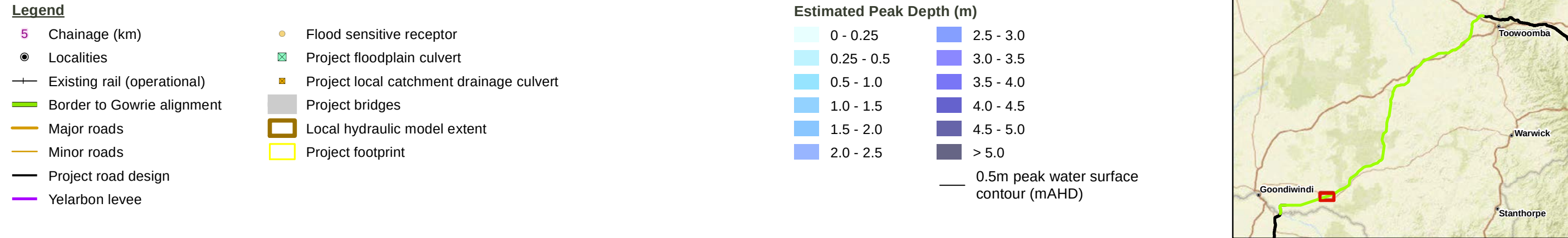
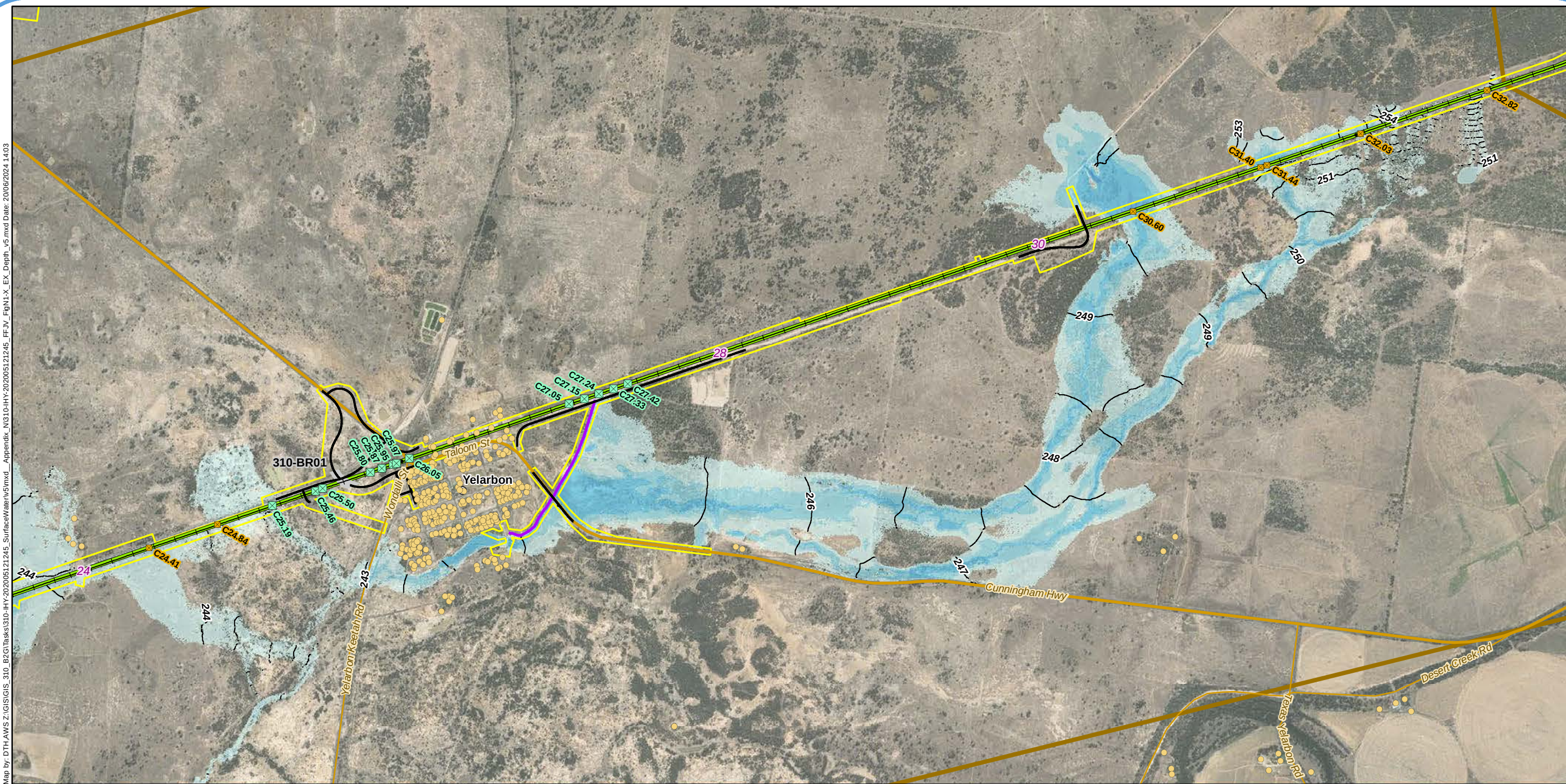


A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



A3 scale: 1:20,000
0 0.2 0.4 0.6 0.8 1km







Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



Legend

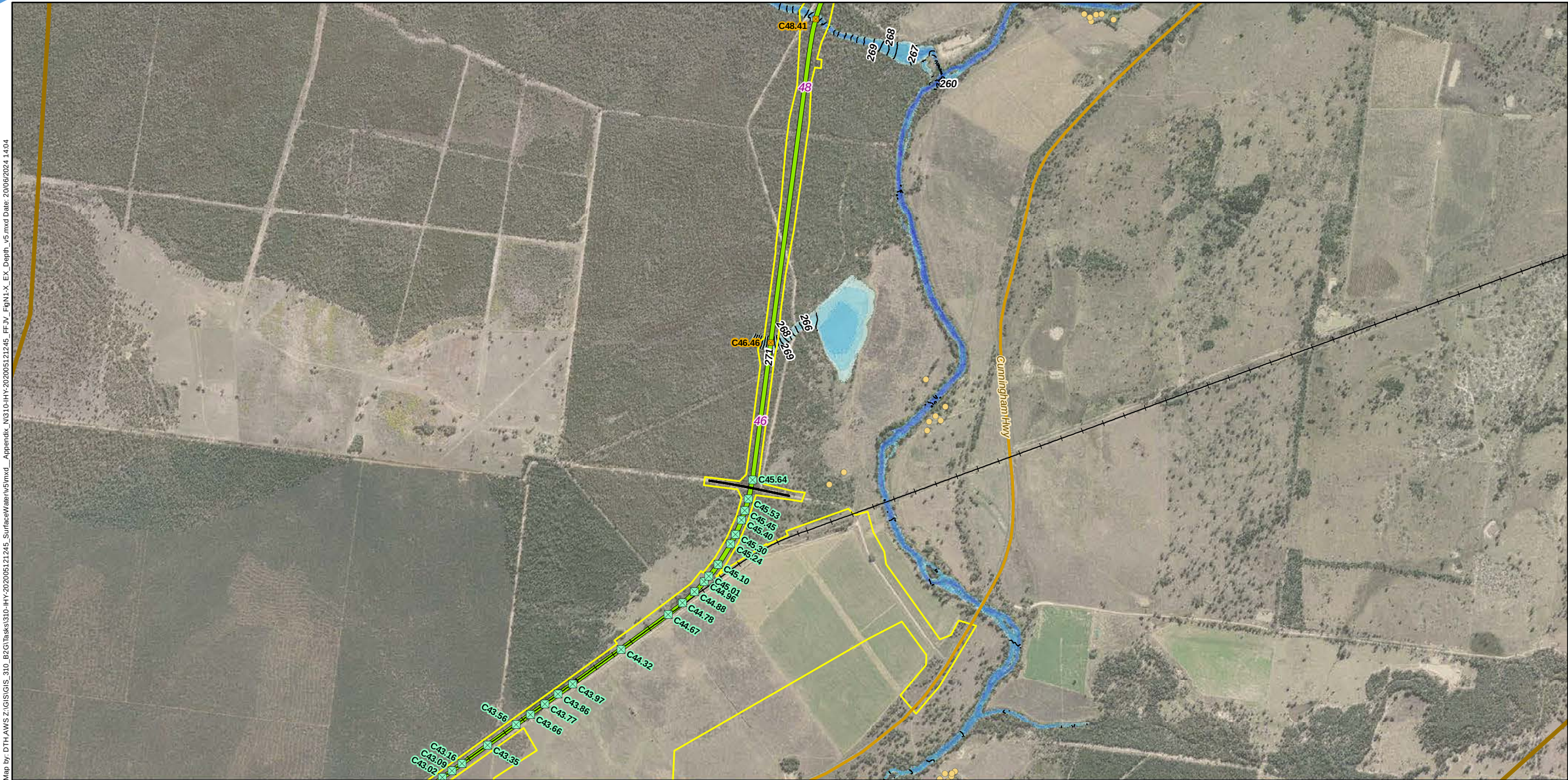
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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

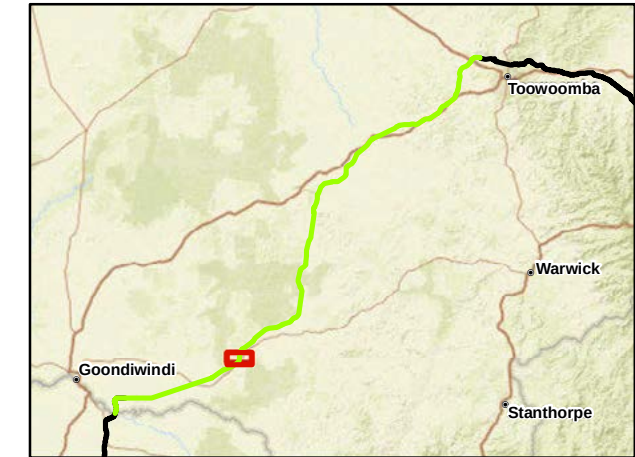


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



A3 scale: 1:25,000
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 N1 - Page 8 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:04



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface 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 N1 - Page 9 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:04



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\Tasks\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:04

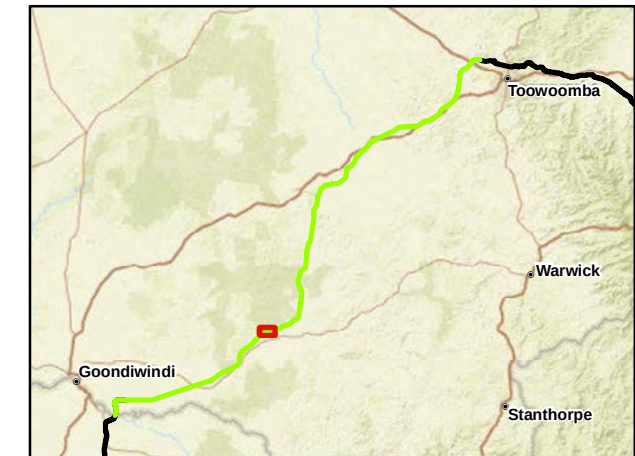


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface 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 N1 - Page 11 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	





- Estimated Peak Depth (m)**

A map of south-eastern Australia showing the study area. A red rectangle indicates the study site, located on the border between New South Wales and Victoria. The map includes labels for Goondiwindi, Toowoomba, Warwick, and Stanthorpe. A green line highlights the route from Goondiwindi to Toowoomba, passing through the study site.

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

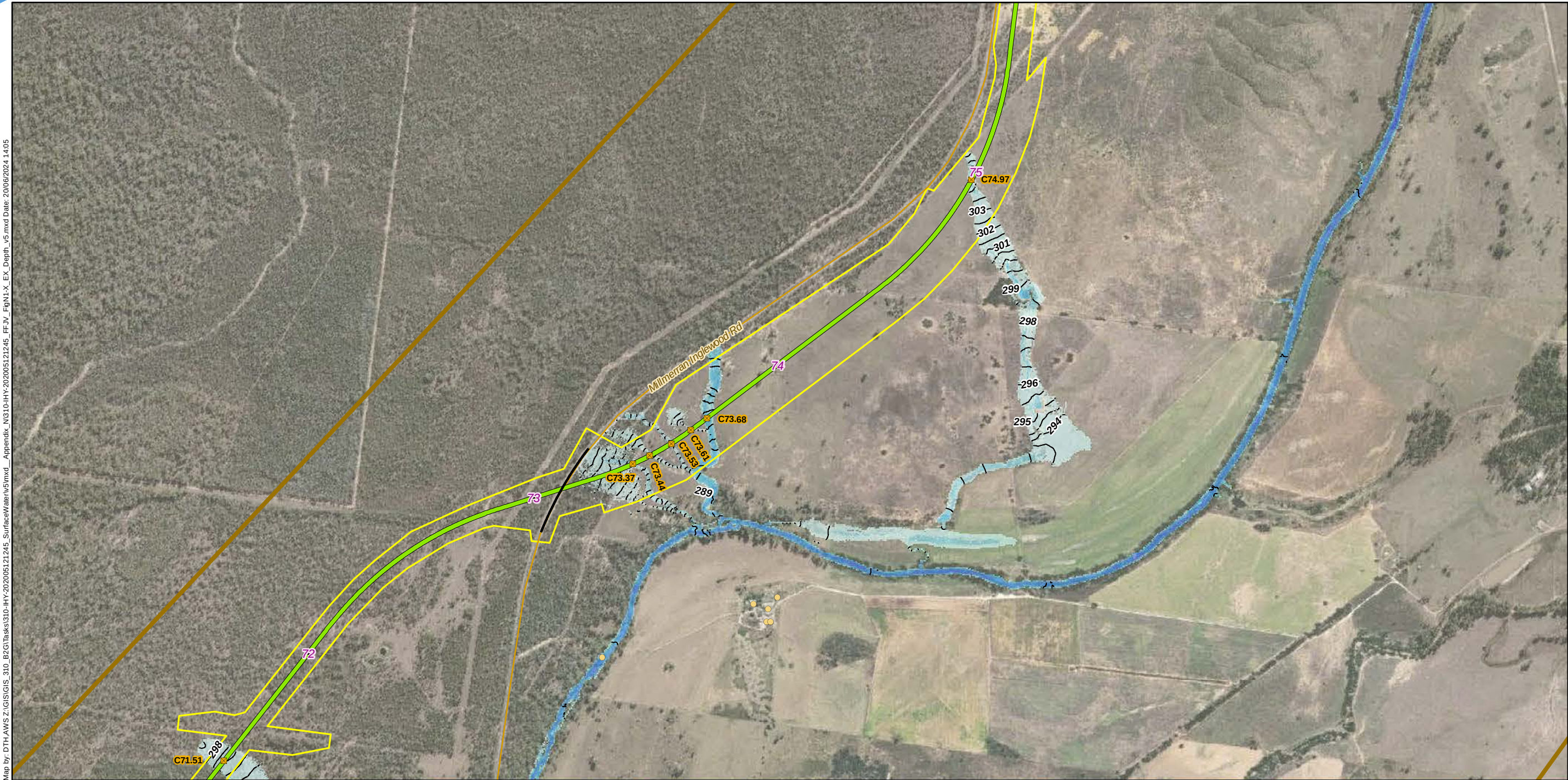
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 13 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:05



Legend

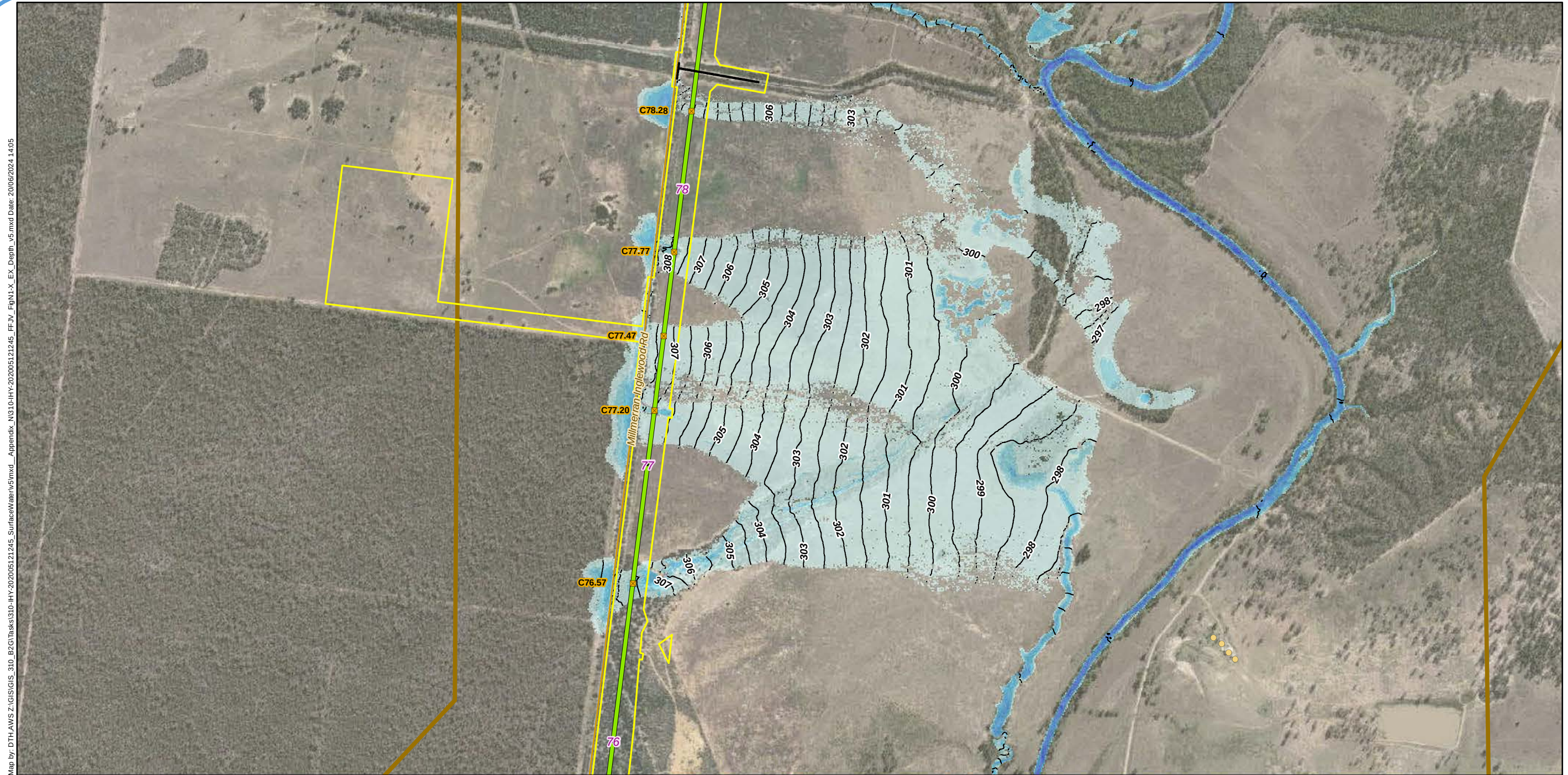
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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

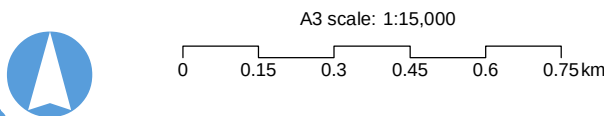
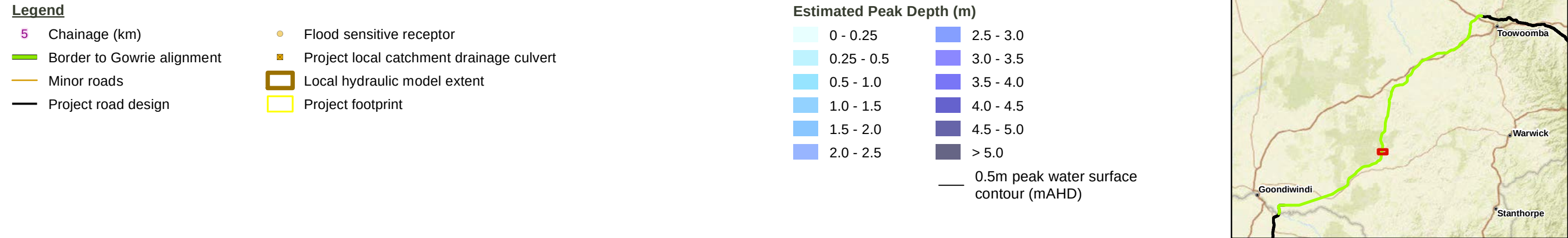
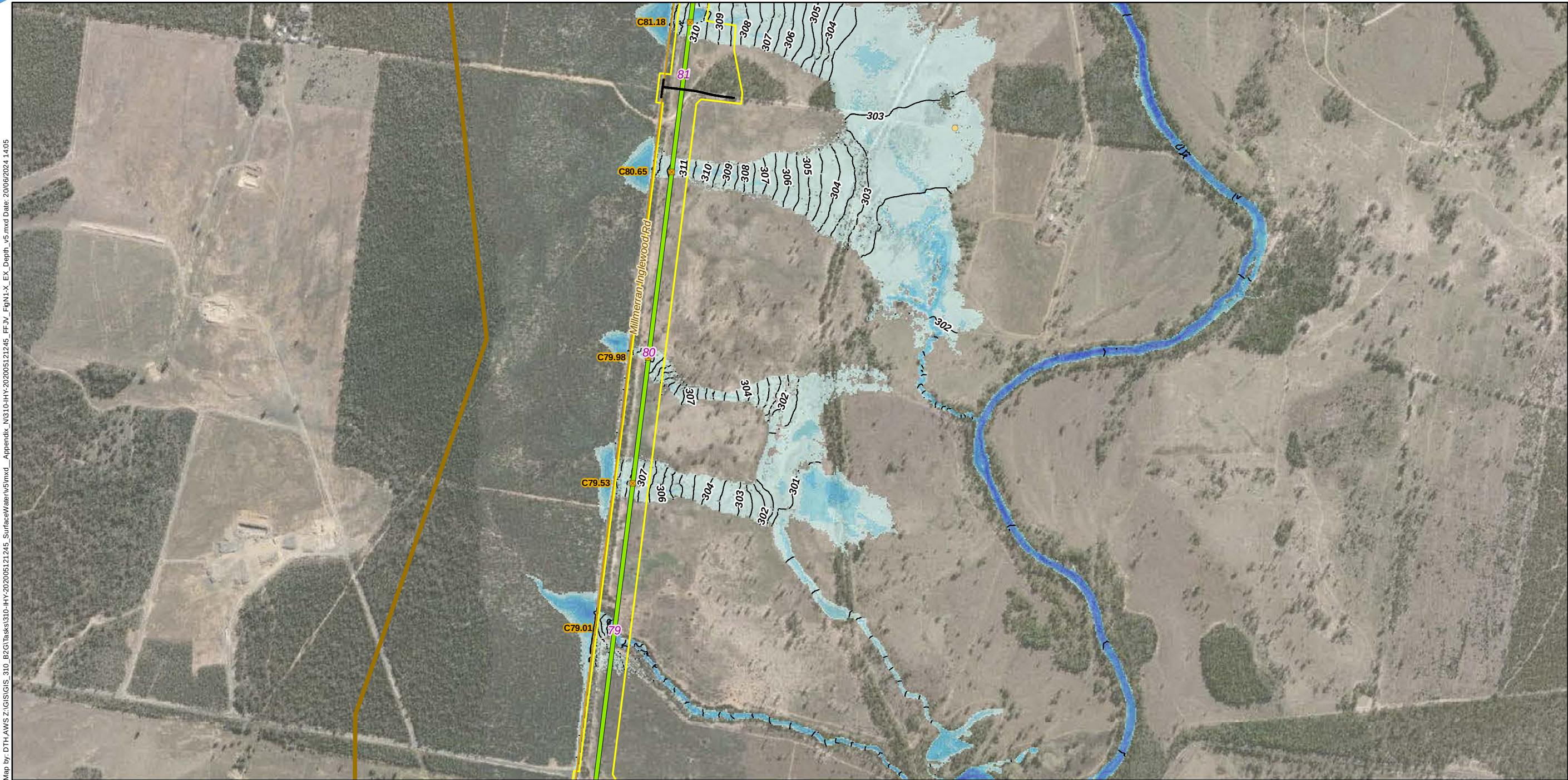


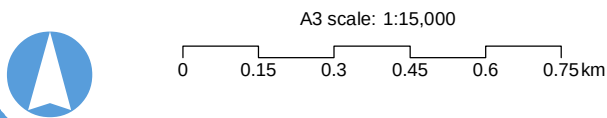
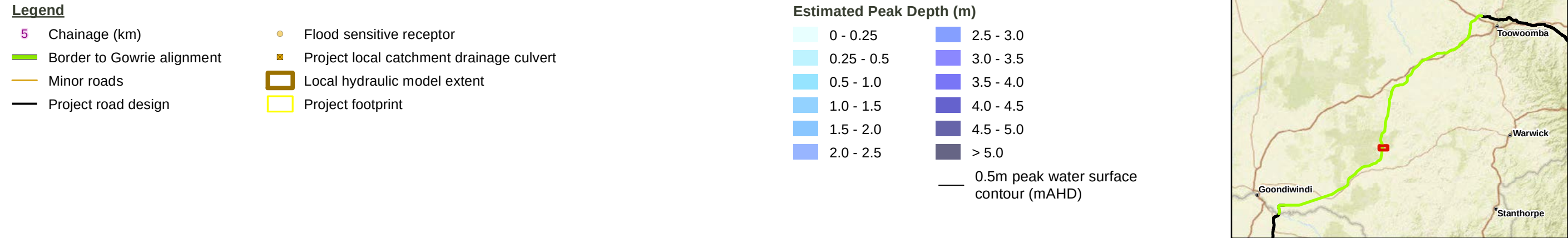
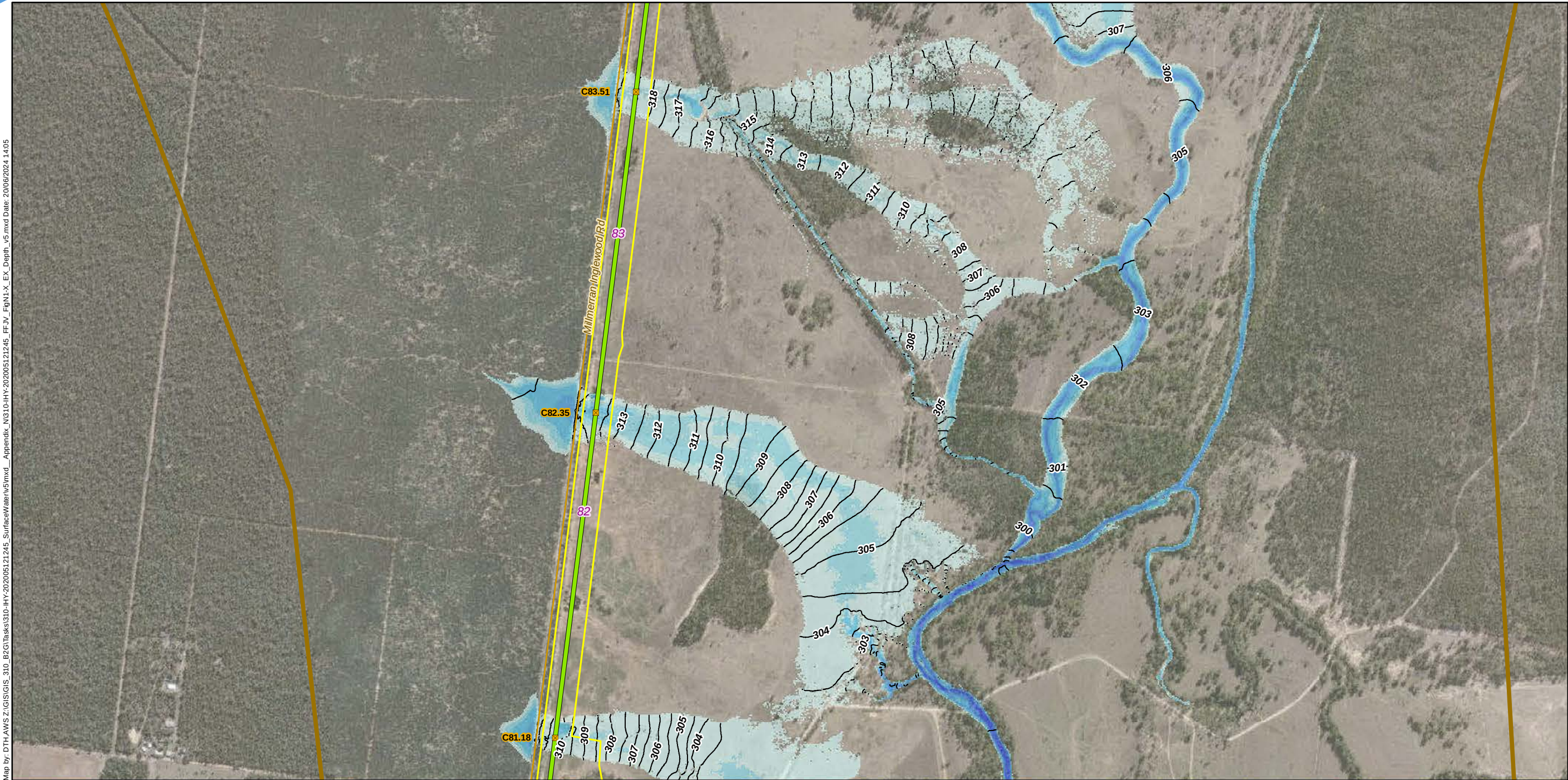
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 15 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case







Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



5 Chainage (km)

 Border to Gowrie alignment

— Minor roads

— Project road design

- Flood sensitive receptor

☒ Project floodplain culvert

- Project local catchment drainage culvert

Project bridges

 Local hydraulic model extent

 Project footprint

0 - 0.25

0.25 - 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

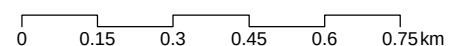
■ 4.5 - 5.0

■ > 5.0

— 0.5m peak water surface contour (mAHD)



A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 19 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appldix_IV310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:05



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface 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 N1 - Page 20 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:05



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

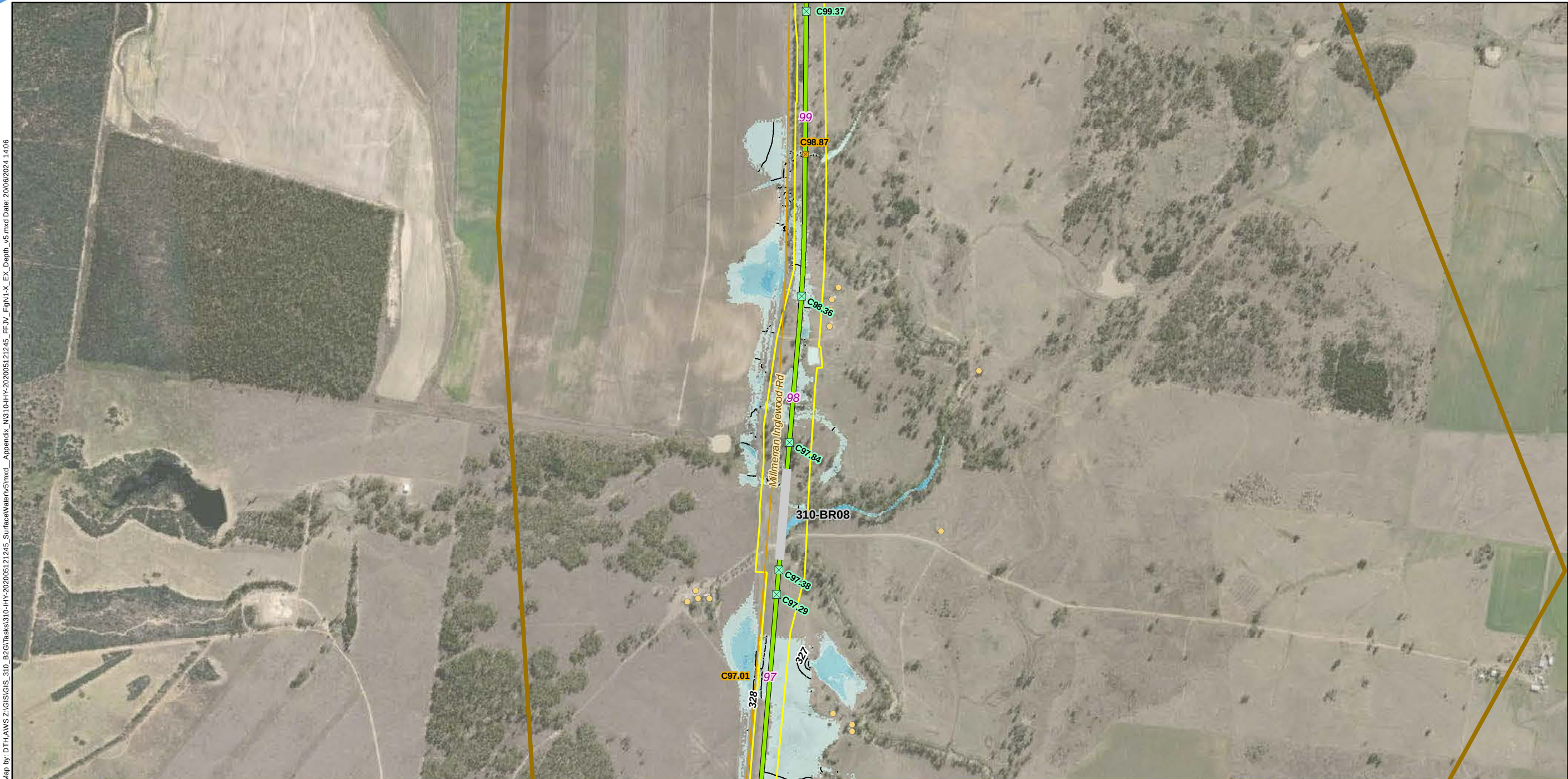
Estimated Peak Depth (m)

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
0.5m peak water surface contour (mAHD)	



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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak Depth (m)

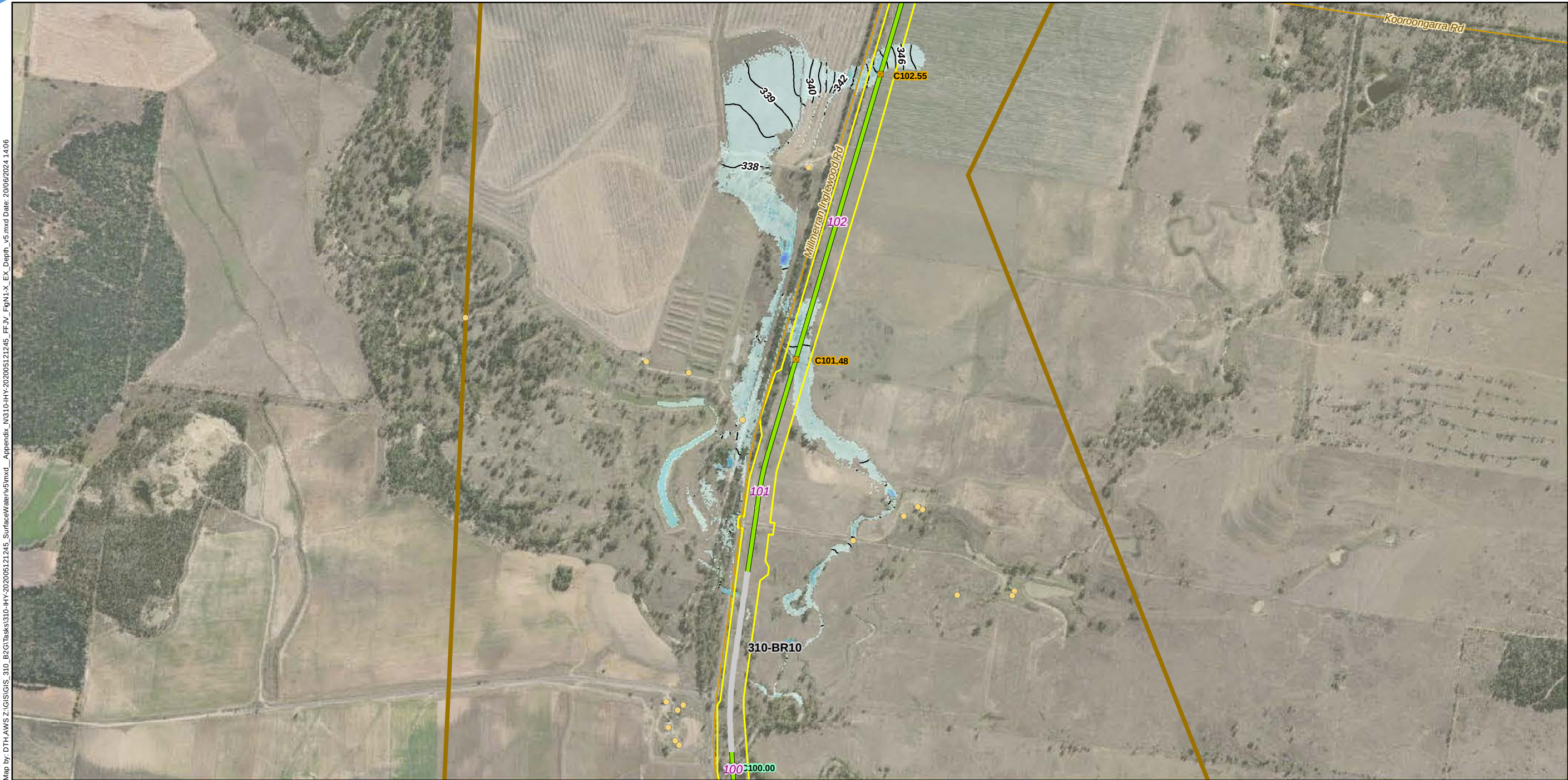
0 - 0.25	2.5 - 3.0
0.25 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0

0.5m peak water surface contour (mAHD)



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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAH)	



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 N1 - Page 23 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case



- Estimated Peak Depth (m)**

A map of south-eastern Australia showing the study area. A red square indicates the study site, located on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, and a network of roads is shown in red and black lines.

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 24 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

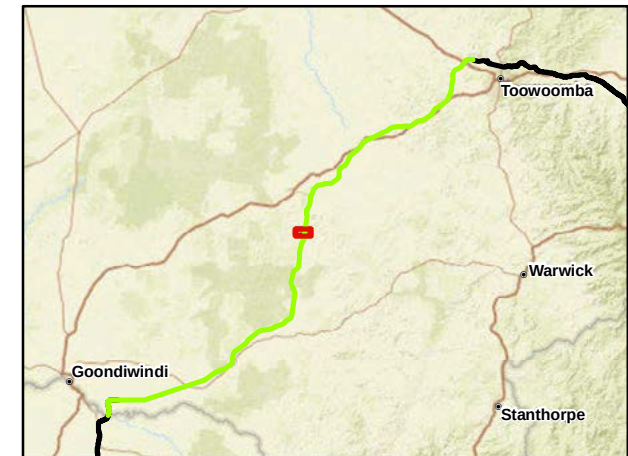


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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 |
- 0.5m peak water surface 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 N1 - Page 26 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case



- Estimated Peak Depth (m)**

A map of south-eastern Australia showing the study area. A red square indicates the study site, located on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The study area is highlighted in green.

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 27 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:06



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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

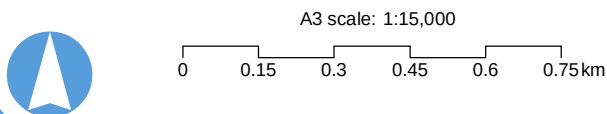
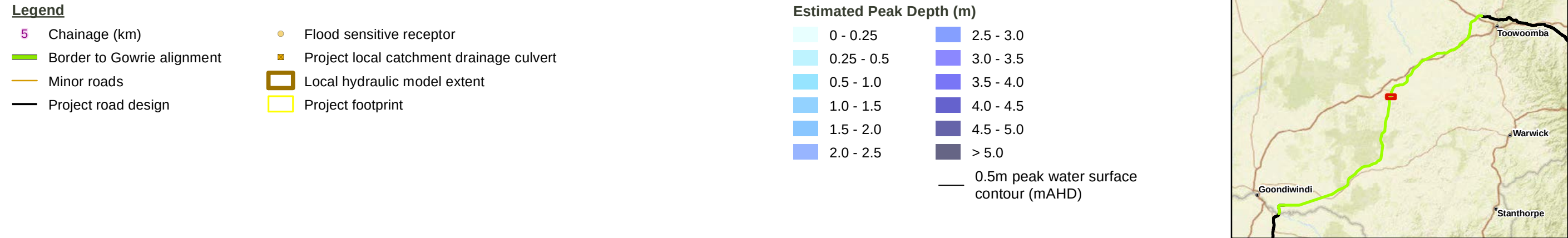


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

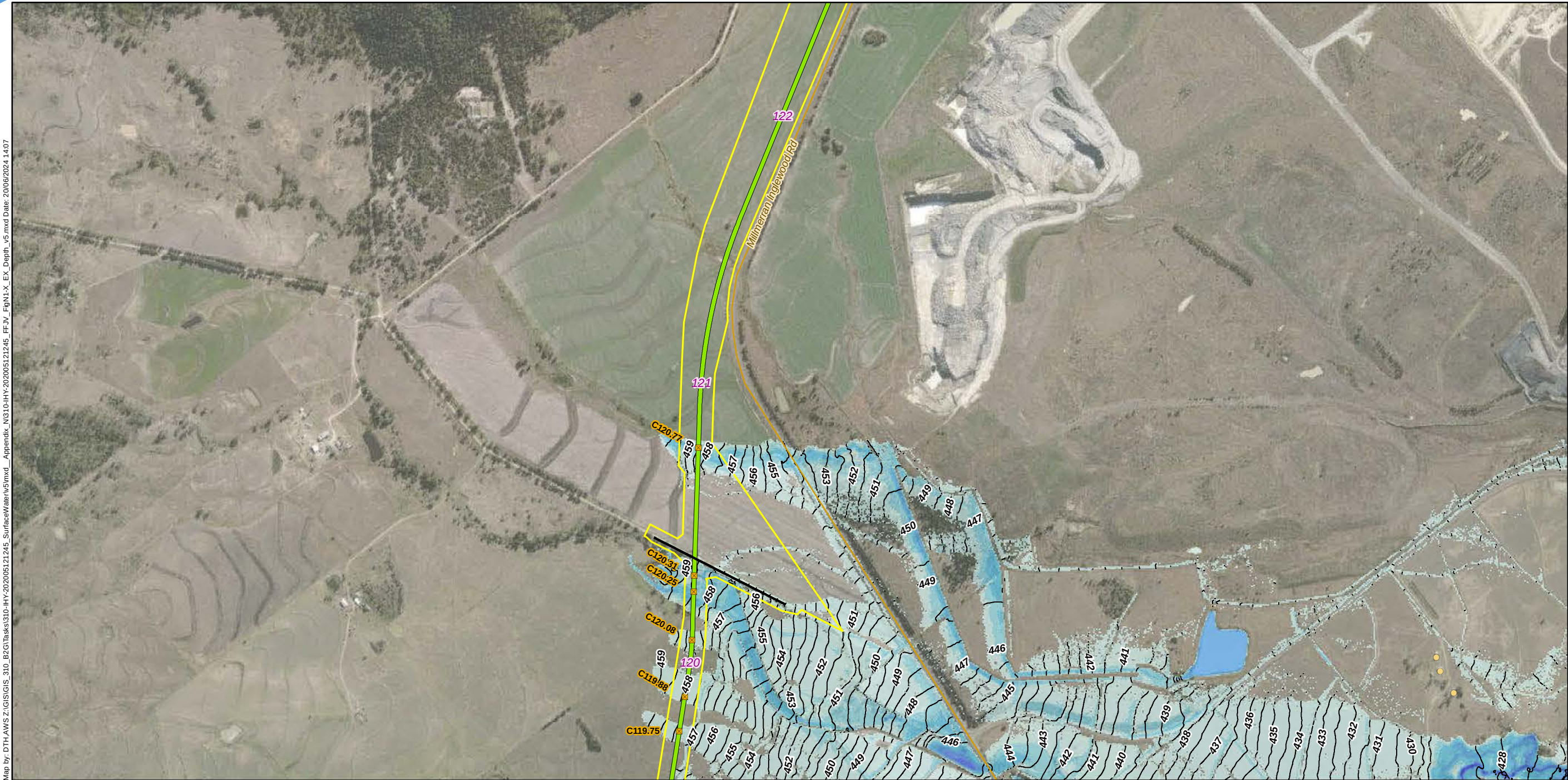
Border to Gowrie

Figure N1 - Page 28 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case



Map by: D:\HAWES\Z:\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:07

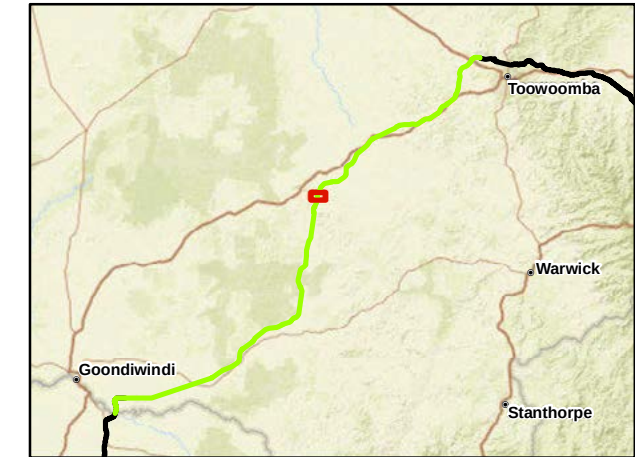


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

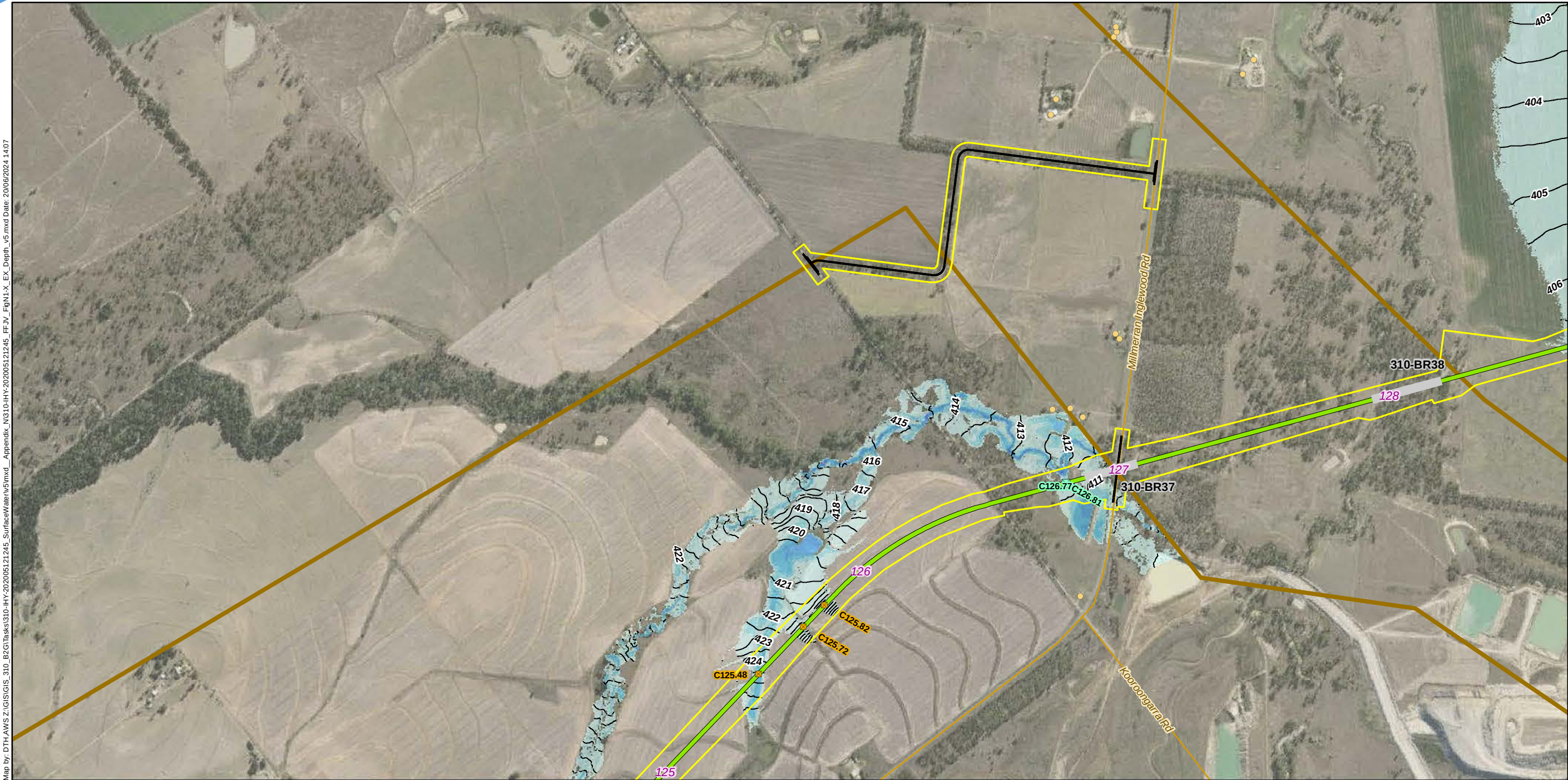
Estimated Peak Depth (m)

- | | |
|------------|-----------|
| 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 |
- 0.5m peak water surface contour (mAHD)



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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:07

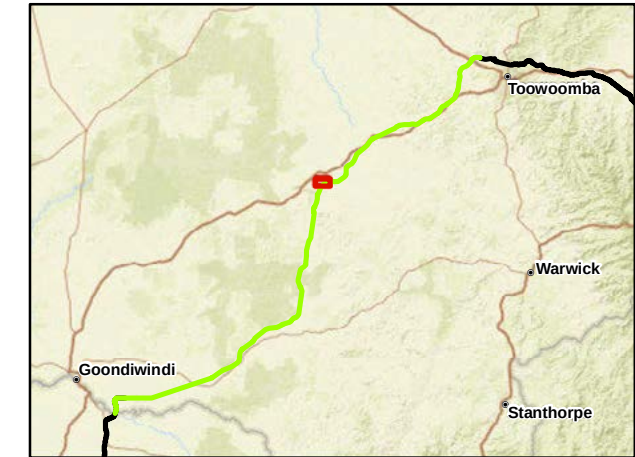


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



- Estimated Peak Depth (m)**

A map of the study area in south-eastern Queensland, Australia. The map shows a network of roads (black lines) and rivers (blue lines). The study site is marked with a red square. Major towns labeled include Goondiwindi, Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, indicating different land cover types.

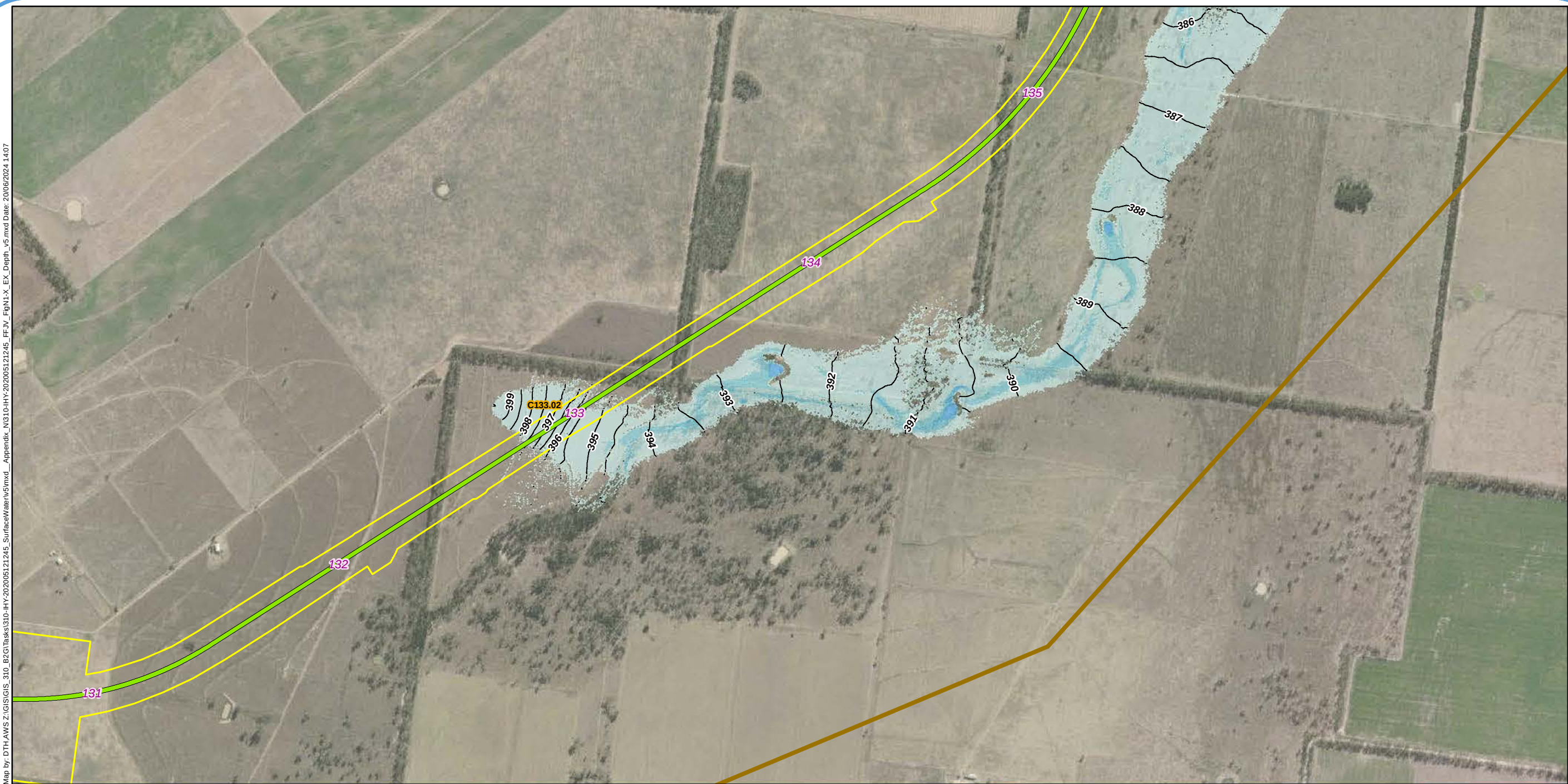


Border to Gowrie

Figure N1 - Page 33 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-IHY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:07

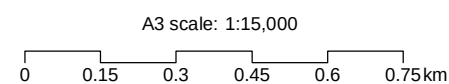


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



Map by: D:\HAWKS\GIS\310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:07

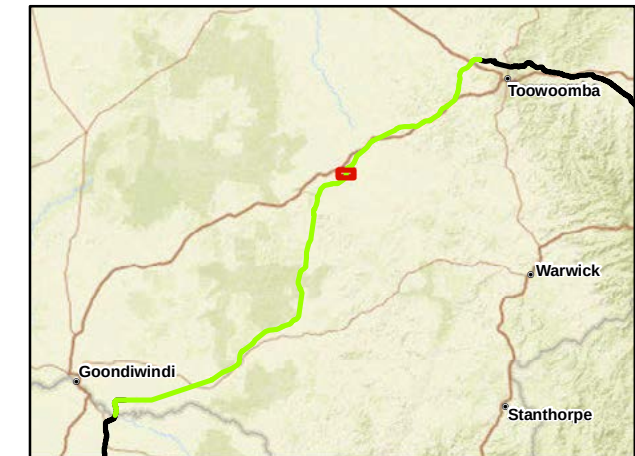


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



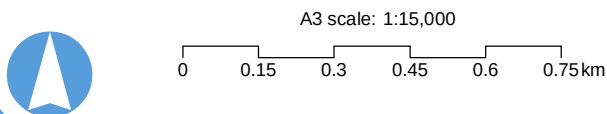
Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

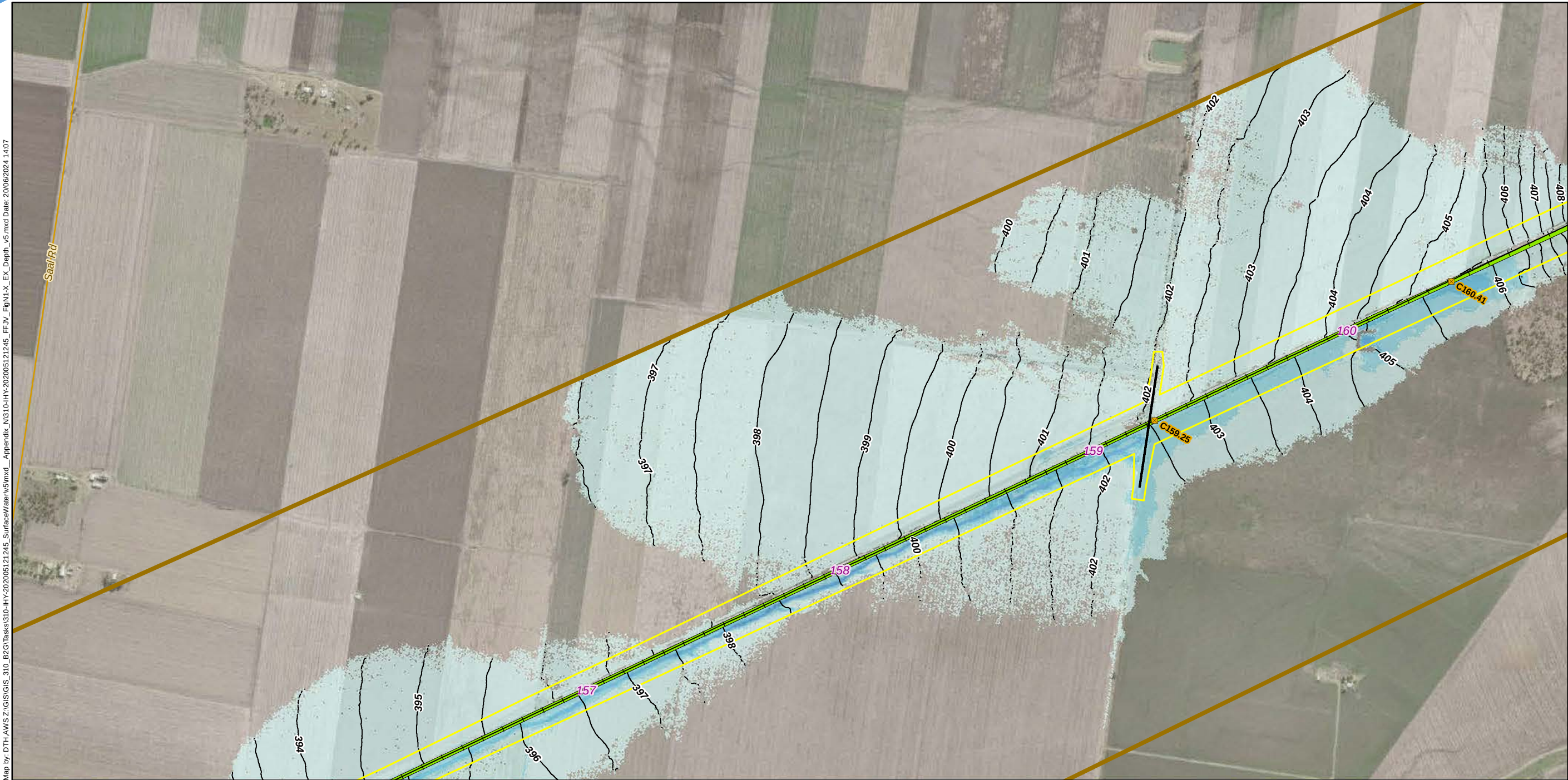
Estimated Peak Depth (m)

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

0.5m peak water surface contour (mAHD)



Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\Tasks\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:07

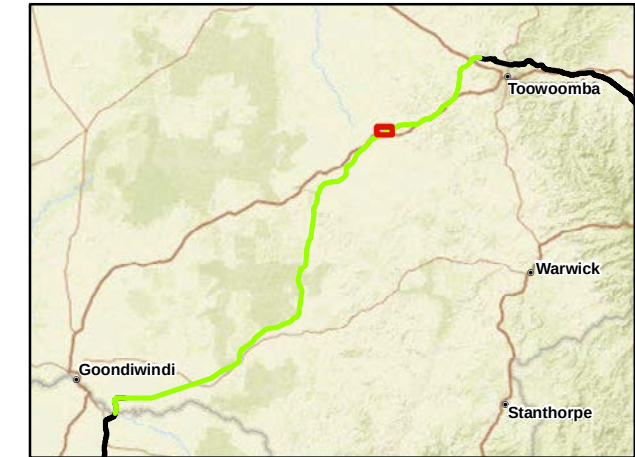


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



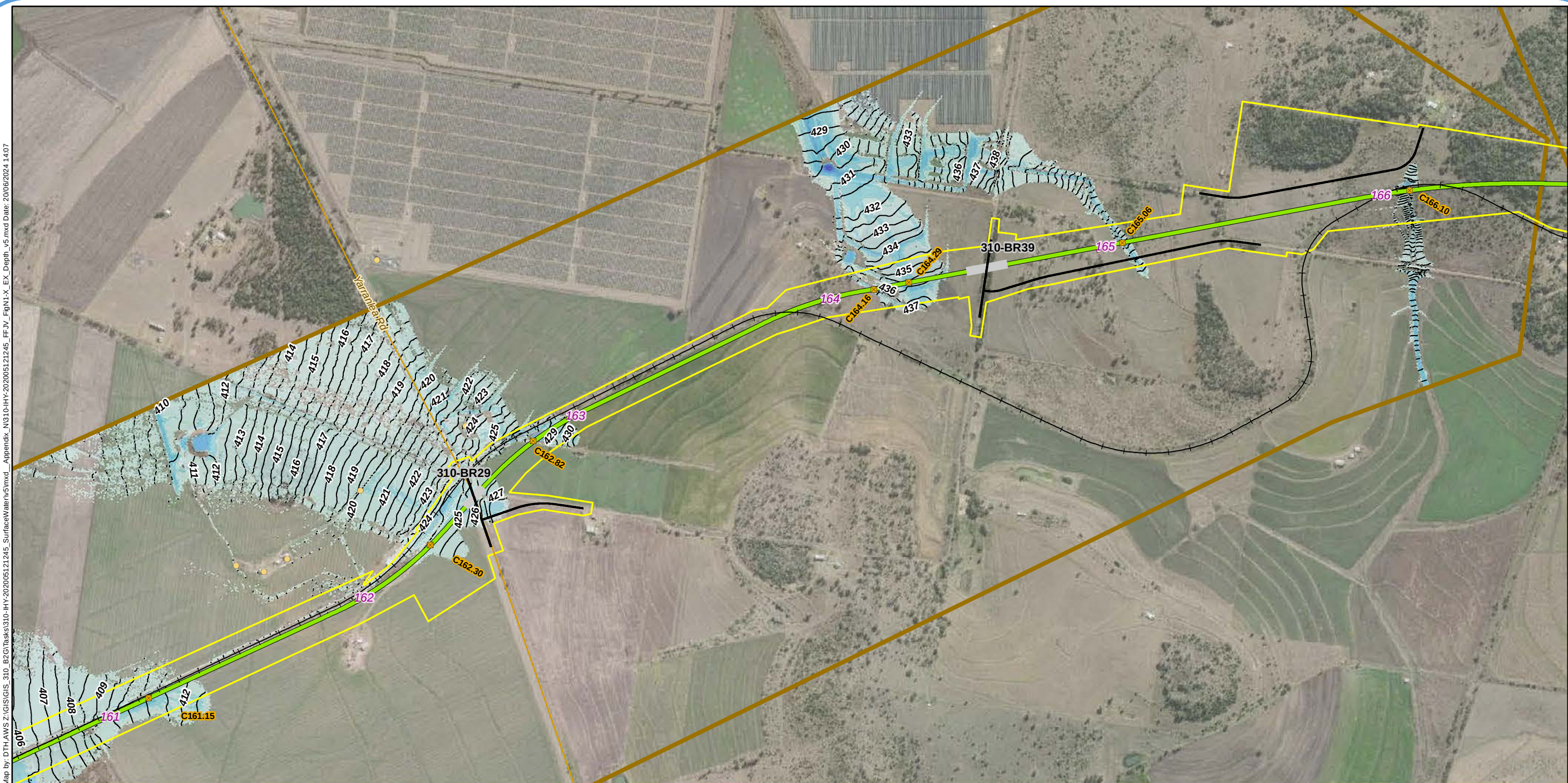
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 37 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_N\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:07



Legend

- | | |
|-------------------------------|--|
| 5 Chainage (km) | ● Flood sensitive receptor |
| — Existing rail (operational) | ■ Project local catchment drainage culvert |
| — Border to Gowrie alignment | ■ Project bridges |
| — Minor roads | ■ Local hydraulic model extent |
| — Project road design | ■ Project footprint |

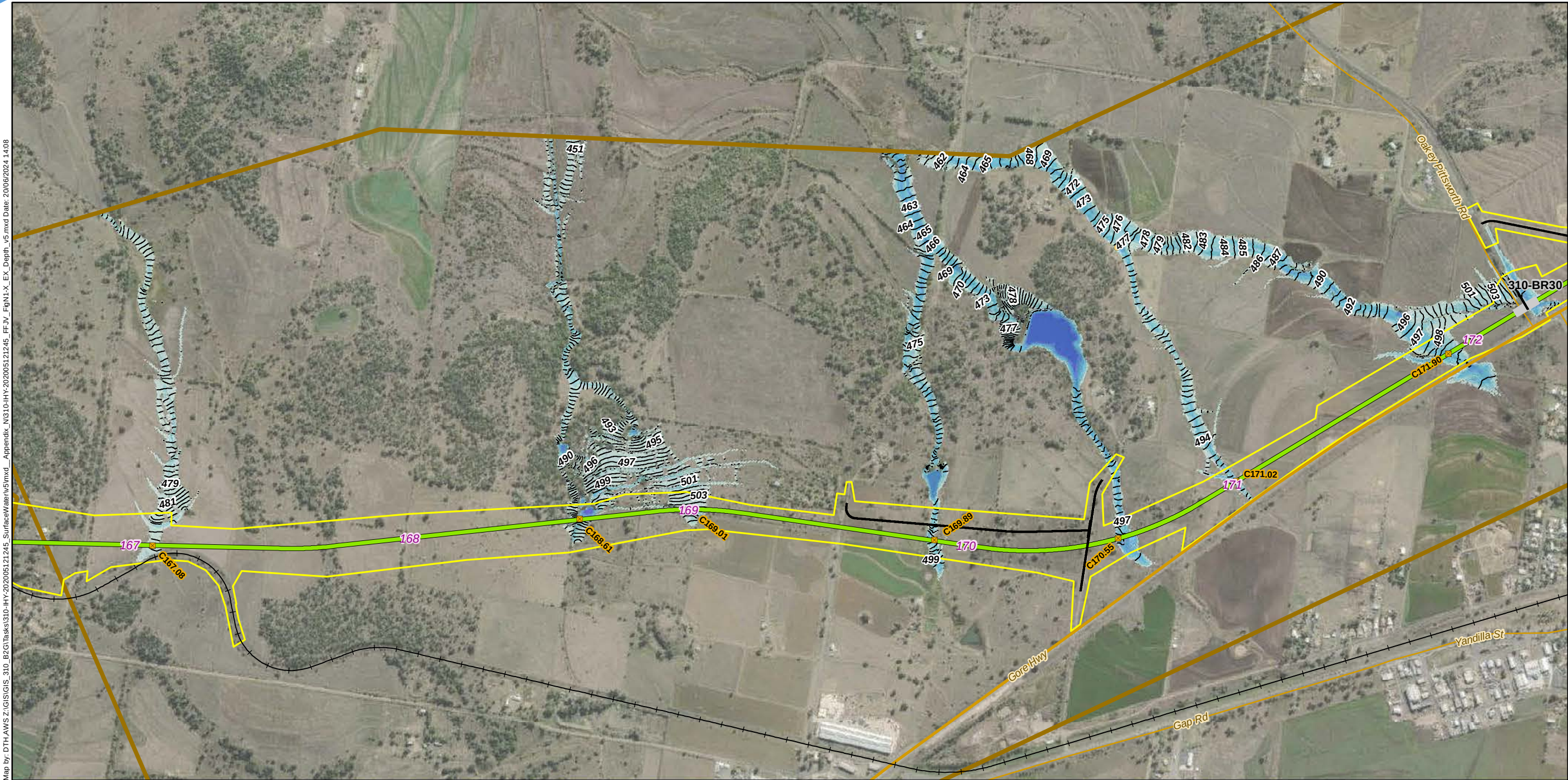
Estimated Peak Depth (m)

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
— 0.5m peak water surface contour (mAHD)	



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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd Appendix_IV310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:08

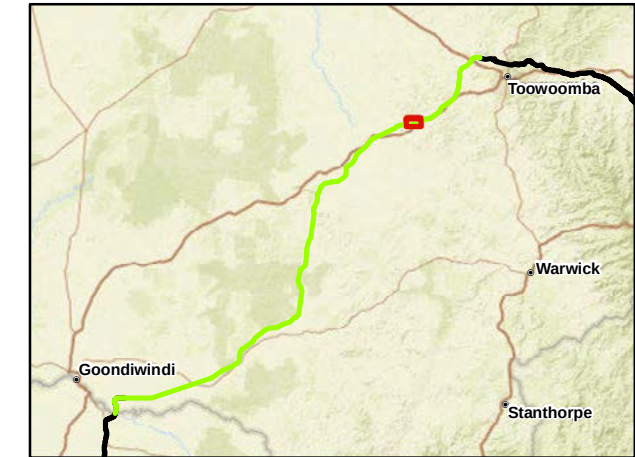


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated Peak 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

0.5m peak water surface contour (mAHD)



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

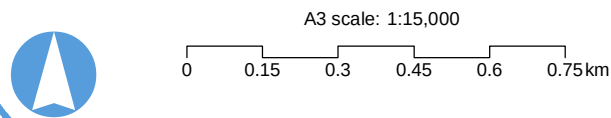
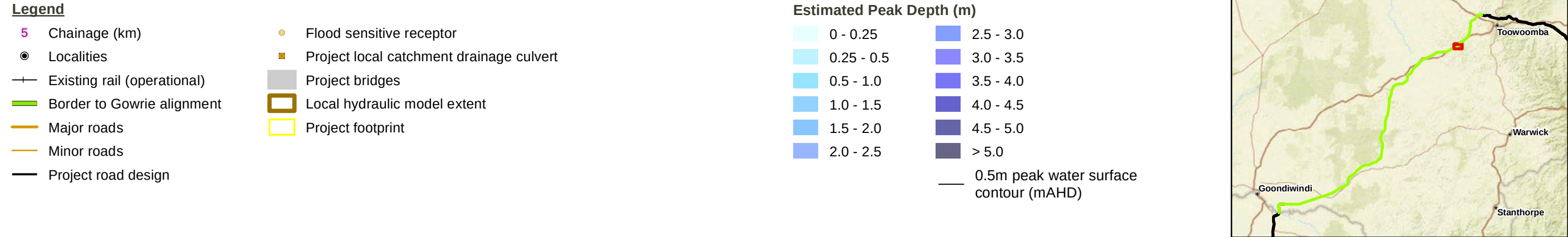


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 40 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case



Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:08

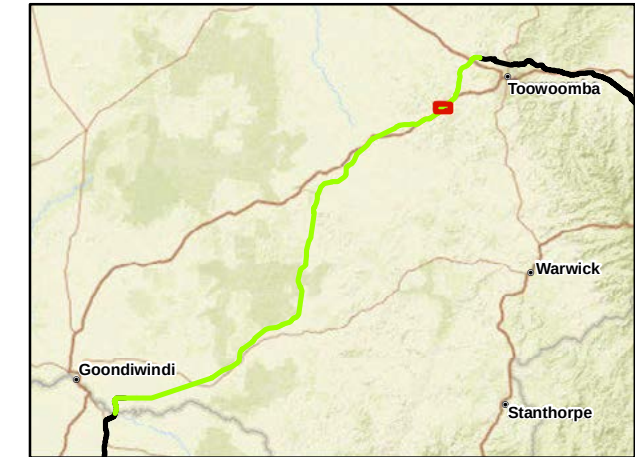


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	



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

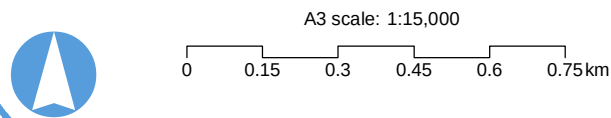
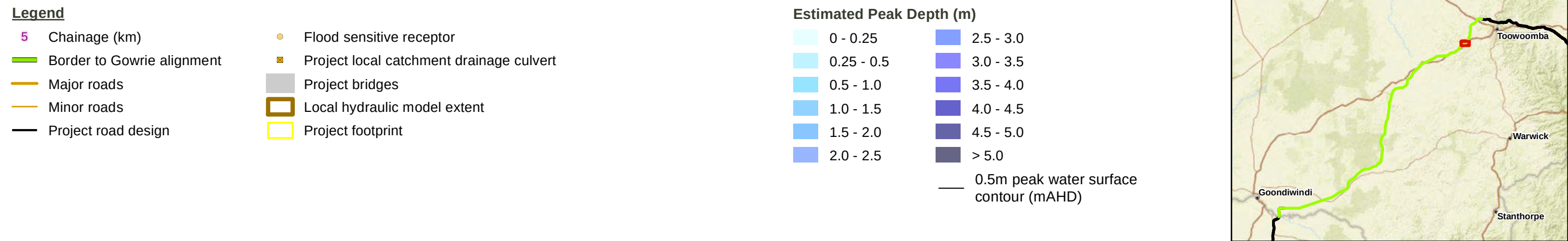


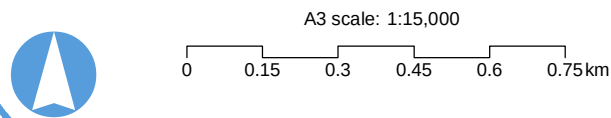
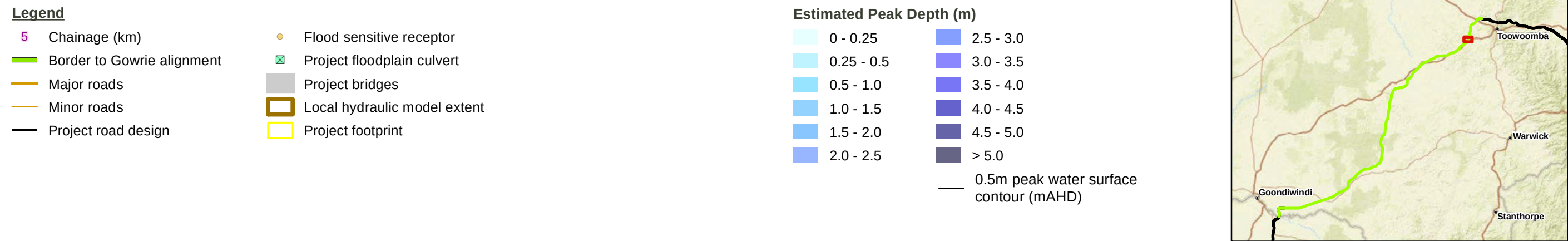
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N1 - Page 42 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case





Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN1-X_EX_Depth_v5.mxd Date: 20/06/2024 14:08



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated Peak 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
0.5m peak water surface contour (mAHD)	

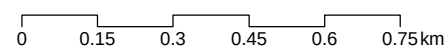


A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



- Estimated Peak Depth (m)**

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

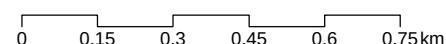
Figure N1 - Page 46 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Existing Case



- Estimated Peak Depth (m)**

A3 scale: 1:15.000

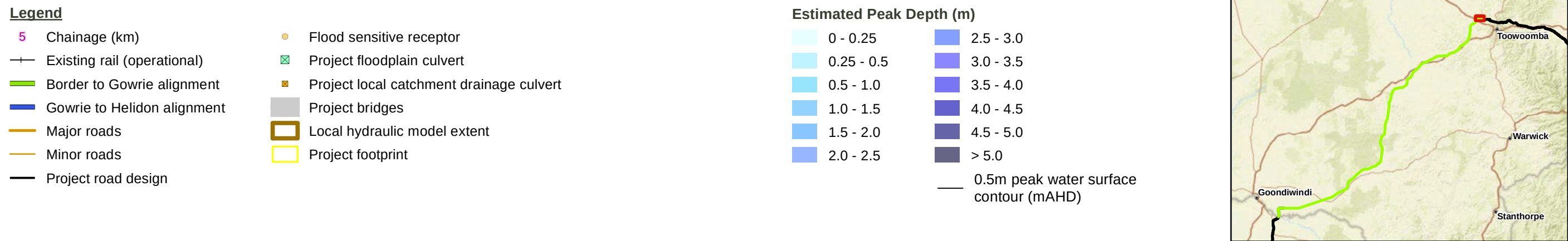
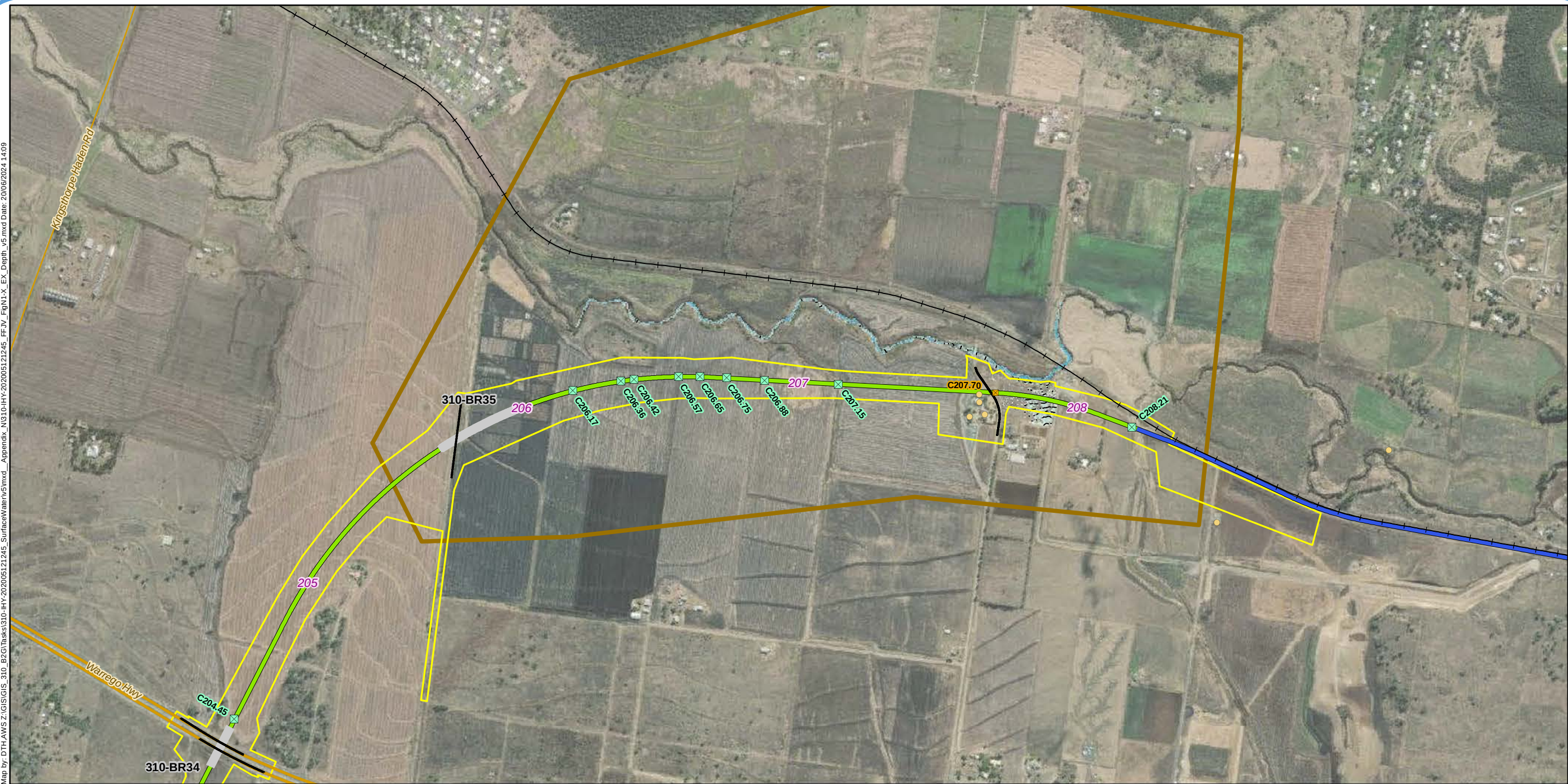


Issue date: 20/06/2024 Version: 5

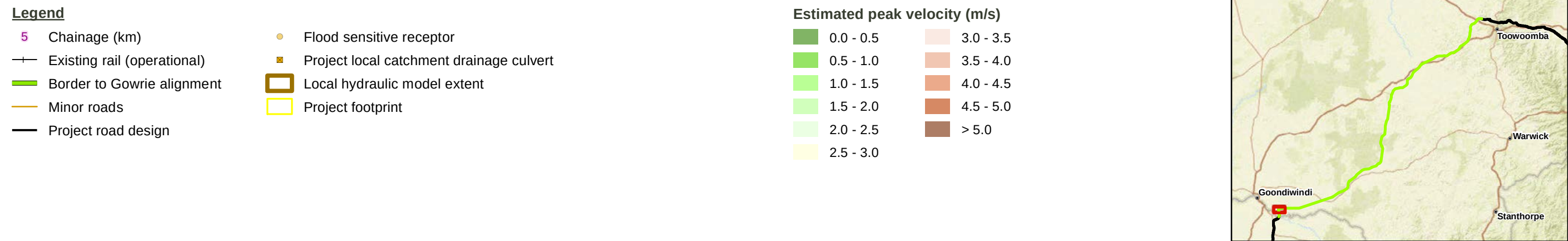
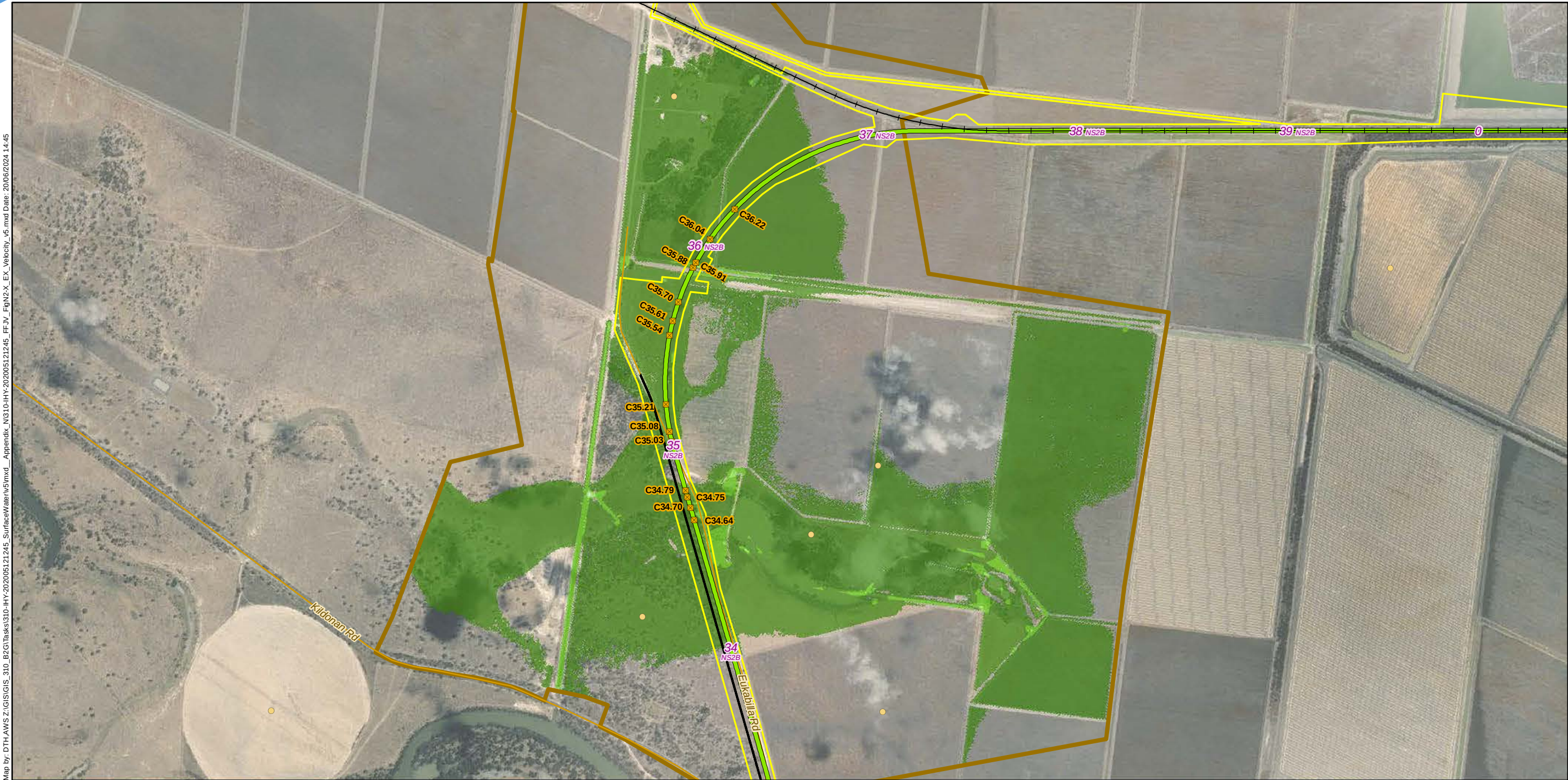
Coordinate System: GDA 1994 MGA Zone 56

Figure N1 - Page 47 of 48:

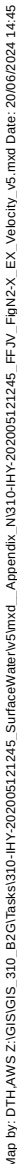
1% AEP Event - Local Catchments - Peak Water Levels - Existing Case



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



A3 scale: 1:20,000
0 0.2 0.4 0.6 0.8 1km



Legend

- Legend**
- | | | | |
|---|-----------------------------|---|--|
| 5 | Chainage (km) | | Flood sensitive receptor |
| + | Existing rail (operational) | ■ | Project local catchment drainage culvert |
| — | Border to Gowrie alignment | ▭ | Local hydraulic model extent |
| — | Project road design | ▭ | Project footprint |

Estimated peak velocity (m/s)

Estimated peak velocity (m/s)

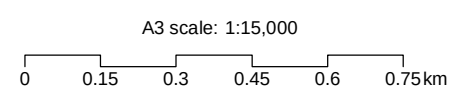
0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



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

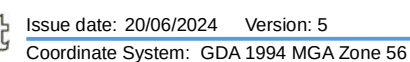
Border to Gowrie

Figure N2 - page 2 of 48:

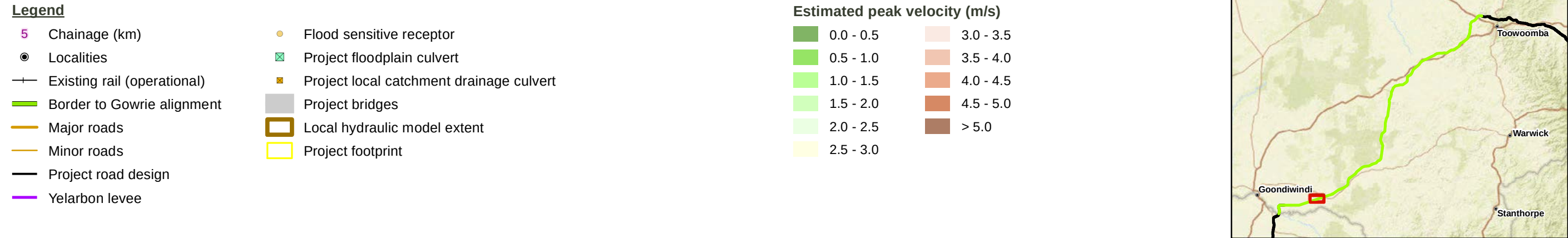
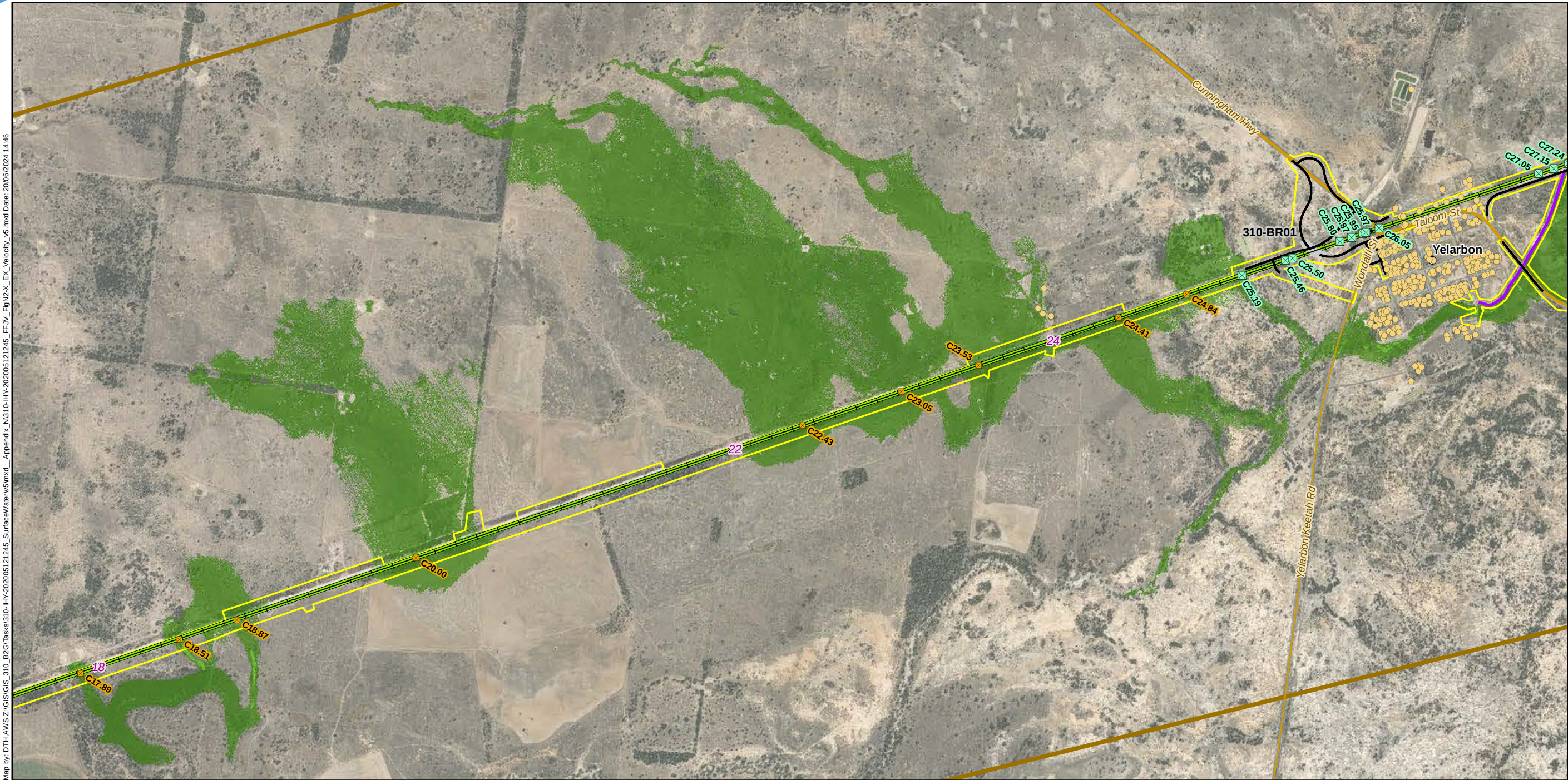
1% AEP Event - Local Catchments - Peak Velocity - Existing Case



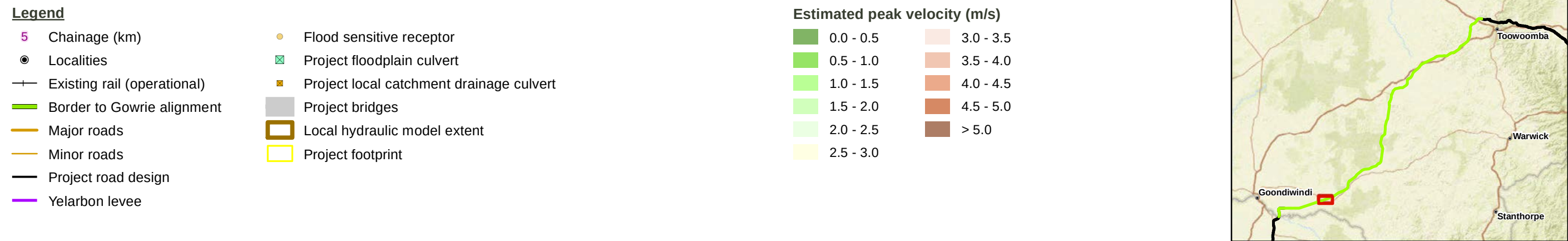
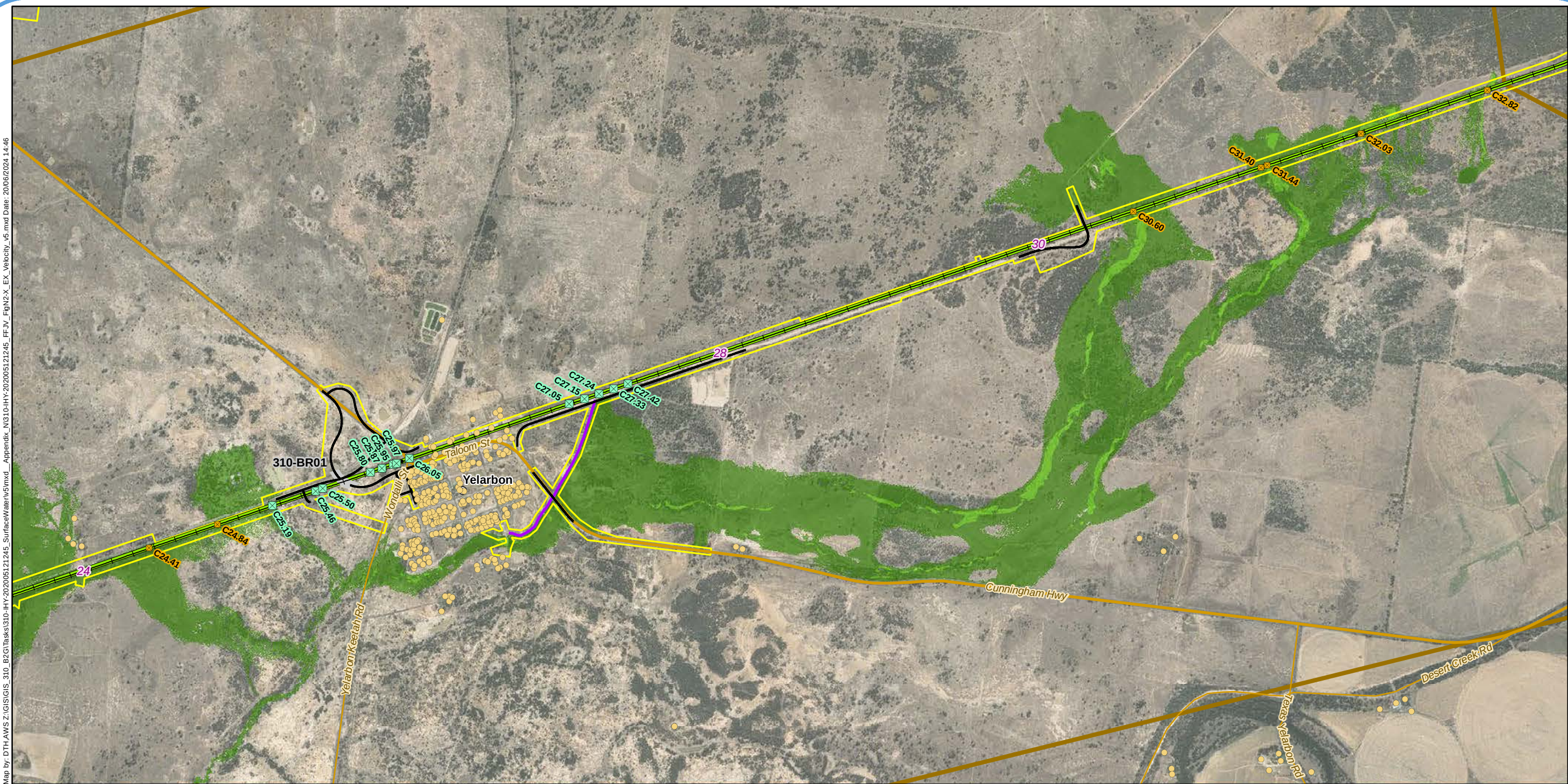
- Estimated peak velocity (m/s)



1% AEP Event - Local Catchments - Peak Velocity - Existing Case



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



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



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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: 1:25,000
0 0.25 0.5 0.75 1 1.25 km



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local 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	



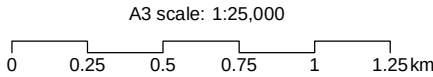
A3 scale: 1:25,000
0 0.25 0.5 0.75 1 1.25 km



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local 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	





- Estimated peak velocity (m/s)**

The map shows a region in south-eastern Australia. A red line represents the proposed pipeline route, starting from the bottom left and extending towards the top right. A red square marks the location of the proposed pipeline crossing. The map includes labels for several towns: Goondiwindi, Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, indicating different land types or vegetation. A network of roads is shown as thin grey lines, and a river is visible as a blue line.



A step function graph on a horizontal axis labeled from 0 to 0.75 km. The function is 1 for intervals $[0, 0.15)$, $[0.3, 0.45)$, and $[0.6, 0.75]$, and 0 for intervals $[0.15, 0.3)$ and $[0.45, 0.6)$.

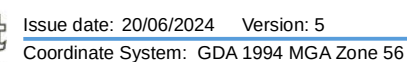


Figure N2 - page 9 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

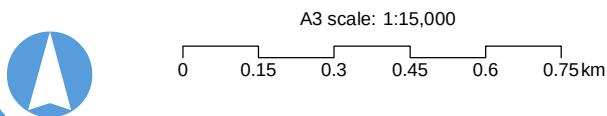
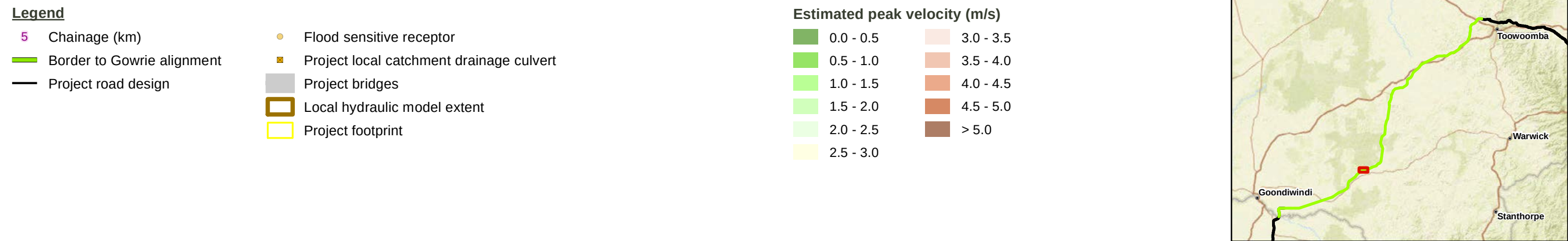
Estimated peak velocity (m/s)

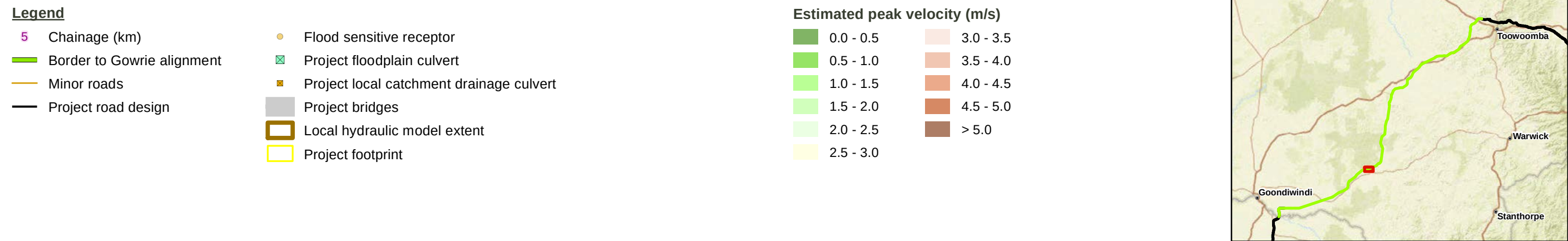
0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km





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

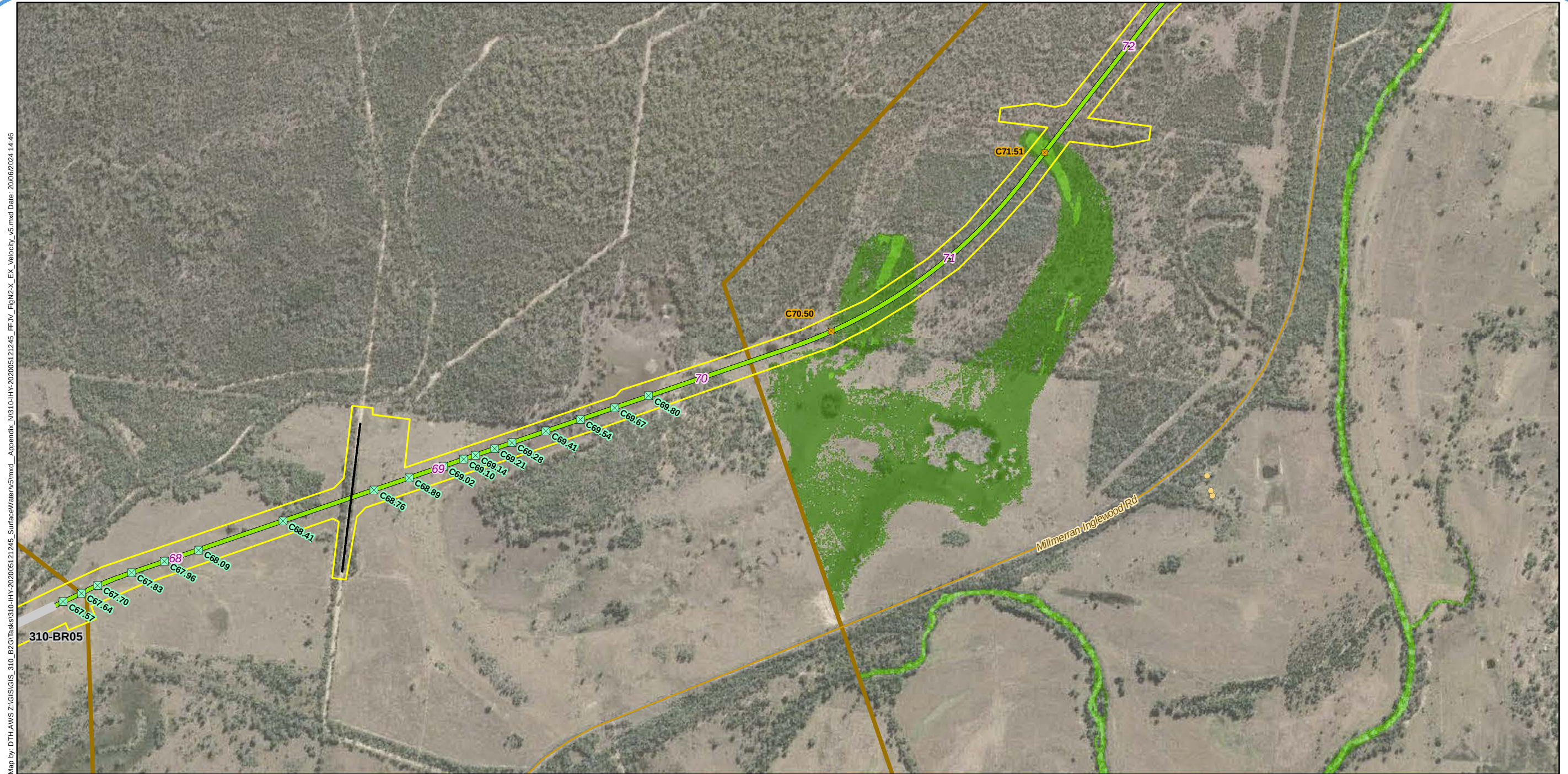


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 12 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

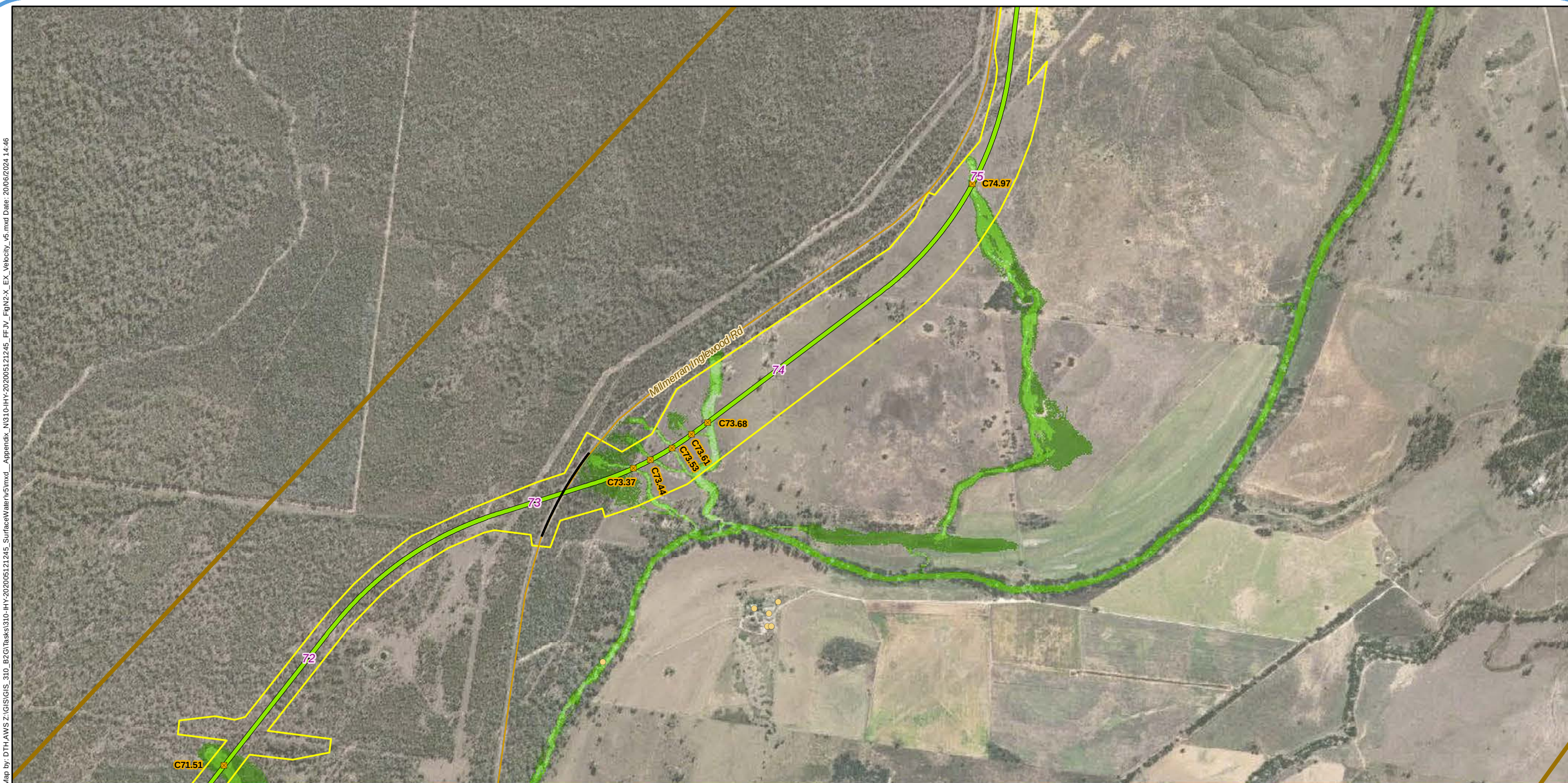
- | | |
|-----------|-----------|
| 0.0 - 0.5 | 3.0 - 3.5 |
| 0.5 - 1.0 | 3.5 - 4.0 |
| 1.0 - 1.5 | 4.0 - 4.5 |
| 1.5 - 2.0 | 4.5 - 5.0 |
| 2.0 - 2.5 | > 5.0 |
| 2.5 - 3.0 | |



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appldix_IV310-HY-202005121245_FF\JV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:46



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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 N2 - page 14 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd Appendix_IV310-HY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:46



Legend

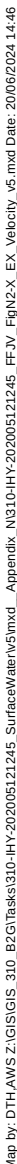
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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



Legend

- Legend**
- | | | | |
|---|----------------------------|--|--|
| 5 | Chainage (km) | | Flood sensitive receptor |
| | Border to Gowrie alignment | | Project local catchment drainage culvert |
| | Minor roads | | Local hydraulic model extent |
| | Project road design | | Project footprint |

Estimated peak velocity (m/s)

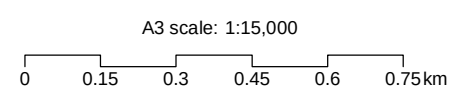
Estimated peak velocity (m/s)

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 0.75km



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 16 of 48:

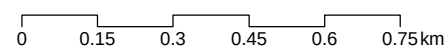
1% AEP Event - Local Catchments - Peak Velocity - Existing Case



- Estimated peak velocity (m/s)

A map of south-eastern Australia showing the study area. A red square indicates the study site, located on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The study area is highlighted in green.

A3 scale: 1:15,000

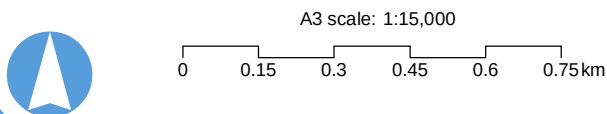
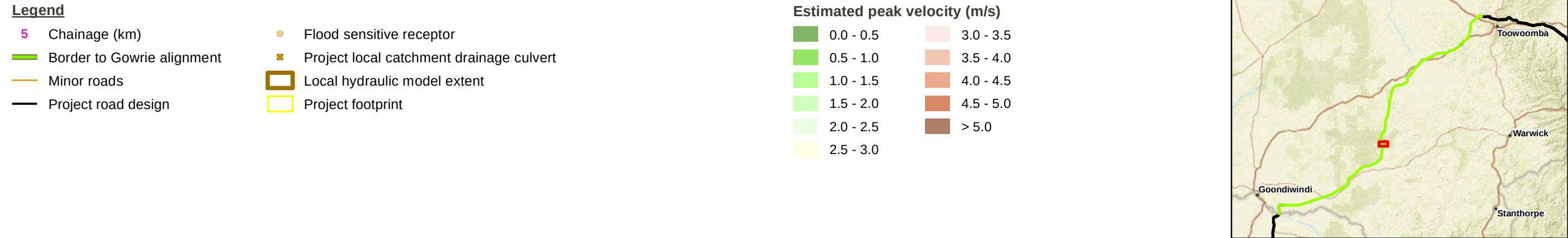


Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Figure N2 - page 17 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case





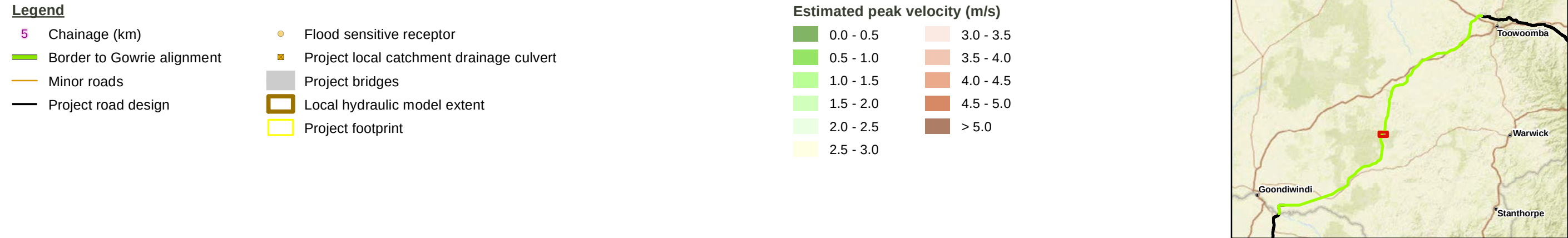
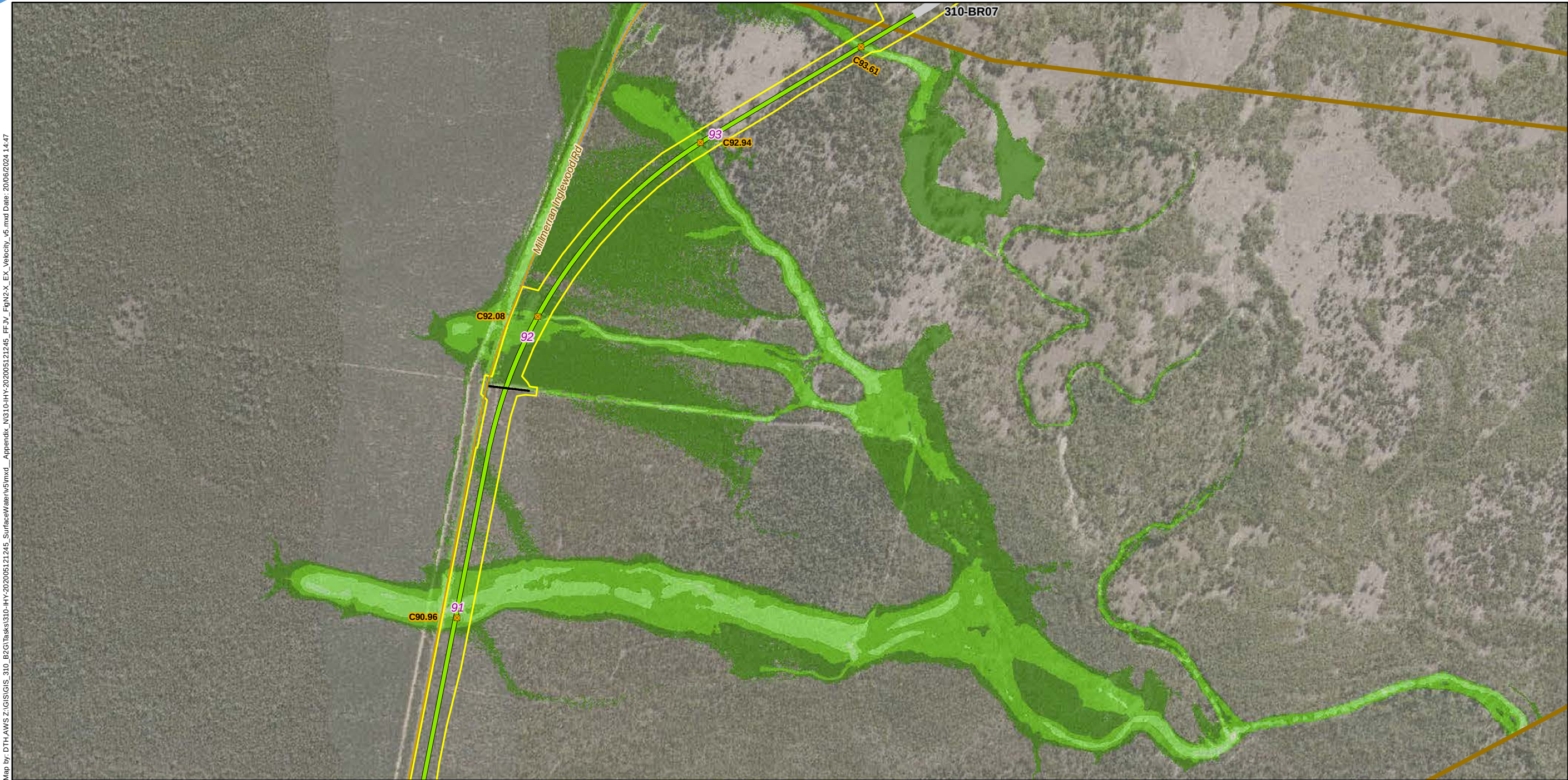
- Estimated peak velocity (m/s)

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	



Figure N2 - page 19 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



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



Future Freight
Integrating Community, Environment and Engineering

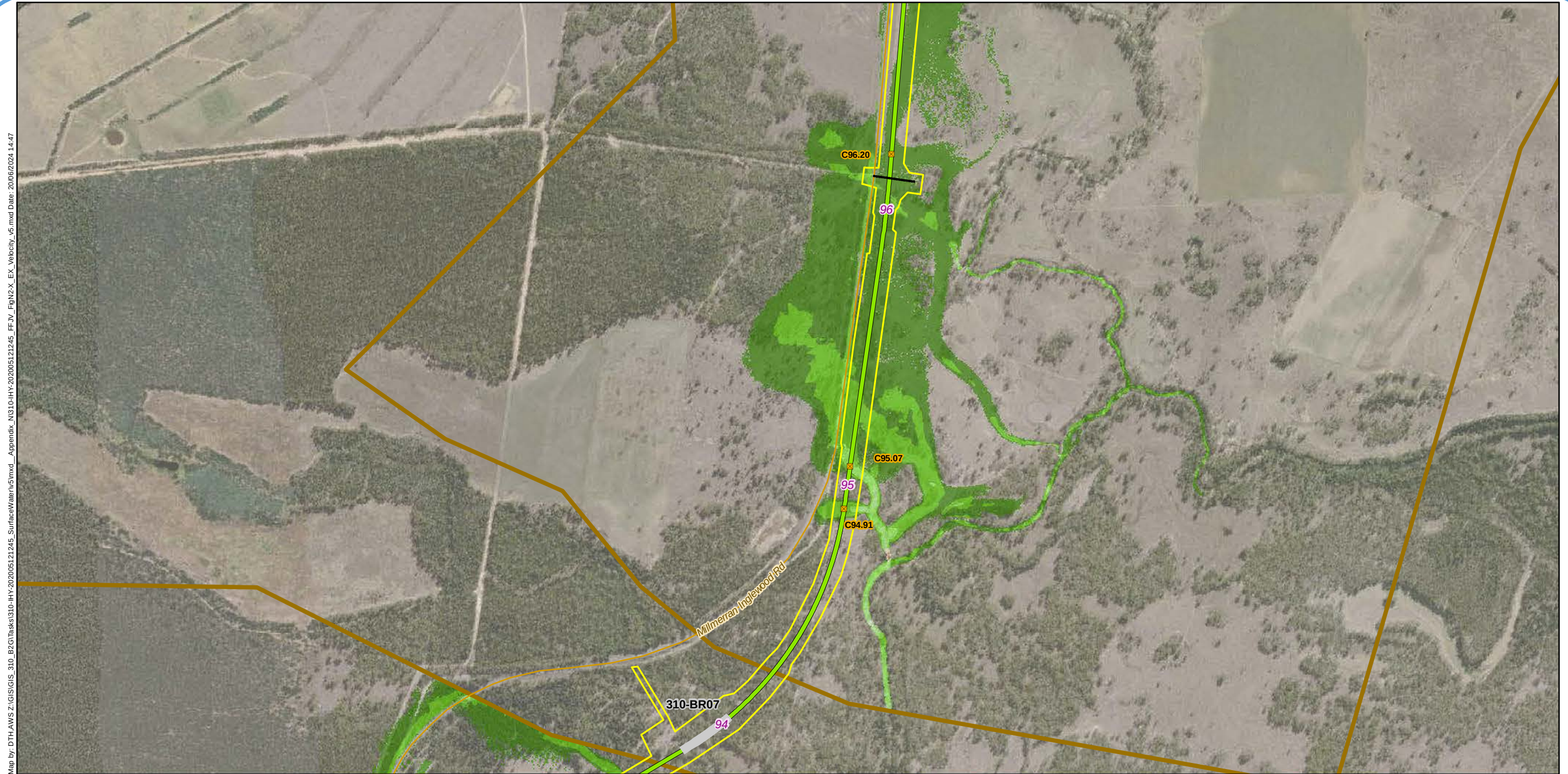
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 20 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWaterV5.mxd Appendix_310-HY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:47



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_1\310-HY-202005121245_FF\JV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:47



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local 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 N2 - page 22 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWaterV5.mxd_Appldix_IV310-HY-202005121245_FF\JV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:47



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local 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



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

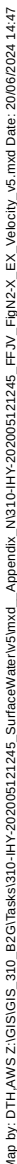


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 23 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



Legend

- Legend**
- | | | | |
|---|----------------------------|---|--|
| 5 | Chainage (km) |  | Flood sensitive receptor |
|  | Border to Gowrie alignment |  | Project floodplain culvert |
|  | Minor roads |  | Project local catchment drainage culvert |
|  | Project road design |  | Project bridges |
| | |  | Local hydraulic model extent |
| | |  | Project footprint |

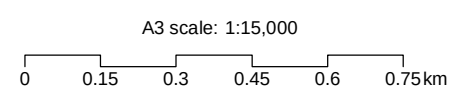
Estimated peak velocity (m/s)

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 N2 - page 24 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

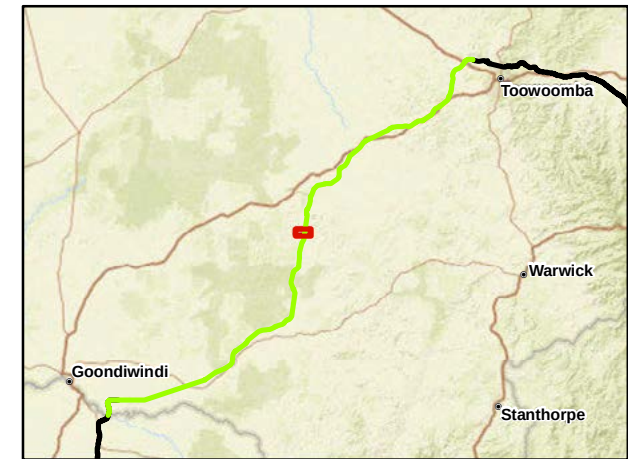


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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



- Estimated peak velocity (m/s)**

A map of south-eastern Australia showing the study area. A red square indicates the study site, located on a road between Toowoomba and Goondiwindi. The map also shows the locations of Toowoomba, Warwick, Stanthorpe, and Goondiwindi. The study area is highlighted in green.

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Figure N2 - page 26 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



- Estimated peak velocity (m/s)**

A map of south-eastern Australia showing the study area. A red square indicates the study site, located on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, and a network of roads is shown in red and black lines.



Border to Gowrie

Figure N2 - page 27 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

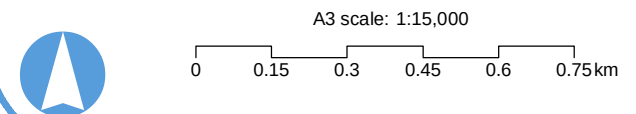
Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWaterV5.mxd Appendix_IV310-HY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:47



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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	





- Estimated peak velocity (m/s)

A map of south-eastern Australia showing the study area. A red rectangle indicates the study site, located on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, and a network of roads is shown in red and black lines.



Border to Gowrie

Figure N2 - page 29 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:48



Legend

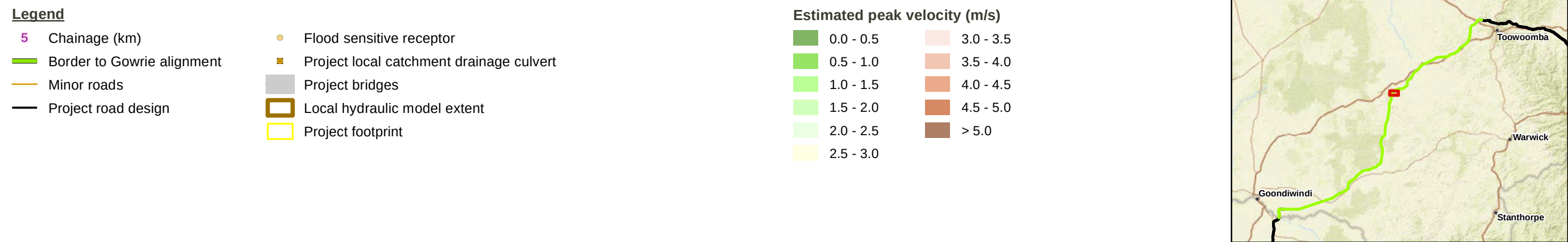
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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	



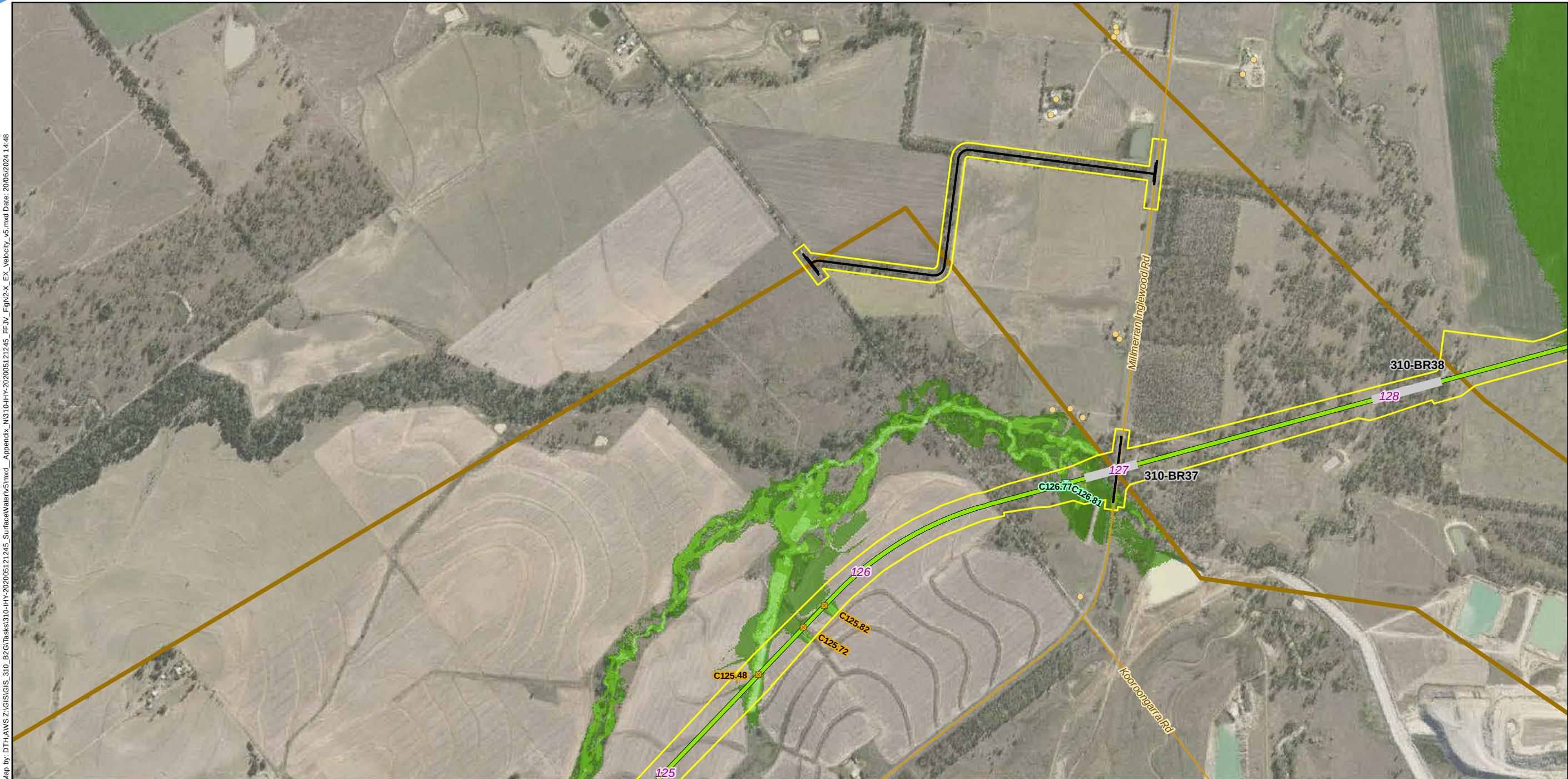
A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:48



Legend

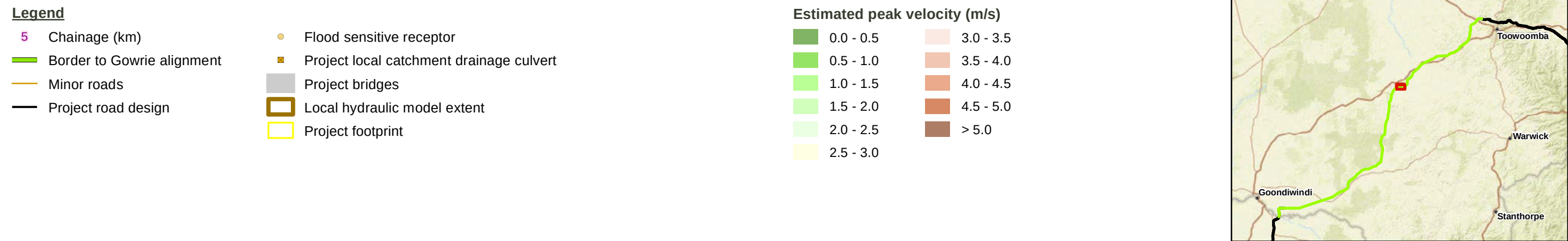
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak velocity (m/s)

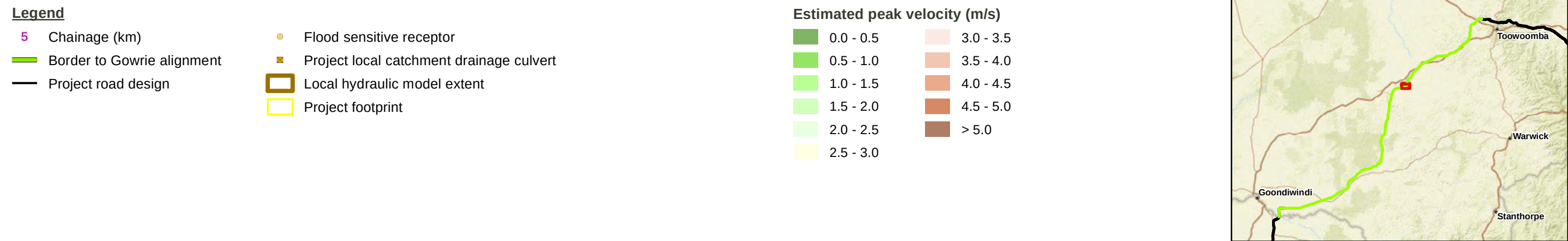
0.0 - 0.5	3.0 - 3.5
0.5 - 1.0	3.5 - 4.0
1.0 - 1.5	4.0 - 4.5
1.5 - 2.0	4.5 - 5.0
2.0 - 2.5	> 5.0
2.5 - 3.0	



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



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



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWaterV5.mxd_Appldix_IV310-HY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:48



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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



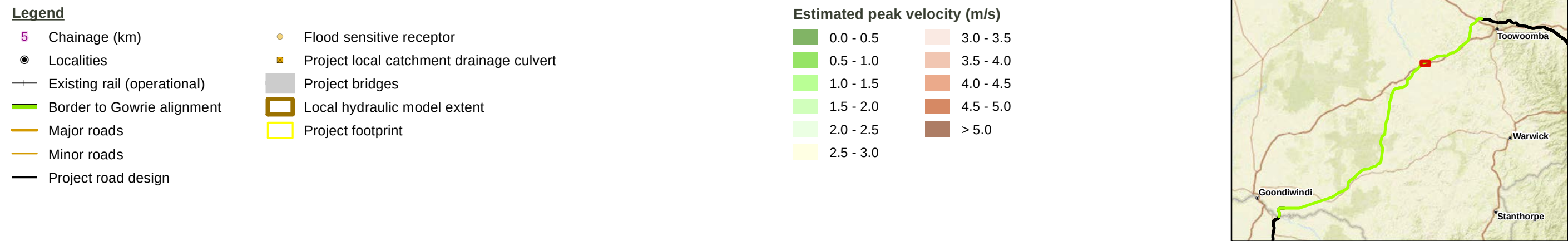
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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 35 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



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

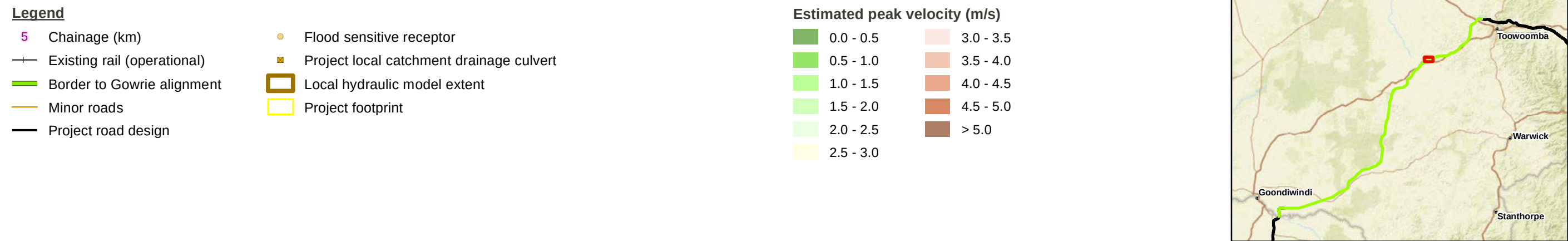
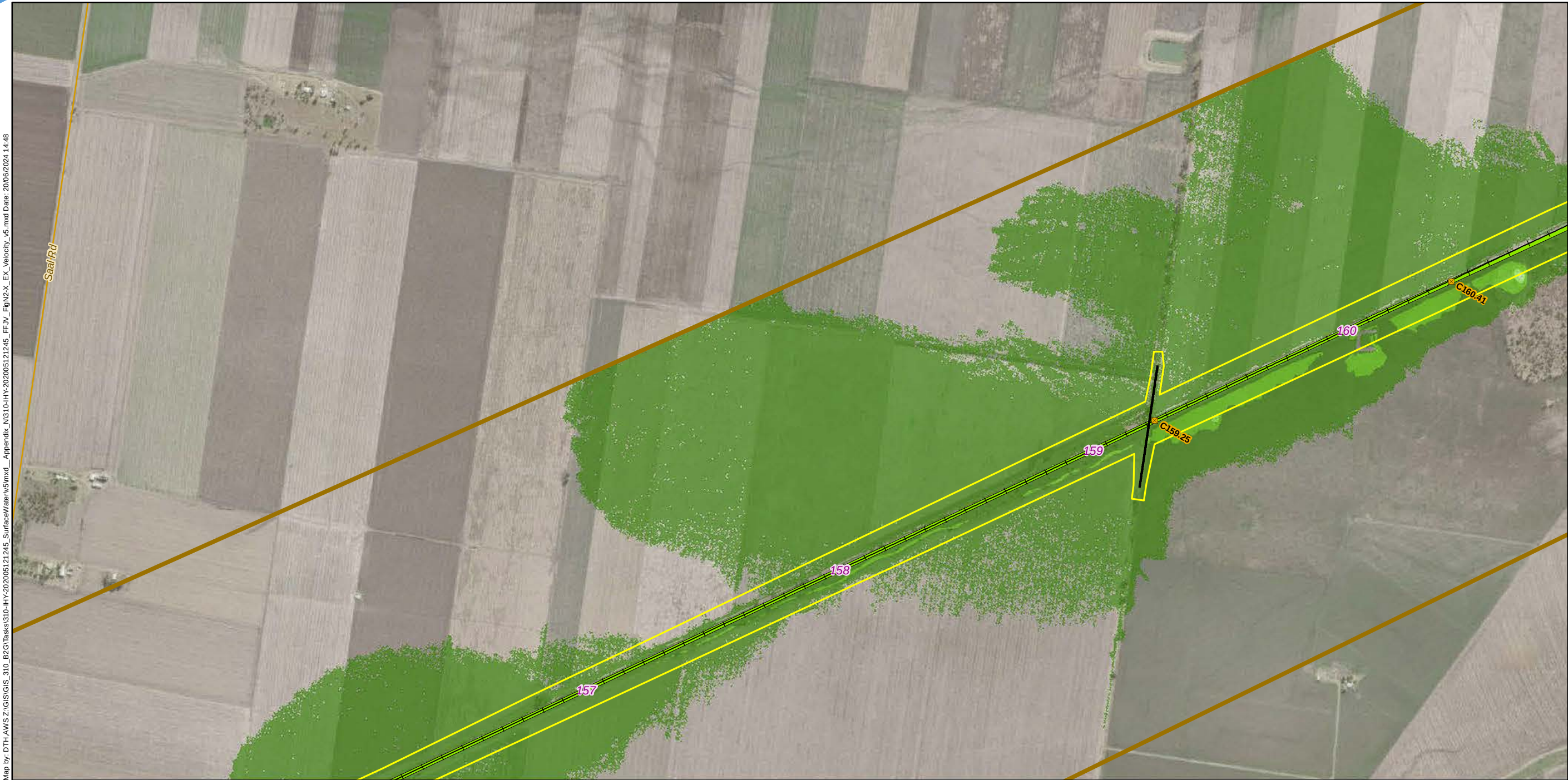


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 36 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



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 N2 - page 37 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWaterV5.mxd Appendix_IV310-HY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:48



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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



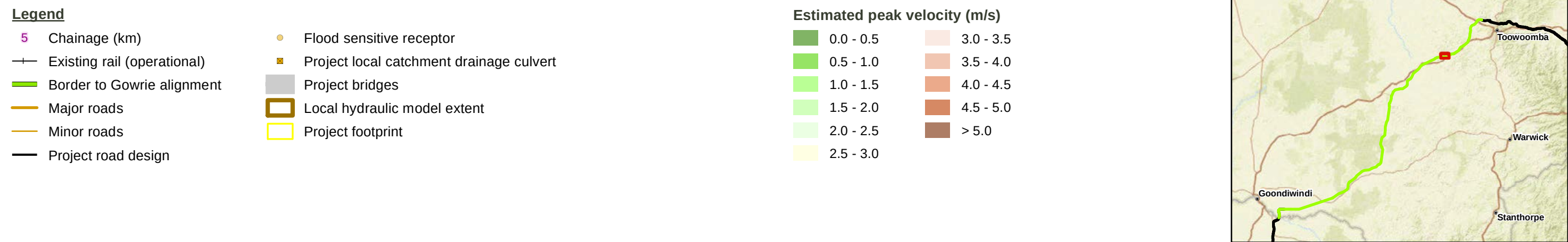
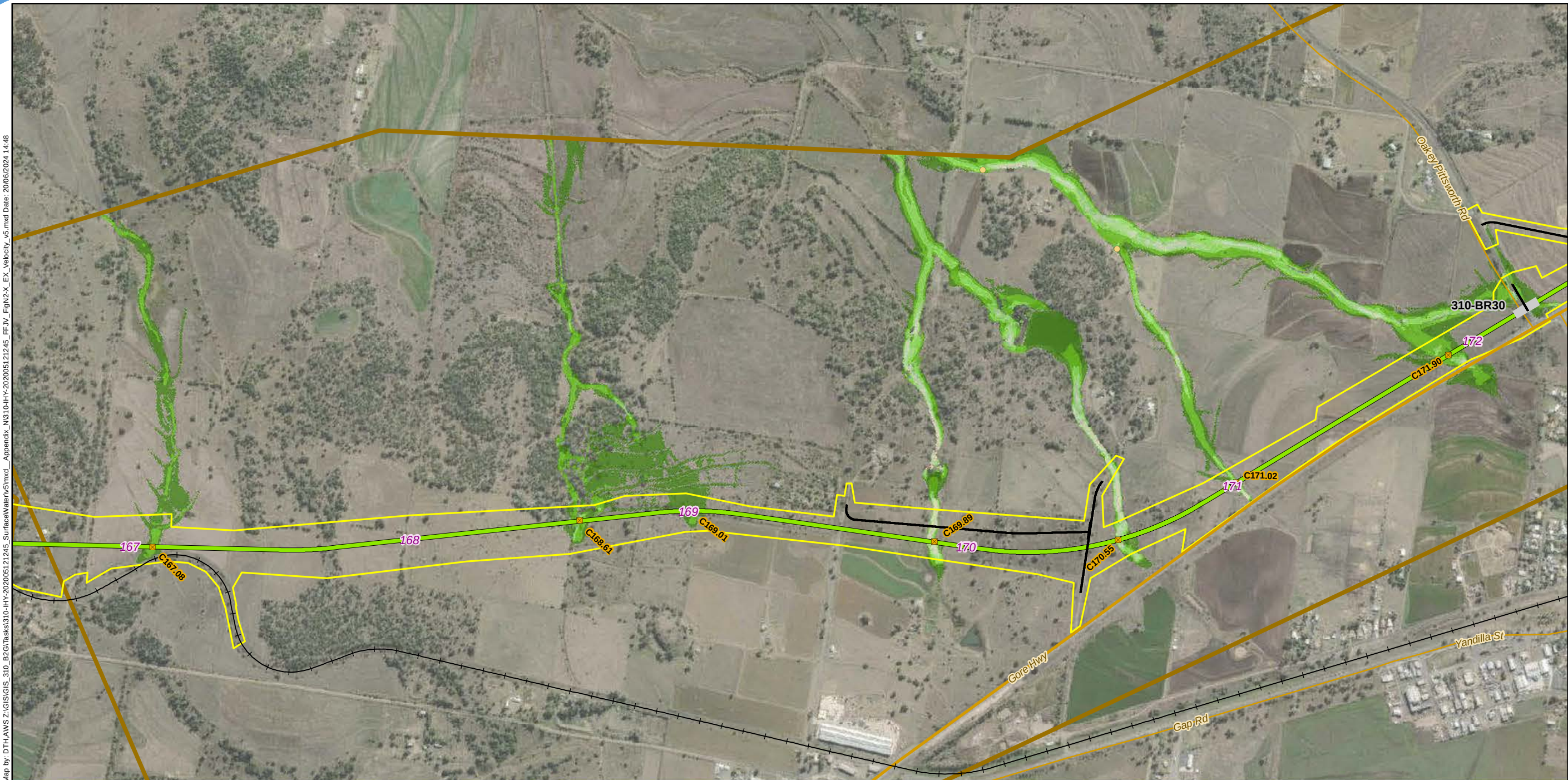
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 38 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:48



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



- Estimated peak velocity (m/s)

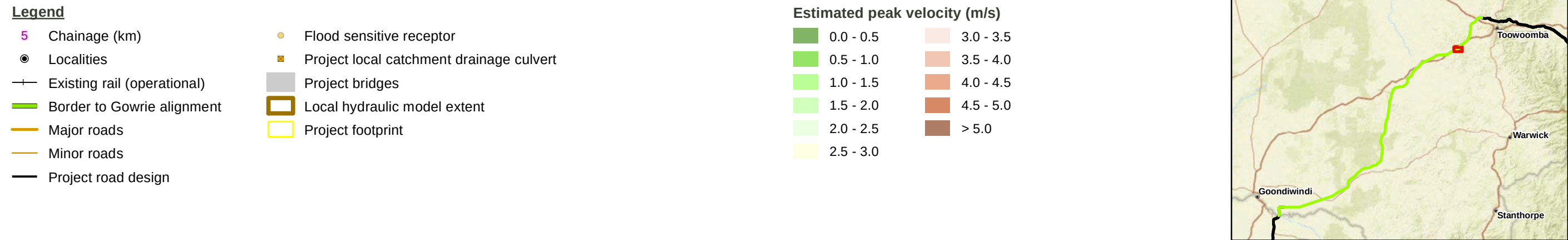
Figure N2 - page 40 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56



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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:48

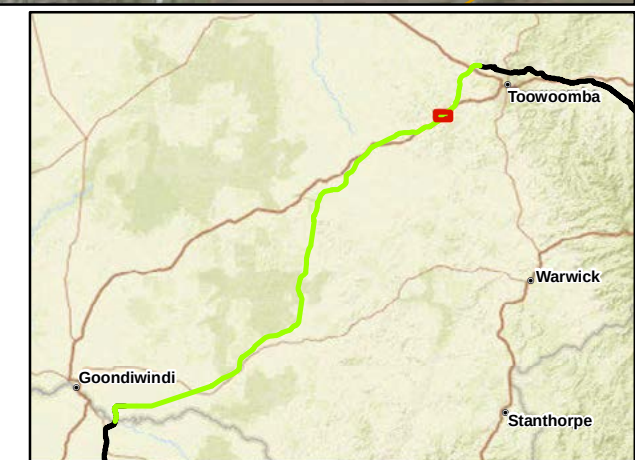


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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 N2 - page 42 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

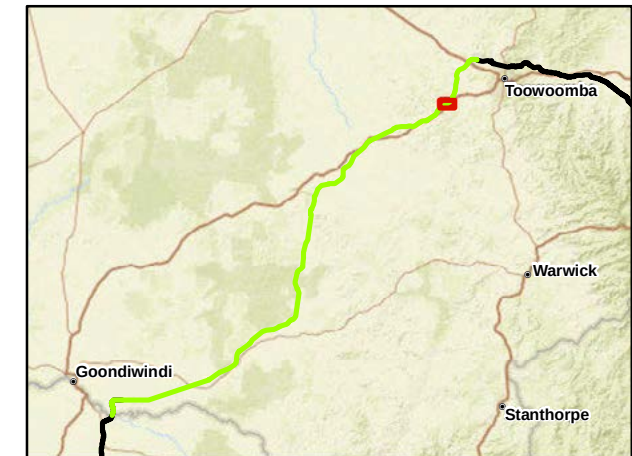
Map by: DTH.AWS Z:\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWaterV5.mxd Appendix_IV310-HY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:49



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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	



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

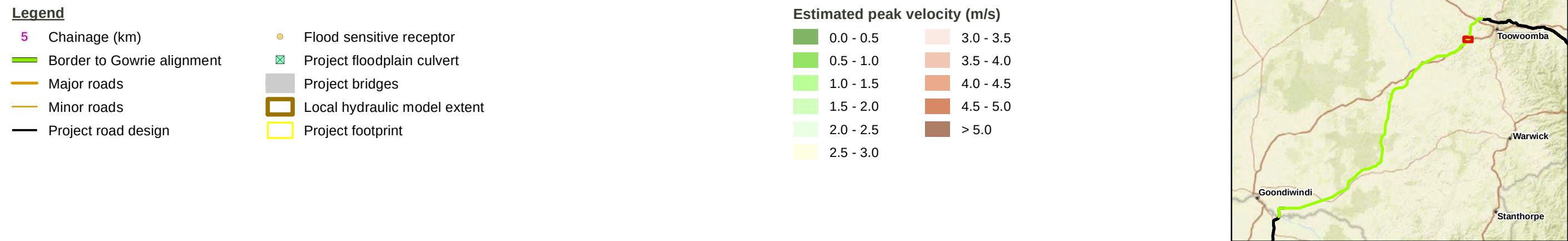


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 43 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



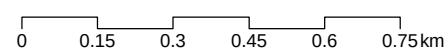
A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



- Estimated peak velocity (m/s)

A3 scale: 1:15,000

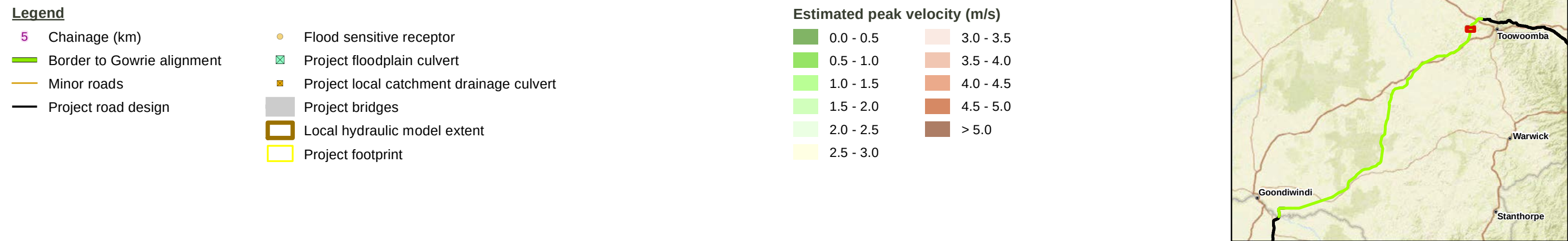
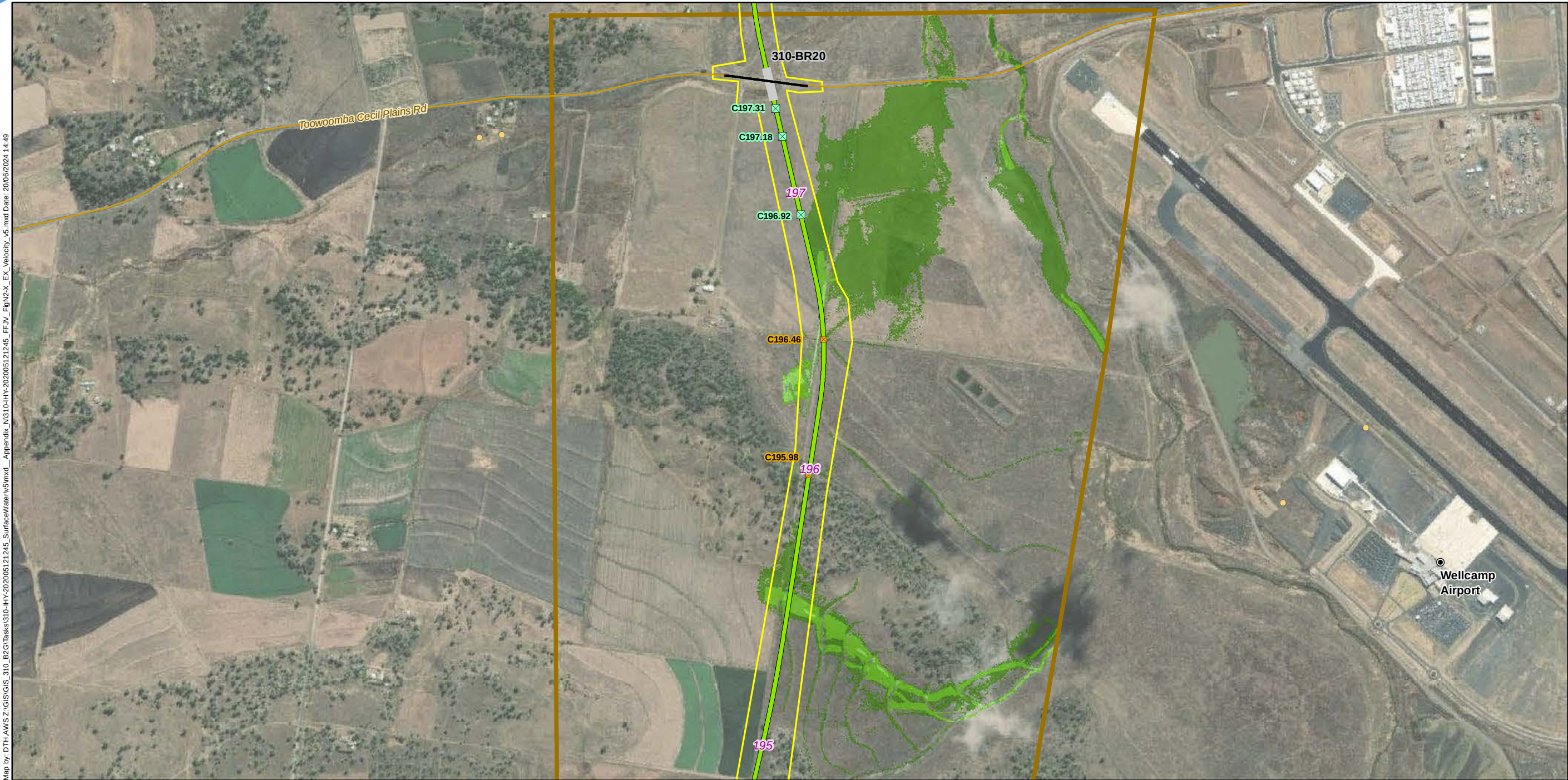


Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Figure N2 - page 45 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



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 N2 - page 46 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-IHY-202005121245_SurfaceWaterV5.mxd Appendix_IV310-IHY-202005121245_FFJV_FigN2-X_EX_Velocity_v5.mxd Date: 20/06/2024 14:49



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local 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

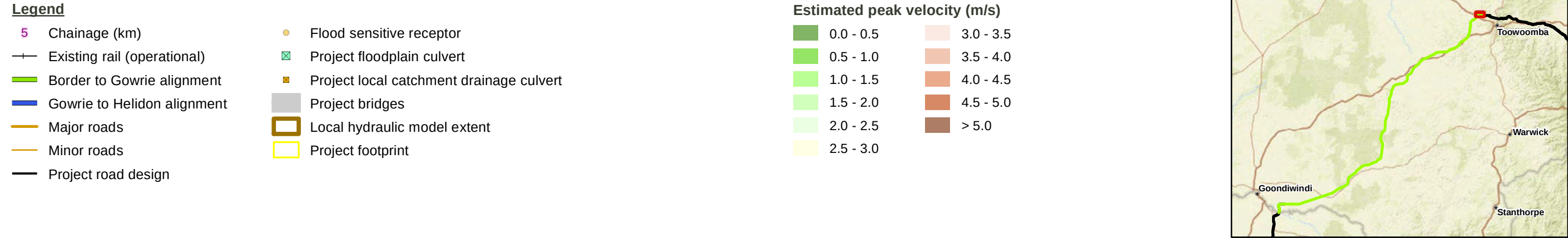
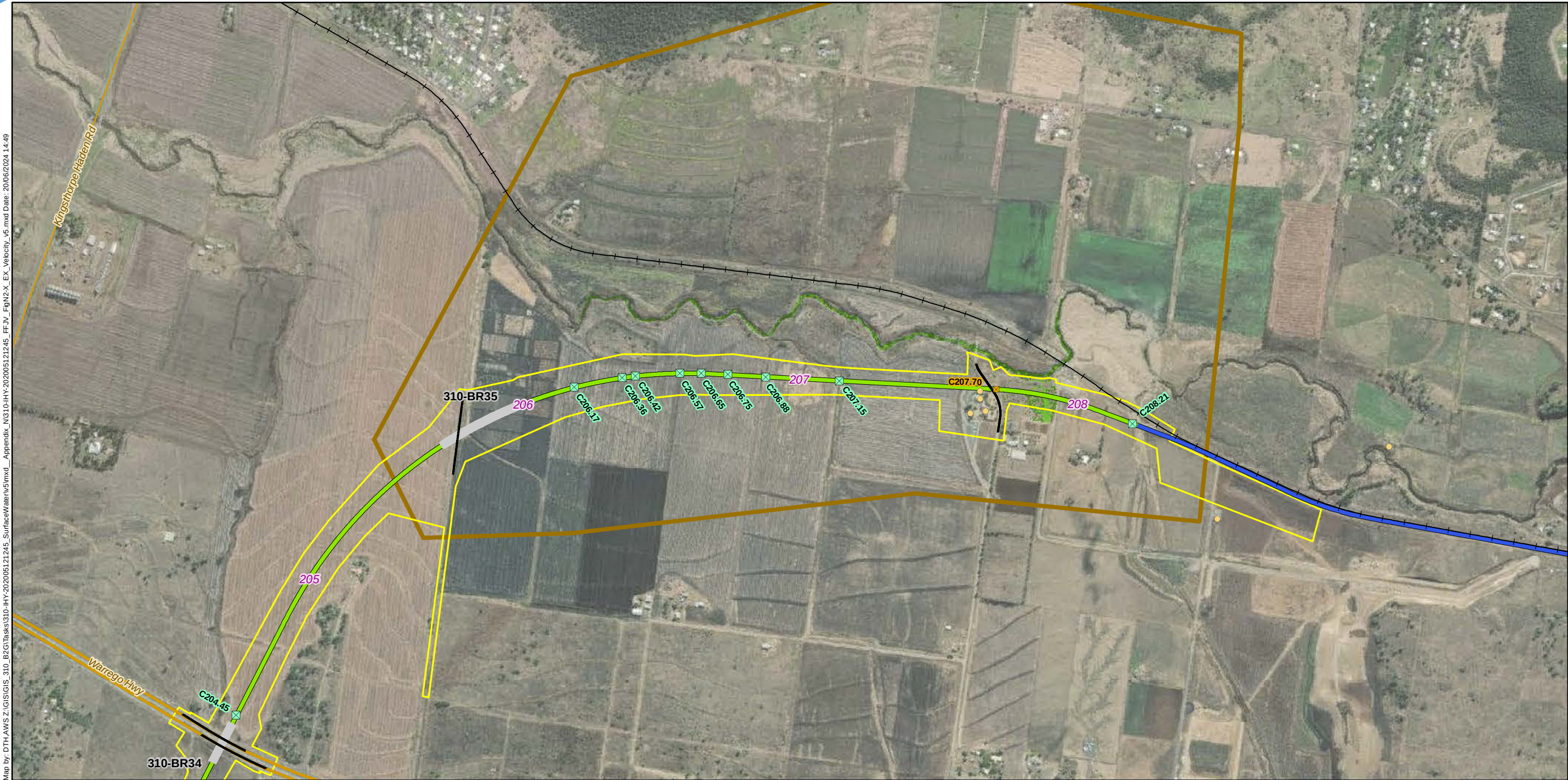


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N2 - page 47 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case



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 N2 - page 48 of 48:

1% AEP Event - Local Catchments - Peak Velocity - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:49



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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: 1:20,000
0 0.2 0.4 0.6 0.8 1km



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

Border to Gowrie

Figure N3 - page 1 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:49



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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

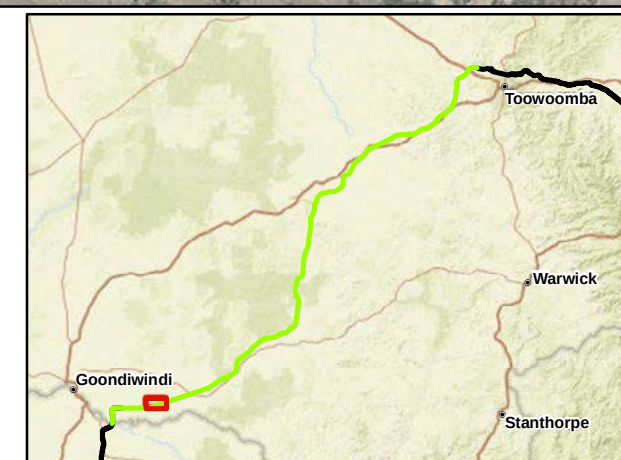
Border to Gowrie

Figure N3 - page 2 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case



- Velocity x Depth product (m²/s)

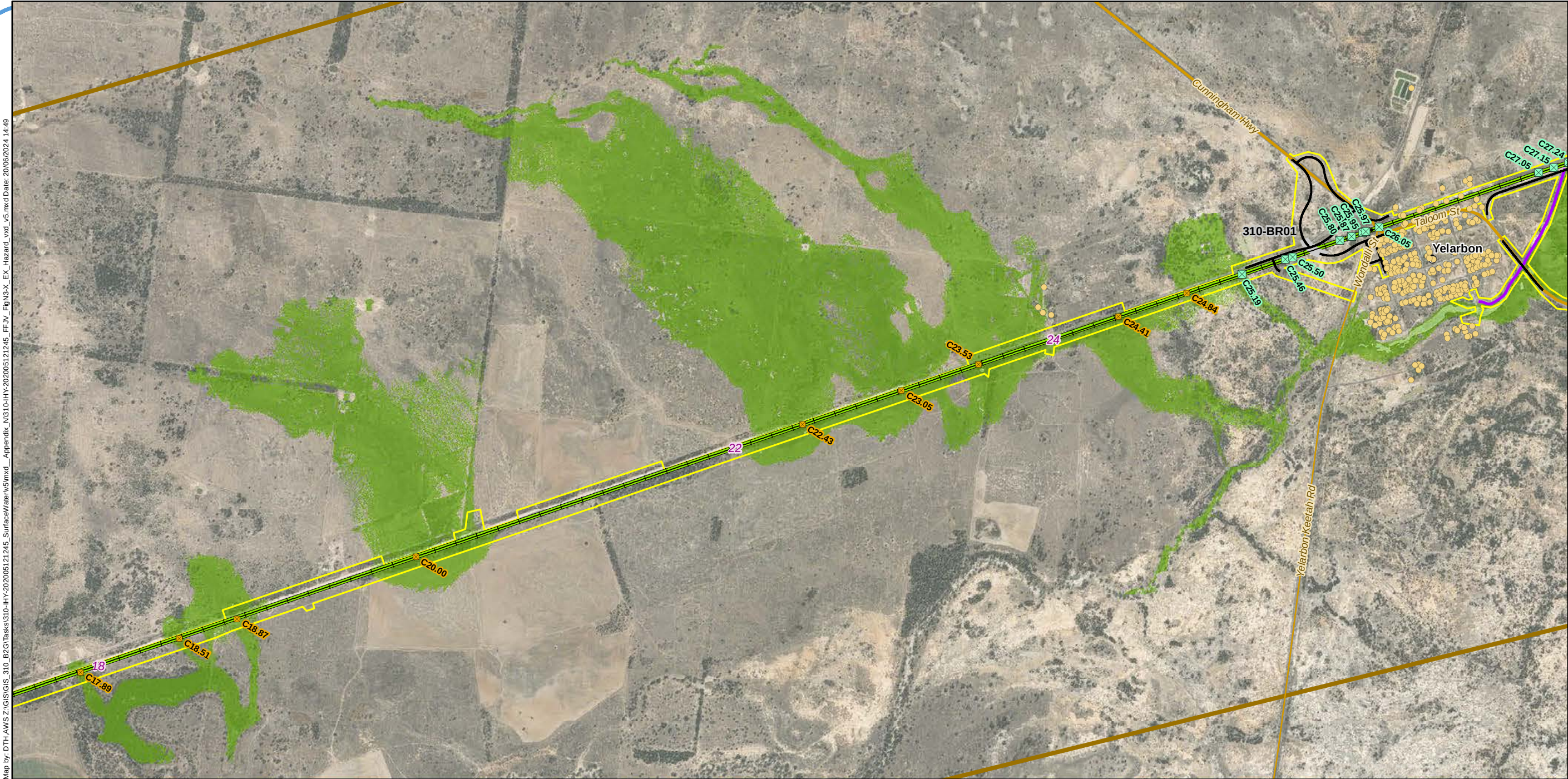


Border to Gowrie

Figure N3 - page 3 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:49



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Yelarbon levee
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Velocity x Depth product (m²/s)

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



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



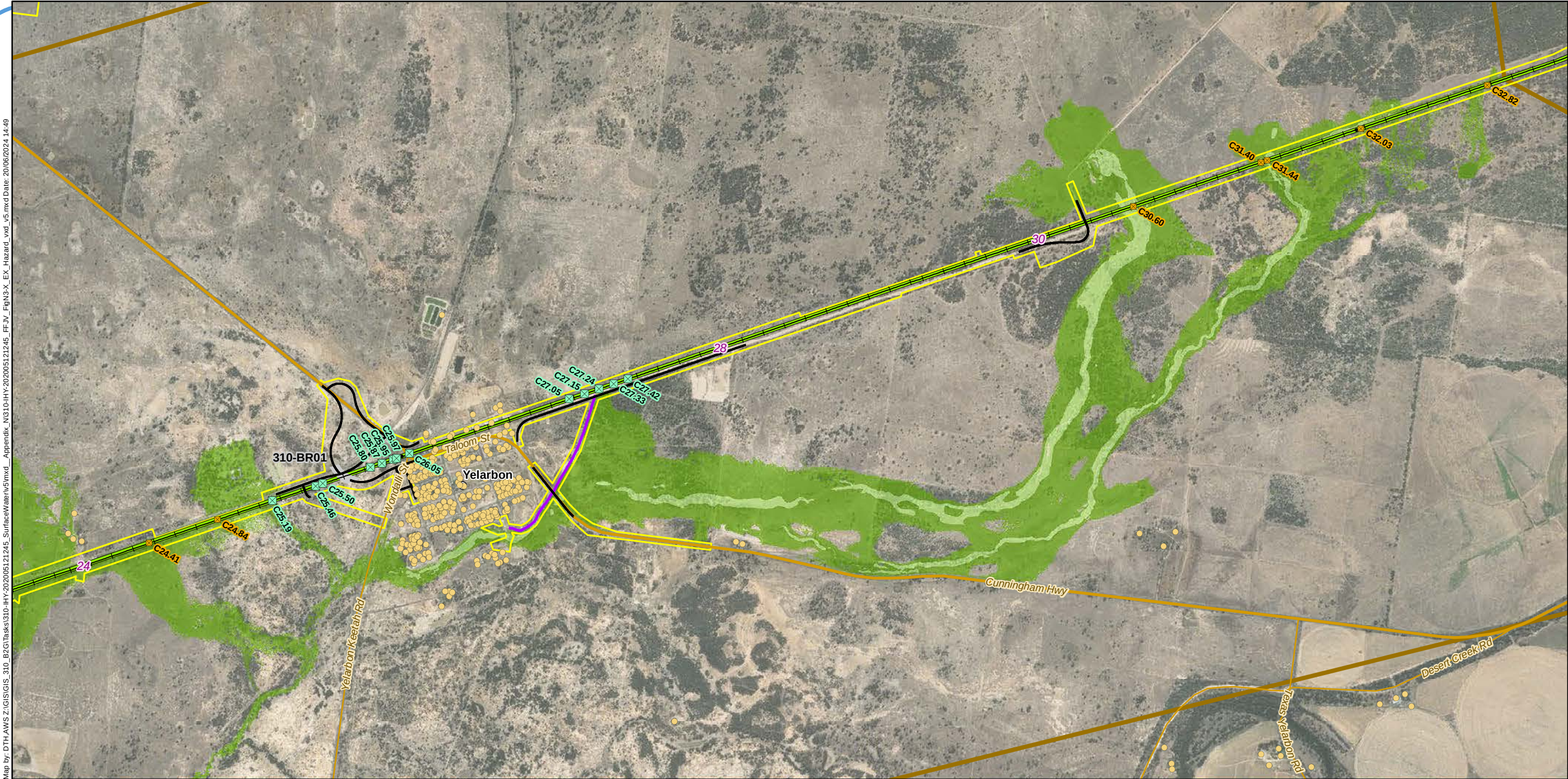
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 4 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:49



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Yelarbon levee
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Velocity x Depth product (m²/s)

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



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

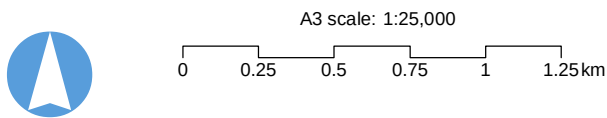
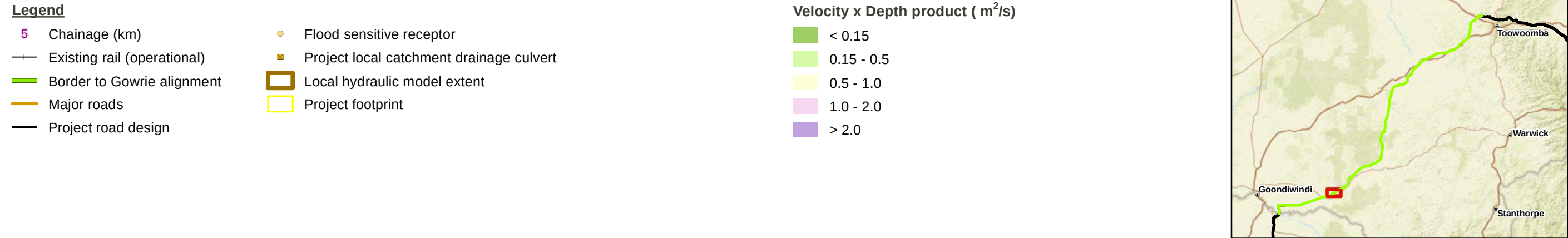


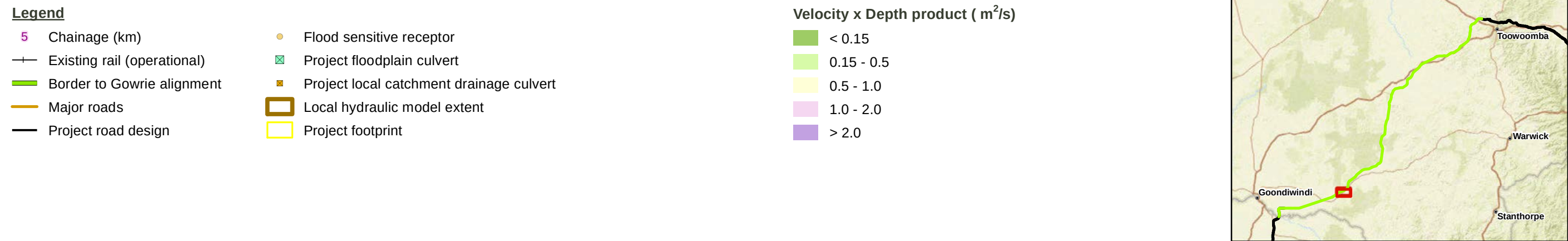
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 5 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case





A3 scale: 1:25,000
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 N3 - page 7 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case



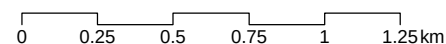
- Velocity x Depth product (m
- ²
- /s)



Figure N3 - page 8 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

A3 scale: 1:25,000



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

Map by: D:\HAWKS\Z\GIS\GIS_310_B2\GIS\Tasks\310-HY-202005121245_SurfaceWater\5mxd Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:50



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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: 1:15,000
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 N3 - page 9 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vmsd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:50



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Velocity x Depth product (m²/s)

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



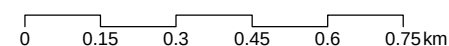
A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km



- Velocity x Depth product (m
- ²
- /s)



A3 scale: 1:15,000



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

Figure N3 - page 11 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vmsd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:50

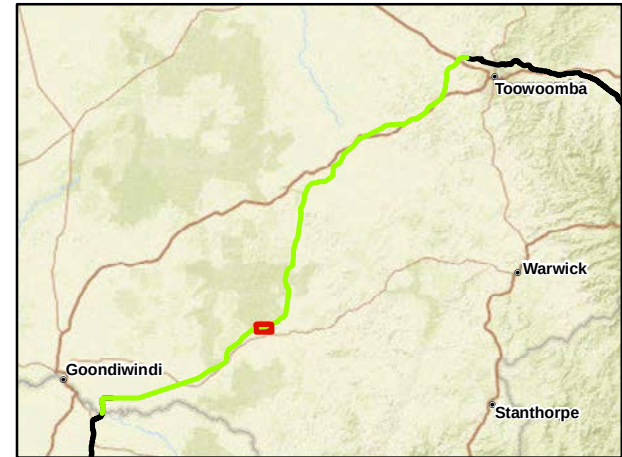


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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

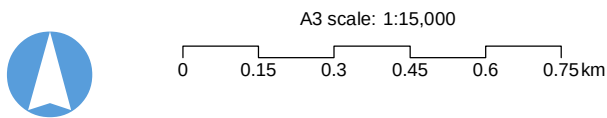
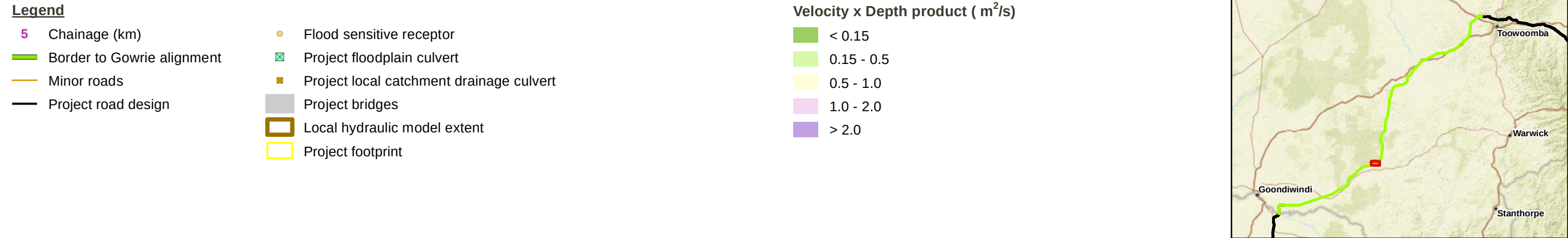


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 12 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case





- Velocity x Depth product (m²/s)

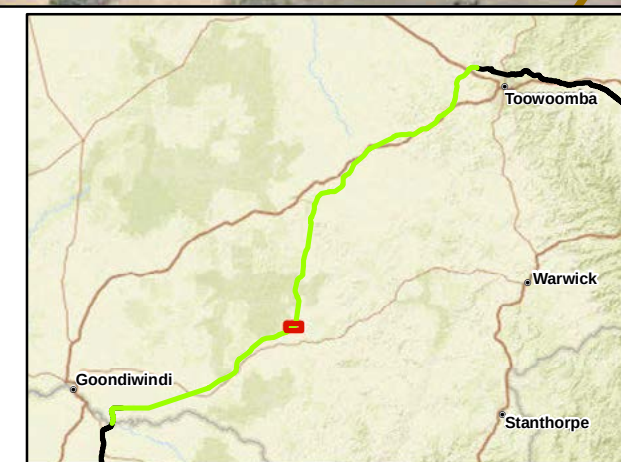
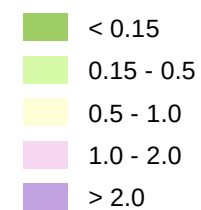
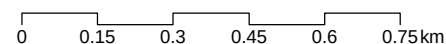


Figure N3 - page 14 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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

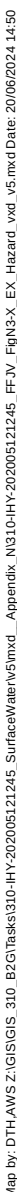


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 15 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

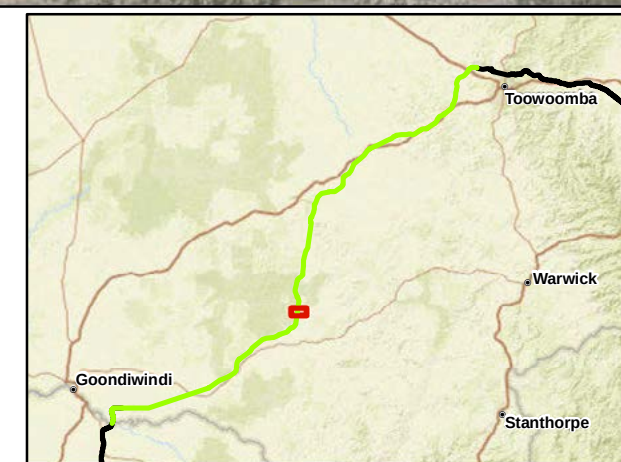


Legend

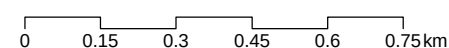
- Legend**
- | | | | |
|---|----------------------------|--|--|
| 5 | Chainage (km) | | Flood sensitive receptor |
| | Border to Gowrie alignment | | Project local catchment drainage culvert |
| | Minor roads | | Local hydraulic model extent |
| | Project road design | | Project footprint |

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



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 16 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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 N3 - page 17 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:50



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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
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Border to Gowrie

Figure N3 - page 18 of 48:

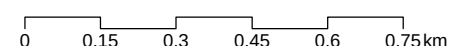
1% AEP Event - Local Catchments - Peak Hazard - Existing Case



- Velocity x Depth product (m
- ²
- /s)



A3 scale: 1:15.000

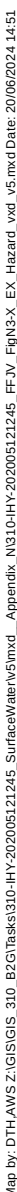


Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Figure N3 - page 19 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

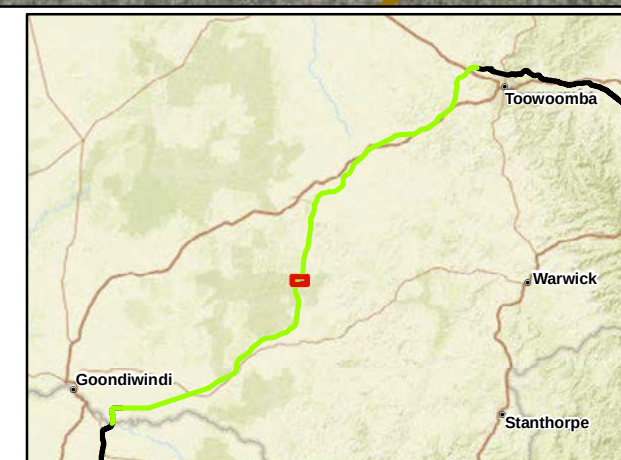


Legend

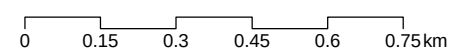
- Legend**
- | | | | |
|---|----------------------------|--|--|
| 5 | Chainage (km) | | Flood sensitive receptor |
| | Border to Gowrie alignment | | Project local catchment drainage culvert |
| | Minor roads | | Project bridges |
| | Project road design | | Local hydraulic model extent |
| | | | Project footprint |

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



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 20 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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 N3 - page 21 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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 N3 - page 22 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: D:\HAWKS\GIS\310_B2\GIS\310-HY-202005121245_SurfaceWater\5vmsd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:51



Legend

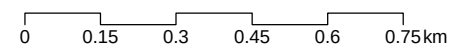
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

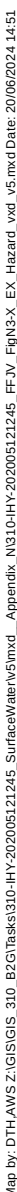
Velocity x Depth product (m²/s)

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



A3 scale: 1:15,000



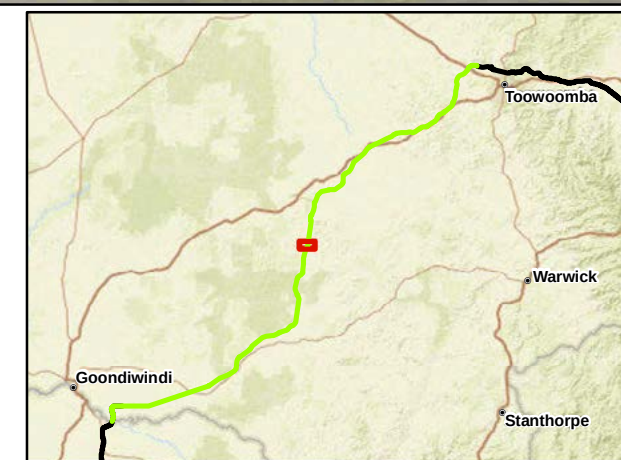


Legend

- ### Legend

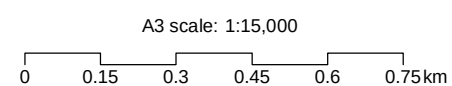
Velocity x Depth product (m²/s)

- Velocity x Depth product (m²/s)



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 N3 - page 24 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

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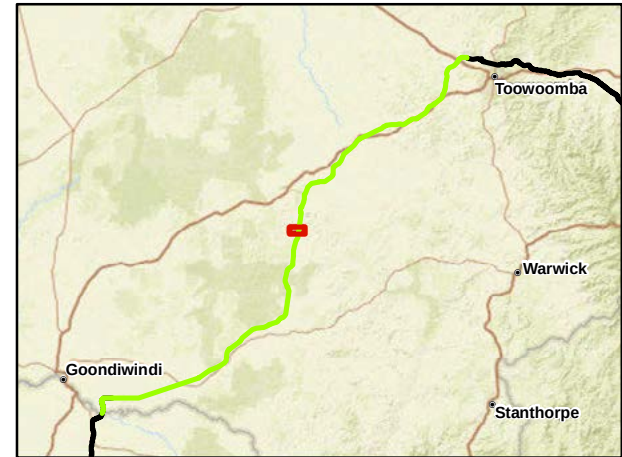


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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 N3 - page 25 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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 N3 - page 26 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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 N3 - page 27 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:51



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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 N3 - page 28 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vnxmxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:51



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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



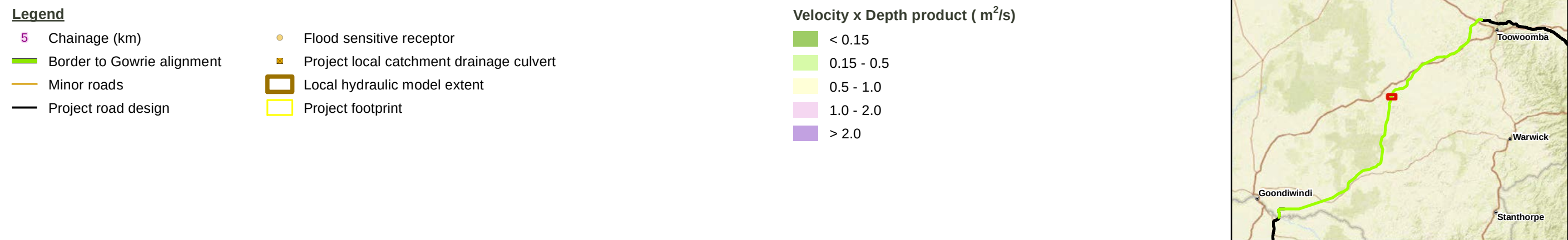
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 29 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: D:\HAWKS\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5vmsd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:51



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 N3 - page 30 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vnx.dwg Appendix_IV310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:51



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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



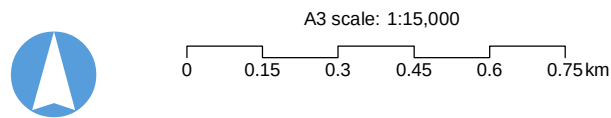
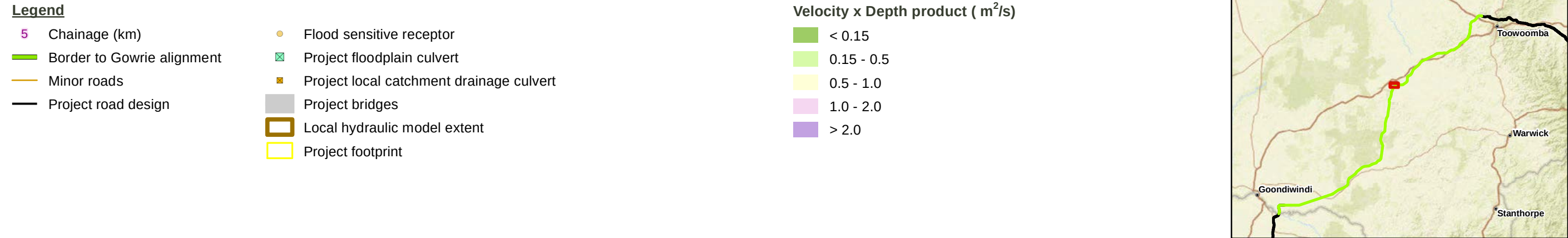
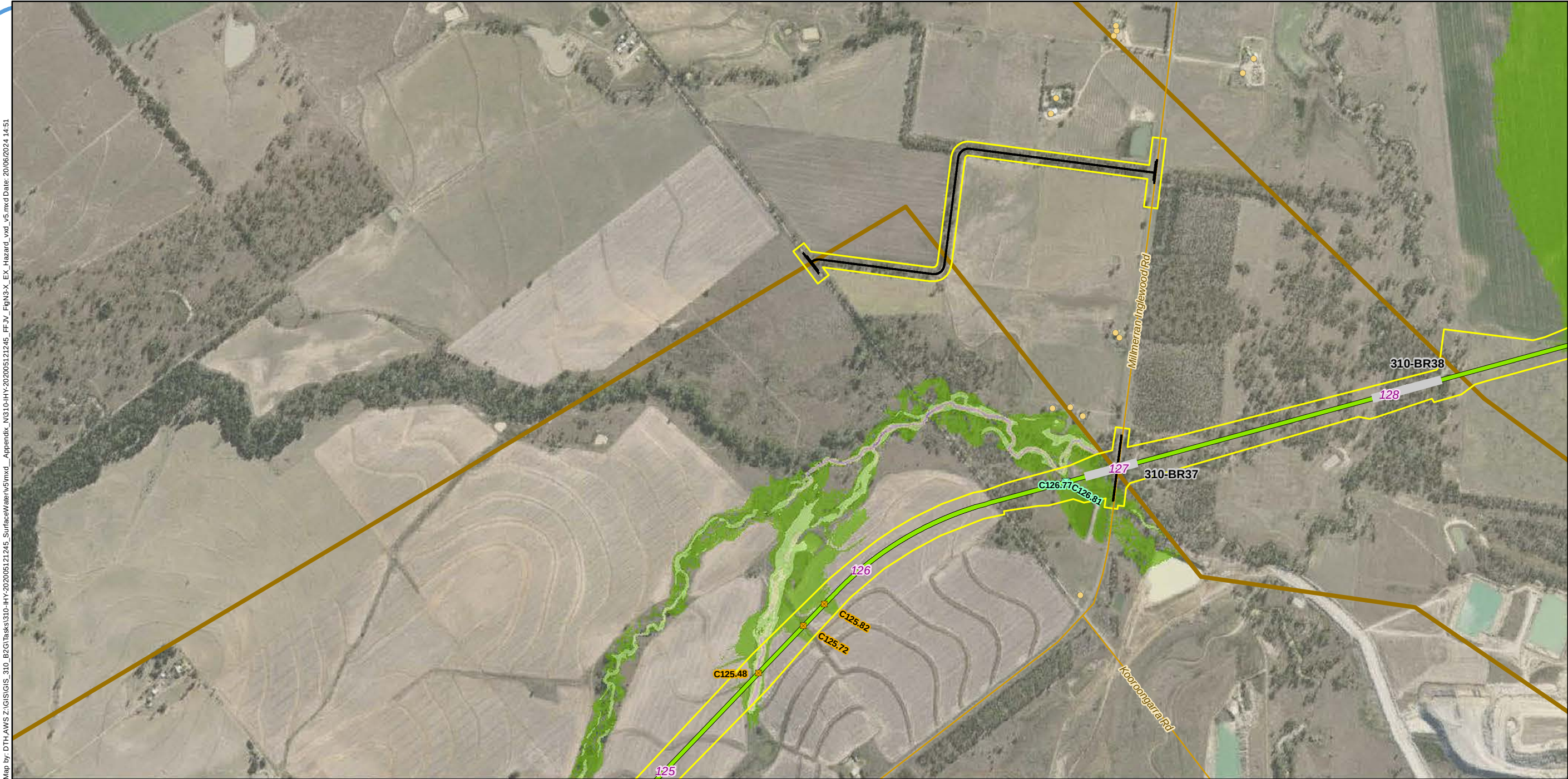
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

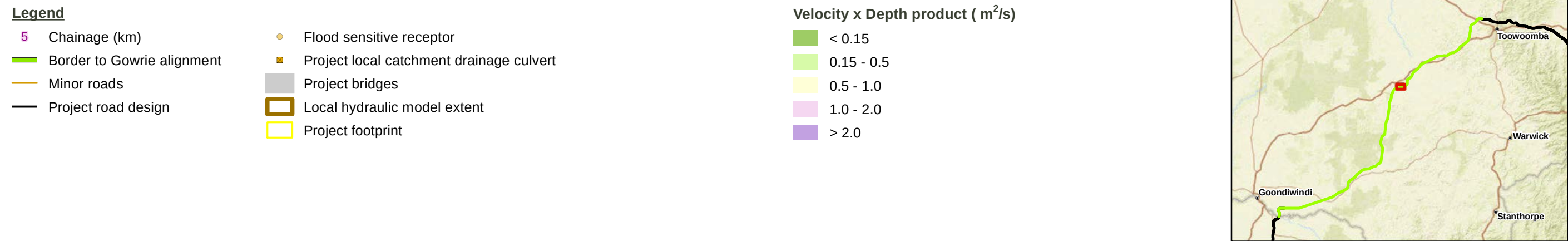
Border to Gowrie

Figure N3 - page 31 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vmsd_Appendix_N\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:51





Map by: D:\HAWKS\Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:52



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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 N3 - page 34 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case



- Velocity x Depth product (m
- ²
- /s)

-



Border to Gowrie

Figure N3 - page 35 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd Appendix_1\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:52



Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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

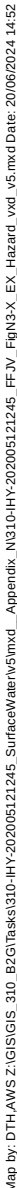


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 36 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

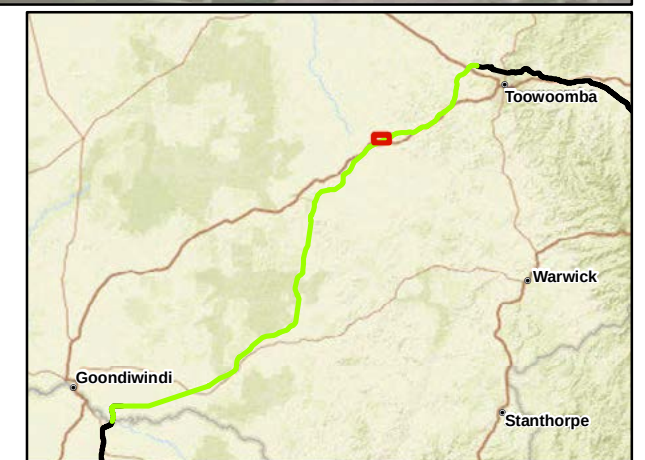


Legend

- Legend**
- | | | | |
|-----|-----------------------------|---|--|
| 5 | Chainage (km) | | Flood sensitive receptor |
| —+— | Existing rail (operational) | ■ | Project local catchment drainage culvert |
| — | Border to Gowrie alignment | ▭ | Local hydraulic model extent |
| — | Minor roads | ▭ | Project footprint |
| — | Project road design | | |

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 N3 - page 37 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_BR2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:52

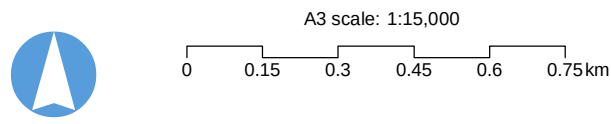


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

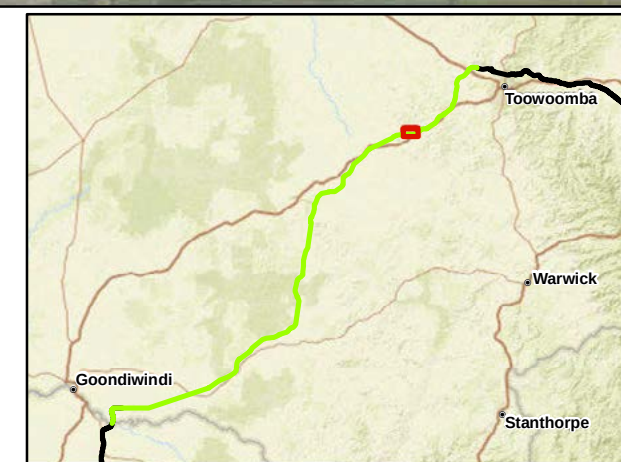
Velocity x Depth product (m²/s)

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

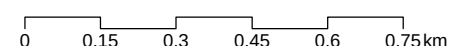




- Velocity x Depth product (m
- ²
- /s)



A3 scale: 1:15.000



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

Figure N3 - page 39 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:52



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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: 1:15,000
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 N3 - page 40 of 48:

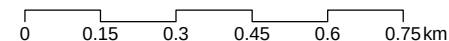
1% AEP Event - Local Catchments - Peak Hazard - Existing Case



- Velocity x Depth product (m²/s)



A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Figure N3 - page 41 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: D:\HAWKS\Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vnx\Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:52



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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 N3 - page 42 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd Appendix_IV310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:52

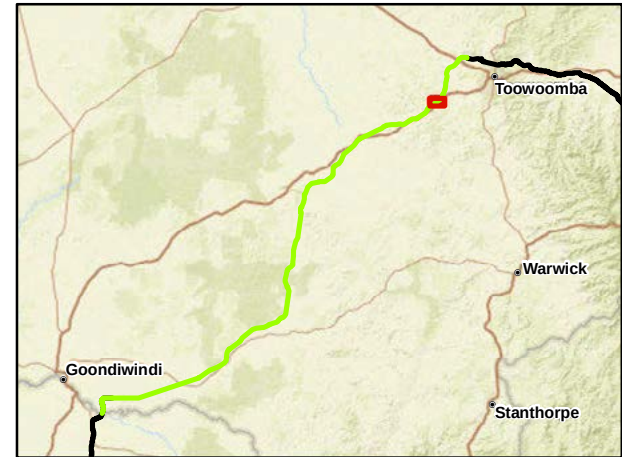


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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 N3 - page 43 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vmsd_Appendix_IV310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:52

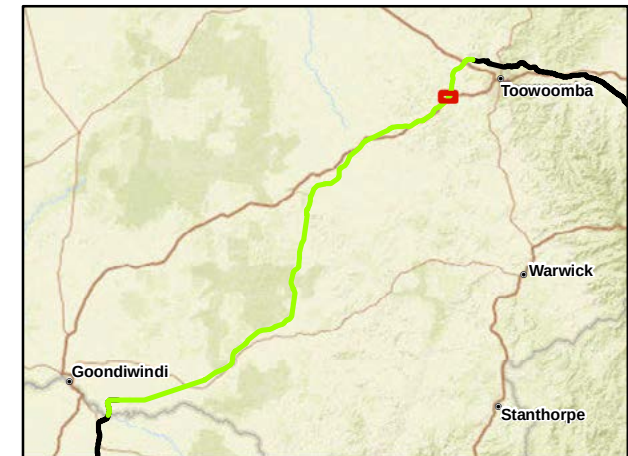


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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

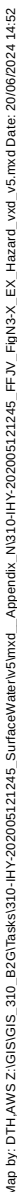


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 44 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case



Legend

- Legend**
- | | | | |
|---|----------------------------|--|--|
| 5 | Chainage (km) | | Flood sensitive receptor |
| | Border to Gowrie alignment | | Project floodplain culvert |
| | Major roads | | Project local catchment drainage culvert |
| | Project road design | | Local hydraulic model extent |
| | | | Project footprint |

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 0.75km



Issue date: 20/06/2024 Version: 5

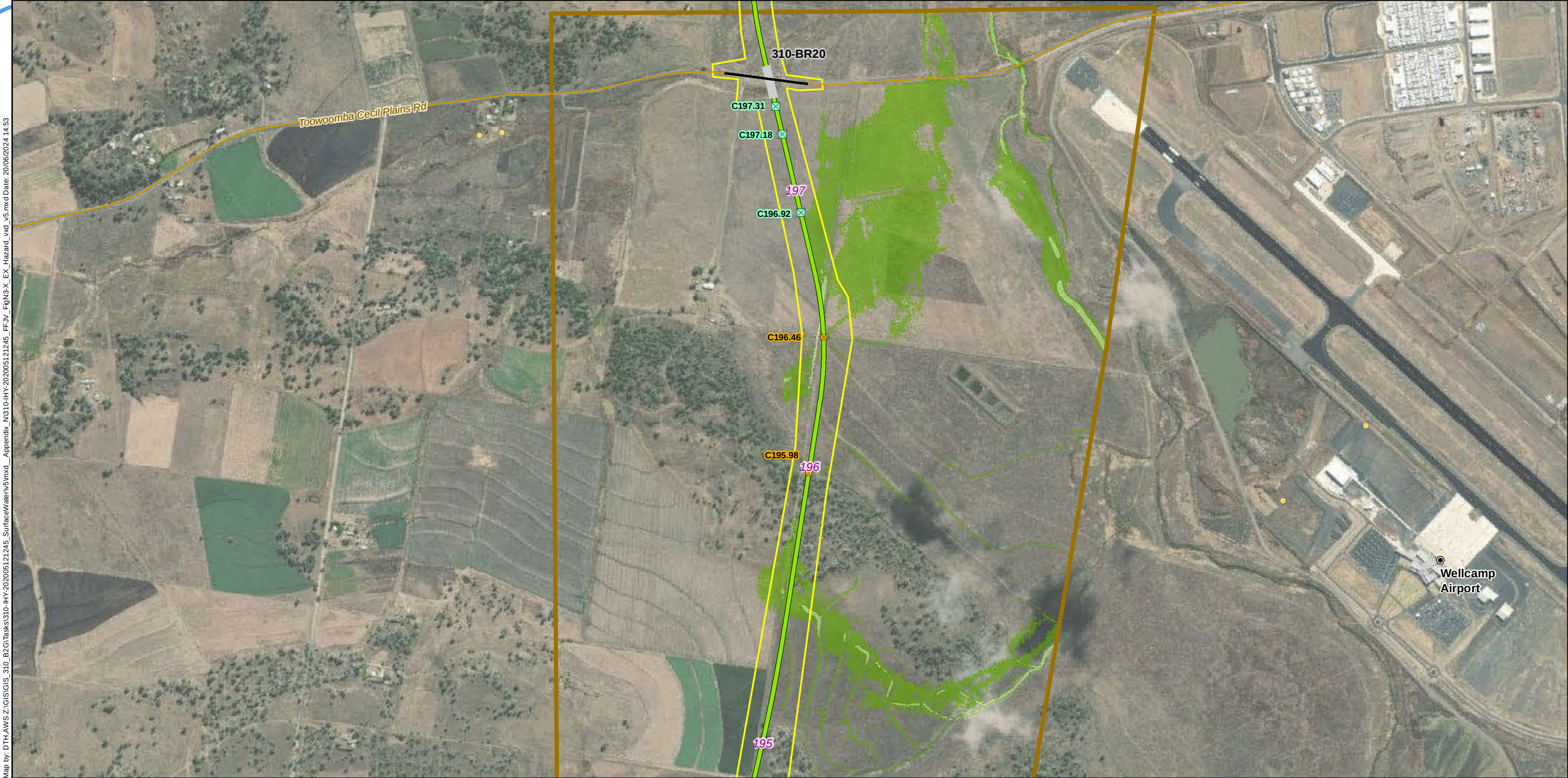
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 45 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5vnxmxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:53



Legend

5 Chainage (km)

Border to Gowrie alignment

Minor roads

Project road design

Flood sensitive receptor

Project floodplain culvert

Project local catchment drainage culvert

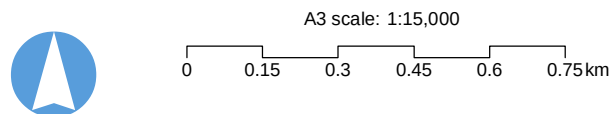
Project bridges

Local hydraulic model extent

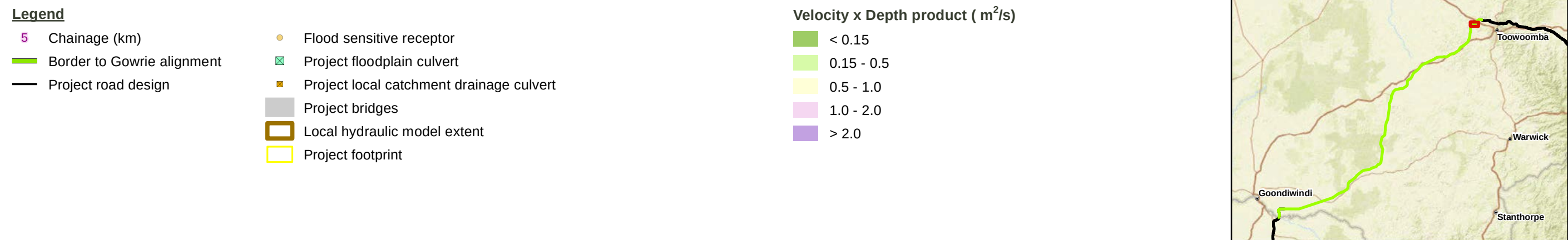
Project footprint

Velocity x Depth product (m²/s)

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



Map by: D:\HAWKS\GIS\310_BR2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:53



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



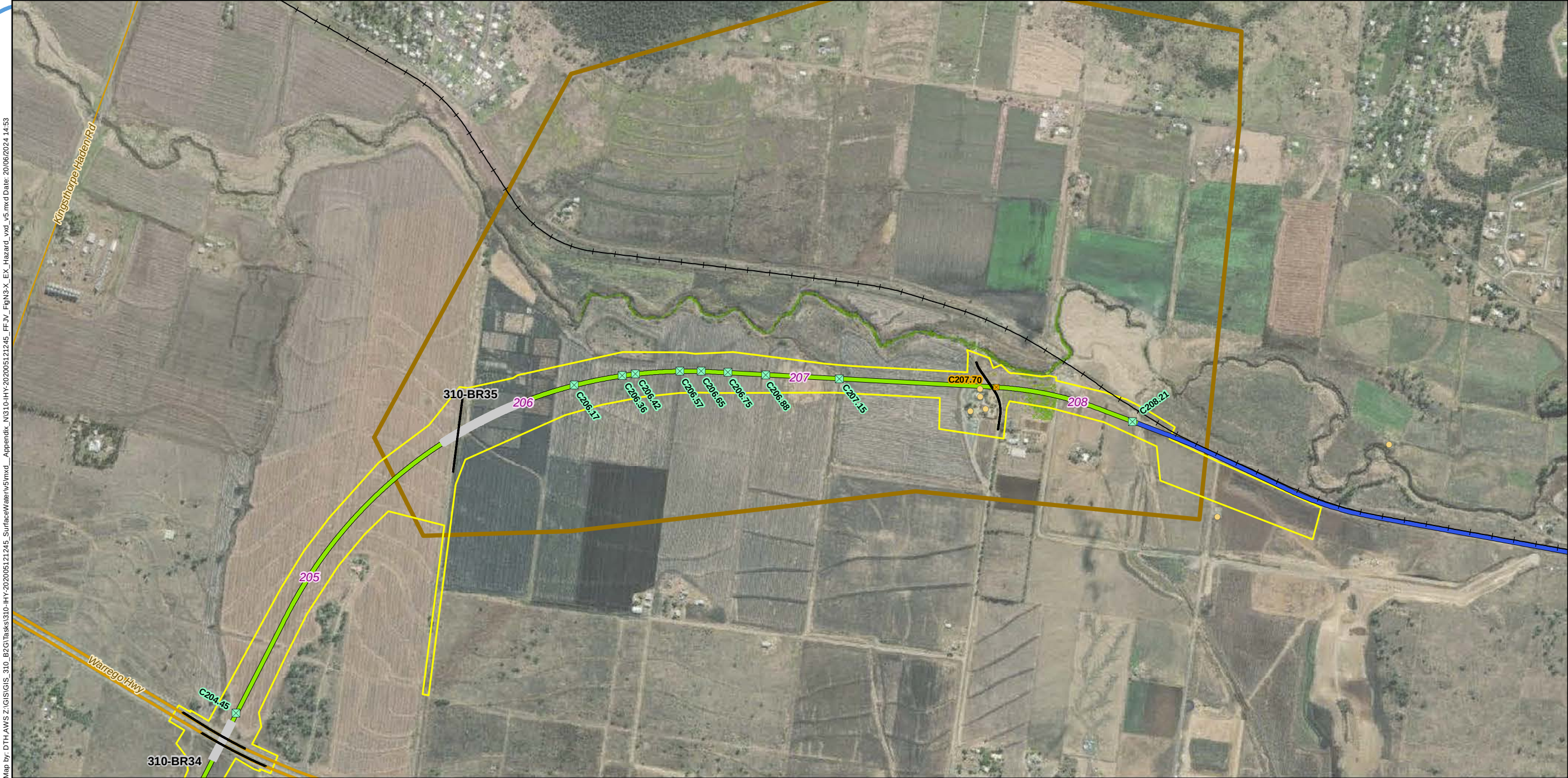
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N3 - page 47 of 48:

1% AEP Event - Local Catchments - Peak Hazard - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_310-HY-202005121245_FF\JV_FigN3-X_EX_Hazard_vnd_v5.mxd Date: 20/06/2024 14:53

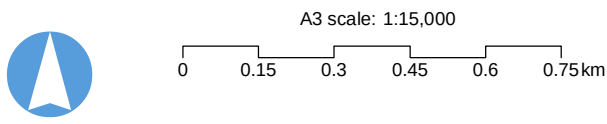


Legend

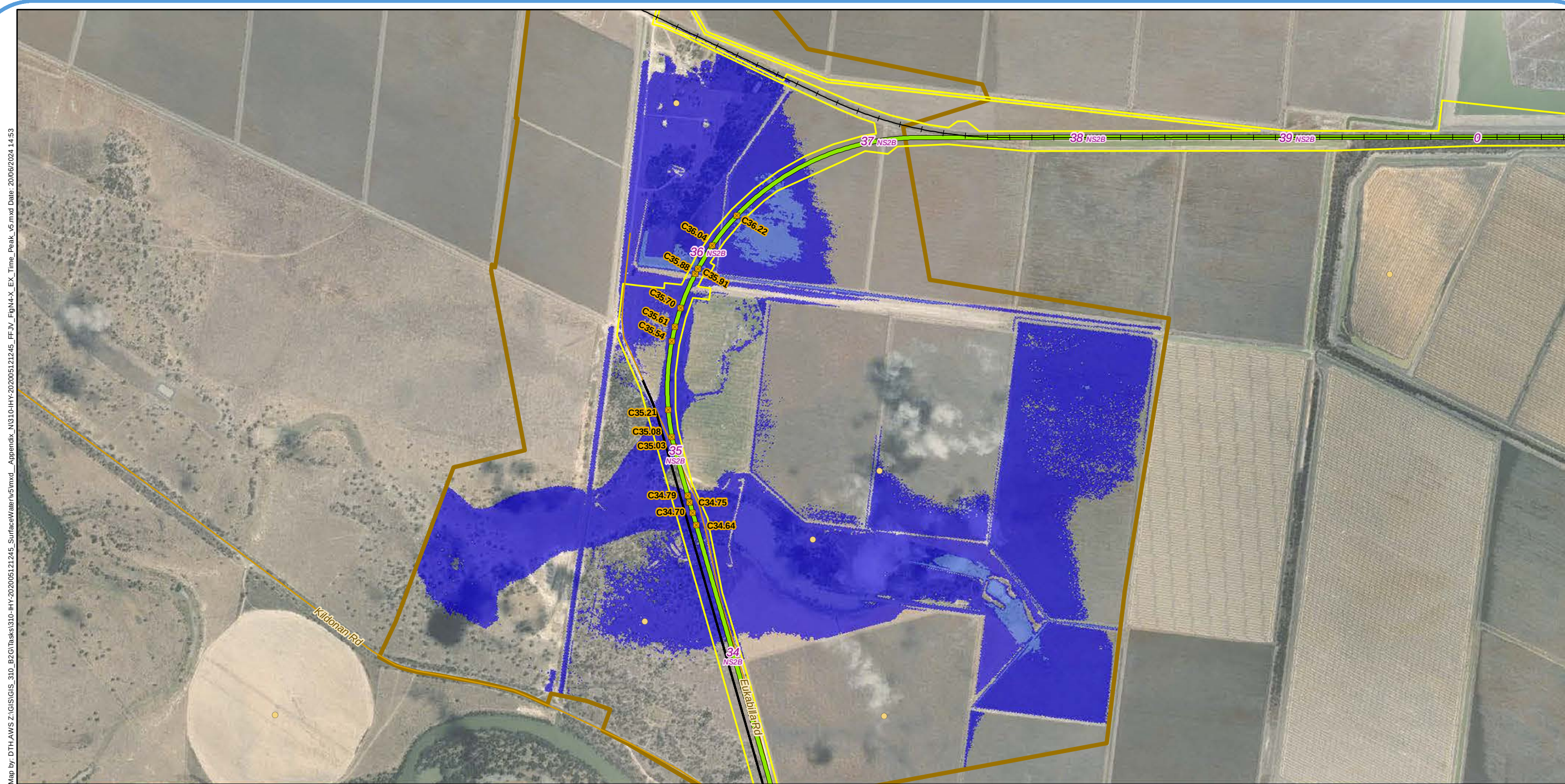
5 Chainage (km)	Flood sensitive receptor
Existing rail (operational)	Project floodplain culvert
Border to Gowrie alignment	Project local catchment drainage culvert
Gowrie to Helidon alignment	Project bridges
Major roads	Local hydraulic model extent
Minor roads	Project footprint
Project road design	

Velocity x Depth product (m²/s)

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



Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:53

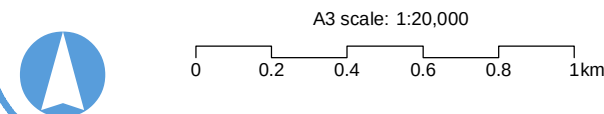


Legend

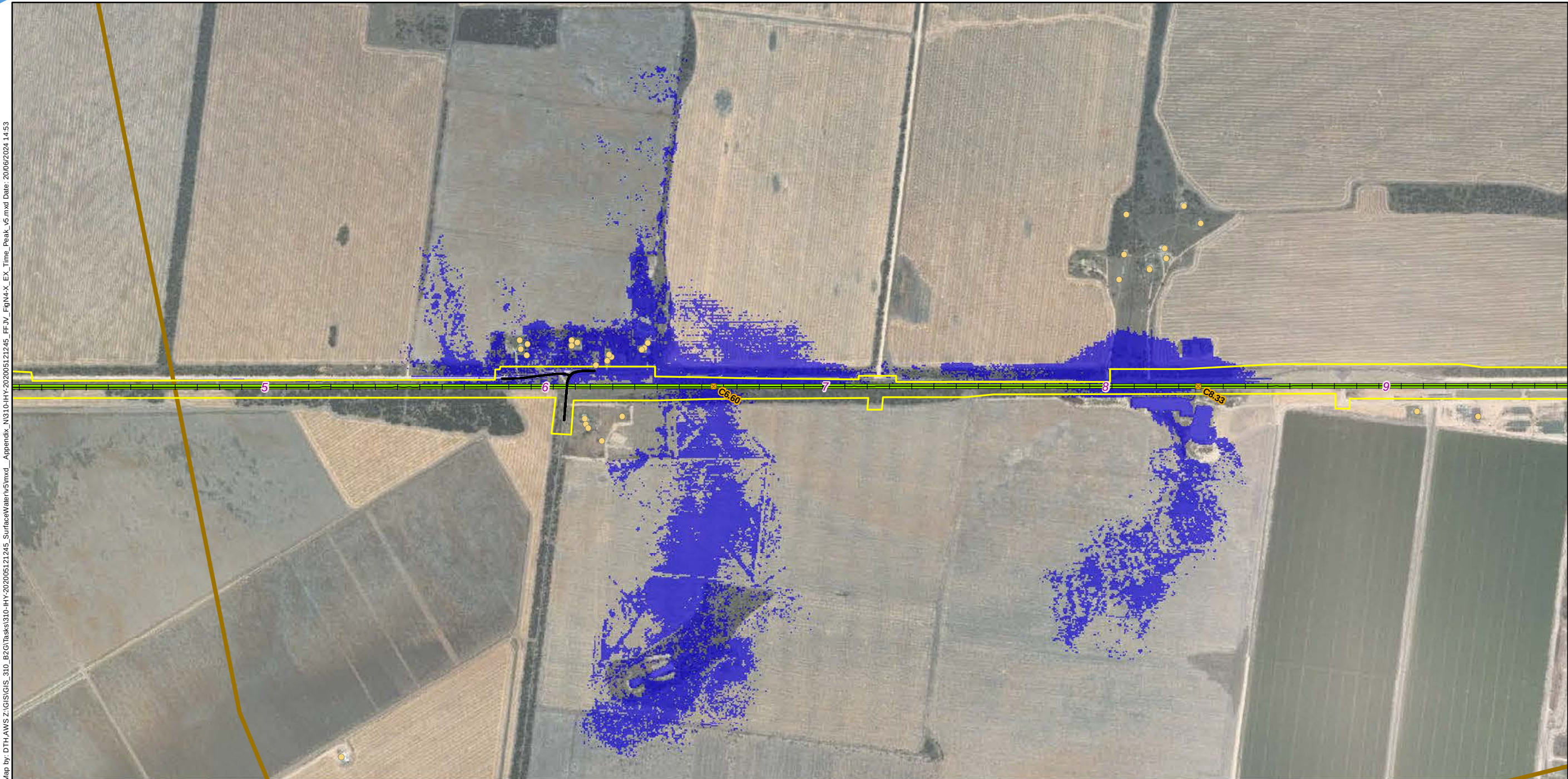
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:53



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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 N4 - page 2 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:53



Legend

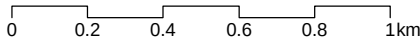
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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: 1:20,000



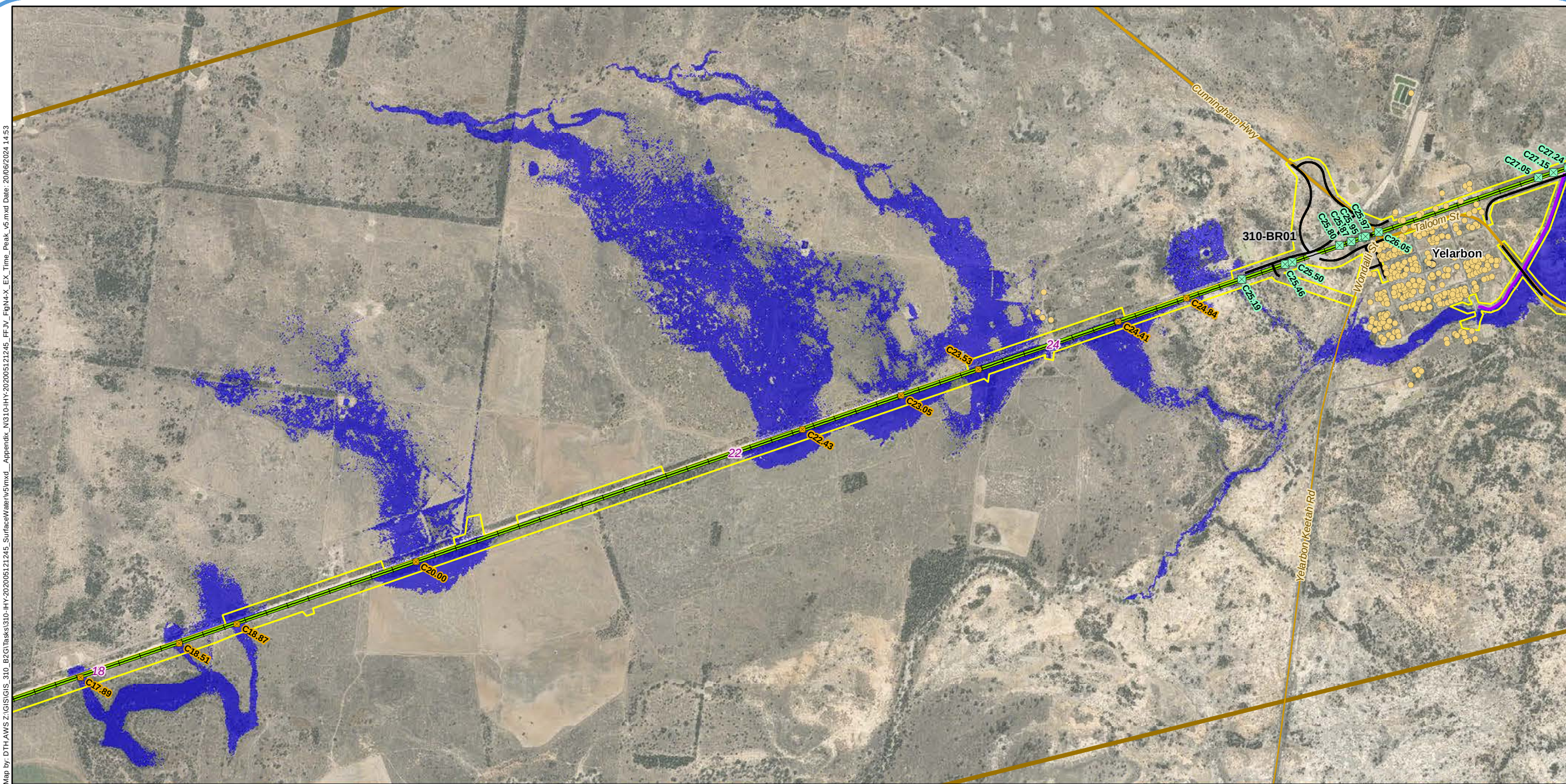
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 3 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

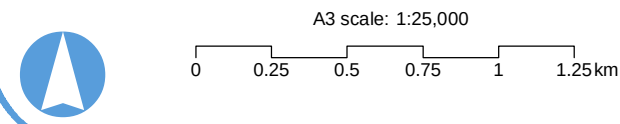


Legend

- 5 Chainage (km)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Yelarbon levee
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local 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 | |





- Estimated time of inundation (hours)

A map of south-eastern Queensland, Australia, showing the location of the study area. The map includes the towns of Goondiwindi, Toowoomba, Warwick, and Stanthorpe. A red square indicates the study site, located near Goondiwindi. A green line represents the road network, and a black line represents the border with New South Wales.

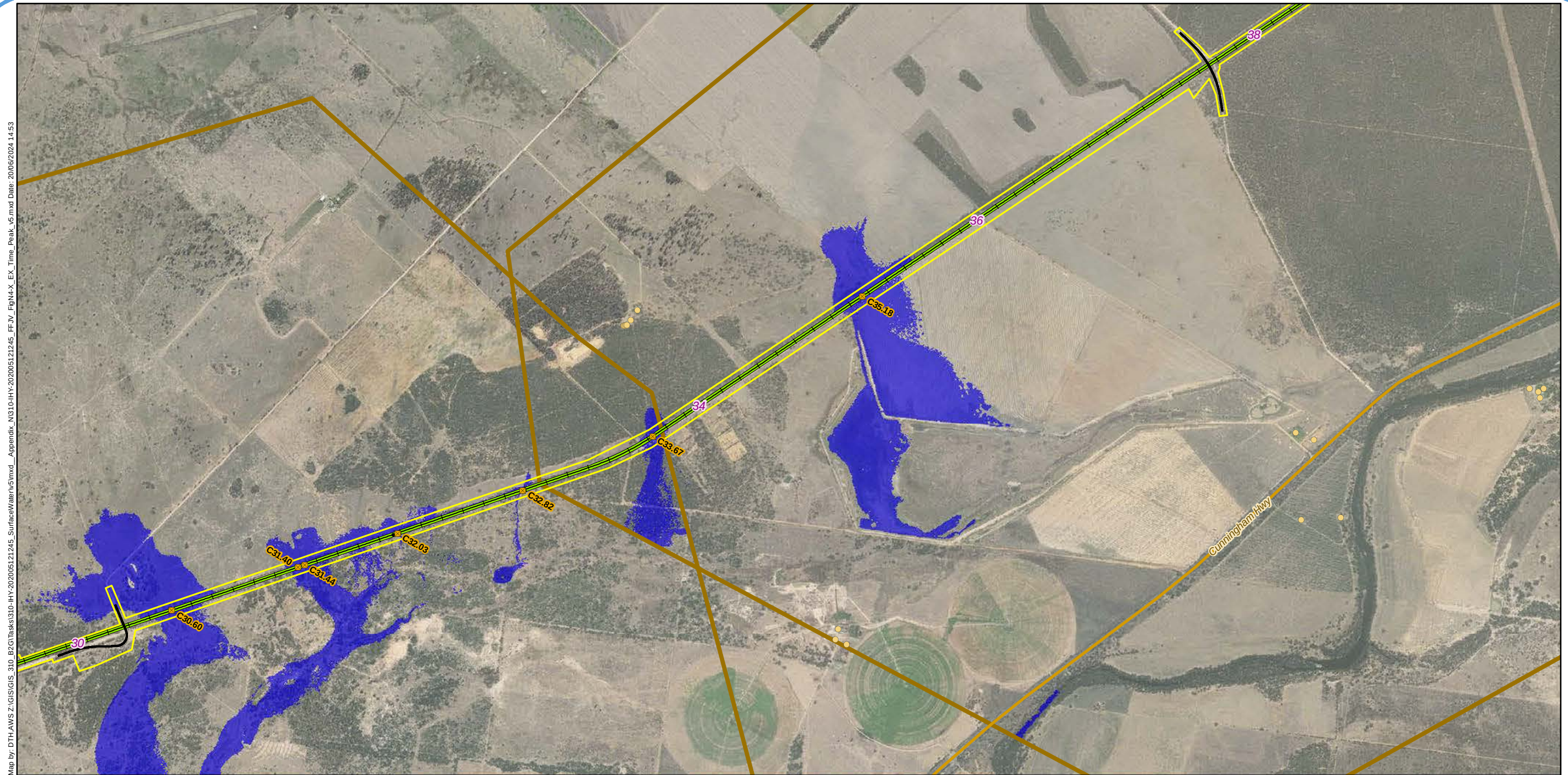


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Border to Gowrie

Figure N4 - page 5 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

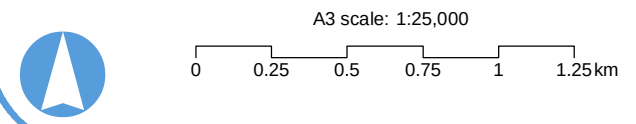


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local 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: 1:25,000
0 0.25 0.5 0.75 1 1.25 km



- Estimated time of inundation (hours)

Figure N4 - page 8 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



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- Estimated time of inundation (hours)

A map of south-eastern Australia showing the locations of Goondiwindi, Toowoomba, Warwick, and Stanthorpe. A red line indicates the proposed route, and a red square marks the location of the study area.

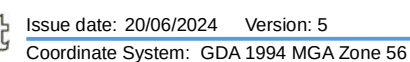


Figure N4 - page 9 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54

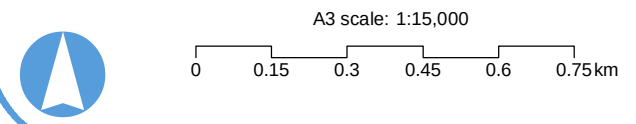
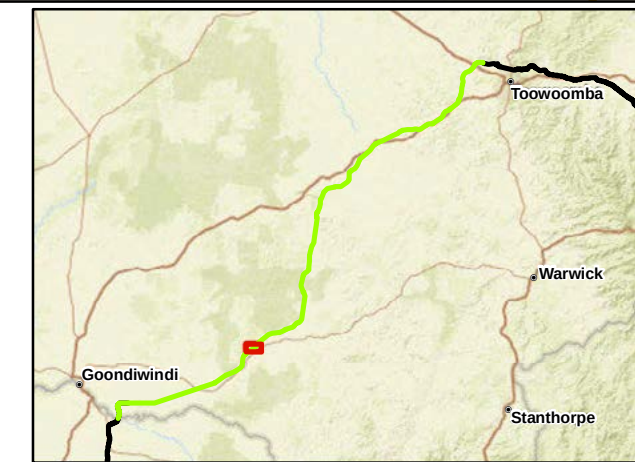


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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	





- Estimated time of inundation (hours)

A map of south-eastern Queensland, Australia, showing the location of the study area. The map includes major roads (black lines) and rivers (blue lines). The study site is marked with a red rectangle on a road between Goondiwindi and Toowoomba. Other towns labeled on the map are Toowoomba, Warwick, and Stanthorpe. The terrain is shown with green and brown shading, indicating different land cover types.

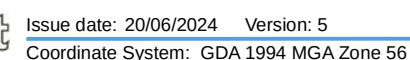


Figure N4 - page 11 of 48:

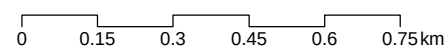
1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- Estimated time of inundation (hours)**

The map shows the Toowoomba region in Queensland, Australia. A green line represents the proposed road route, starting from the bottom left and heading towards the top right. A red rectangle is placed on this route, indicating the location of the proposed road widening project. The map also shows major roads, rivers, and towns including Toowoomba, Warwick, Stanthorpe, and Goondiwindi.

A3 scale: 1:15,000



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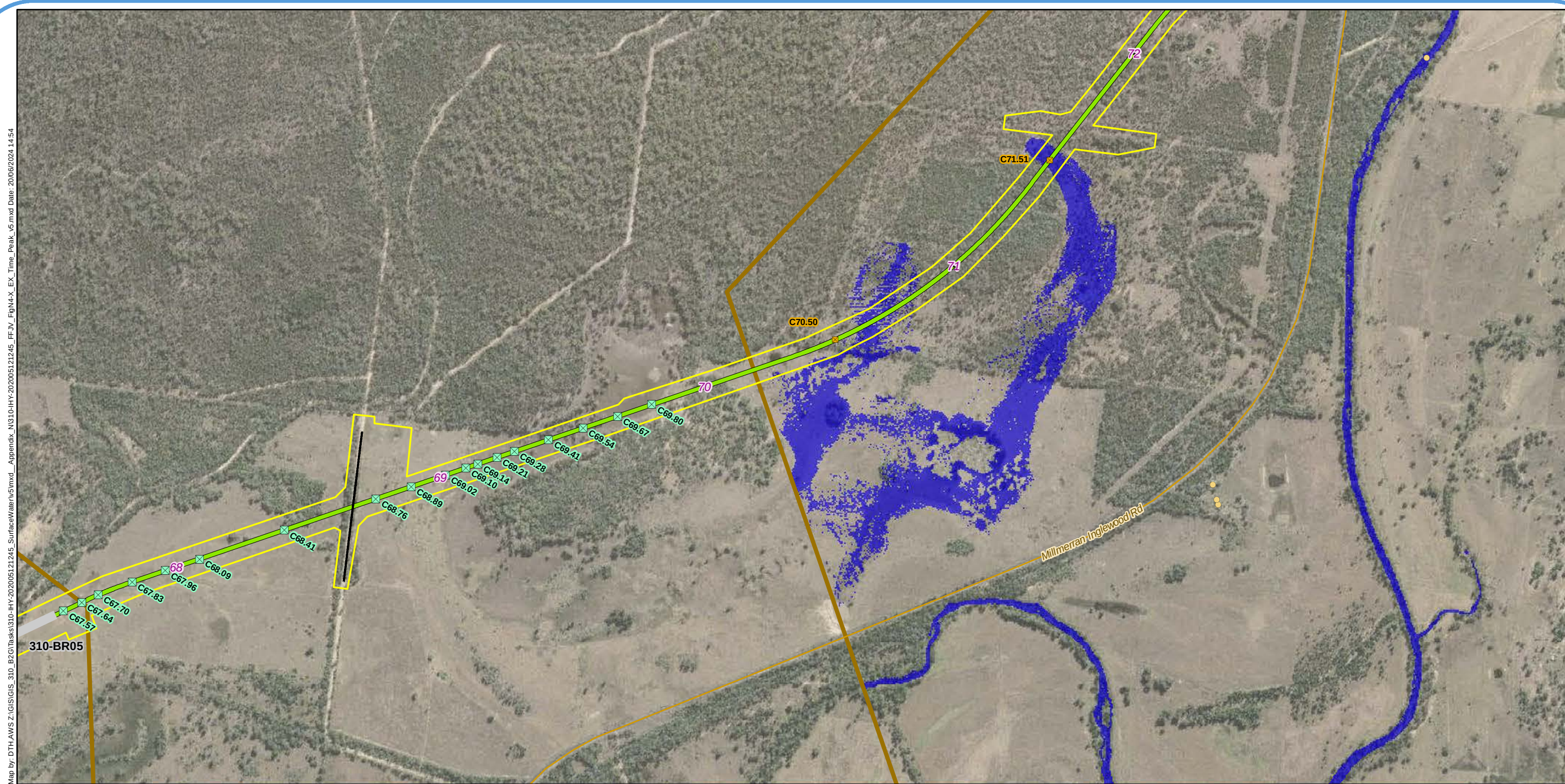
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 12 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54

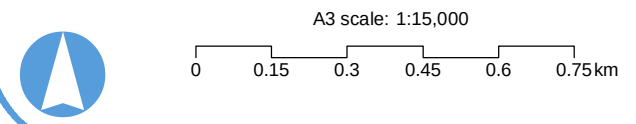
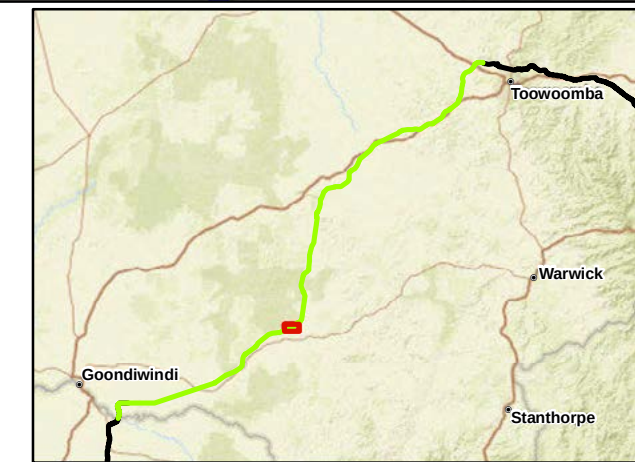


Legend

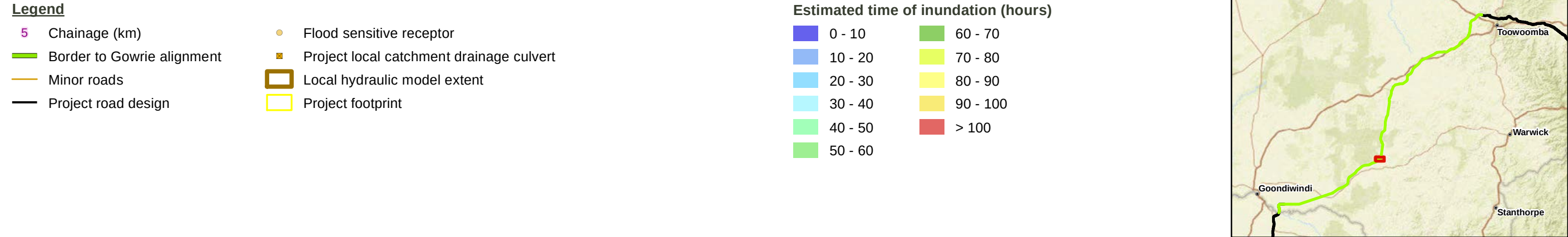
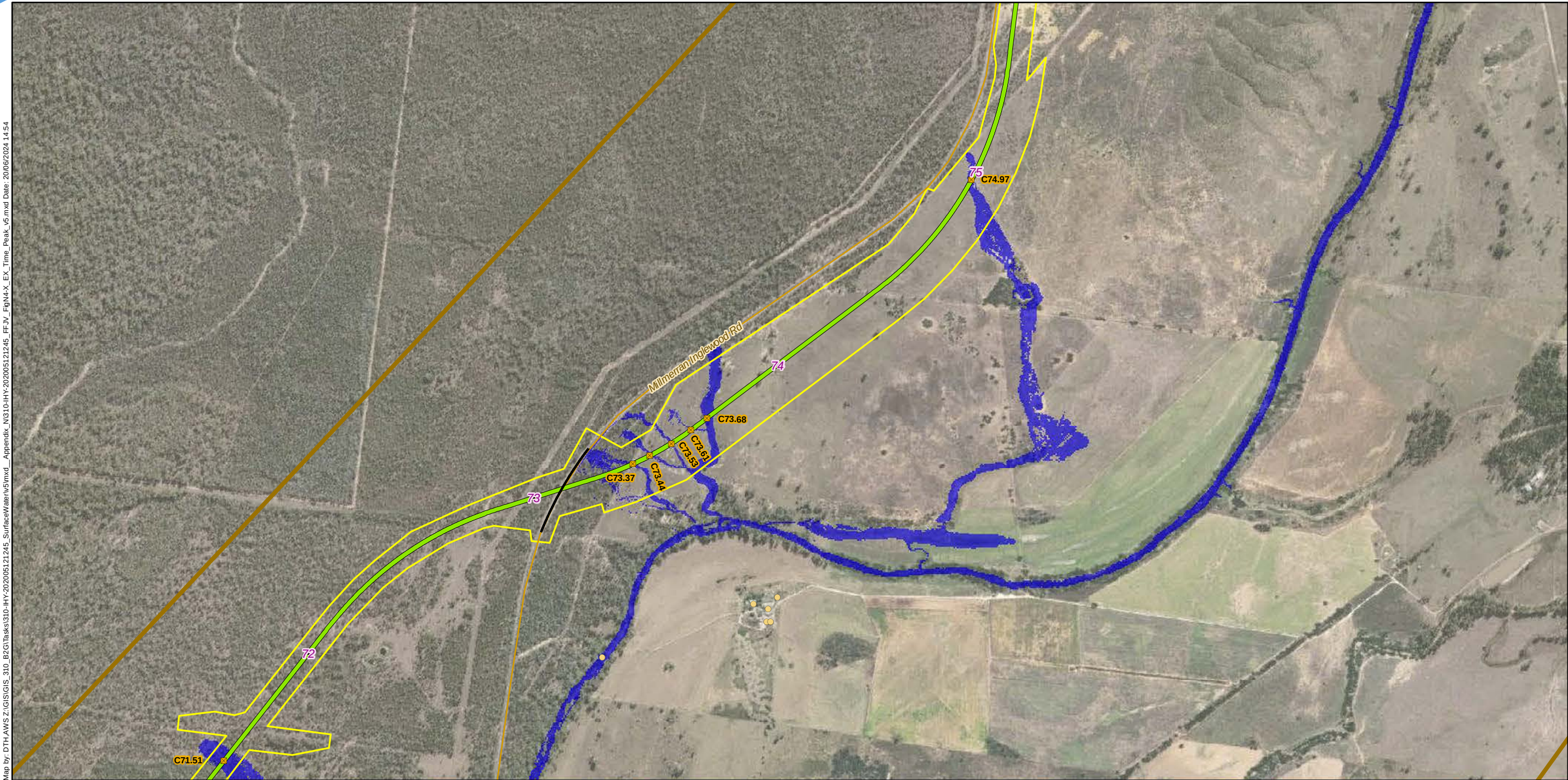
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54



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



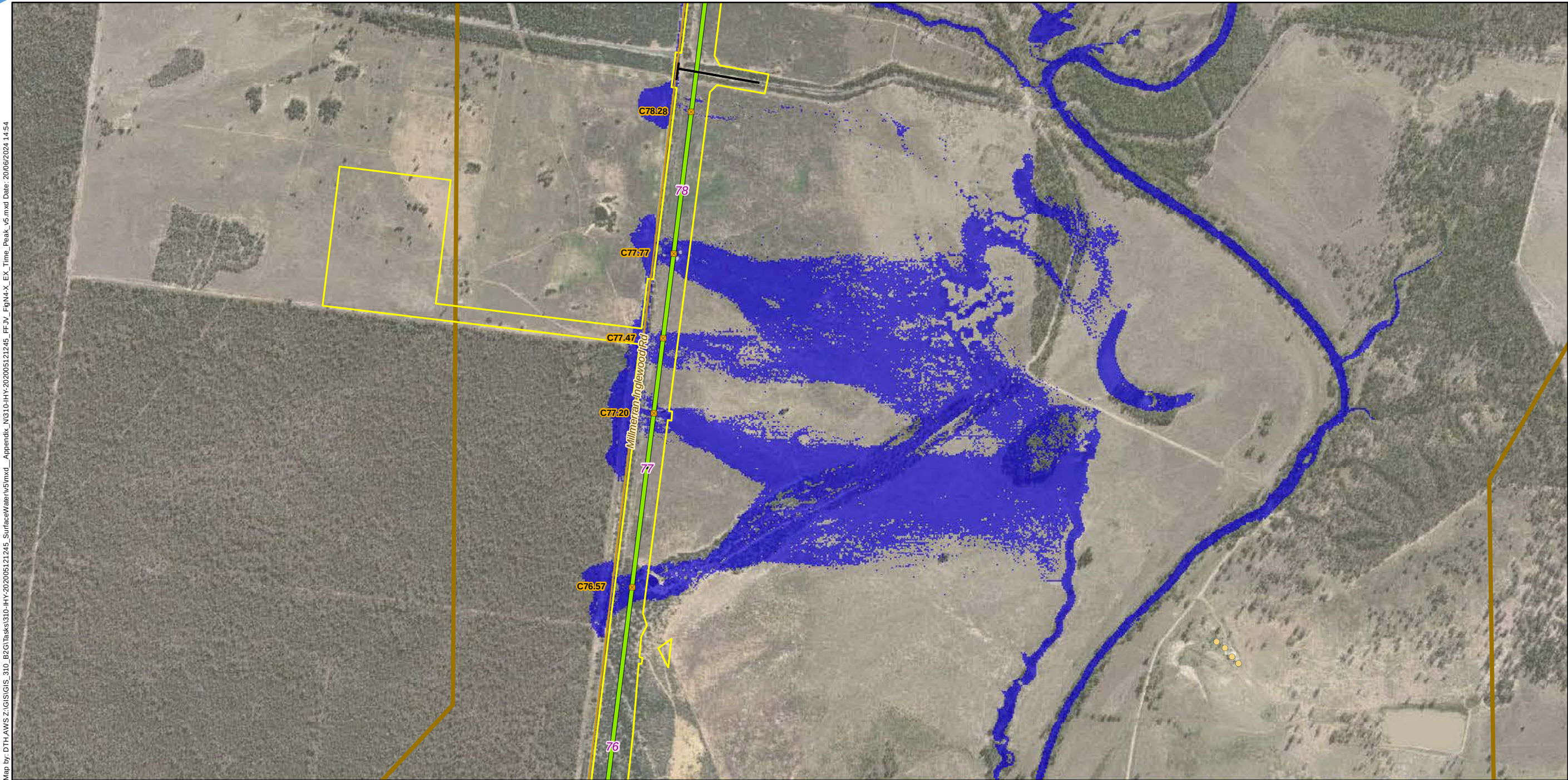
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 14 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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 N4 - page 15 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appldix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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



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 N4 - page 16 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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

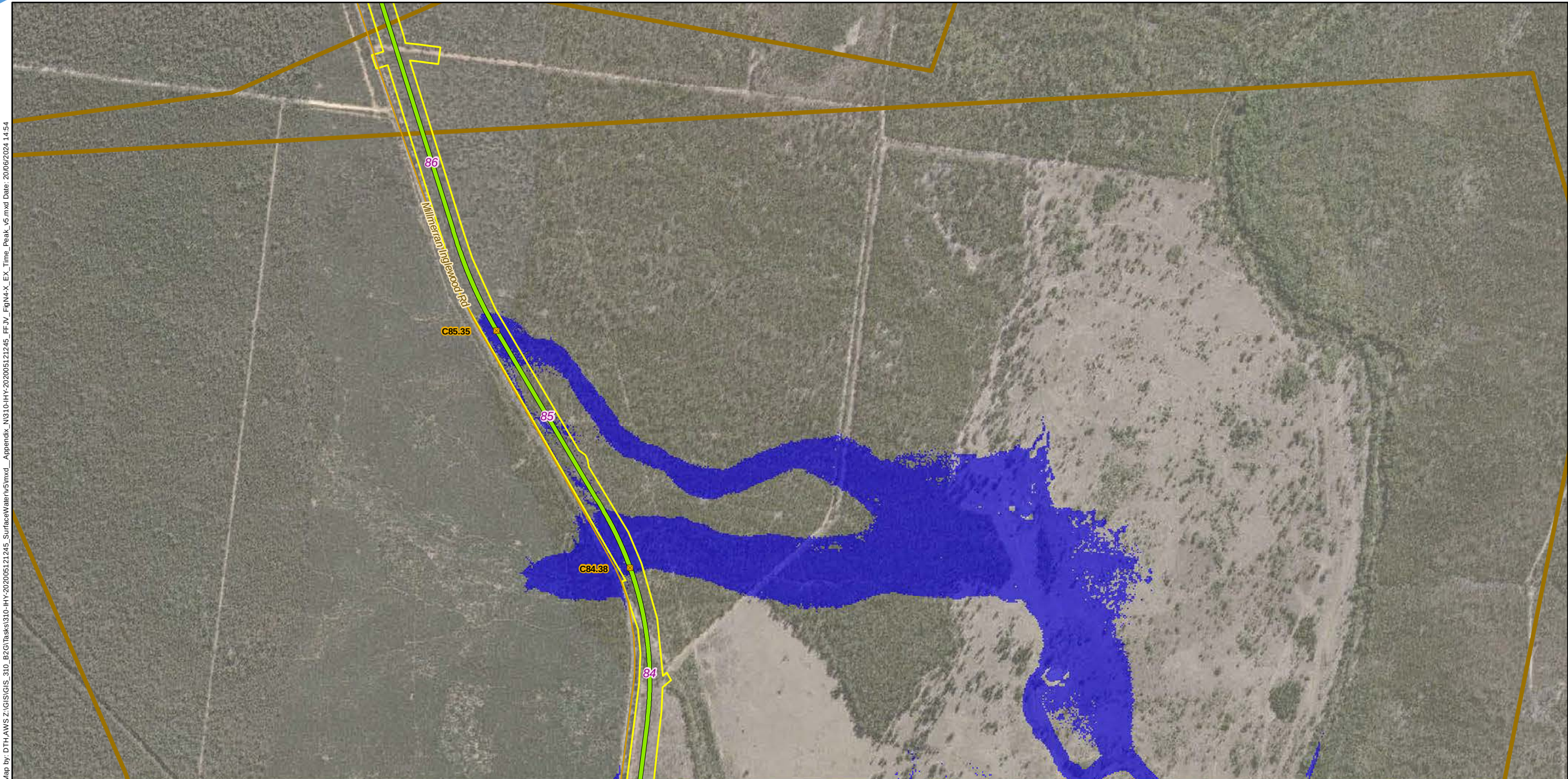


Border to Gowrie

Figure N4 - page 17 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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



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 N4 - page 18 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design

-  Local hydraulic model extent
 Project footprint

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

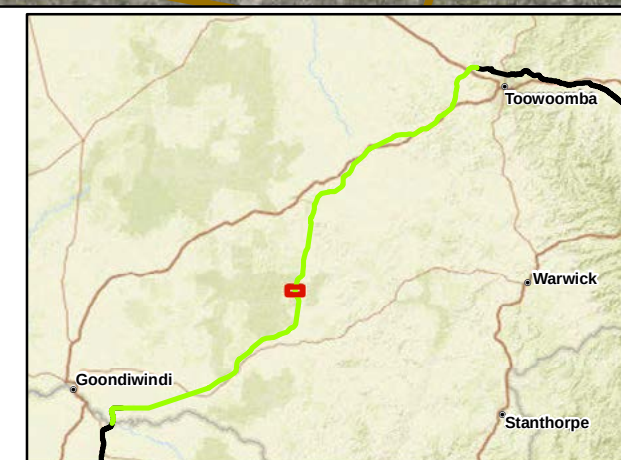
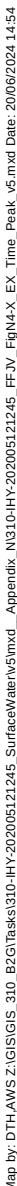


Figure N4 - page 19 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



Legend

- ### Legend

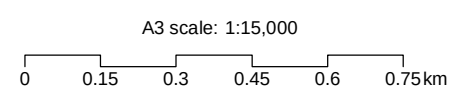
Estimated time of inundation (hours)

- Estimated time of inundation (hours)**



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 N4 - page 20 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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



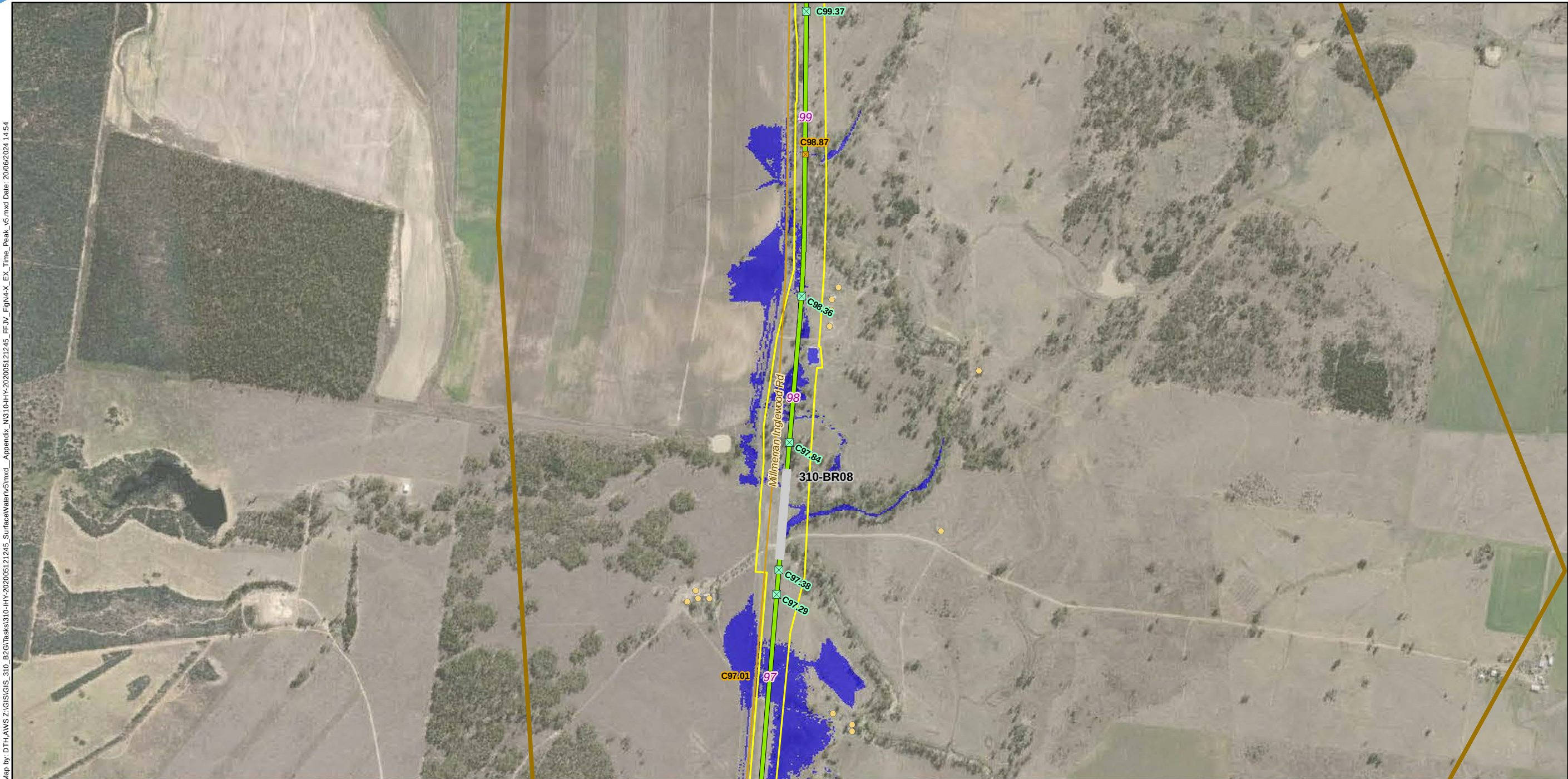
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 21 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:54



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local 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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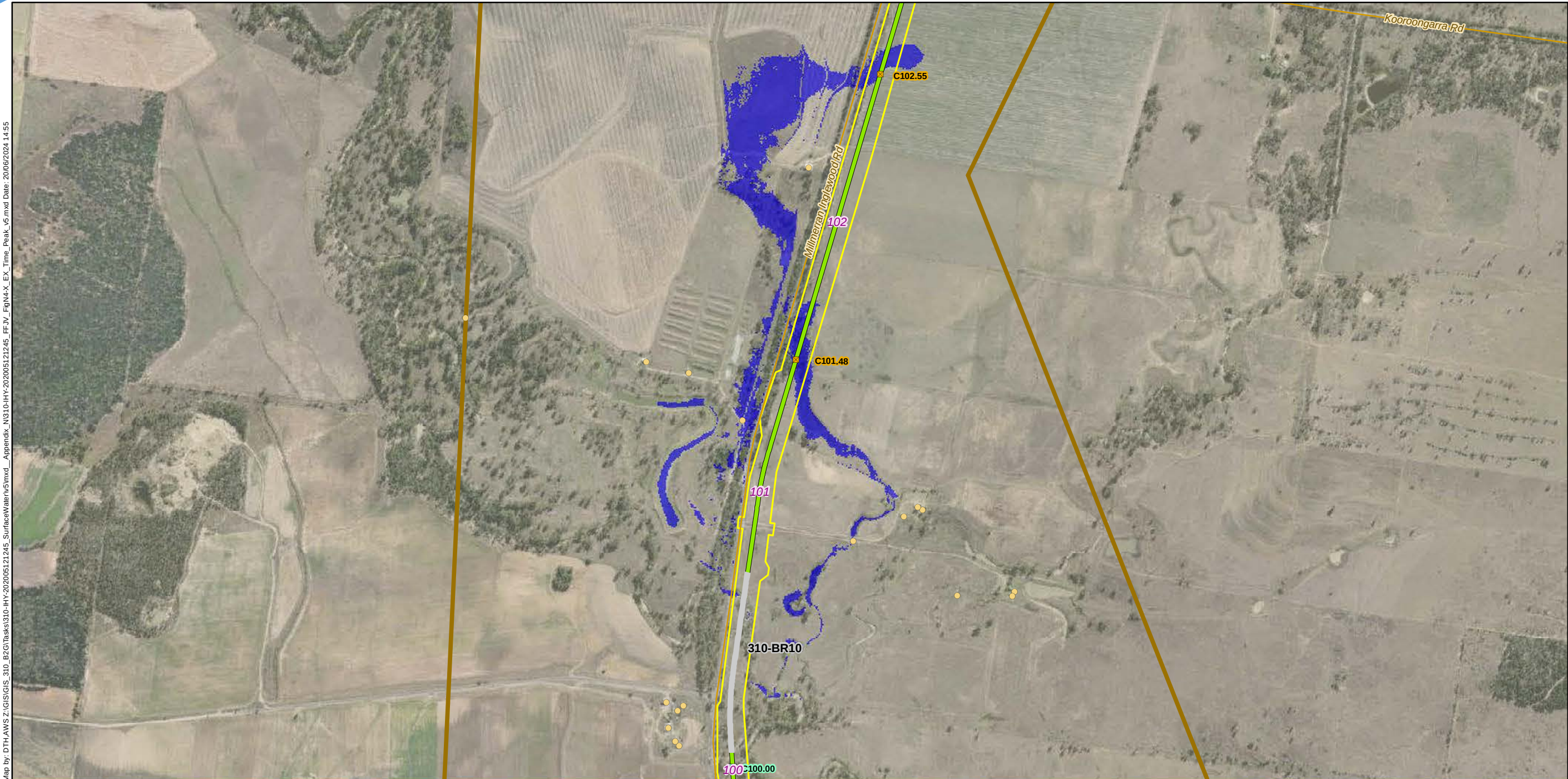
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 22 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appldix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated time of inundation (hours)

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



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

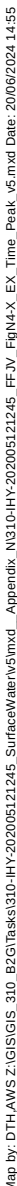


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 23 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



Legend

- ### Legend

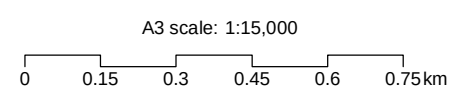
Estimated time of inundation (hours)

- Estimated time of inundation (hours)**



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



Issue date: 20/06/2024 Version: 5

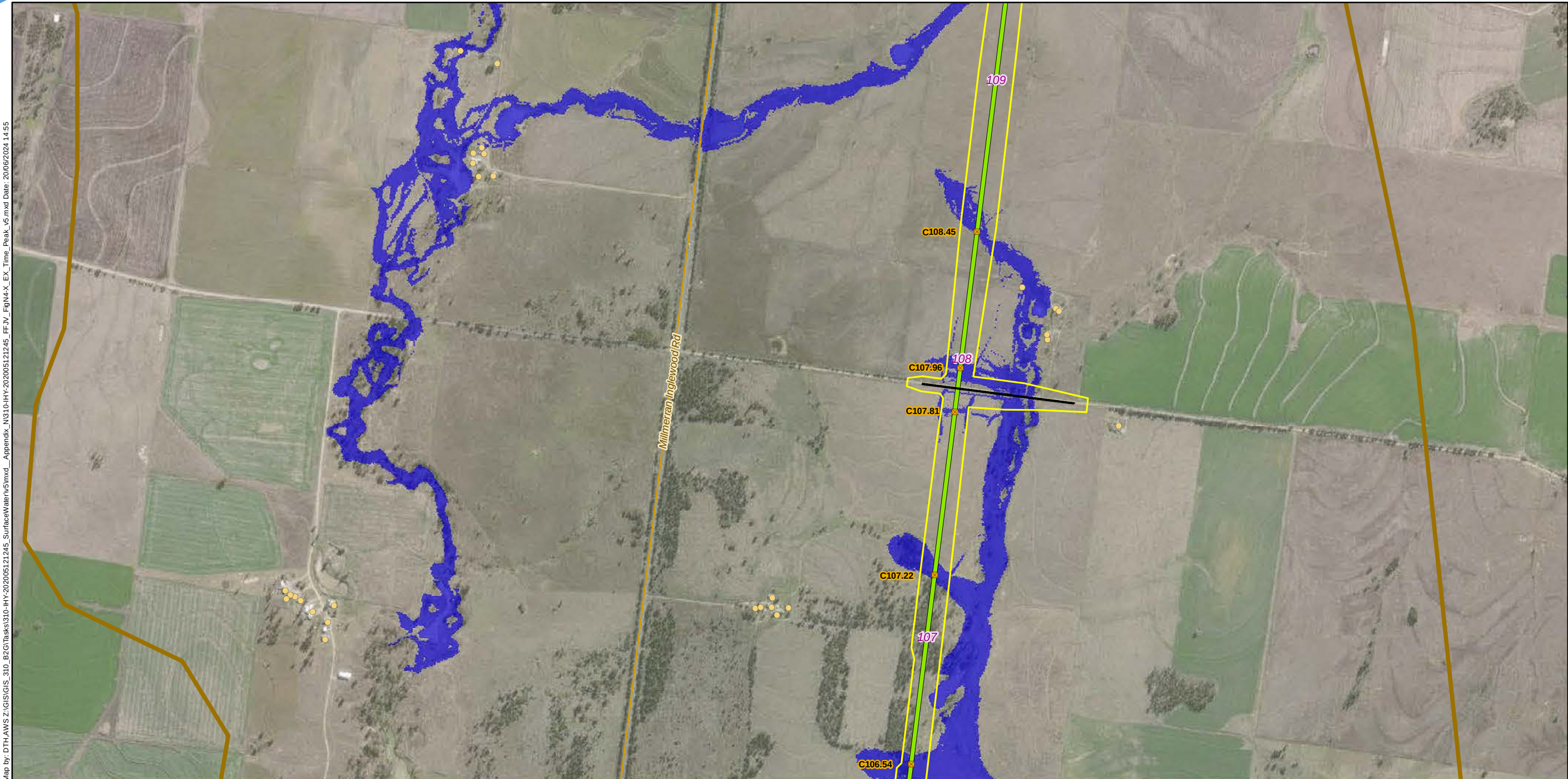
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 24 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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 N4 - page 25 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appldix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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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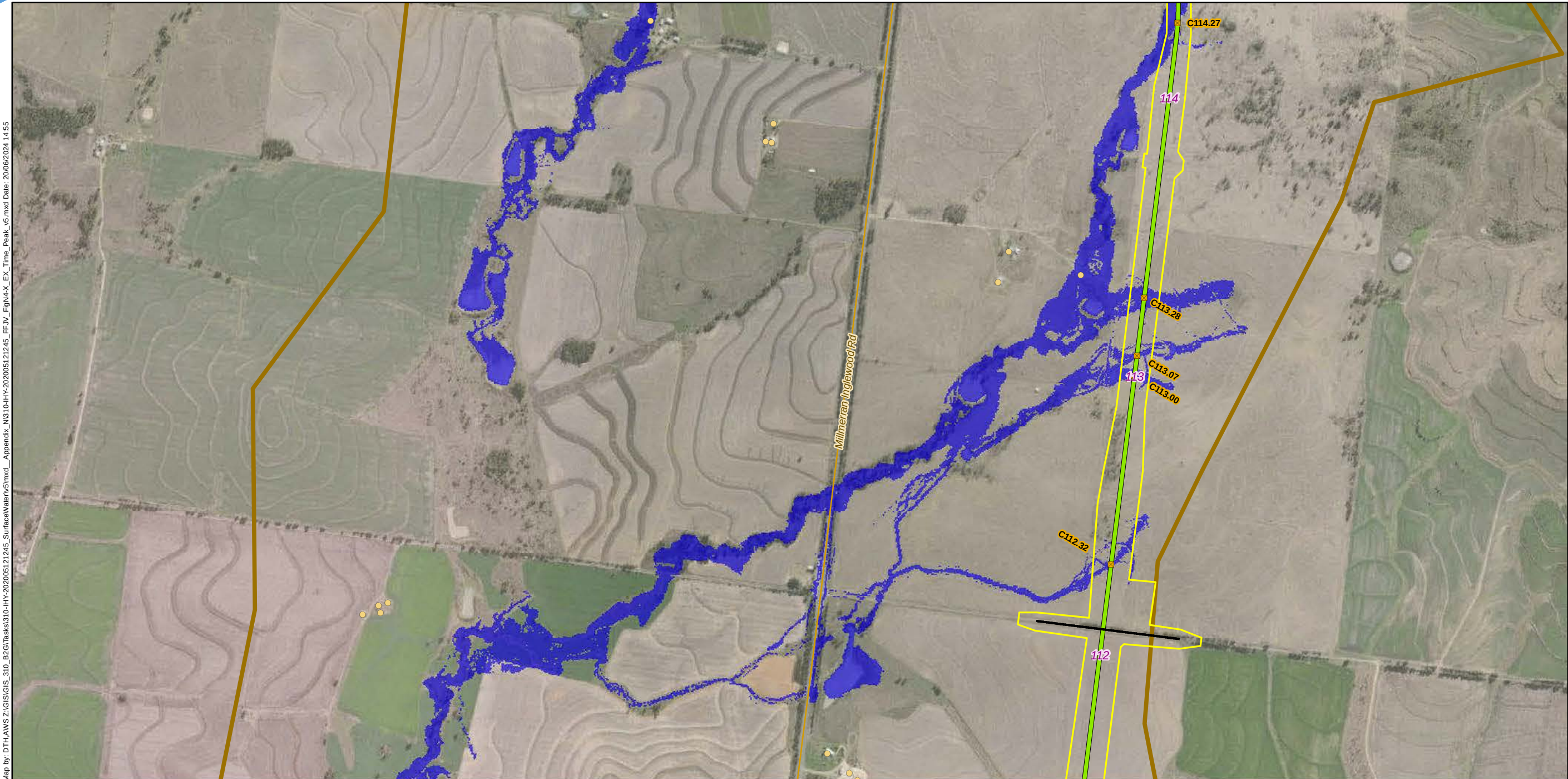
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 26 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5vnx\Appendix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55



Legend

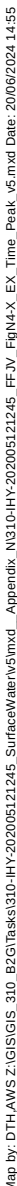
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

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



Legend

- Legend**
- | | | | |
|---|----------------------------|--|--|
| 5 | Chainage (km) | | Flood sensitive receptor |
| | Border to Gowrie alignment | | Project local catchment drainage culvert |
| | Minor roads | | Project bridges |
| | Project road design | | Local hydraulic model extent |
| | | | Project footprint |

Estimated time of inundation (hours)

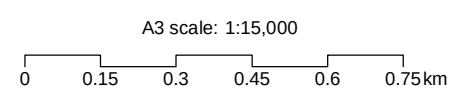
- Estimated time of inundation (hours)**
- | | |
|---------|----------|
| 0 - 10 | 60 - 70 |
| 10 - 20 | 70 - 80 |
| 20 - 30 | 80 - 90 |
| 30 - 40 | 90 - 100 |
| 40 - 50 | > 100 |
| 50 - 60 | |



A3 scale: 1:15,000



0 0.15 0.3 0.45 0.6 0.75km



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 28 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- Estimated time of inundation (hours)

A map of south-eastern Australia showing the study area. A red rectangle indicates the study site, located on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, and a network of roads is shown in red and black lines.

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 29 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

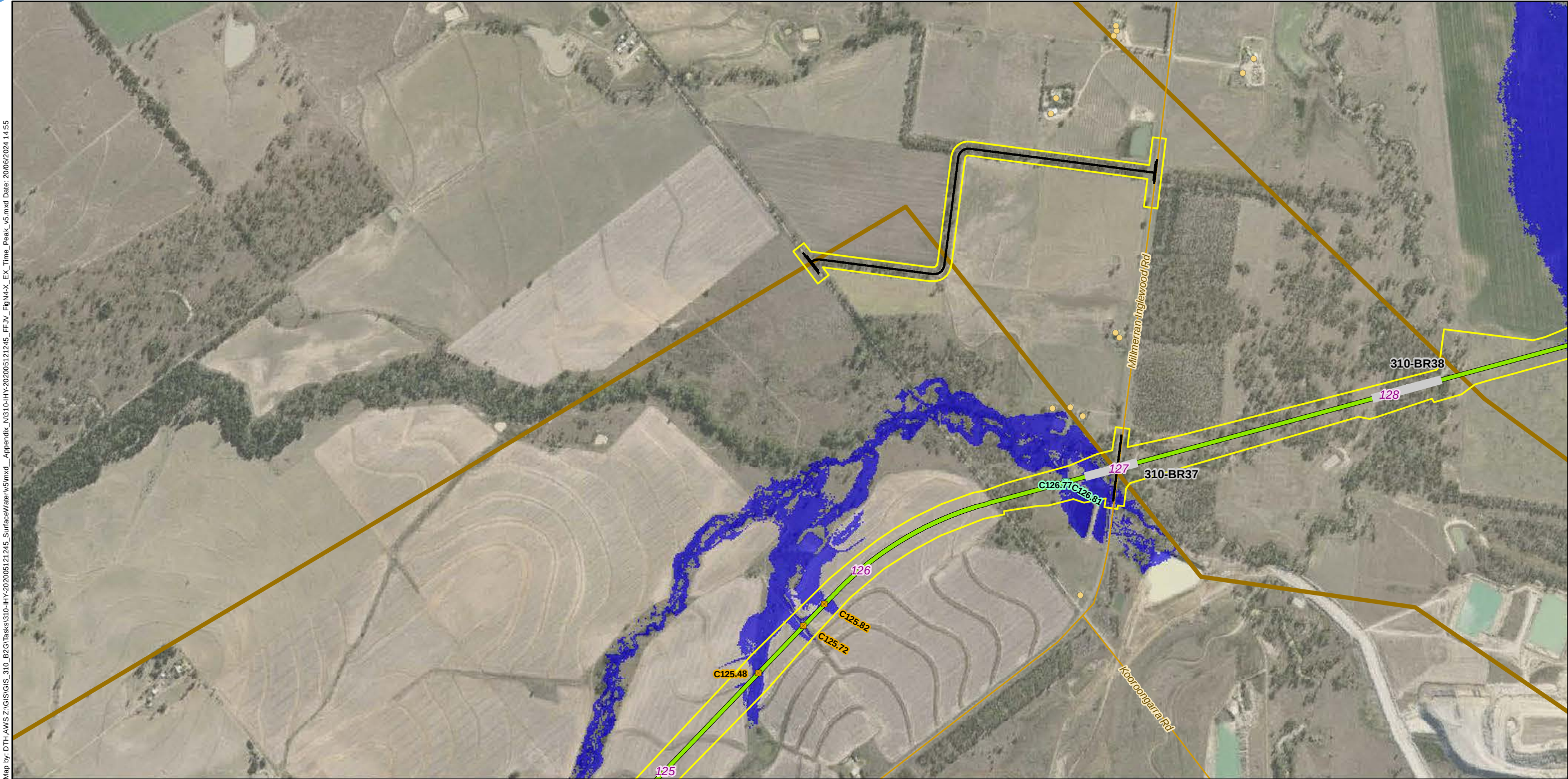
Estimated time of inundation (hours)

- | | |
|---------|----------|
| 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

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local 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

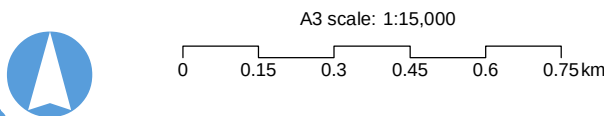
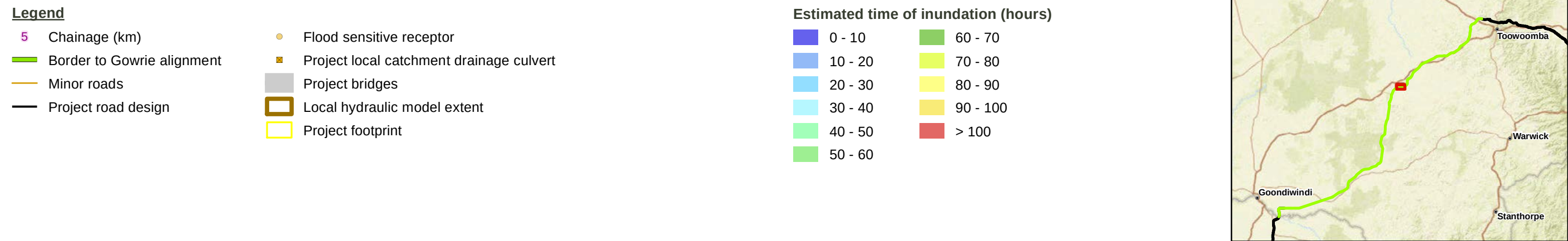
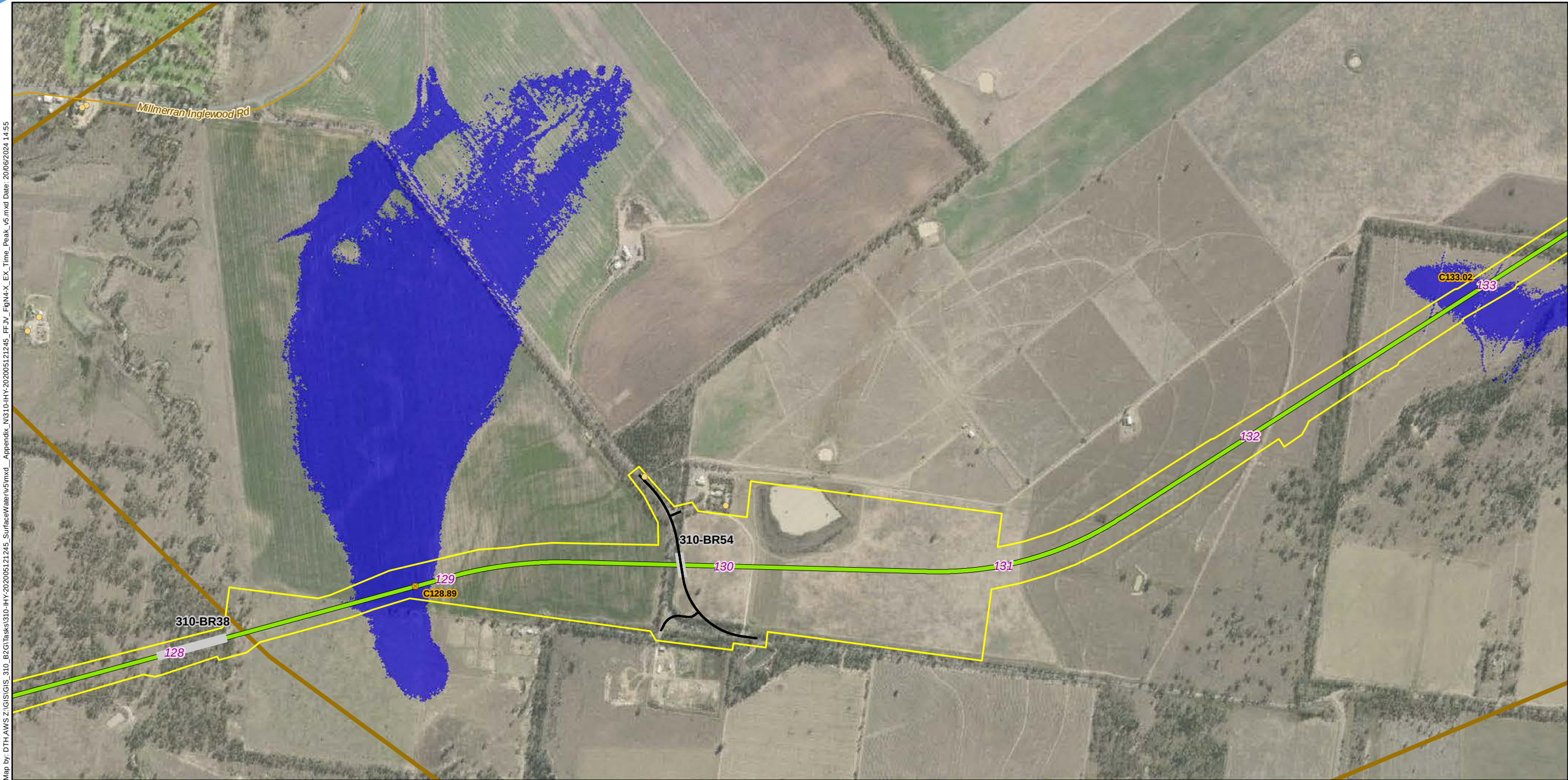


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 32 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_IV\310-IHY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 34 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appldix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:55

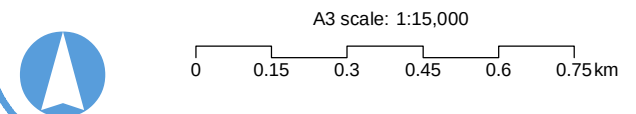
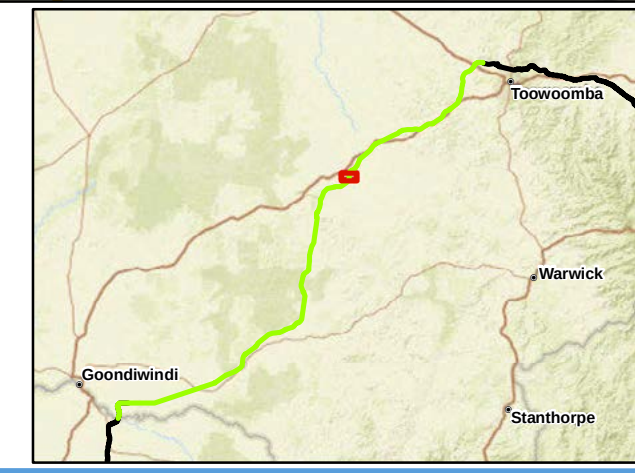


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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)
- Localities
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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



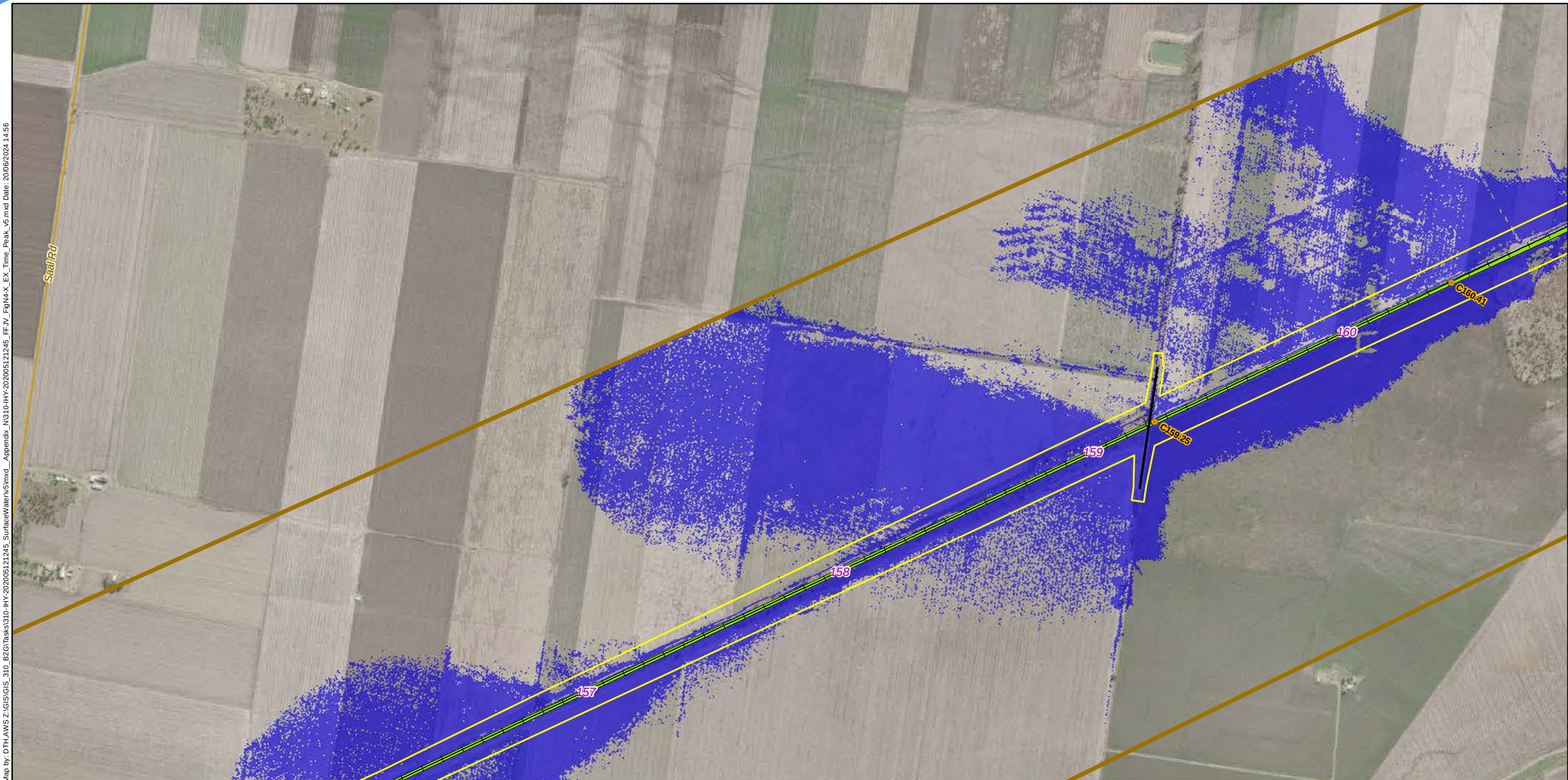
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 36 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd_Appendix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:56



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local 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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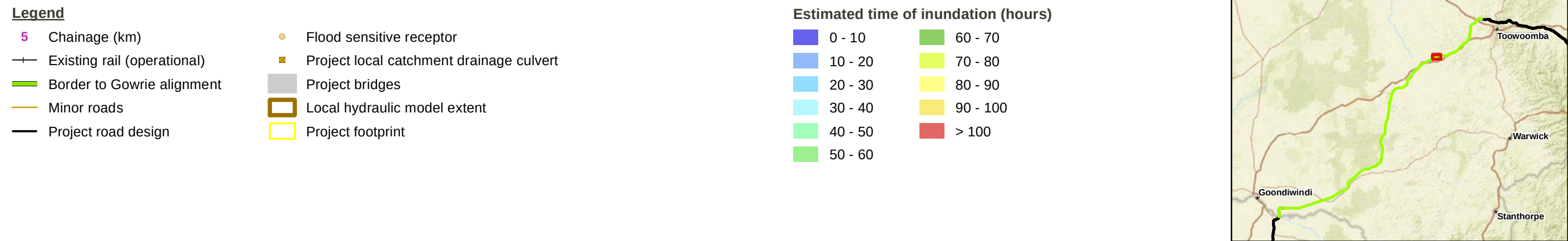
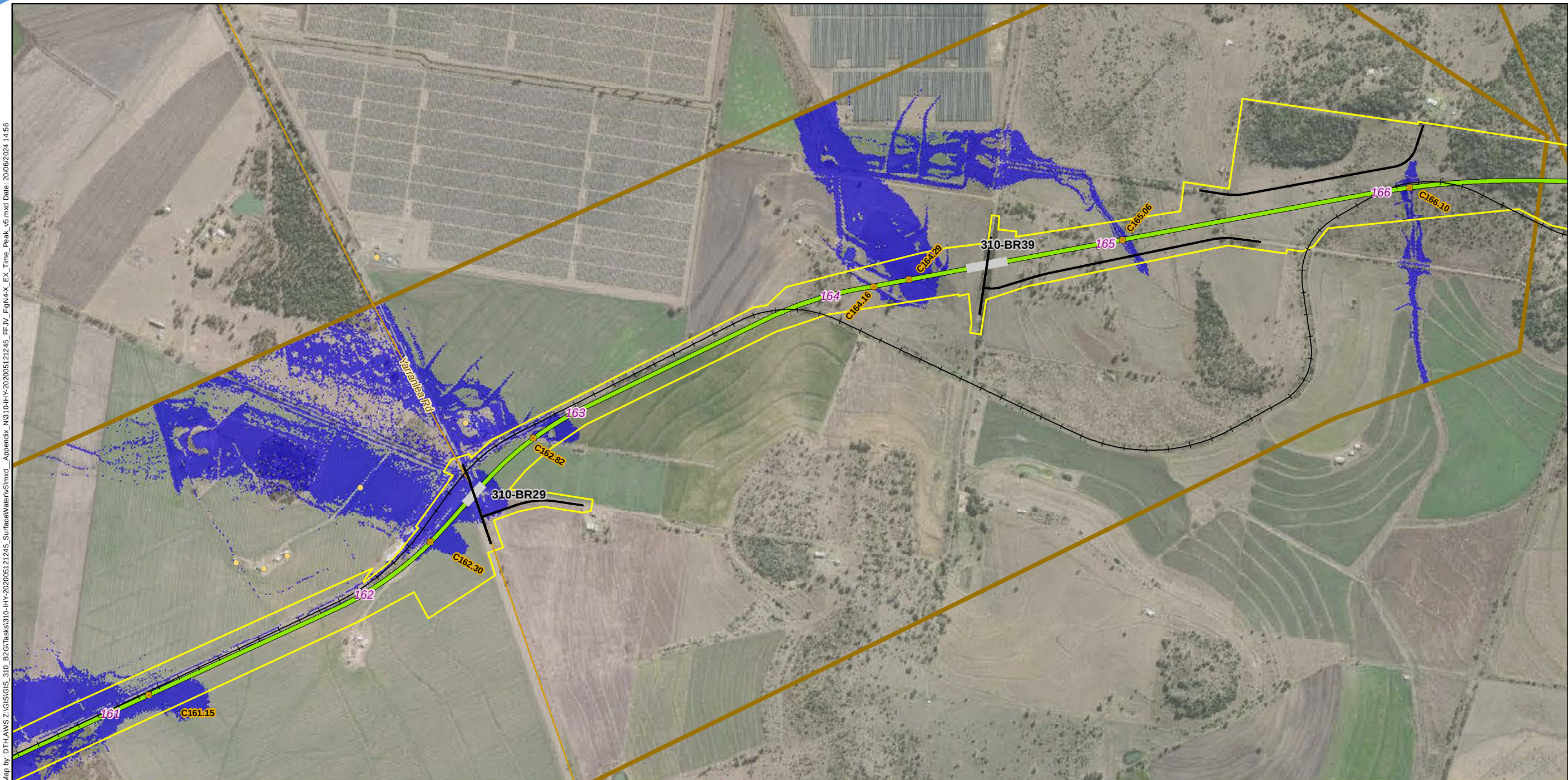
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 37 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: D:\HAWKS\GIS\310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_N\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:56



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



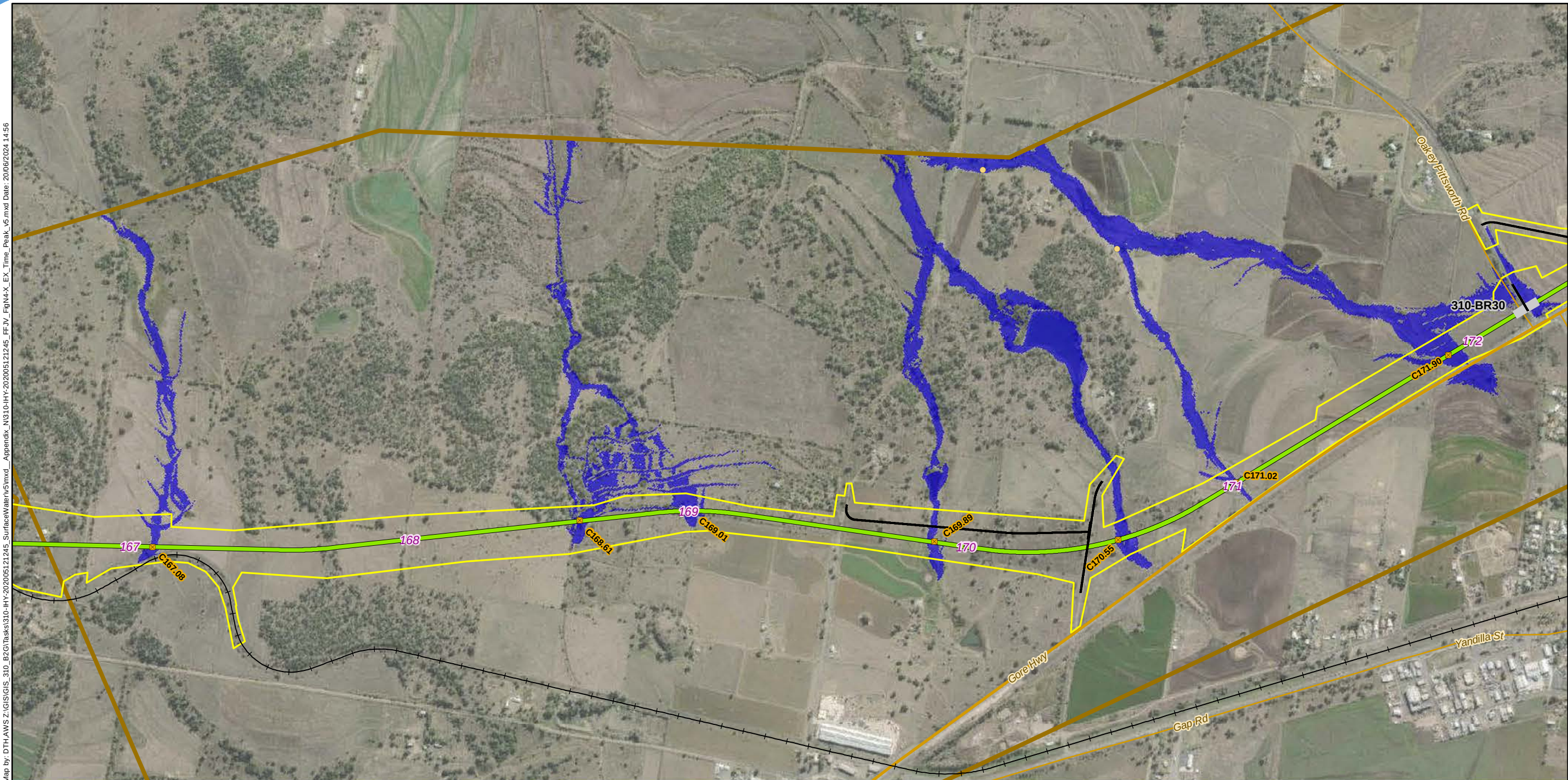
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 38 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: D:\HAWKS\GIS\310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_IV\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:56

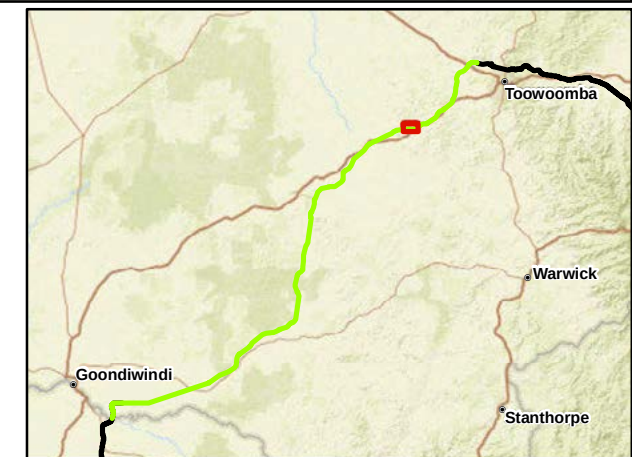


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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



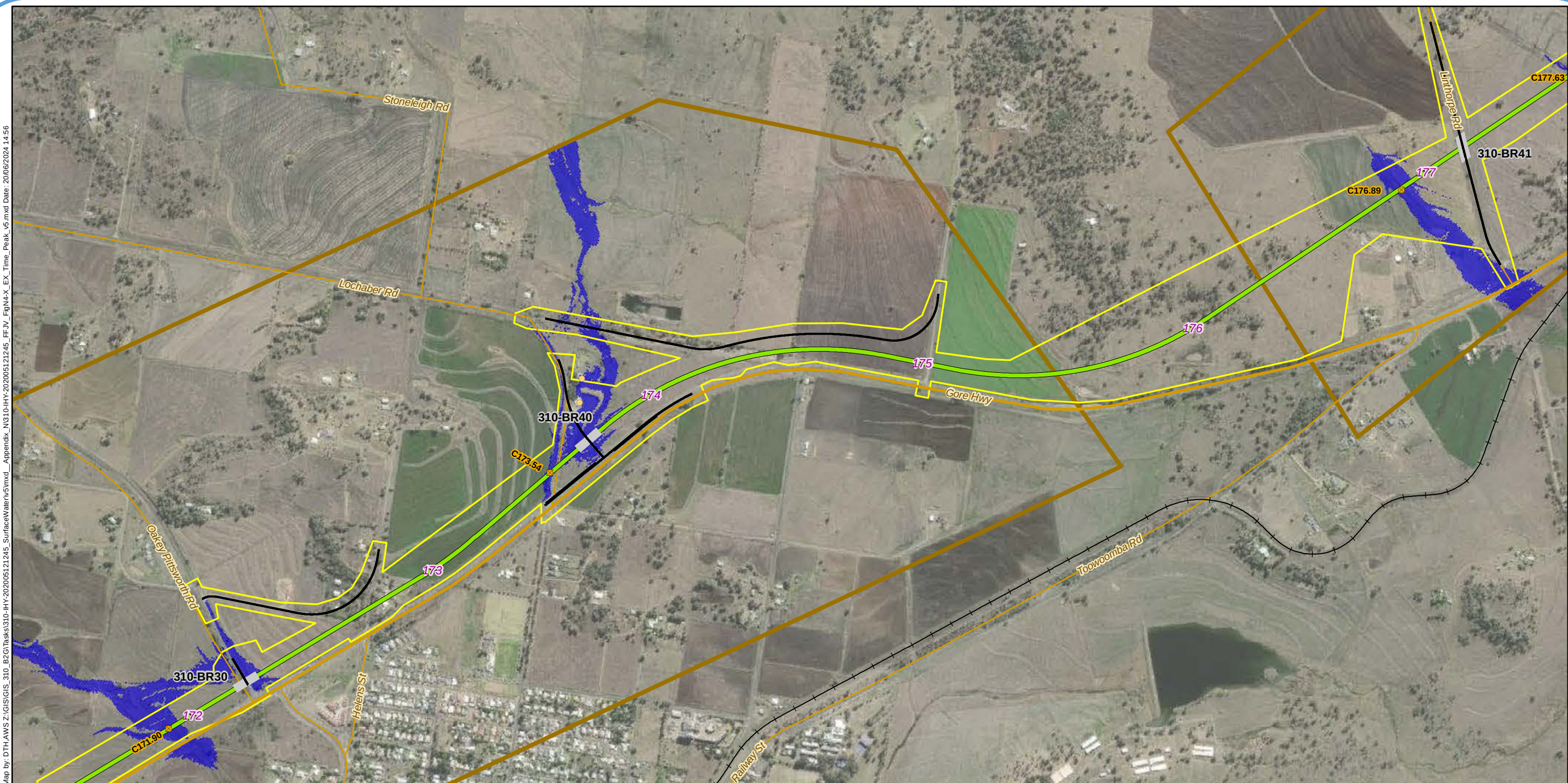
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 39 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:56

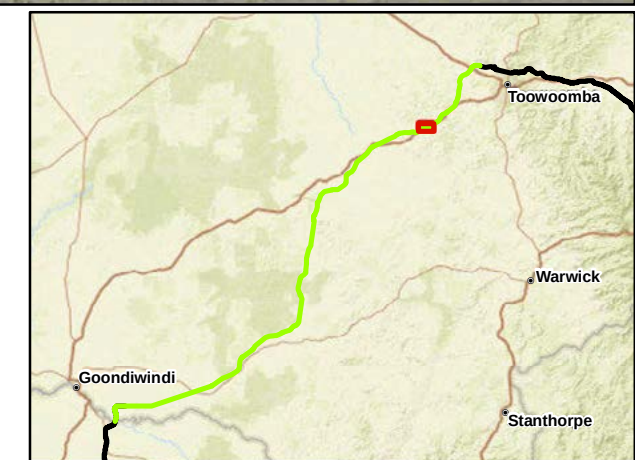


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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

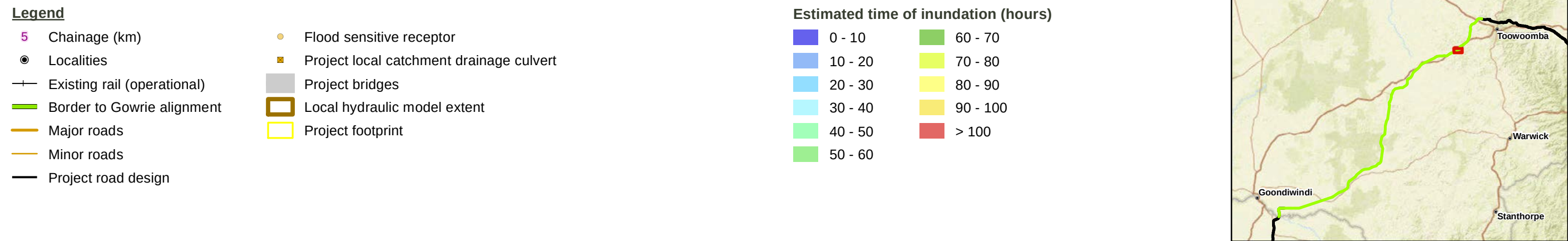


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 40 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



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 N4 - page 41 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- Estimated time of inundation (hours)

A map of south-eastern Australia showing the location of the study area. A red square marks the study site, situated on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, and a network of roads is shown in red and black lines.

A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 42 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\GIS_310-HY-202005121245_SurfaceWater\5mxd Appendix_IV310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:56



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local 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



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

Border to Gowrie

Figure N4 - page 43 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- Estimated time of inundation (hours)**



Border to Gowrie

Figure N4 - page 44 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- Estimated time of inundation (hours)**

A step function graph on a horizontal axis labeled from 0 to 0.75 km. The function is 1 for intervals $[0, 0.15)$, $[0.3, 0.45)$, and $[0.6, 0.75]$, and 0 for intervals $[0.15, 0.3)$ and $[0.45, 0.6)$.

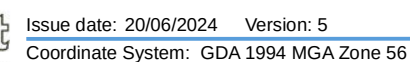


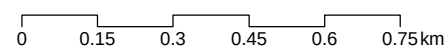
Figure N4 - page 45 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case



- Estimated time of inundation (hours)**

A3 scale: 1:15,000



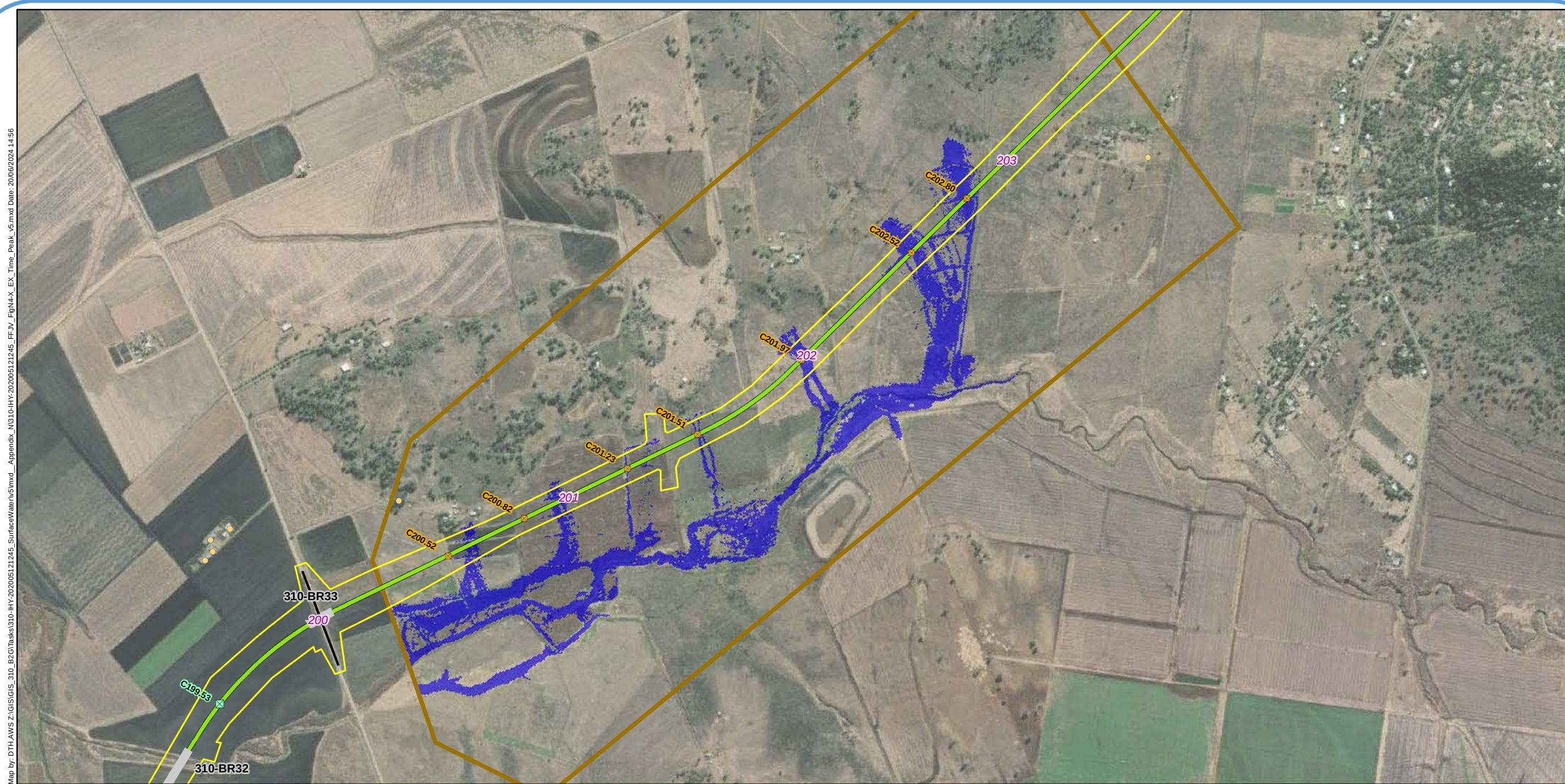
Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

Figure N4 - page 46 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

Map by: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-IHY-202005121245_SurfaceWaterV5.mxd Appendix_IV310-IHY-202005121245_FFJV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:56

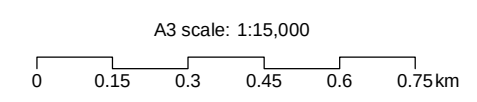
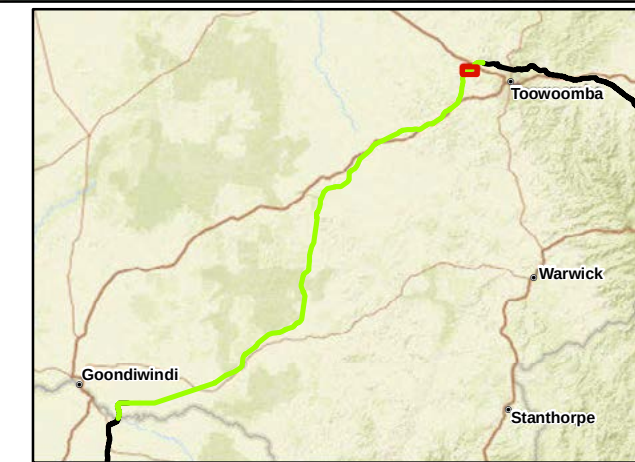


Legend

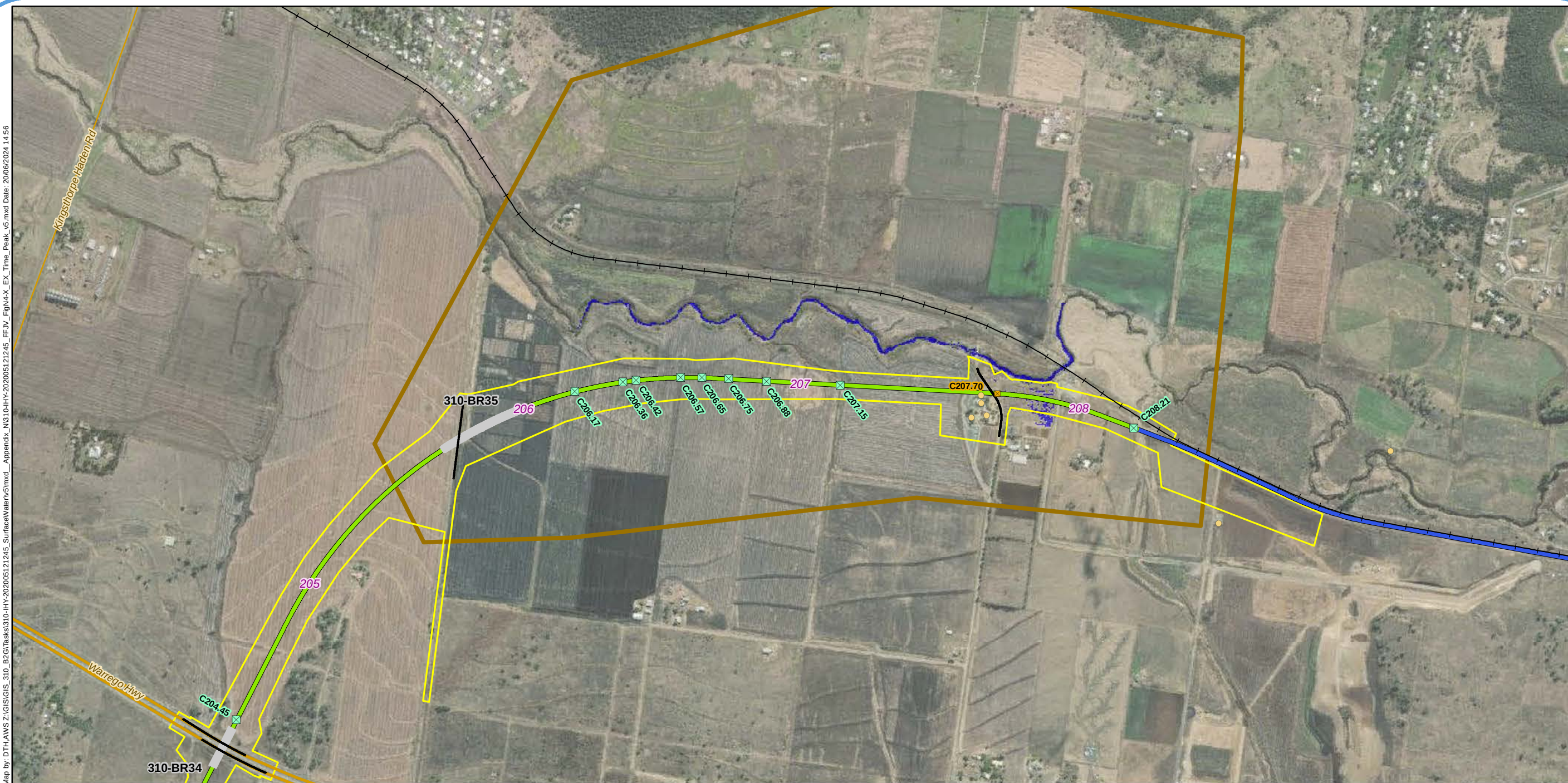
- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

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: DTH\AWS Z\GIS\GIS_310_B2\GIS\310-HY-202005121245_SurfaceWater\5mxd Appendix_1\310-HY-202005121245_FF\JV_FigN4-X_EX_Time_Peak_v5.mxd Date: 20/06/2024 14:56



Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Gowrie to Helidon alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local 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

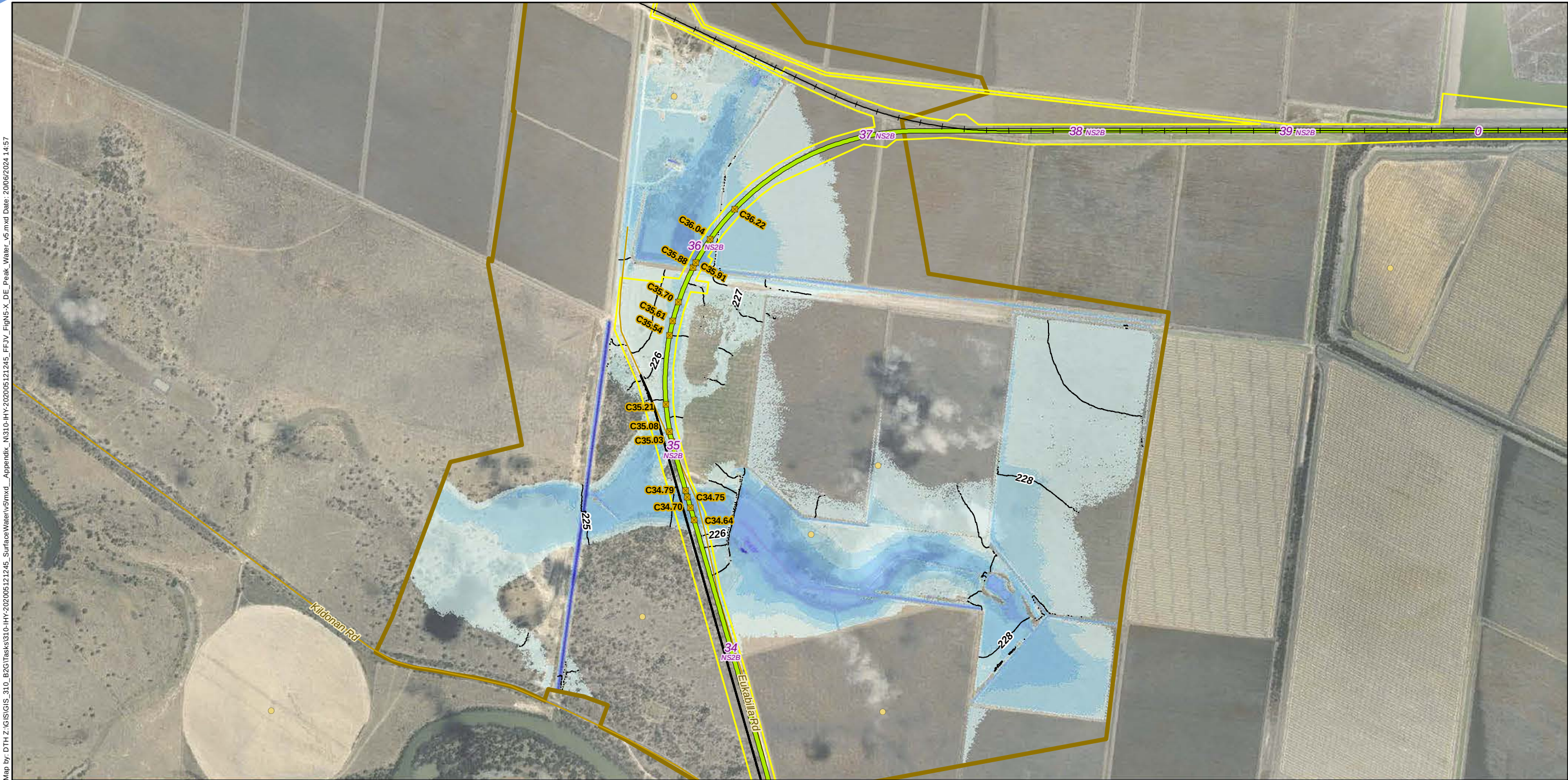


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N4 - page 48 of 48:

1% AEP Event - Local Catchments - Peak Time of Inundation - Existing Case

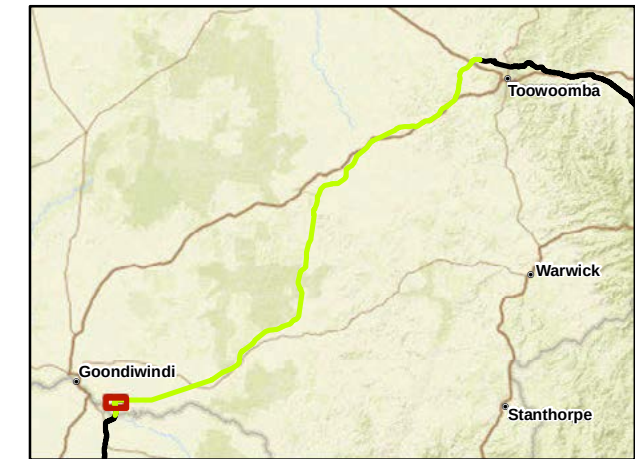


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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 |
- 0.5m peak water surface contour (mAHD)



A3 scale: 1:20,000
0 0.2 0.4 0.6 0.8 1km

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:57

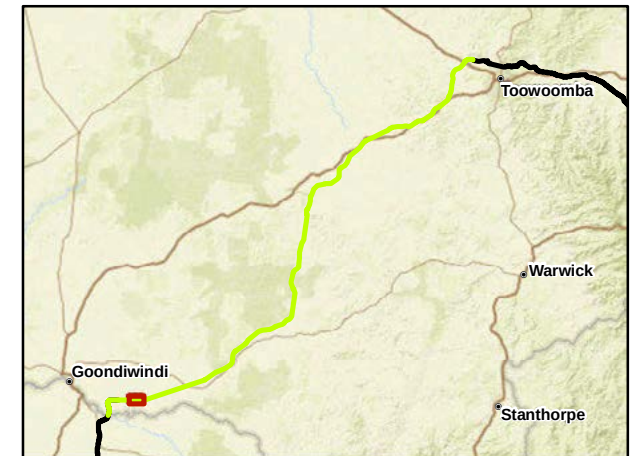


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:57



Legend

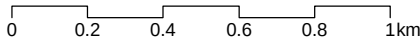
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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 |
- 0.5m peak water surface contour (mAHD)



A3 scale: 1:20,000



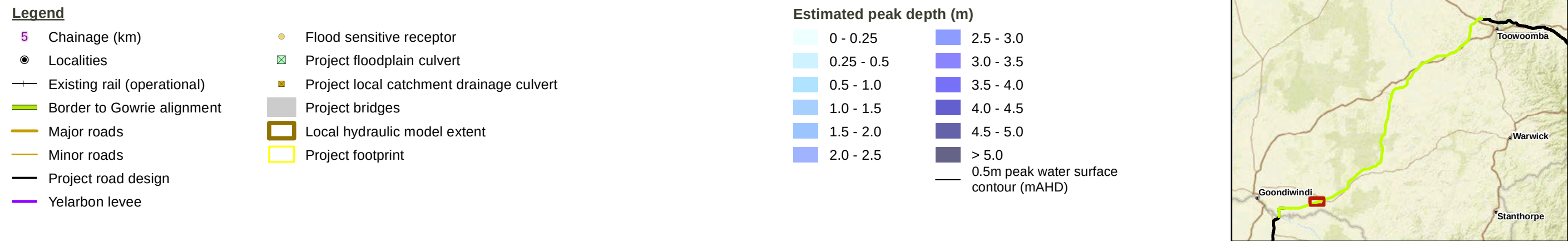
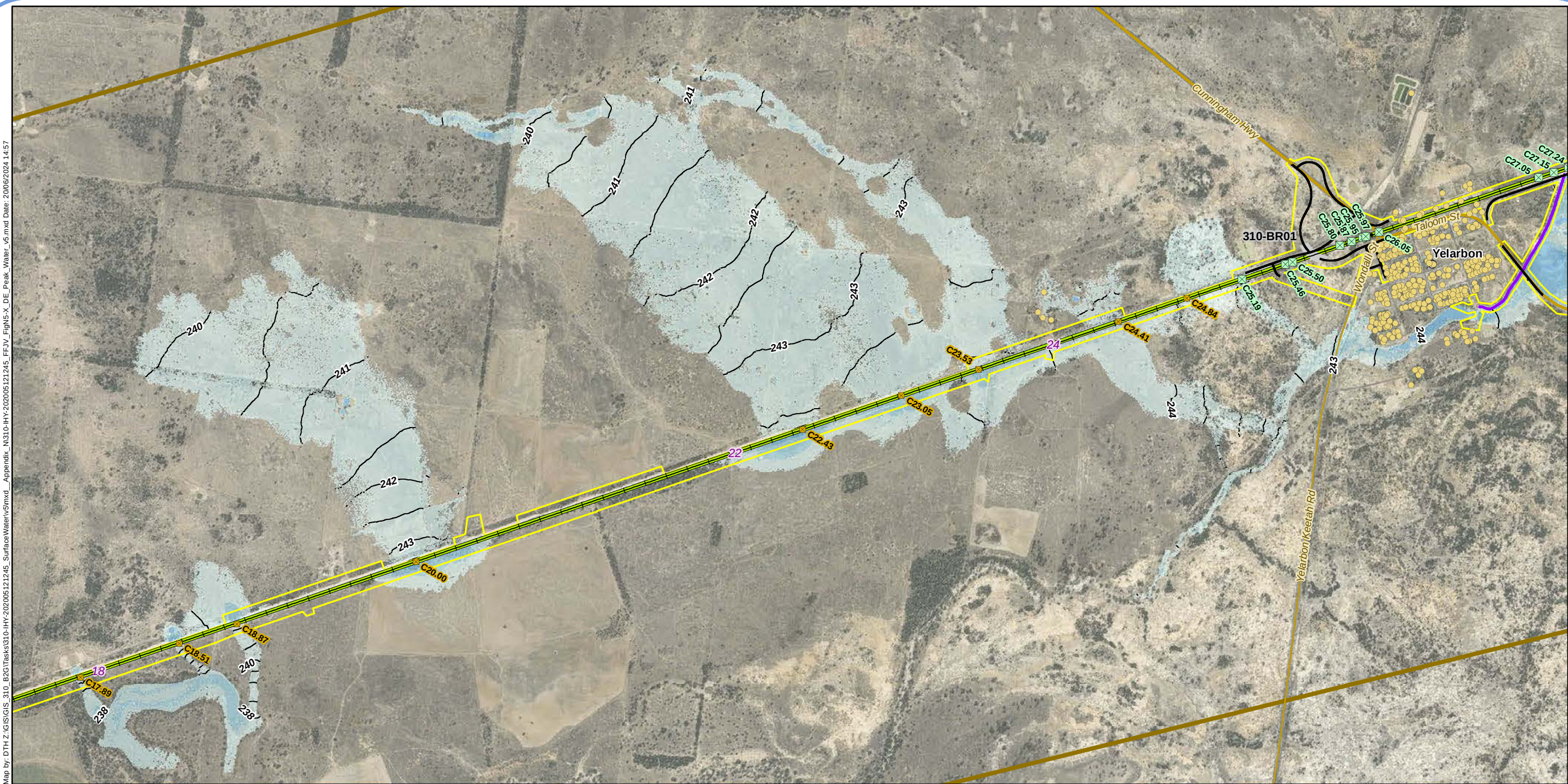
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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N5 - page 3 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



A3 scale: 1:25,000
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 N5 - page 4 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

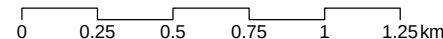


- Estimated peak depth (m)**

A map of the study area in south-east Queensland, Australia. The map shows the locations of Goondiwindi, Toowoomba, Warwick, and Stanthorpe. A red rectangle highlights the area around Goondiwindi, indicating the location of the study site. The map also shows the Murrumbidgee River and the Murrumbidgee Highway.



A3 scale: 1:25,000



Issue date: 20/06/2024 Version: 5

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Border to Gowrie

Figure N5 - page 5 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



Legend

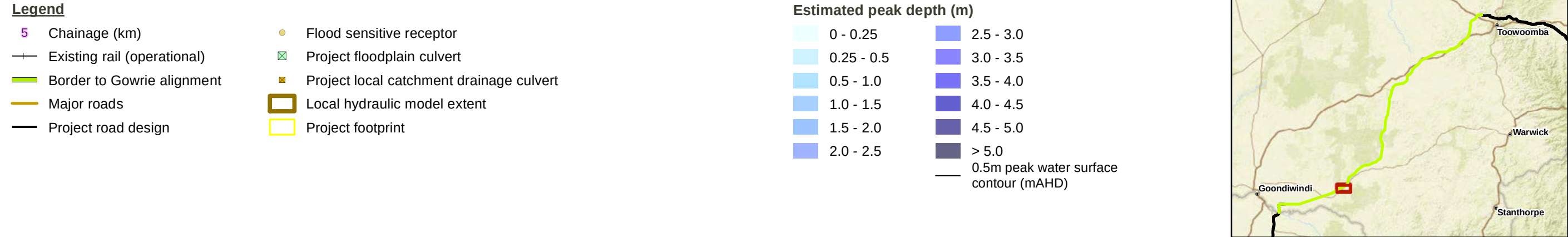
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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 |
- 0.5m peak water surface contour (mAHD)

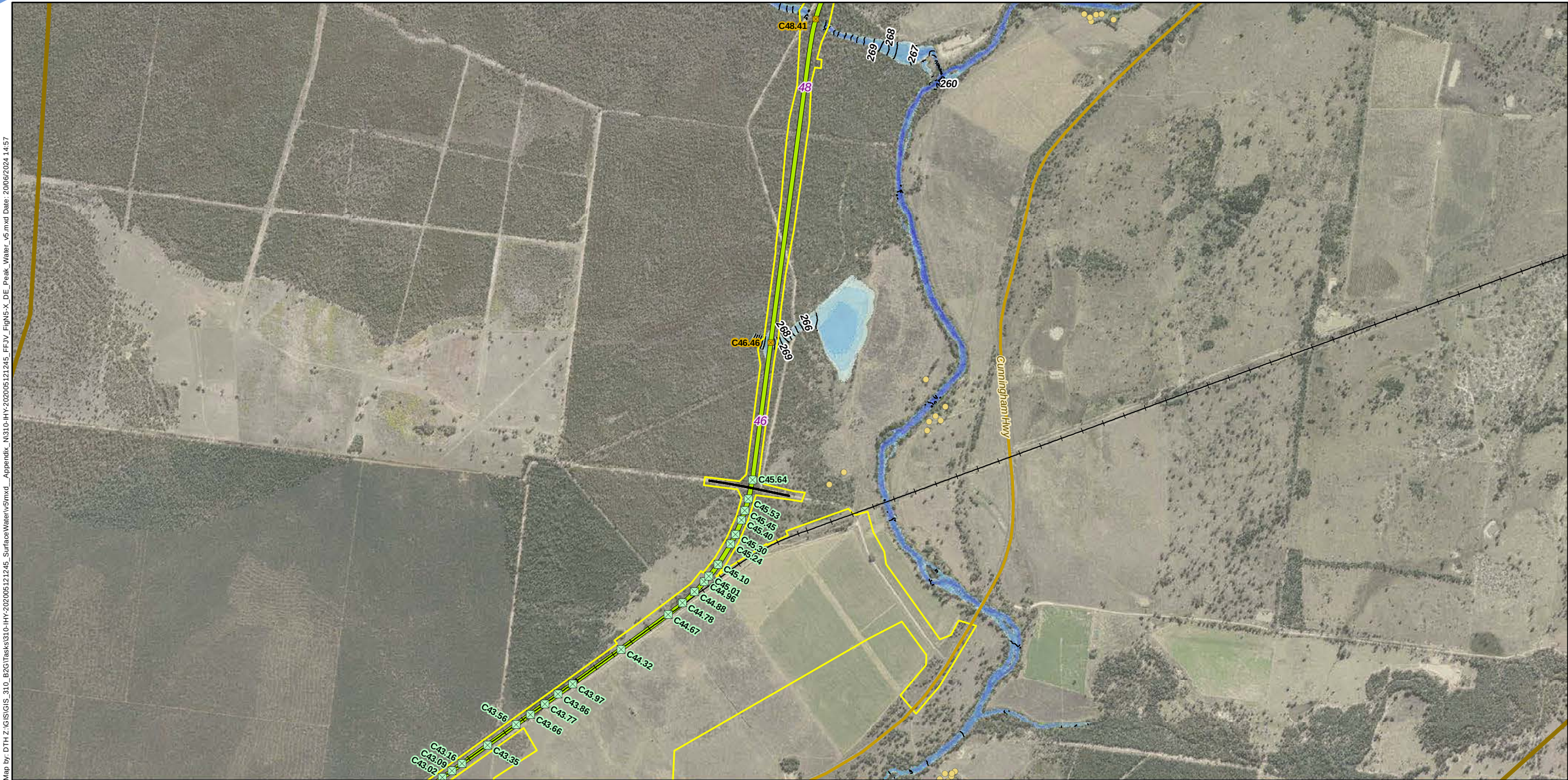


A3 scale: 1:25,000
0 0.25 0.5 0.75 1 1.25 km



A3 scale: 1:25,000

0 0.25 0.5 0.75 1 1.25 km

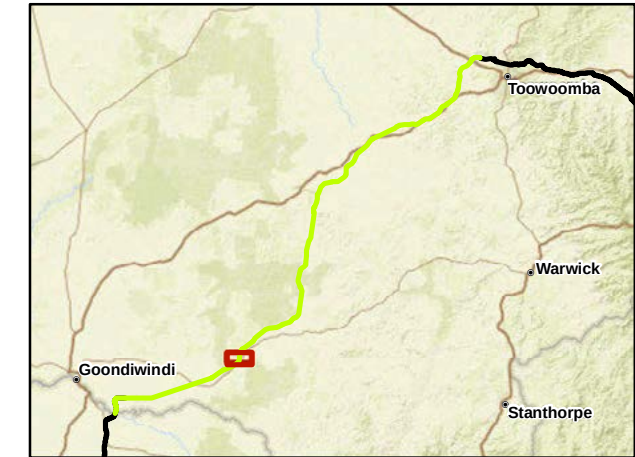


Legend

- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



A3 scale: 1:25,000
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 N5 - page 8 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:57



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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

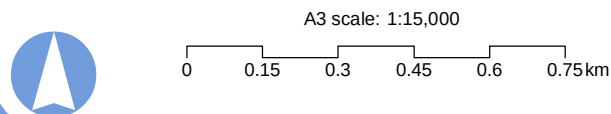
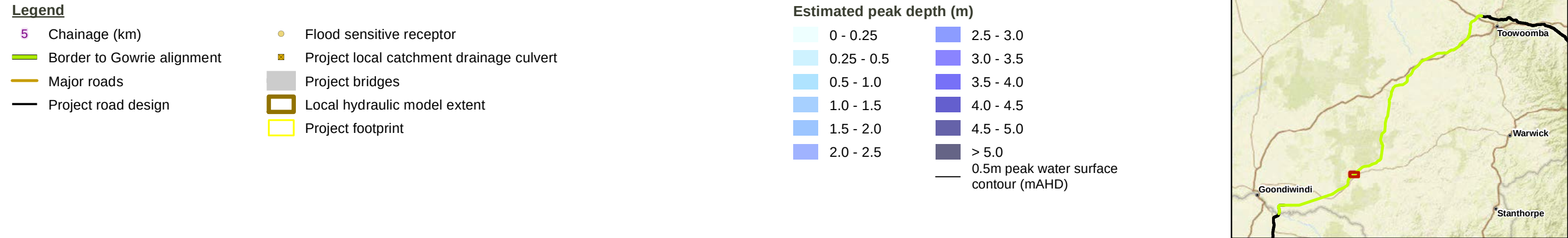
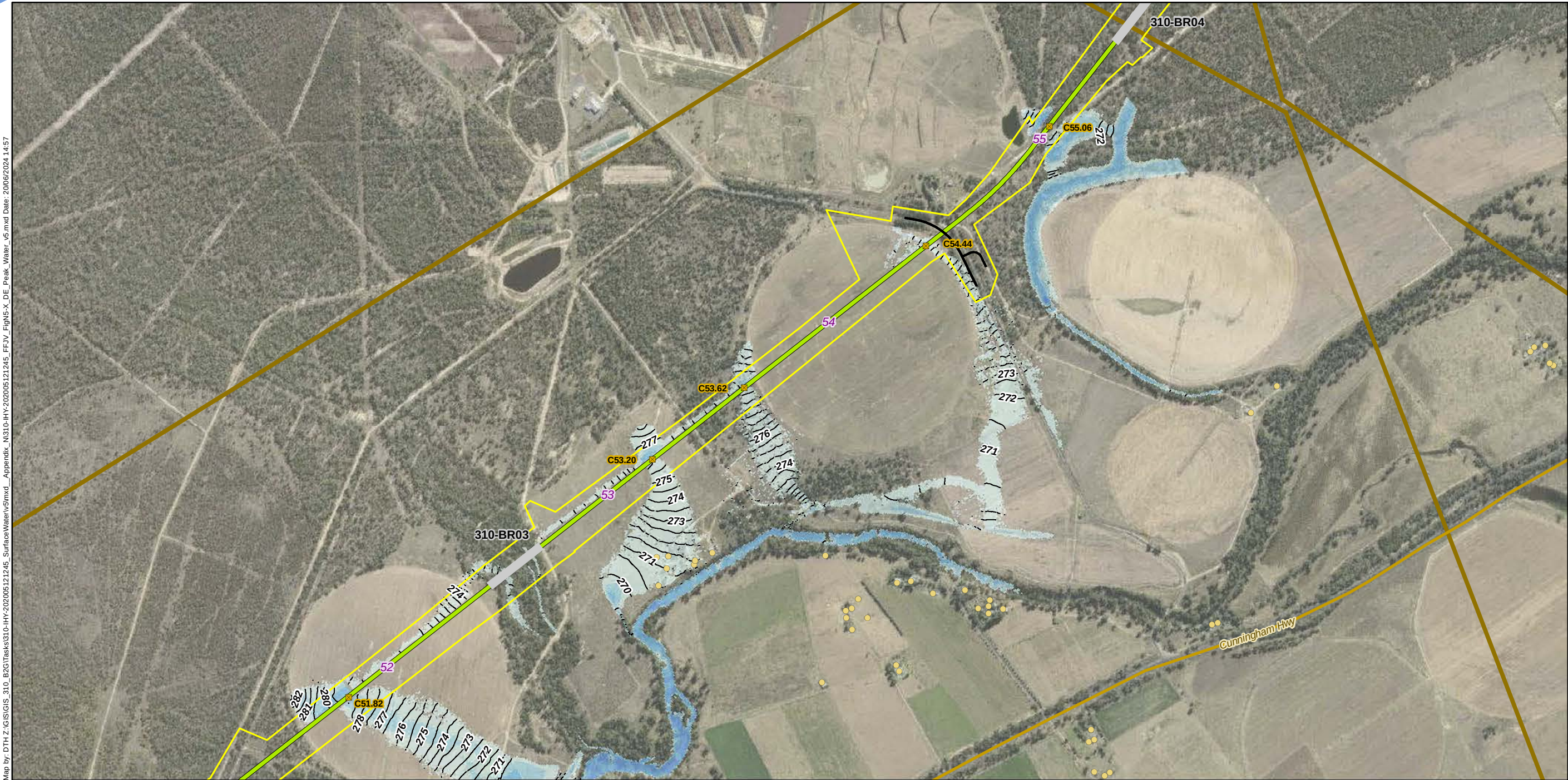


Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N5 - page 9 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:57



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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

0.5m peak water surface contour (mAHD)



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



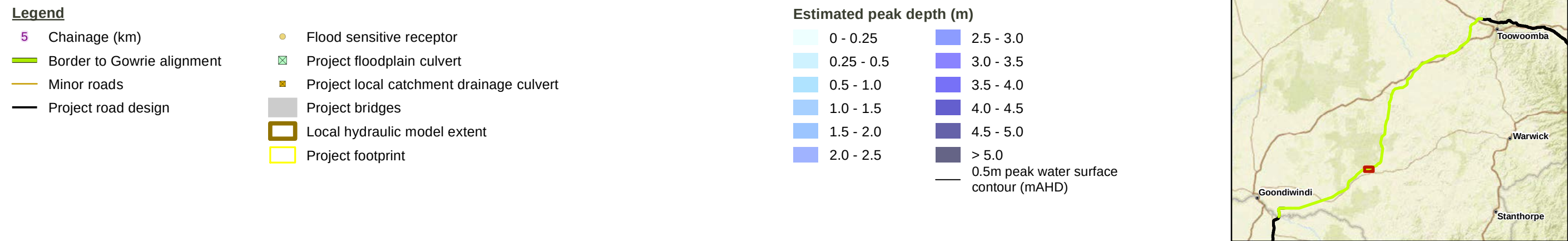
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Coordinate System: GDA 1994 MGA Zone 56

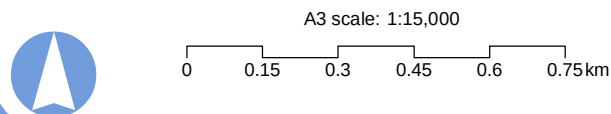
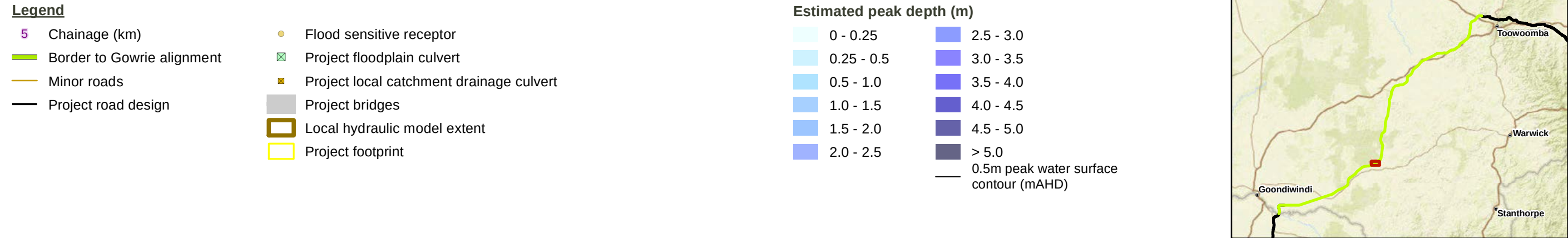
Border to Gowrie

Figure N5 - page 11 of 48:

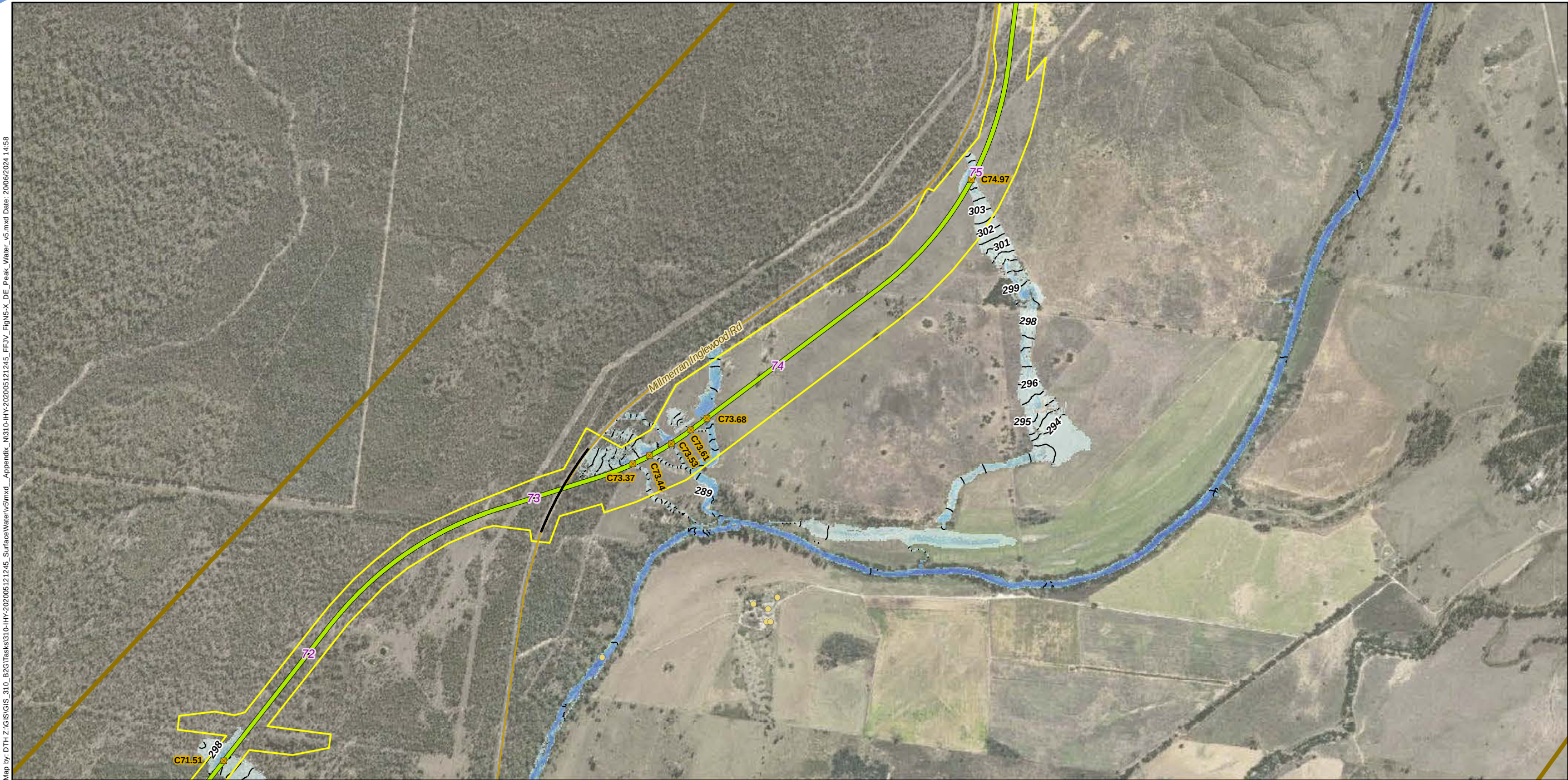
1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



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



Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:58



Legend

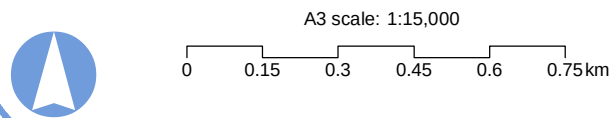
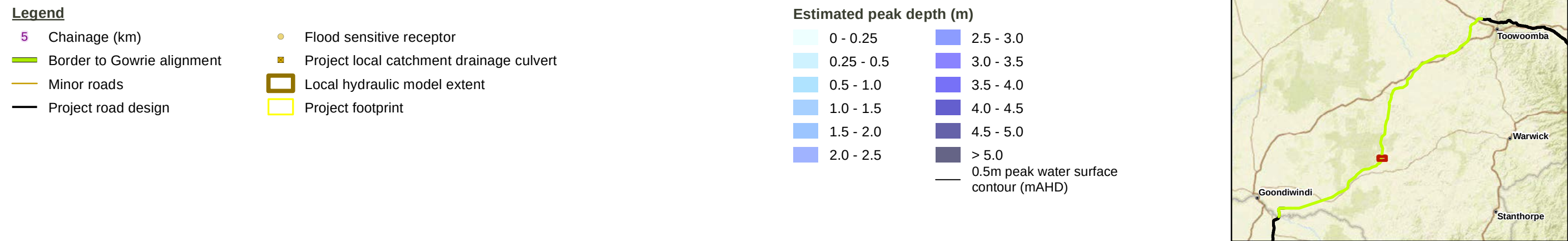
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
	0.5m peak water surface contour (mAHD)



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



Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:58



Legend

- 5

 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak depth (m)

- 0 - 0.25
- 0.25 - 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
- 0.5m peak water surface contour (mAHD)



A3 scale: 1:15,000

0 0.15 0.3 0.45 0.6 0.75 km



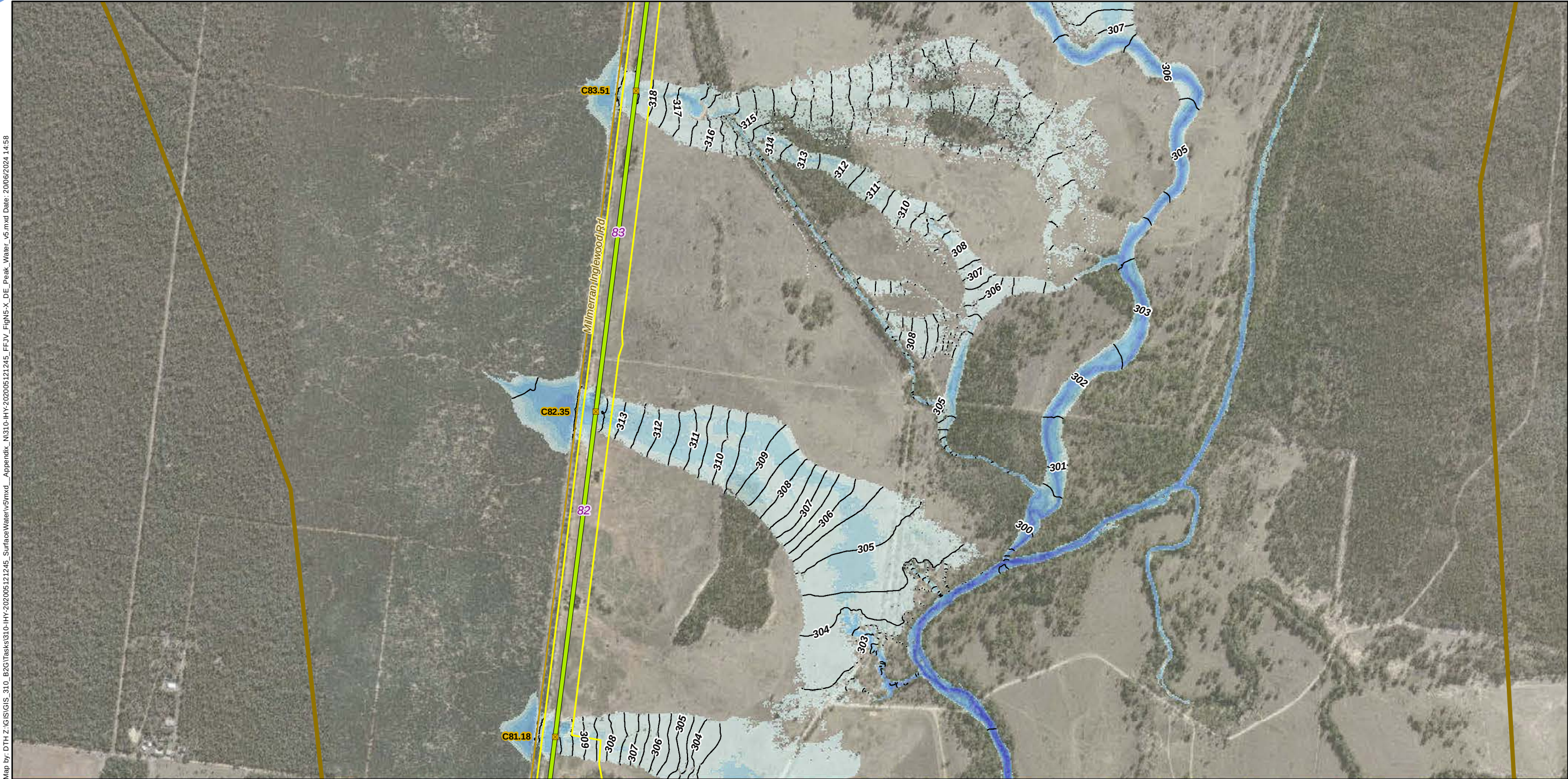
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Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N5 - page 16 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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

0.5m peak water surface contour (mAHD)



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 N5 - page 17 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:58



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface 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 N5 - page 18 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:58



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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 N5 - page 19 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:58



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface 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 N5 - page 20 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

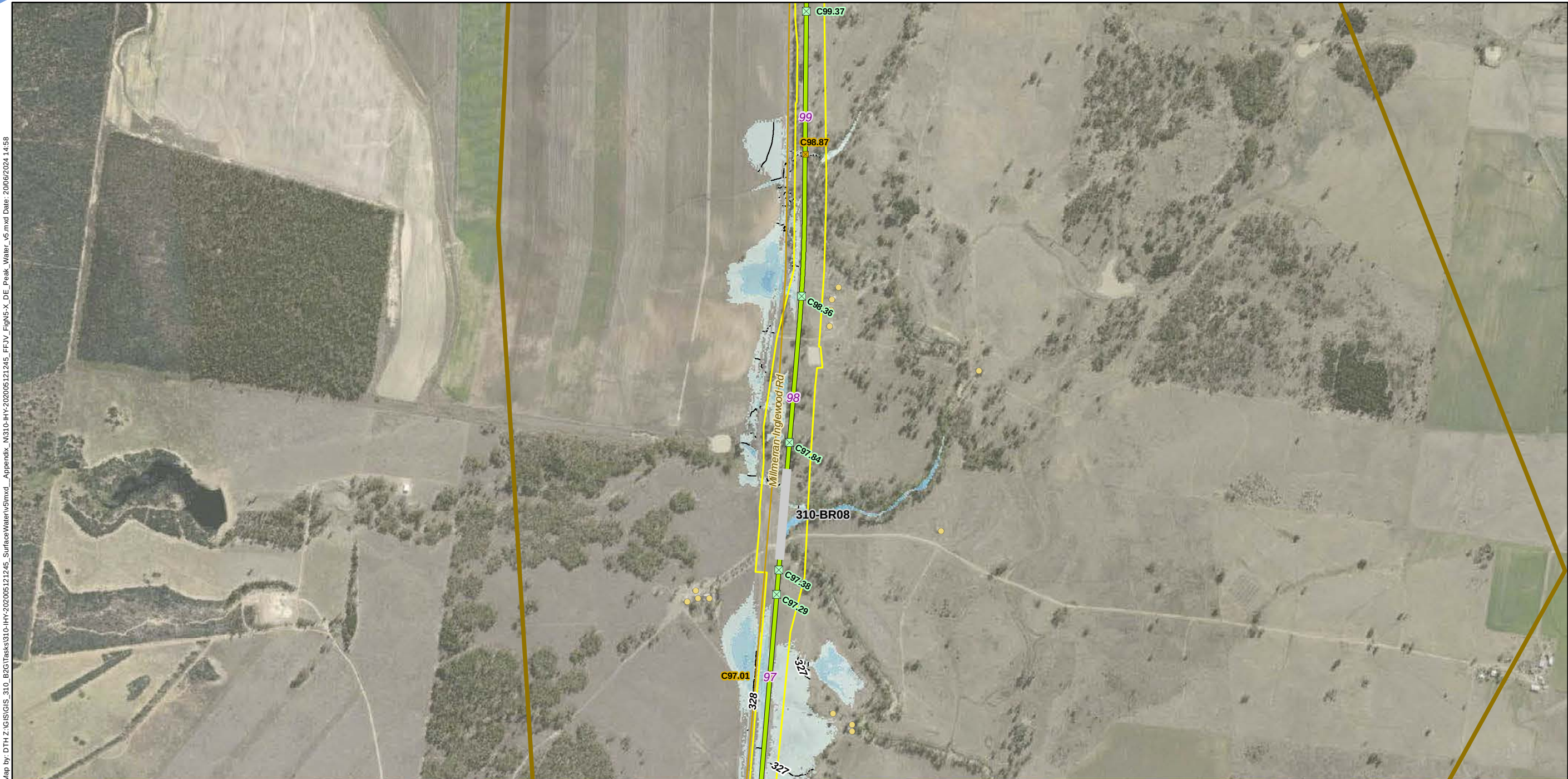
Estimated peak depth (m)

- | | |
|--|-----------|
| 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 |
| 0.5m peak water surface contour (mAHD) | |



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

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:58



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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 |
- 0.5m peak water surface contour (mAHD)



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

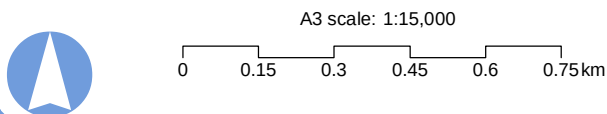
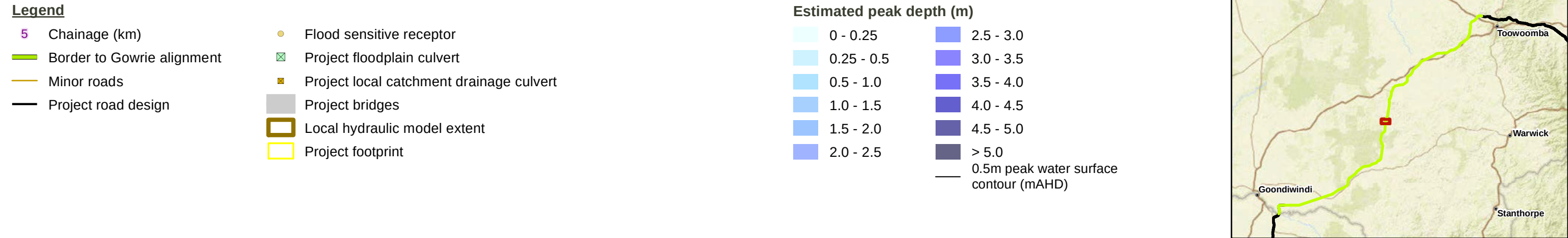
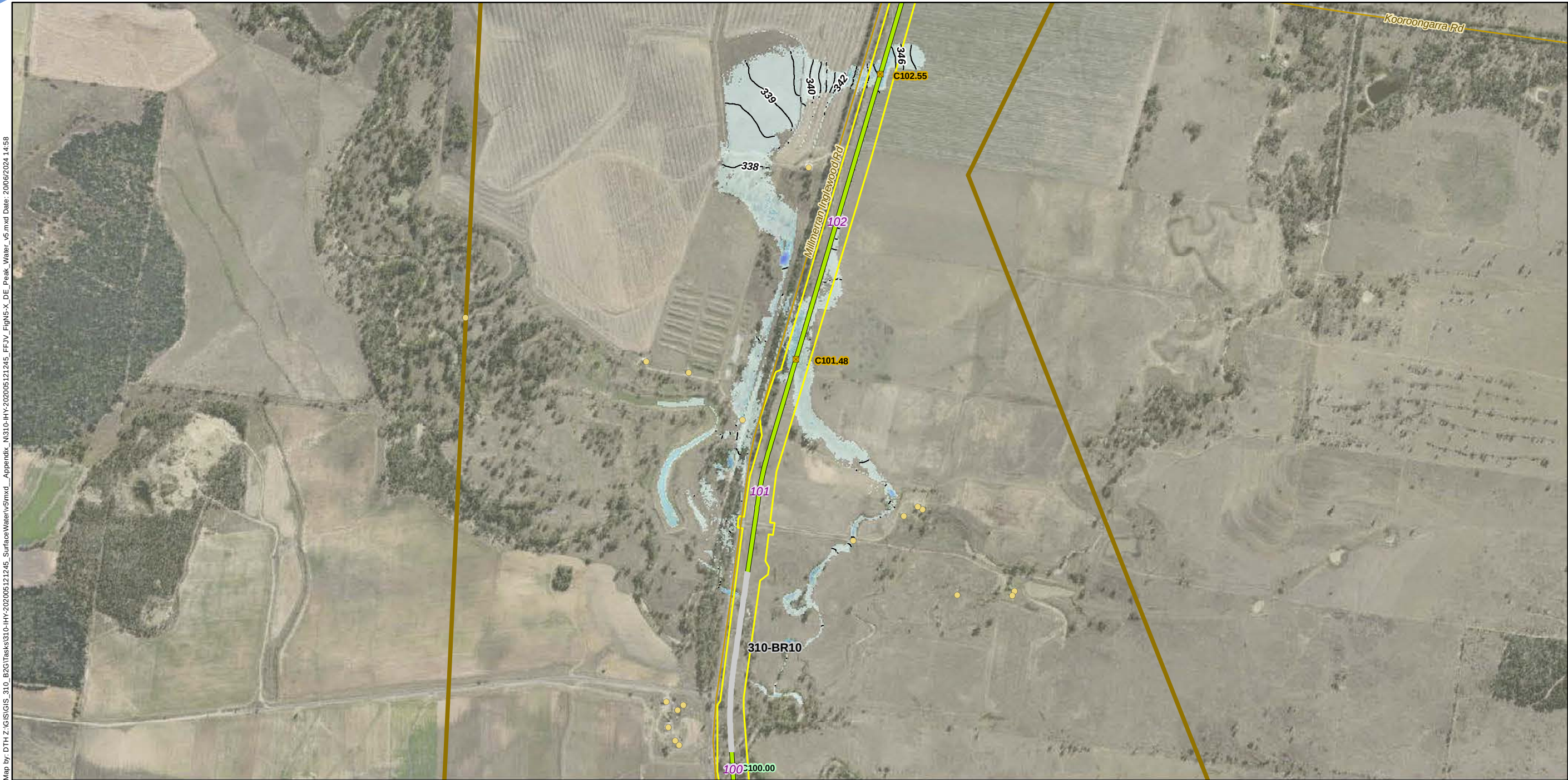


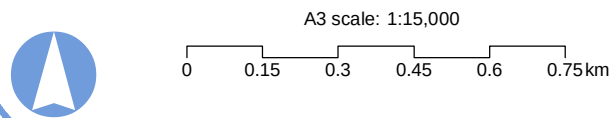
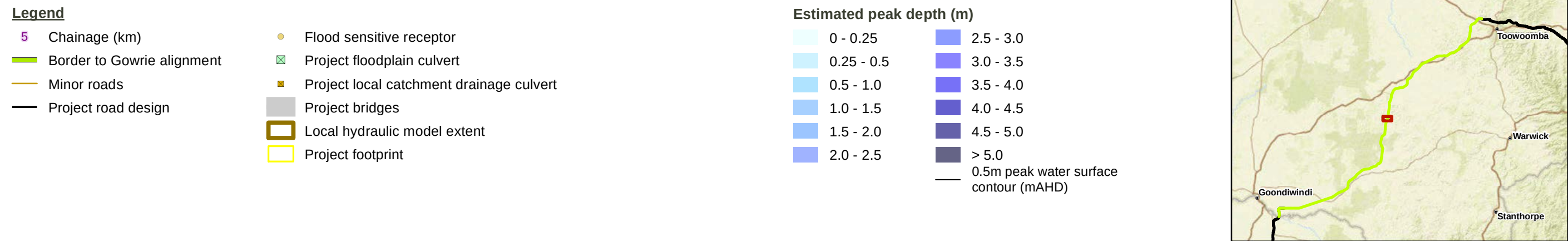
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

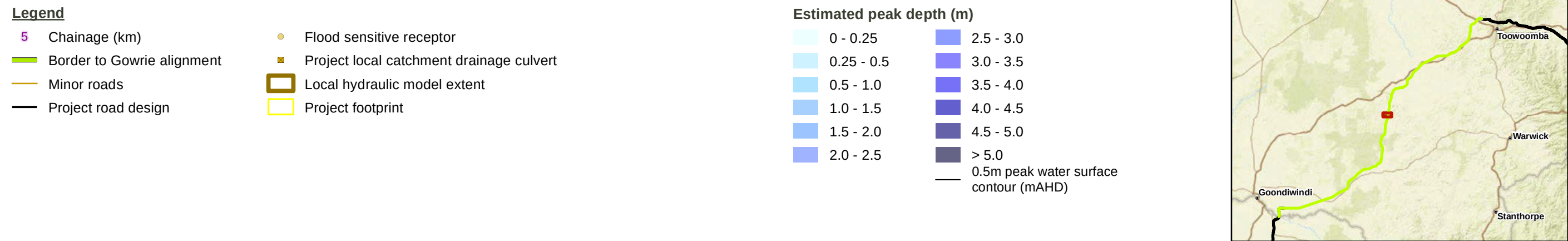
Border to Gowrie

Figure N5 - page 22 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

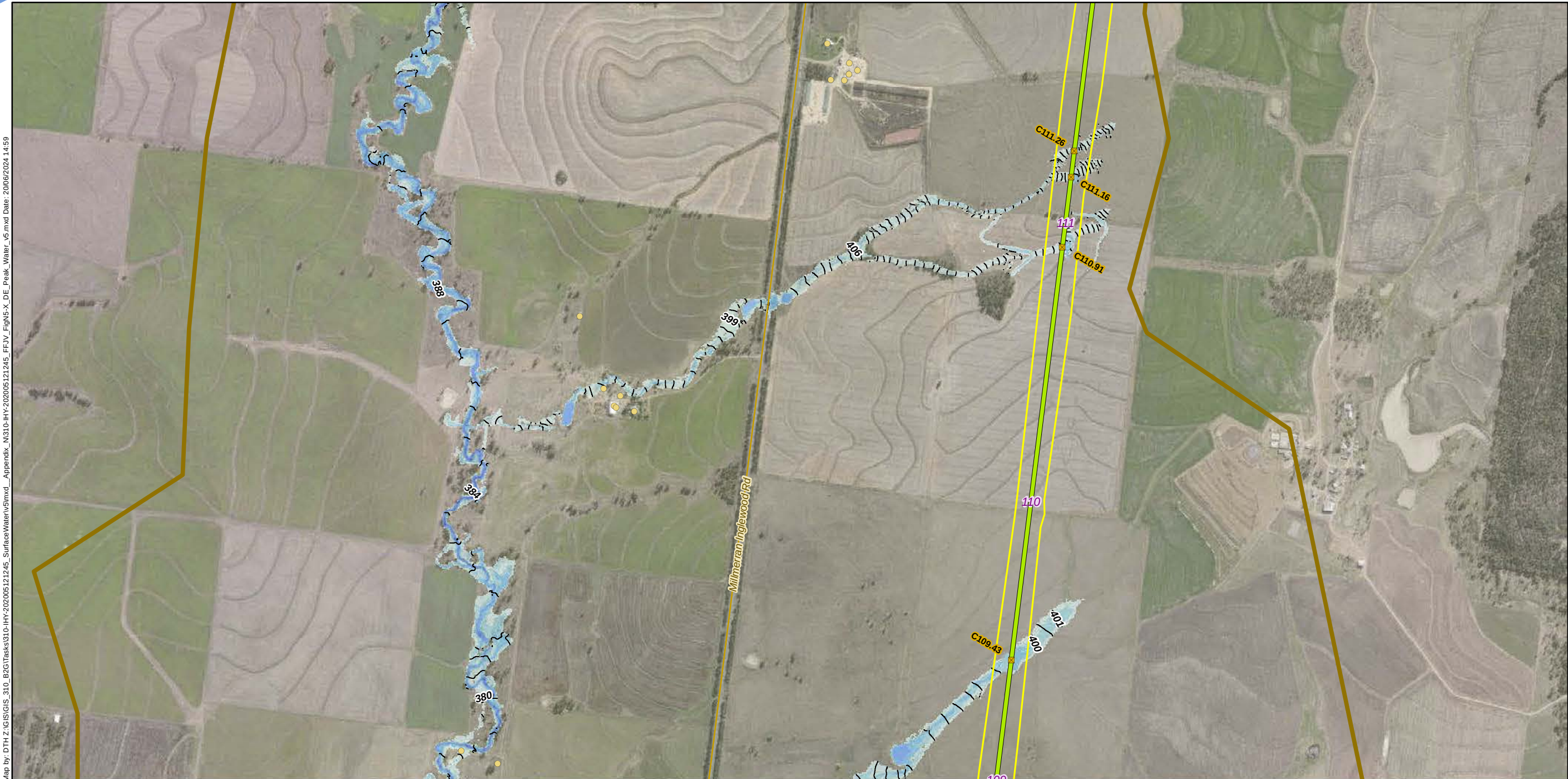






A3 scale: 1:15,000
0 0.15 0.3 0.45 0.6 0.75 km

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 14:59



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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 |
| 0.5m peak water surface contour (mAHD) | |



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 N5 - page 26 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



- Estimated peak depth (m)**

A map of south-eastern Australia showing the study area. A red square indicates the study site, located on a road between Goondiwindi and Toowoomba. The map also shows the locations of Toowoomba, Warwick, and Stanthorpe. The terrain is depicted with green and brown shading, and a network of roads is shown.

A3 scale: 1:15,000



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Border to Gowrie

Figure N5 - page 27 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

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Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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



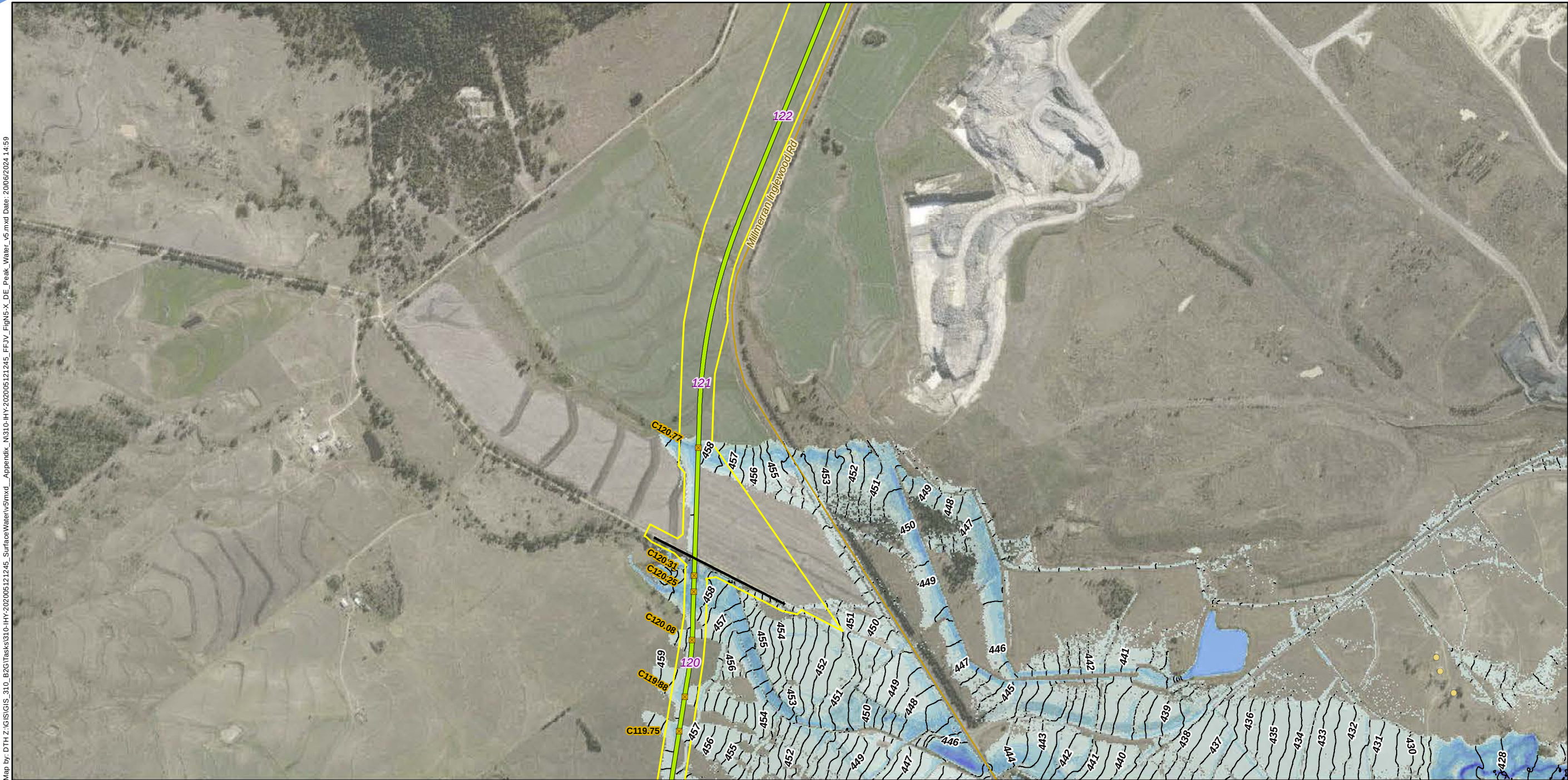
Issue date: 20/06/2024 Version: 5
Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N5 - page 29 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

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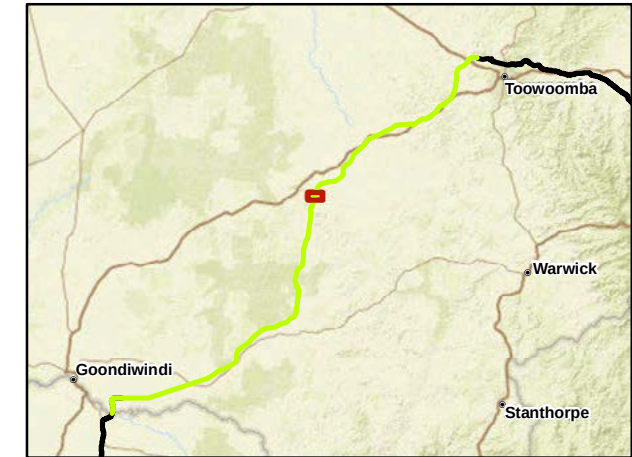


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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



Legend

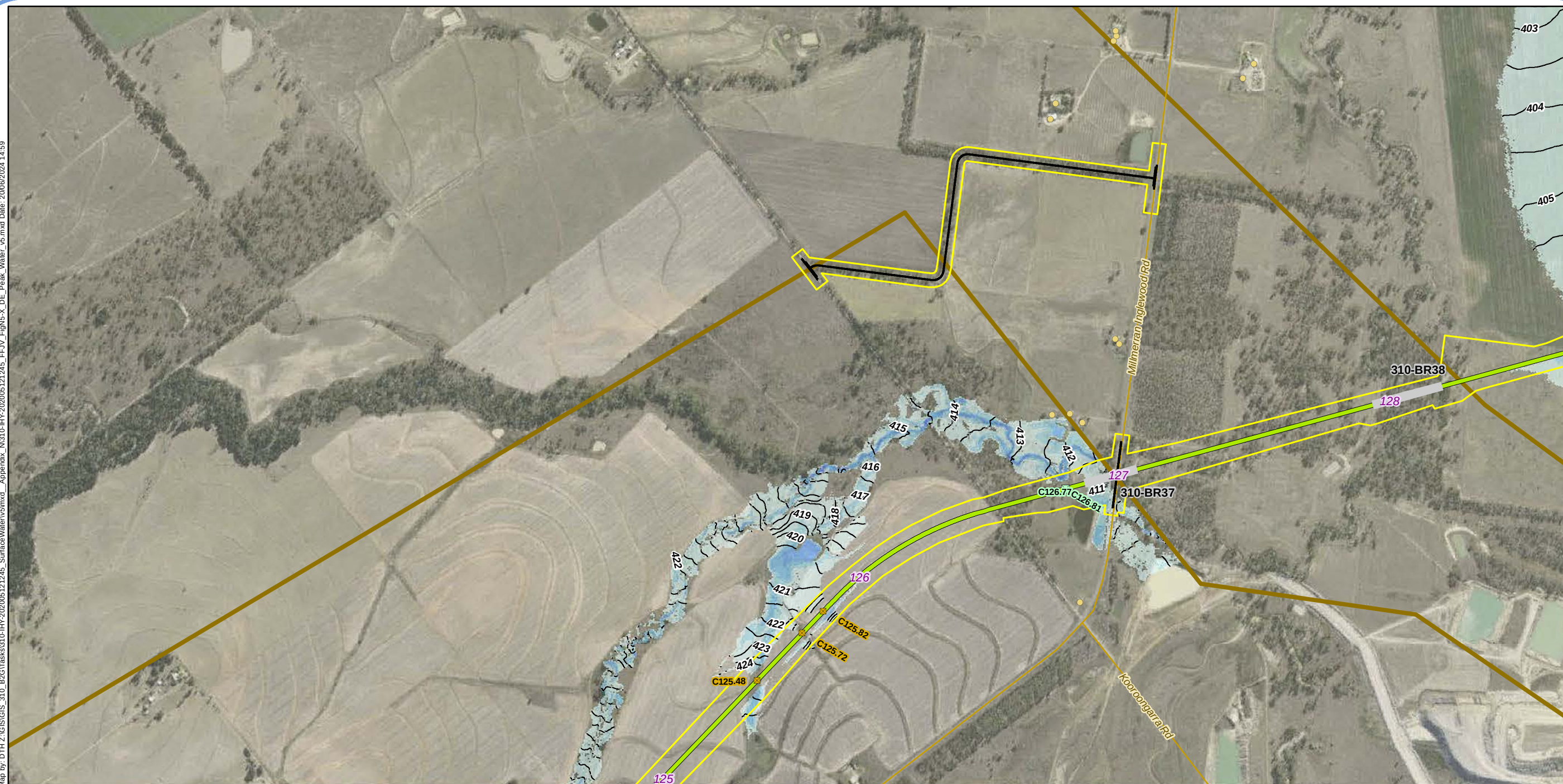
- 5 Chainage (km)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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 |
- 0.5m peak water surface contour (mAHD)



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



5 Chainage (km)

 Border to Gowrie alignment

— Minor roads

— Project road design

- Flood sensitive receptor

☒ Project floodplain culvert

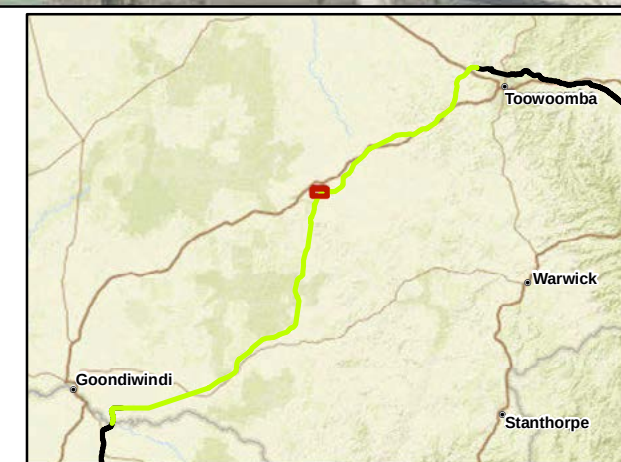
- ☒ Project local catchment drainage culvert

Project bridges

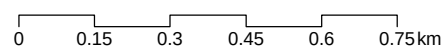
 Local hydraulic model extent

 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
 — 0.5m peak water surface contour (mAHSD)



A3 scale: 1:15,000



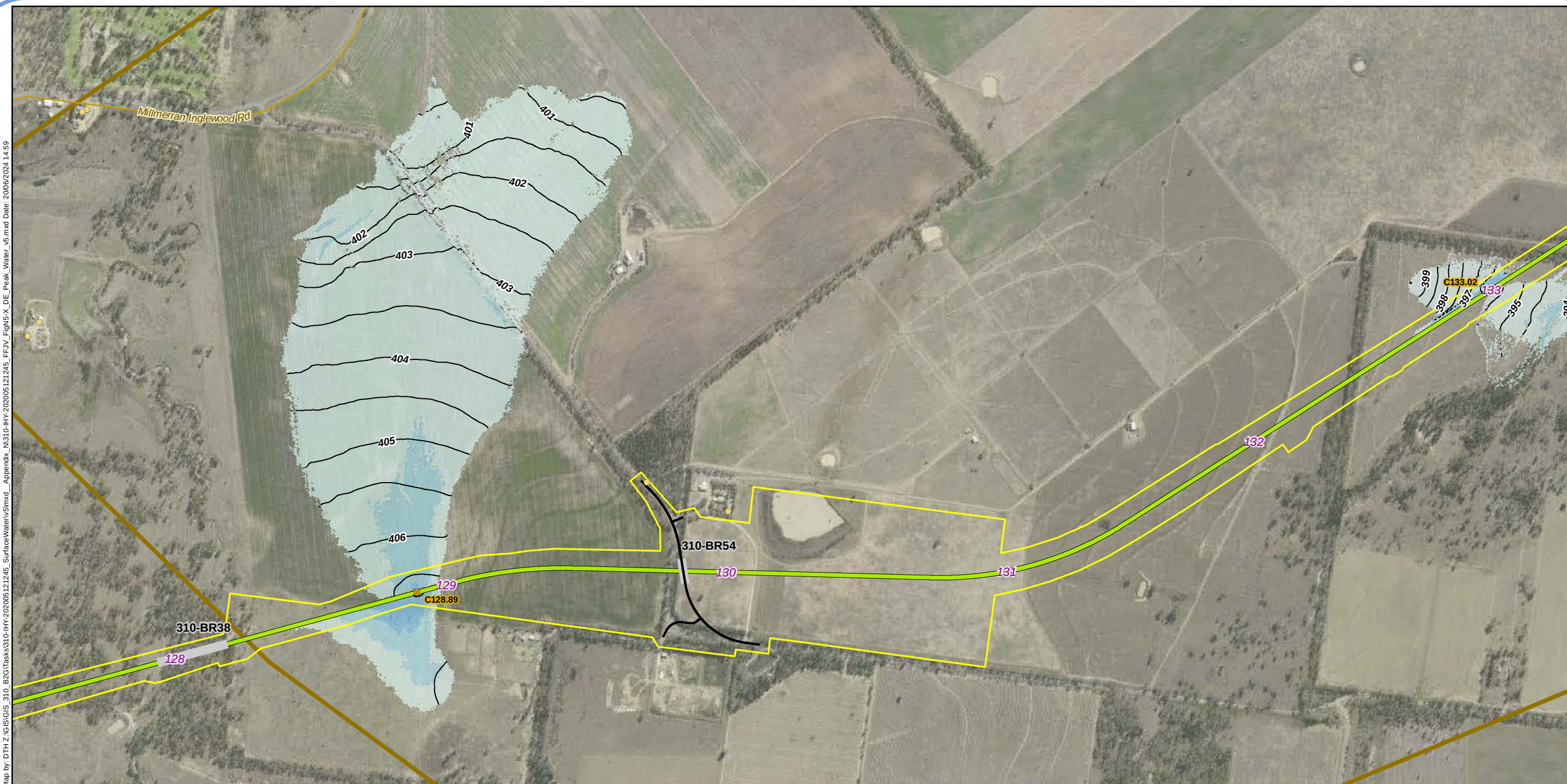
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Border to Gowrie

Figure N5 - page 32 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



5 Chainage (km)

Border to Gowrie alignment

Minor roads

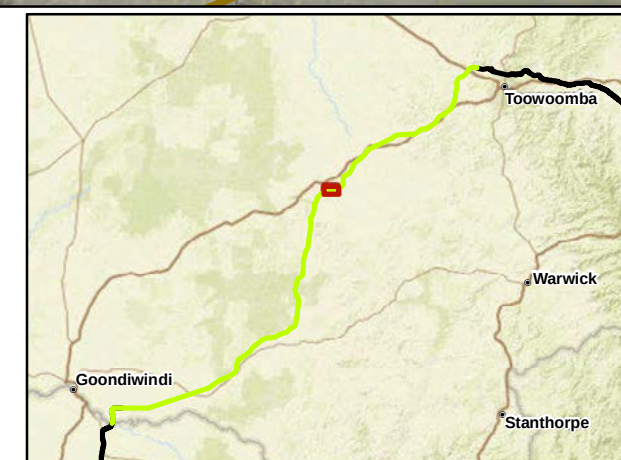
Project road design

- ## Project bridges

Figure 1 is a map of the study area showing the spatial distribution of the peak water surface elevation (mAHd) for the 2011/12 season. The map displays a color-coded legend for peak water surface elevation (mAHd) and a black line for the 0.5m peak water surface contour (mAHd). The legend ranges from 0 - 0.25 to > 5.0 mAHd. The map shows the coastline of the study area with various locations marked by colored dots corresponding to the legend.

Color	Peak water surface elevation (mAHd)
Lightest Blue	0 - 0.25
Light Blue	0.25 - 0.5
Medium Blue	0.5 - 1.0
Dark Blue	1.0 - 1.5
Very Dark Blue	1.5 - 2.0
Dark Purple	2.0 - 2.5
Medium Purple	2.5 - 3.0
Dark Purple	3.0 - 3.5
Very Dark Purple	3.5 - 4.0
Black	4.0 - 4.5
Dark Grey	4.5 - 5.0
Black	> 5.0

— 0.5m peak water surface contour (mAHd)

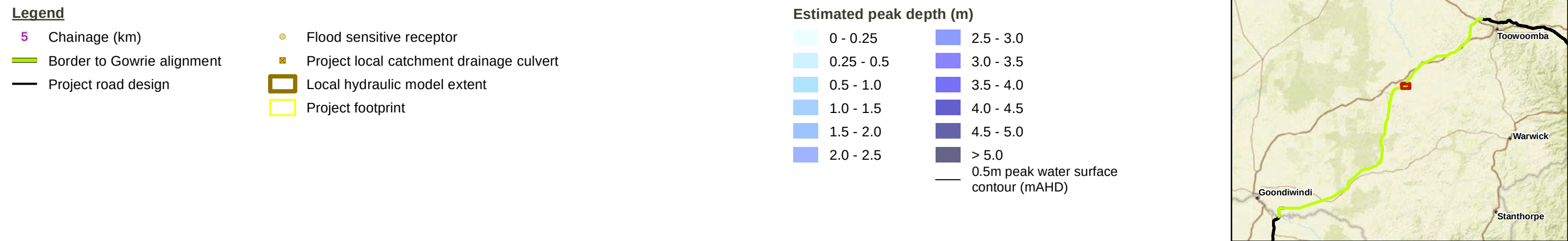


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1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



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

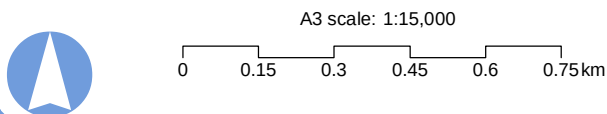
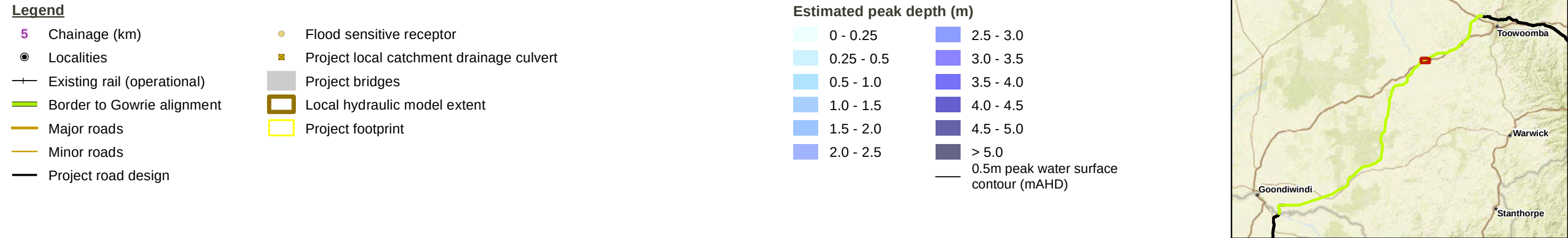
Border to Gowrie

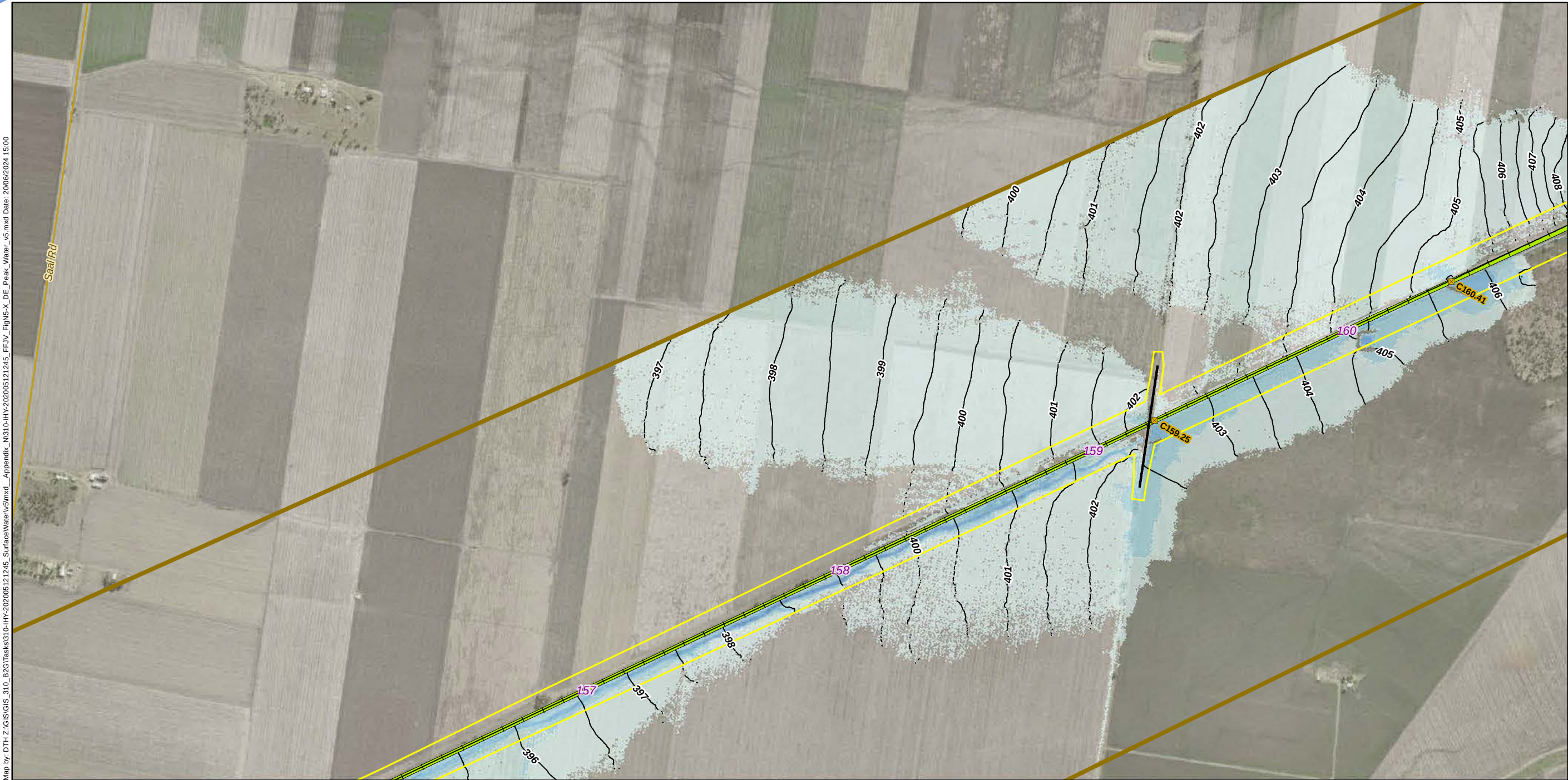
Figure N5 - page 34 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

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Legend

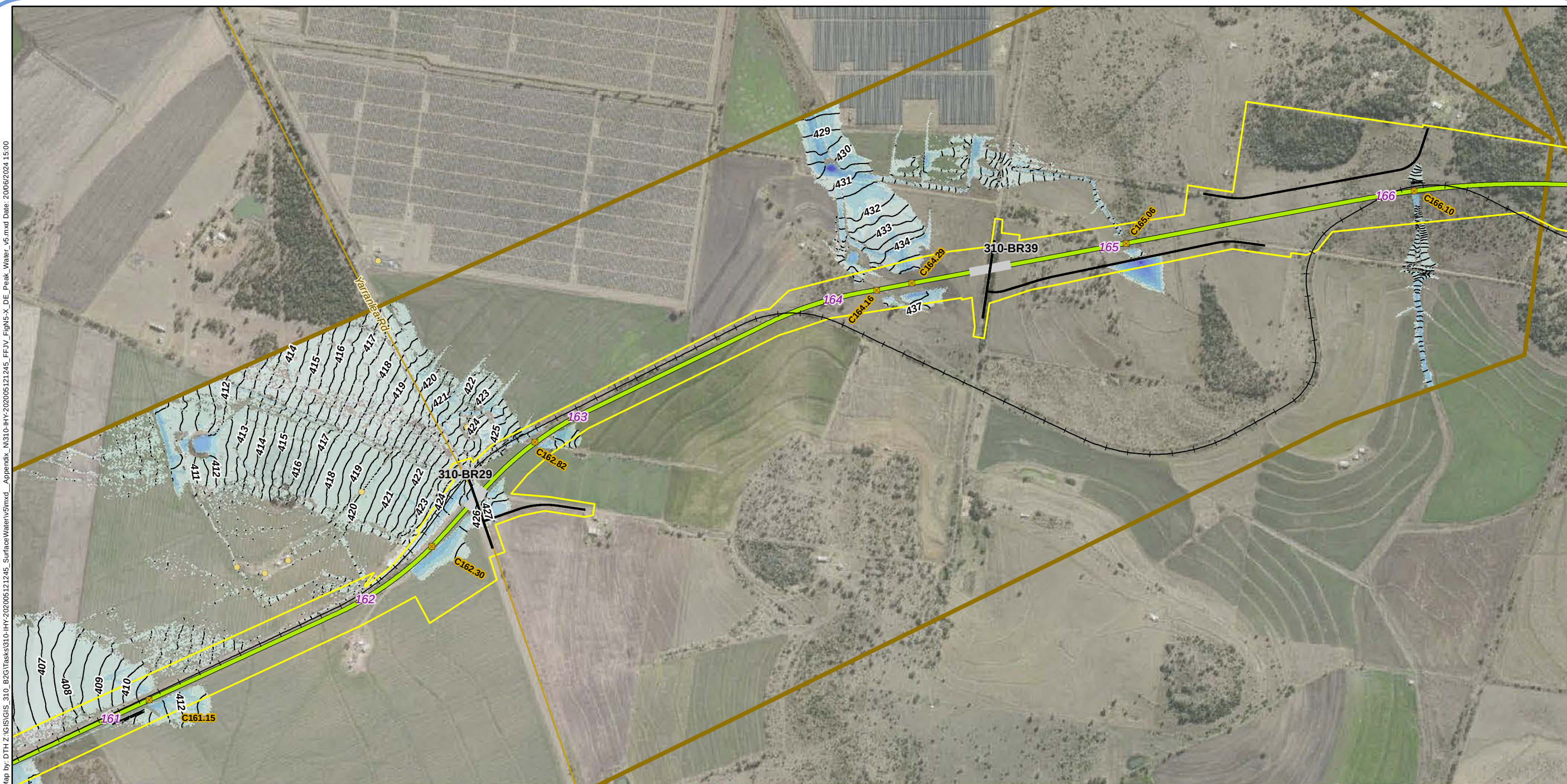
- 5 Chainage (km)
- Existing rail (operational)
- Border to Gowrie alignment
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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



Chainage (km)	Flood sensitive receptor
Existing rail (operational)	Project local catchment drainage culvert
Border to Gowrie alignment	Project bridges
Minor roads	Local hydraulic model extent
Project road design	Project footprint

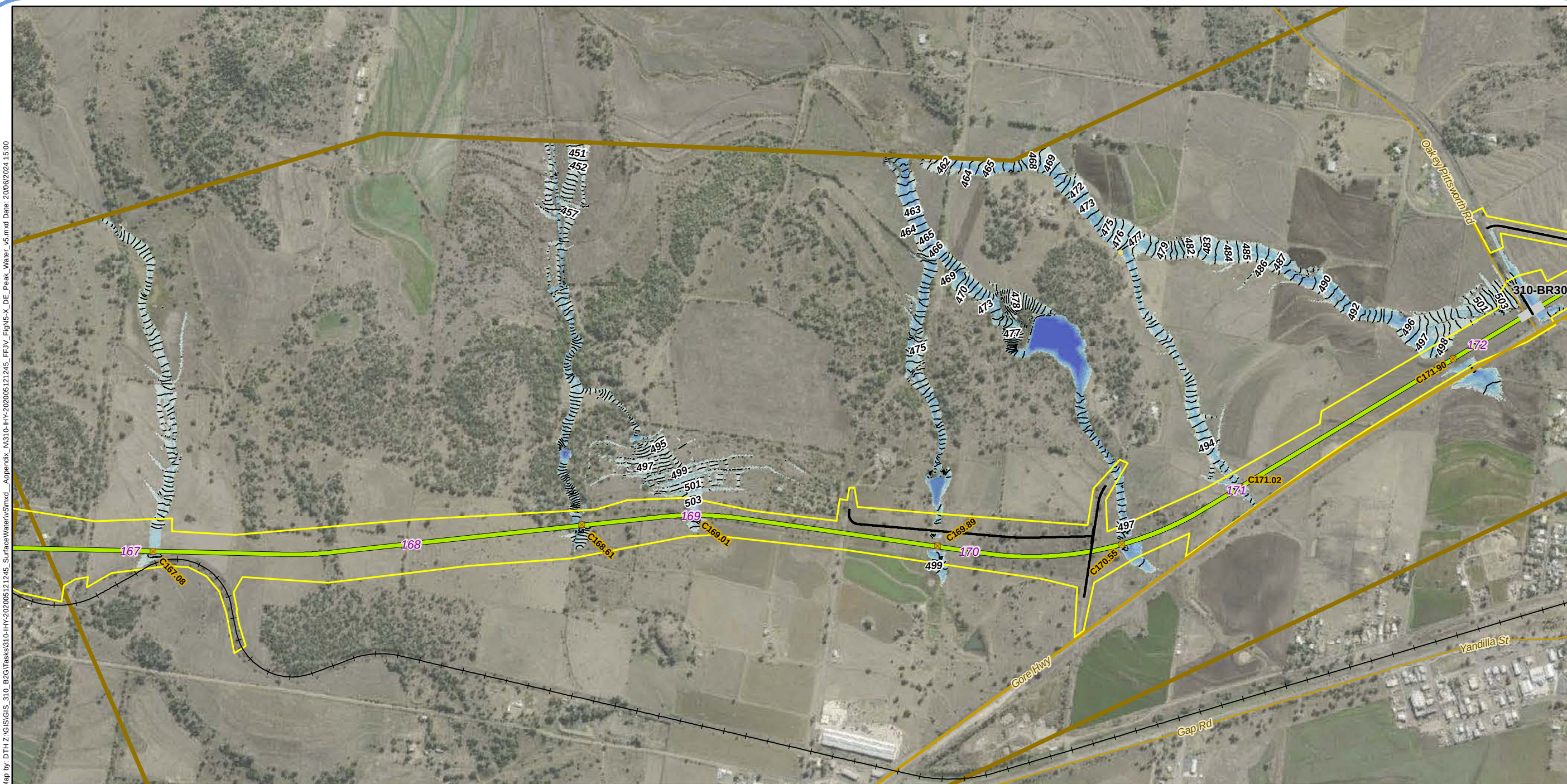
0 - 0.25 2.5 - 3.0
 0.25 - 0.5 3.0 - 3.5
 0.5 - 1.0 3.5 - 4.0
 1.0 - 1.5 4.0 - 4.5
 1.5 - 2.0 4.5 - 5.0
 2.0 - 2.5 > 5.0
 — 0.5m peak water surface contour (mAHSD)



1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

Border to Gowrie

Figure N5 - page 38 of 48:

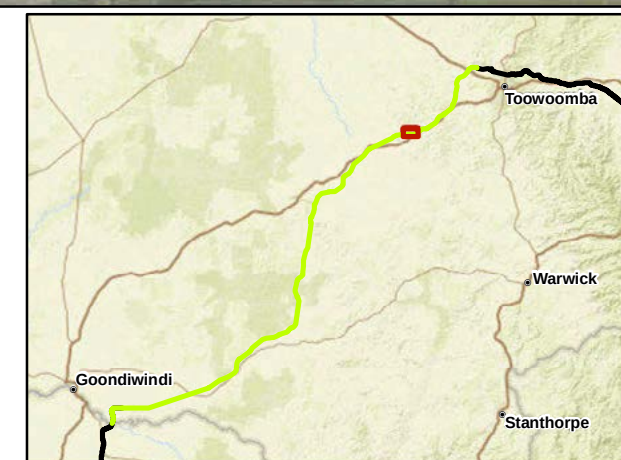


- 5 Chainage (km)
- + Existing rail (operational)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design

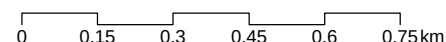
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Color	Range (m)
Lightest Blue	0 - 0.25
Light Blue	0.25 - 0.5
Medium Blue	0.5 - 1.0
Dark Blue	1.0 - 1.5
Very Dark Blue	1.5 - 2.0
Dark Purple	2.0 - 2.5
Light Purple	2.5 - 3.0
Medium Purple	3.0 - 3.5
Dark Purple	3.5 - 4.0
Very Dark Purple	4.0 - 4.5
Black	4.5 - 5.0
Black	> 5.0

— 0.5m peak water surface contour (mAHD)



A3 scale: 1:15,000

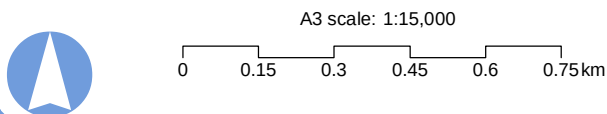
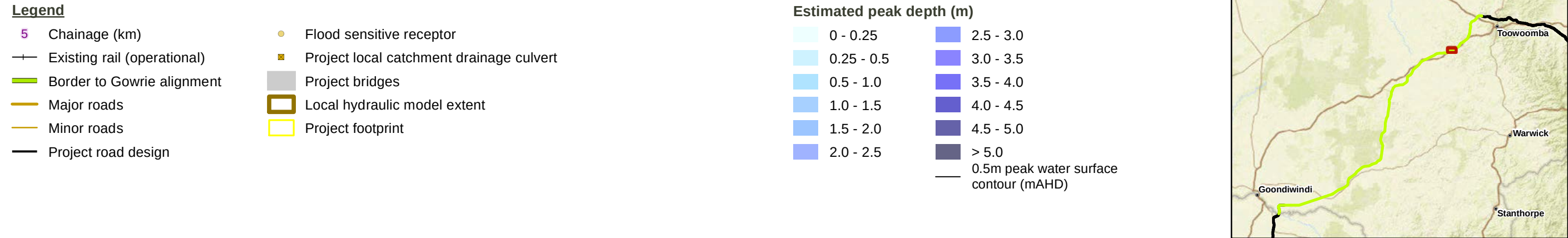


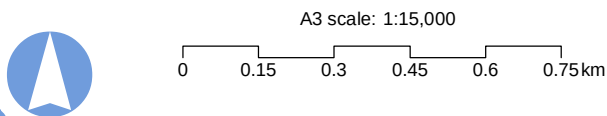
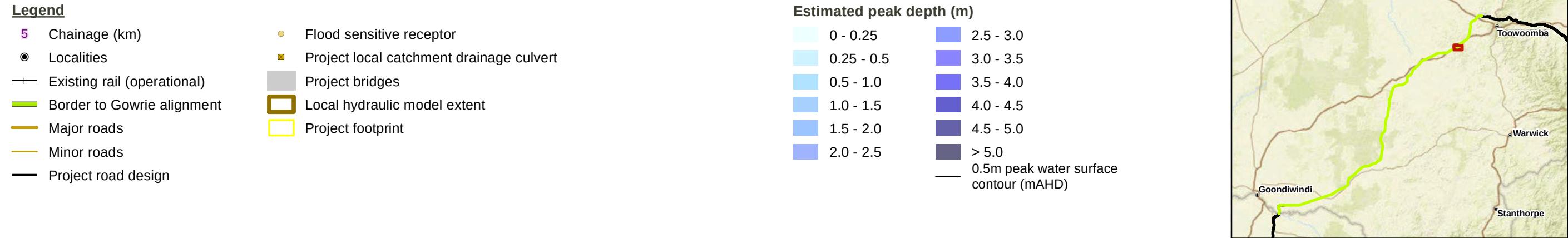
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1% AEP Event - Local Catchments - Peak Water Levels - Developed Case





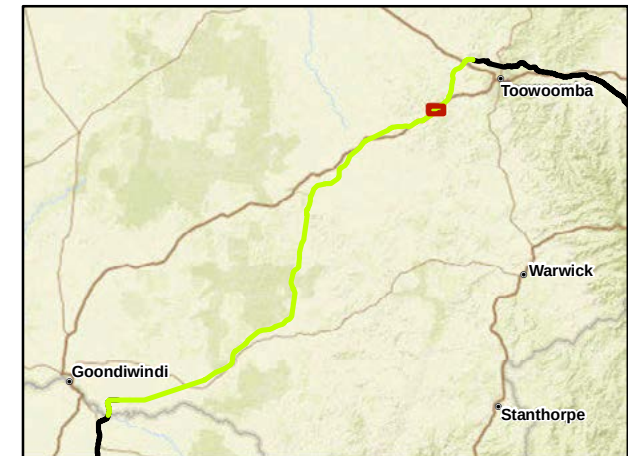


Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 15:00



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Minor roads
- Project road design
- Flood sensitive receptor
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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 |
- 0.5m peak water surface contour (mAHD)



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

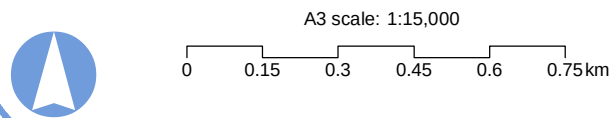
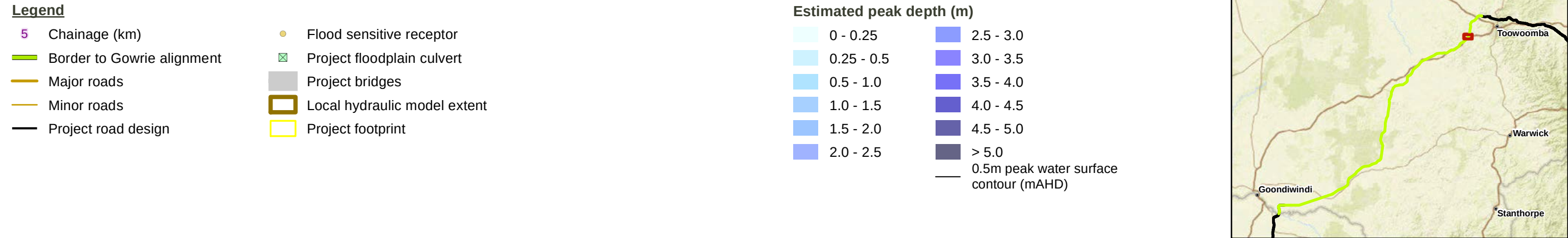


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Coordinate System: GDA 1994 MGA Zone 56

Border to Gowrie

Figure N5 - page 43 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case



Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWater\5mxd_Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 15:00



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Major roads
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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



- Estimated peak depth (m)**

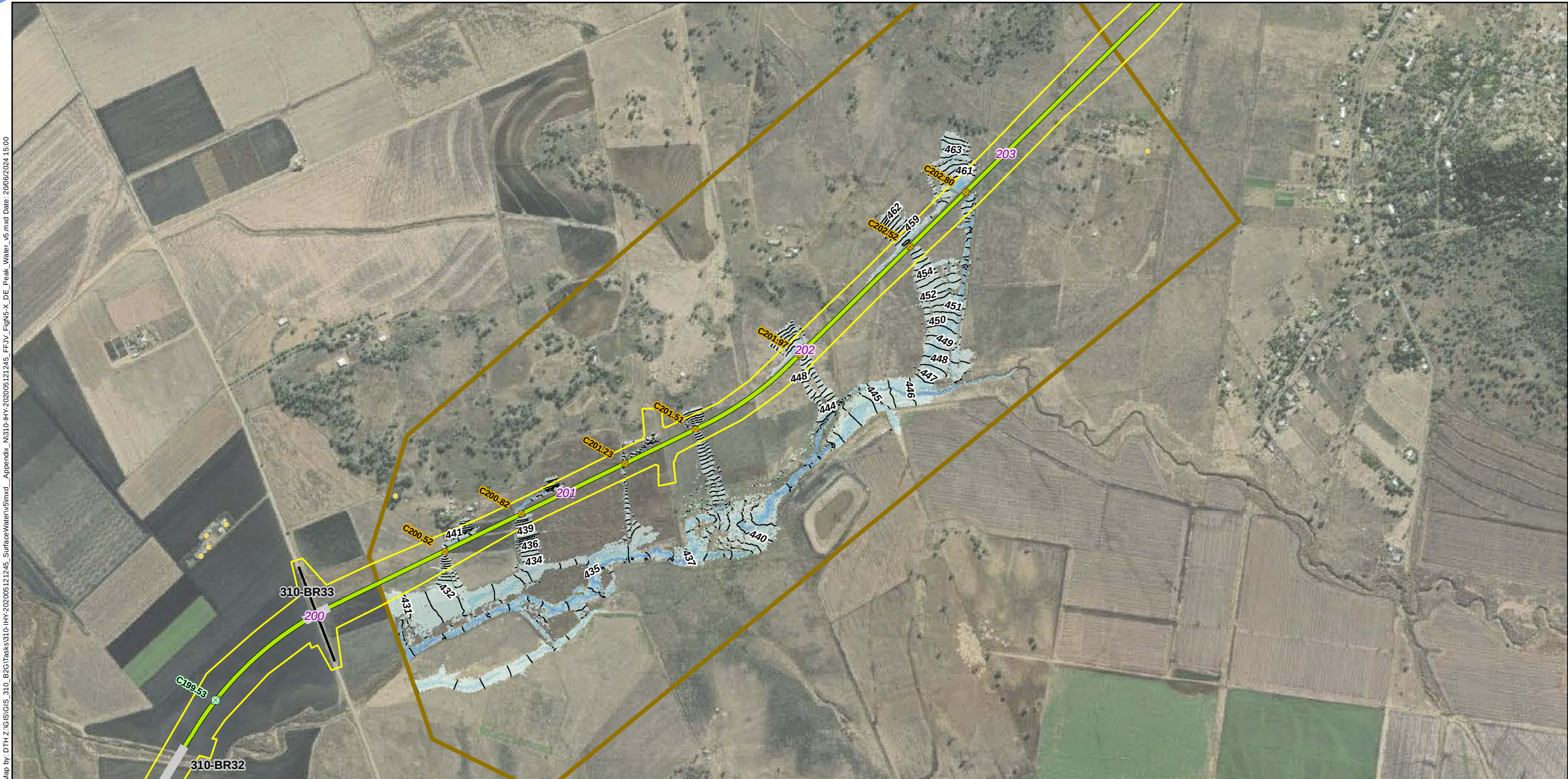


Border to Gowrie

Figure N5 - page 46 of 48:

1% AEP Event - Local Catchments - Peak Water Levels - Developed Case

Map by: DTH Z:\GIS\GIS_310_B2G\Tasks\310-IHY-202005121245_SurfaceWaterV5.mxd Appendix_N310-IHY-202005121245_FF\JV_FigN5-X_DE_Peak_Water_v5.mxd Date: 20/06/2024 15:00



Legend

- 5 Chainage (km)
- Border to Gowrie alignment
- Project road design
- Flood sensitive receptor
- Project floodplain culvert
- Project local catchment drainage culvert
- Project bridges
- Local hydraulic model extent
- Project footprint

Estimated peak 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
0.5m peak water surface contour (mAHD)	



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



- Estimated peak depth (m)**

A map showing the proposed route from Toowoomba to Goondiwindi. The route is highlighted in yellow, starting from Toowoomba in the north-east and heading south-west towards Goondiwindi. The map includes labels for Toowoomba, Warwick, Stanthorpe, and Goondiwindi. A red rectangle on the route indicates the location of the proposed bridge.



A3 scale: 1:15,000



Issue date: 20/06/2024 Version: 5

Coordinate System: GDA 1994 MGA Zone 56

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1% AEP Event - Local Catchments - Peak Water Levels - Developed Case