

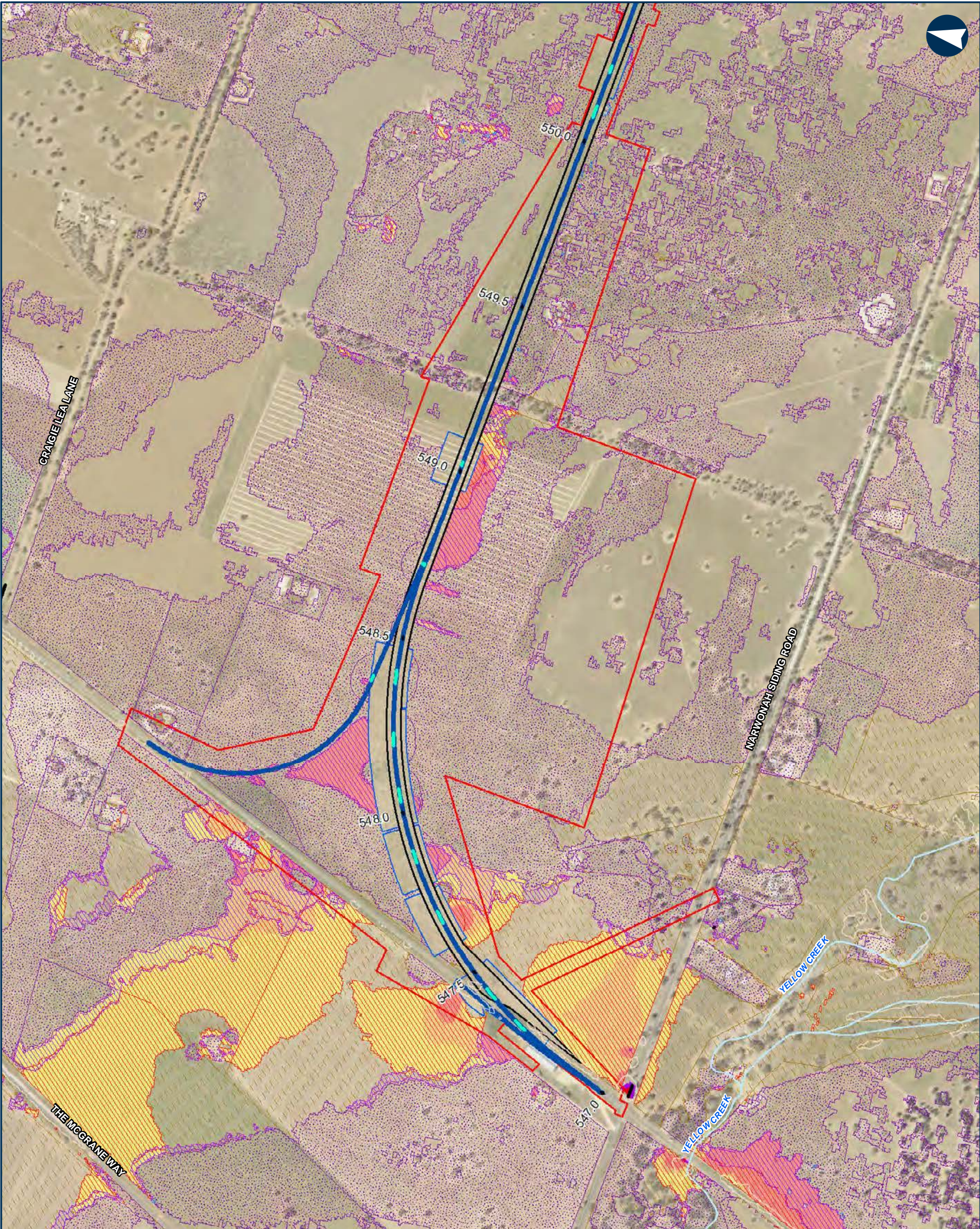
TECHNICAL REPORT 03

Updated flooding and hydrology assessment

Appendix 18 QDL compliance (scour/erosion 1% AEP with blockage)

NARROMINE TO NARRABRI PROJECT





NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.1

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

Greater than 20% increase

Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

Existing velocity < 1m/s, design velocity > 1.2m/s

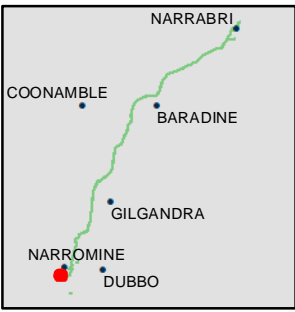
Existing velocity > 1m/s, velocity change > 20%

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

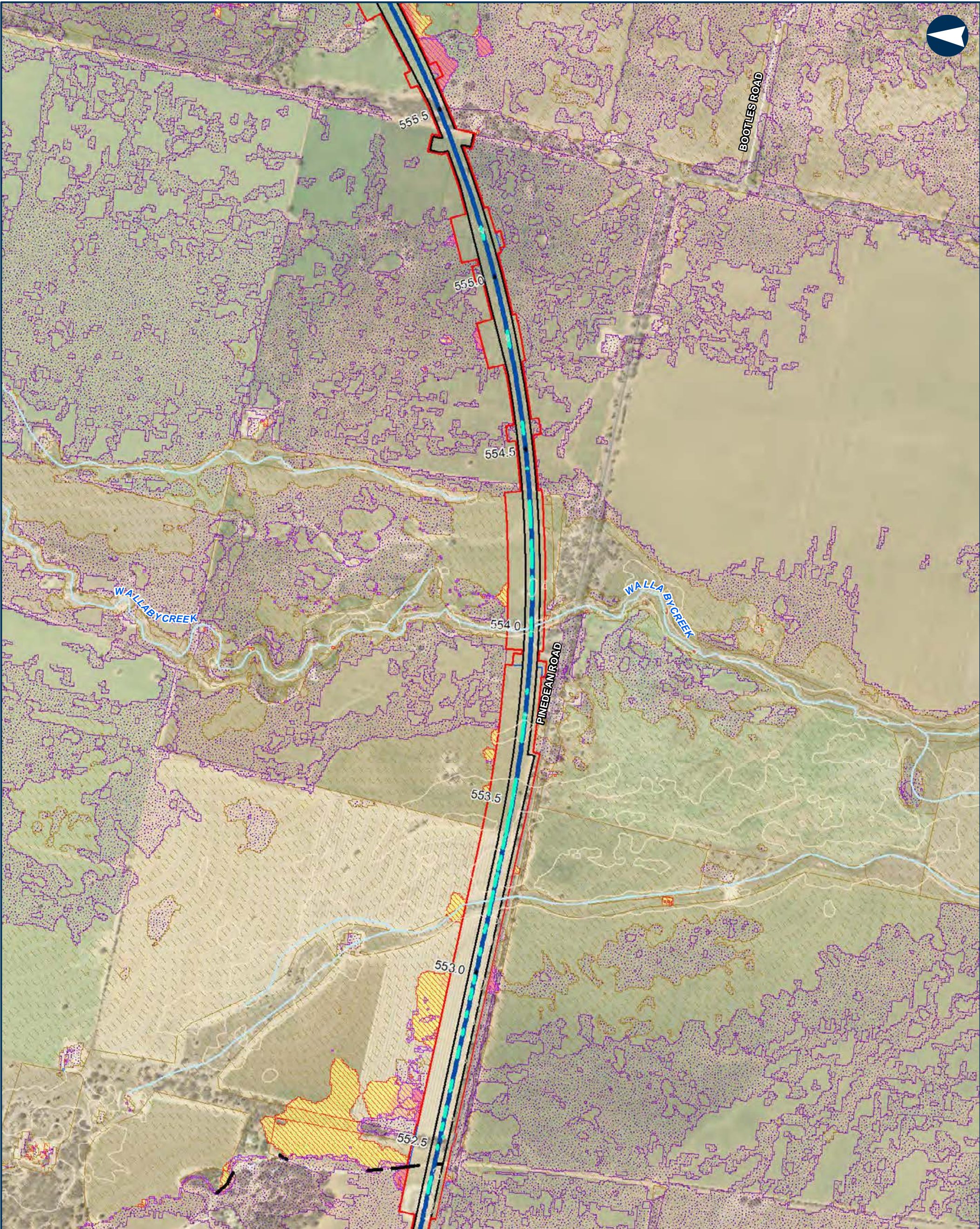
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.3

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

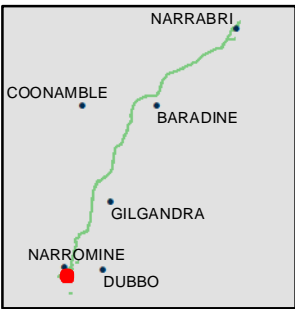
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

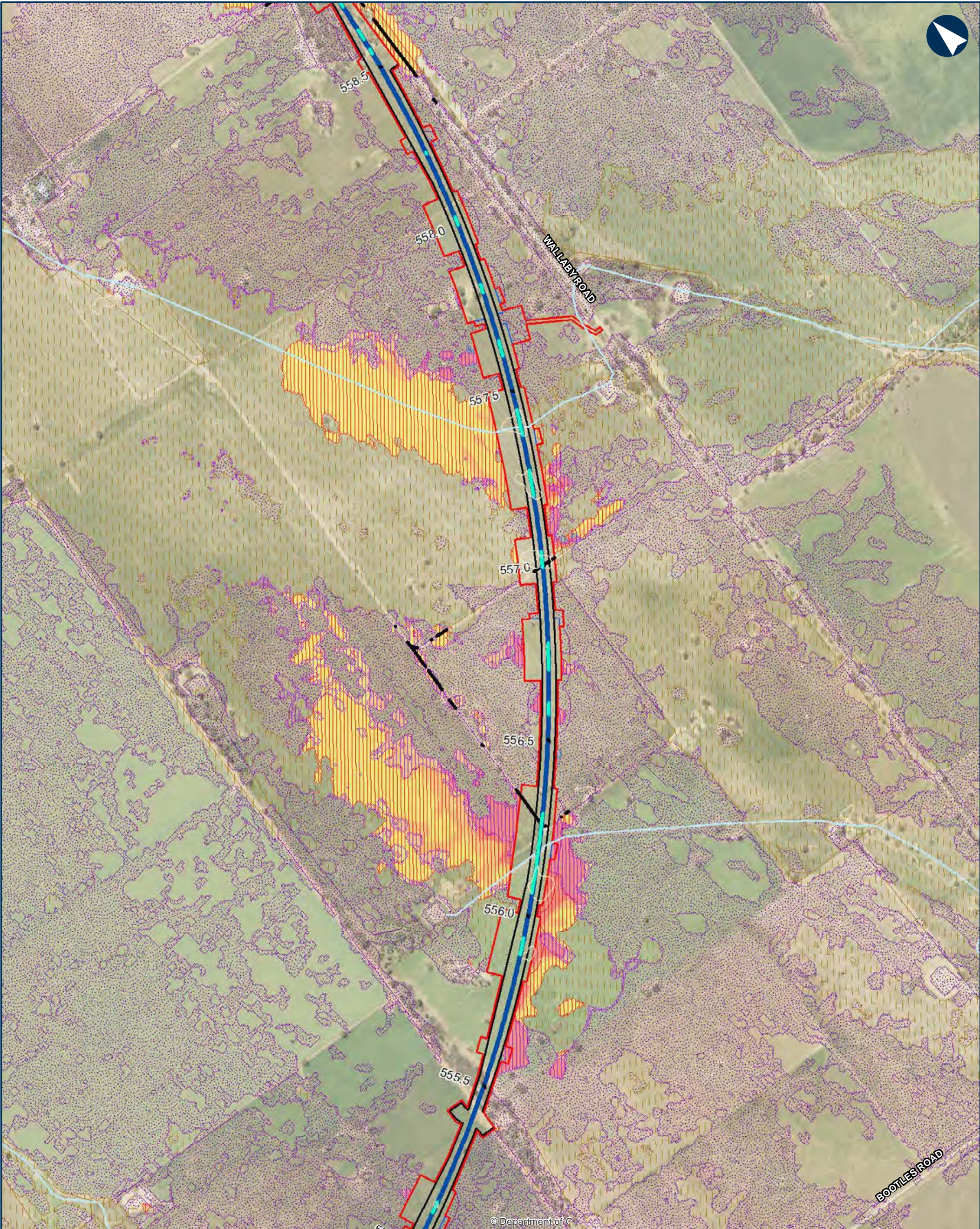
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



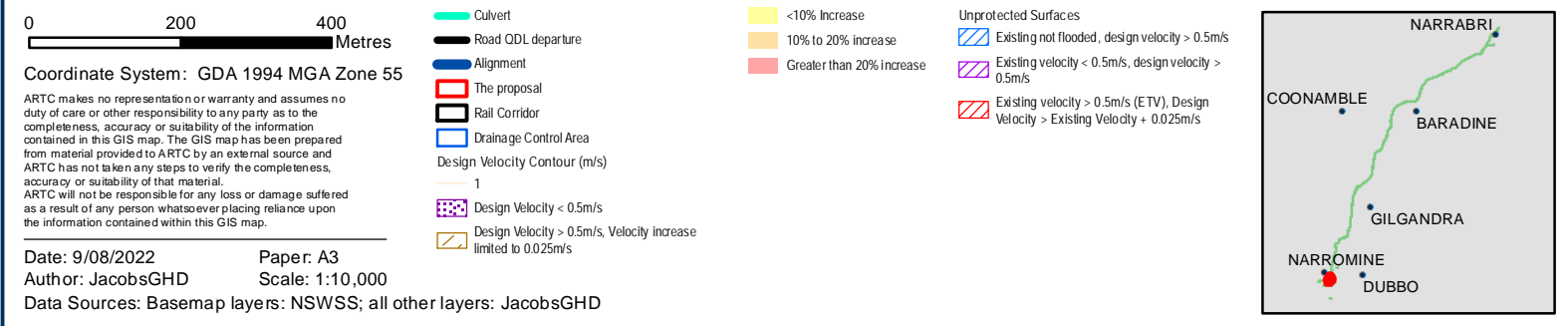
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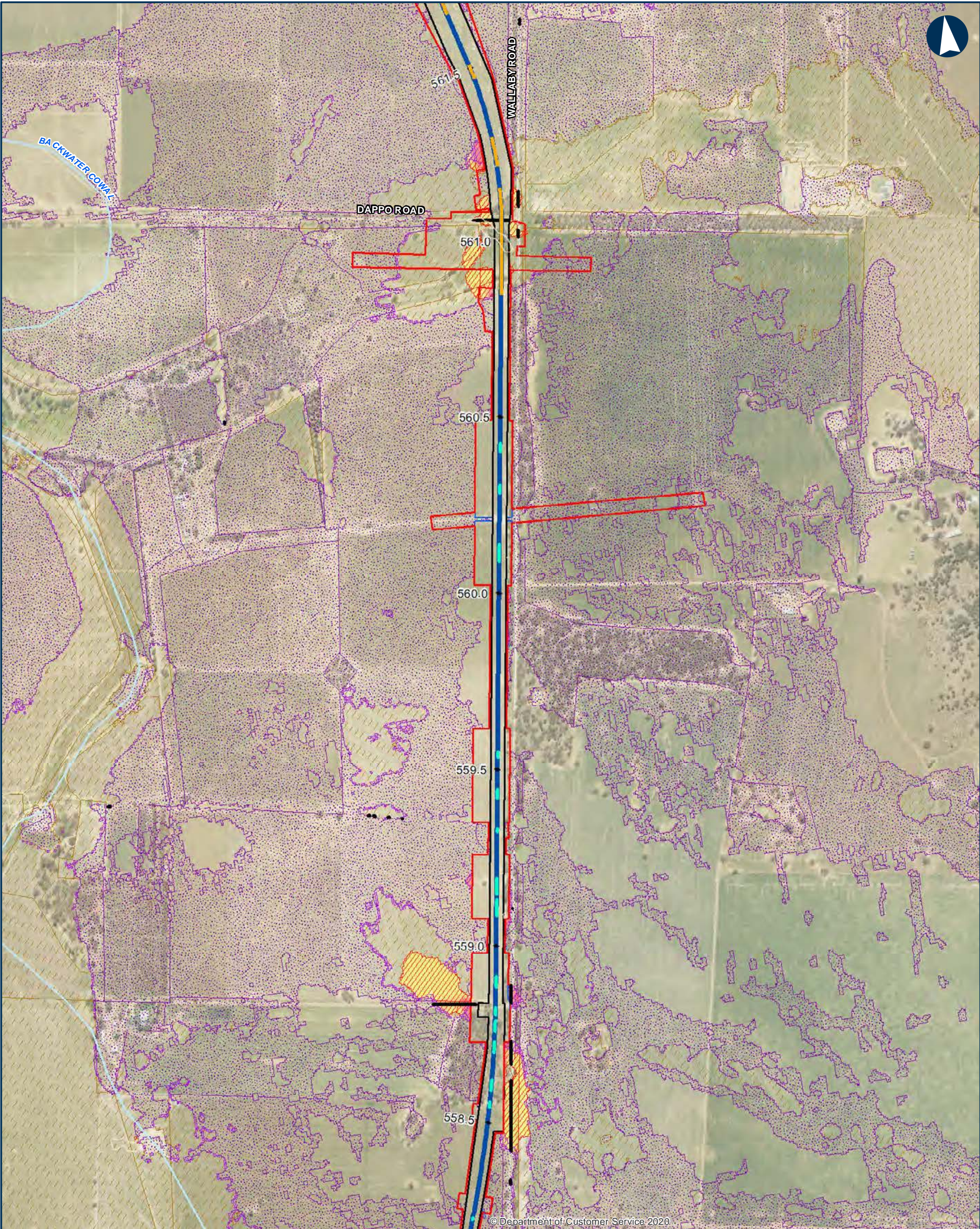
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.4



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.5

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

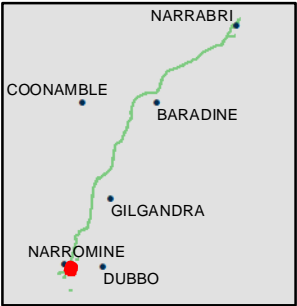
Greater than 20% increase

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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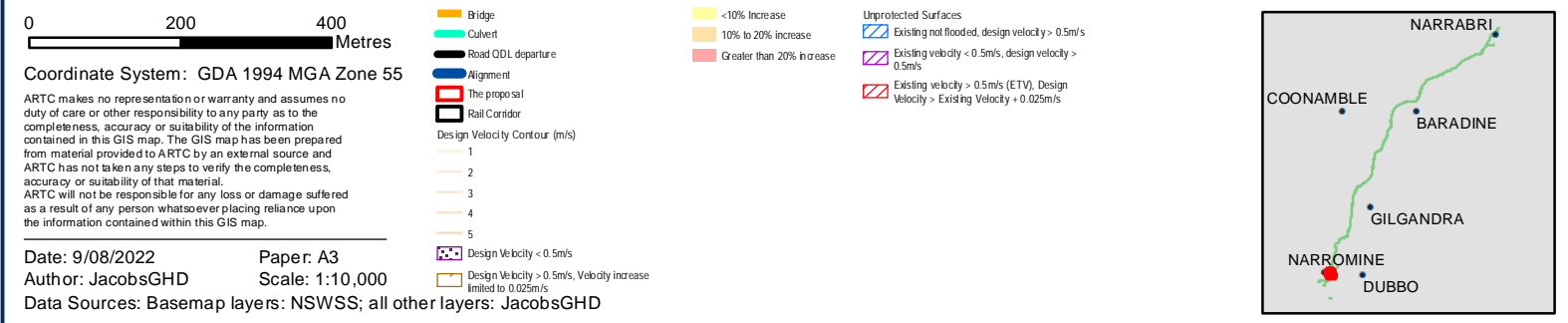
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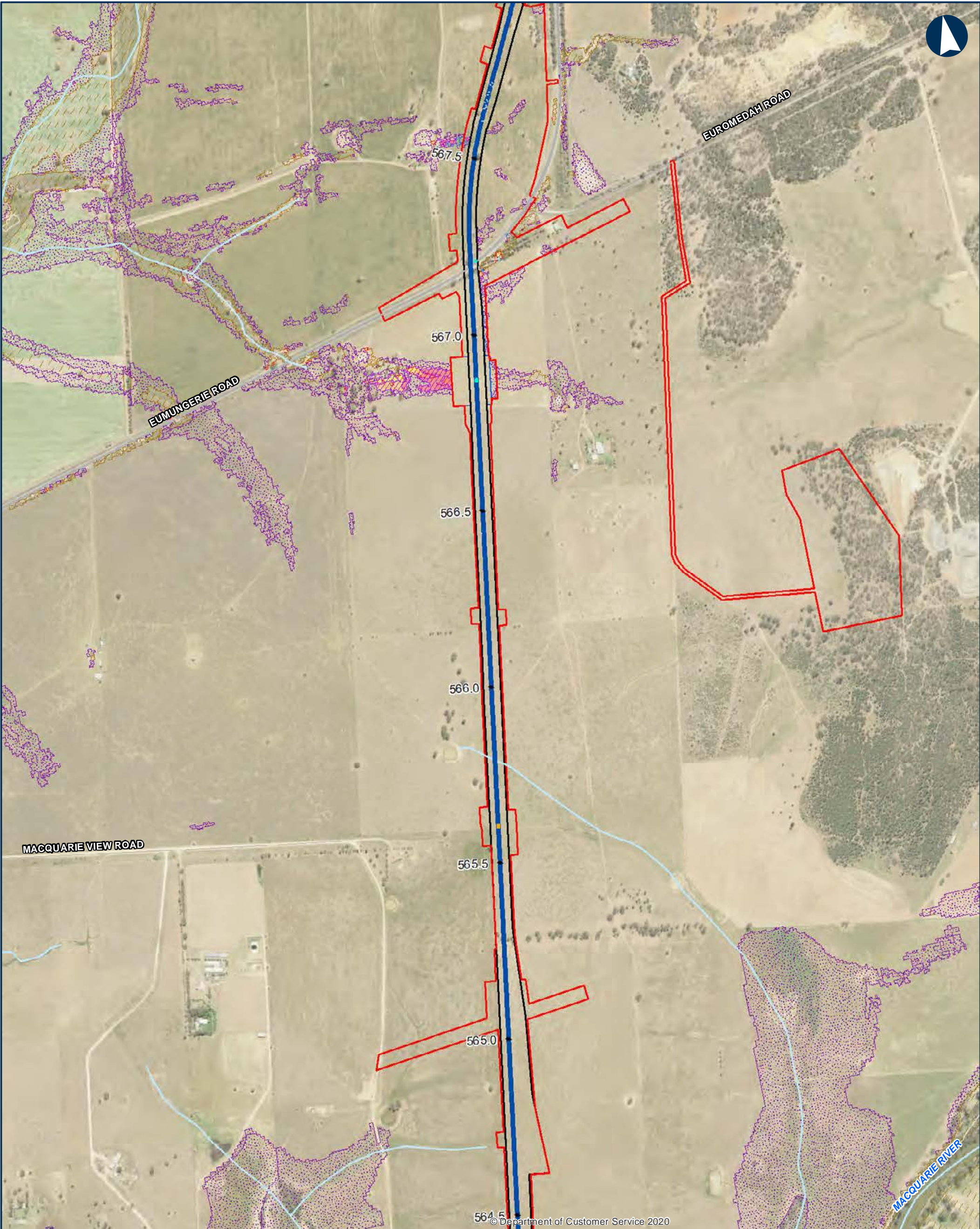
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.6



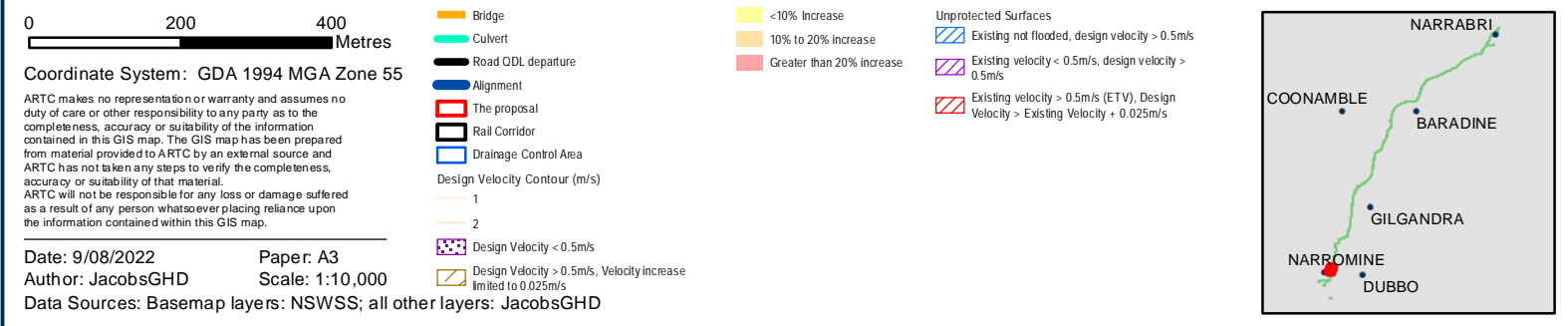
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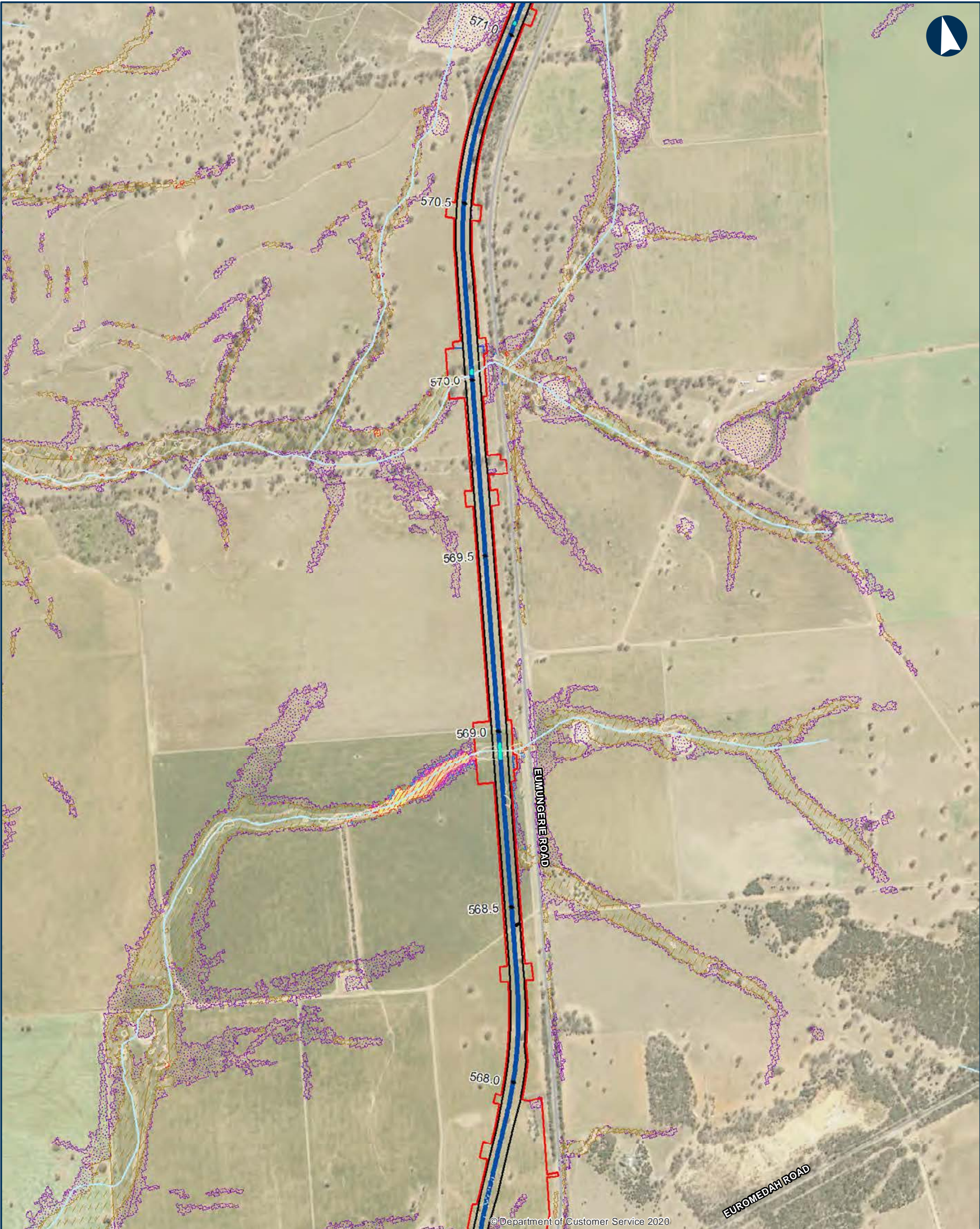
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.7



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.8

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

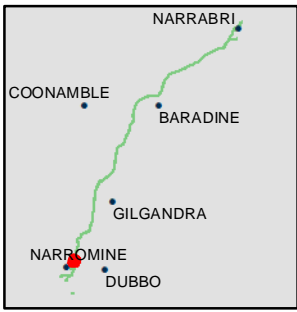
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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

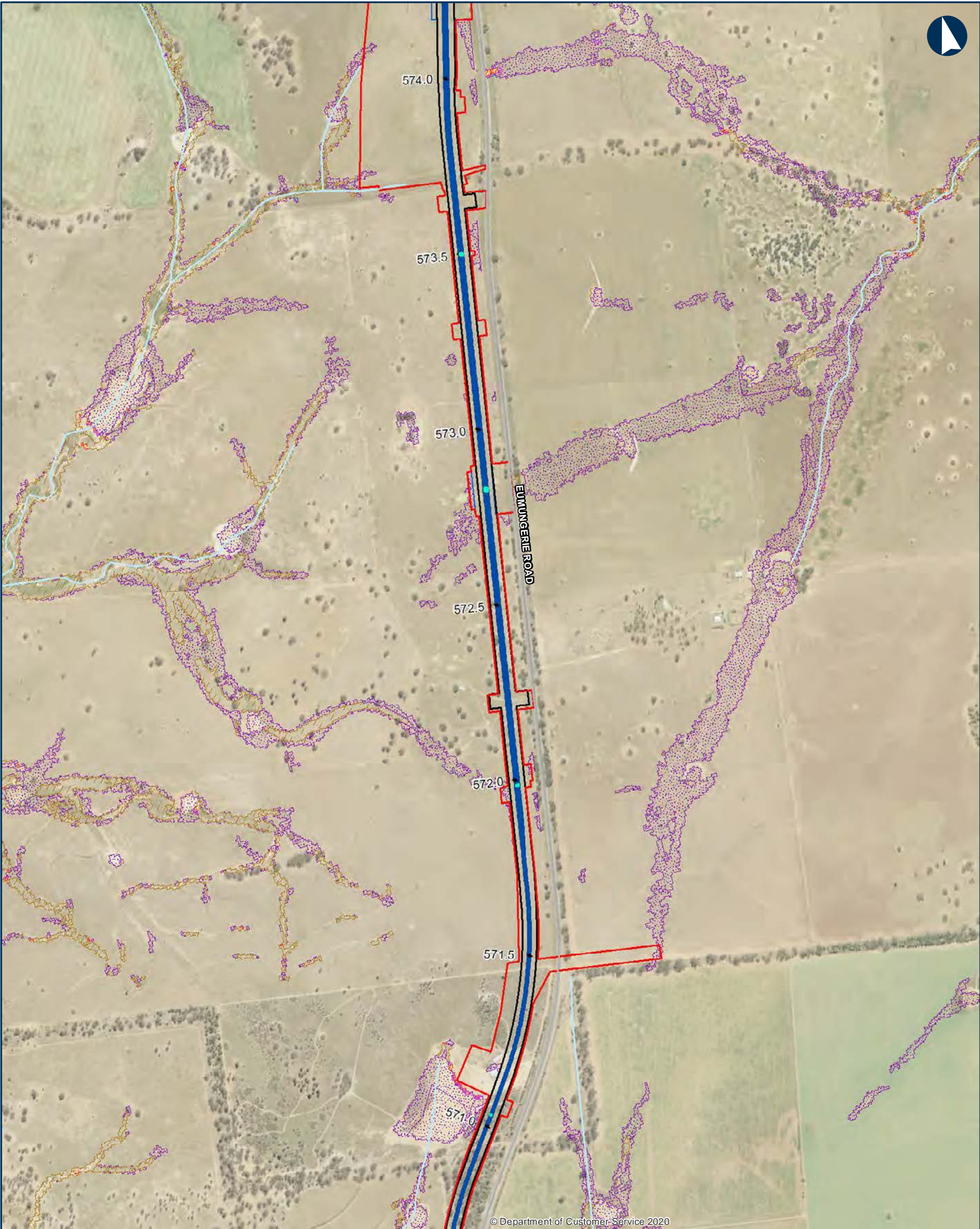
- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.9

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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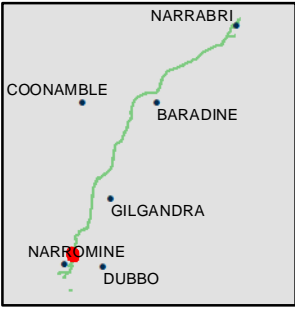
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

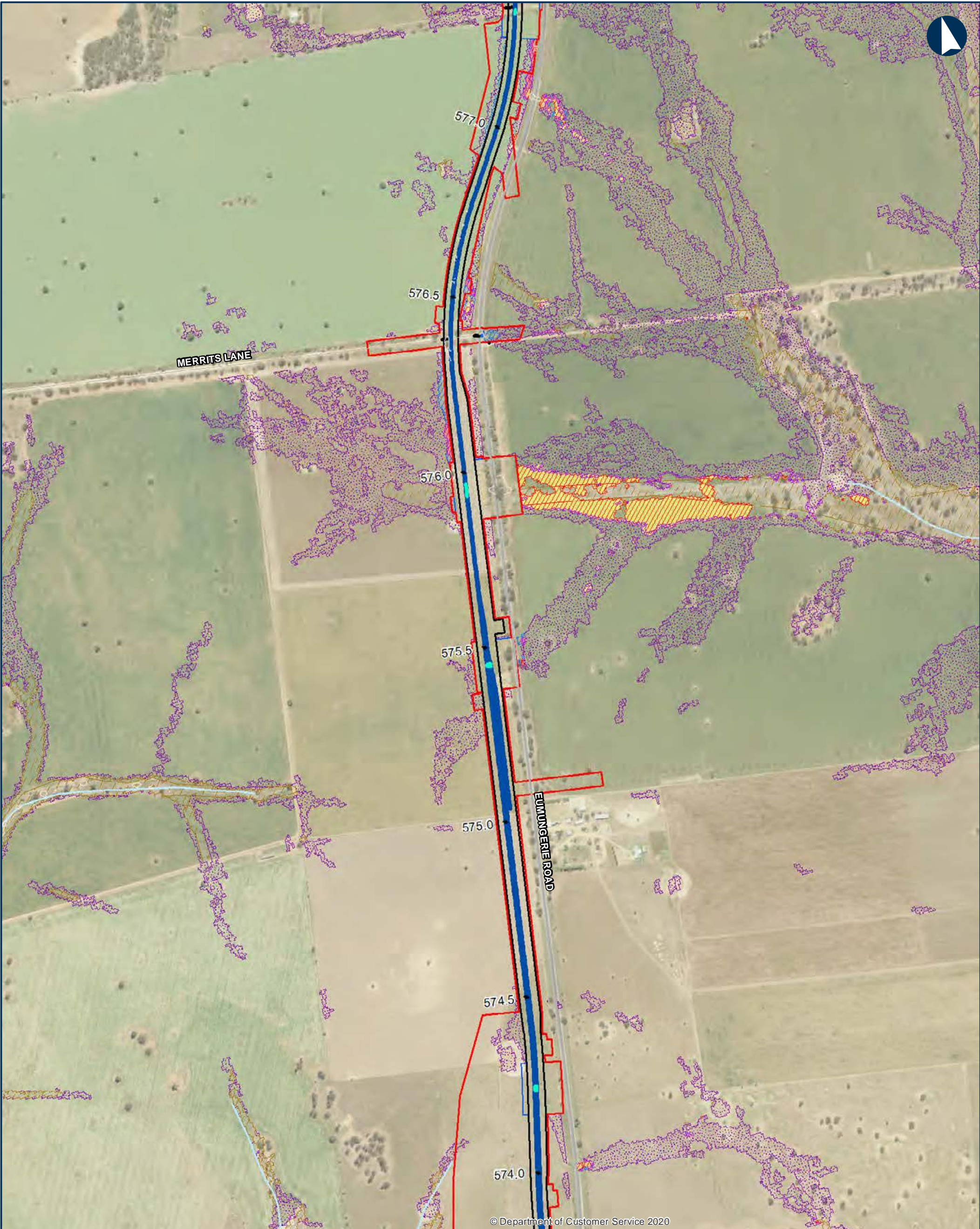
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.10

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

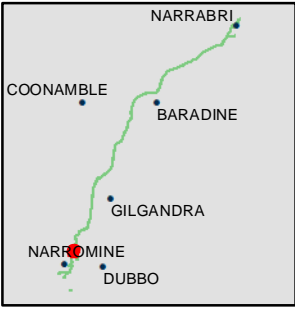
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

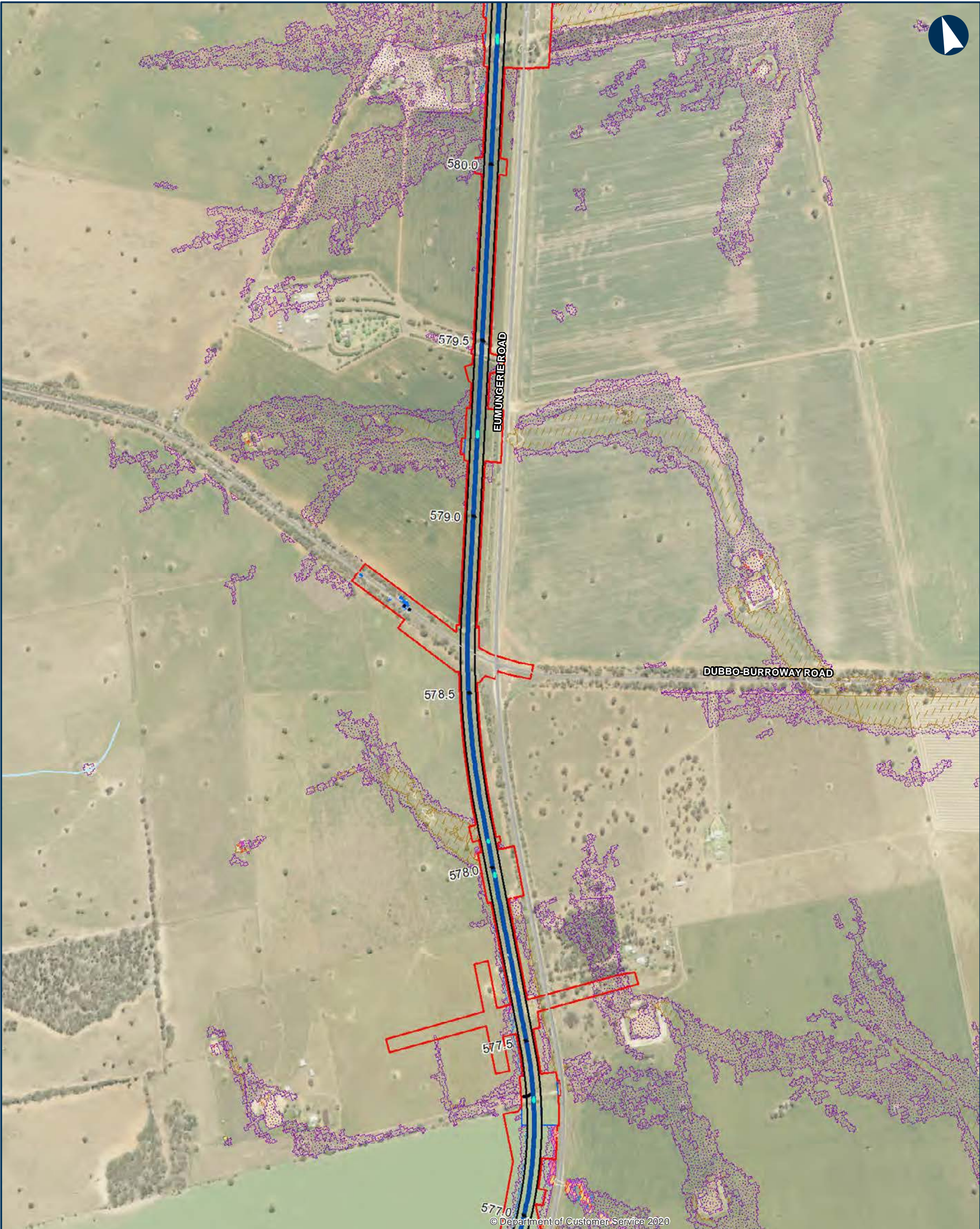
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Protected Surfaces
- Existing not flooded, design velocity > 1.2m/s
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



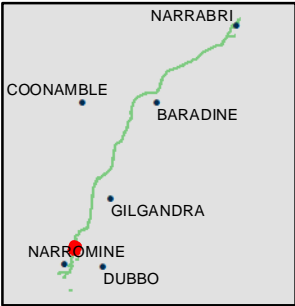
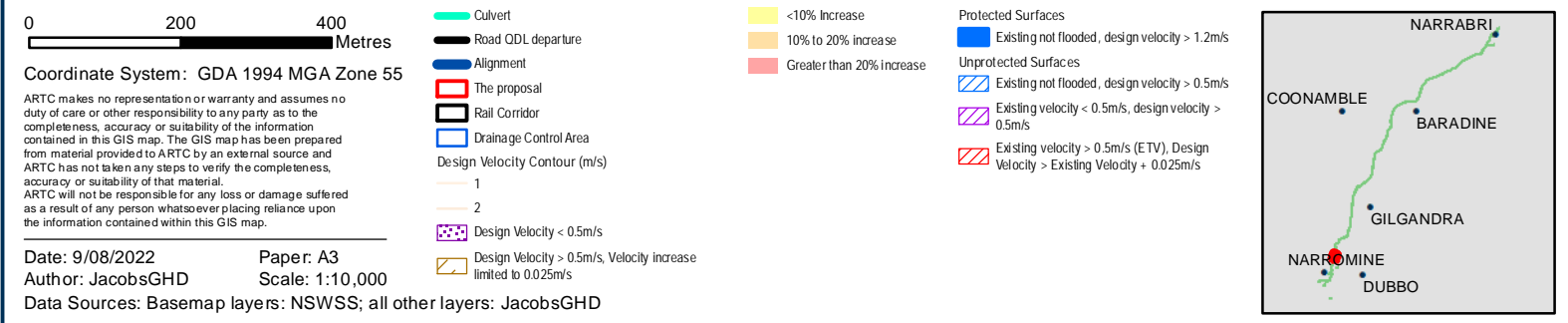
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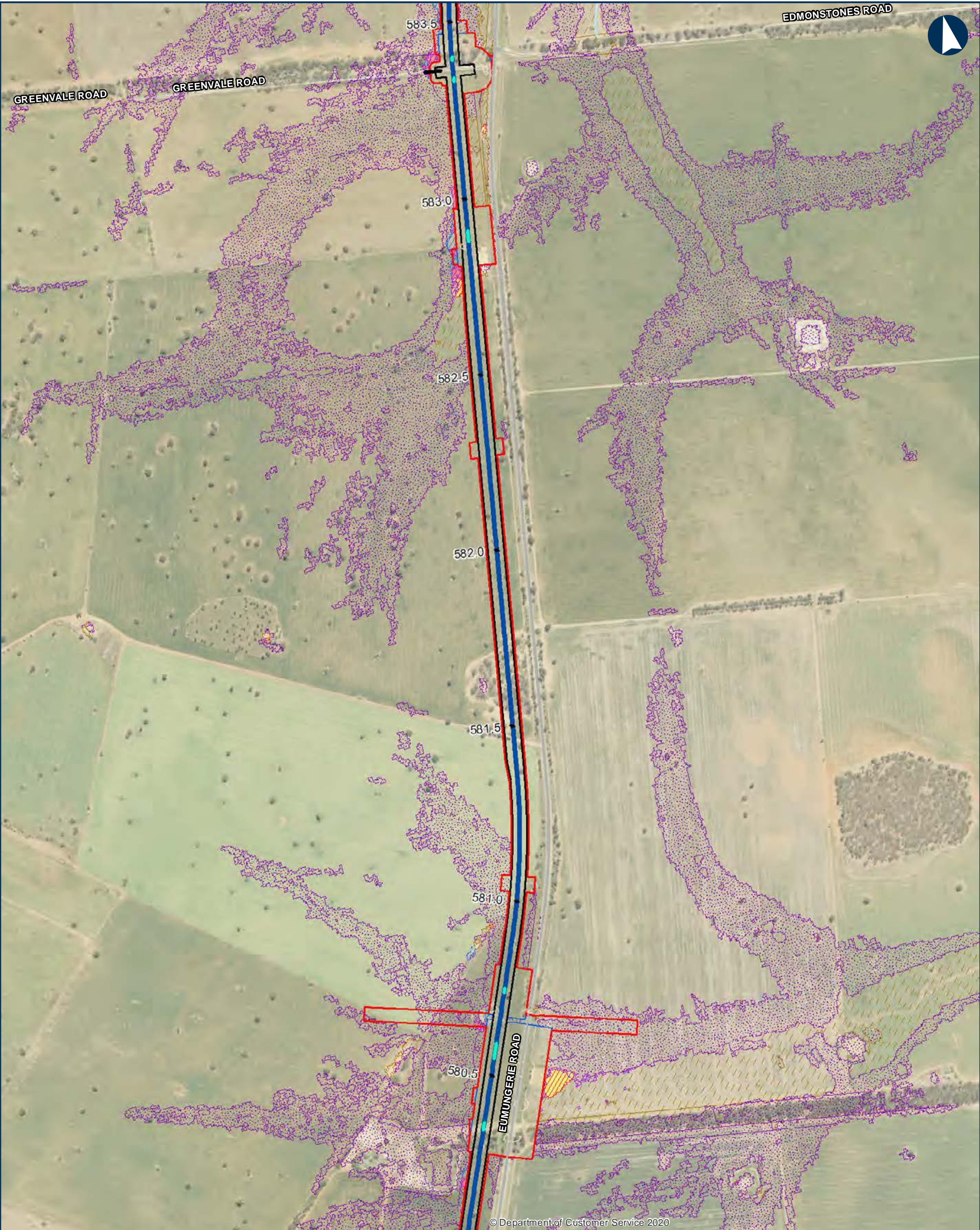
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.11



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.12

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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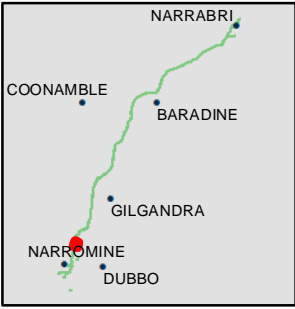
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.13

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

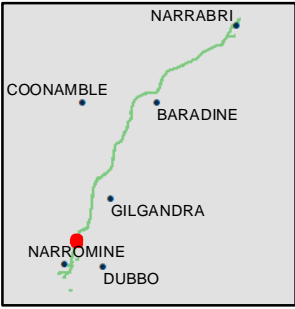
Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

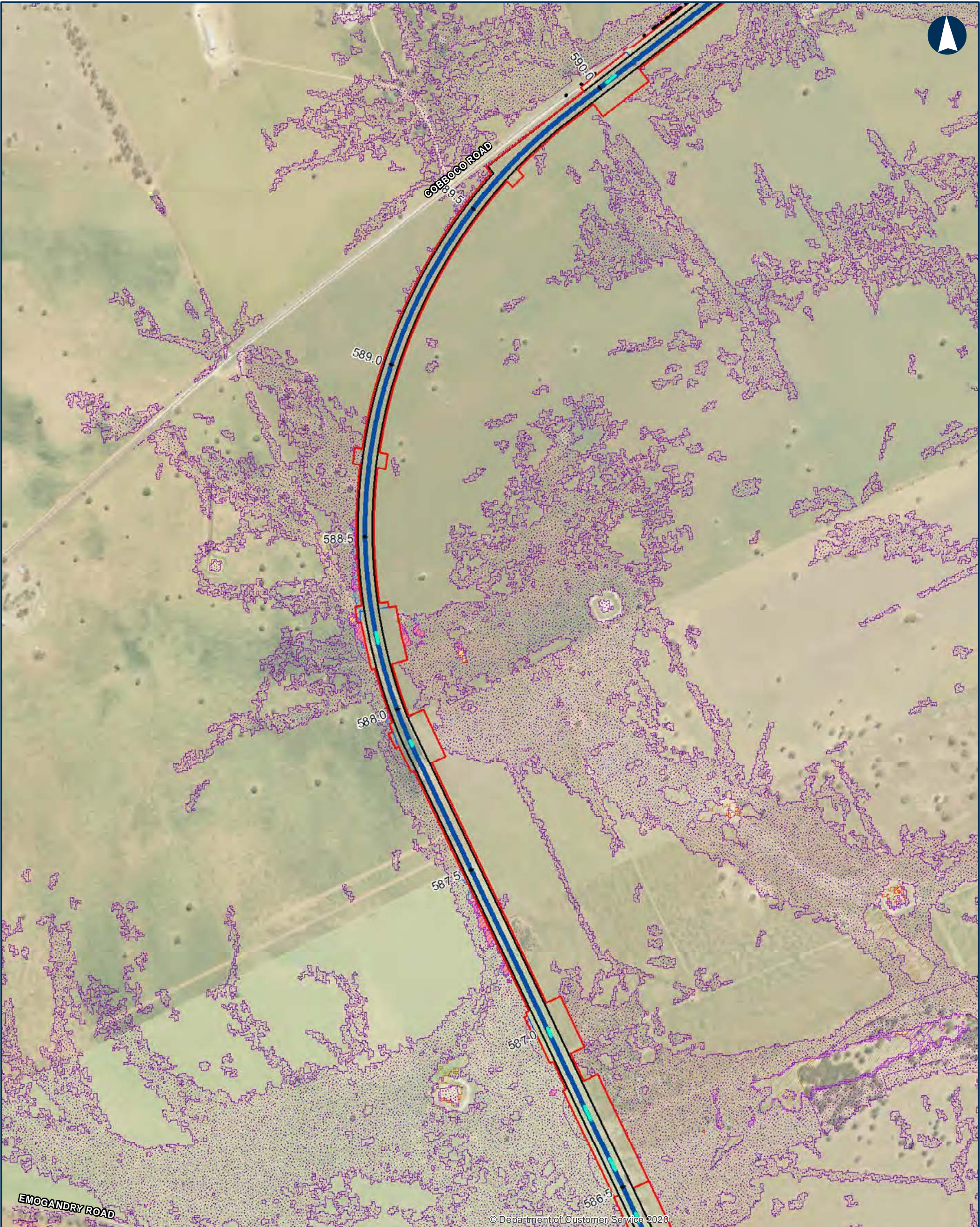
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



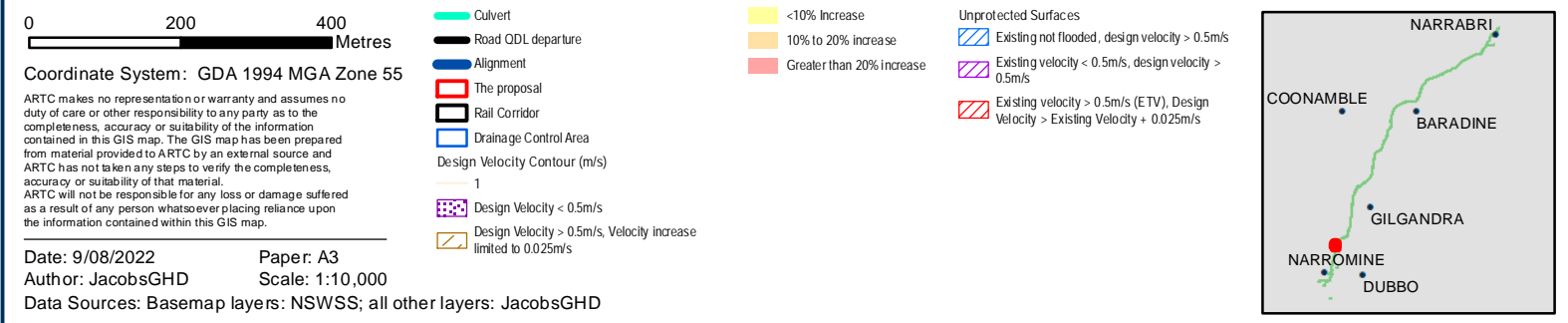
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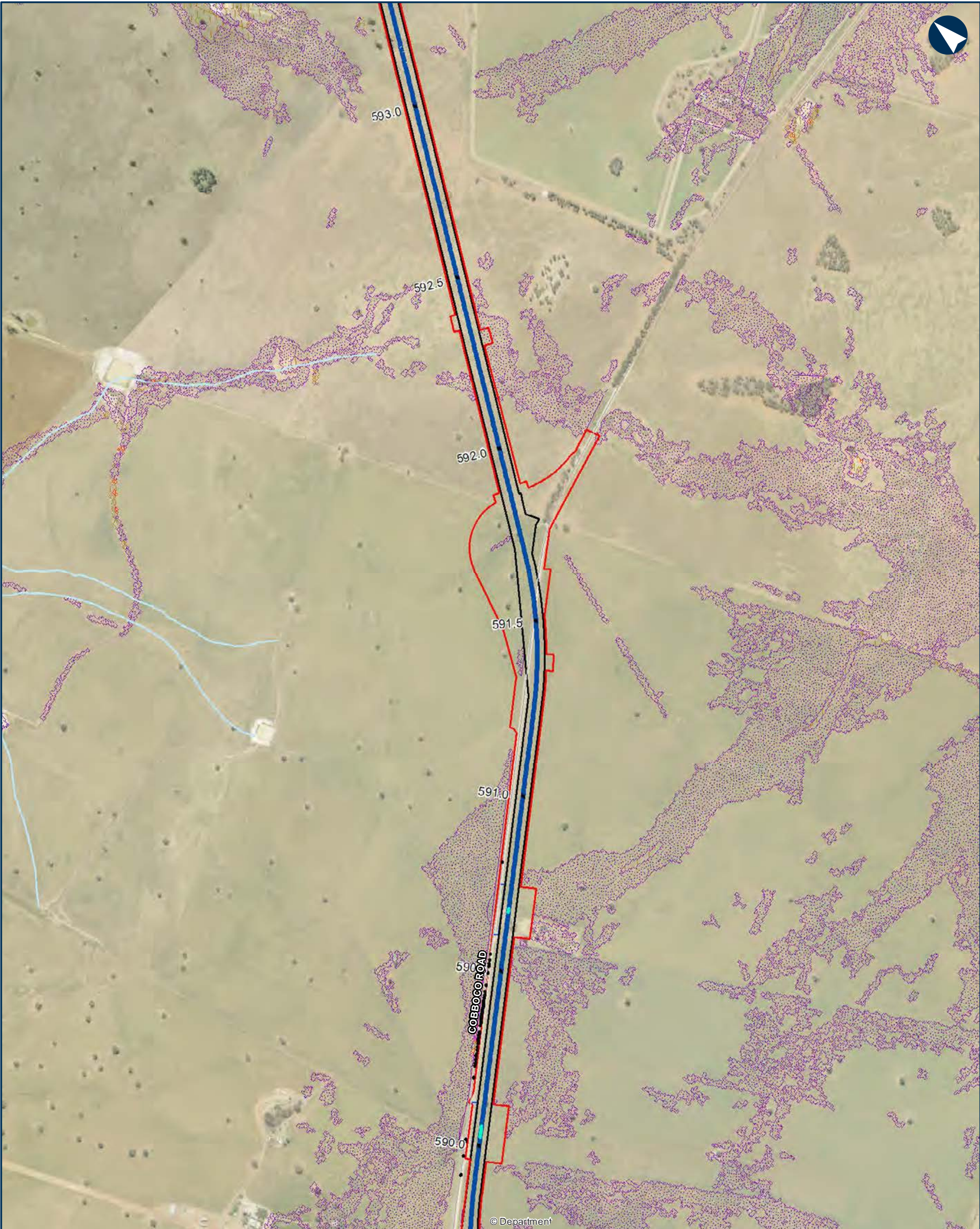
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

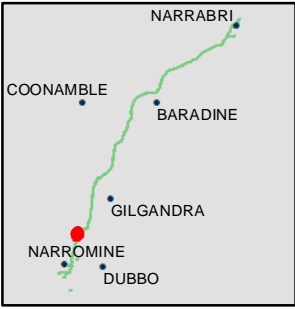
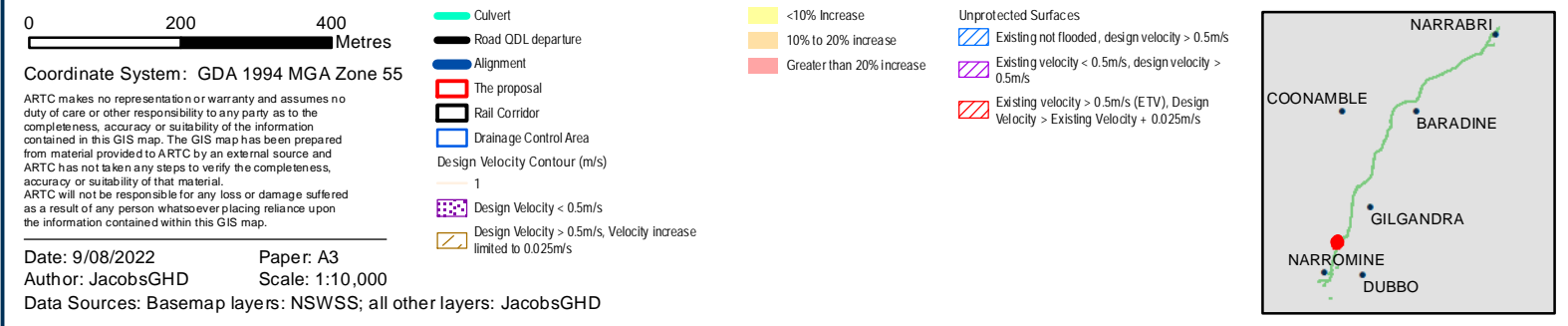
Appendix I - Figure 2.4.14





NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.15



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.16

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

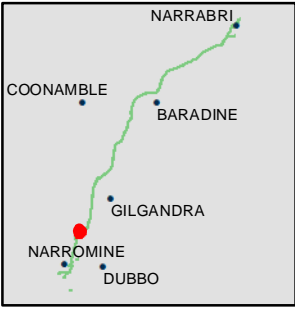
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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

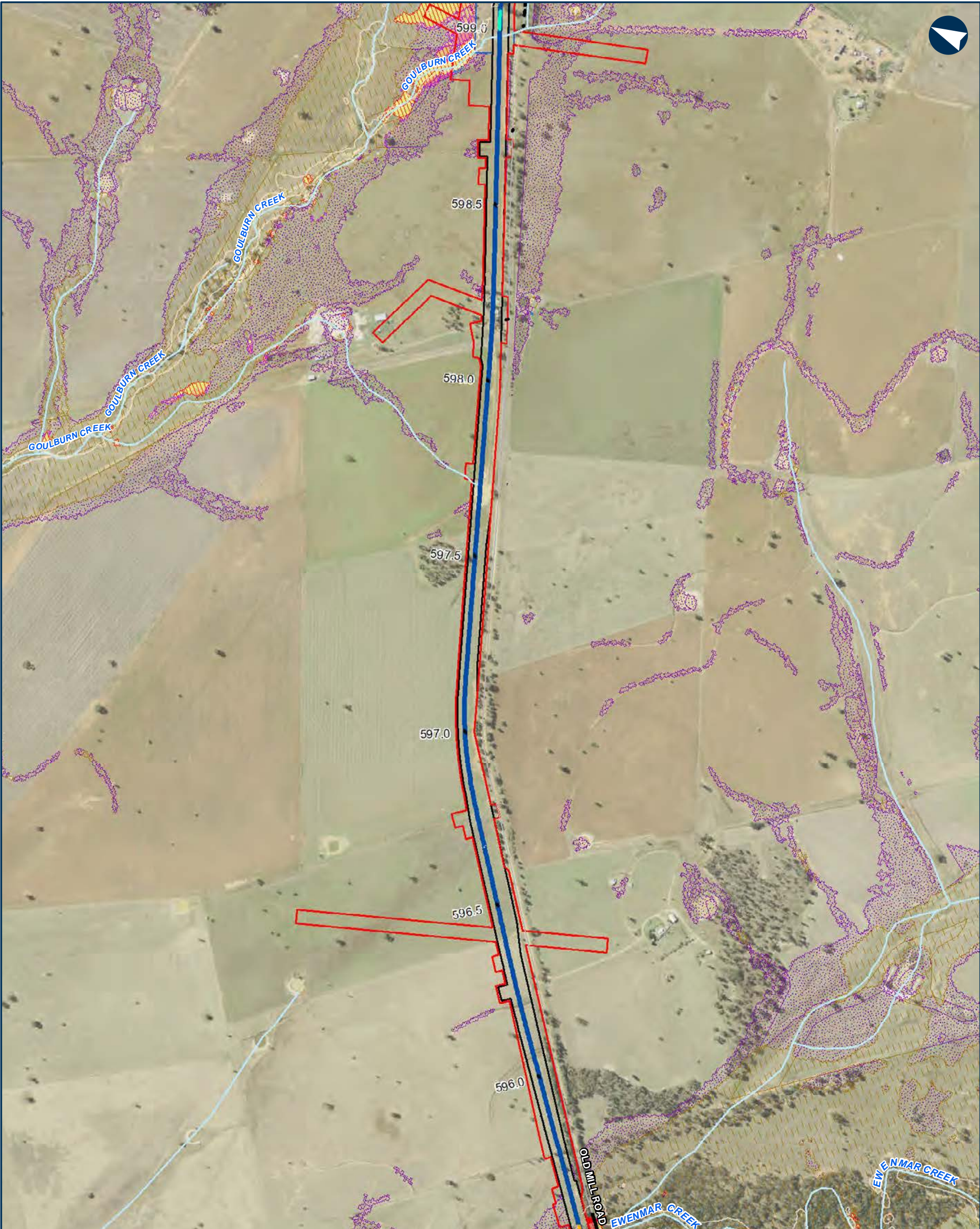
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Protected Surfaces
- Existing velocity < 1m/s, design velocity > 1.2m/s
 - Existing velocity > 1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.17

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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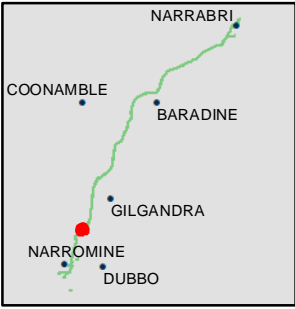
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase

- Protected Surfaces
- Existing velocity <1m/s, design velocity > 1.2m/s
 - Existing velocity >1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.18

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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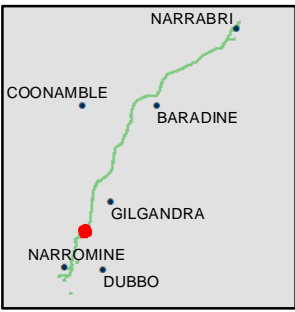
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

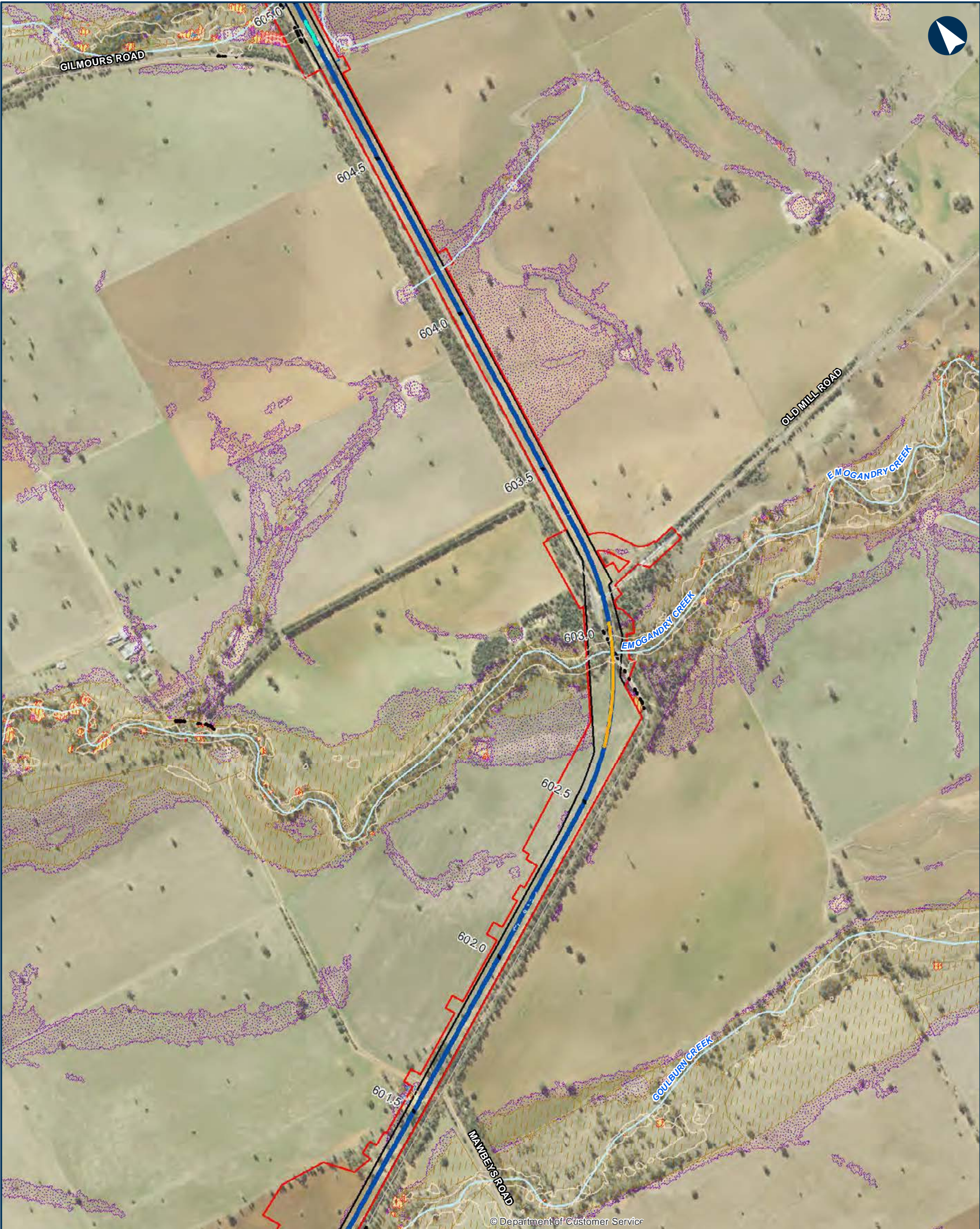
- Protected Surfaces
- Existing velocity < 1m/s, design velocity > 1.2m/s
 - Existing velocity > 1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.19

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

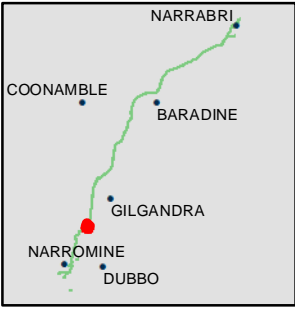
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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

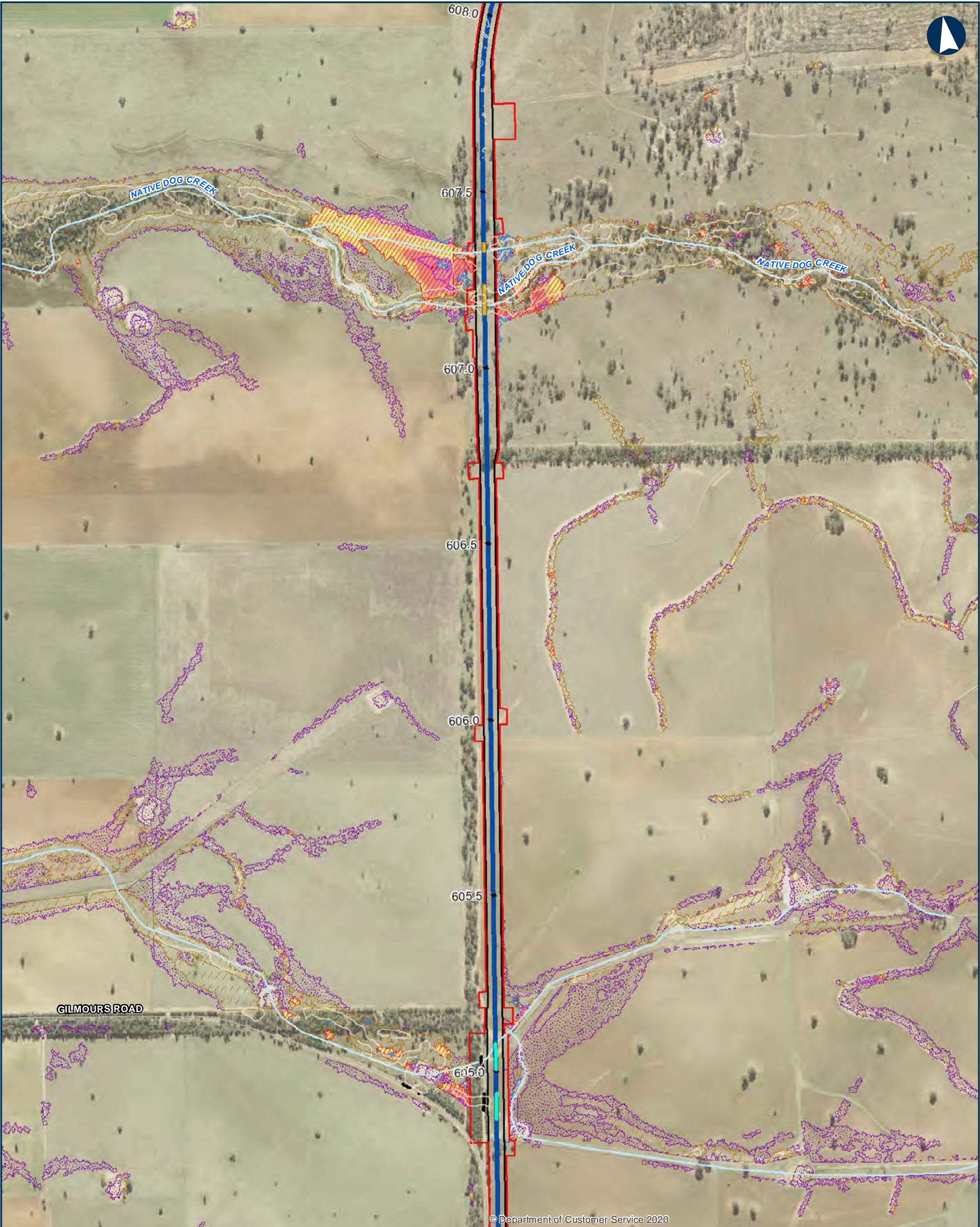
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.20

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

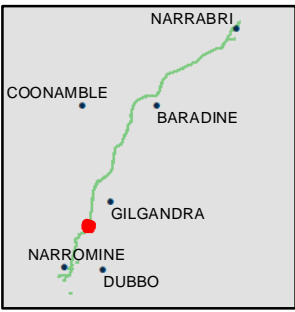
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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

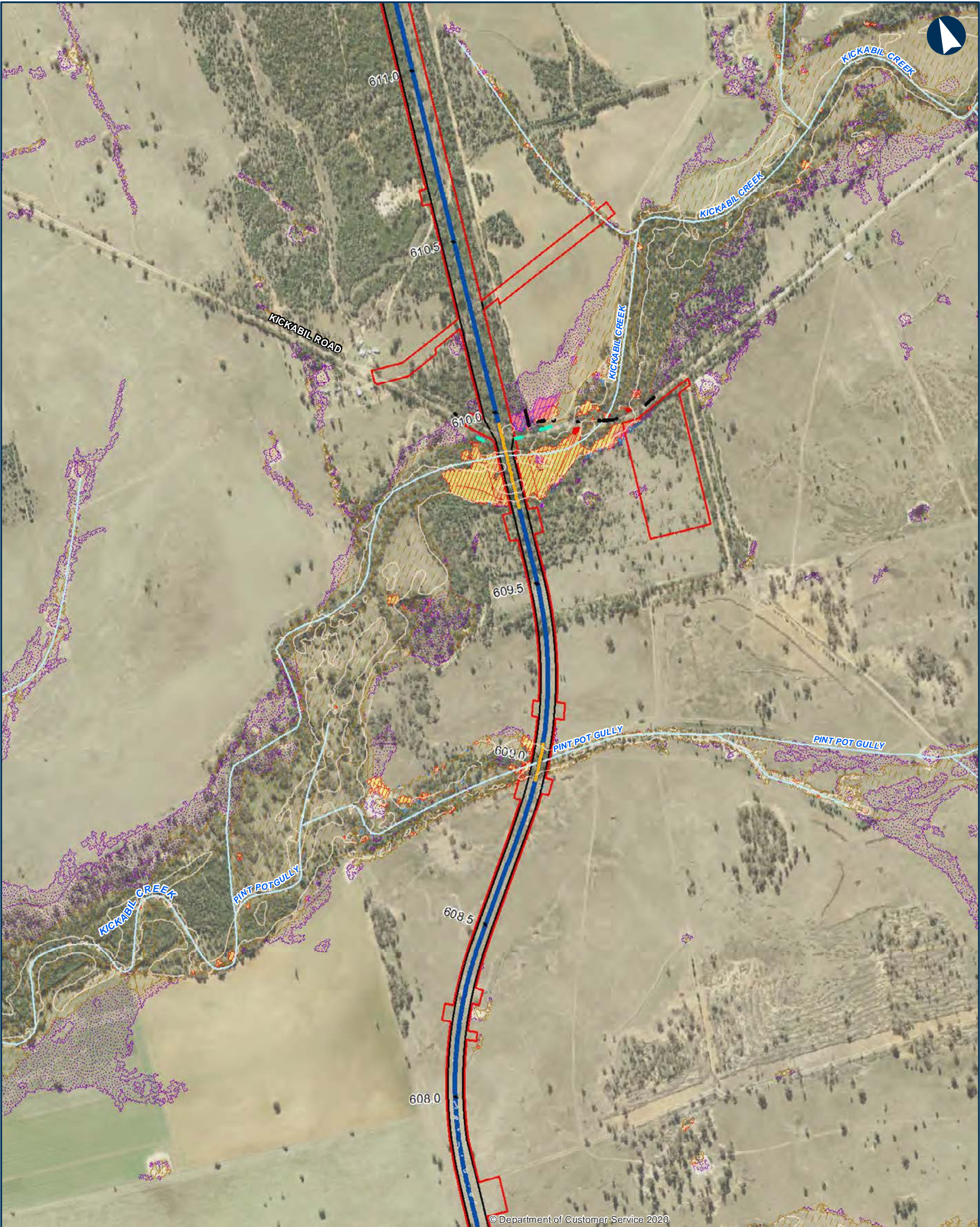
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.21

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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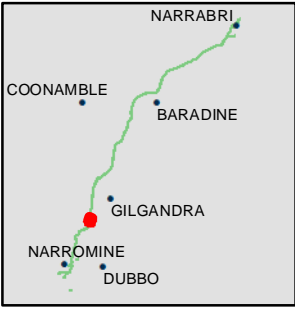
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase

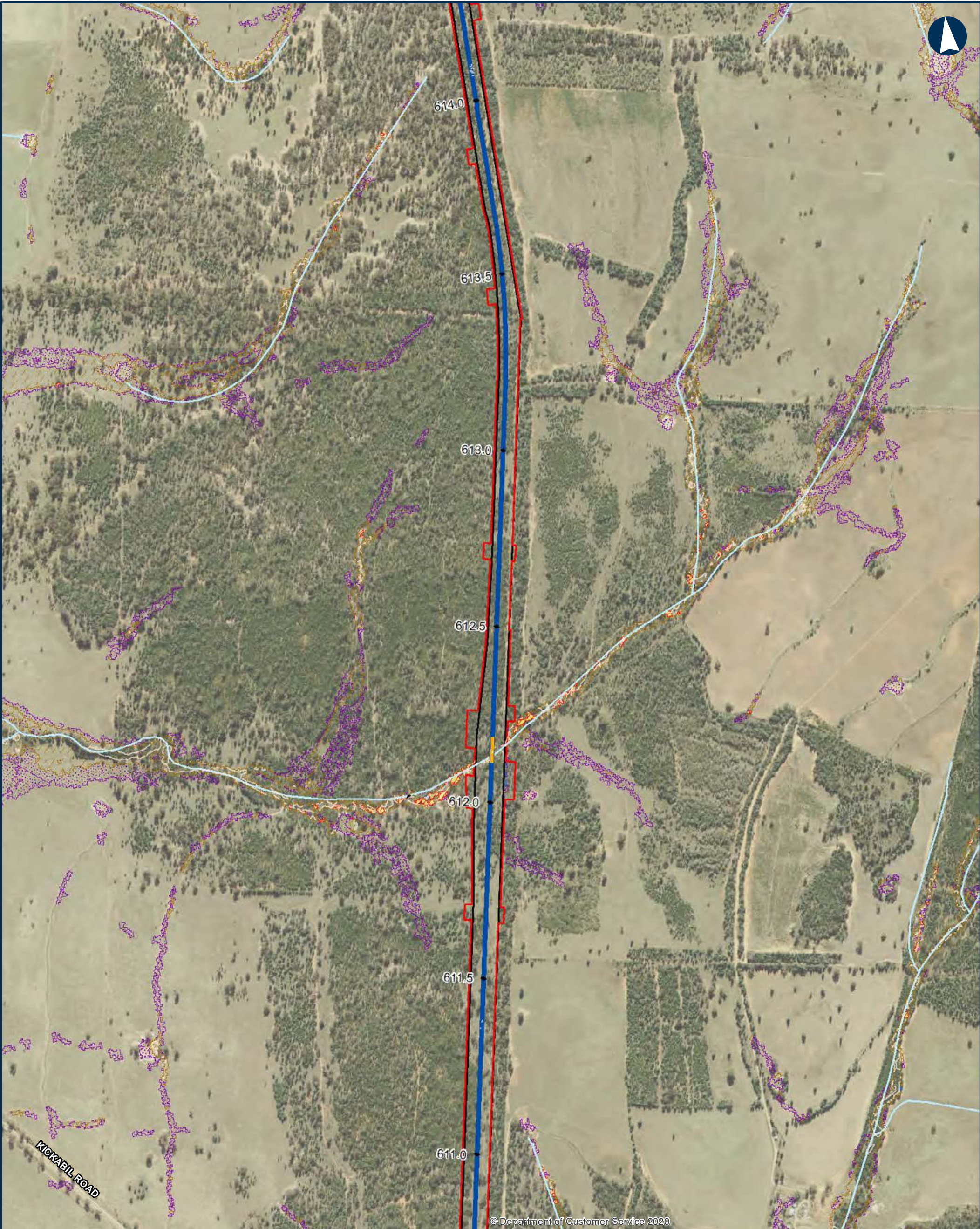
- Protected Surfaces
- Existing velocity <1m/s, design velocity > 1.2m/s
 - Existing velocity >1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.22

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD

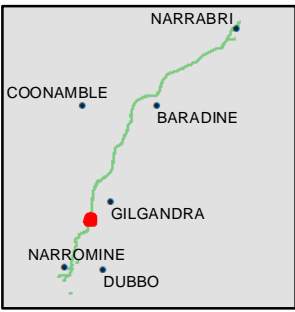
Paper: A3
Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

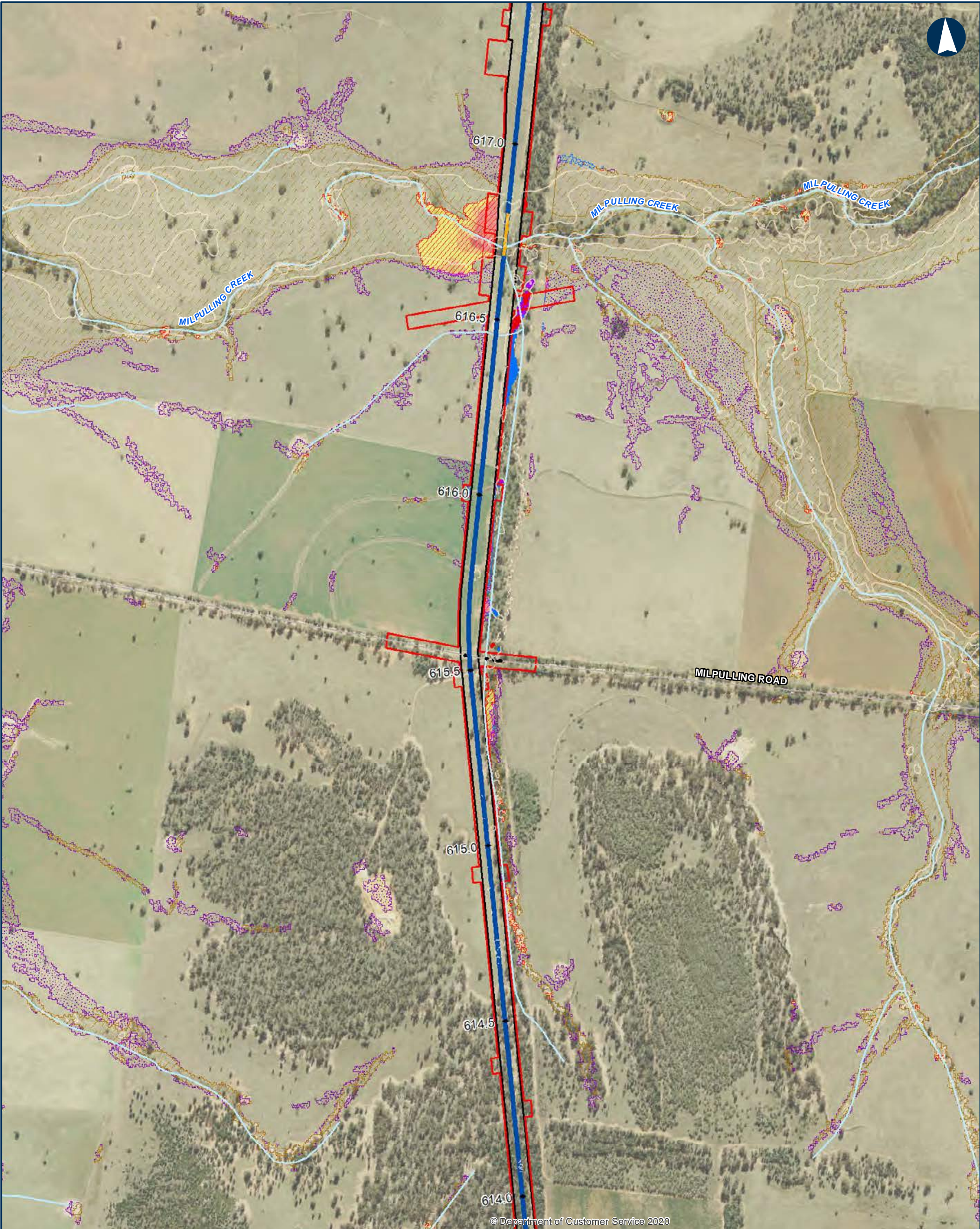
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



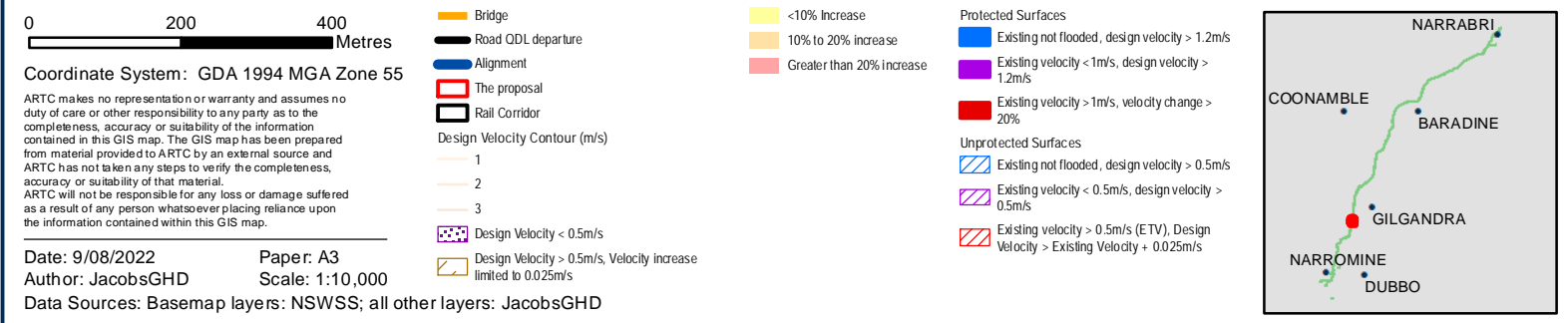
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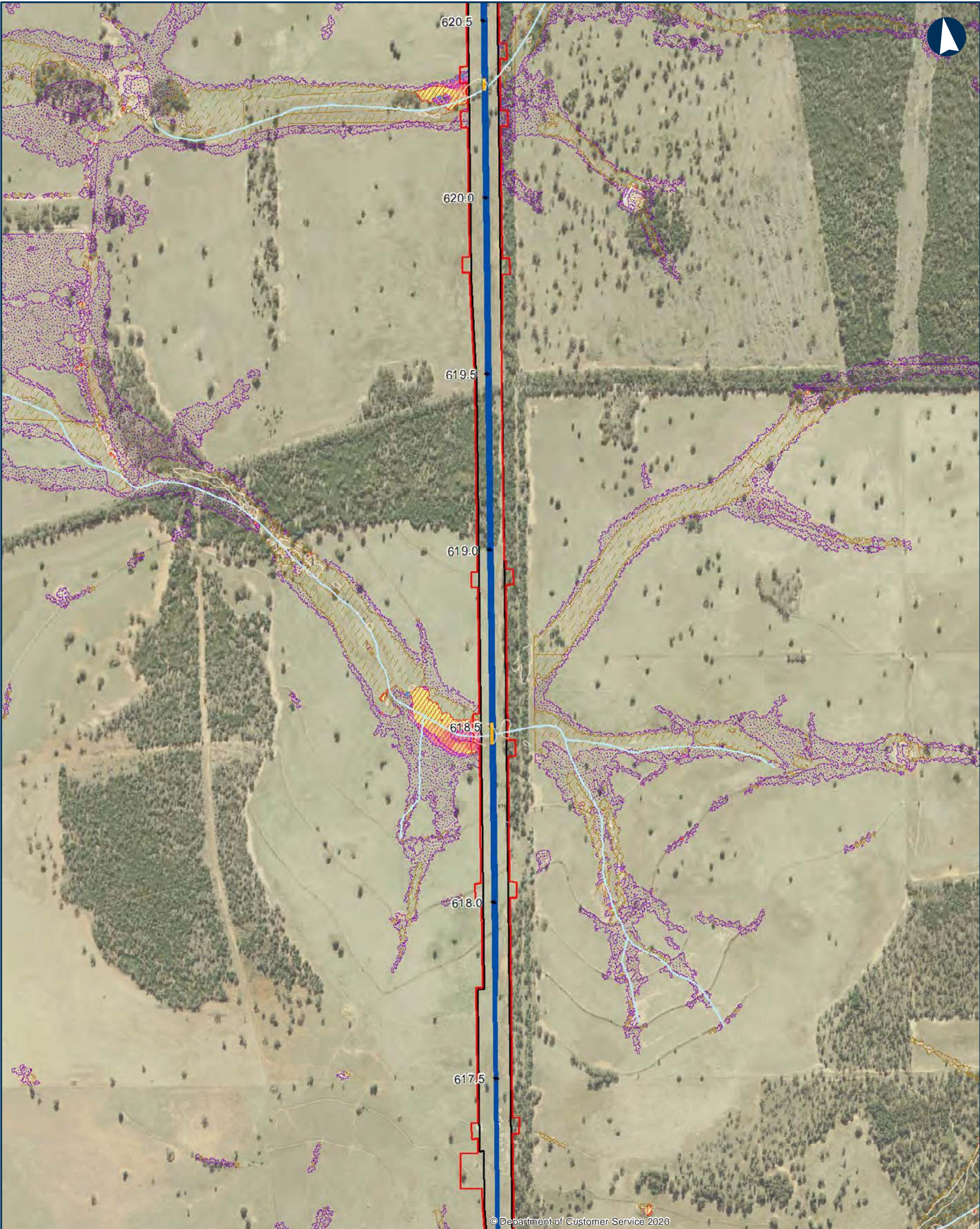
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.23





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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.24

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Road QDL departure

Alignment

The proposal

Rail Corridor

Design Velocity Contour (m/s)

1

2

3

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

Greater than 20% increase

Protected Surfaces

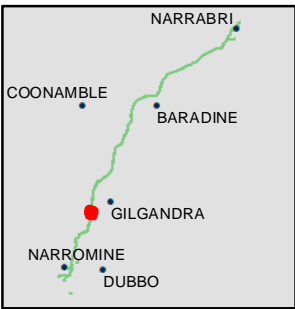
Existing not flooded, design velocity > 1.2m/s

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

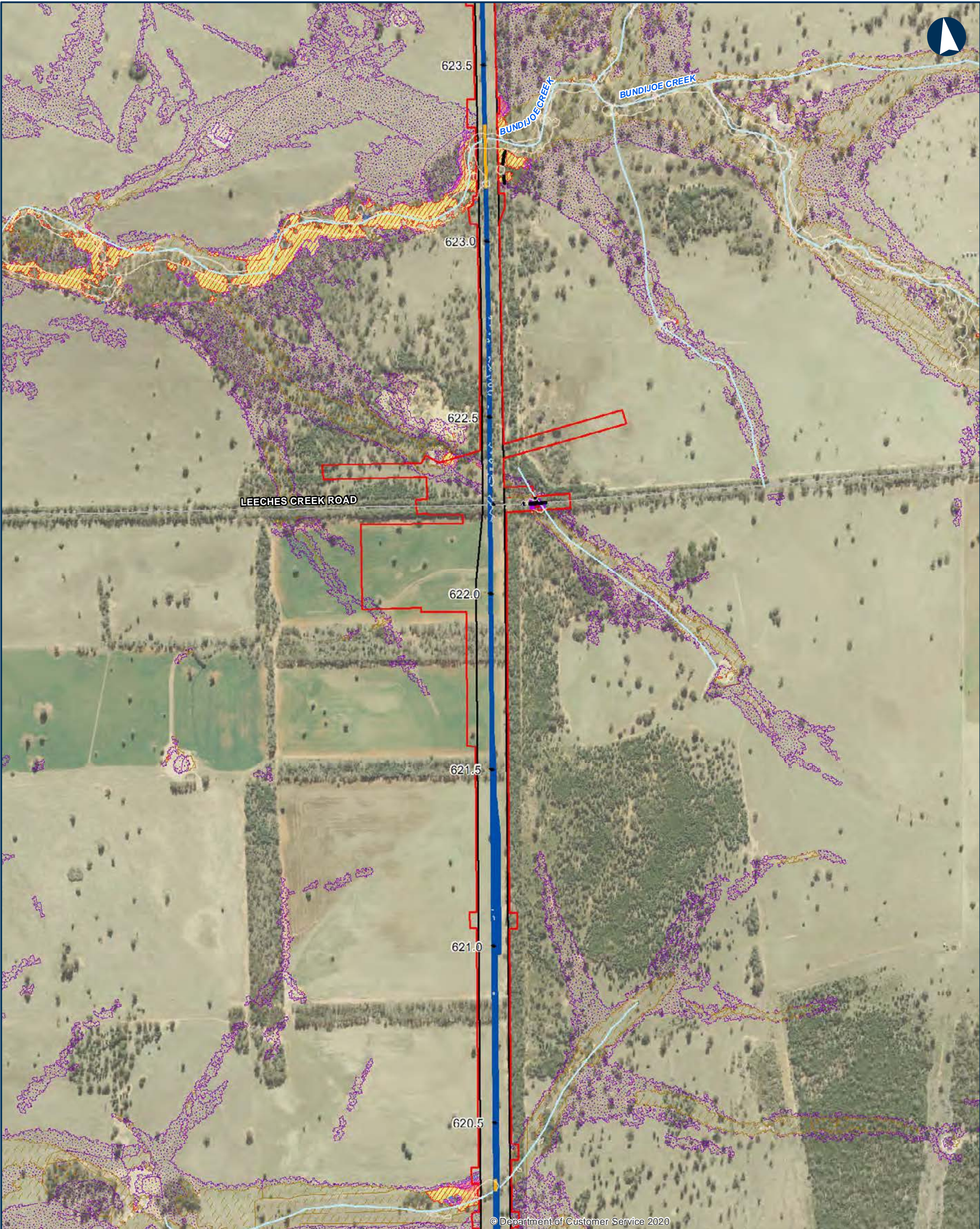
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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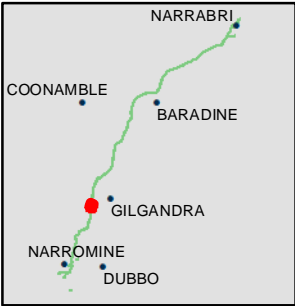
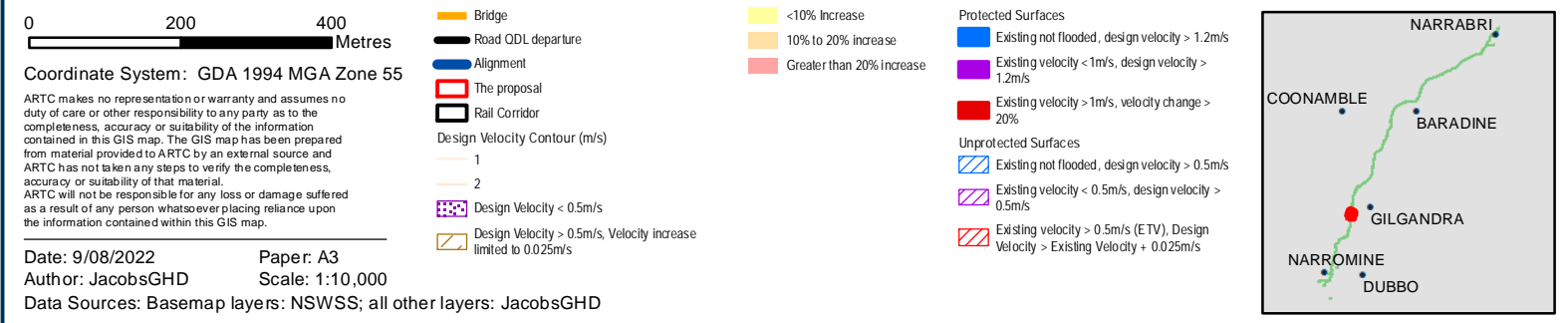
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.25



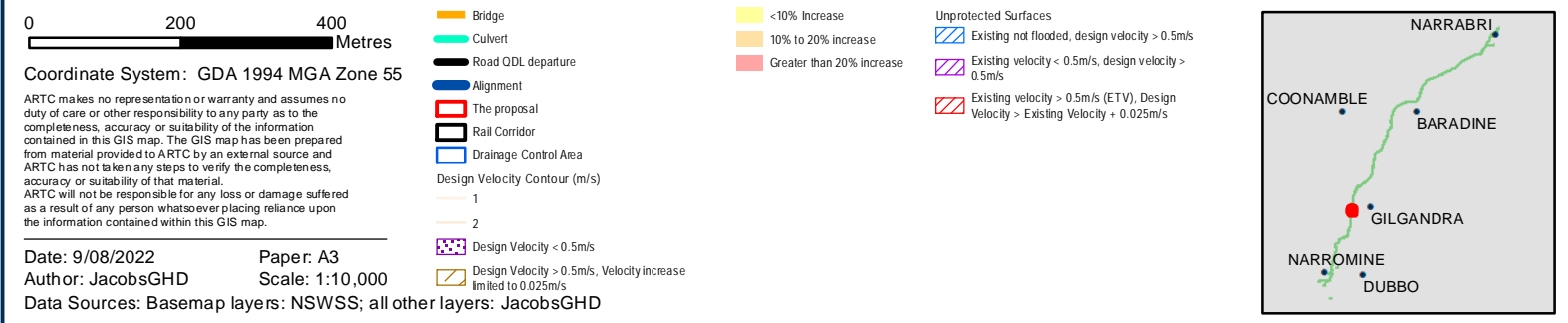
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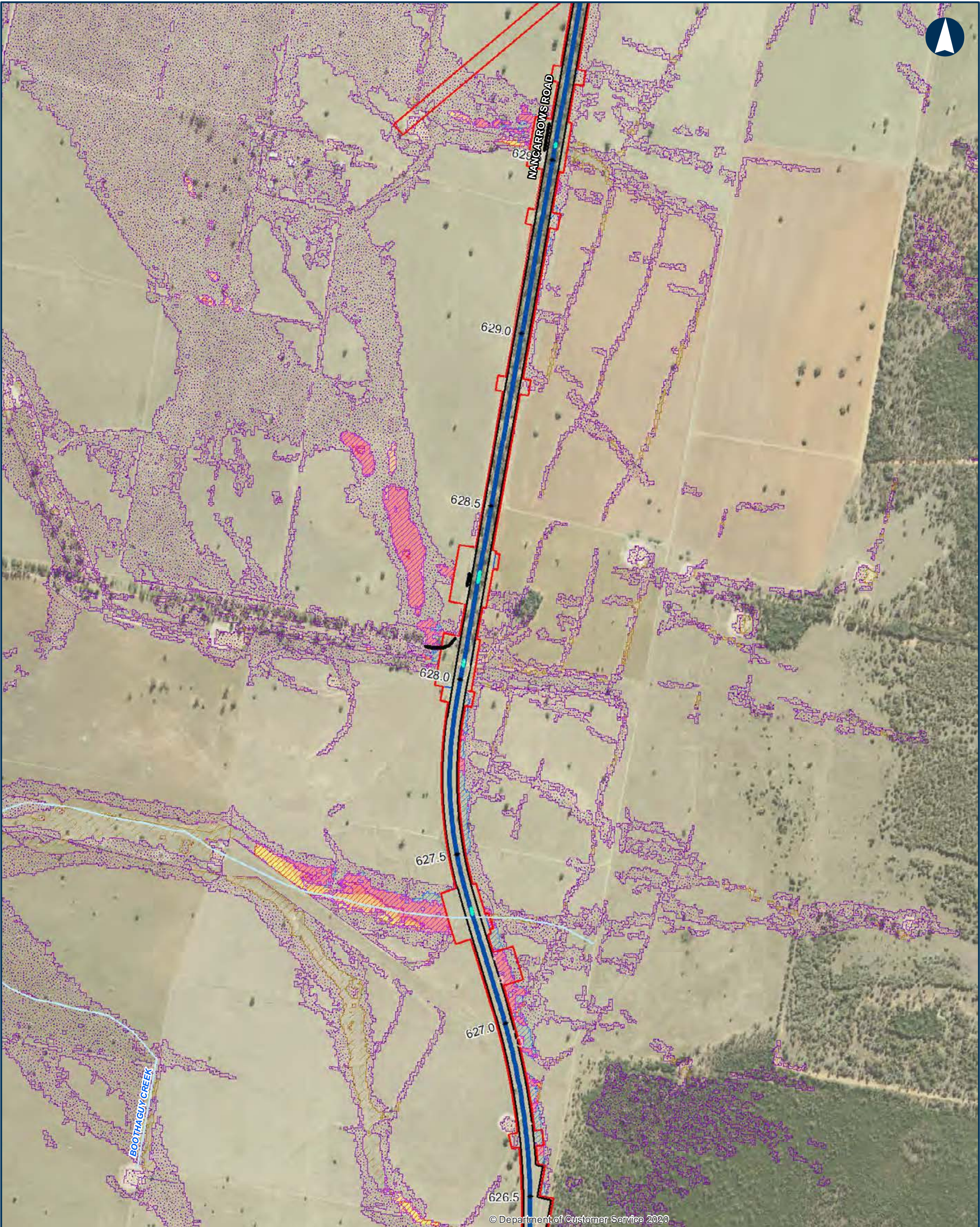
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.26



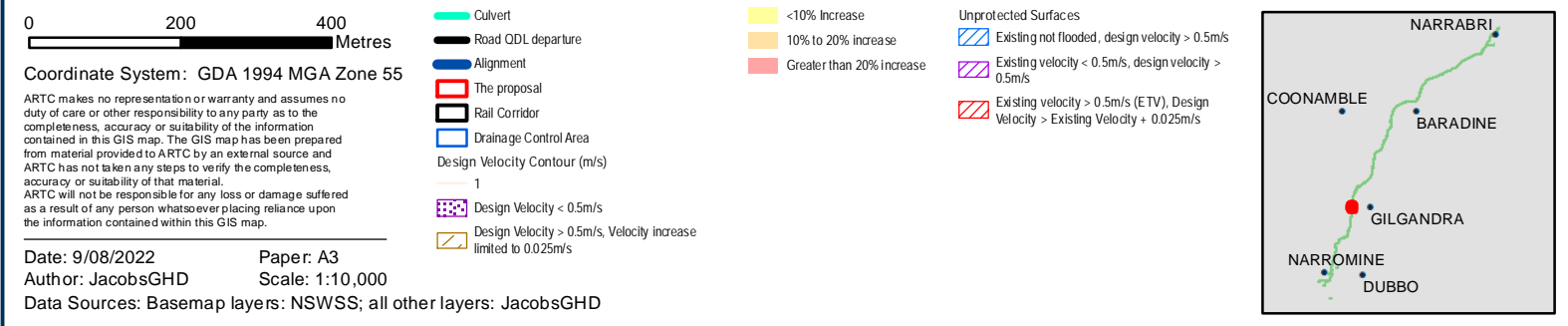
INLAND RAIL ARTC

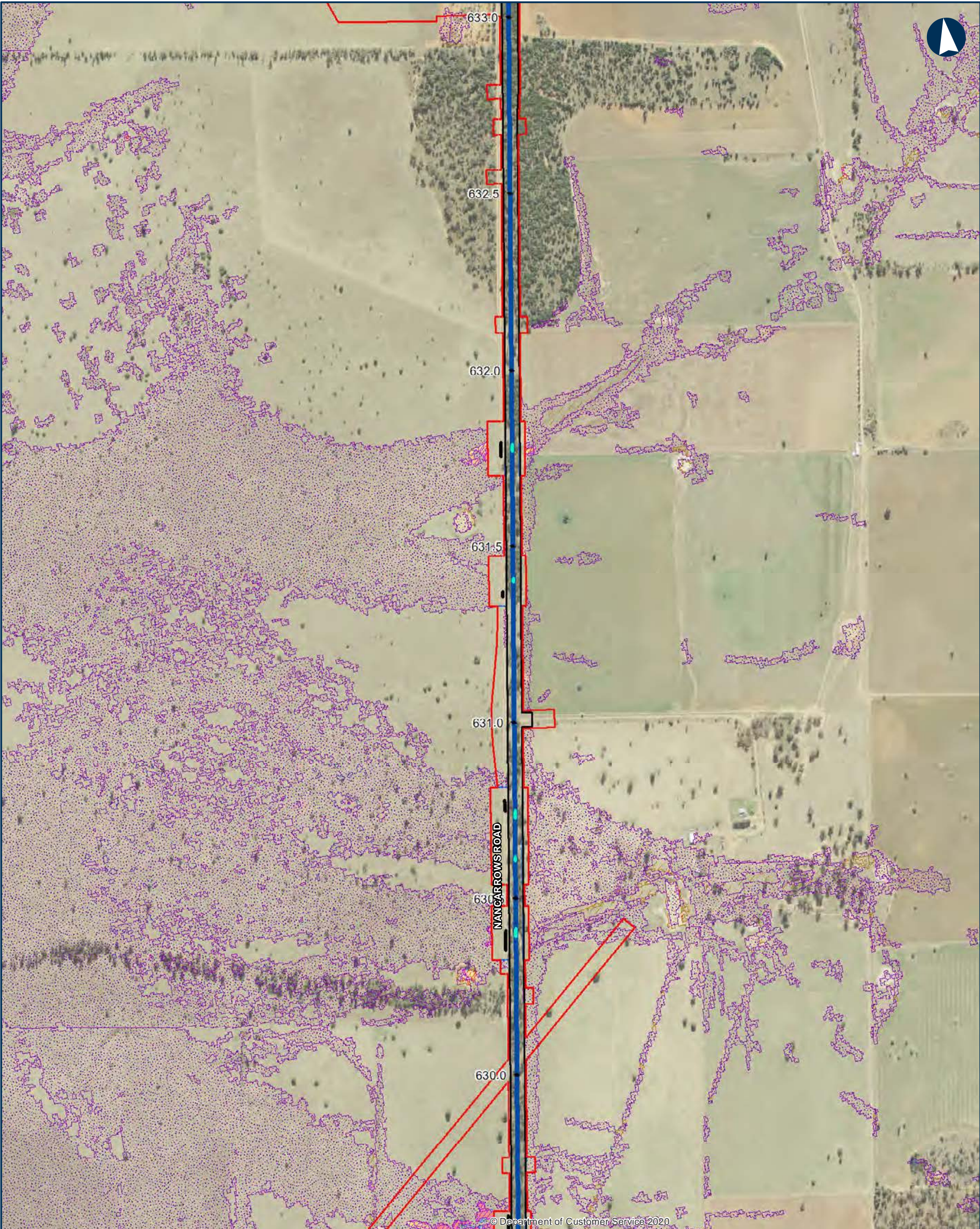
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

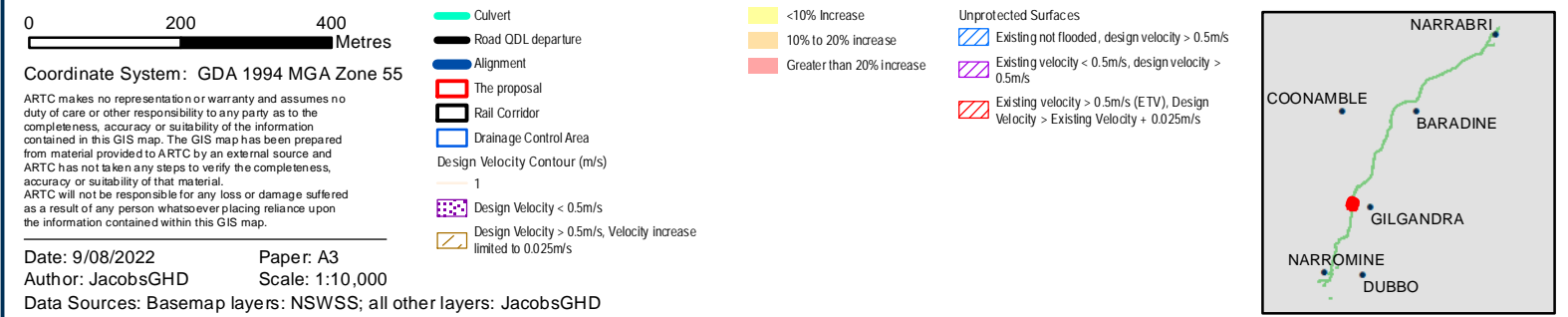
Appendix I - Figure 2.4.27





NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.28



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.29

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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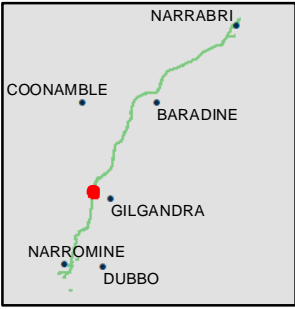
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

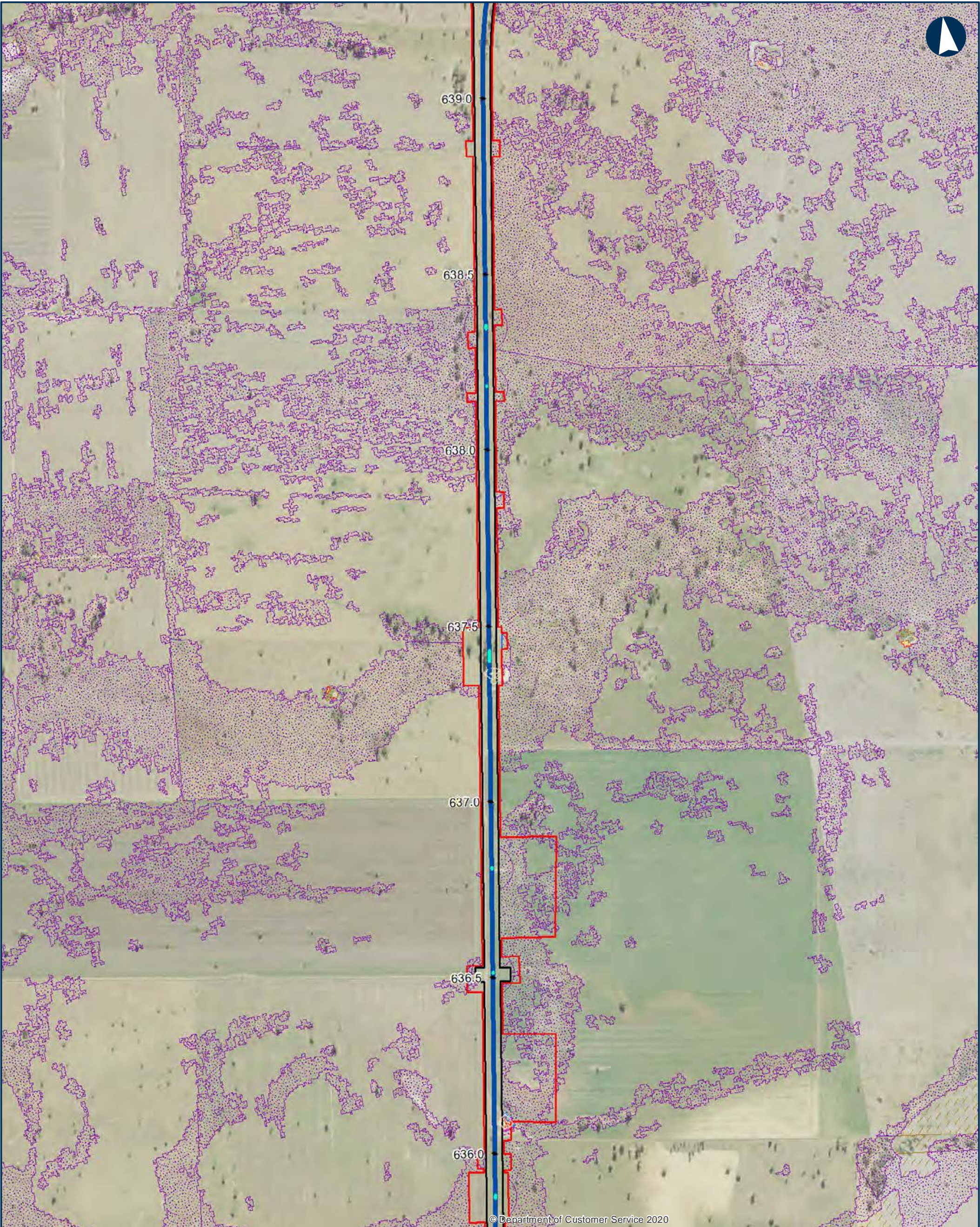
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Protected Surfaces
- Existing velocity < 1m/s, design velocity > 1.2m/s
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.30

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

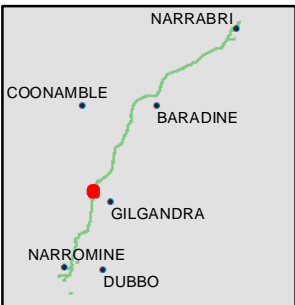
Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.31

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

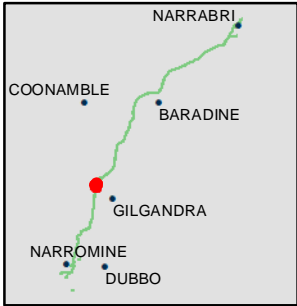
Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



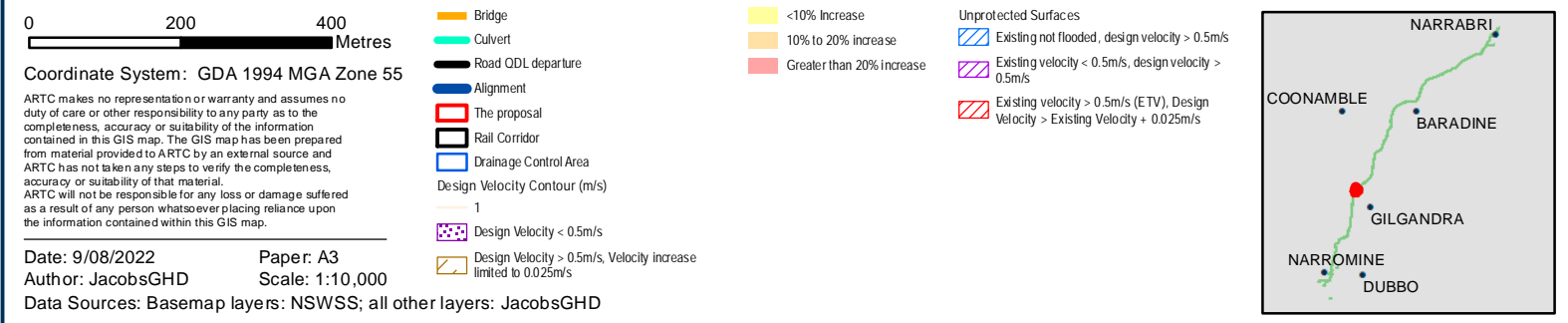
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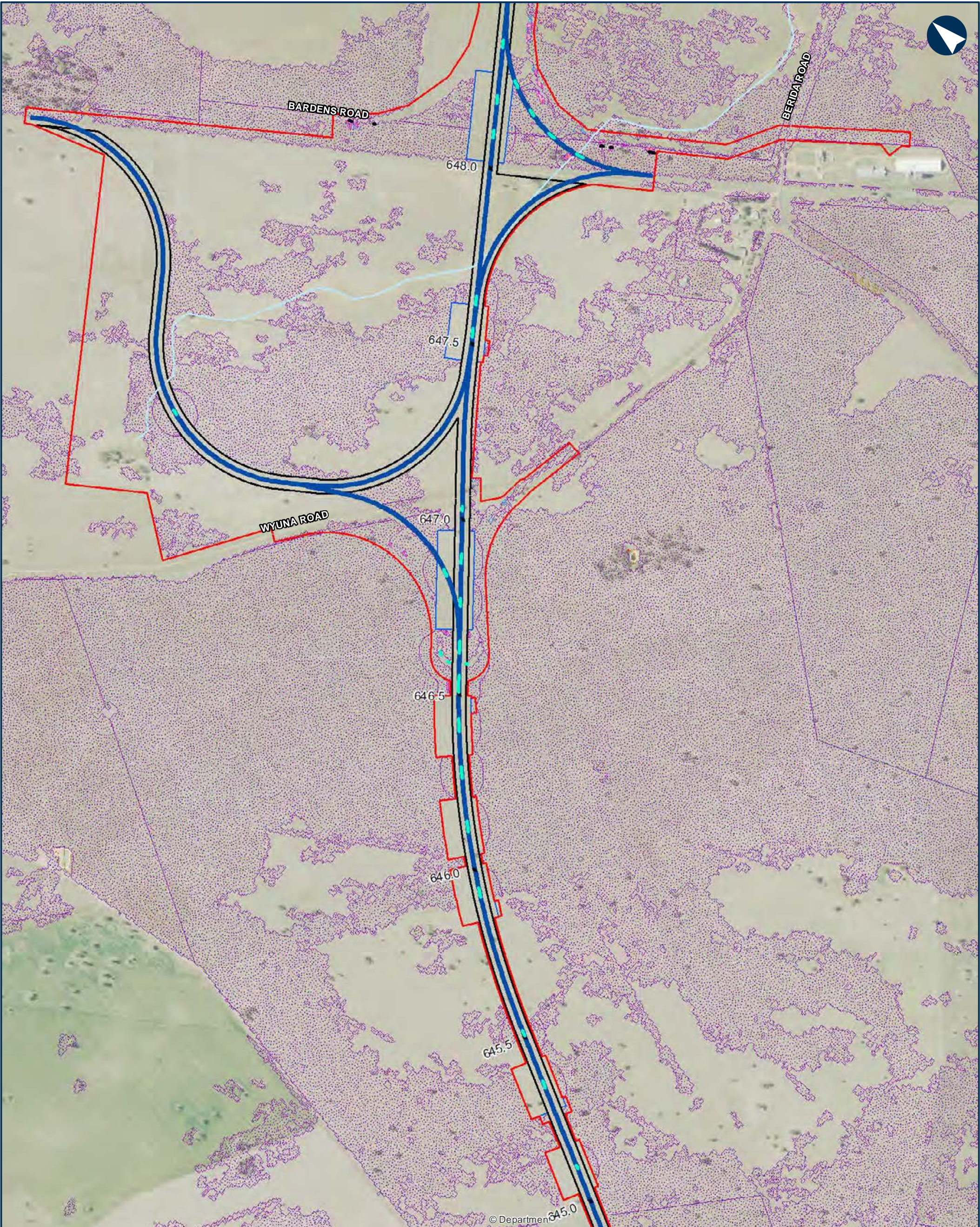
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.32





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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.33

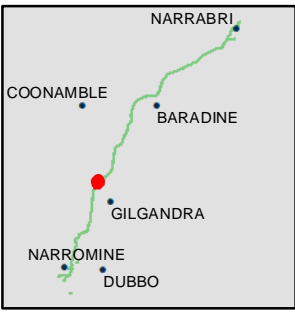
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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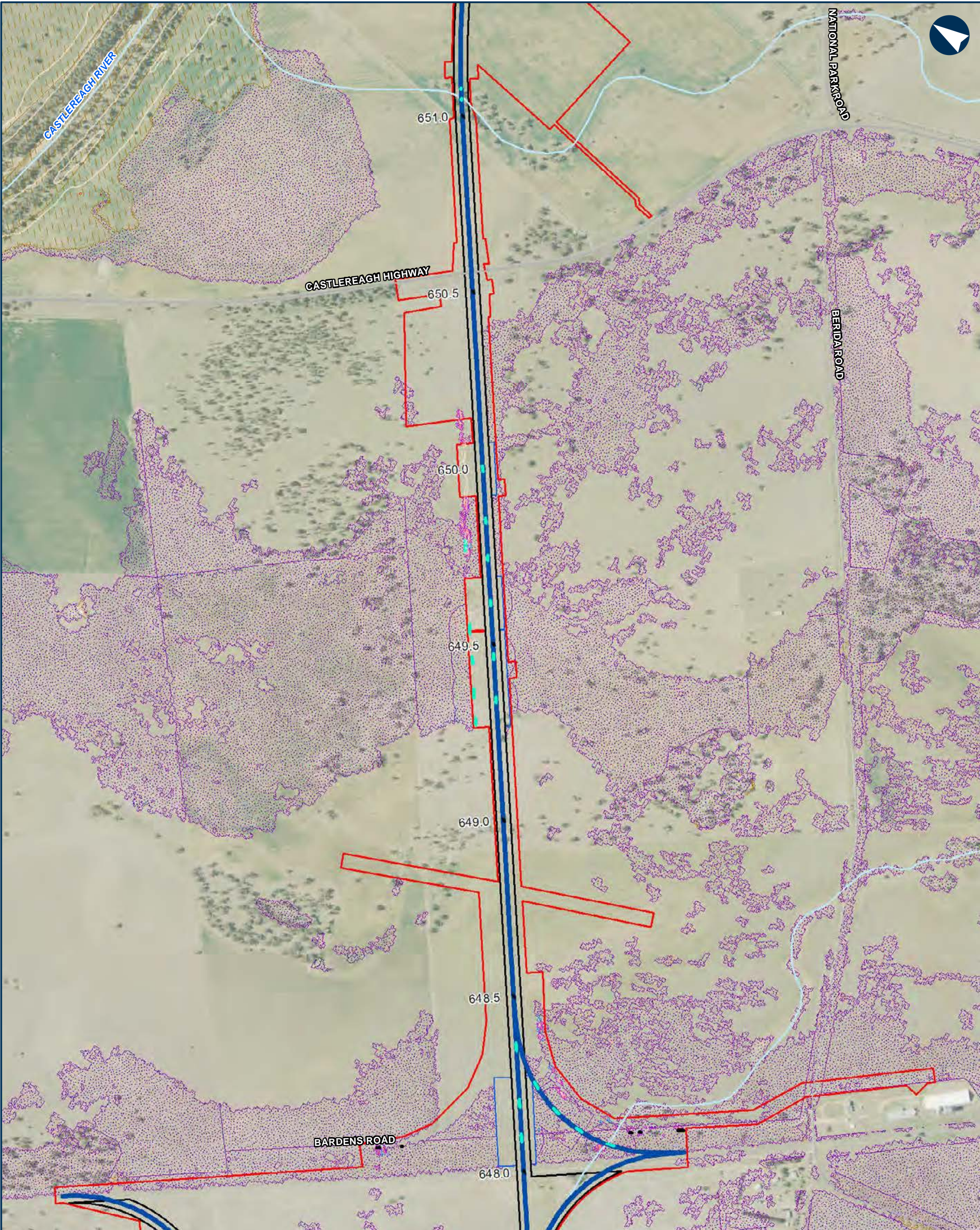
Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.34

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

3

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase

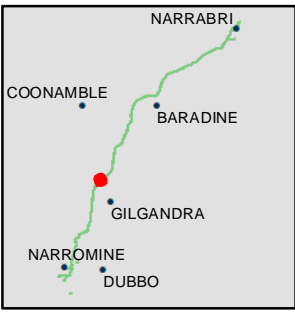
10% to 20% Increase

Greater than 20% Increase
- Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

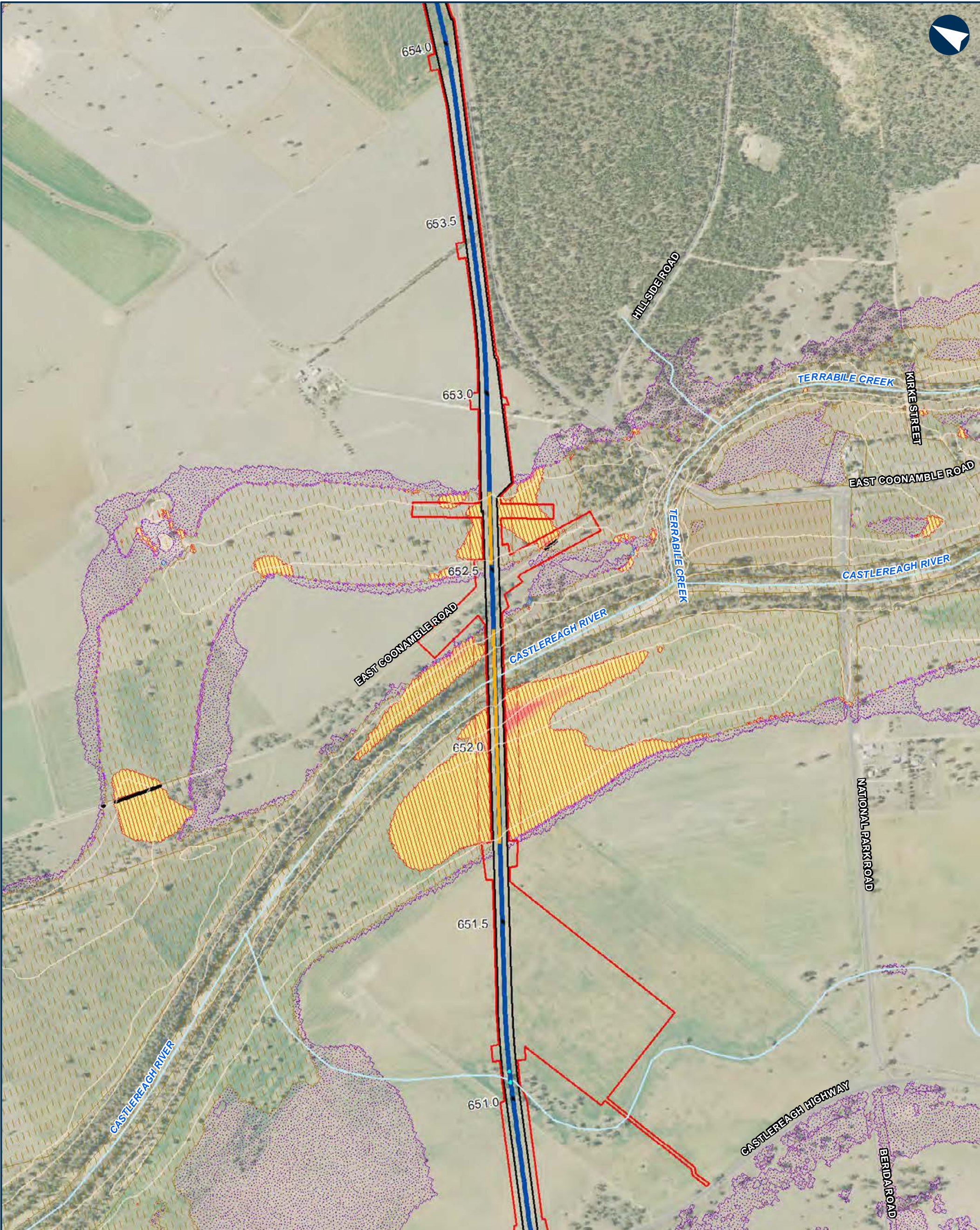
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.35

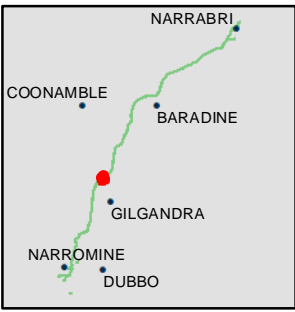
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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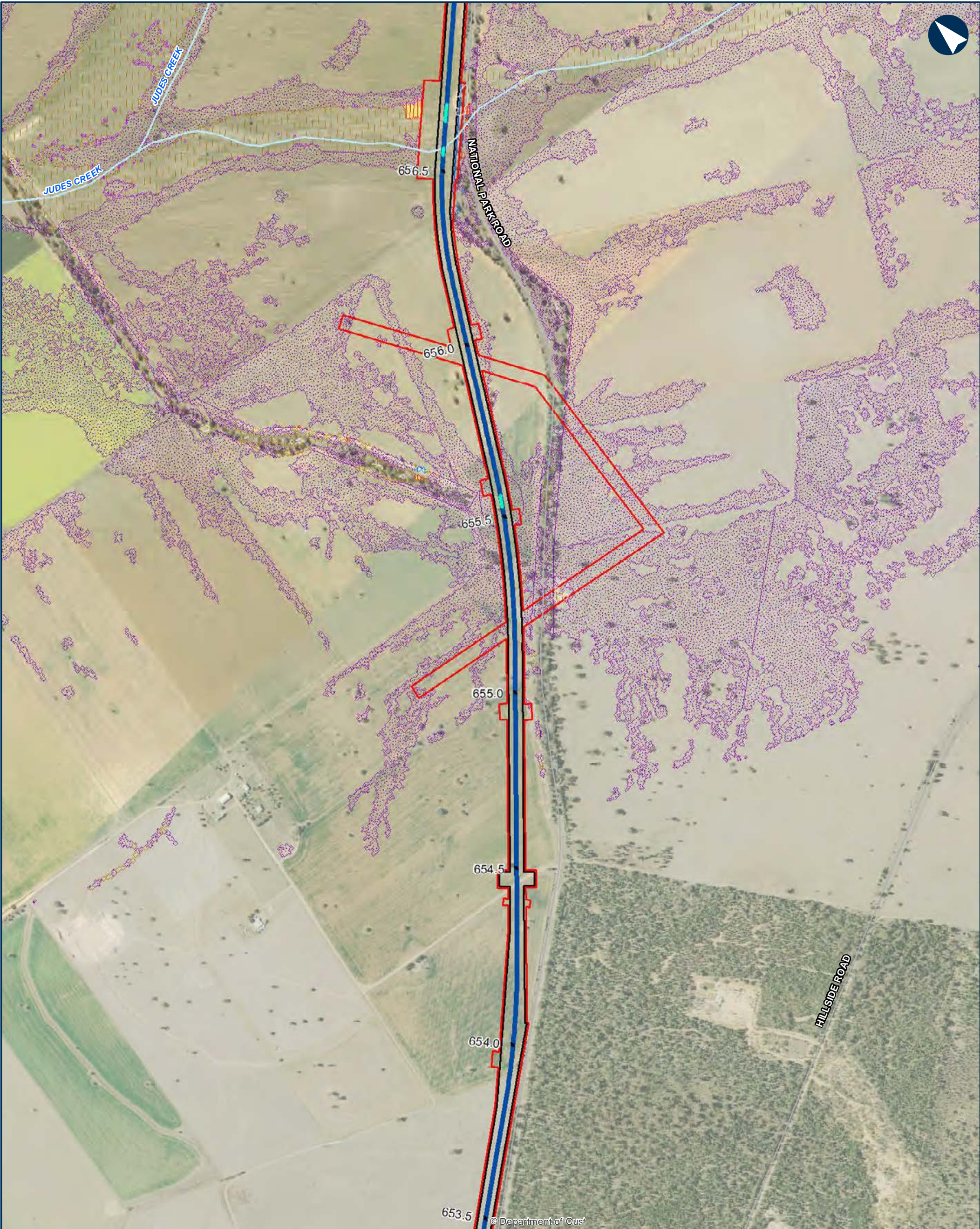
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
 - 4
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



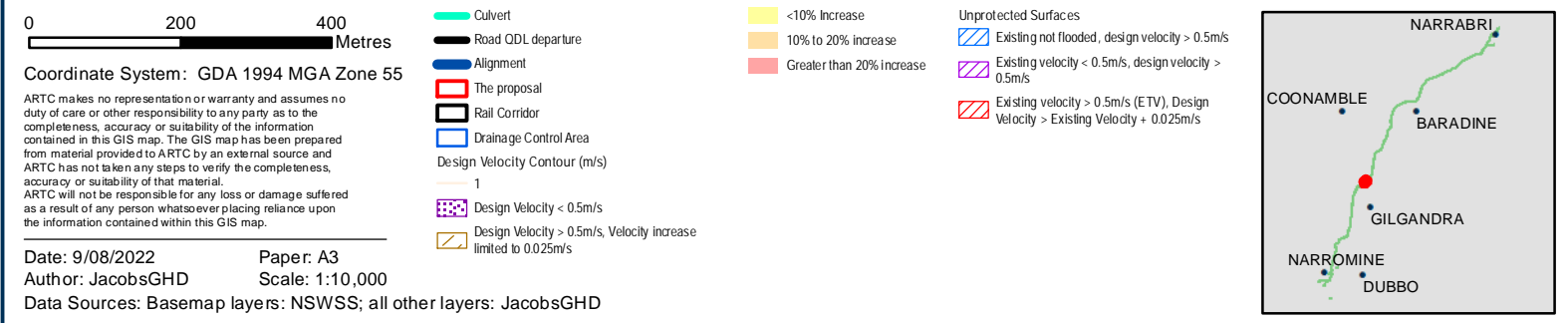
INLAND RAIL **ARTC**

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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.36



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.37

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

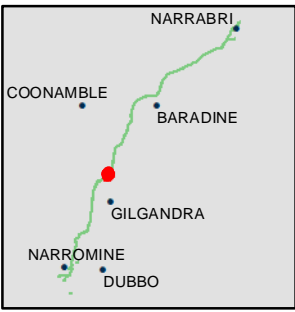
Greater than 20% increase

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

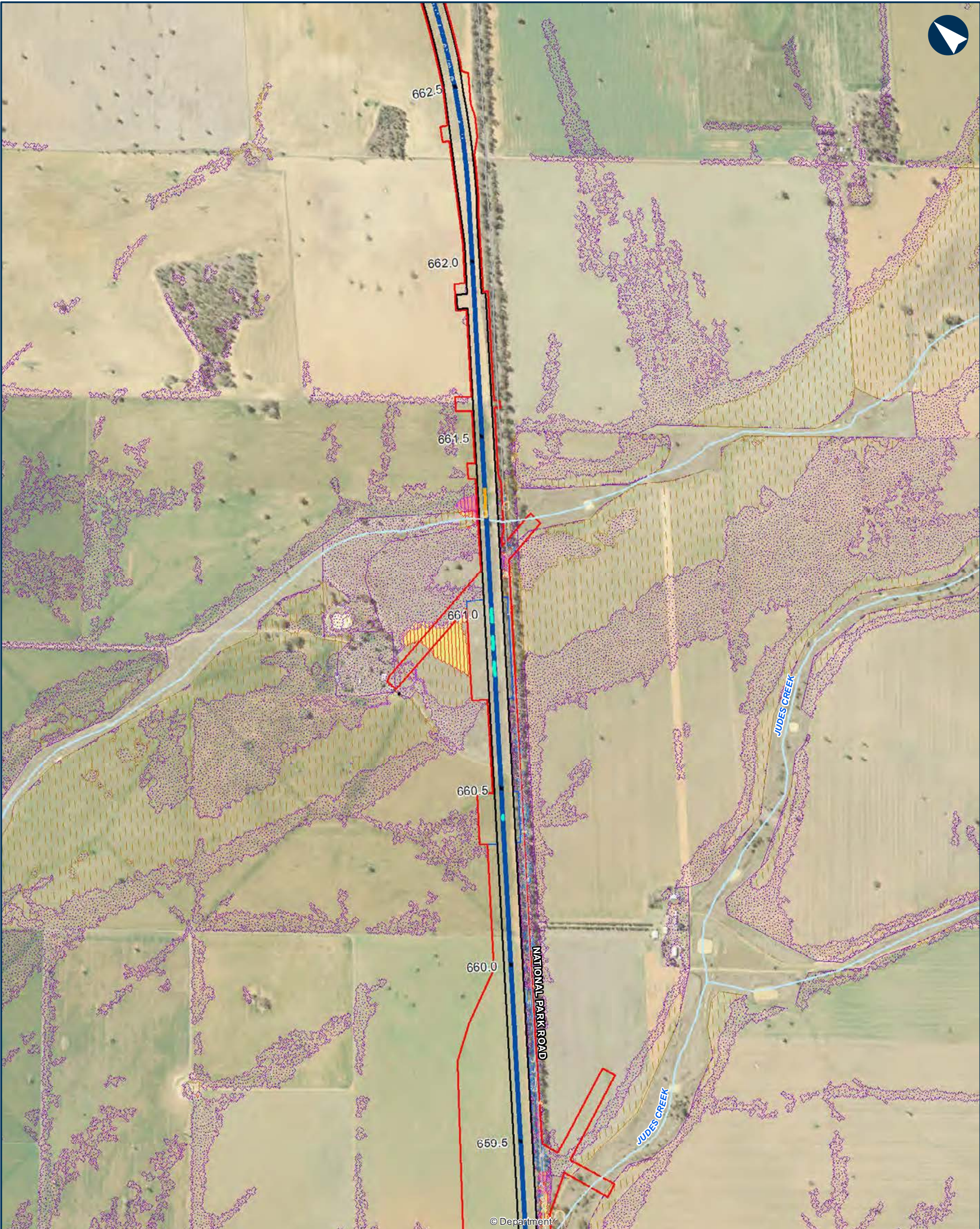
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



INLAND RAIL

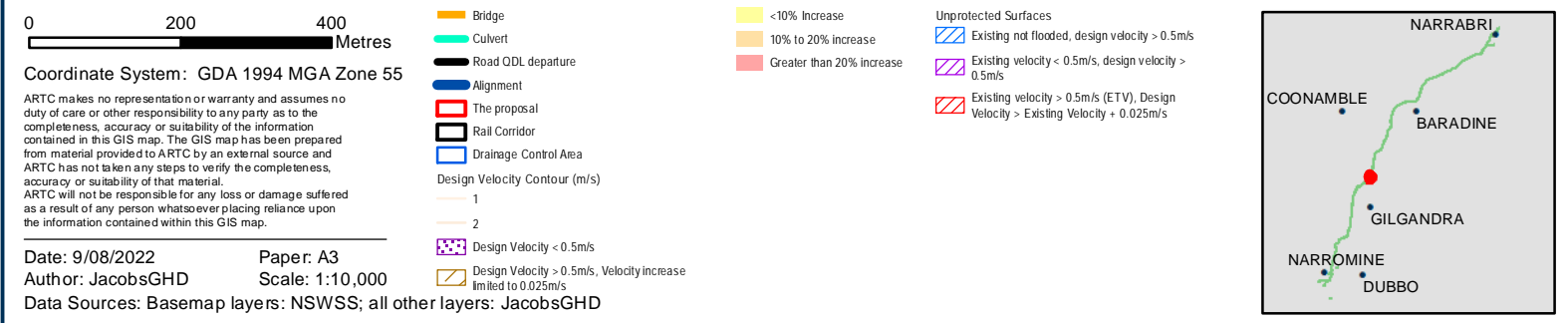
ARTC

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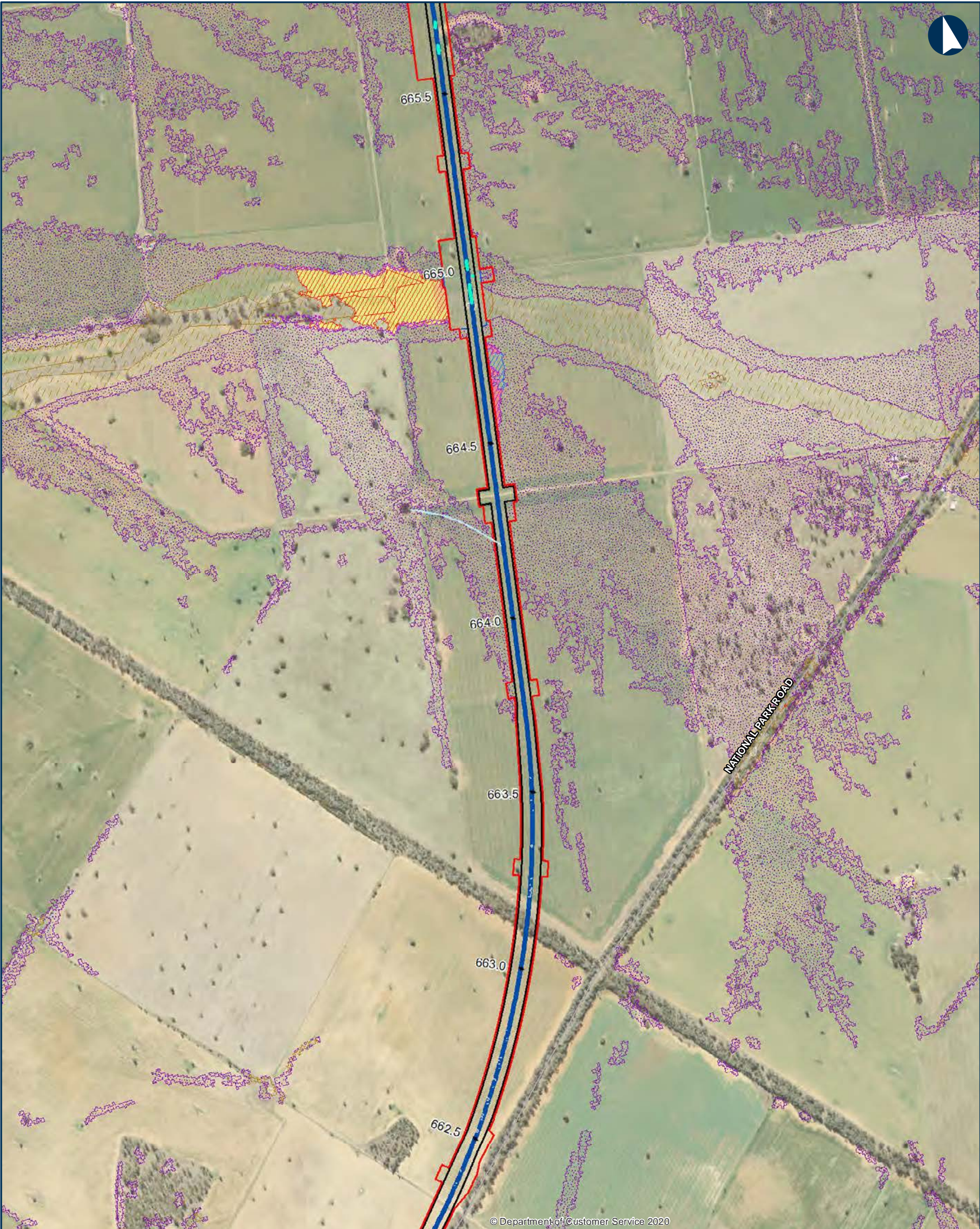
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.38



INLAND RAIL ARTC

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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.39

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

Greater than 20% increase

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s

NARRABRI

COONAMBLE

BARADINE

GILGANDRA

NARROMINE

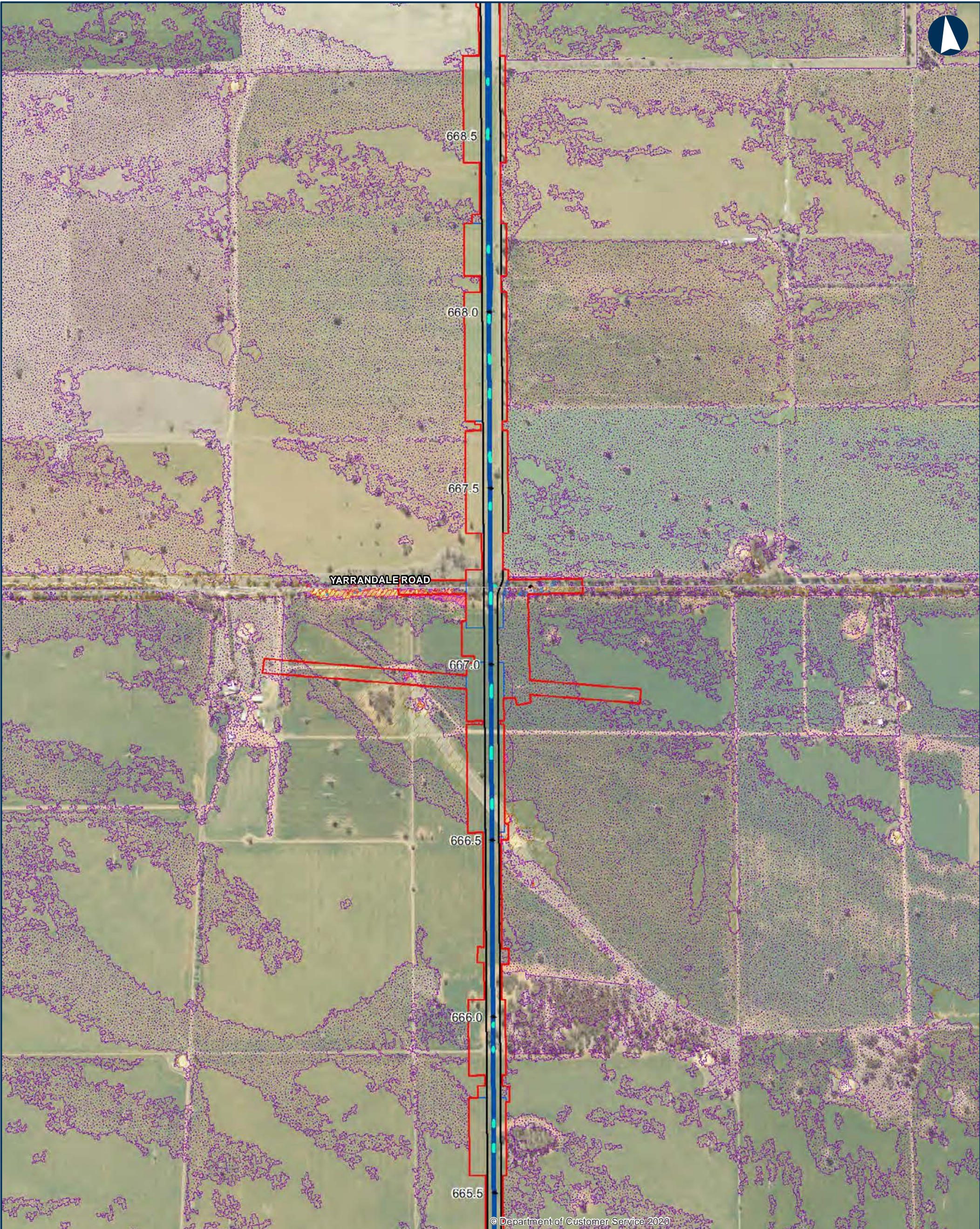
DUBBO

INLAND RAIL

ARTC

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N:\AU\Newcastle\Projects\2219593\GIS\GIS_2500_N2N_v2\Maps\Deliverables_SP\IR\EIS\Flooding_Hydrology\Appendices\2500_EISFWAPP089_QDL_ScourErosion_1pcBlockage_revD.mxd



NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.40

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

Greater than 20% increase

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s

NARRABRI

COONAMBLE

BARADINE

GILGANDRA

NARROMINE

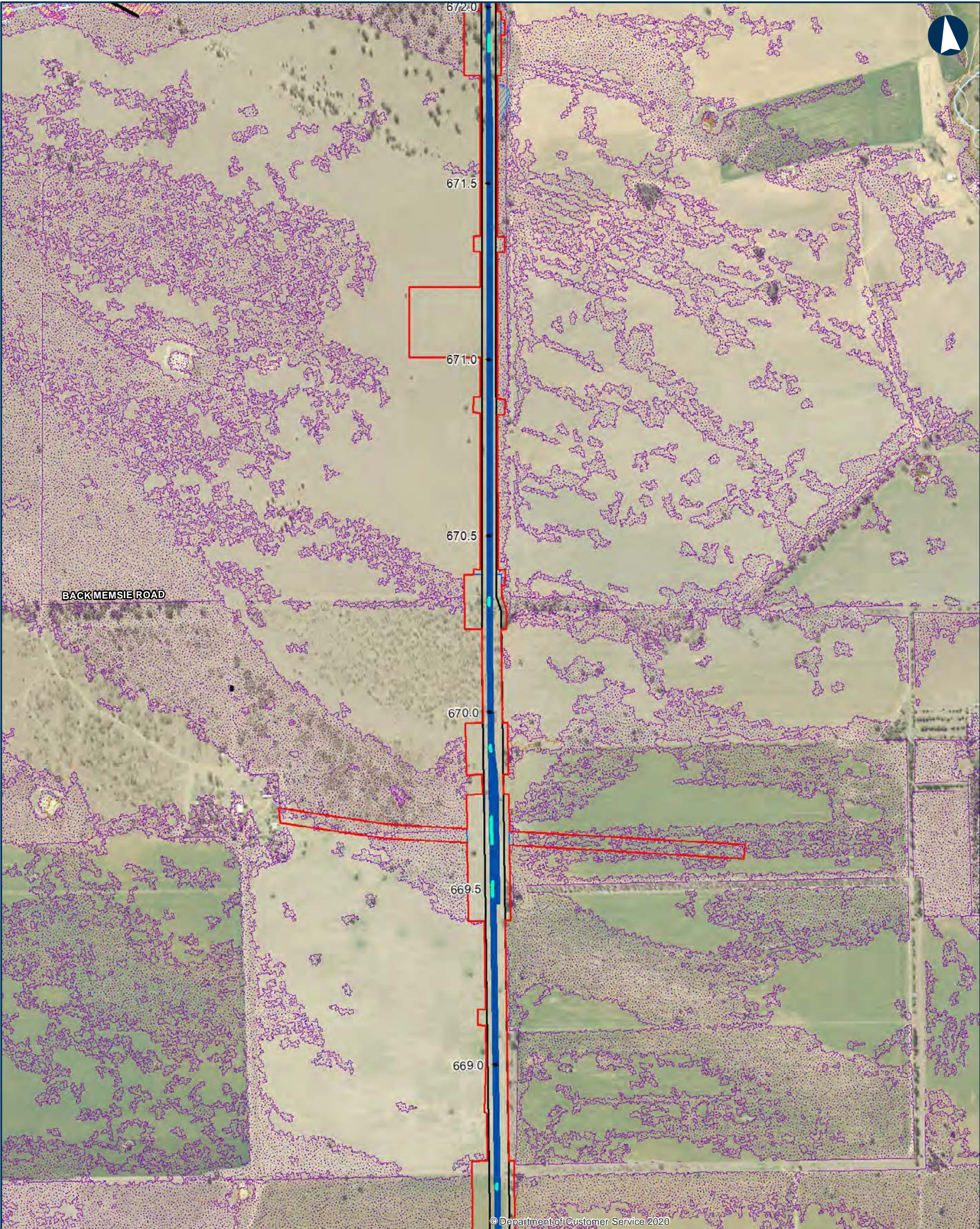
DUBBO

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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.41

0 200 400 Metres
Coordinate System: GDA 1994 MGA Zone 55

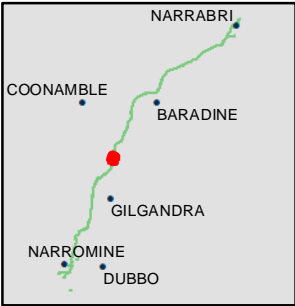
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

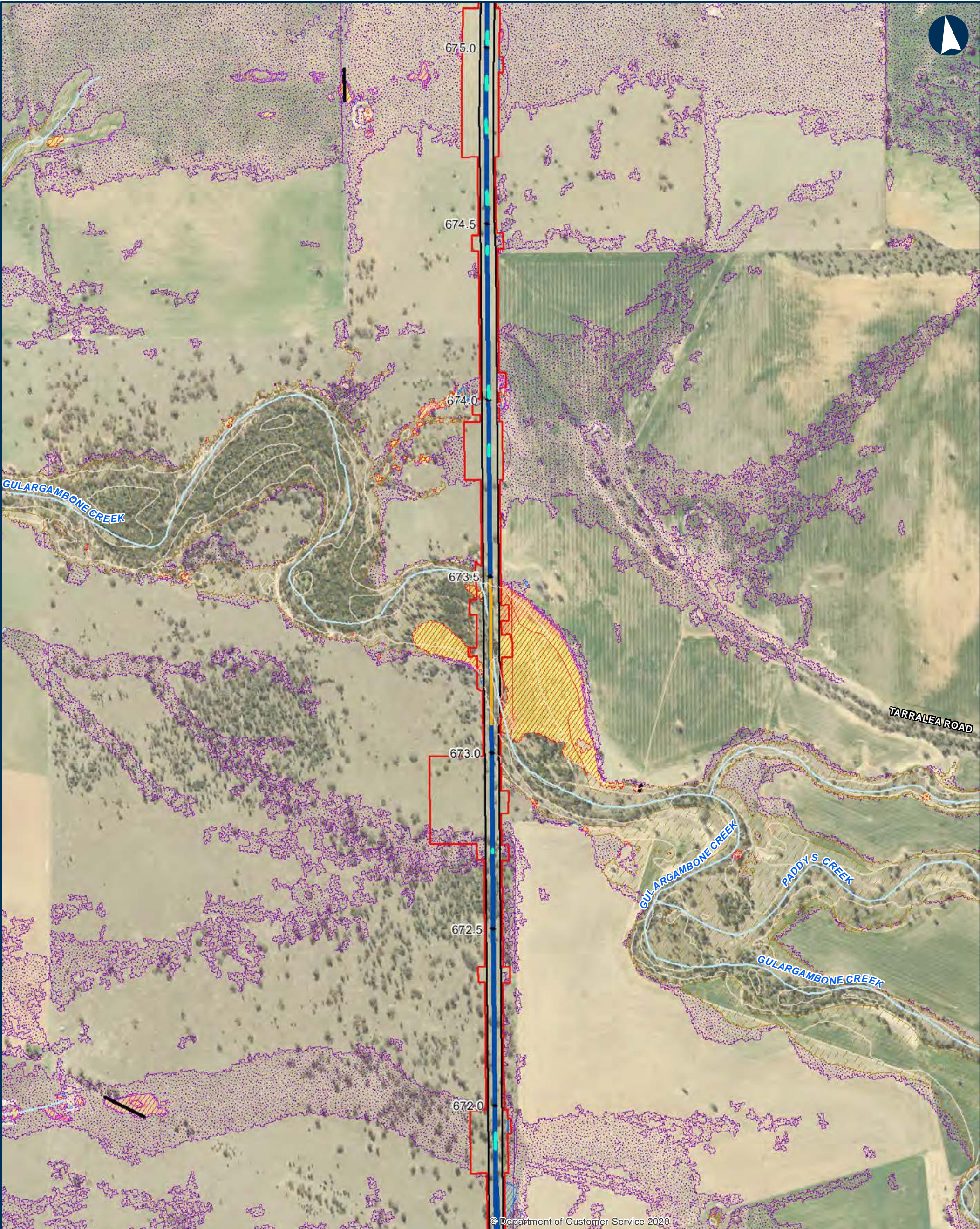
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.42

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge
Culvert
Road ODL departure
Alignment

The proposal
Rail Corridor
Drainage Control Area

Design Velocity Contour (m/s)
1
2
3

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

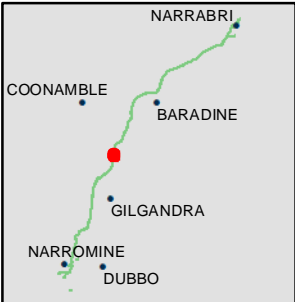
<10% Increase
10% to 20% increase
Greater than 20% increase

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

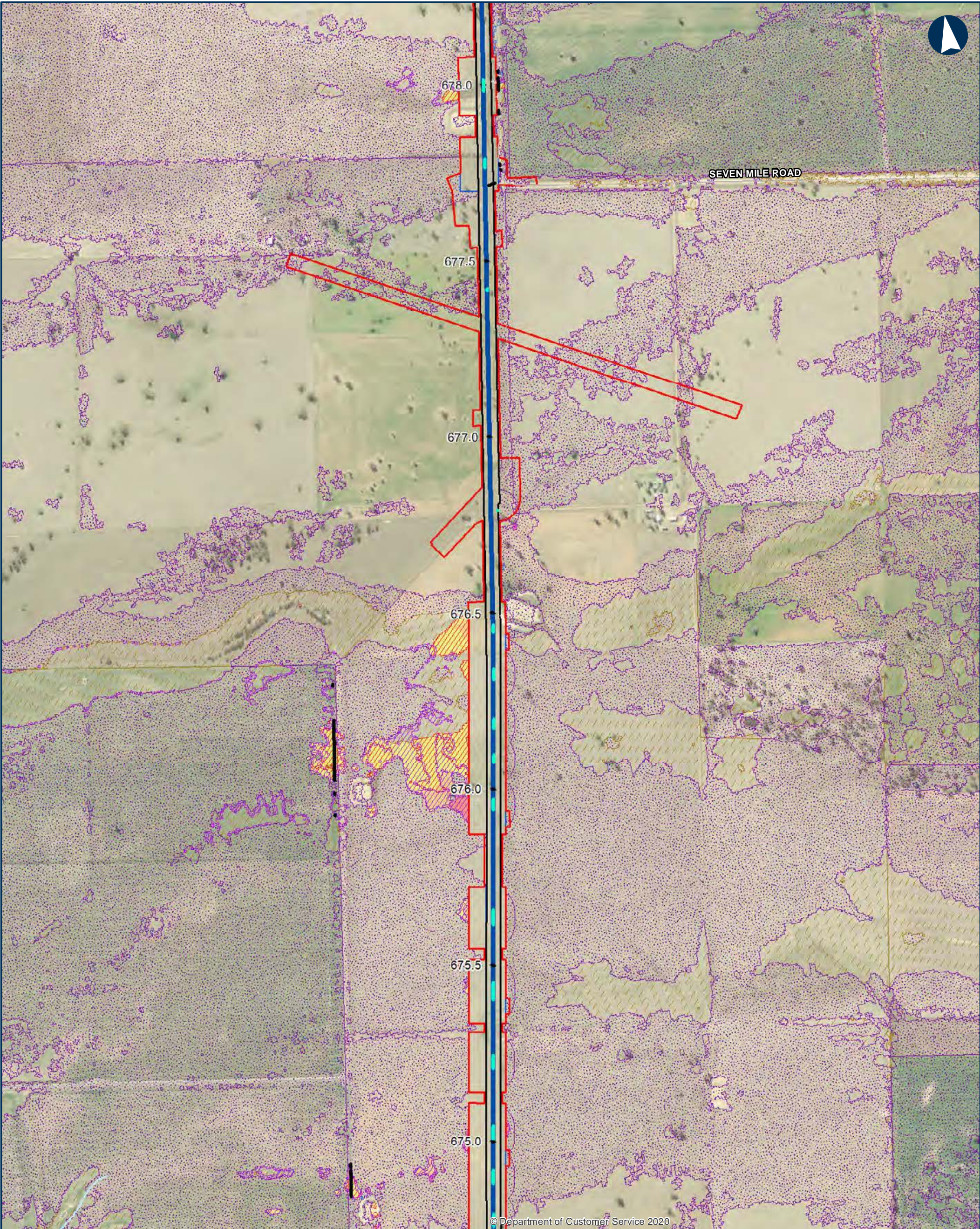
Existing velocity < 0.5m/s, design velocity > 0.5m/s

Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.43

0 200 400 Metres
Coordinate System: GDA 1994 MGA Zone 55

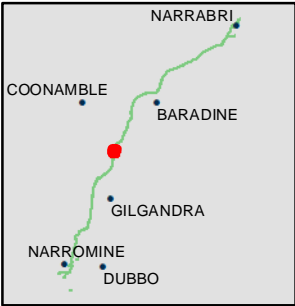
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.44

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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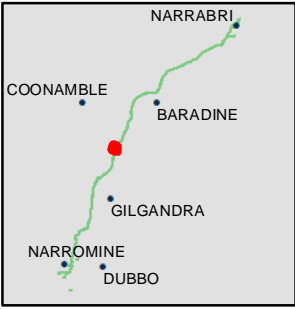
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

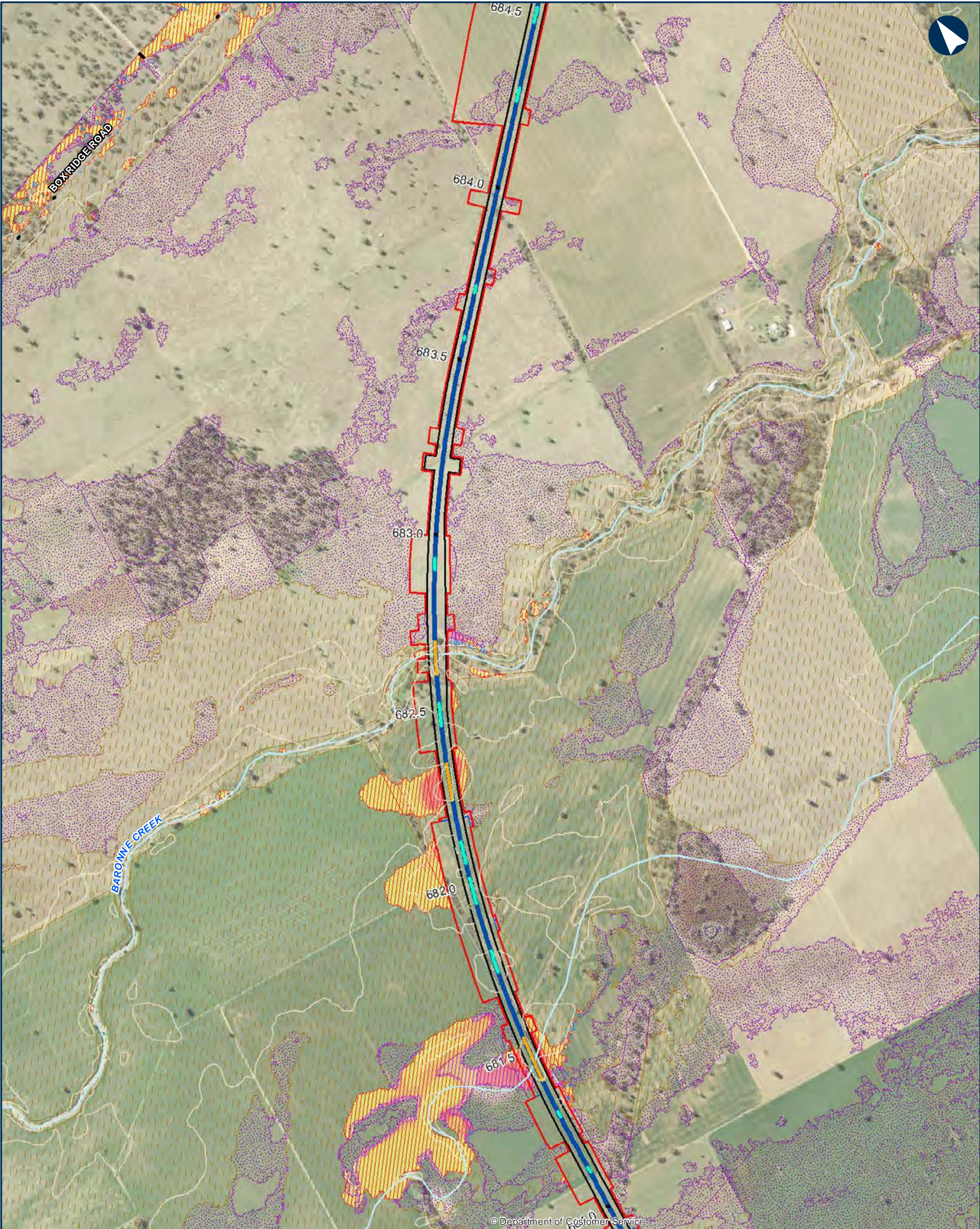
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.45

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

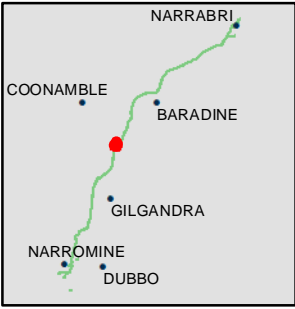
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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- 2
- 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.46

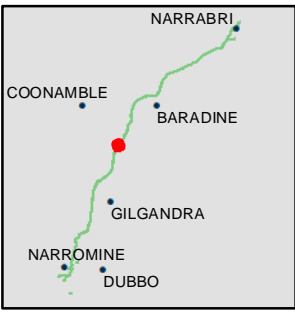
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.47

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

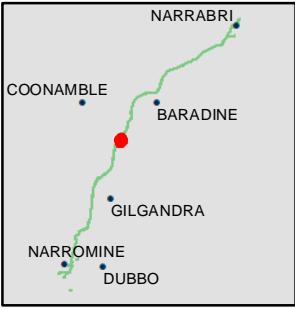
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- 2
- 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

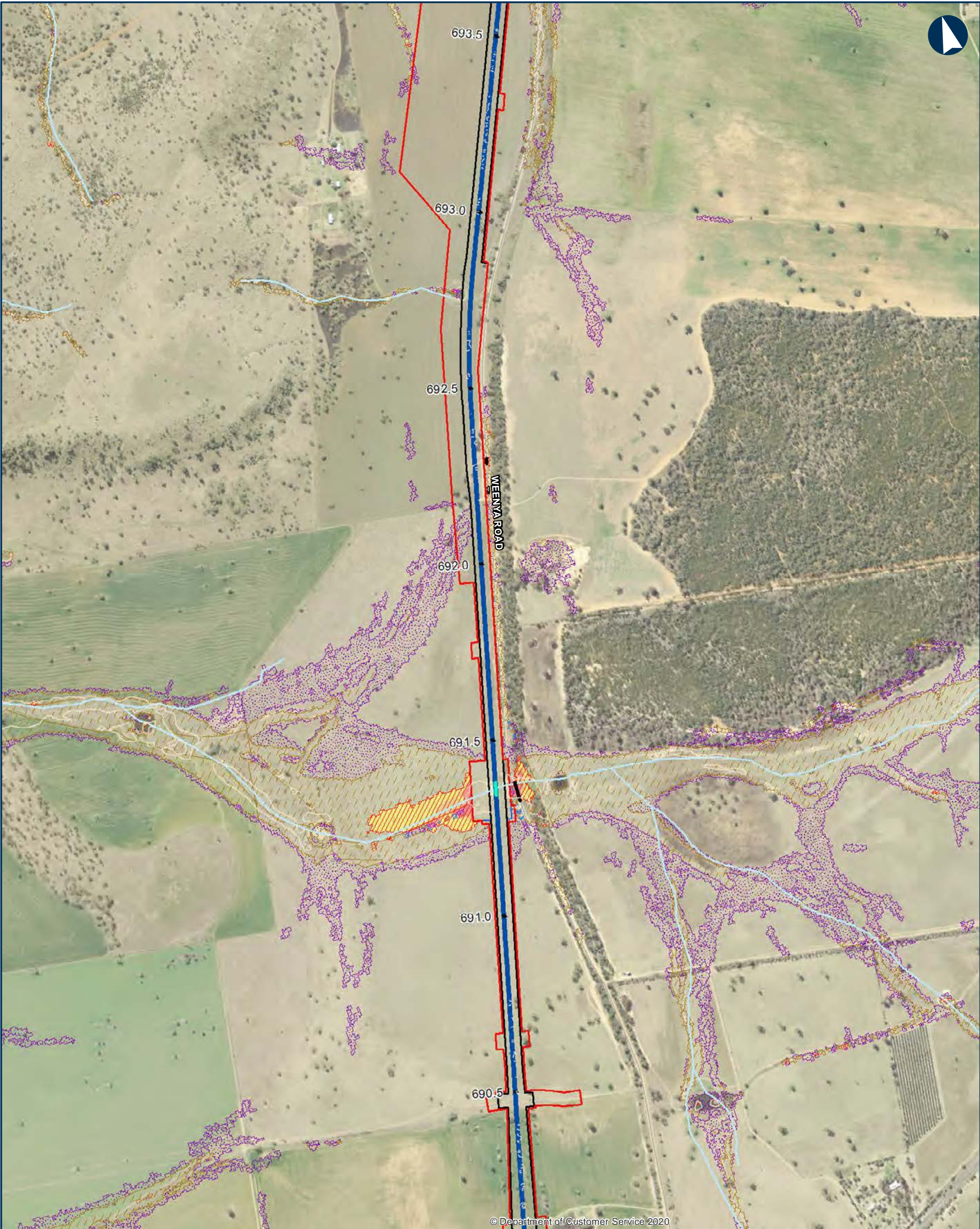
- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.48

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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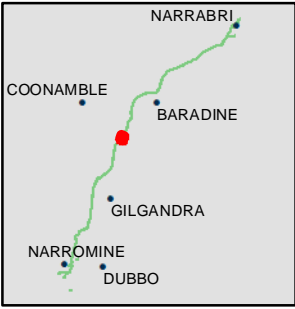
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

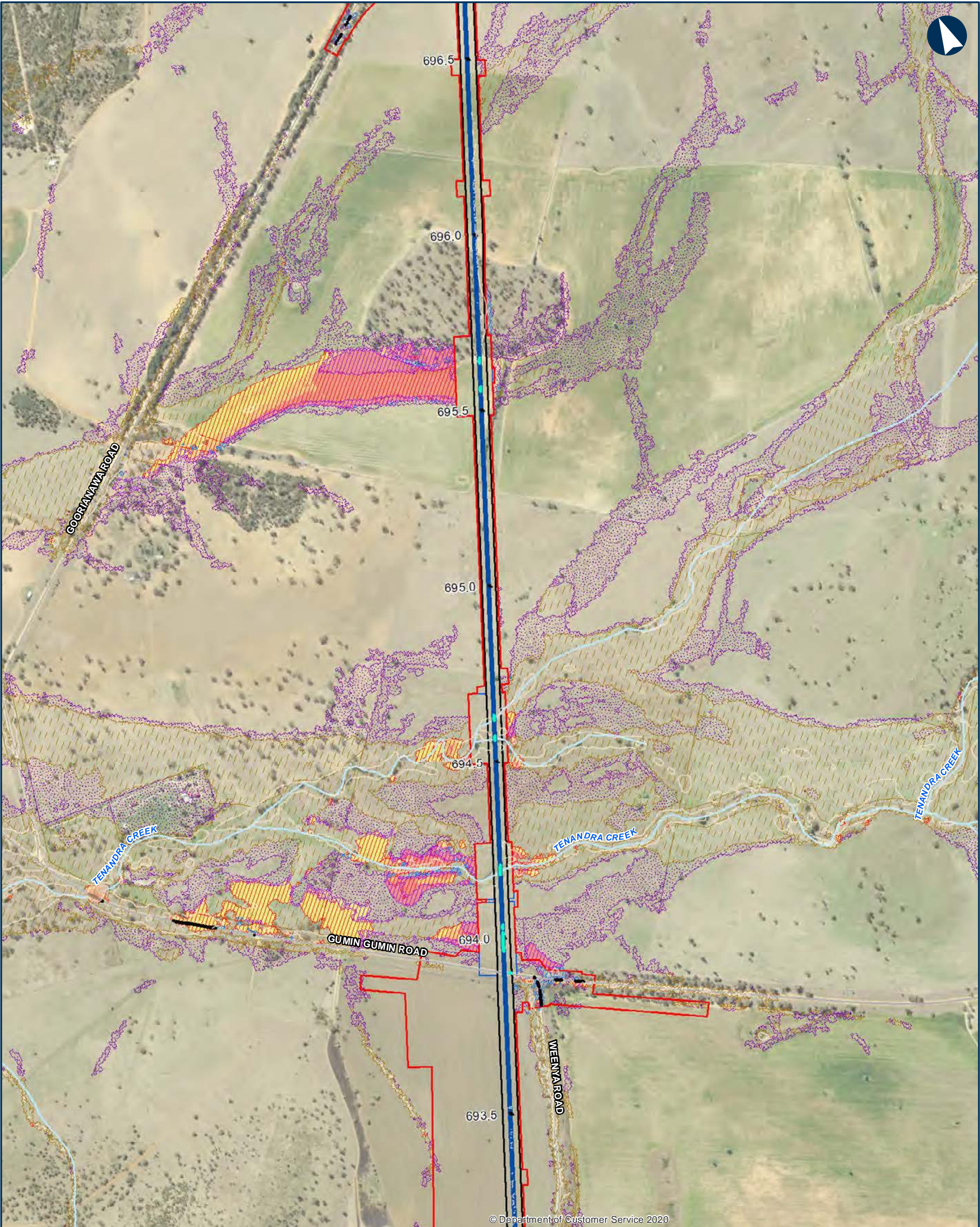
- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.49

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

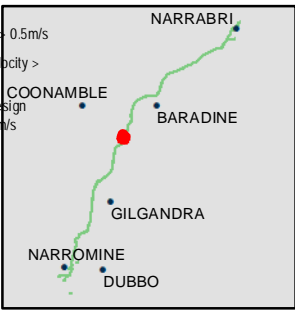
Culvert
Road QDL departure
Alignment
The proposal
Rail Corridor
Drainage Control Area

Design Velocity Contour (m/s)

1
2
3
4
5
6
7
8

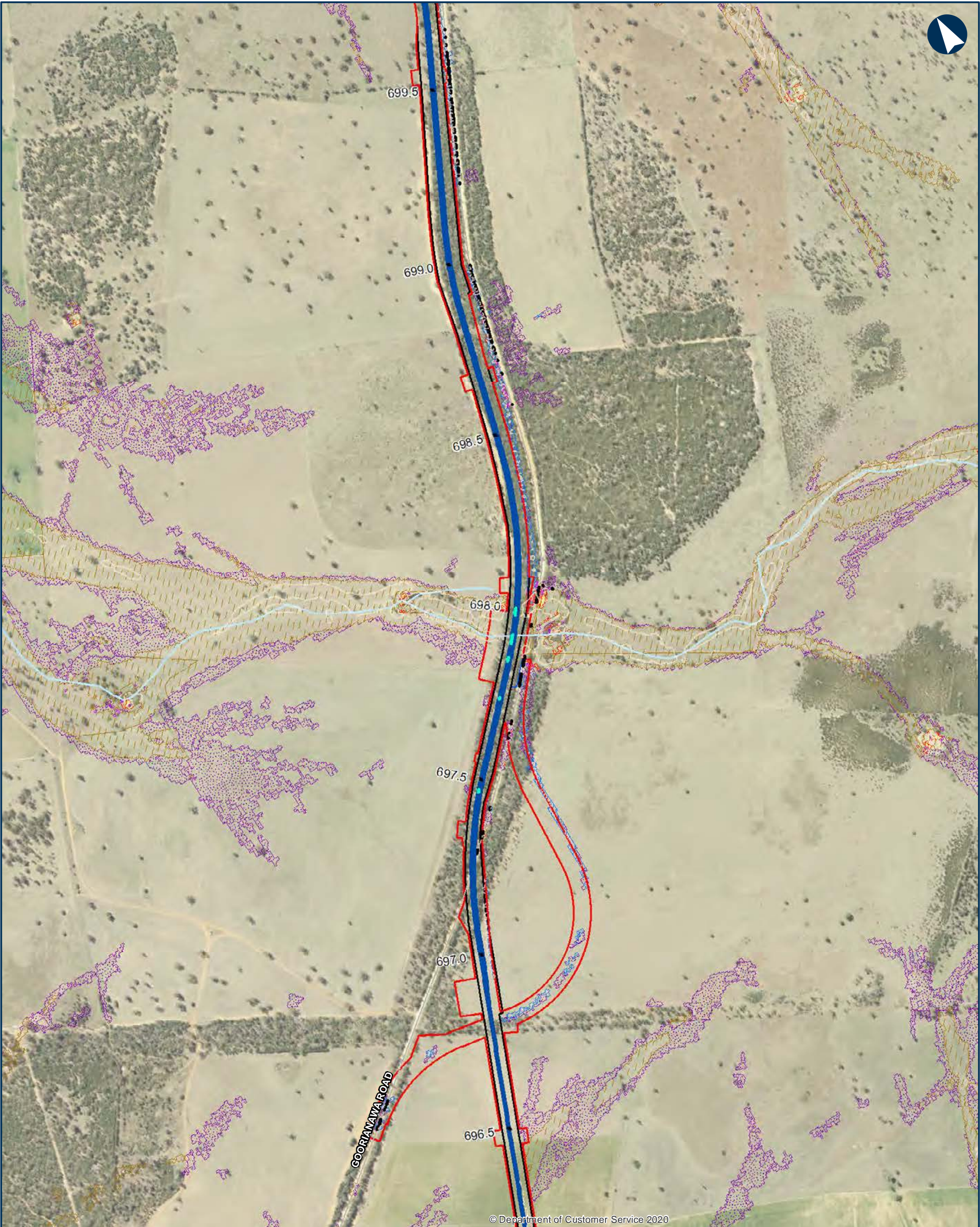
<10% Increase
10% to 20% increase
Greater than 20% increase

Unprotected Surfaces
Existing not flooded, design velocity > 0.5m/s
Existing velocity < 0.5m/s, design velocity > 0.5m/s
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.50

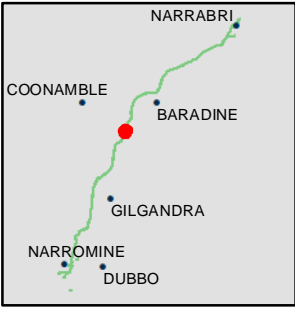
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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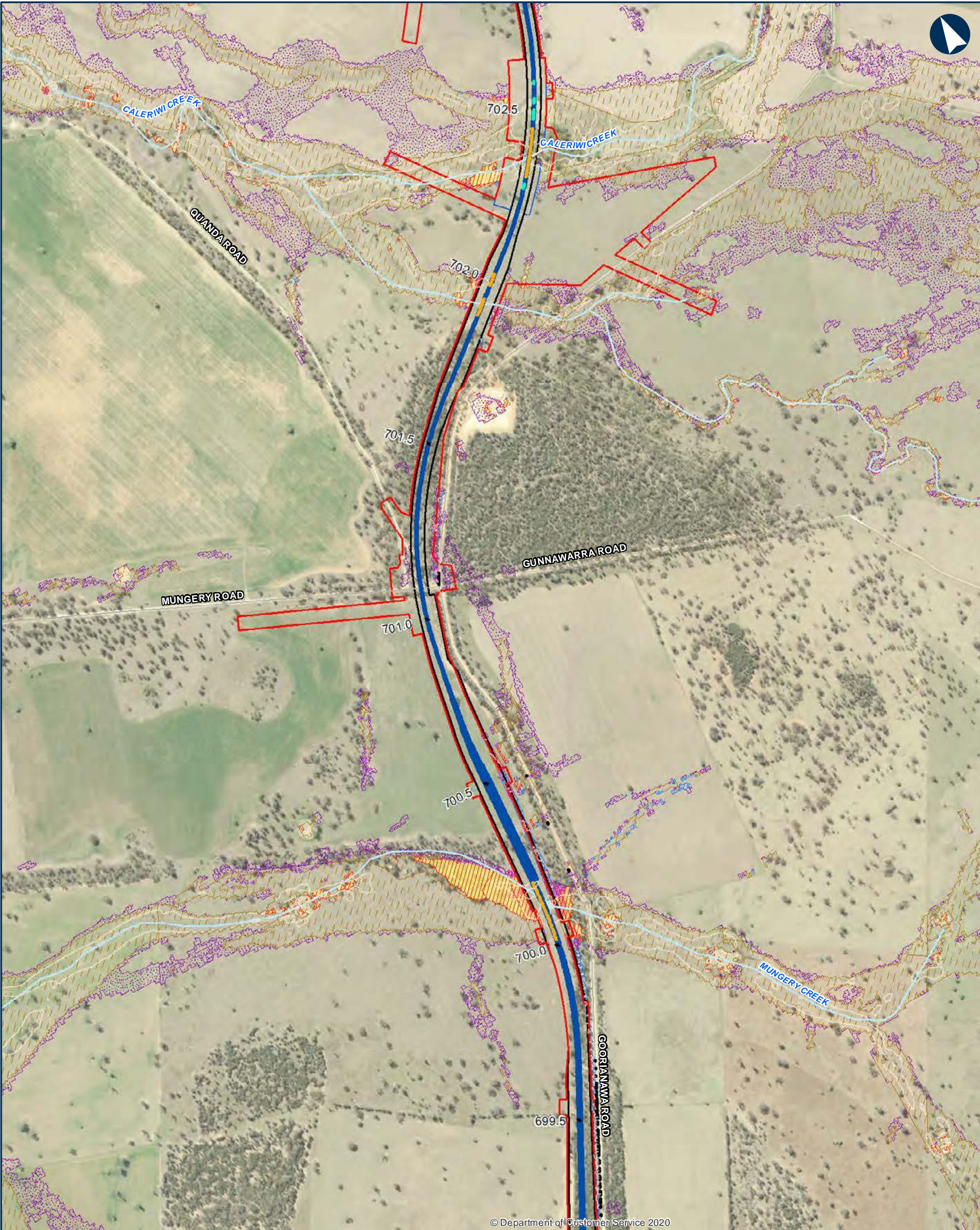
Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
 - 4
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.51

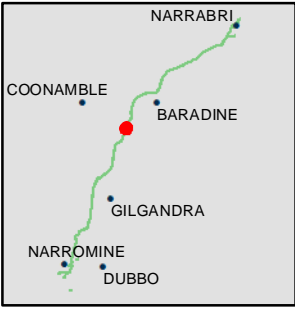
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
 - 4
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.52

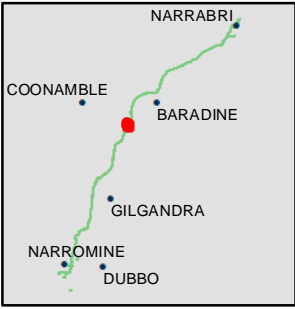
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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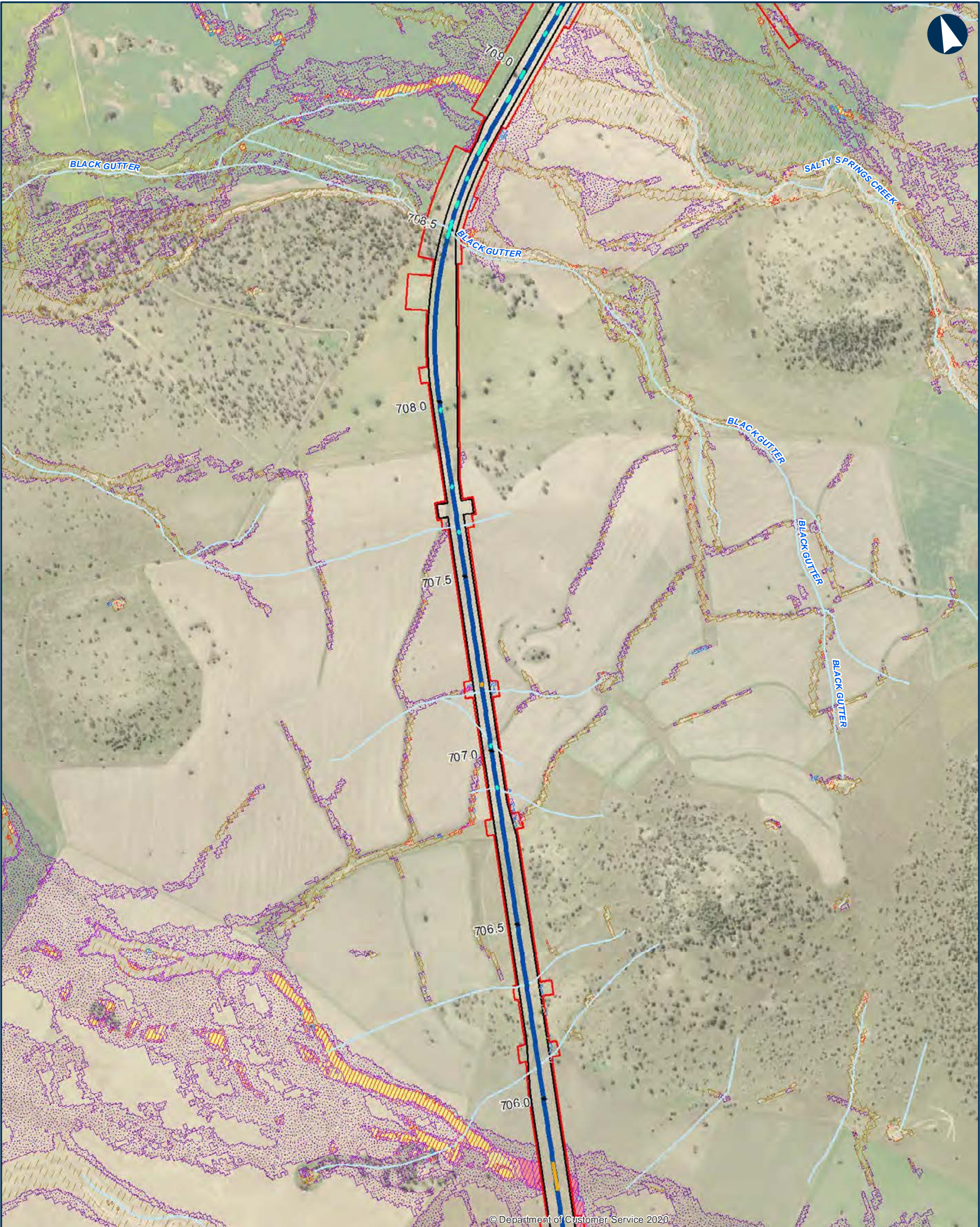
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road QDL departure
- Alignment
- The proposal
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- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.53

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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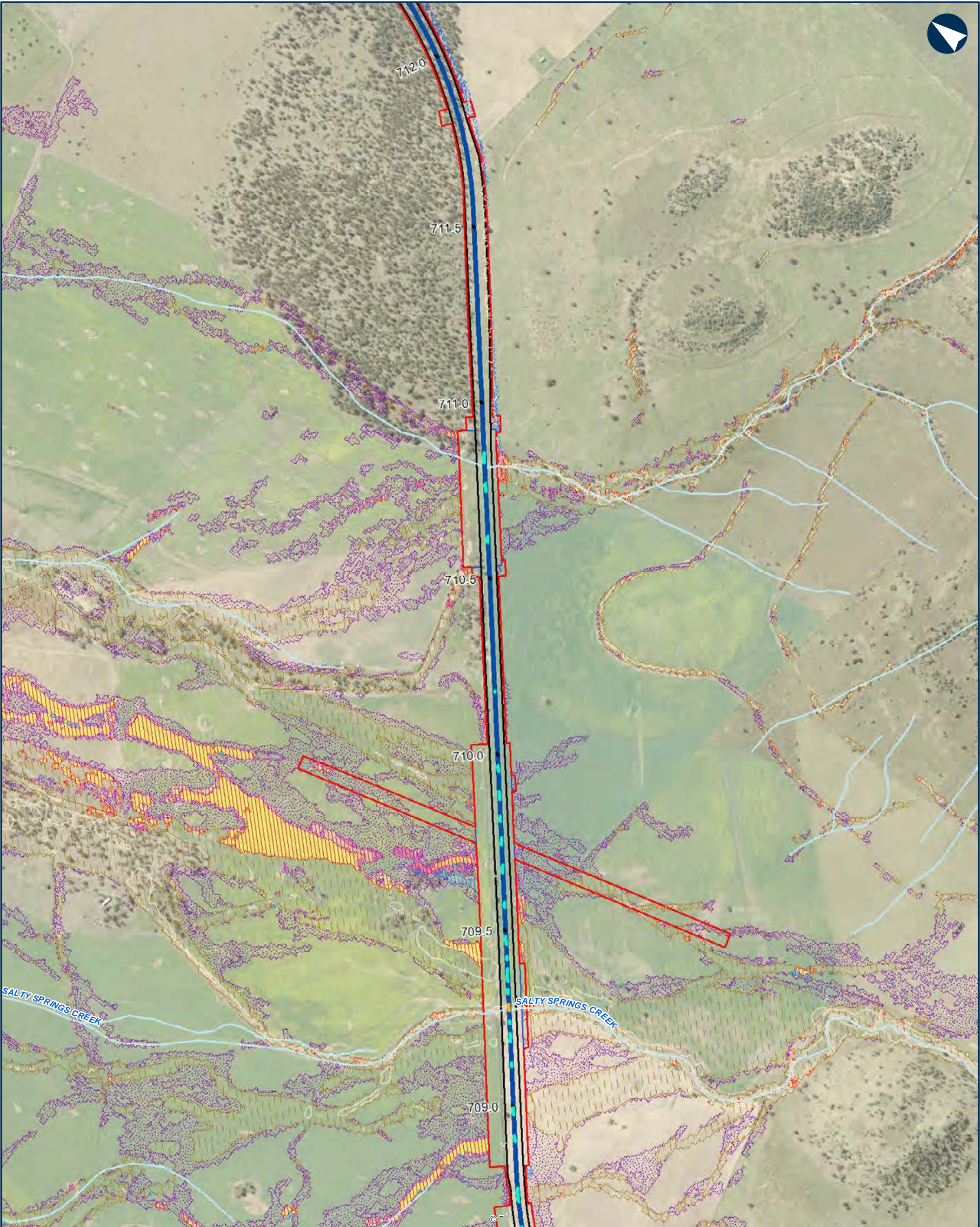
Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
 - 4
 - 5
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (E.T.V.) Design Velocity > Existing Velocity + 0.025m/s
- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.54

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

3

4

5

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase

10% to 20% Increase

Greater than 20% Increase
- Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

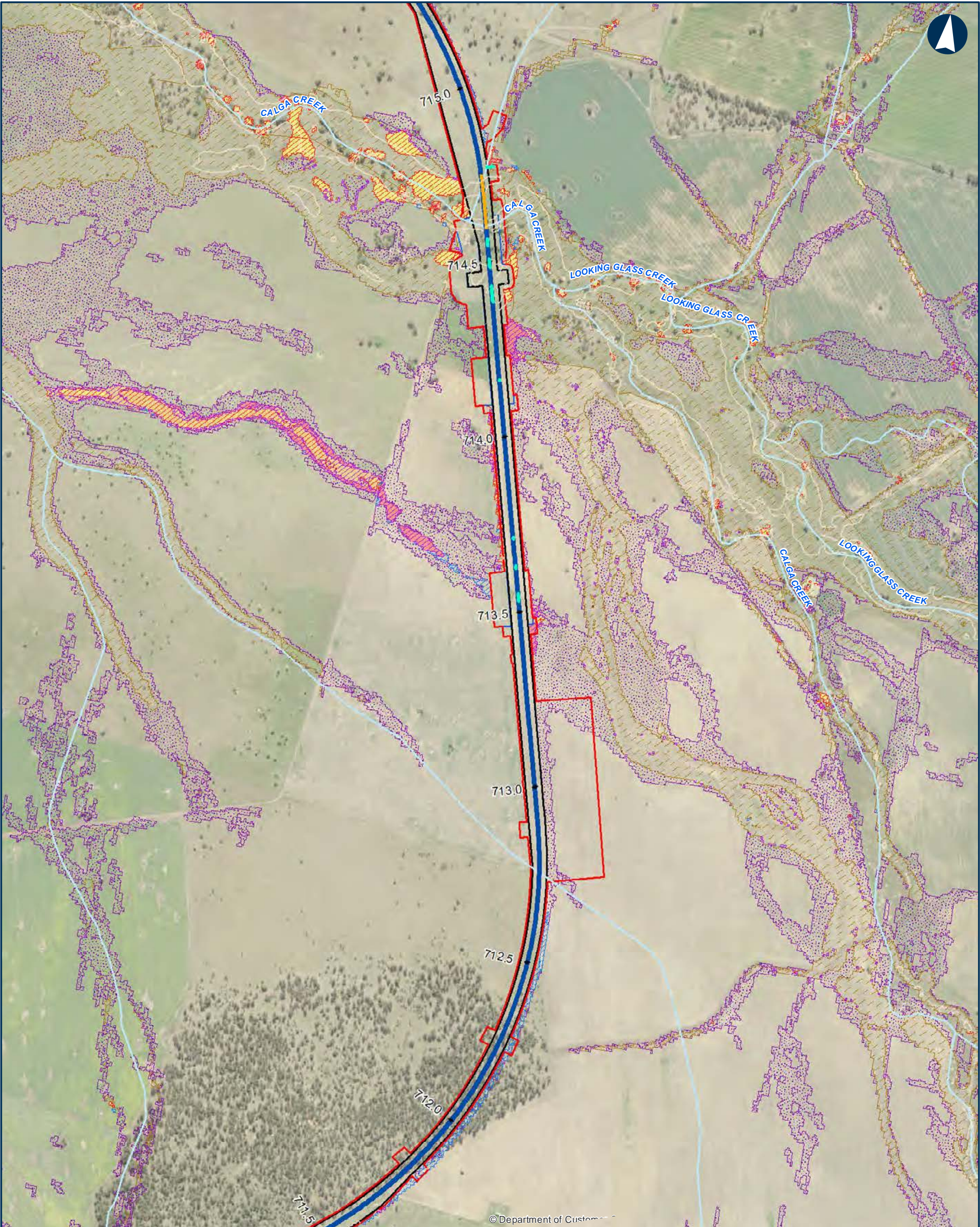
Existing velocity > 0.5m/s (E.T.V.) Design Velocity > Existing Velocity + 0.025m/s



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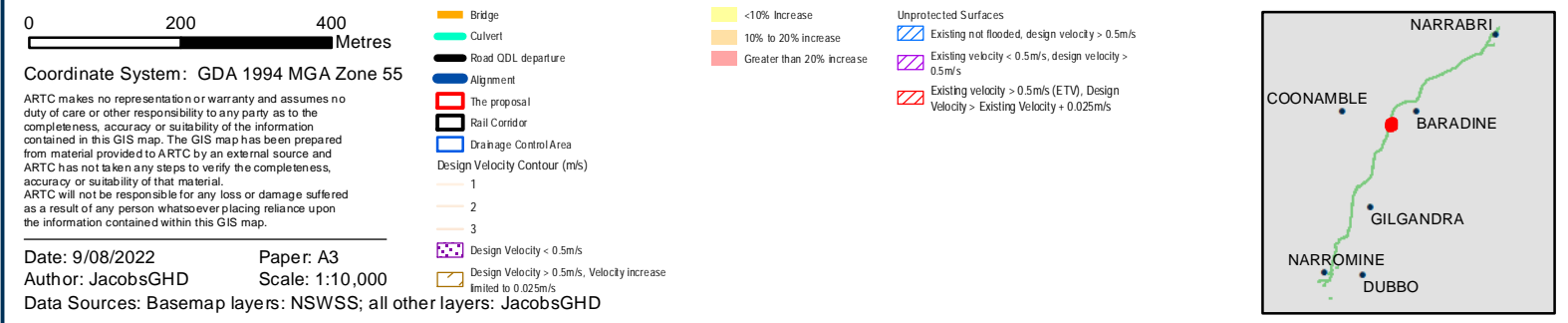
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.55



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.56

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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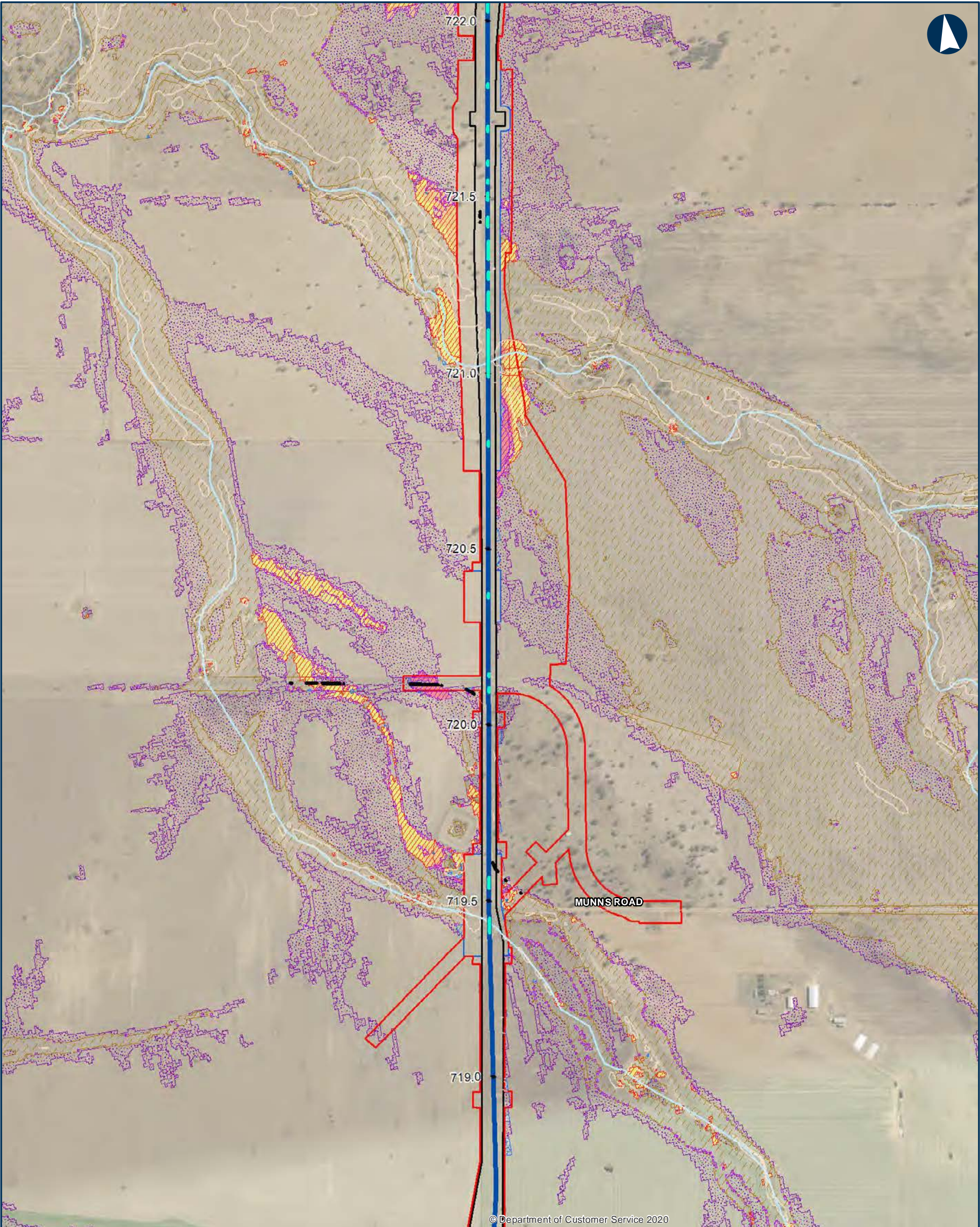
Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
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 - 4
 - 5
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (E.T.V.) Design Velocity > Existing Velocity + 0.025m/s
- Velocity Increase
 - < 10% Increase
 - 10% to 20% Increase
 - Greater than 20% Increase



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.57

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

3

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% Increase

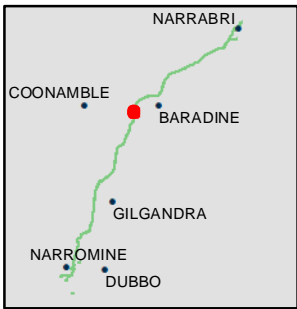
Greater than 20% increase

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

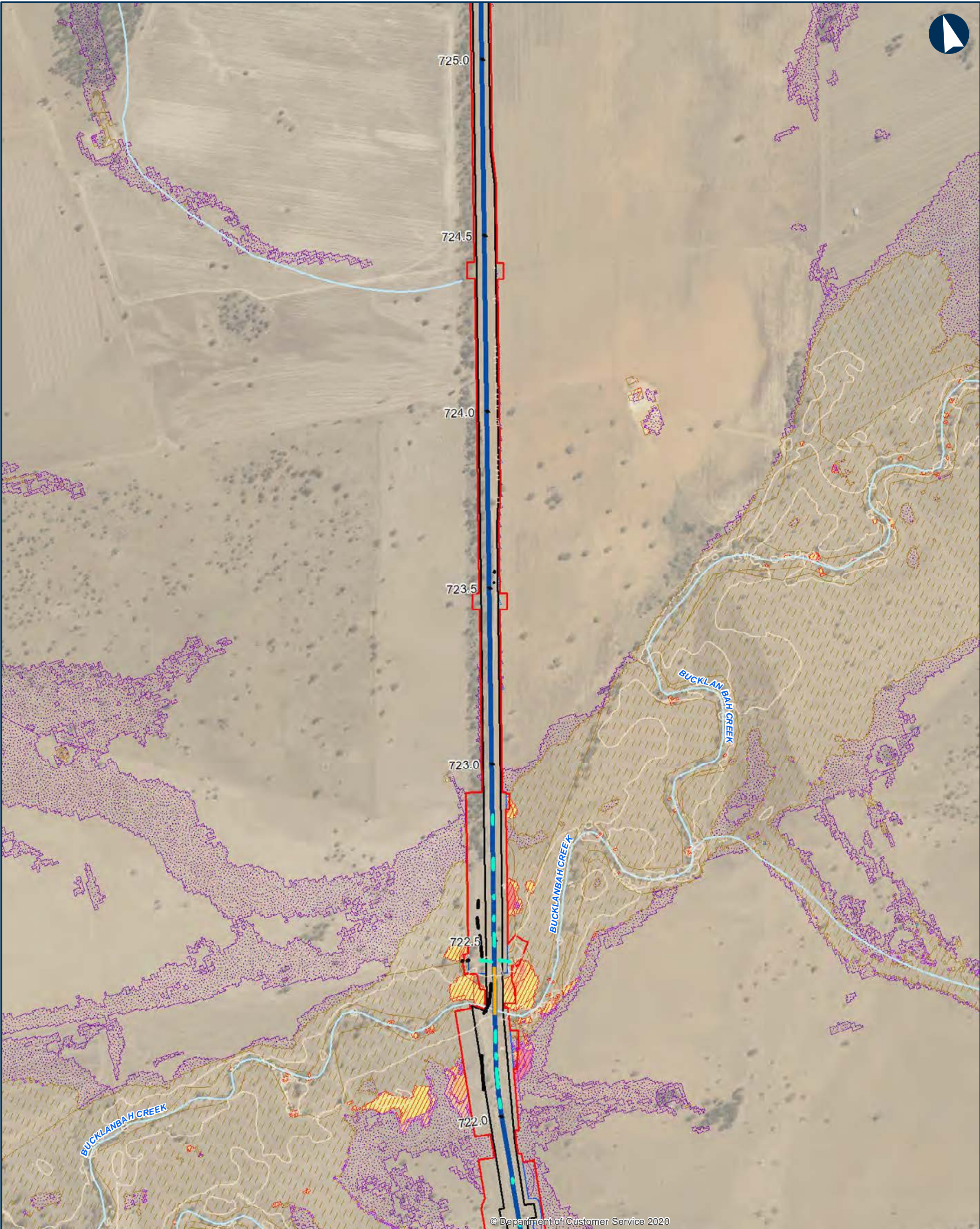
Existing velocity < 0.5m/s, design velocity > 0.5m/s

Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.58

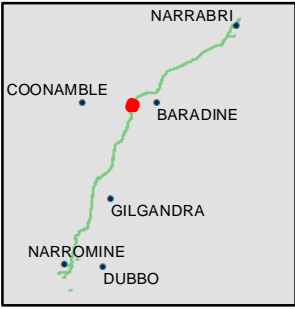
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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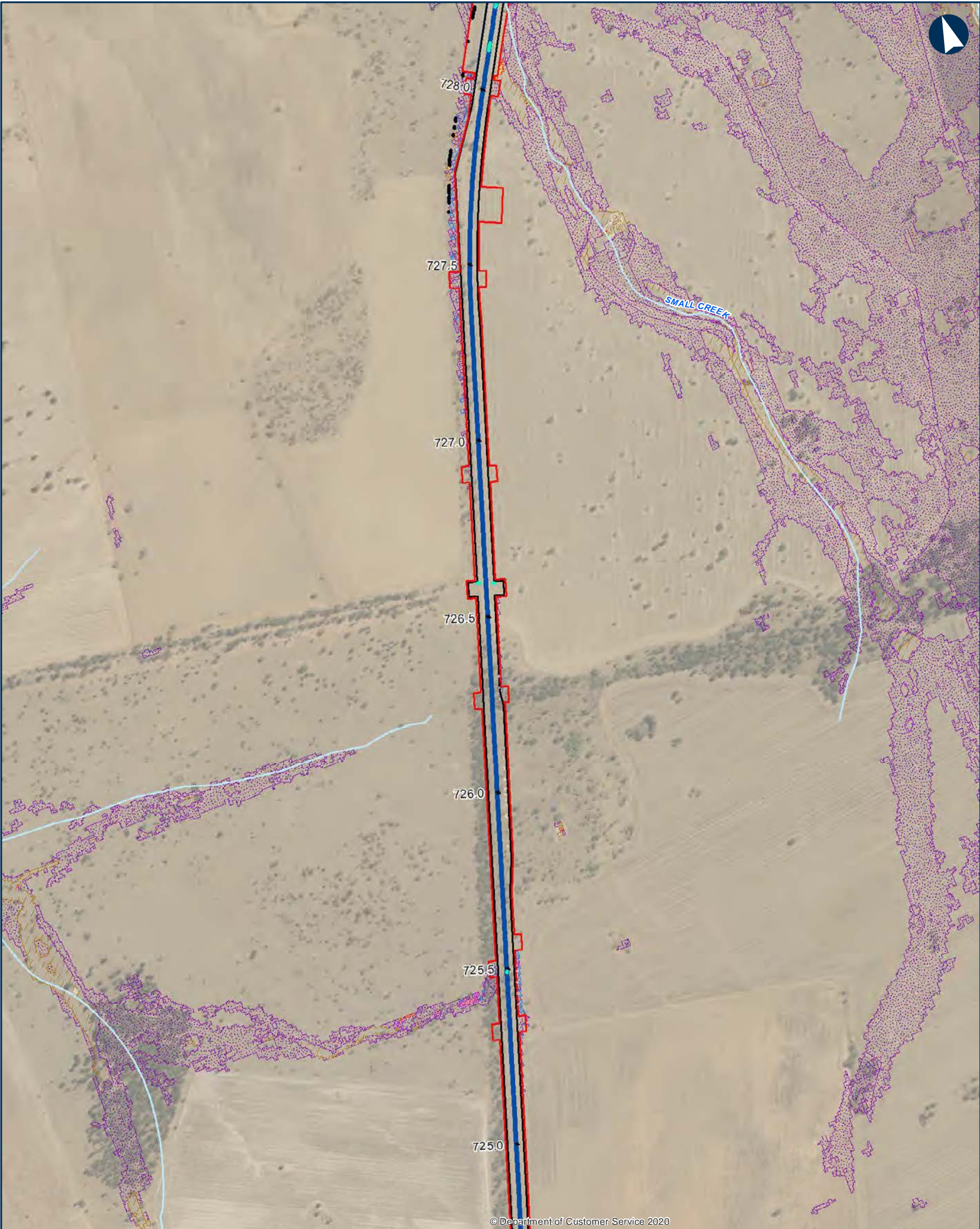
Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
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- Alignment
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- Design Velocity Contour (m/s)
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 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.59

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

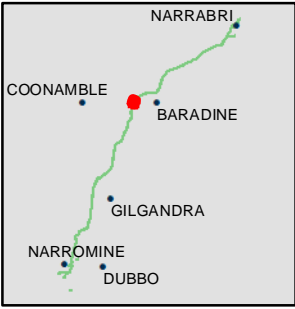
Greater than 20% increase

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

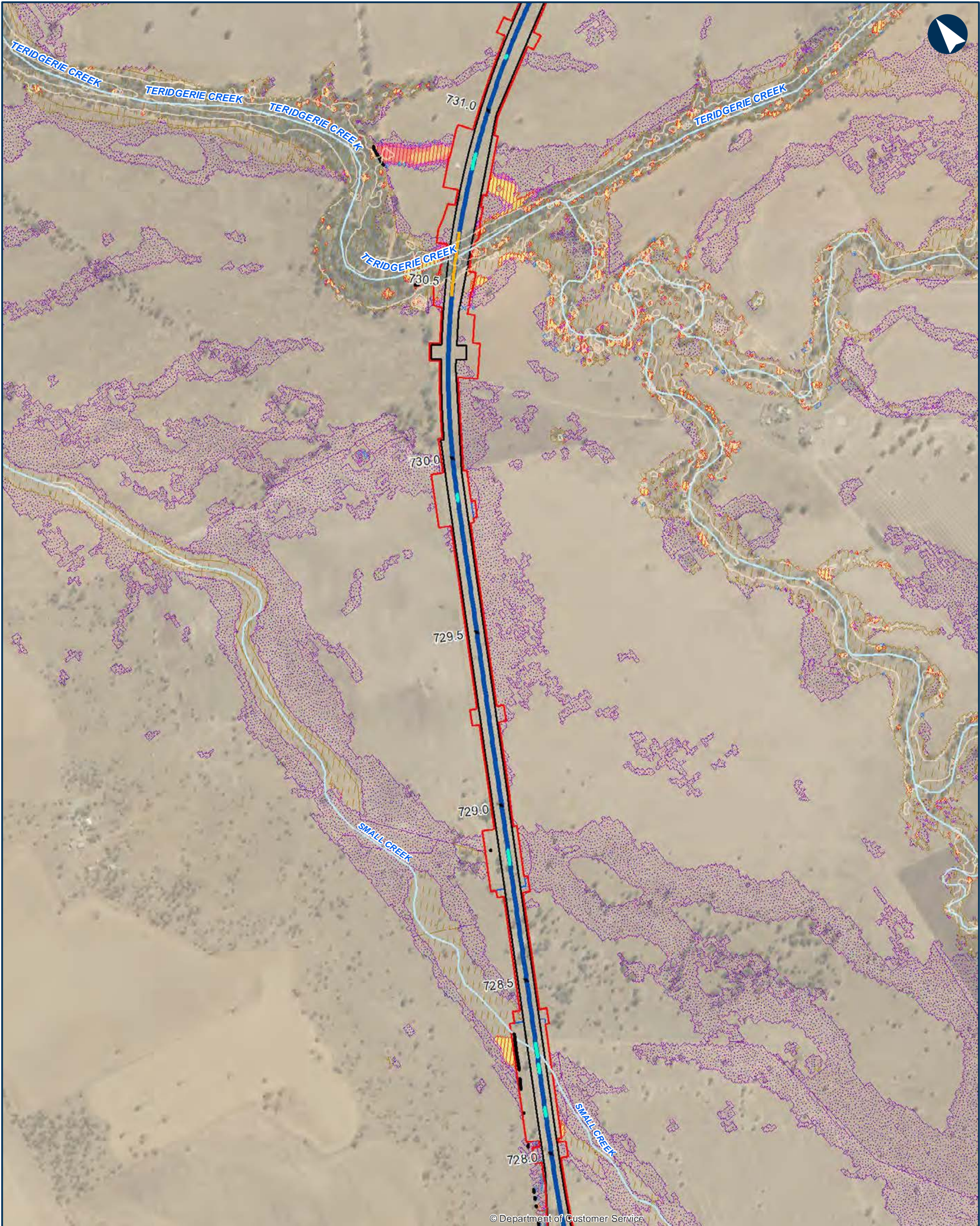
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.60

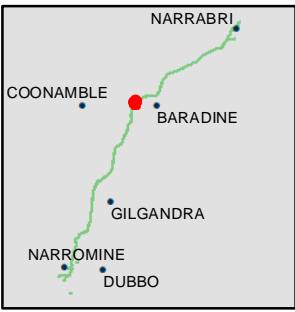
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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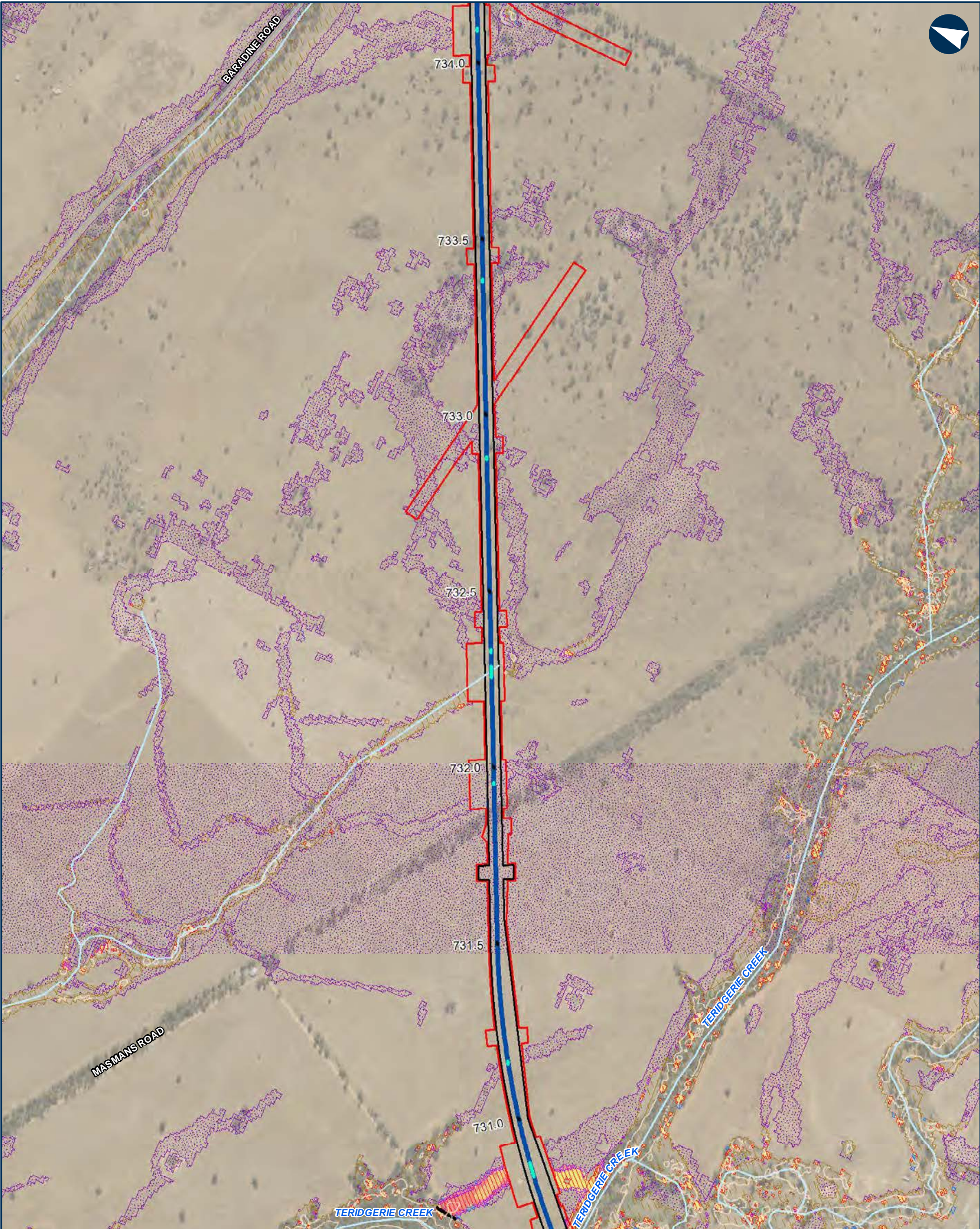
Date: 9/08/2022 Paper: A3
 Author: JacobsGHD Scale: 1:10,000
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- Bridge
- Culvert
- Road QDL departure
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- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- 2
- 3
- 4
- 5
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (E.T.V.) Design Velocity > Existing Velocity + 0.025m/s
- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.61

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road ODL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

3

4

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

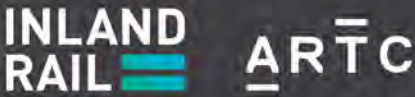
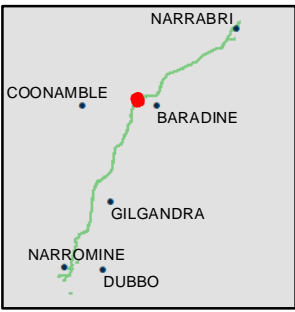
Greater than 20% increase

Unprotected Surfaces

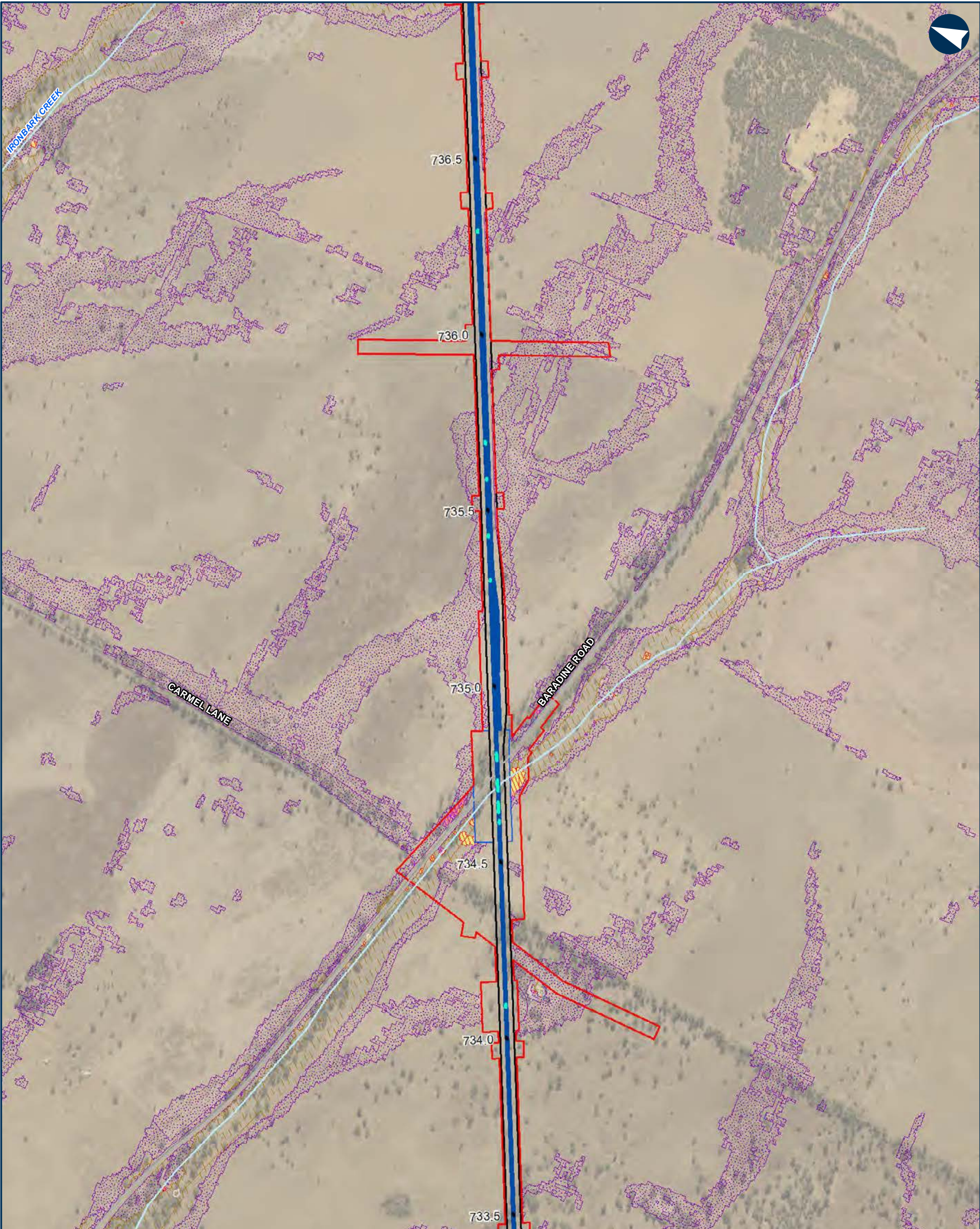
Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.62

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

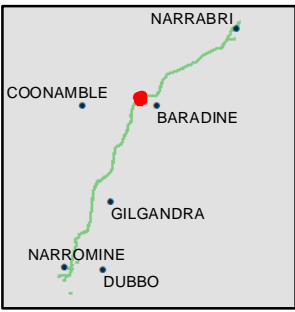
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

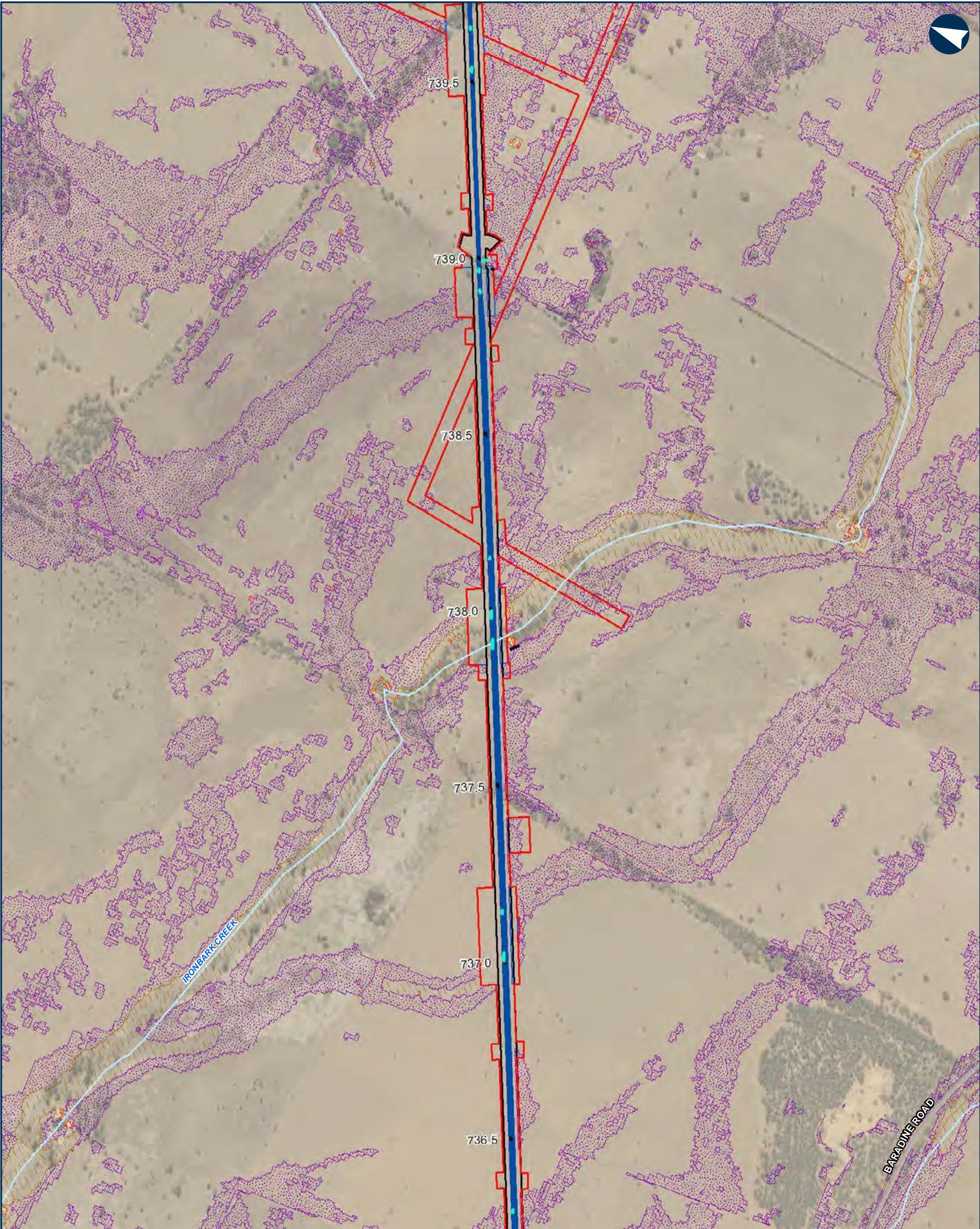
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.63

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Author: JacobsGHD
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Paper: A3
Scale: 1:10,000

- Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase

10% to 20% increase

Greater than 20% increase
- Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

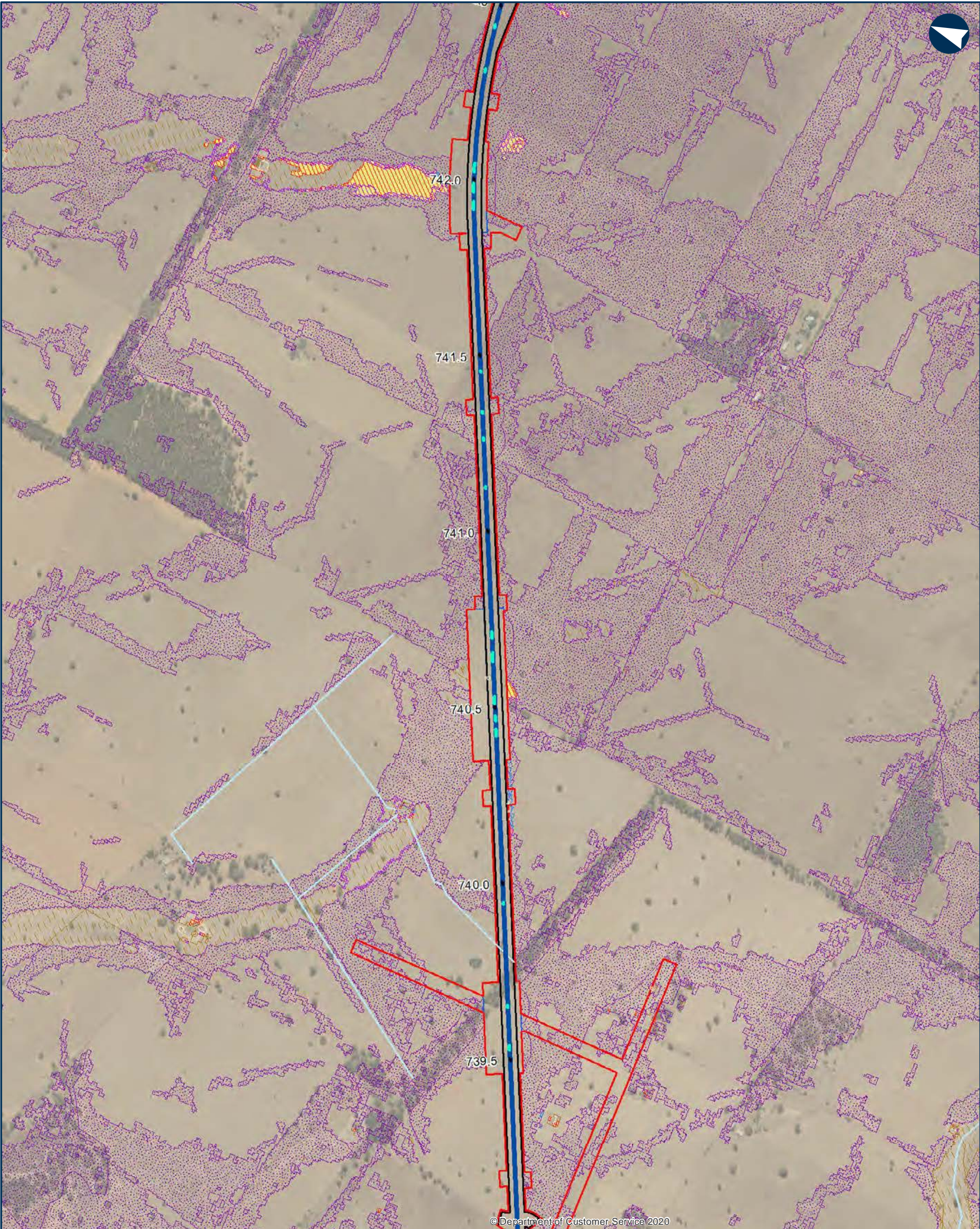
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.64

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



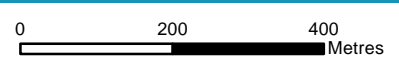
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.65



Coordinate System: GDA 1994 MGA Zone 55

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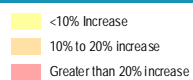
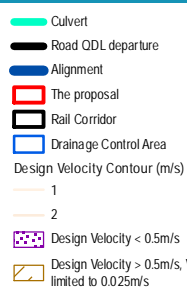
Date: 9/08/2022

Paper: A3




Date: 9/08/2022
Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD



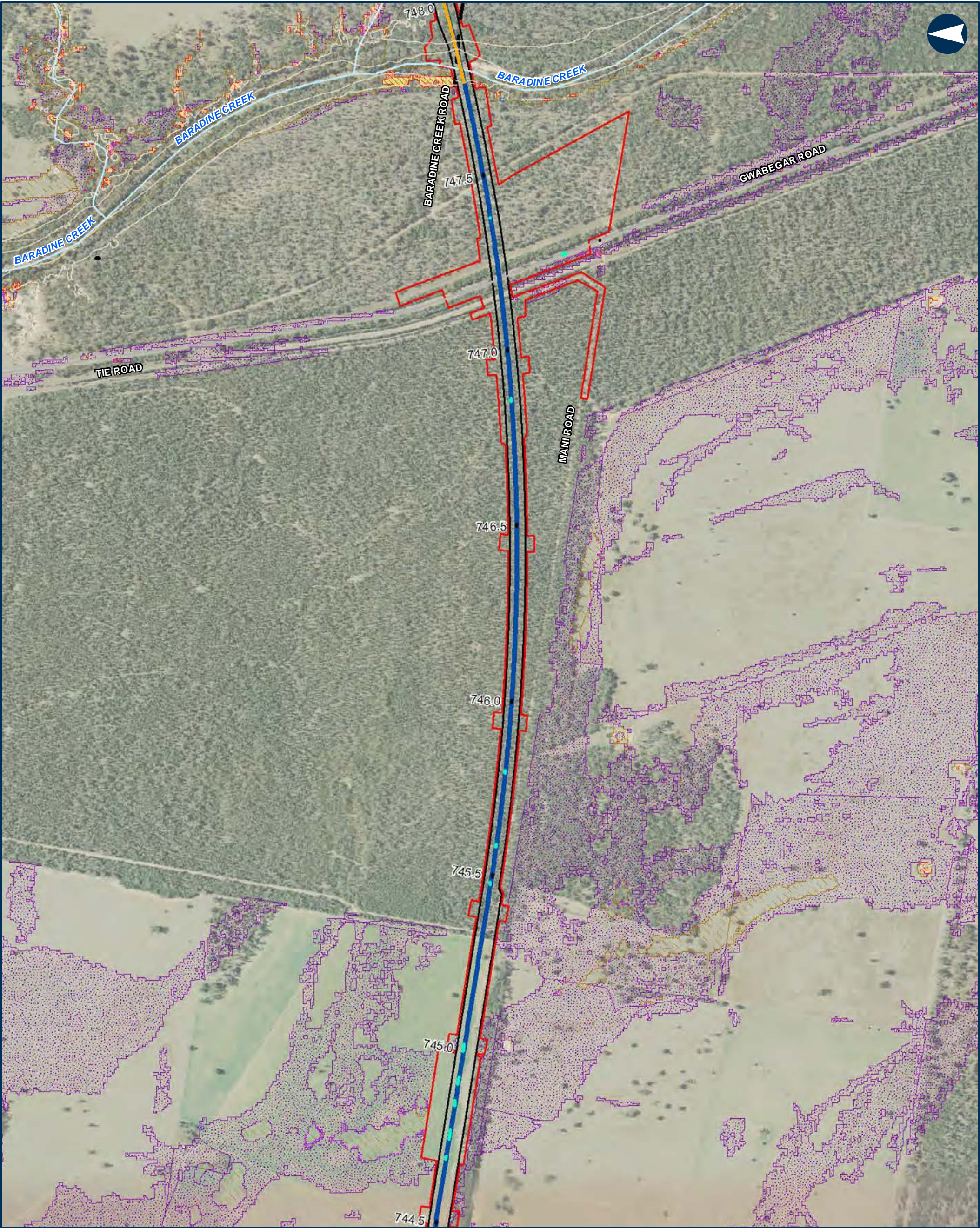
Unprotected Surfaces

-  Existing not flooded, design velocity > 0.5m/s
-  Existing velocity < 0.5m/s, design velocity > 0.5m/s
-  Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.66

0 200 400 Metres

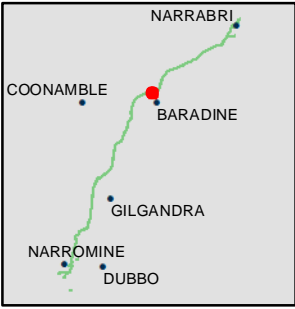
Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

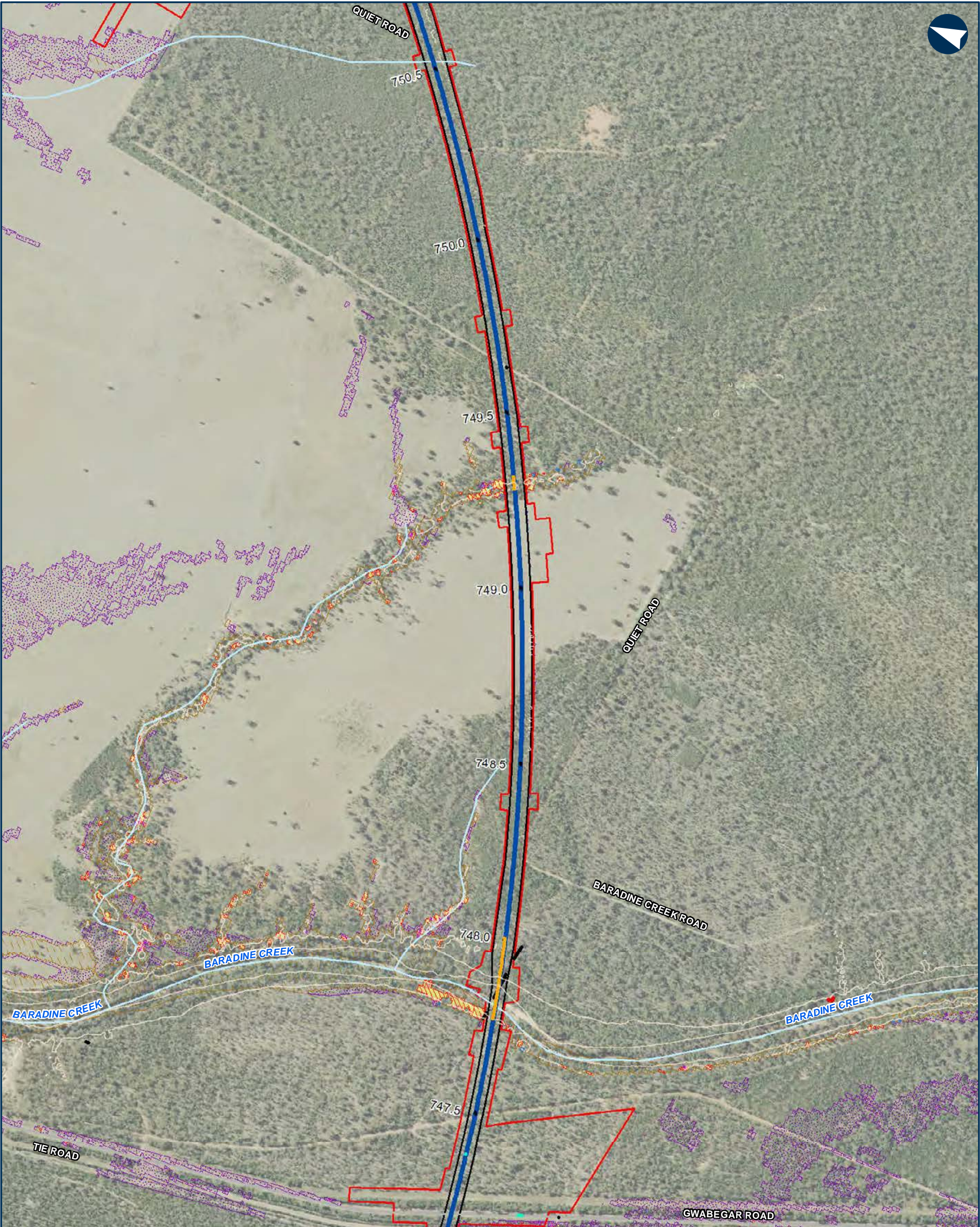
Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
- 1
- 2
- 3
- 4
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase
- Protected Surfaces
- Existing velocity < 1 m/s, design velocity > 1.2m/s
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
- Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.67

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road ODL departure

Alignment

The proposal

Rail Corridor

Design Velocity Contour (m/s)

1

2

3

4

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

10% to 20% increase

Greater than 20% increase

Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

Existing velocity < 1m/s, design velocity > 1.2m/s

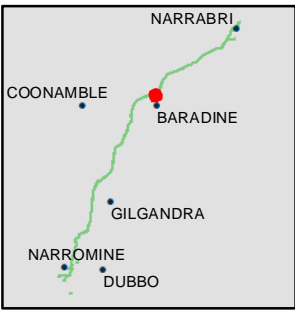
Existing velocity > 1m/s, velocity change > 20%

Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

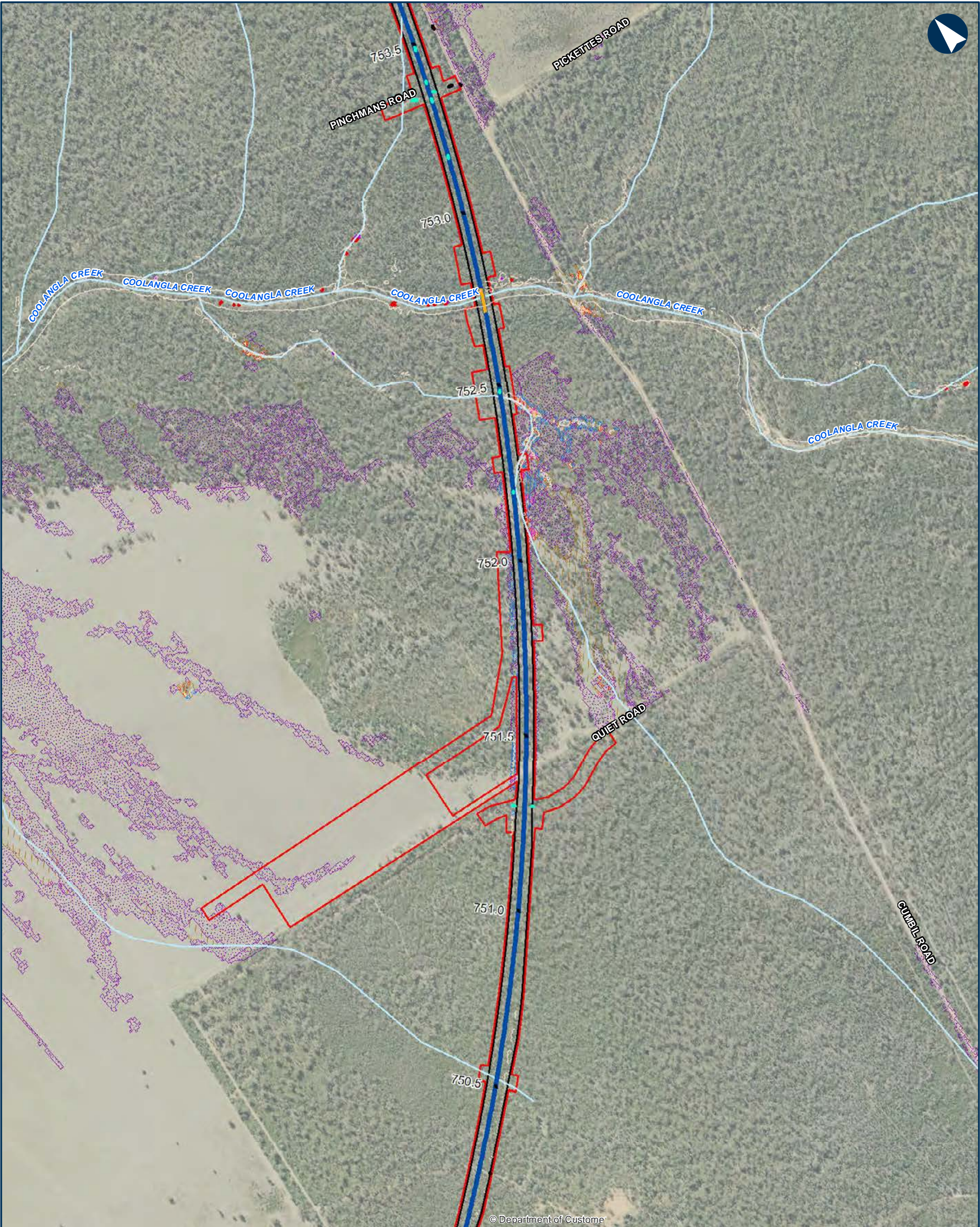
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.68

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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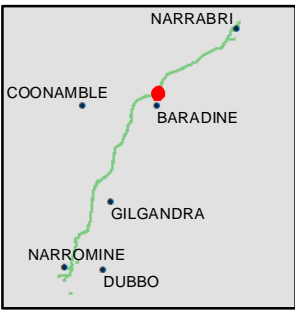
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase

- Protected Surfaces
- Existing not flooded, design velocity > 1.2m/s
 - Existing velocity < 1m/s, design velocity > 1.2m/s
 - Existing velocity > 1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



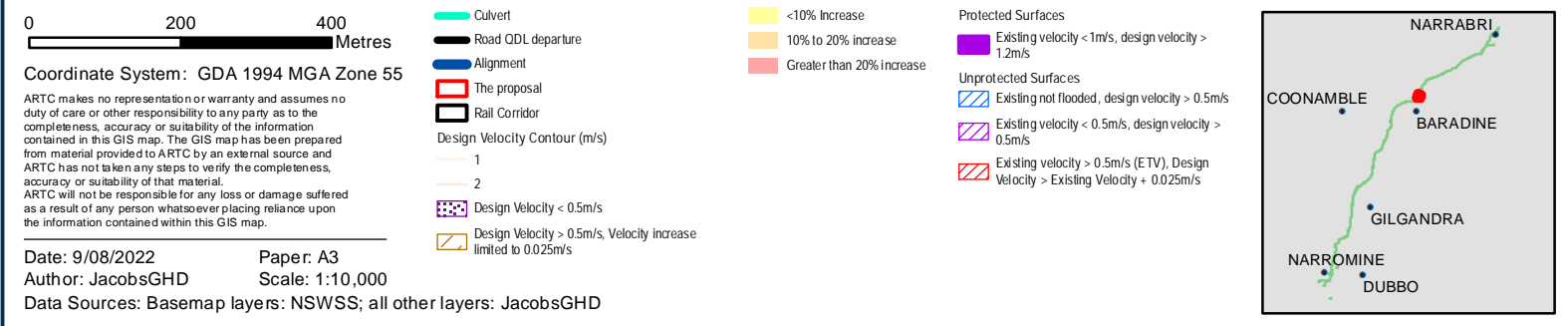
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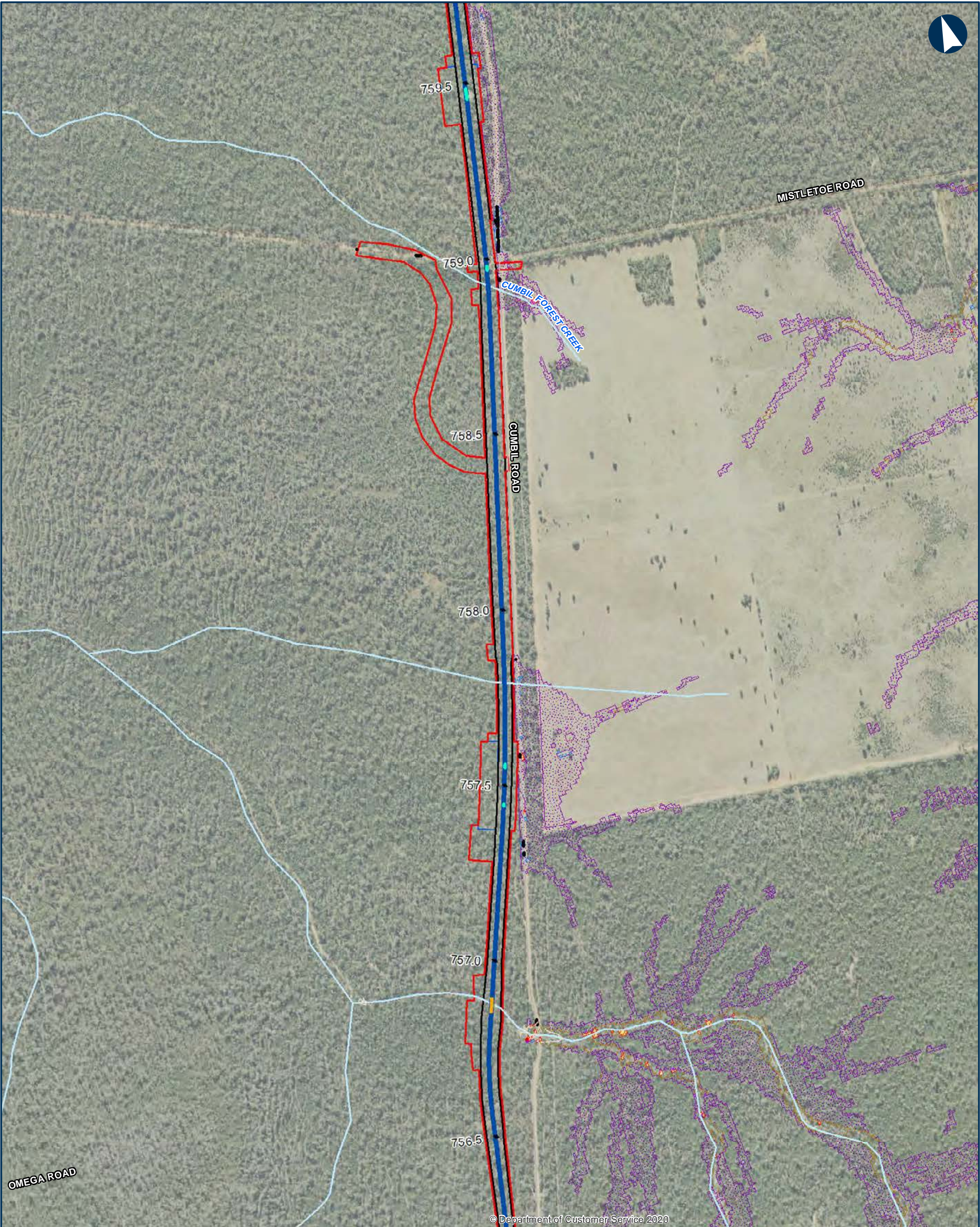
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.69



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.70

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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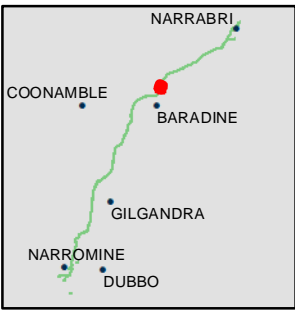
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase

- Protected Surfaces
- Existing velocity <1m/s, design velocity > 1.2m/s
 - Existing velocity >1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.71

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

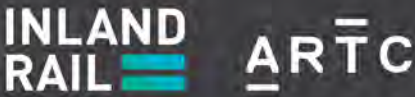
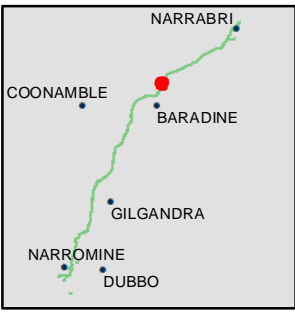
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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

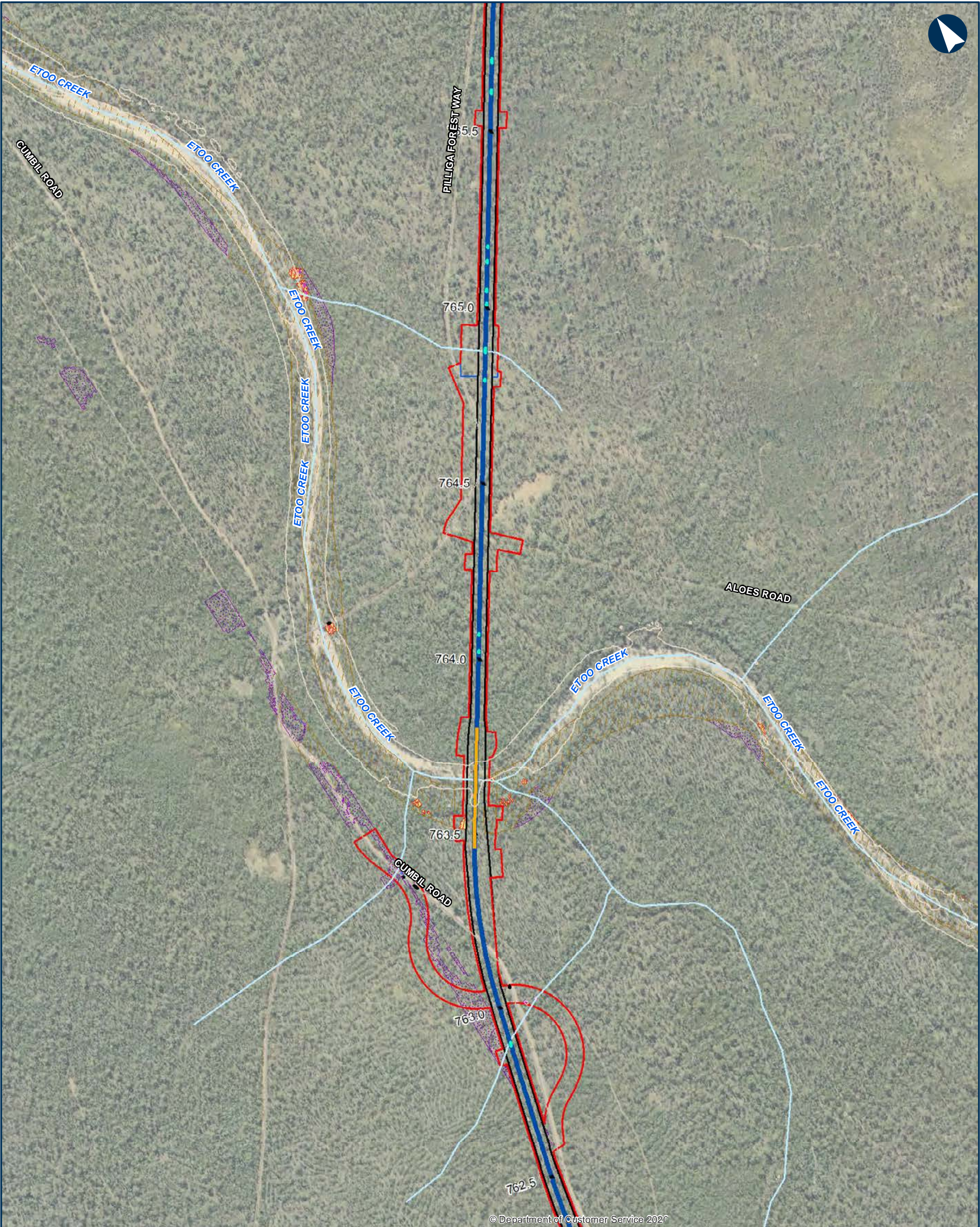
Paper: A3
Scale: 1:10,000

Legend

- Culvert
- Road CDL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
 - 4
 - 5
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- Greater than 20% increase
- Protected Surfaces
 - Existing not flooded, design velocity > 1.2m/s
 - Existing velocity <1m/s, design velocity > 1.2m/s
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.72

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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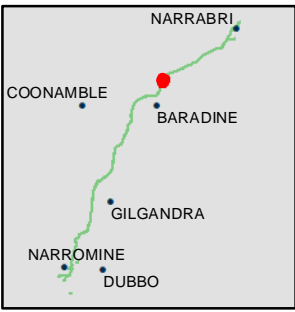
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

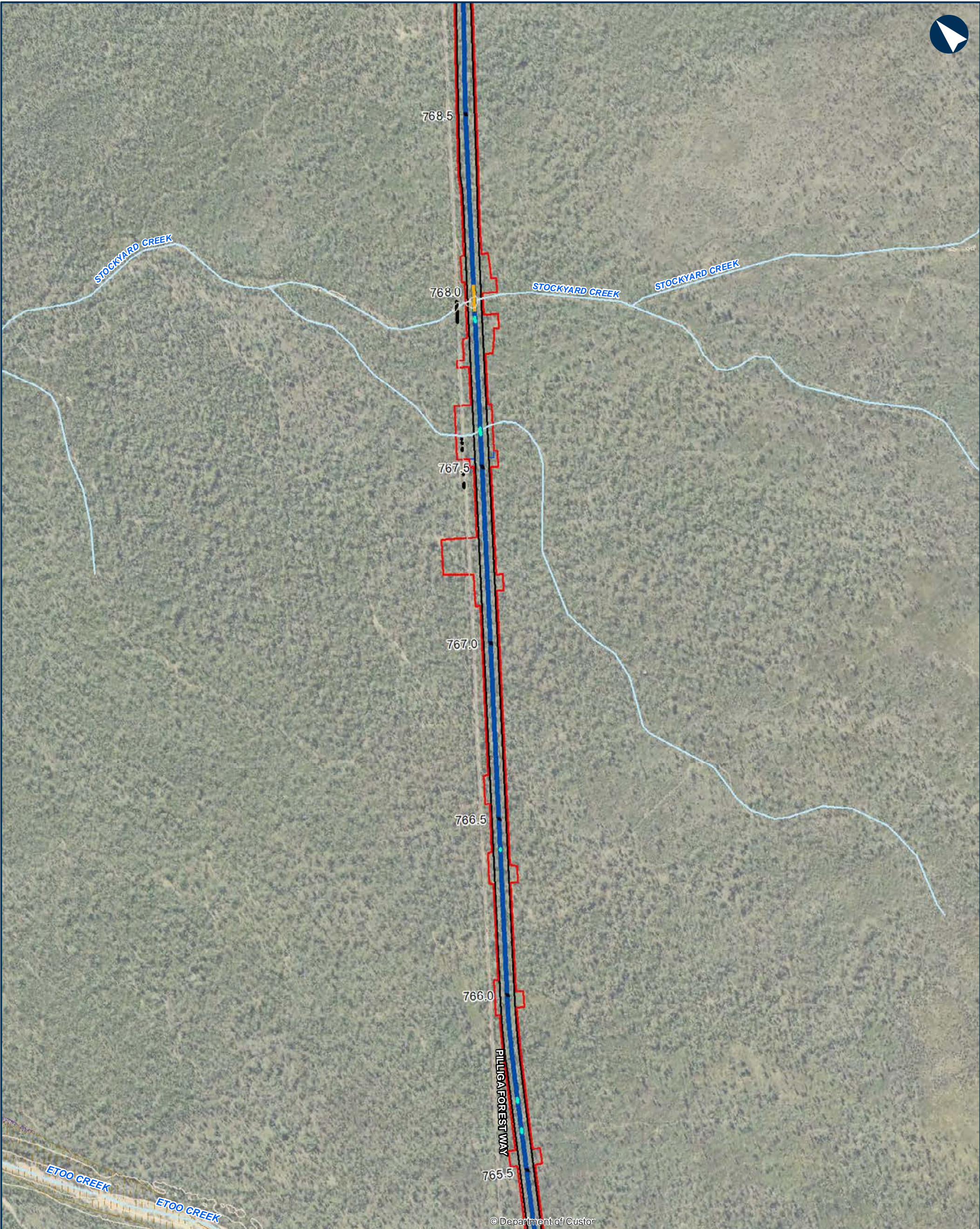
- <10% Increase
- 10% to 20% Increase
- Greater than 20% increase

- Protected Surfaces
- Existing velocity <1m/s, design velocity > 1.2m/s
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



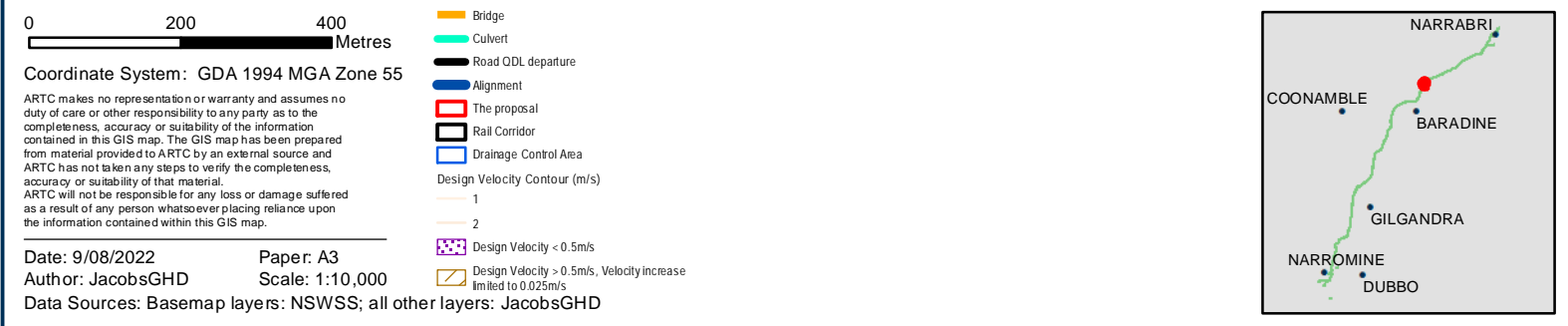
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.73





NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.74

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Design Velocity Contour (m/s)

1

2

3

Protected Surfaces

Existing velocity >1m/s, velocity change > 20%

NARRABRI

COONAMBLE

BARADINE

GILGANDRA

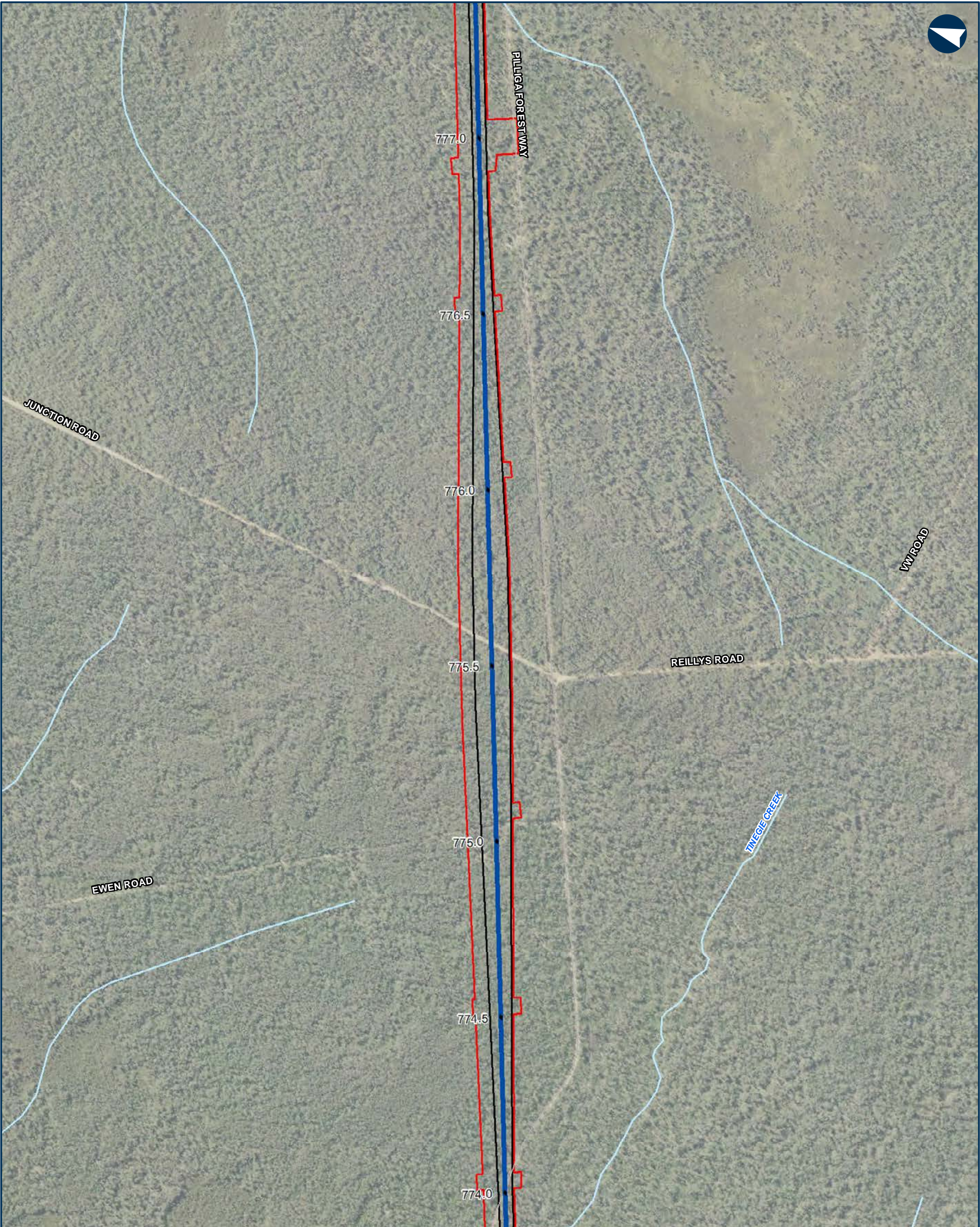
NARROMINE

DUBBO

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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.76

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Road QDL departure

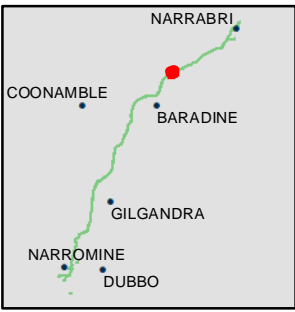
Alignment

The proposal

Rail Corridor

Design Velocity Contour (m/s)

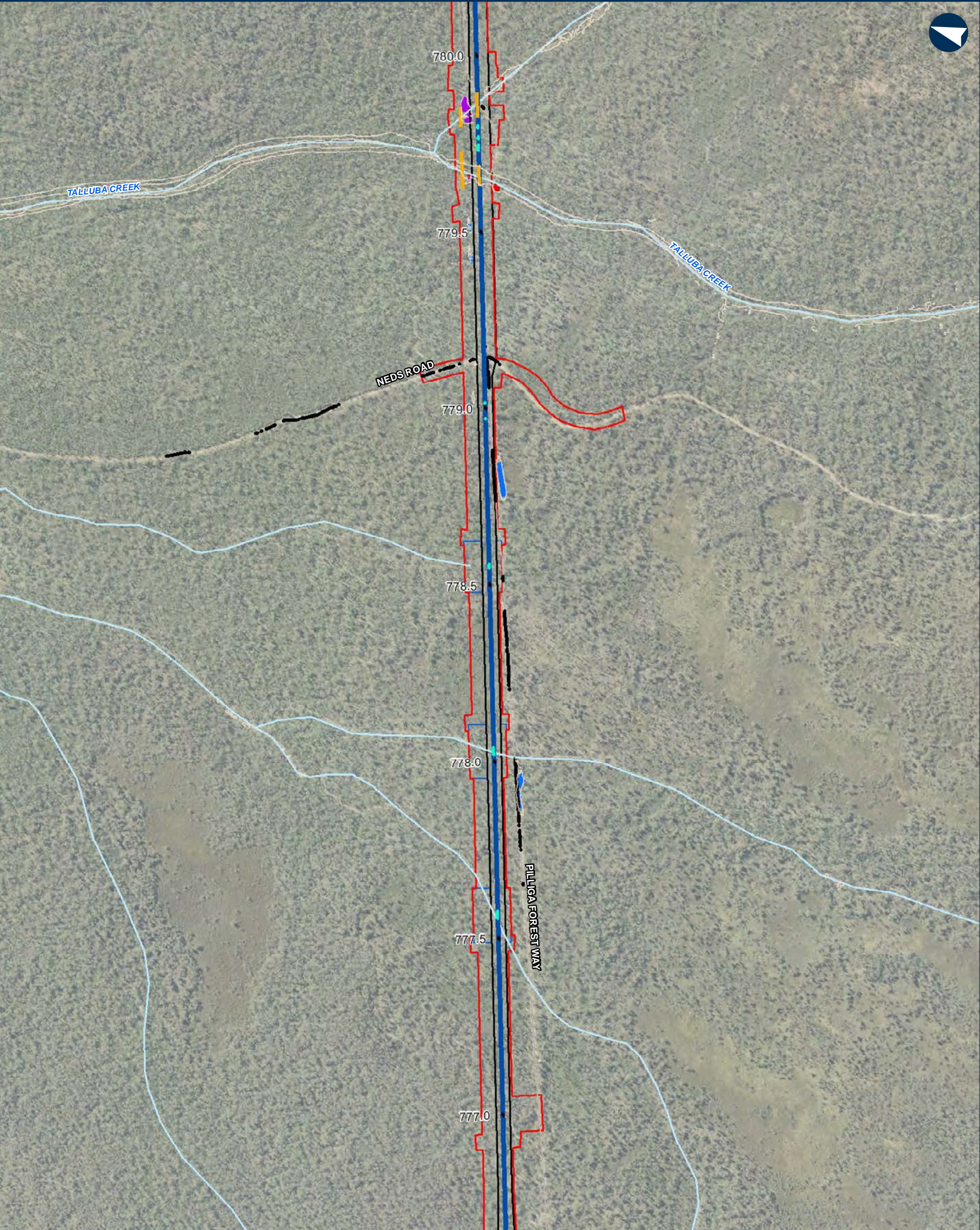
1



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.77

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

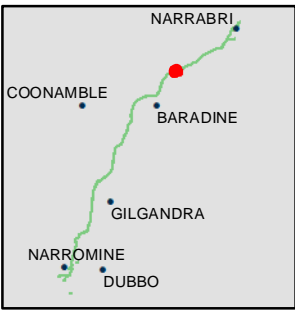
3

Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

Existing velocity <1m/s, design velocity > 1.2m/s

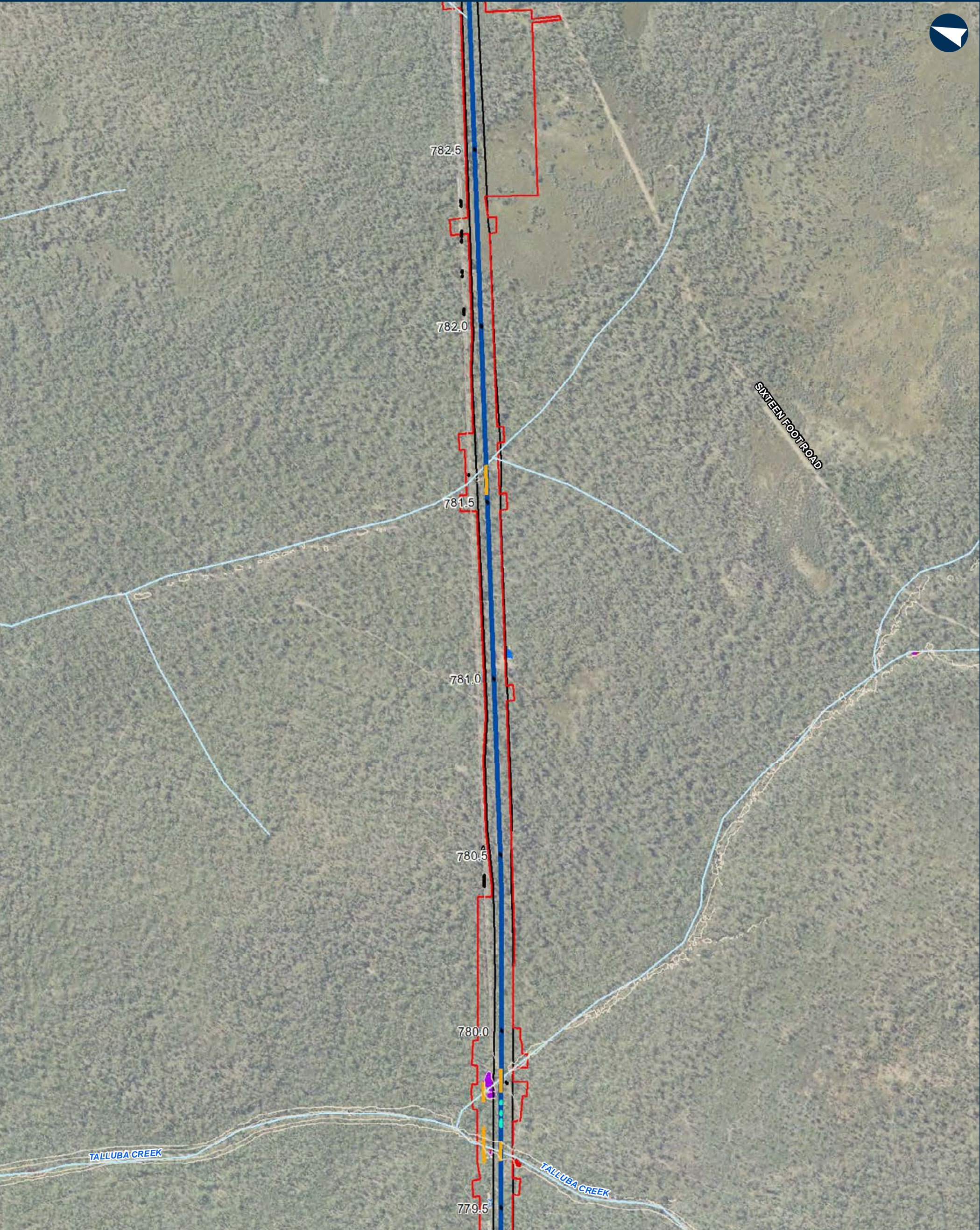
Existing velocity >1m/s, velocity change > 20%



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.78

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Design Velocity Contour (m/s)

1

2

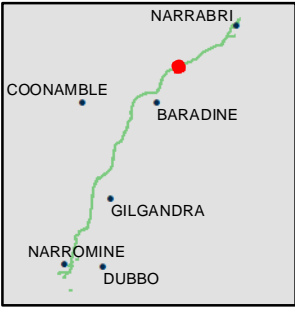
3

Protected Surfaces

Existing not flooded, design velocity > 12m/s

Existing velocity <1m/s, design velocity > 1.2m/s

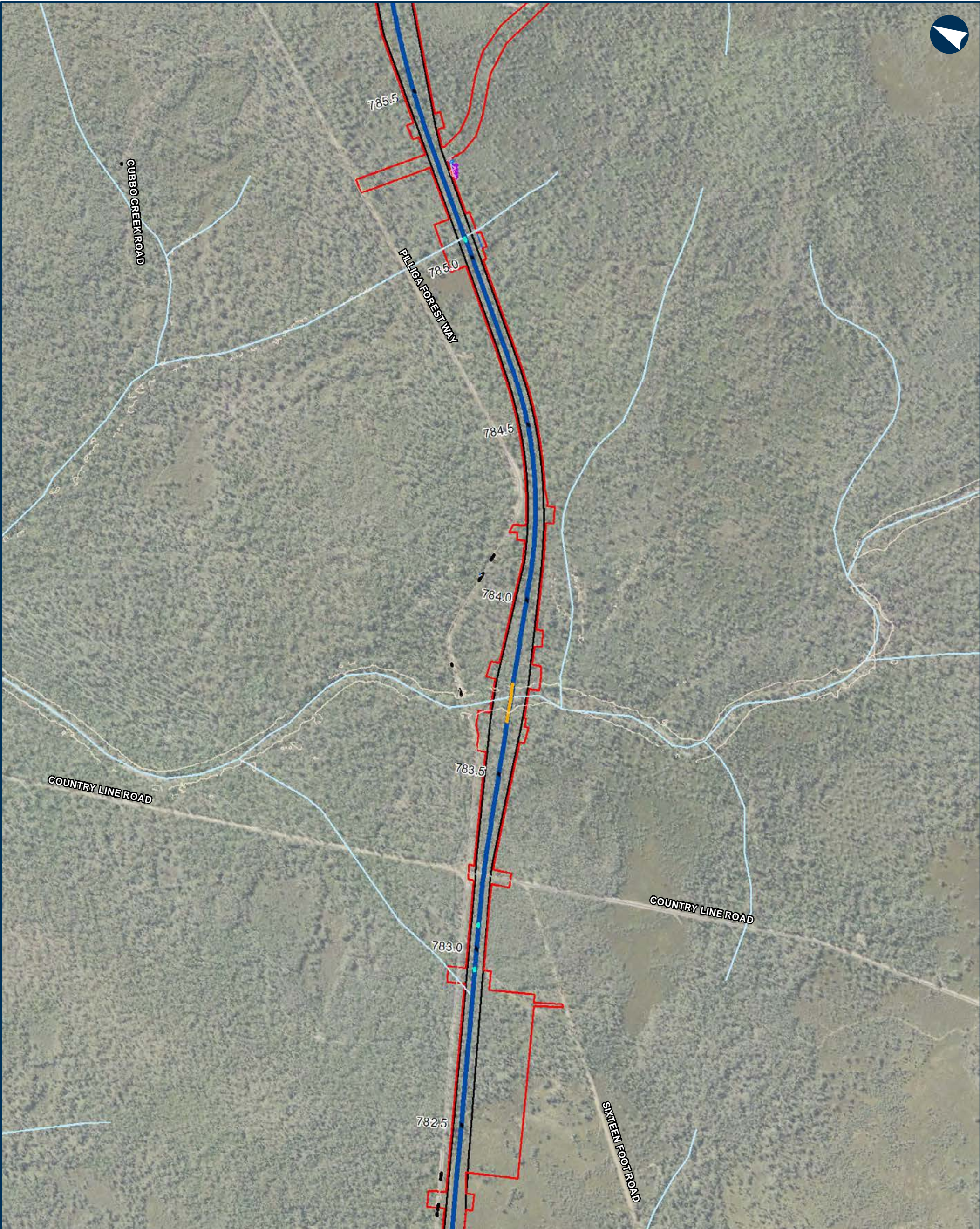
Existing velocity >1m/s, velocity change > 20%



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.79

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

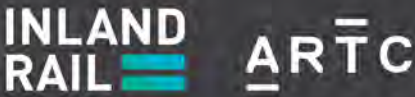
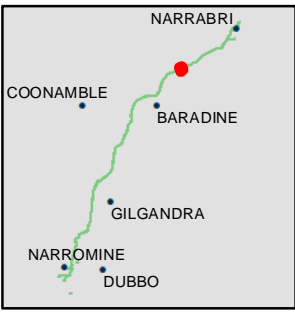
3

4

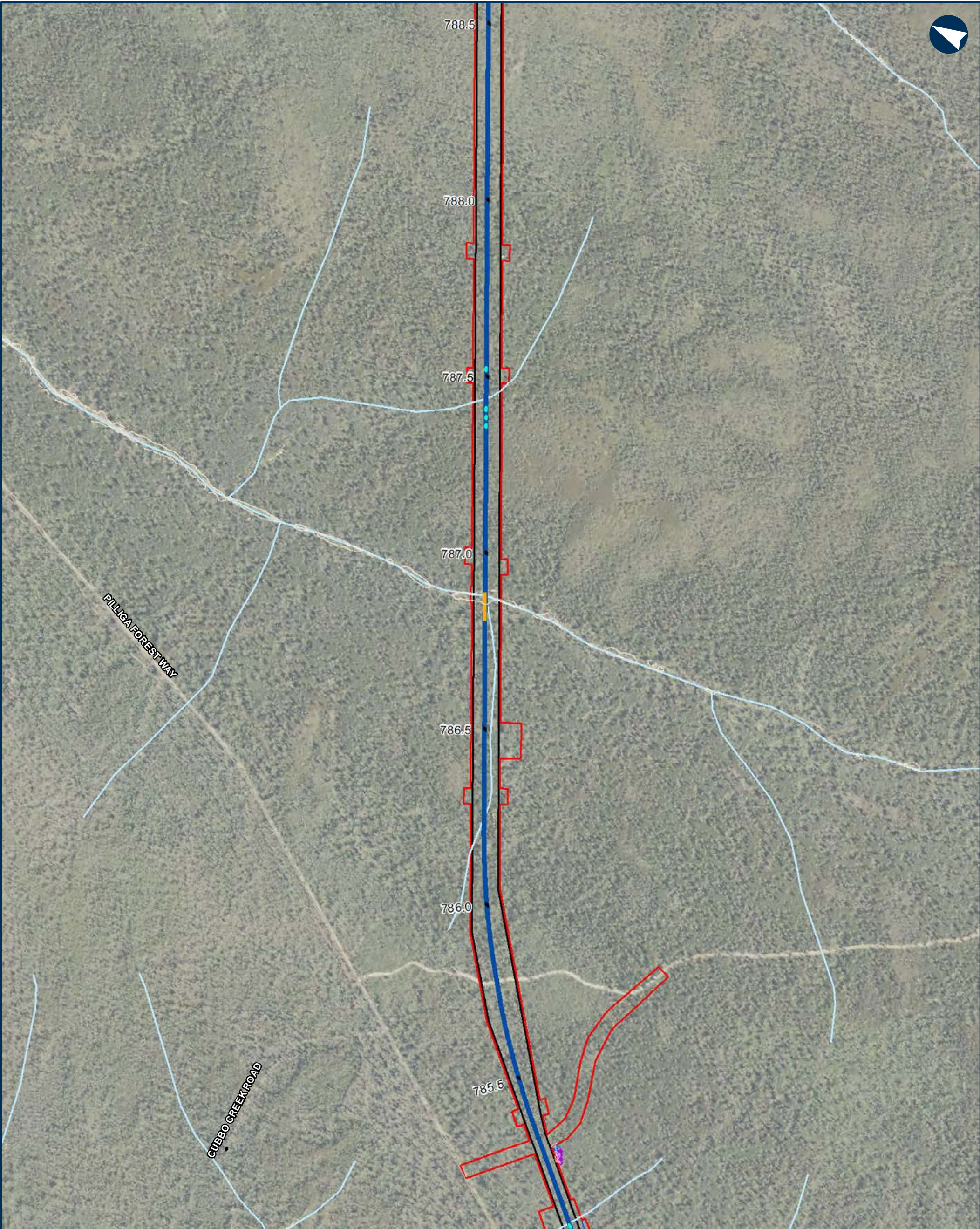
Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

Existing velocity <1m/s, design velocity > 1.2m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.80

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

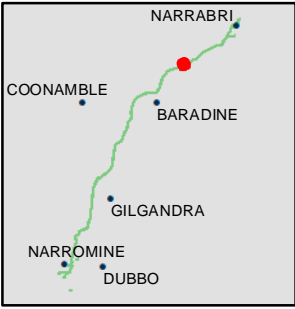
3

4

Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

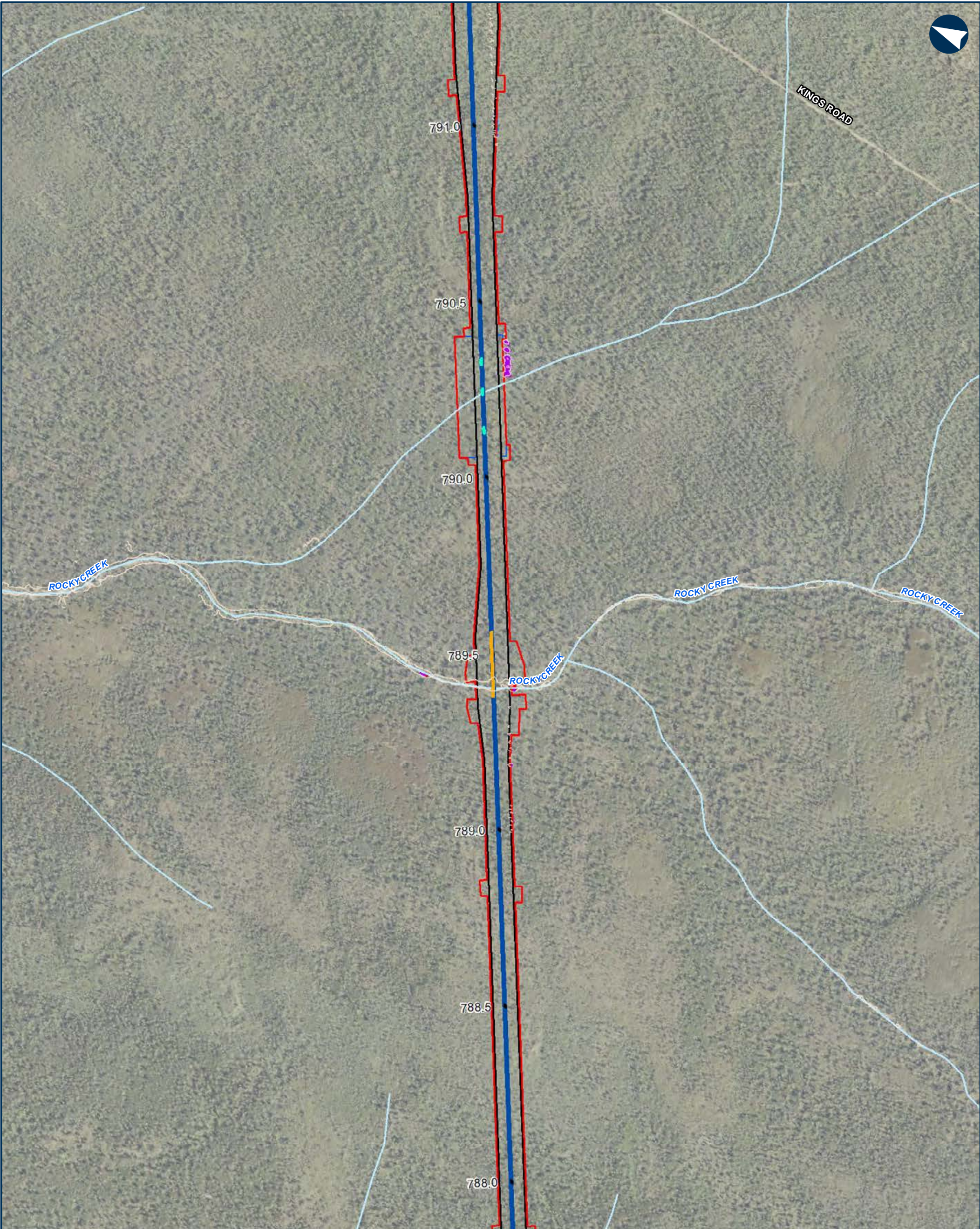
Existing velocity <1m/s, design velocity > 1.2m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.81

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

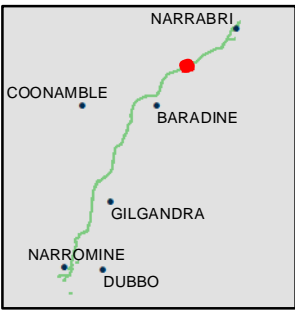
2

Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

Existing velocity <1m/s, design velocity > 1.2m/s

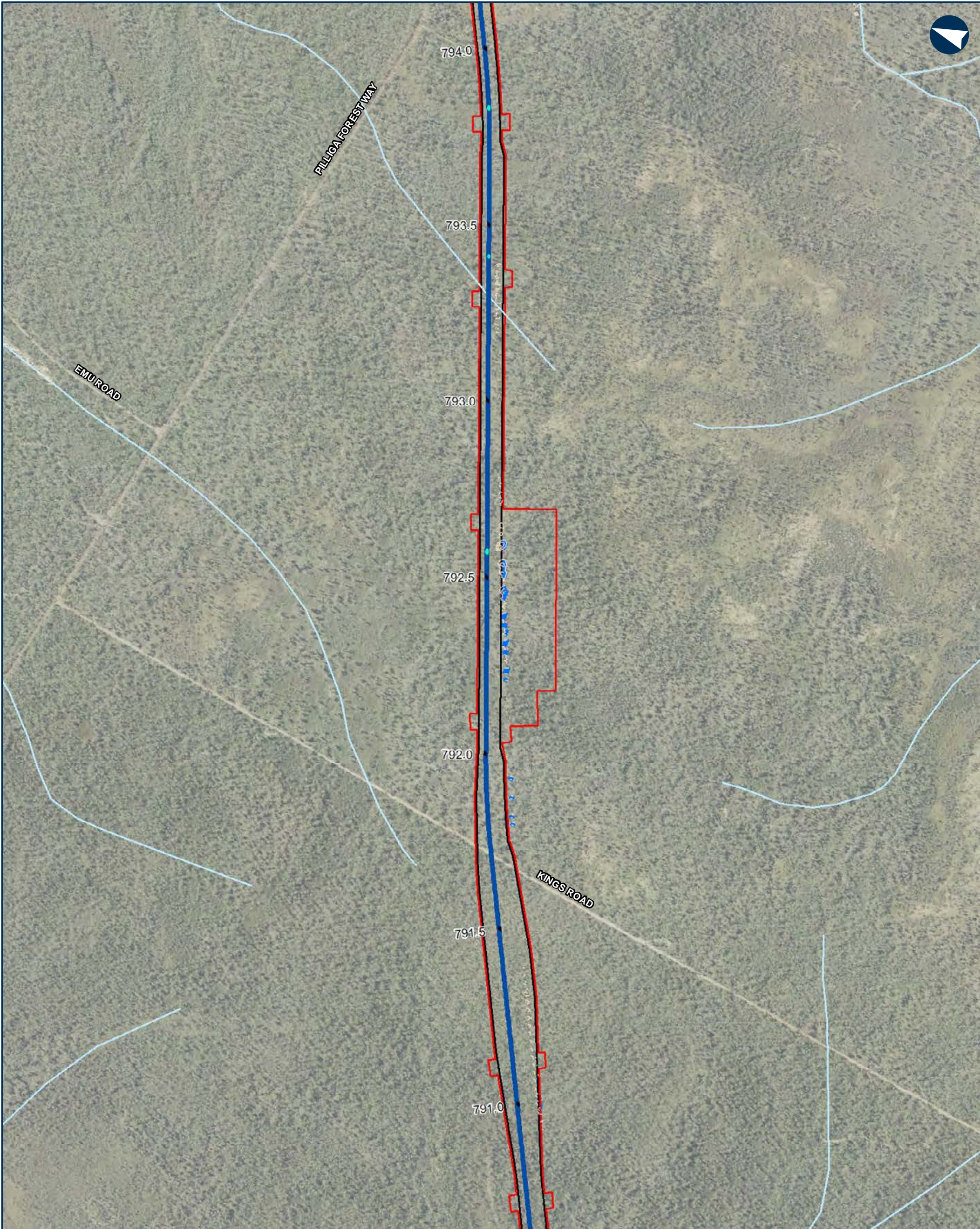
Existing velocity >1m/s, velocity change > 20%



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.82

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Design Velocity Contour (m/s)

1

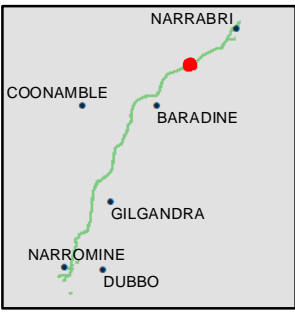
2

3

Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

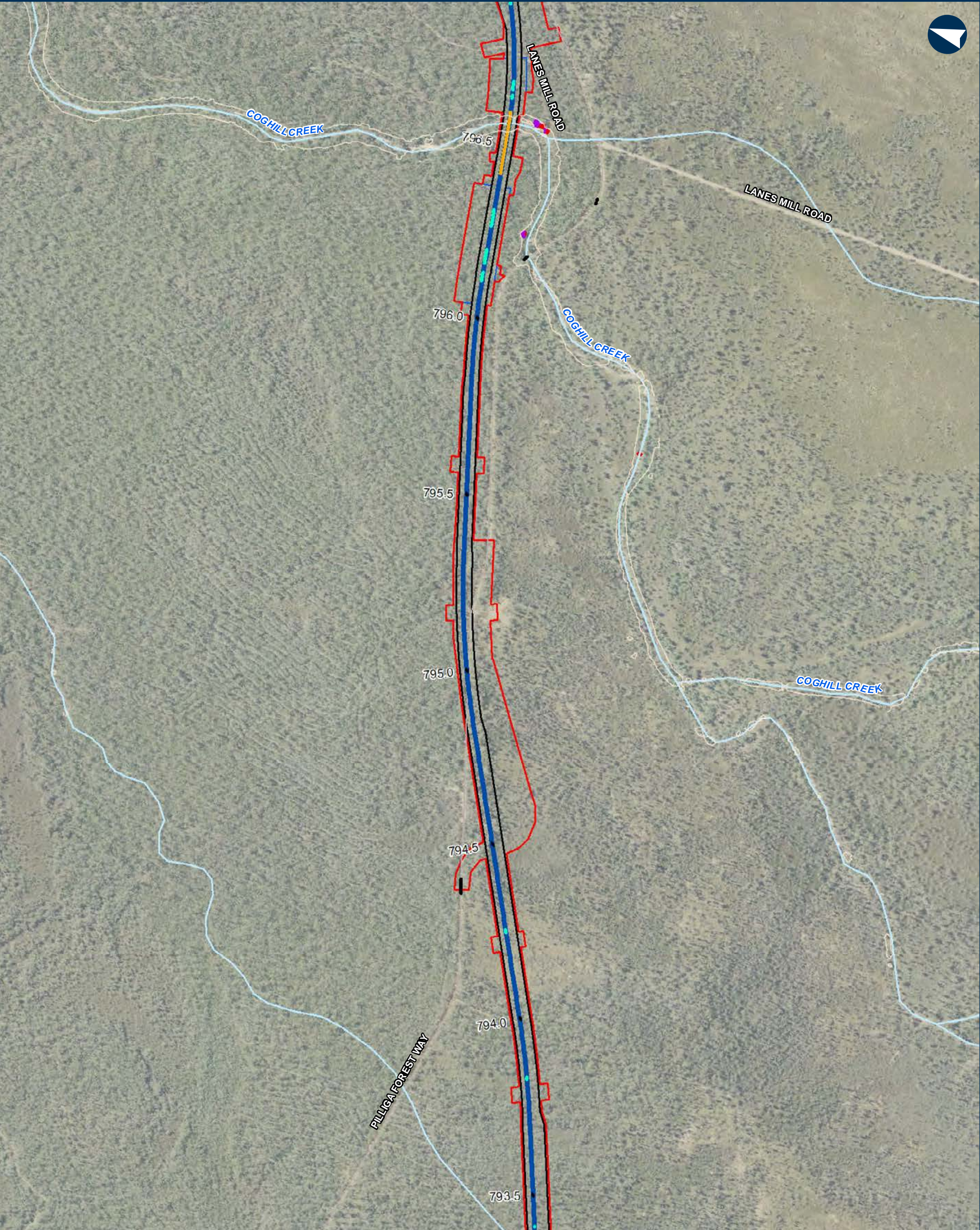
Existing velocity <1m/s, design velocity > 1.2m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.83

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

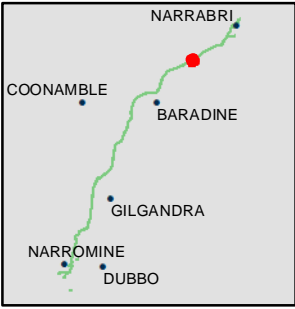
1

2

Protected Surfaces

Existing velocity <1m/s, design velocity > 1.2m/s

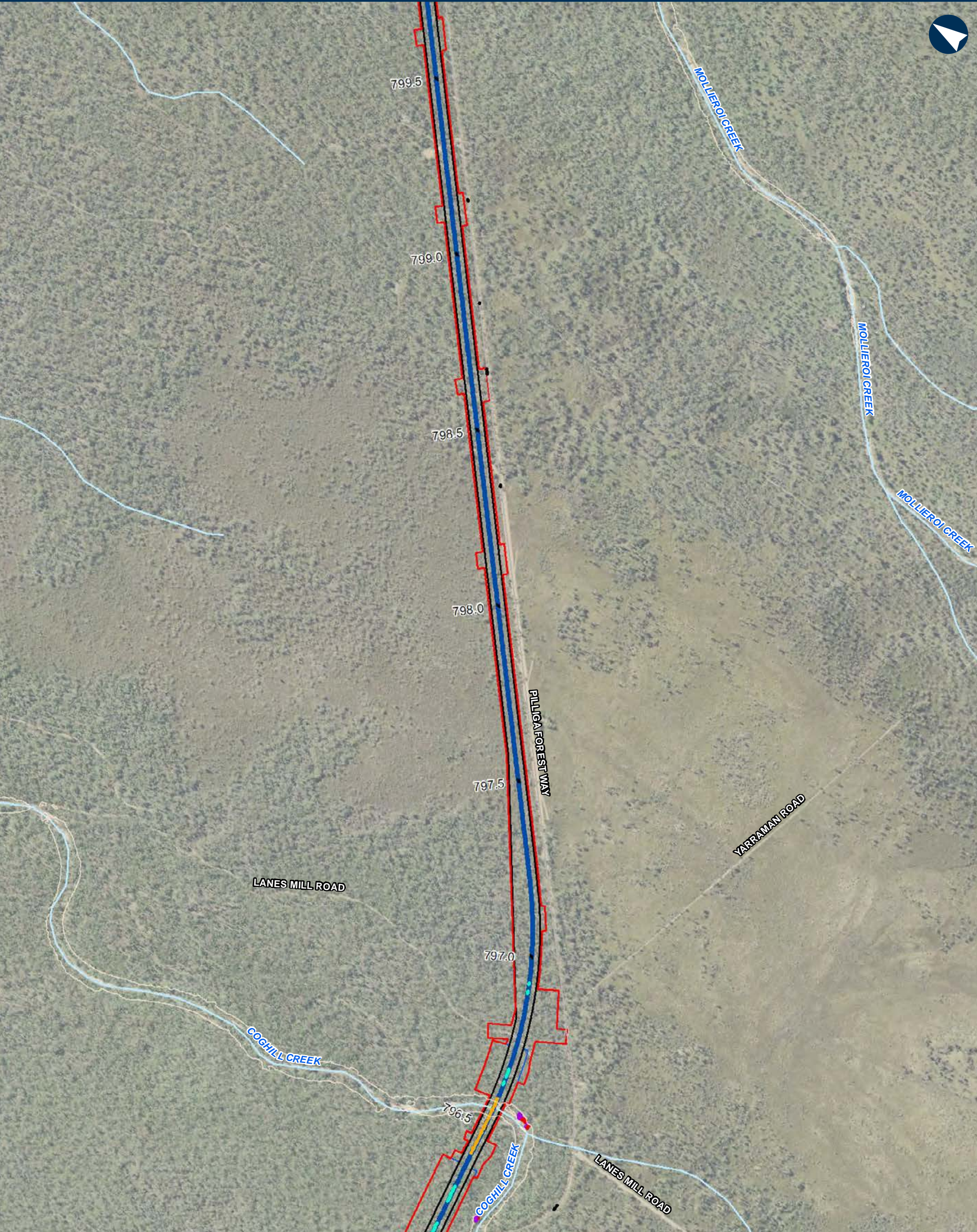
Existing velocity >1m/s, velocity change > 20%



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.84

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

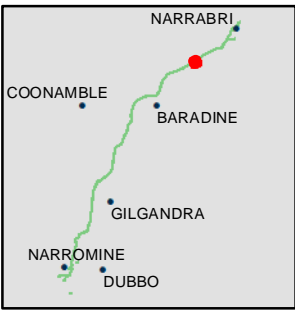
1

2

Protected Surfaces

Existing velocity <1m/s, design velocity > 1.2m/s

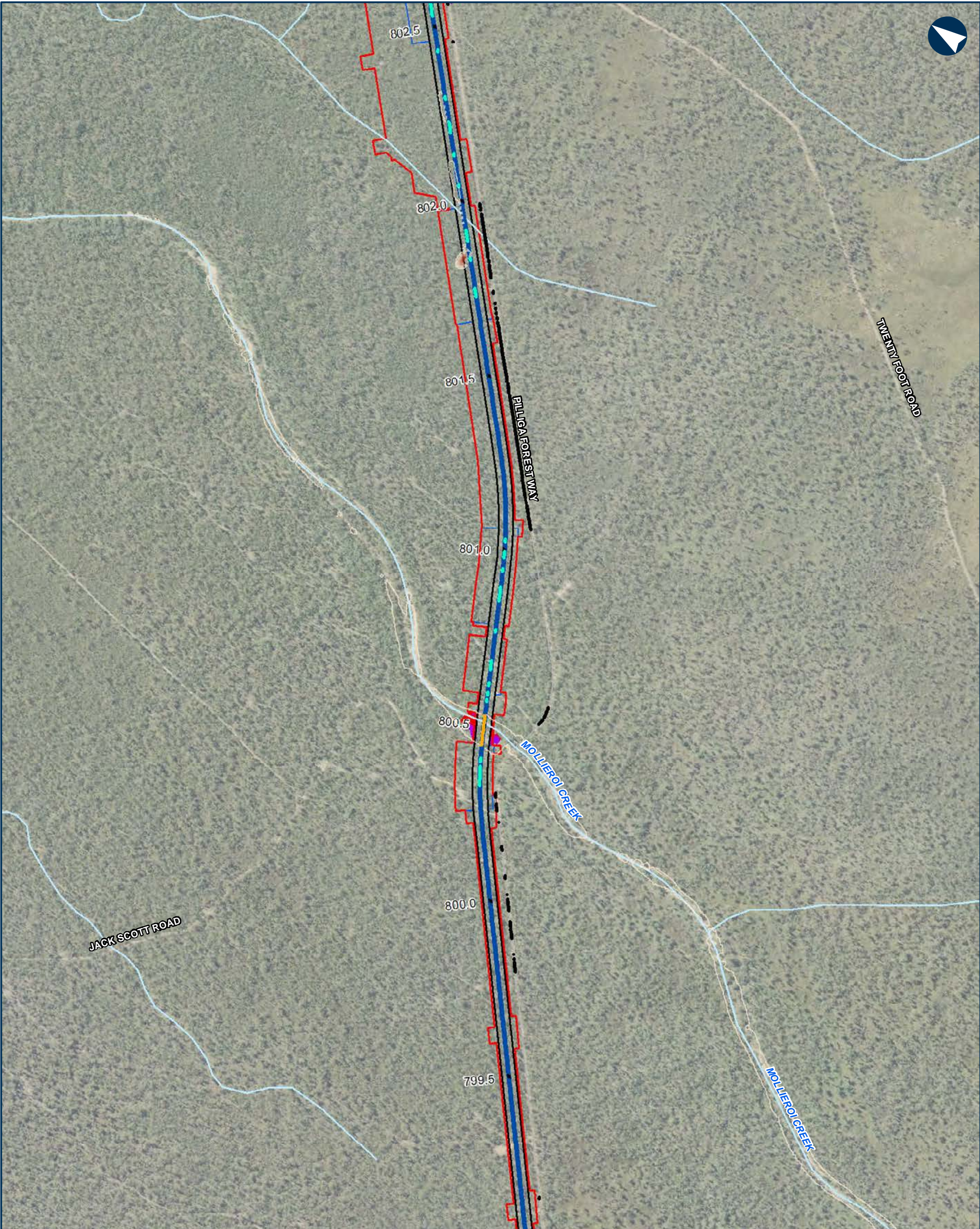
Existing velocity >1m/s, velocity change > 20%



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.85

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity Contour (m/s)

1

2

3

6

7

Protected Surfaces

Existing velocity <1m/s, design velocity > 1.2m/s

Existing velocity >1m/s, velocity change > 20%

NARRABRI

COONAMBLE

BARADINE

GILGANDRA

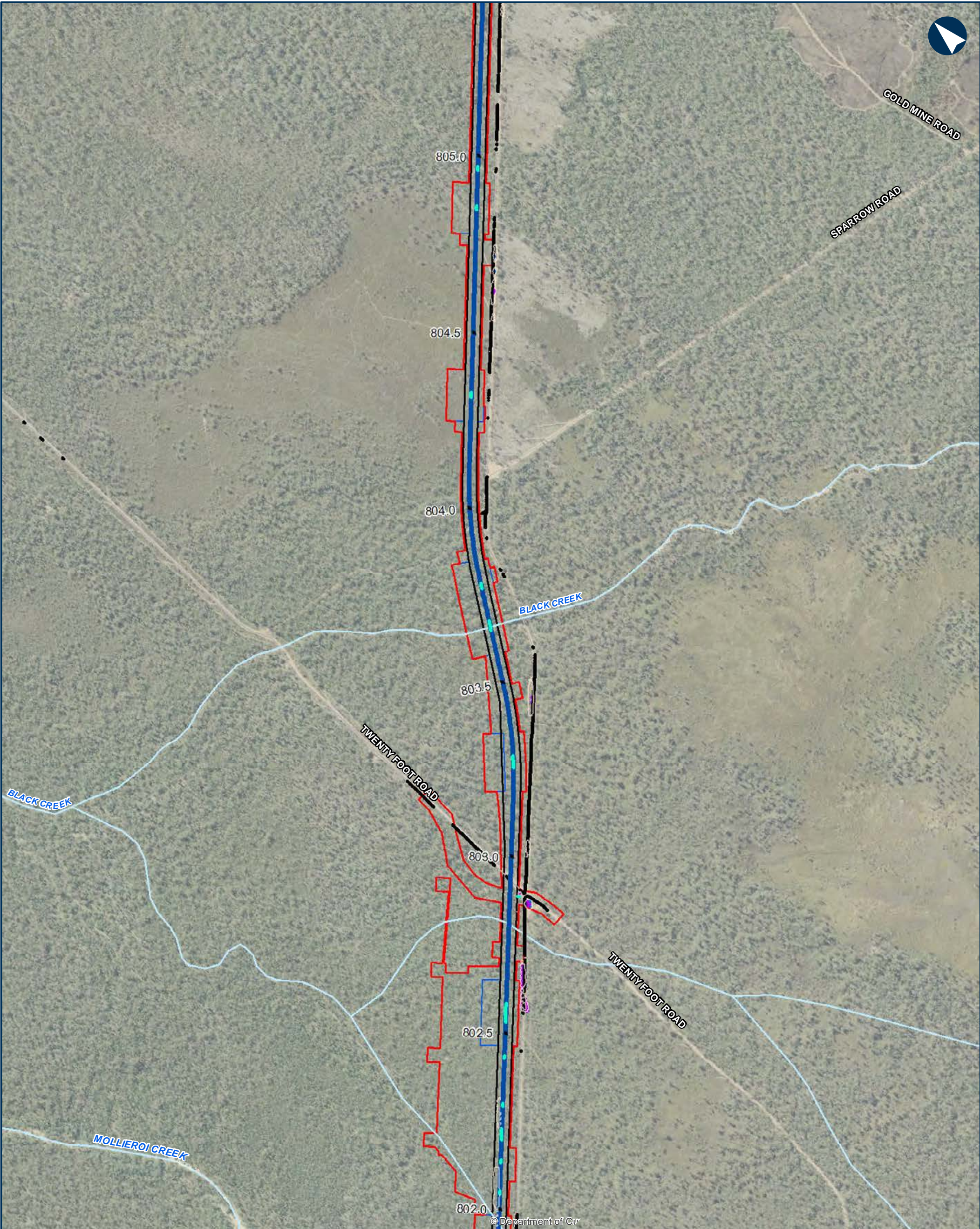
NARROMINE

DUBBO

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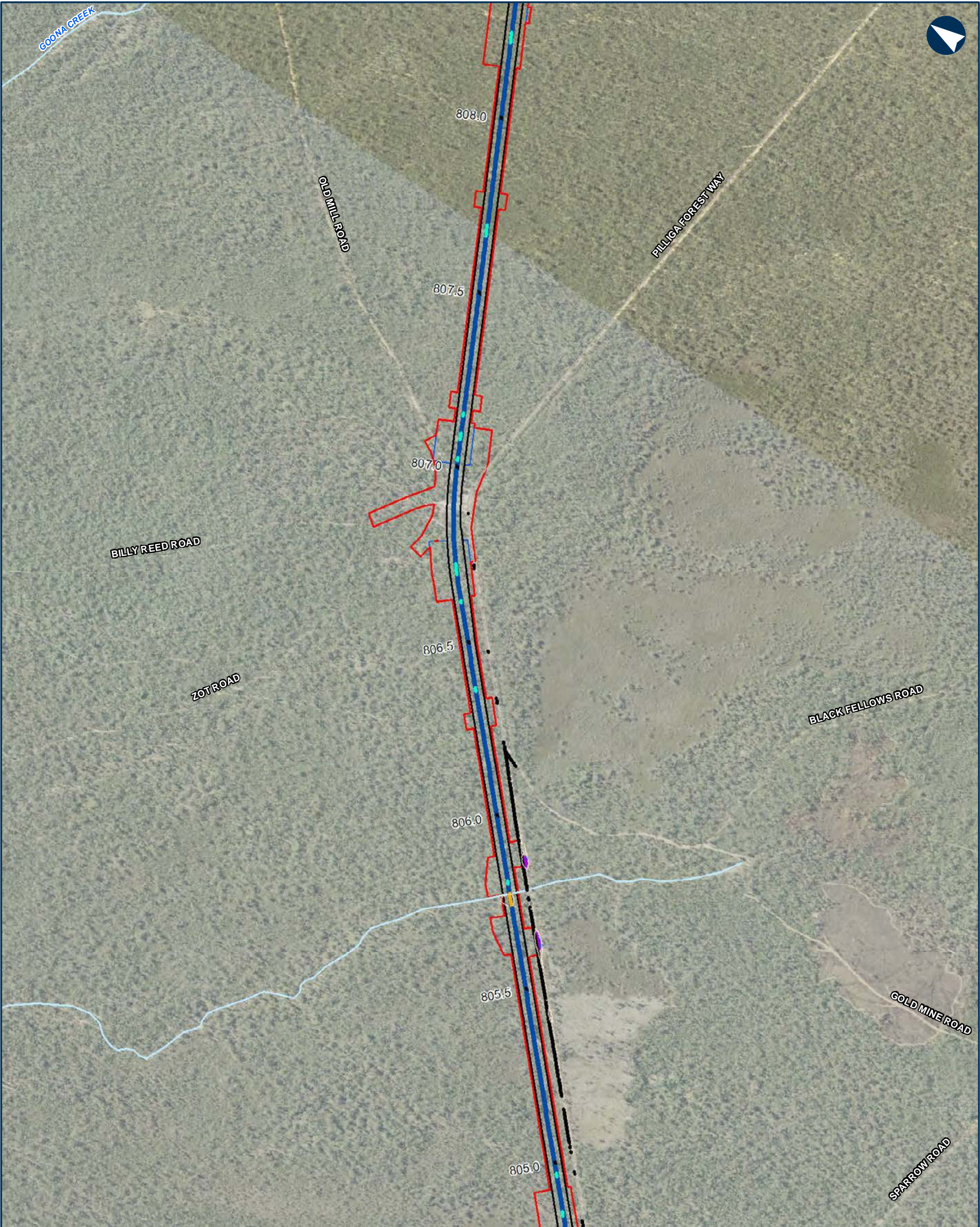
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.86



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.87

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Author: JacobsGHD

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3

Scale: 1:10,000

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

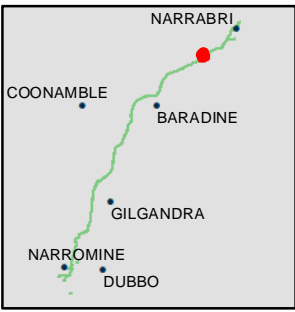
Design Velocity Contour (m/s)

1

Protected Surfaces

Existing not flooded, design velocity > 1.2m/s

Existing velocity <1m/s, design velocity > 1.2m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.88

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

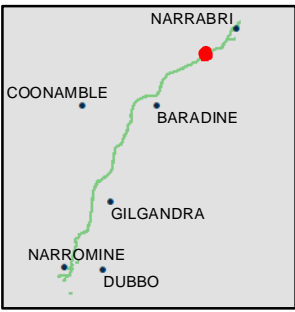
Drainage Control Area

Design Velocity Contour (m/s)

1

Protected Surfaces

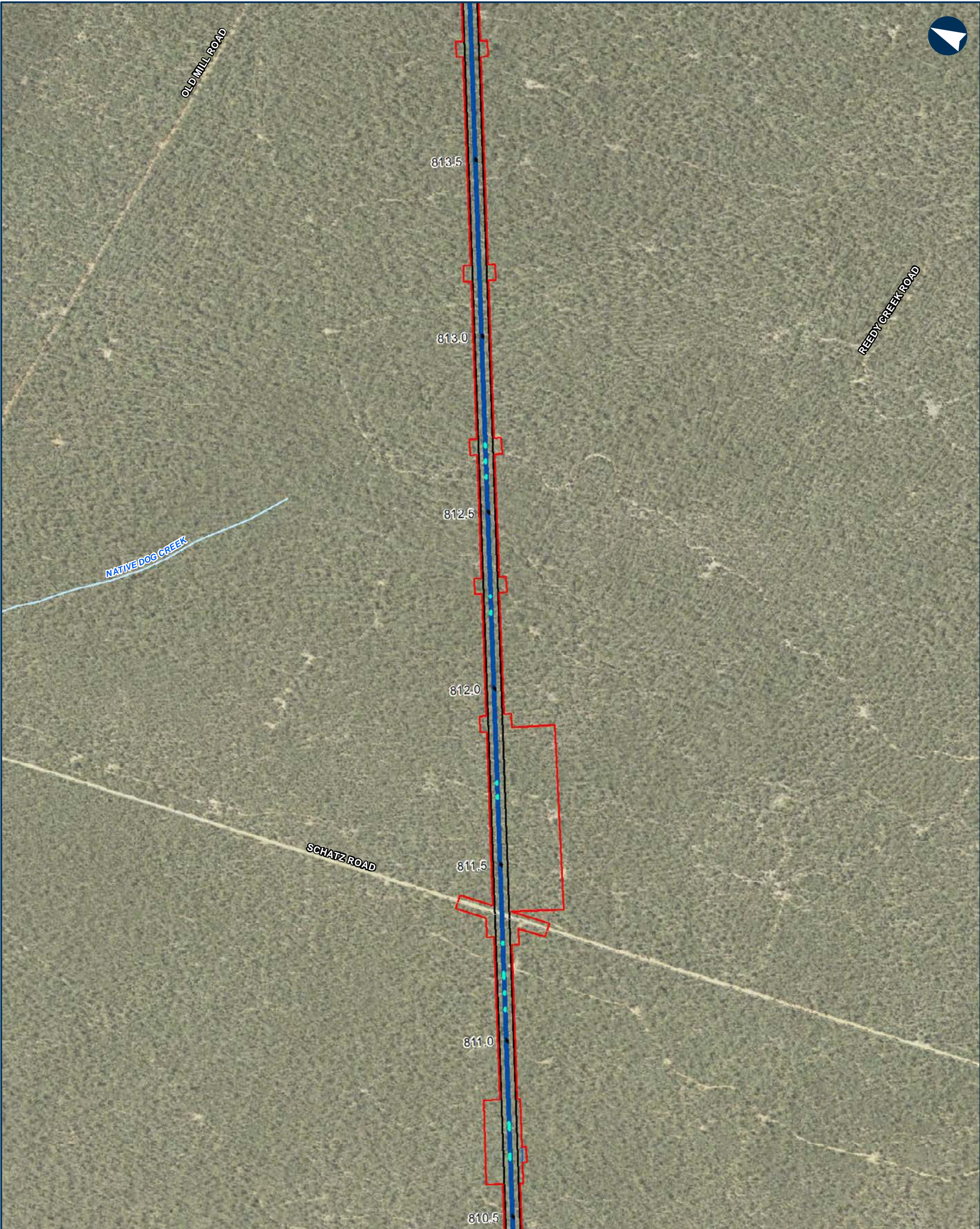
Existing velocity <1m/s, design velocity >1.2m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.89

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

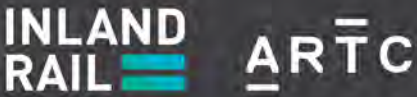
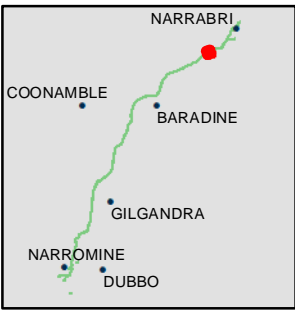
Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.90

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

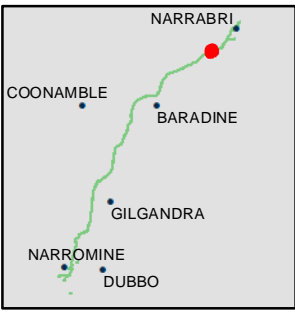
Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.91

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

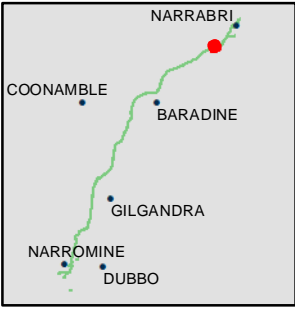
Design Velocity Contour (m/s)

1

2

Protected Surfaces

Existing velocity >1m/s, velocity change > 20%



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.92

0200400

Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022

Paper: A3

Author: JacobsGHD

Scale: 1:10,000

Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Culvert

Road QDL departure

Alignment

The proposal

Rail Corridor

Drainage Control Area

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

<10% Increase

Unprotected Surfaces

Existing velocity < 0.5m/s, design velocity > 0.5m/s

Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s

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N:\AU\Newcastle\Projects\2219593\GIS\GIS_2500_N2N_v2\Maps\Deliverables_SPIR\EIS\Flooding_Hydrology\Appendices\2500_EISFWPAPP089_QDL_ScourErosion_1pcBlockage_revD.mxd



NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.93

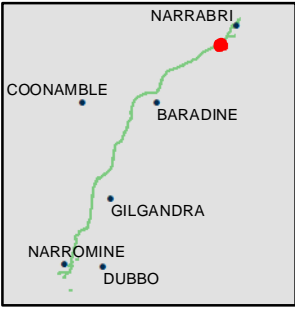
0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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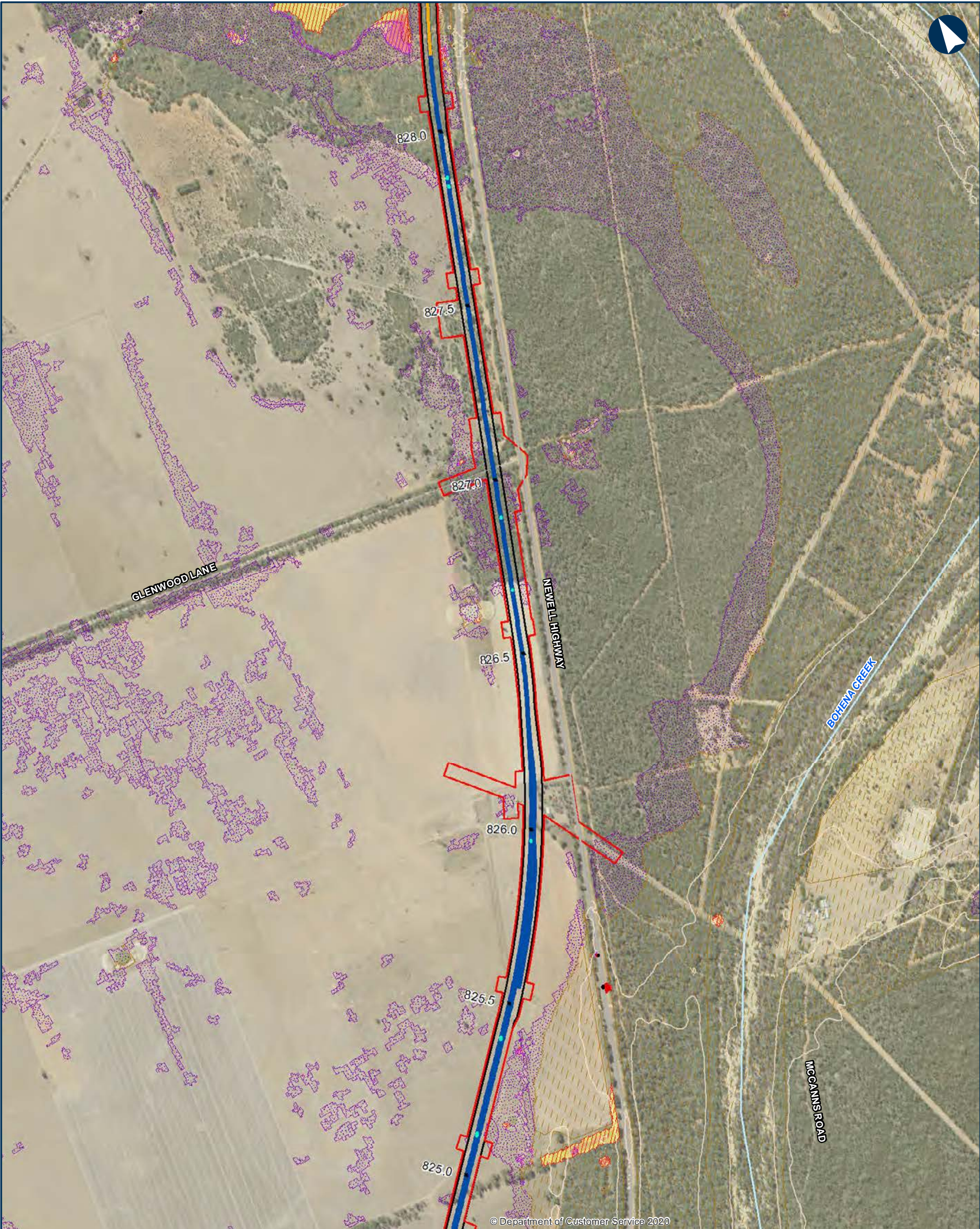
Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase
- Protected Surfaces
 - Existing velocity > 1m/s, velocity change > 20%
- Unprotected Surfaces
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.94

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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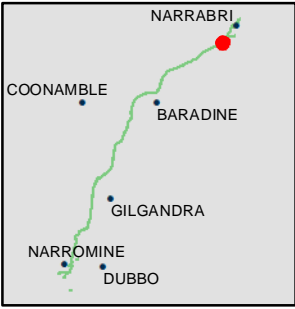
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

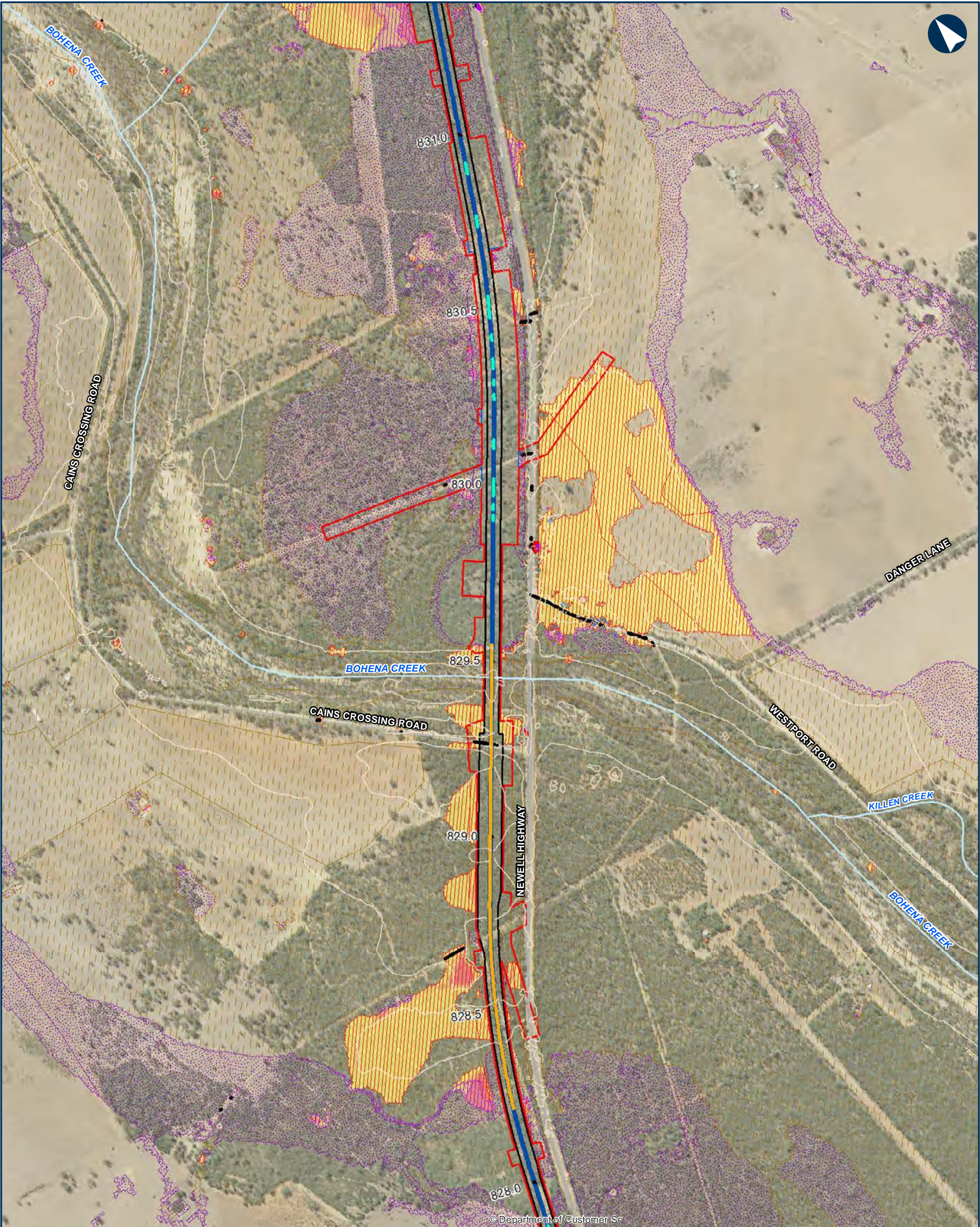
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Protected Surfaces
 - Existing velocity < 1m/s, design velocity > 1.2m/s
 - Existing velocity > 1m/s, velocity change > 20%
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.95

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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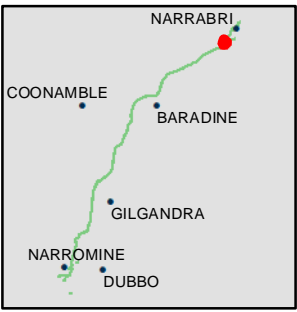
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

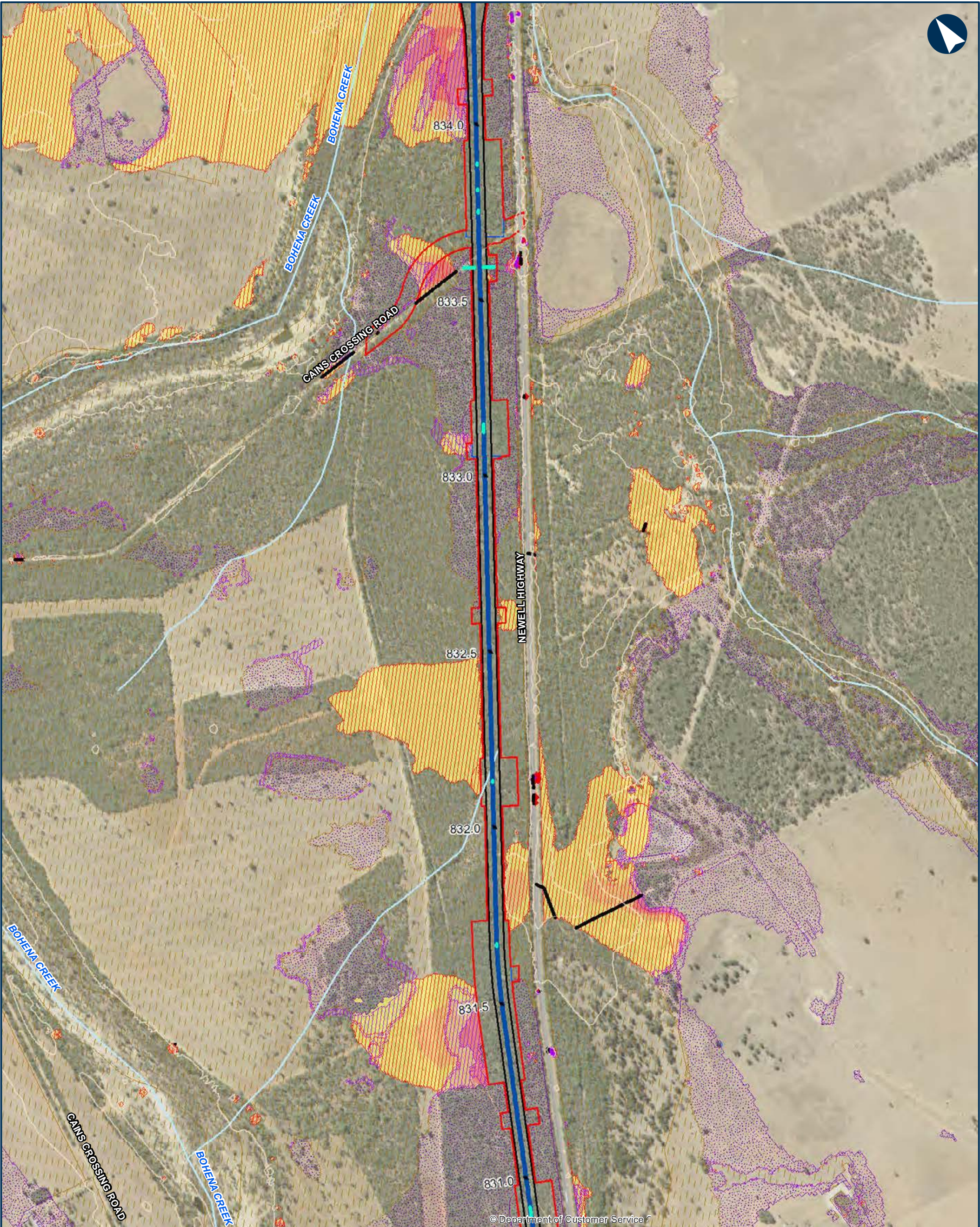
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Protected Surfaces
- Existing not flooded, design velocity > 1.2m/s
 - Existing velocity < 1m/s, design velocity > 1.2m/s
 - Existing velocity > 1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



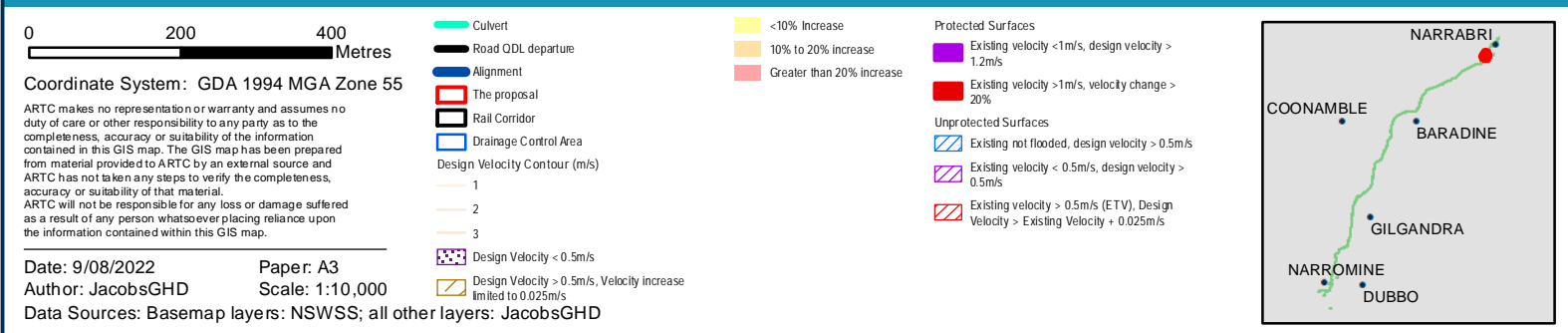
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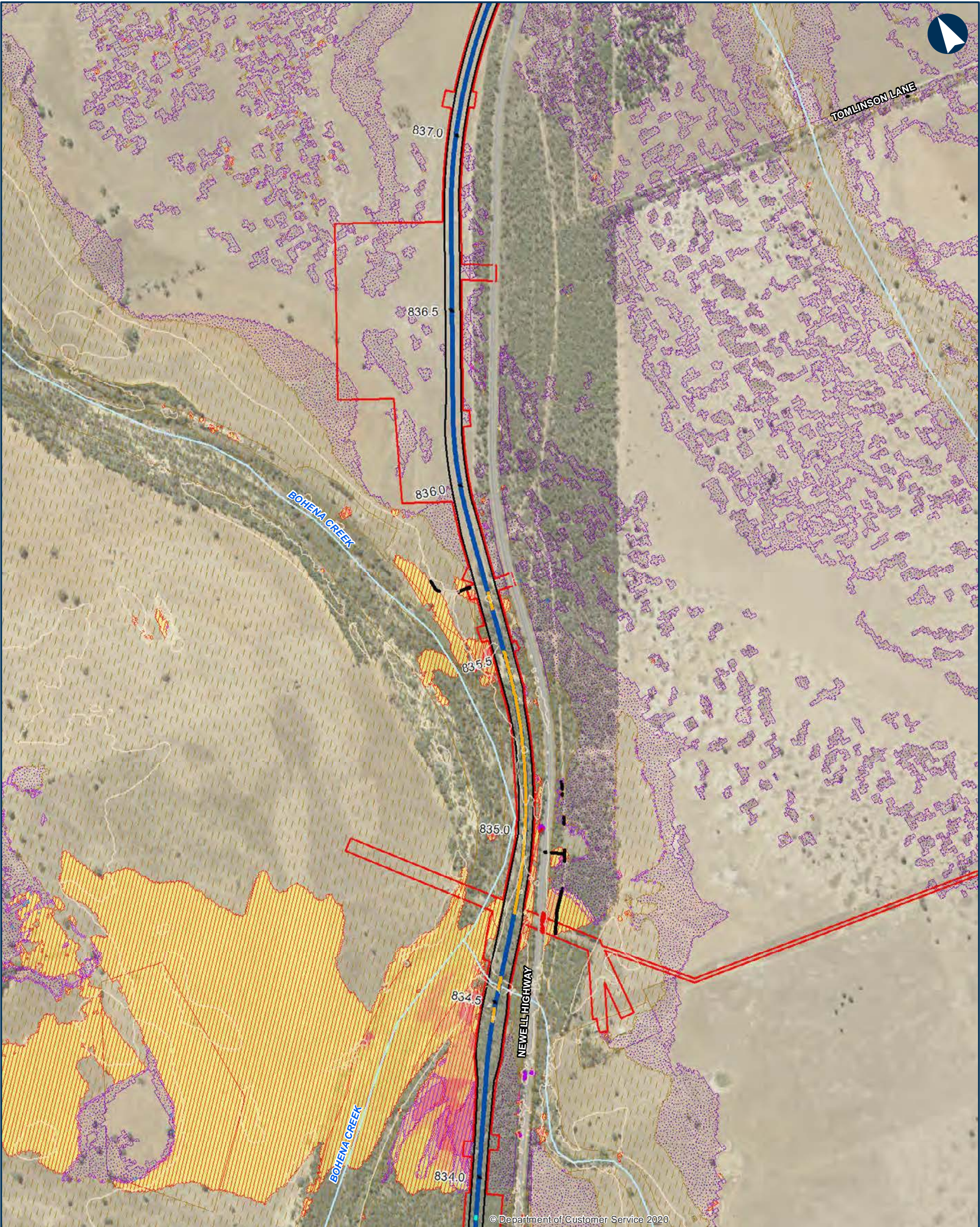
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.96



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.97

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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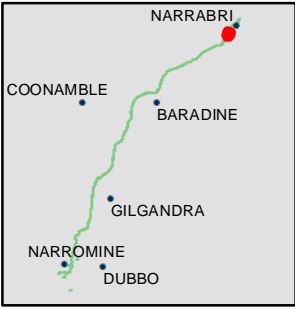
Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Paper: A3
Scale: 1:10,000

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Drainage Control Area
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

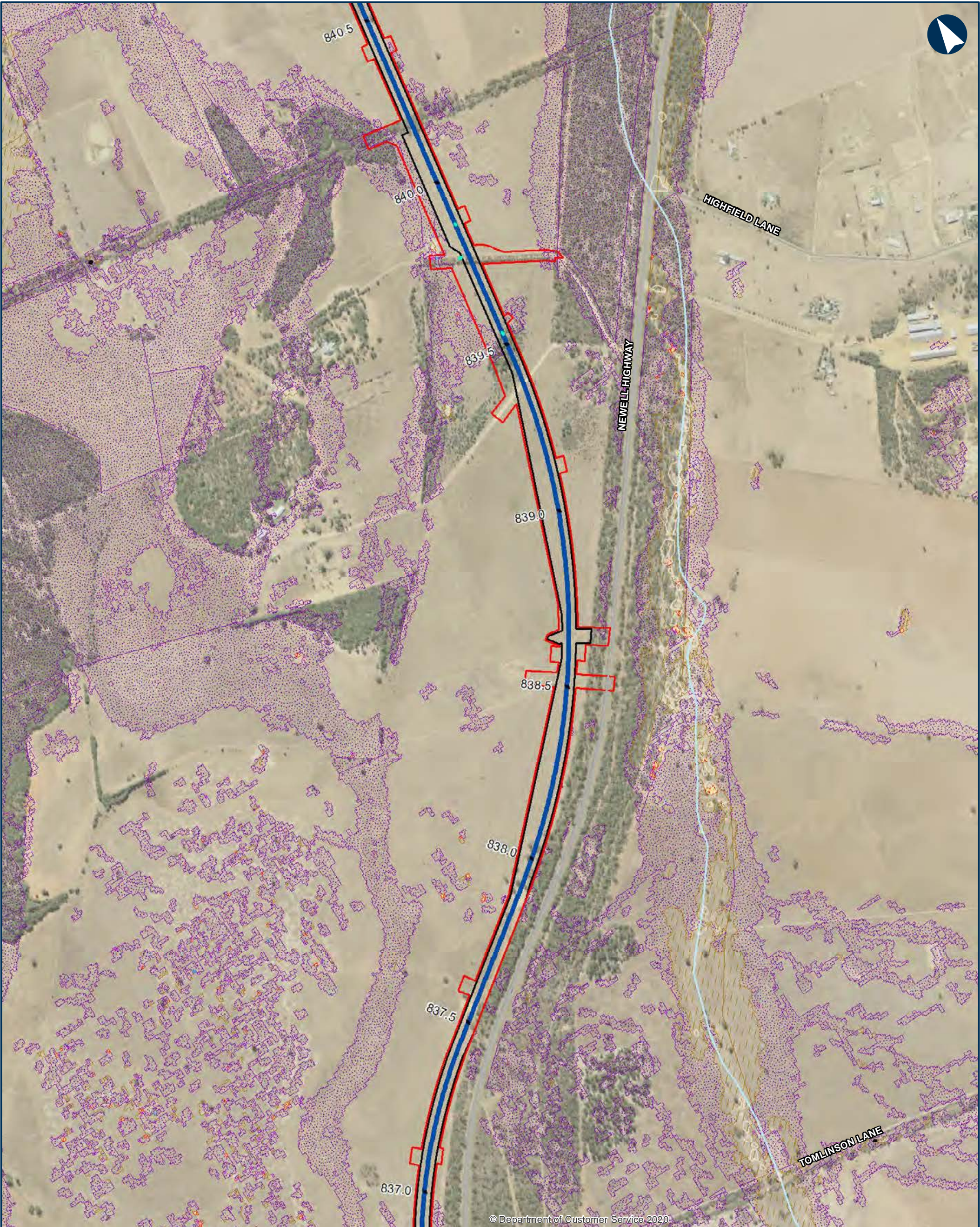
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Protected Surfaces
- Existing velocity < 1m/s, design velocity > 1.2m/s
 - Existing velocity > 1m/s, velocity change > 20%
- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.98

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

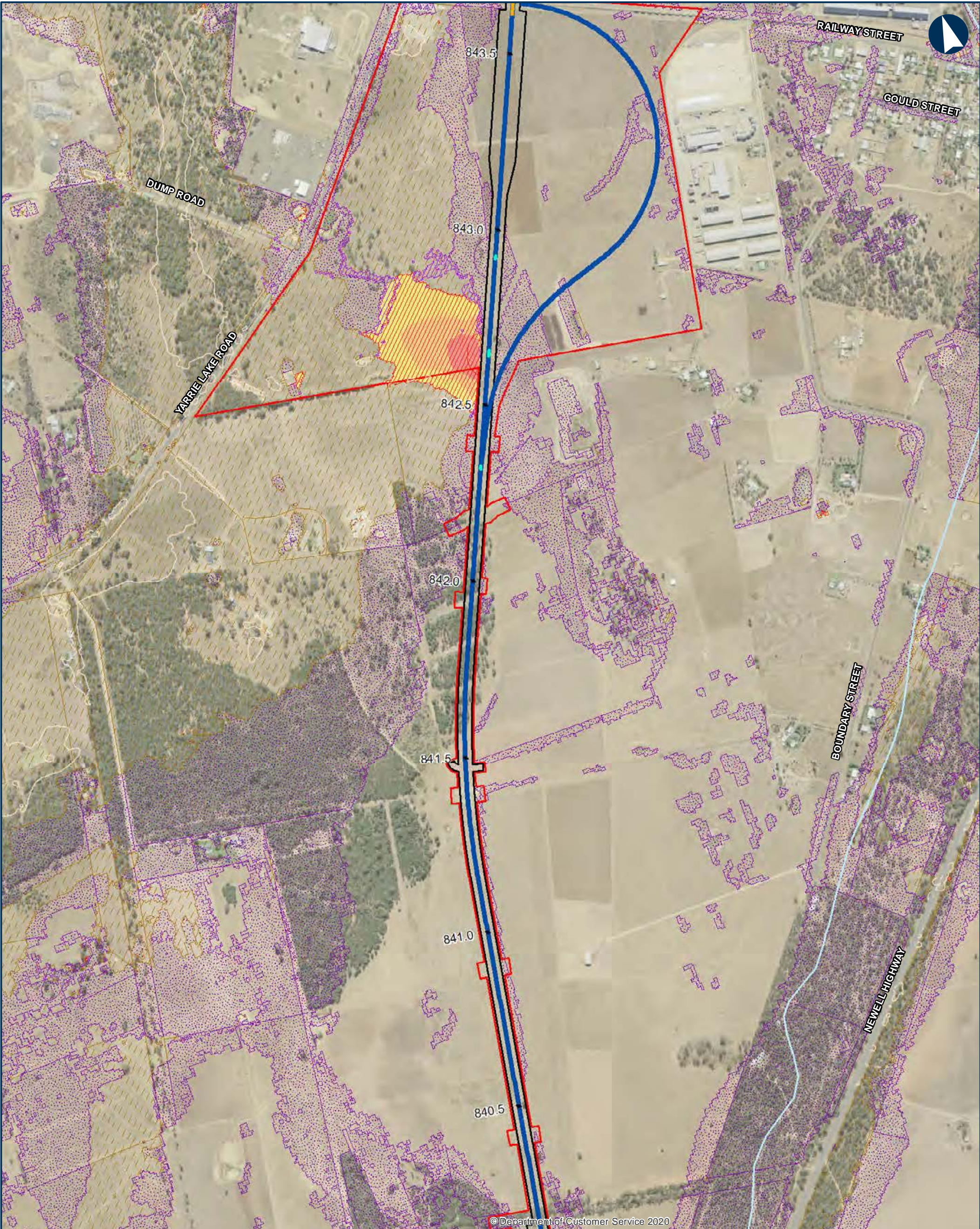
- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.99

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

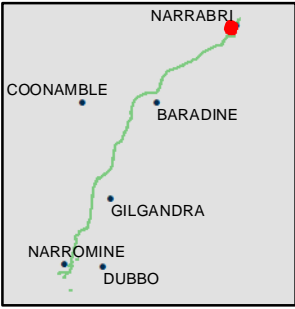
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Bridge
- Culvert
- Road ODL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

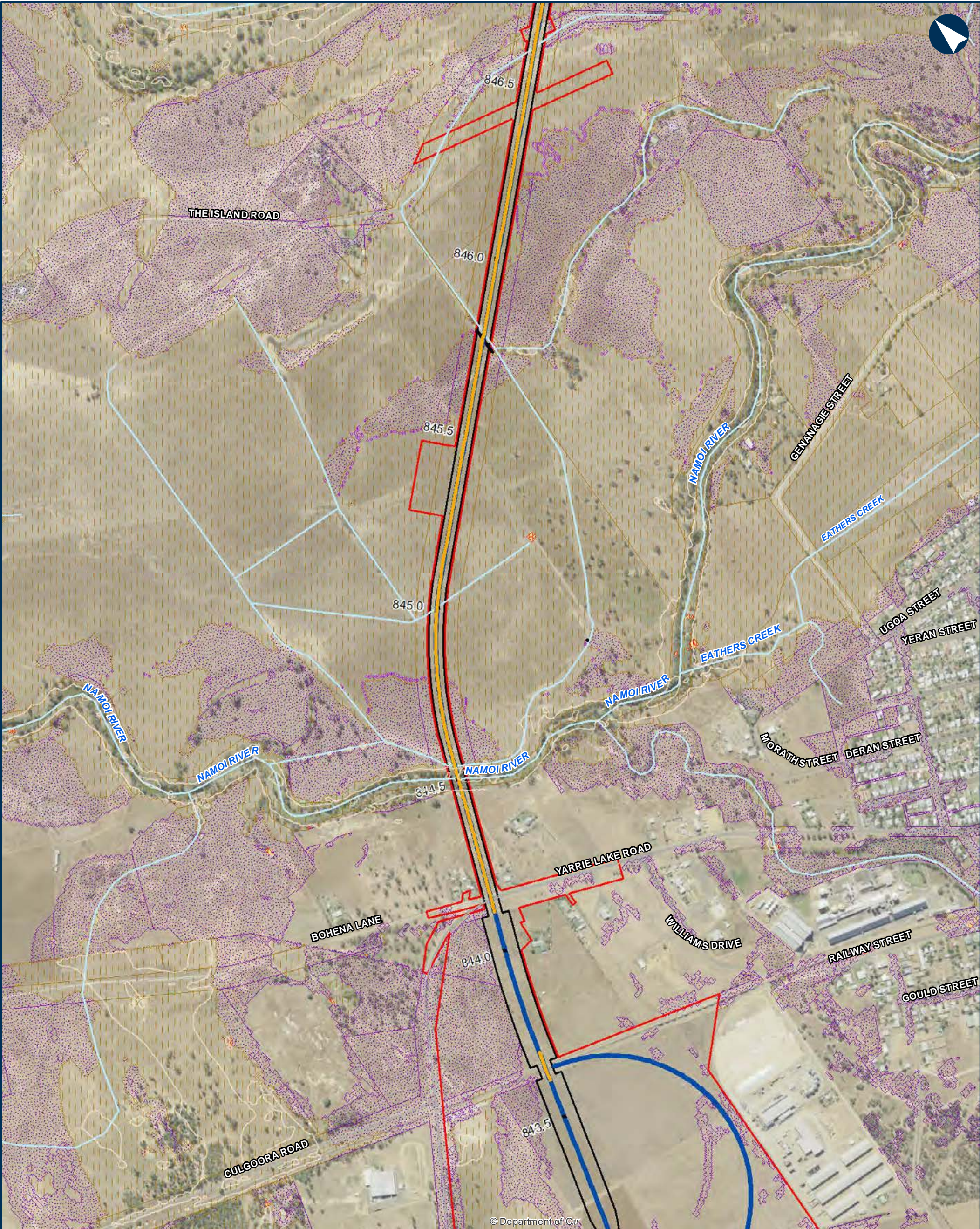
- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase

- Unprotected Surfaces
- Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



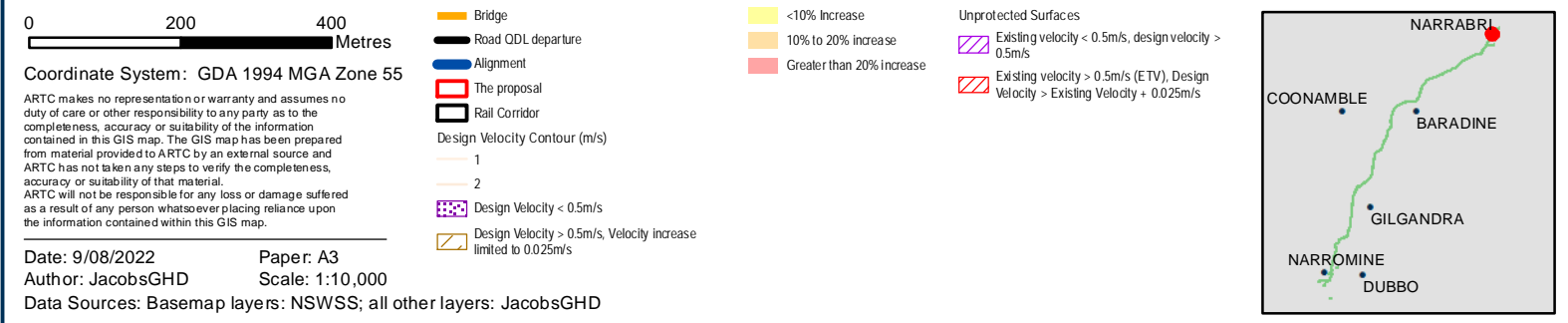
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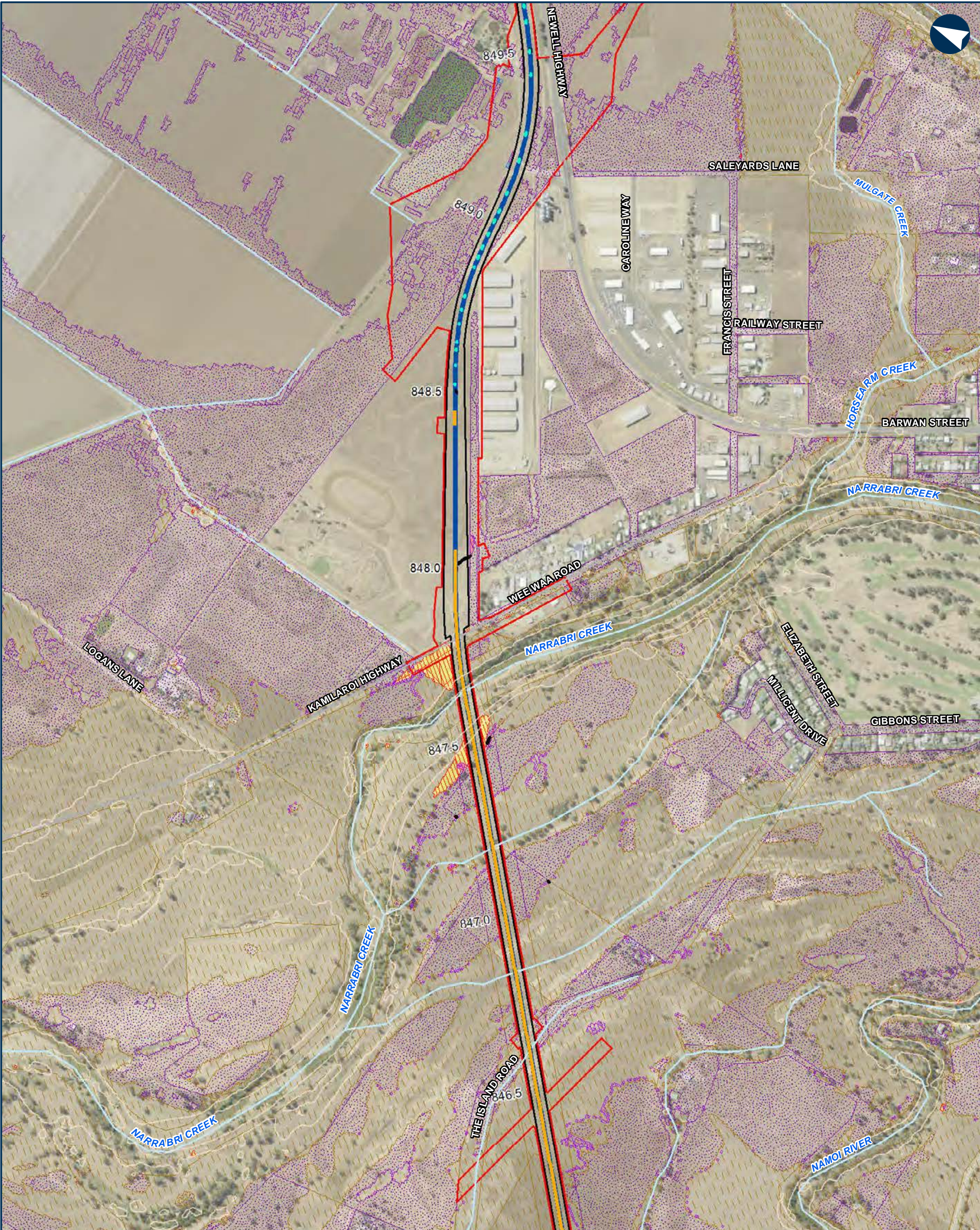
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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.100





NARROMINE TO NARRABRI

QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.101

0200400Metres

Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

Bridge

Culvert

Road ODL departure

Alignment

The proposal

Rail Corridor

Design Velocity Contour (m/s)

1

2

3

Design Velocity < 0.5m/s

Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase

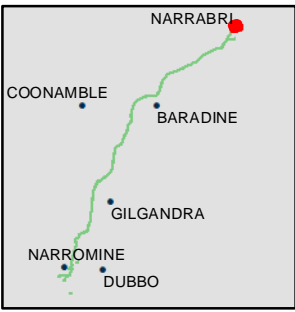
10% to 20% Increase

Greater than 20% Increase
- Unprotected Surfaces

Existing not flooded, design velocity > 0.5m/s

Existing velocity < 0.5m/s, design velocity > 0.5m/s

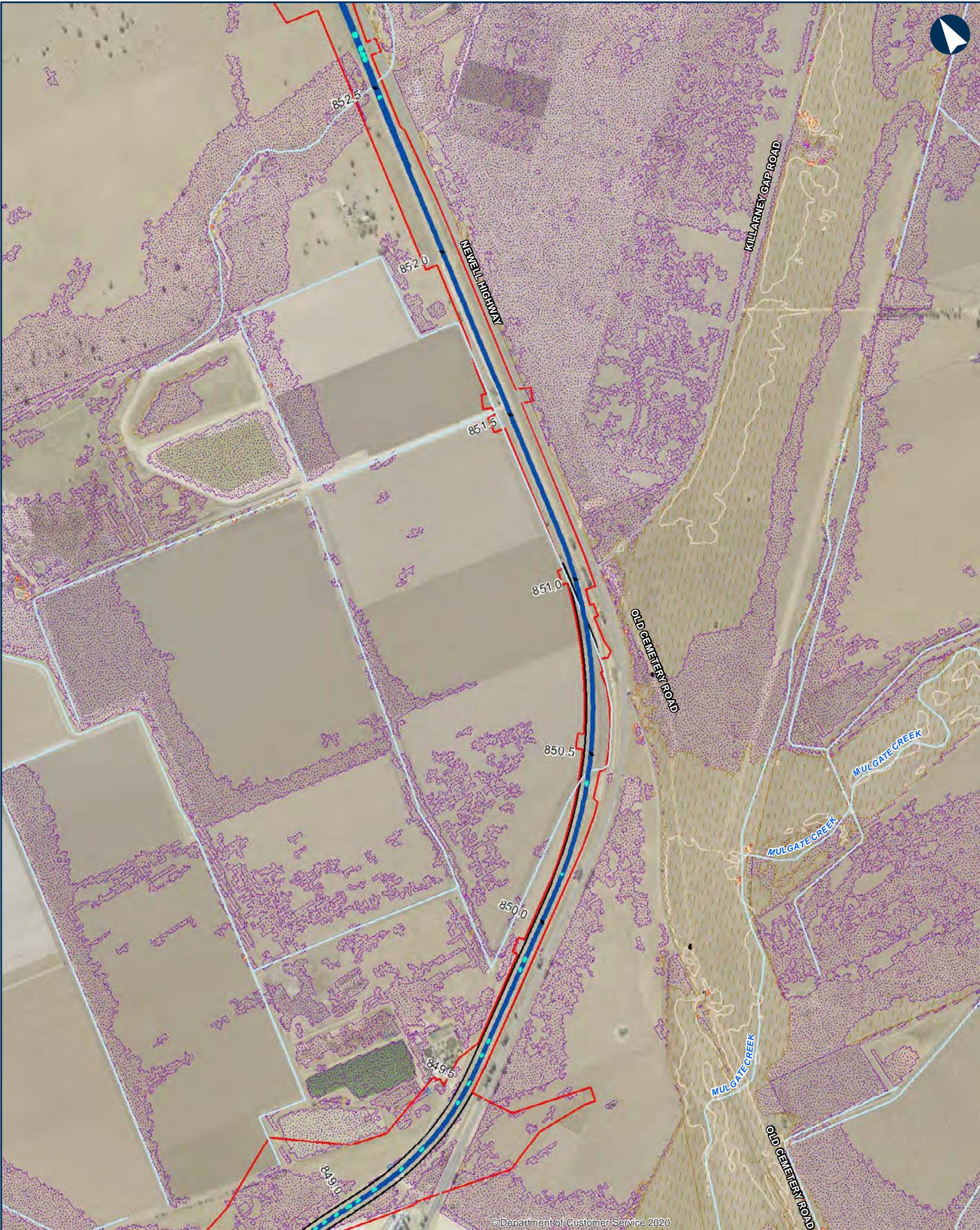
Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage Appendix I - Figure 2.4.102

0 200 400 Metres

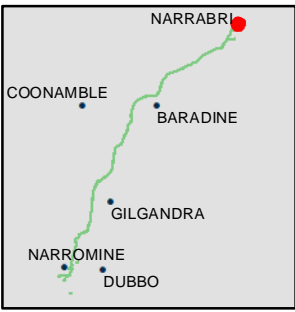
Coordinate System: GDA 1994 MGA Zone 55

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Date: 9/08/2022
Author: JacobsGHD
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

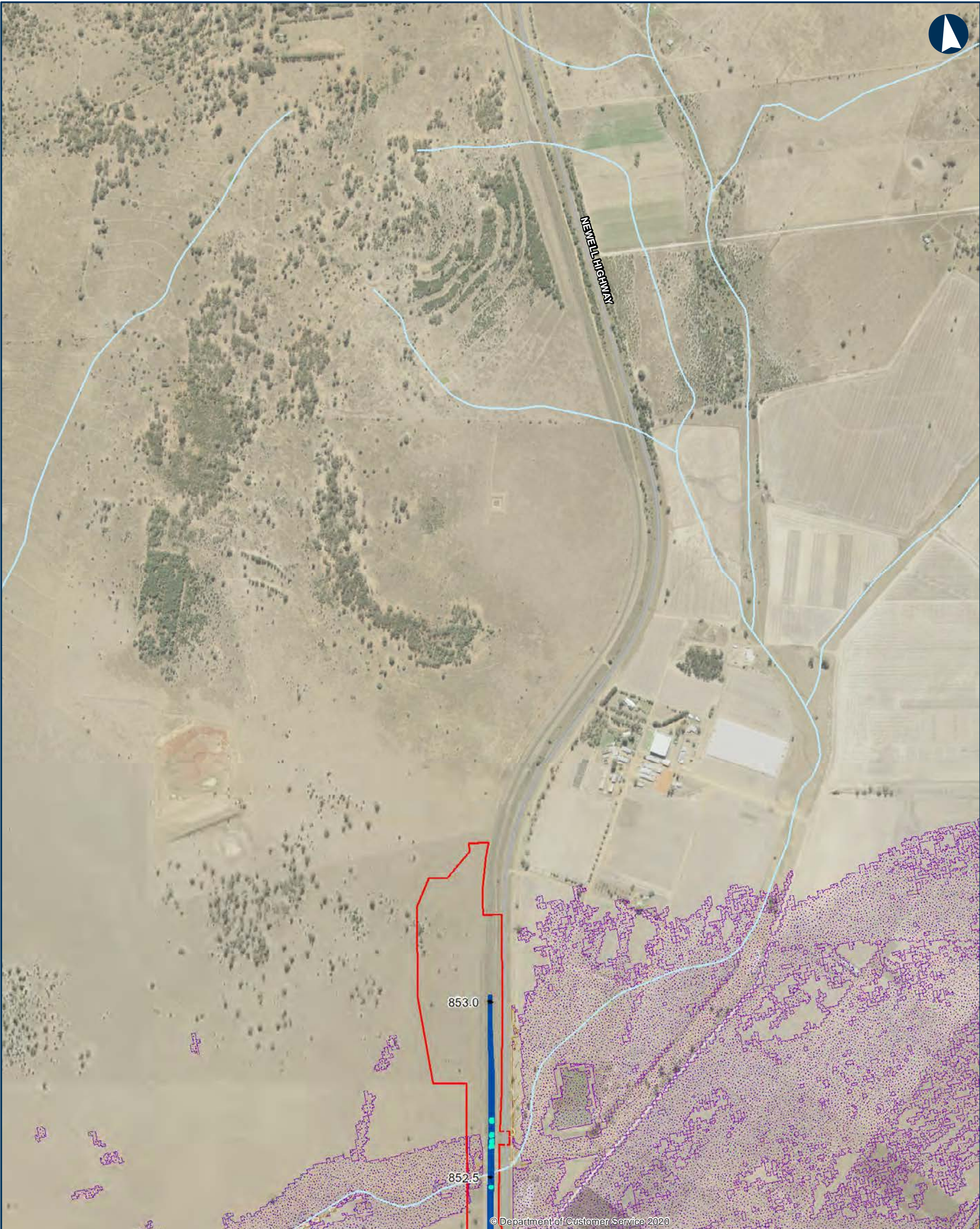
Paper: A3
Scale: 1:10,000

- Culvert
- Road QDL departure
- Alignment
- The proposal
- Rail Corridor
- Design Velocity Contour (m/s)
 - 1
 - 2
 - 3
 - 4
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s
- <10% Increase
- 10% to 20% Increase
- Greater than 20% Increase
- Unprotected Surfaces
 - Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



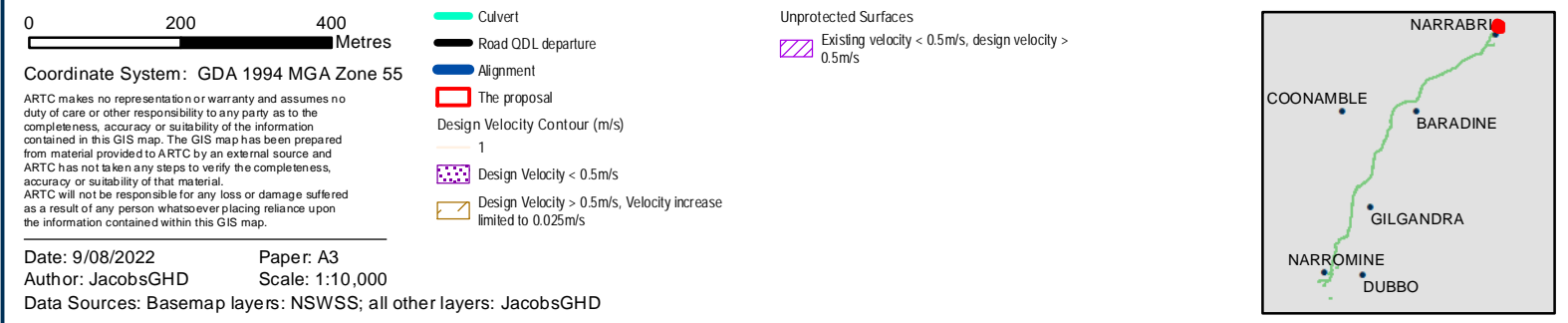
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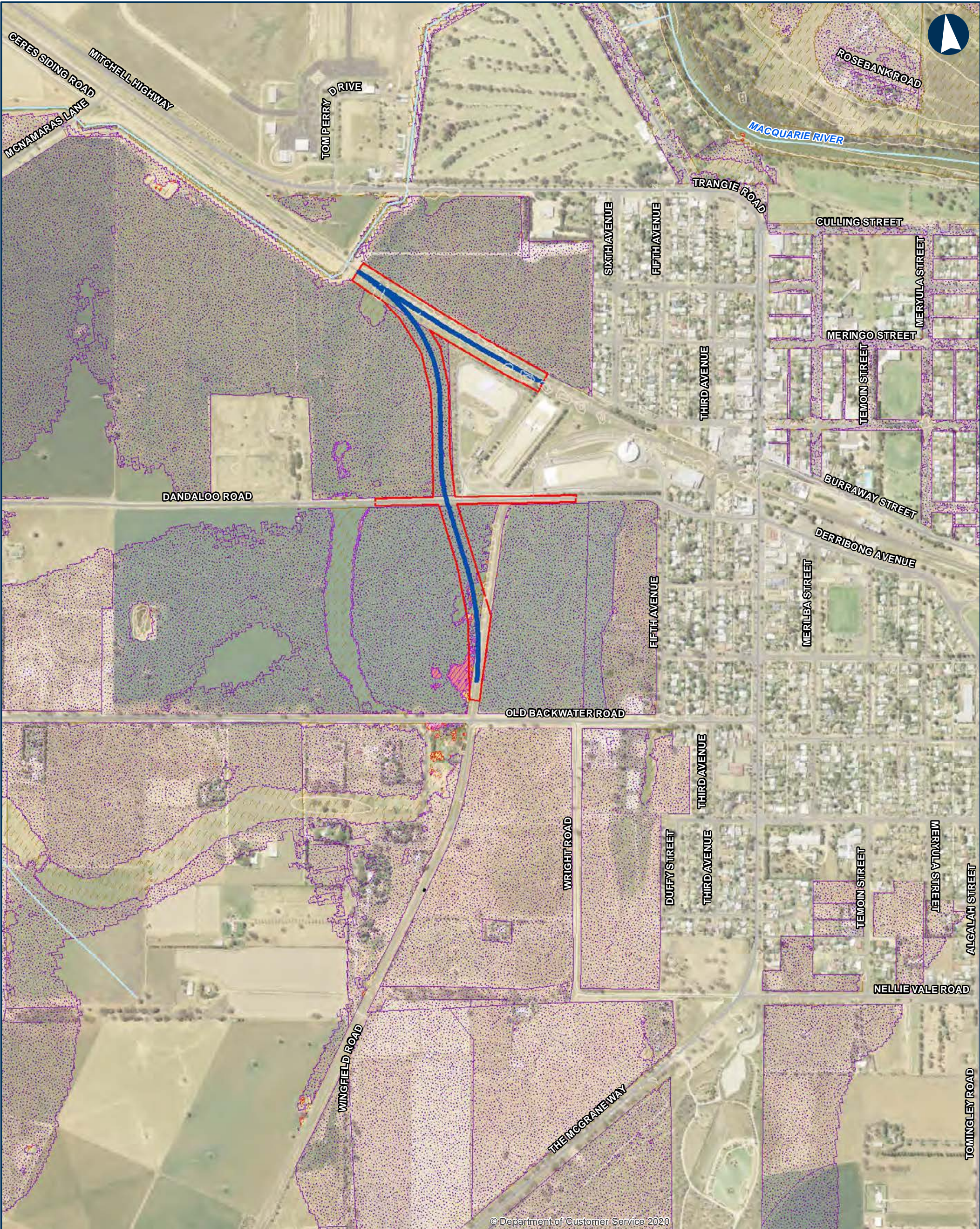
NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.103



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NARROMINE TO NARRABRI QDL departures - Scour / Erosion - 1% AEP with blockage

Appendix I - Figure 2.4.104

0 200 400 Metres

Coordinate System: GDA 1994 MGA Zone 55

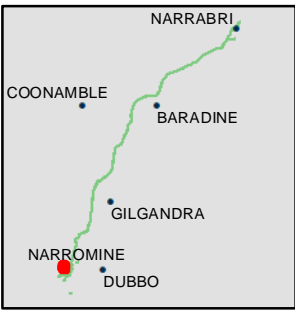
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Date: 9/08/2022 Paper: A3
Author: JacobsGHD Scale: 1:10,000
Data Sources: Basemap layers: NSWSS; all other layers: JacobsGHD

- Road QDL departure
 - Alignment
 - The proposal
- Design Velocity Contour (m/s)
- 1
 - 2
 - 3
 - 4
 - 5
- Design Velocity < 0.5m/s
- Design Velocity > 0.5m/s, Velocity increase limited to 0.025m/s

- <10% Increase
- 10% to 20% increase
- Greater than 20% increase

- Unprotected Surfaces
- Existing not flooded, design velocity > 0.5m/s
 - Existing velocity < 0.5m/s, design velocity > 0.5m/s
 - Existing velocity > 0.5m/s (ETV), Design Velocity > Existing Velocity + 0.025m/s



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