

# TECHNICAL PAPER

# 04

Hydrology and flooding impact assessment

## Appendix A Existing conditions flood maps

### Appendix A3 Duration maps

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT



## Appendix A – Existing conditions flood maps

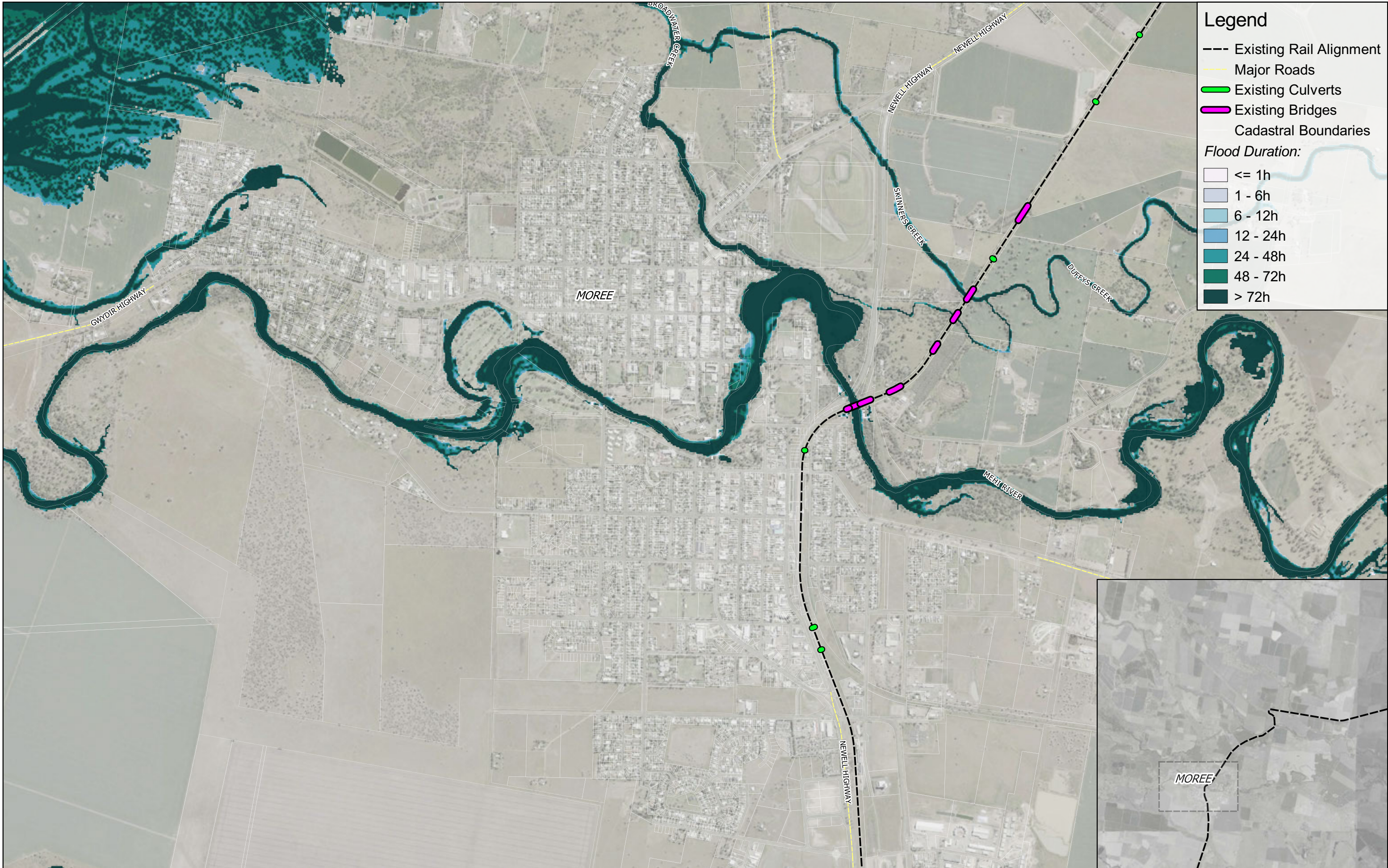
### Map list

MAP SET ID	MAP CONTENTS
EX_DEP_020	Flood Depth and Level – Existing Conditions, 20% AEP Event
EX_DEP_010	Flood Depth and Level – Existing Conditions, 10% AEP Event
EX_DEP_005	Flood Depth and Level – Existing Conditions, 5% AEP Event
EX_DEP_002	Flood Depth and Level – Existing Conditions, 2% AEP Event
EX_DEP_001	Flood Depth and Level – Existing Conditions, 1% AEP Event
EX_DEP_001CC	Flood Depth and Level – Existing Conditions, 1% AEP Event with Climate Change
EX_DEP_PMF	Flood Depth and Level – Existing Conditions, PMF Event
EX_VEL_020	Flood Velocity – Existing Conditions, 20% AEP Event
EX_VEL_010	Flood Velocity – Existing Conditions, 10% AEP Event
EX_VEL_005	Flood Velocity – Existing Conditions, 5% AEP Event
EX_VEL_002	Flood Velocity – Existing Conditions, 2% AEP Event
EX_VEL_001	Flood Velocity – Existing Conditions, 1% AEP Event
EX_VEL_001CC	Flood Velocity – Existing Conditions, 1% AEP Event with Climate Change
EX_VEL_PMF	Flood Velocity – Existing Conditions, PMF Event
EX_DUR_020	Flood Duration – Existing Conditions, 20% AEP Event
EX_DUR_010	Flood Duration – Existing Conditions, 10% AEP Event
EX_DUR_005	Flood Duration – Existing Conditions, 5% AEP Event
EX_DUR_002	Flood Duration – Existing Conditions, 2% AEP Event
EX_DUR_001	Flood Duration – Existing Conditions, 1% AEP Event
EX_DUR_001CC	Flood Duration – Existing Conditions, 1% AEP Event with Climate Change
EX_DUR_PMF	Flood Duration – Existing Conditions, PMF Event
EX_HAZ_020	Flood Hazard Category – Existing Conditions, 20% AEP Event
EX_HAZ_010	Flood Hazard Category – Existing Conditions, 10% AEP Event
EX_HAZ_005	Flood Hazard Category – Existing Conditions, 5% AEP Event
EX_HAZ_002	Flood Hazard Category – Existing Conditions, 2% AEP Event
EX_HAZ_001	Flood Hazard Category – Existing Conditions, 1% AEP Event
EX_HAZ_001CC	Flood Hazard Category – Existing Conditions, 1% AEP Event with Climate Change
EX_HAZ_PMF	Flood Hazard Category – Existing Conditions, PMF Event

## A.3 Duration

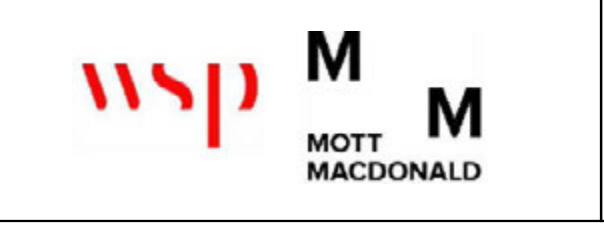
### Map list

MAP SET ID	MAP CONTENTS
EX_DUR_020	Flood Duration – Existing Conditions, 20% AEP Event
EX_DUR_010	Flood Duration – Existing Conditions, 10% AEP Event
EX_DUR_005	Flood Duration – Existing Conditions, 5% AEP Event
EX_DUR_002	Flood Duration – Existing Conditions, 2% AEP Event
EX_DUR_001	Flood Duration – Existing Conditions, 1% AEP Event
EX_DUR_001CC	Flood Duration – Existing Conditions, 1% AEP Event with Climate Change
EX_DUR_PMF	Flood Duration – Existing Conditions, PMF Event



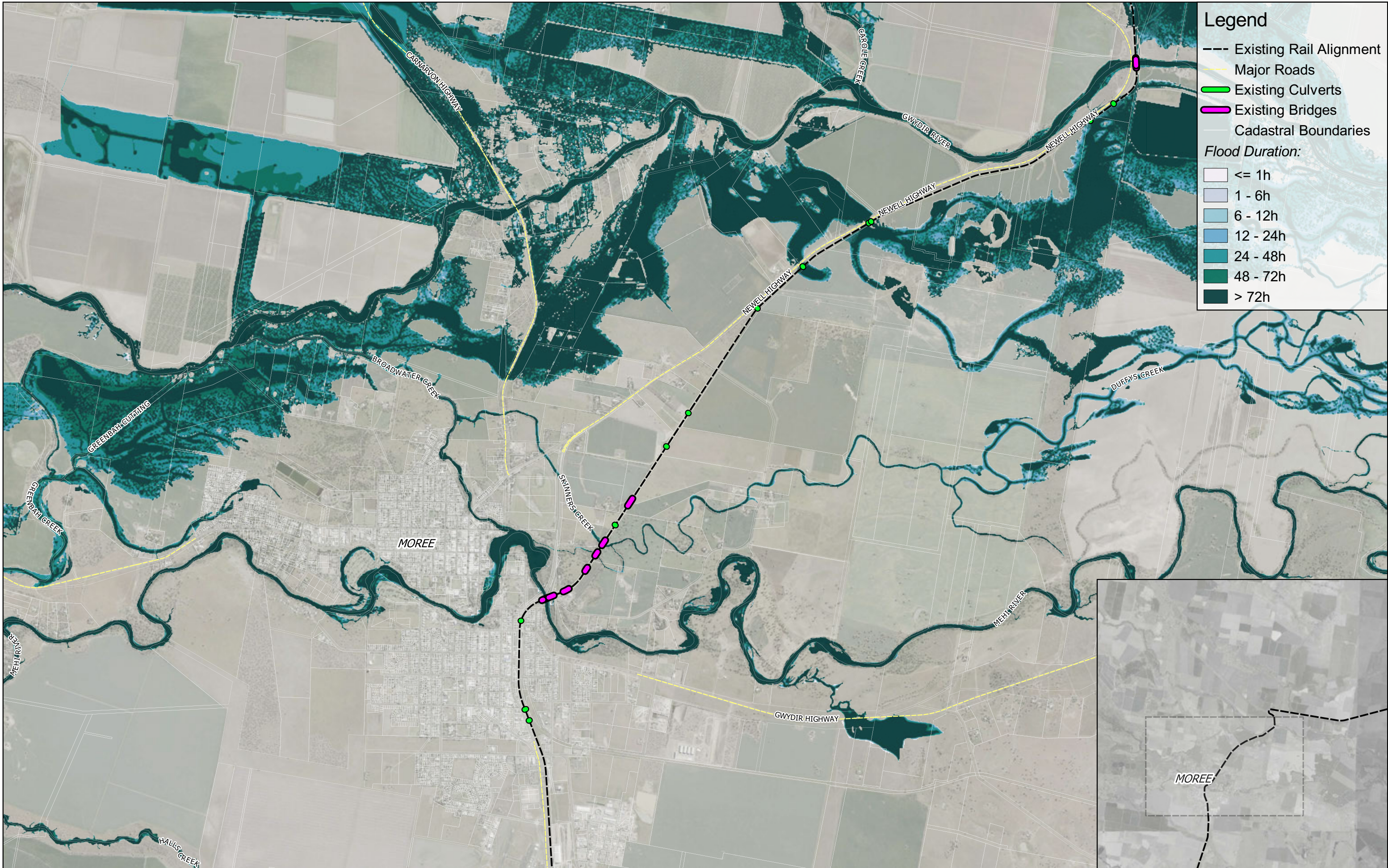
Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:20000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 20% AEP  
 Sheet 1  
 Map ID: EX\_DUR\_020\_1

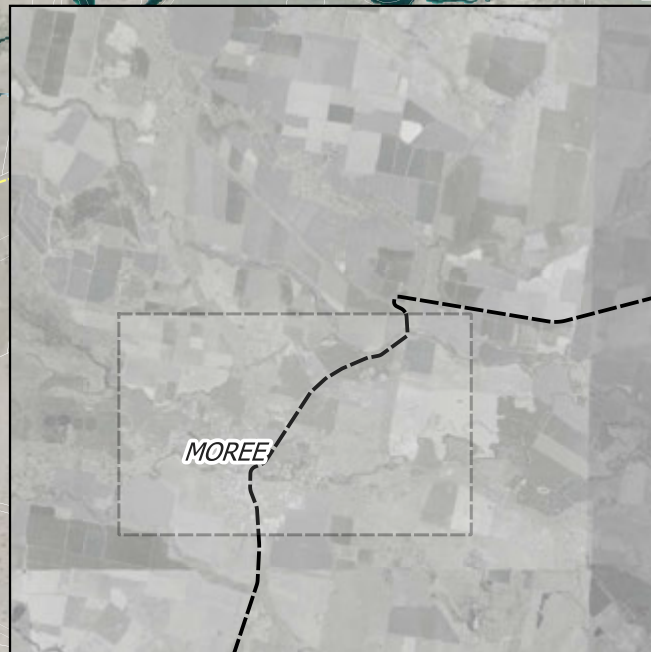


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 20% AEP  
 Sheet 2  
 Map ID: EX\_DUR\_020\_2




### Legend


- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- ▭ Cadastral Boundaries

*Flood Duration:*

- ▭ <= 1h
- ▭ 1 - 6h
- ▭ 6 - 12h
- ▭ 12 - 24h
- ▭ 24 - 48h
- ▭ 48 - 72h
- ▭ > 72h



  
 Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3  
  
 Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
*Peak Flood Duration - Existing Conditions Scenario*  
 Event: 20% AEP  
 Sheet 3  
 Map ID: EX\_DUR\_020\_3

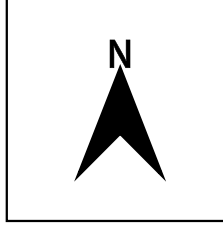


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- ≤ 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:20000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 10% AEP  
 Sheet 1  
 Map ID: EX\_DUR\_010\_1

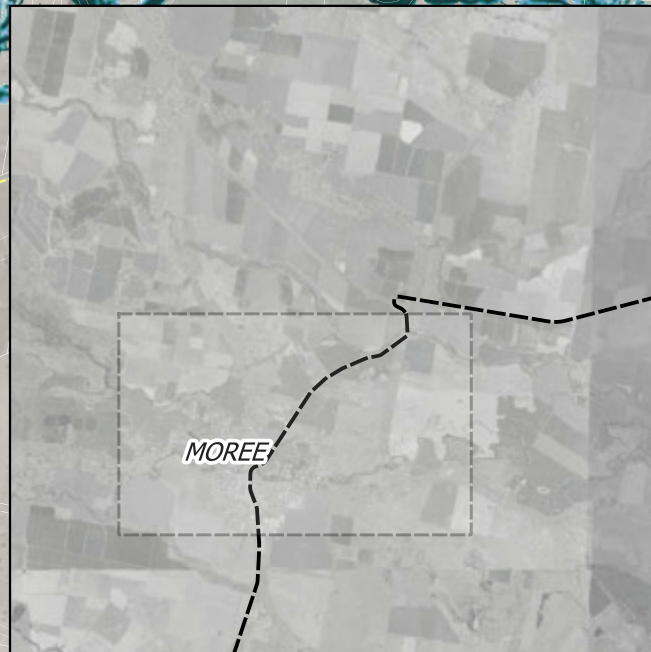


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

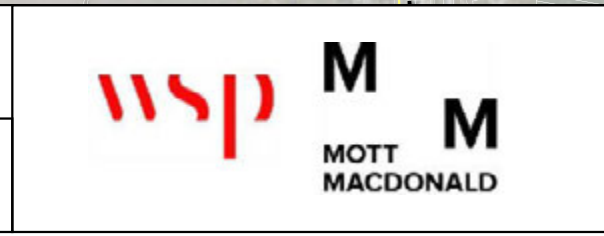
**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 10% AEP  
 Sheet 2  
 Map ID: EX\_DUR\_010\_2

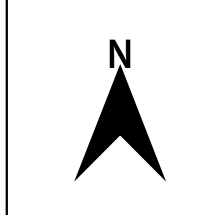
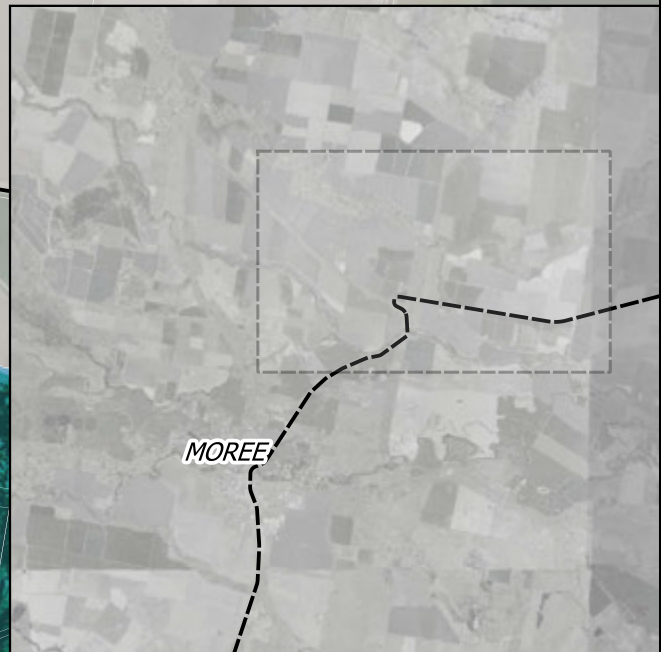


### Legend

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- ▭ Cadastral Boundaries

*Flood Duration:*

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 10% AEP  
 Sheet 3  
 Map ID: EX\_DUR\_010\_3

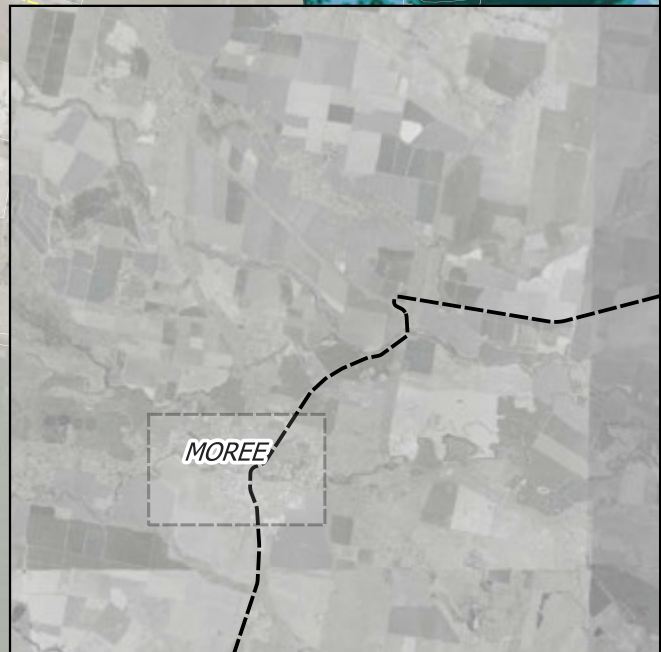



**Legend**



- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



  
 Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3  
  
 Scale: 1:20000

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 5% AEP  
 Sheet 1  
 Map ID: EX\_DUR\_005\_1

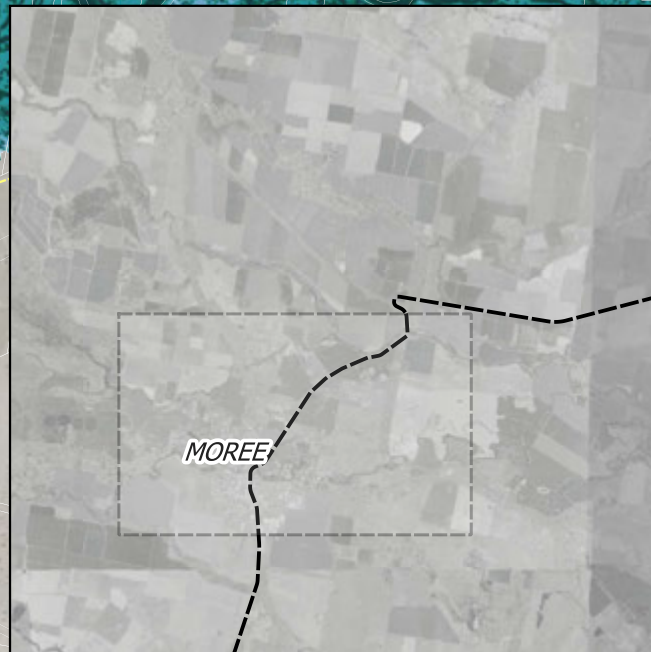


### Legend

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

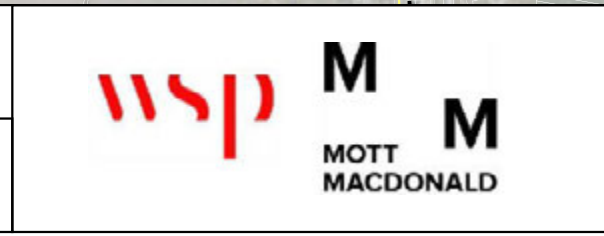
**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 5% AEP  
 Sheet 2  
 Map ID: EX\_DUR\_005\_2

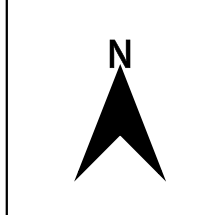


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- ▭ Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 5% AEP  
 Sheet 3  
 Map ID: EX\_DUR\_005\_3



**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h

Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:20000

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 2% AEP  
 Sheet 1  
 Map ID: EX\_DUR\_002\_1

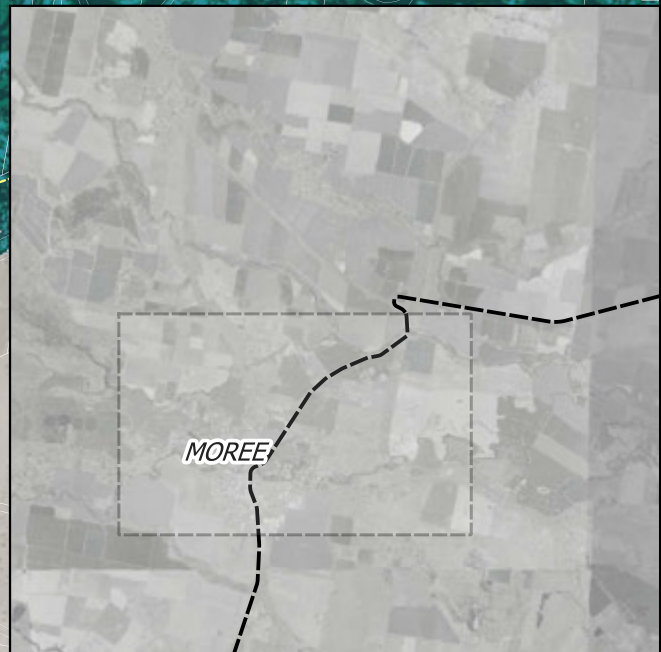



### Legend


- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



  
 Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3  
  
 Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 2% AEP  
 Sheet 2  
 Map ID: EX\_DUR\_002\_2



**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- ▭ Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h

Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 2% AEP  
 Sheet 3  
 Map ID: EX\_DUR\_002\_3



**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h

Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:20000

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 1% AEP  
 Sheet 1  
 Map ID: EX\_DUR\_001\_1



**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

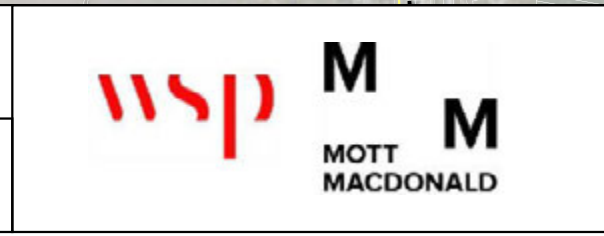
**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 1% AEP  
 Sheet 2  
 Map ID: EX\_DUR\_001\_2

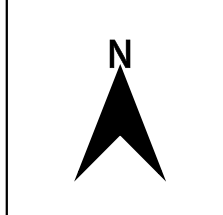


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- ▭ Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



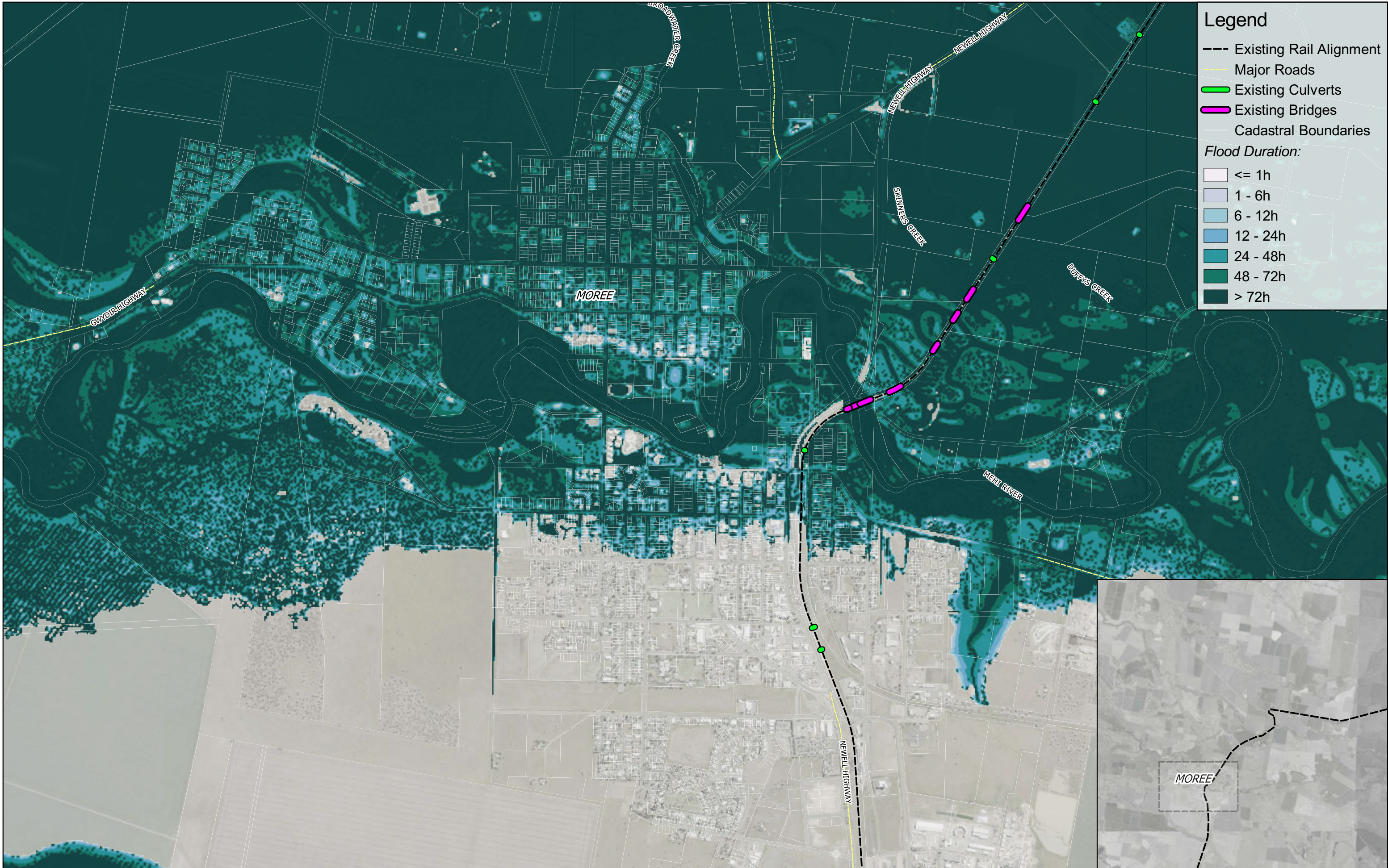
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Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 1% AEP  
 Sheet 3  
 Map ID: EX\_DUR\_001\_3

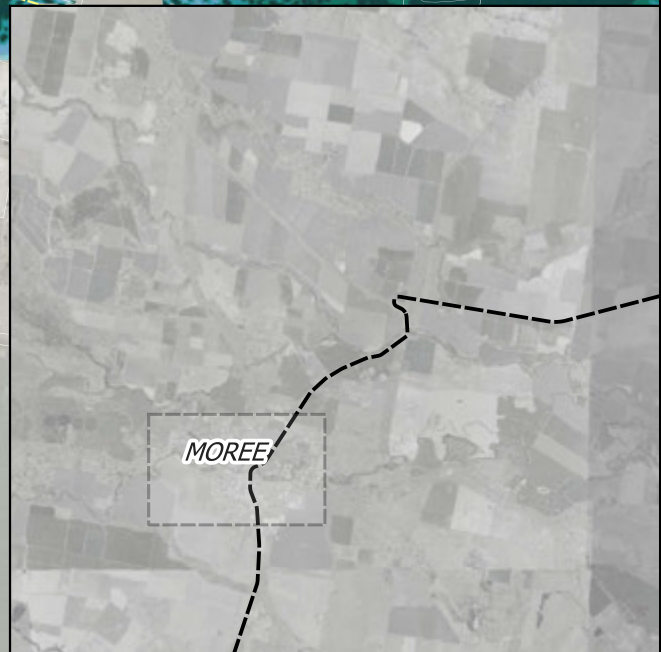


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

**N**

Scale: 1:20000

**wsp** **M**  
**MOTT** **M**  
**MACDONALD**

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 1% AEP Climate Change  
 Sheet 1  
 Map ID: EX\_DUR\_001CC\_1



**Legend**

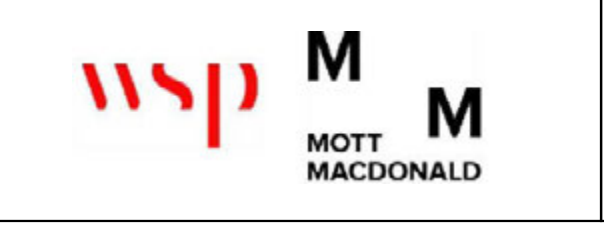
- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h

Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 1% AEP Climate Change  
 Sheet 2  
 Map ID: EX\_DUR\_001CC\_2

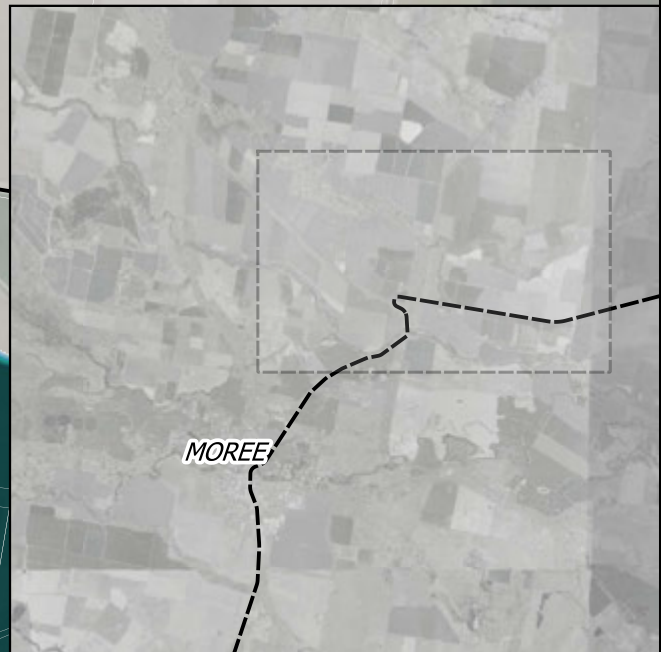


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: 1% AEP Climate Change  
 Sheet 3  
 Map ID: EX\_DUR\_001CC\_3

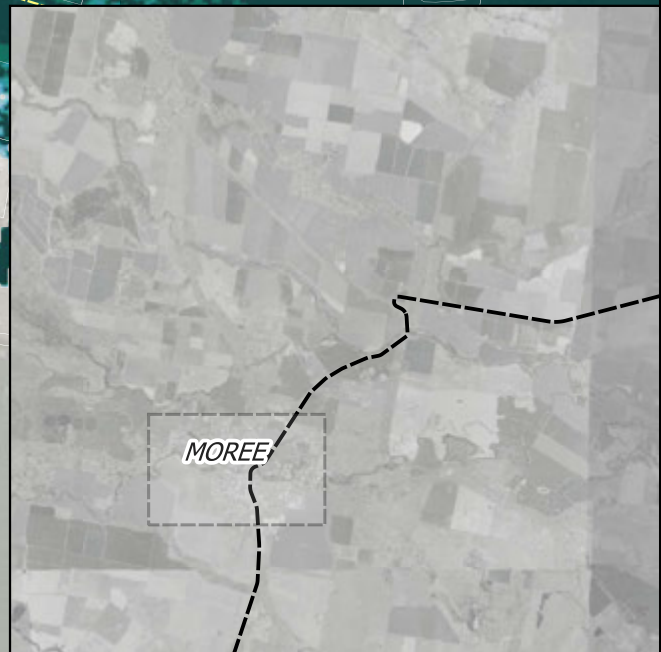


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- ▭ Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h

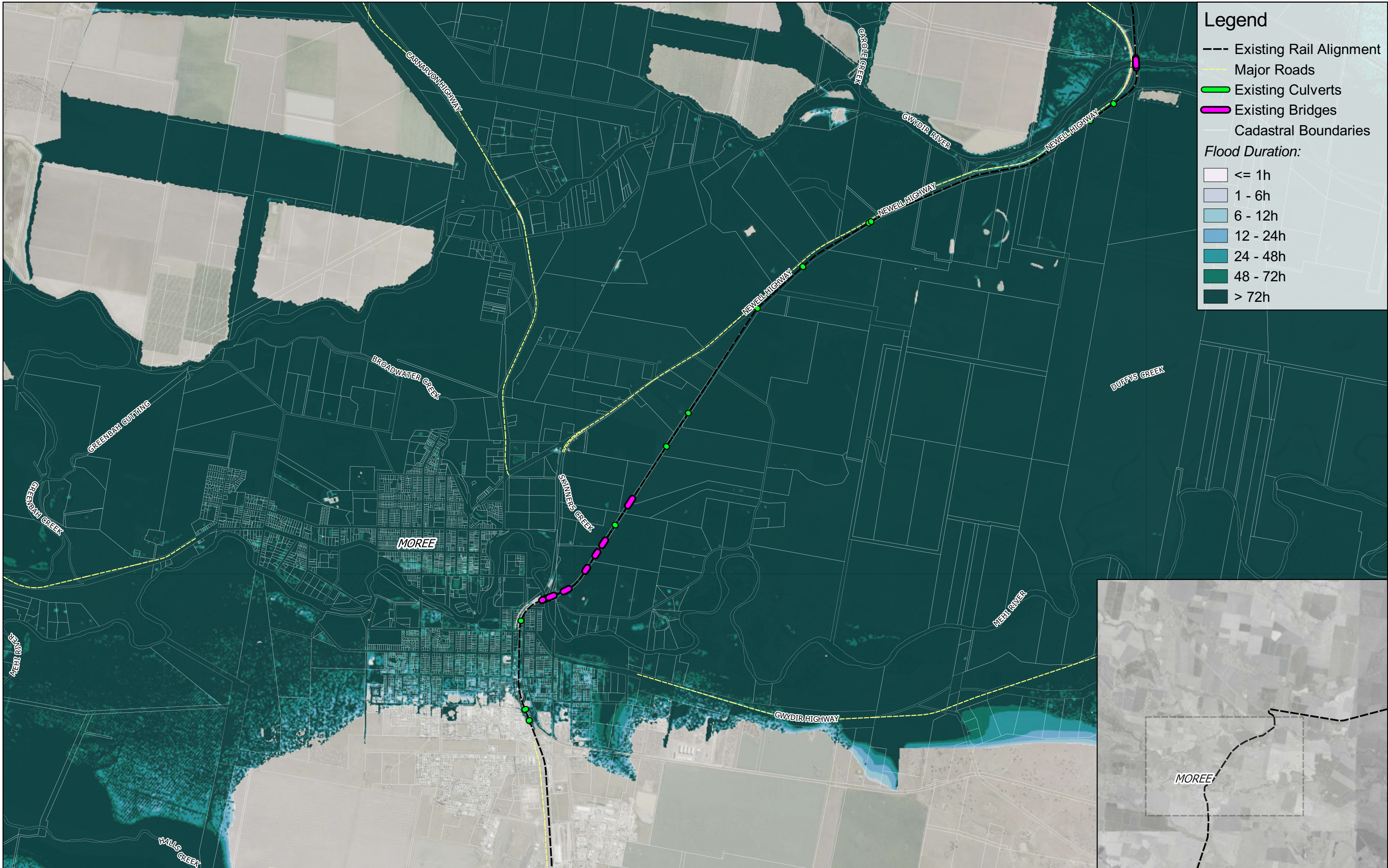


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 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:20000

Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: PMF  
 Sheet 1  
 Map ID: EX\_DUR\_PMF\_1

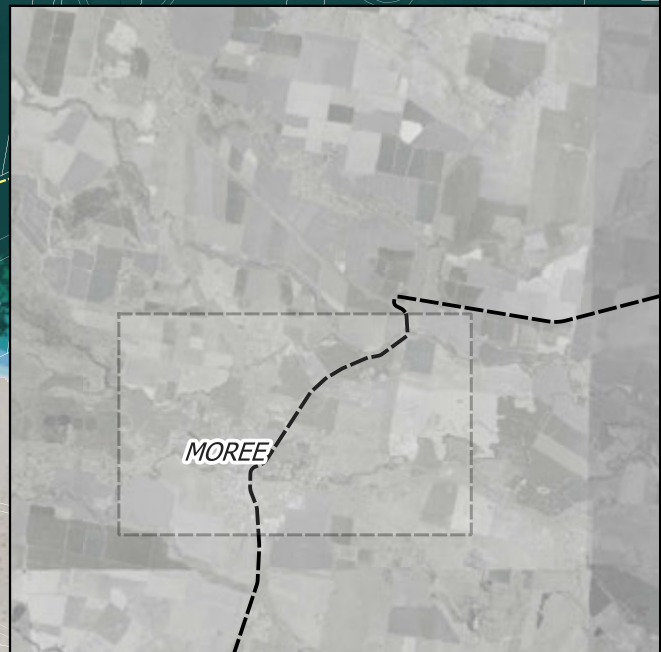



### Legend

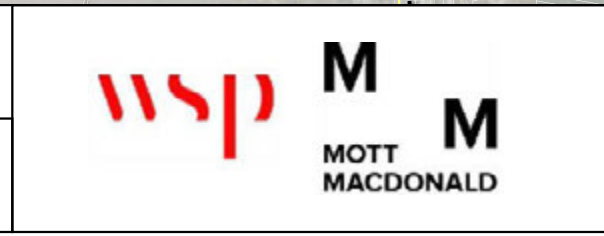
- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h

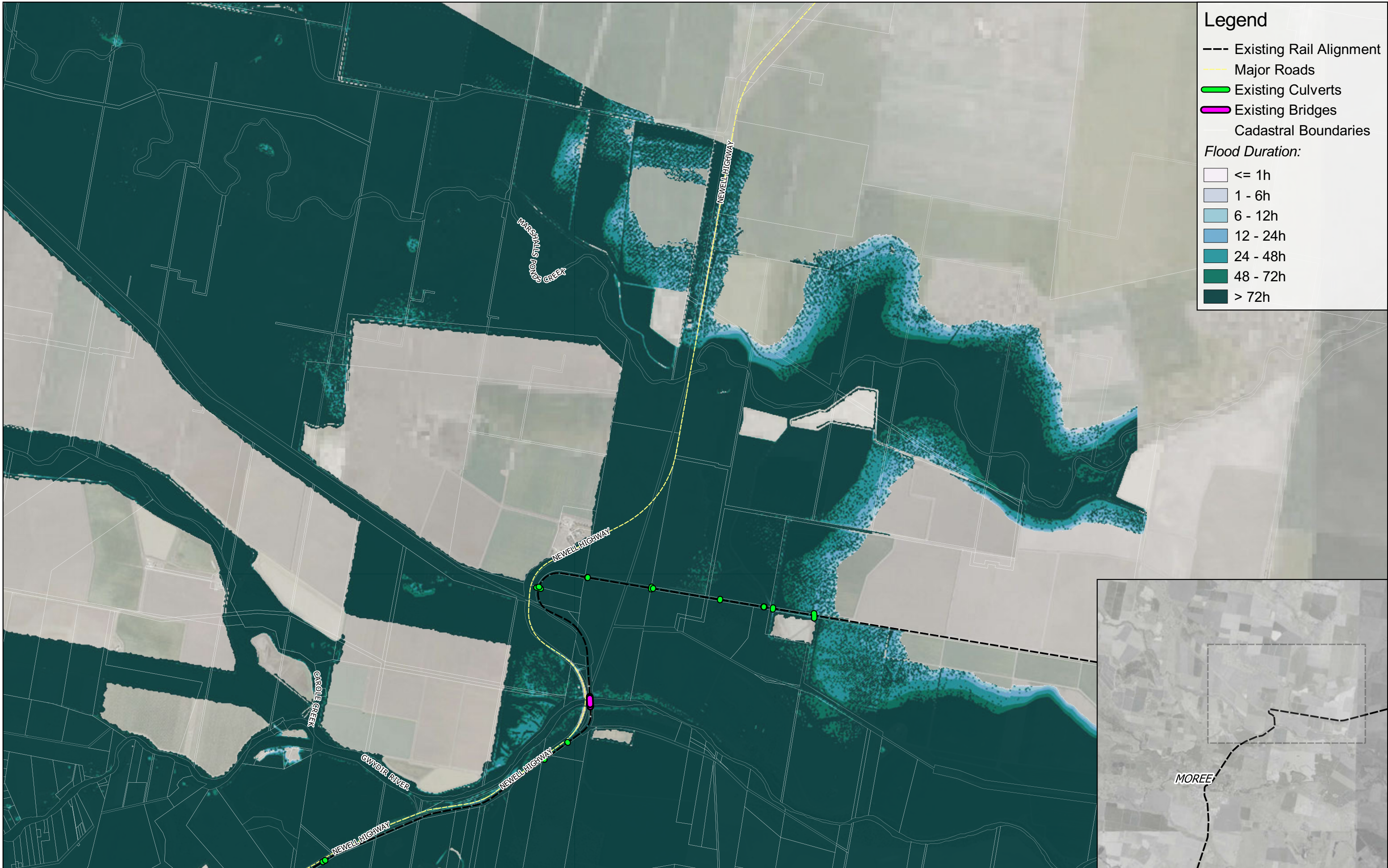



  
 Prepared for: ARTC  
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 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3  
  
 Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: PMF  
 Sheet 2  
 Map ID: EX\_DUR\_PMF\_2

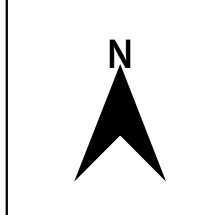


**Legend**

- Existing Rail Alignment
- Major Roads
- Existing Culverts
- Existing Bridges
- Cadastral Boundaries

**Flood Duration:**

- <= 1h
- 1 - 6h
- 6 - 12h
- 12 - 24h
- 24 - 48h
- 48 - 72h
- > 72h



Prepared for: ARTC  
 Coordinate system: GDA 1994 MGA Zone 56  
 Aerial Source: NSW Six Maps  
 Scale ratio correct when printed at A3

Scale: 1:40000



Stage: EIS  
 Version: C  
 Author: JS  
 Approved by: RL  
 Date: 22/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
 Peak Flood Duration - Existing Conditions Scenario  
 Event: PMF  
 Sheet 3  
 Map ID: EX\_DUR\_PMF\_3