

# TECHNICAL PAPER

# 04

Hydrology and flooding impact assessment

## Appendix C Design case cumulative flood impact maps

### **Appendix C3** Duration change maps

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT



## Appendix C – Design case cumulative flood impact maps

### Map list

MAP SET ID	MAP CONTENTS
DESNH_AFF_020	Flood Level Change (Afflux) – Cumulative Design Case, 20% AEP Event
DESNH_AFF_010	Flood Level Change (Afflux) – Cumulative Design Case, 10% AEP Event
DESNH_AFF_005	Flood Level Change (Afflux) – Cumulative Design Case, 5% AEP Event
DESNH_AFF_002	Flood Level Change (Afflux) – Cumulative Design Case, 2% AEP Event
DESNH_AFF_001	Flood Level Change (Afflux) – Cumulative Design Case, 1% AEP Event
DESNH_CHV_020	Flood Velocity Change Impact – Cumulative Design Case, 20% AEP Event
DESNH_CHV_010	Flood Velocity Change Impact – Cumulative Design Case, 10% AEP Event
DESNH_CHV_005	Flood Velocity Change Impact – Cumulative Design Case, 5% AEP Event
DESNH_CHV_002	Flood Velocity Change Impact – Cumulative Design Case, 2% AEP Event
DESNH_CHV_001	Flood Velocity Change Impact – Cumulative Design Case, 1% AEP Event
DESNH_CHDUR_020	Flood Duration Change – Cumulative Design Case, 20% AEP Event
DESNH_CHDUR_010	Flood Duration Change – Cumulative Design Case, 10% AEP Event
DESNH_CHDUR_005	Flood Duration Change – Cumulative Design Case, 5% AEP Event
DESNH_CHDUR_002	Flood Duration Change – Cumulative Design Case, 2% AEP Event
DESNH_CHDUR_001	Flood Duration Change – Cumulative Design Case, 1% AEP Event
DESNH_CHHAZ_020	Flood Hazard (Velocity x Depth) Change – Cumulative Design Case, 20% AEP Event
DESNH_CHHAZ_010	Flood Hazard (Velocity x Depth) Change – Cumulative Design Case, 10% AEP Event
DESNH_CHHAZ_005	Flood Hazard (Velocity x Depth) Change – Cumulative Design Case, 5% AEP Event
DESNH_CHHAZ_002	Flood Hazard (Velocity x Depth) Change – Cumulative Design Case, 2% AEP Event
DESNH_CHHAZ_001	Flood Hazard (Velocity x Depth) Change – Cumulative Design Case, 1% AEP Event

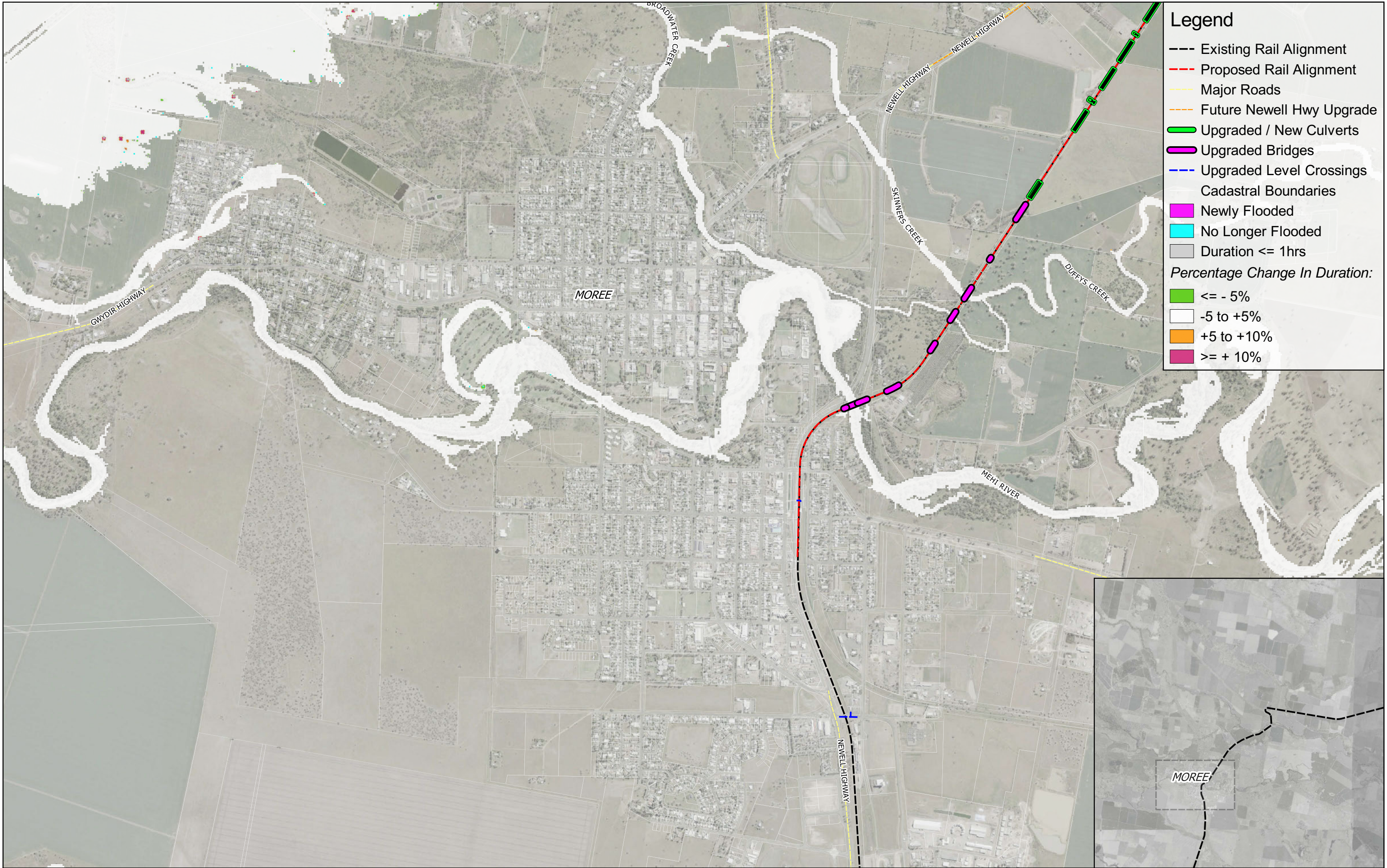


### C.3 Duration change

#### Map list

MAP SET ID	MAP CONTENTS
DESNH_CHDUR_020	Flood Duration Change – Cumulative Design Case, 20% AEP Event
DESNH_CHDUR_010	Flood Duration Change – Cumulative Design Case, 10% AEP Event
DESNH_CHDUR_005	Flood Duration Change – Cumulative Design Case, 5% AEP Event
DESNH_CHDUR_002	Flood Duration Change – Cumulative Design Case, 2% AEP Event
DESNH_CHDUR_001	Flood Duration Change – Cumulative Design Case, 1% AEP Event

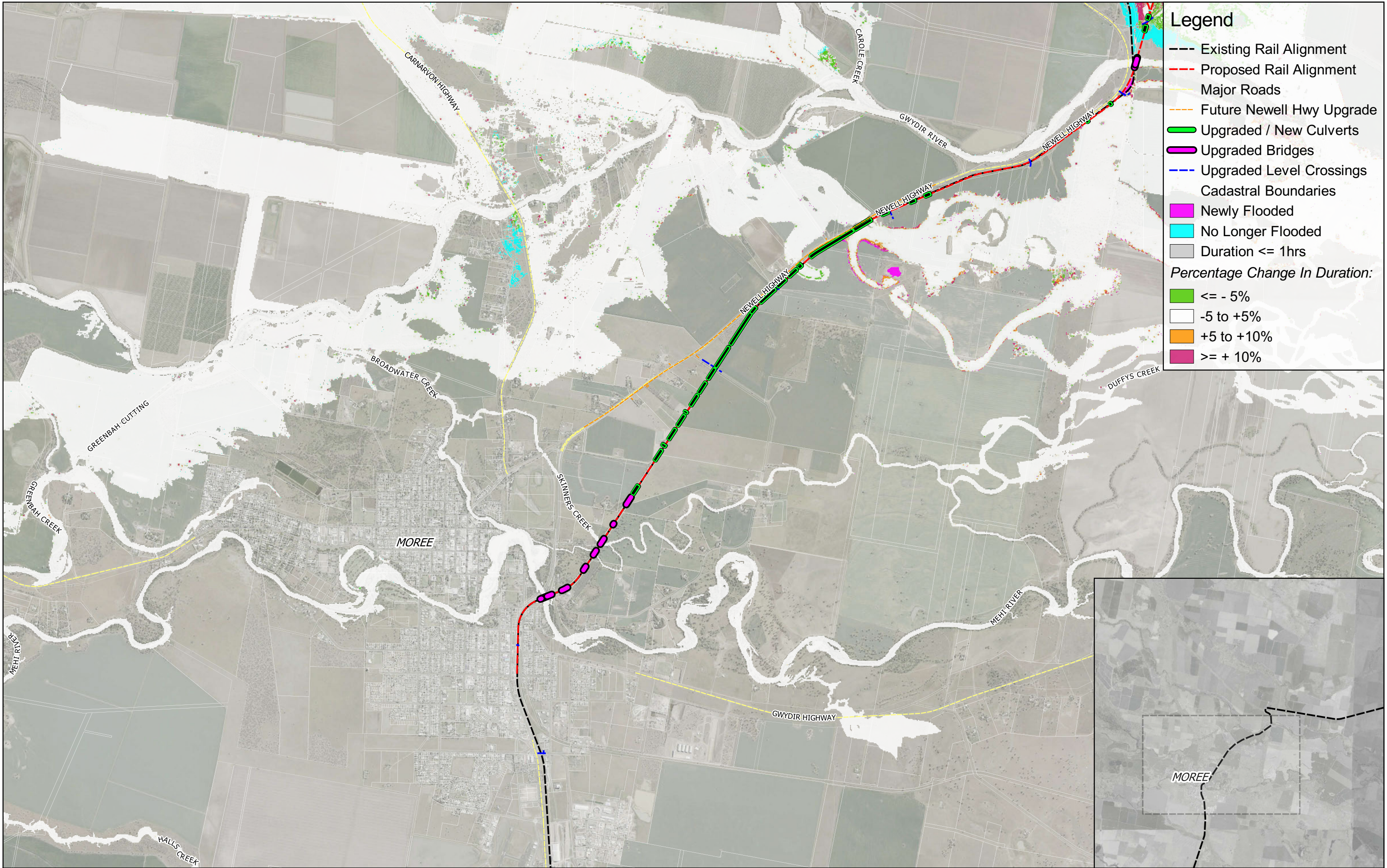




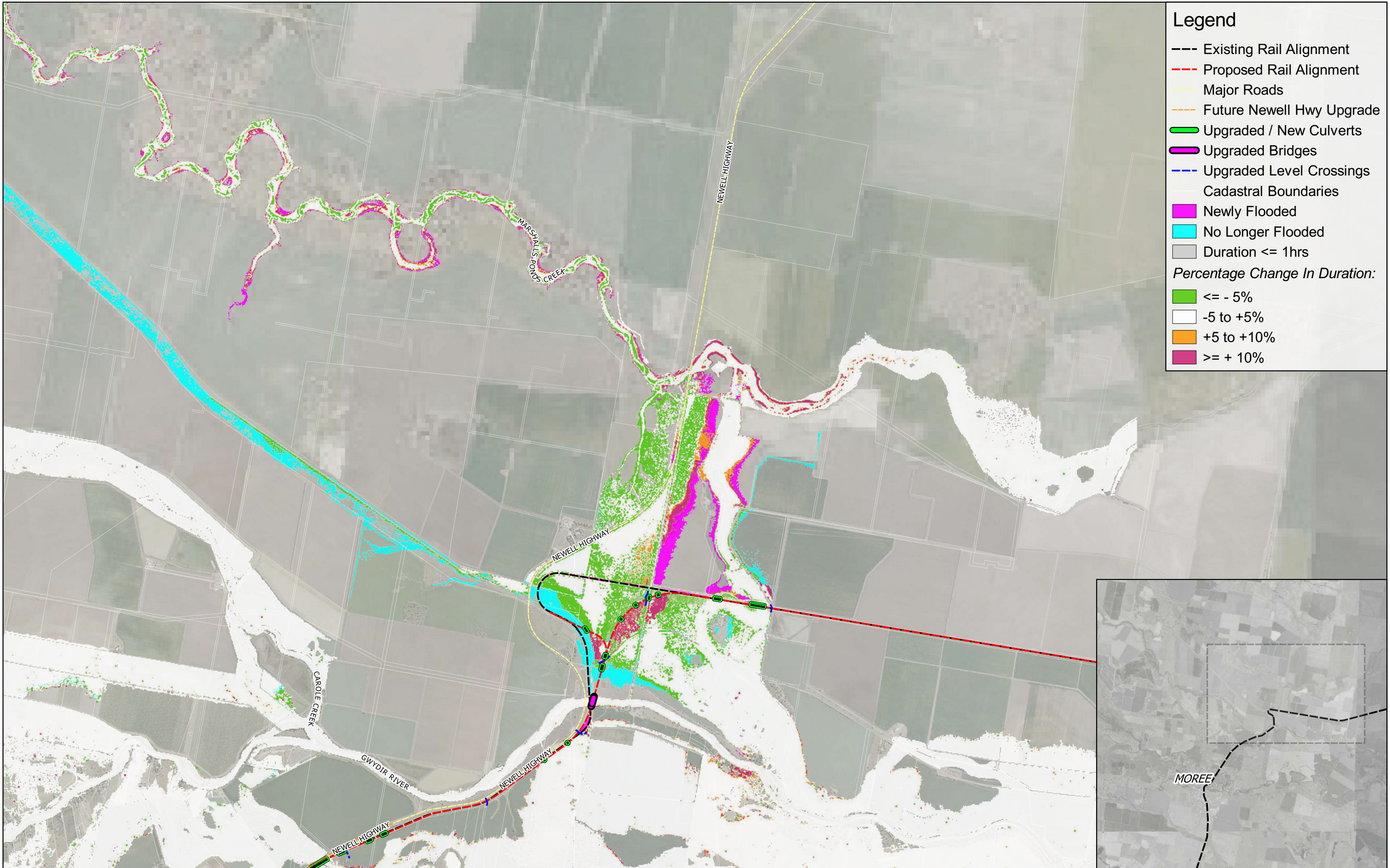
Legend

- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries
- Newly Flooded
- No Longer Flooded
- Duration <= 1hrs
- Percentage Change In Duration:
  - <= - 5%
  - 5 to +5%
  - +5 to +10%
  - >= + 10%







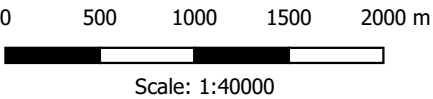


Legend

- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries
- Newly Flooded
- No Longer Flooded
- Duration <= 1hrs
- Percentage Change In Duration:
  - <= - 5%
  - 5 to +5%
  - +5 to +10%
  - >= + 10%



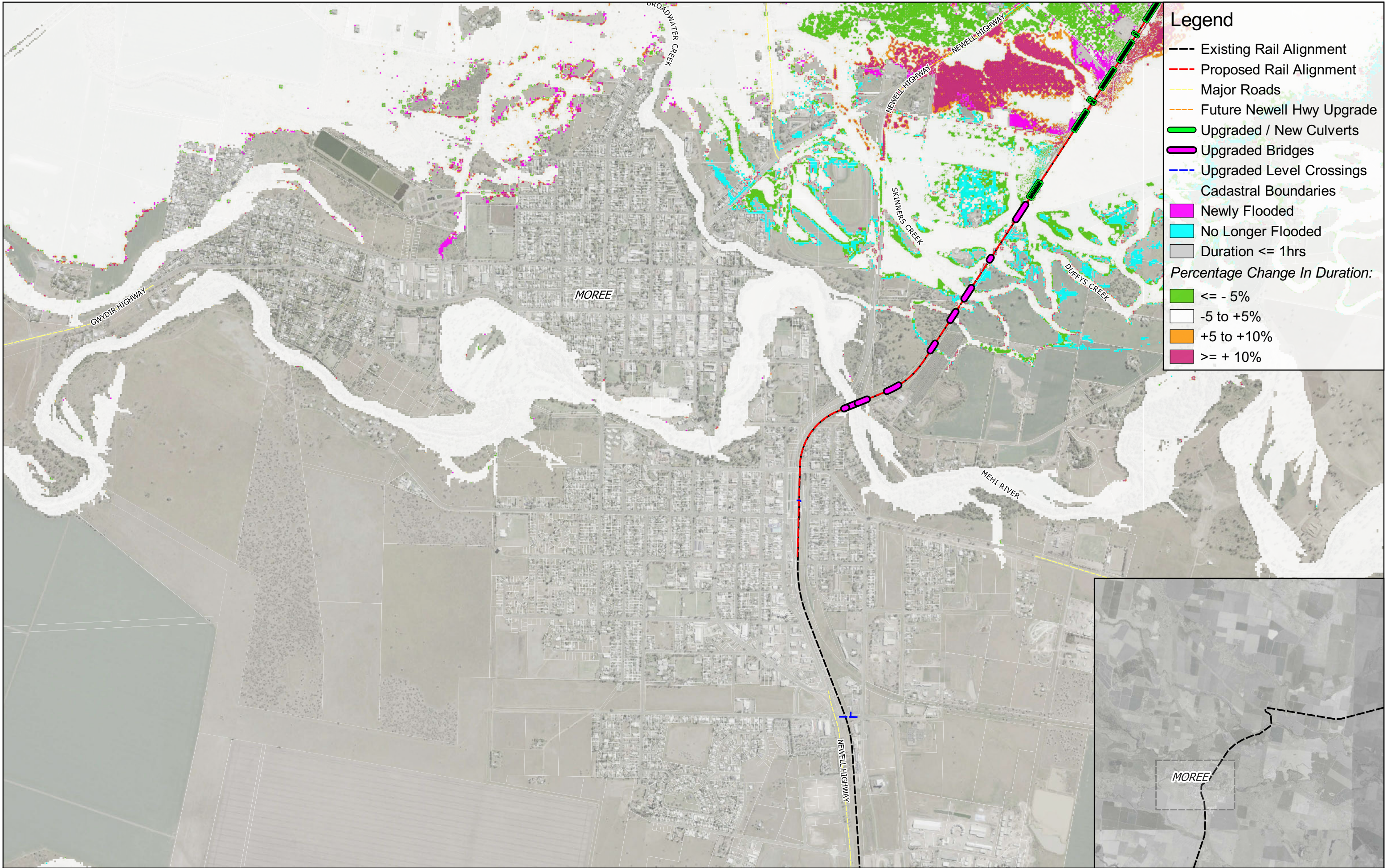
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Coordinate system: GDA 1994 MGA Zone 55  
Aerial Source: NSW Six Maps  
Scale ratio correct when printed at A3



Stage: EIS  
Version: C  
Author: JS  
Approved by: RL  
Date: 30/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
*Peak Flood Change In Duration - Proposed Design Scenario*  
Event: 20% AEP  
Cumulative Impact of N2NS and Newell Highway Upgrade - Sheet 3  
Map ID: DESNH\_CHDUR\_020\_3



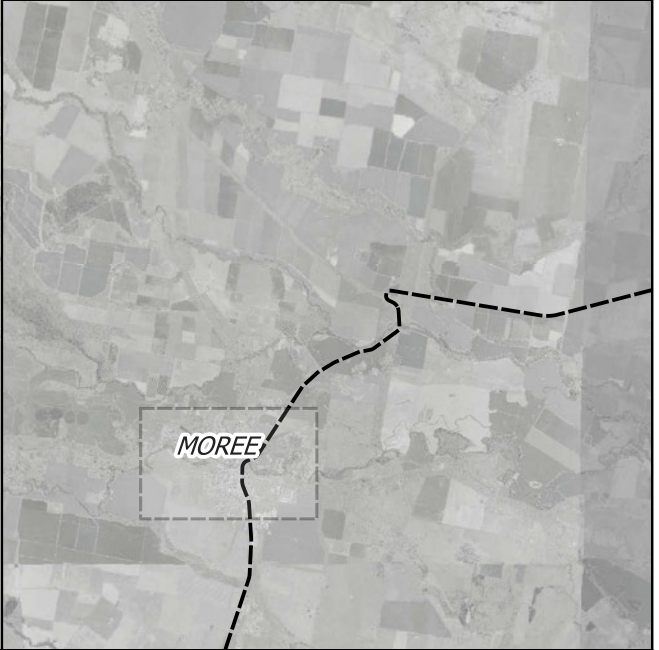


**Legend**

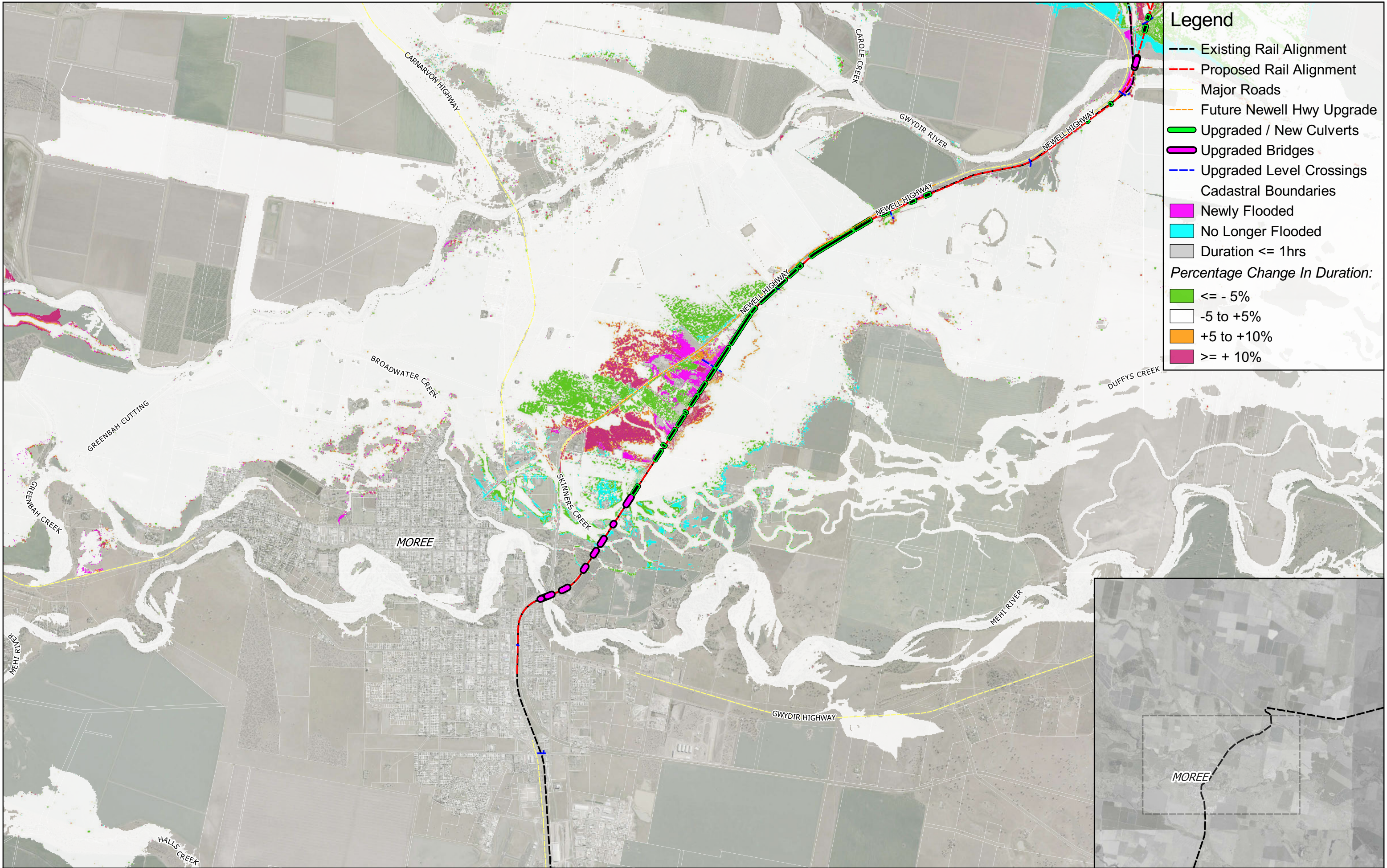
- Existing Rail Alignment
- Proposed Rail Alignment
- Major Roads
- Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries
- Newly Flooded
- No Longer Flooded
- Duration <= 1hrs

**Percentage Change In Duration:**

- <= - 5%
- -5 to +5%
- +5 to +10%
- >= + 10%

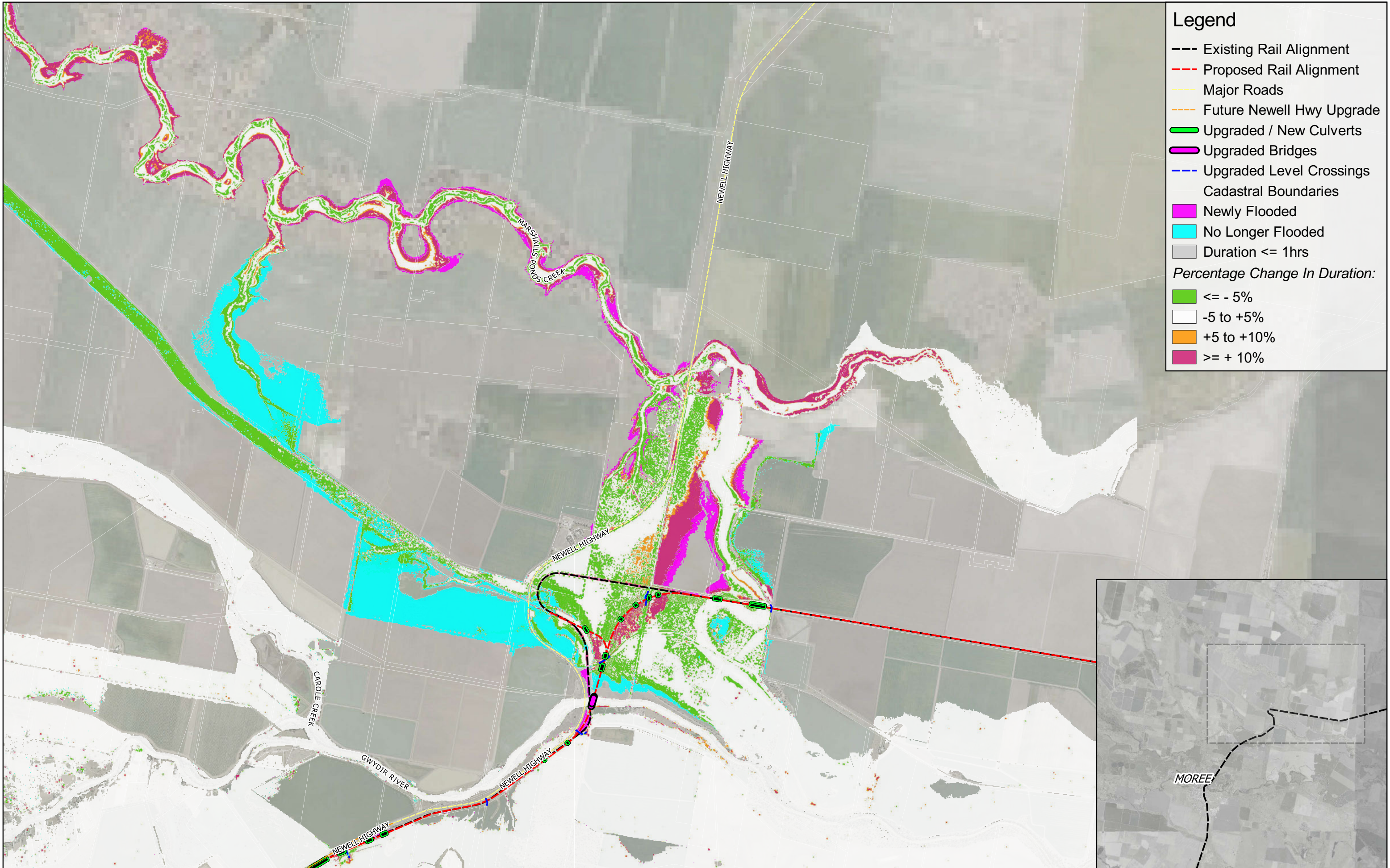






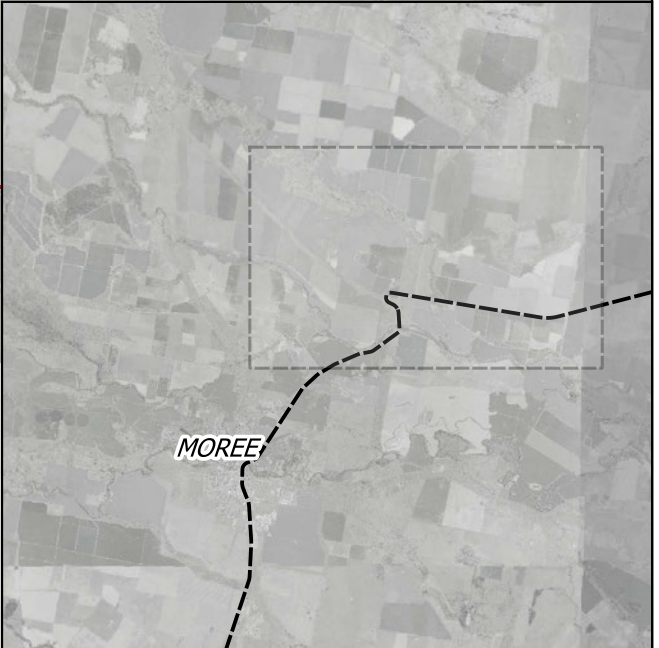
- Legend**
- Existing Rail Alignment
  - Proposed Rail Alignment
  - Major Roads
  - Future Newell Hwy Upgrade
  - Upgraded / New Culverts
  - Upgraded Bridges
  - Upgraded Level Crossings
  - Cadastral Boundaries
  - Newly Flooded
  - No Longer Flooded
  - Duration <= 1hrs
  - Percentage Change In Duration:
    - <= - 5%
    - -5 to +5%
    - +5 to +10%
    - >= + 10%





Legend

- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries
- Newly Flooded
- No Longer Flooded
- Duration <= 1hrs
- Percentage Change In Duration:
  - <= - 5%
  - 5 to +5%
  - +5 to +10%
  - >= + 10%



Prepared for: ARTC  
Coordinate system: GDA 1994 MGA Zone 55  
Aerial Source: NSW Six Maps  
Scale ratio correct when printed at A3

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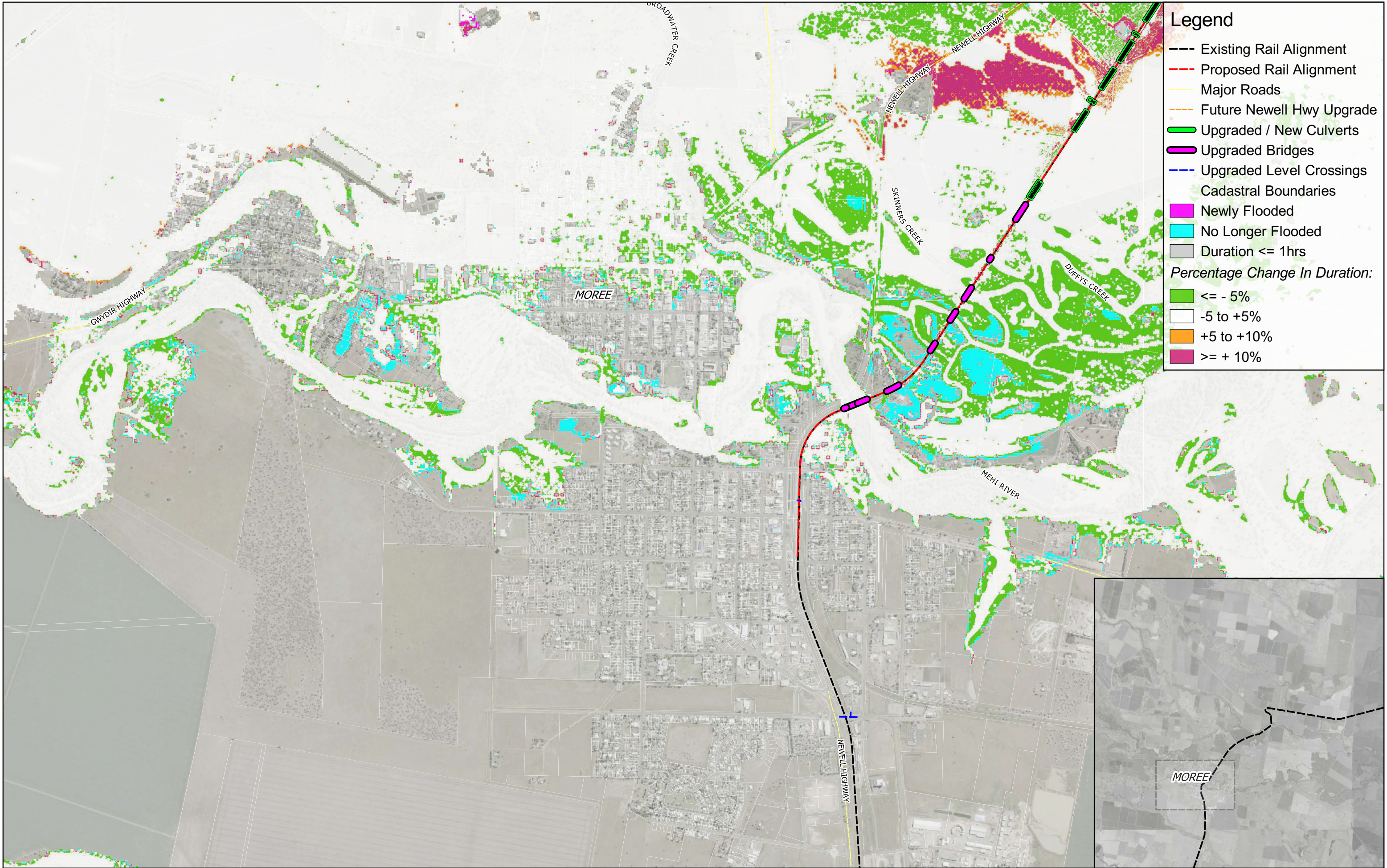
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Stage: EIS  
Version: C  
Author: JS  
Approved by: RL  
Date: 30/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
*Peak Flood Change In Duration - Proposed Design Scenario*  
Event: 10% AEP  
Cumulative Impact of N2NS and Newell Highway Upgrade - Sheet 3  
Map ID: DESNH\_CHDUR\_010\_3





**Legend**

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Existing Rail Alignment

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Proposed Rail Alignment

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Major Roads

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Future Newell Hwy Upgrade

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Upgraded / New Culverts

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Upgraded Bridges

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Upgraded Level Crossings

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Cadastral Boundaries

Newly Flooded

No Longer Flooded

Duration <= 1hrs

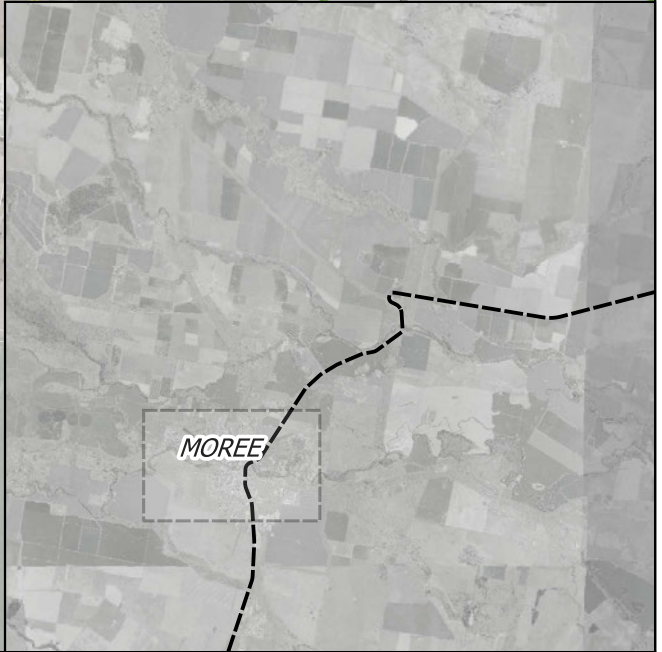
Percentage Change In Duration:

<= - 5%

-5 to +5%

+5 to +10%

>= + 10%

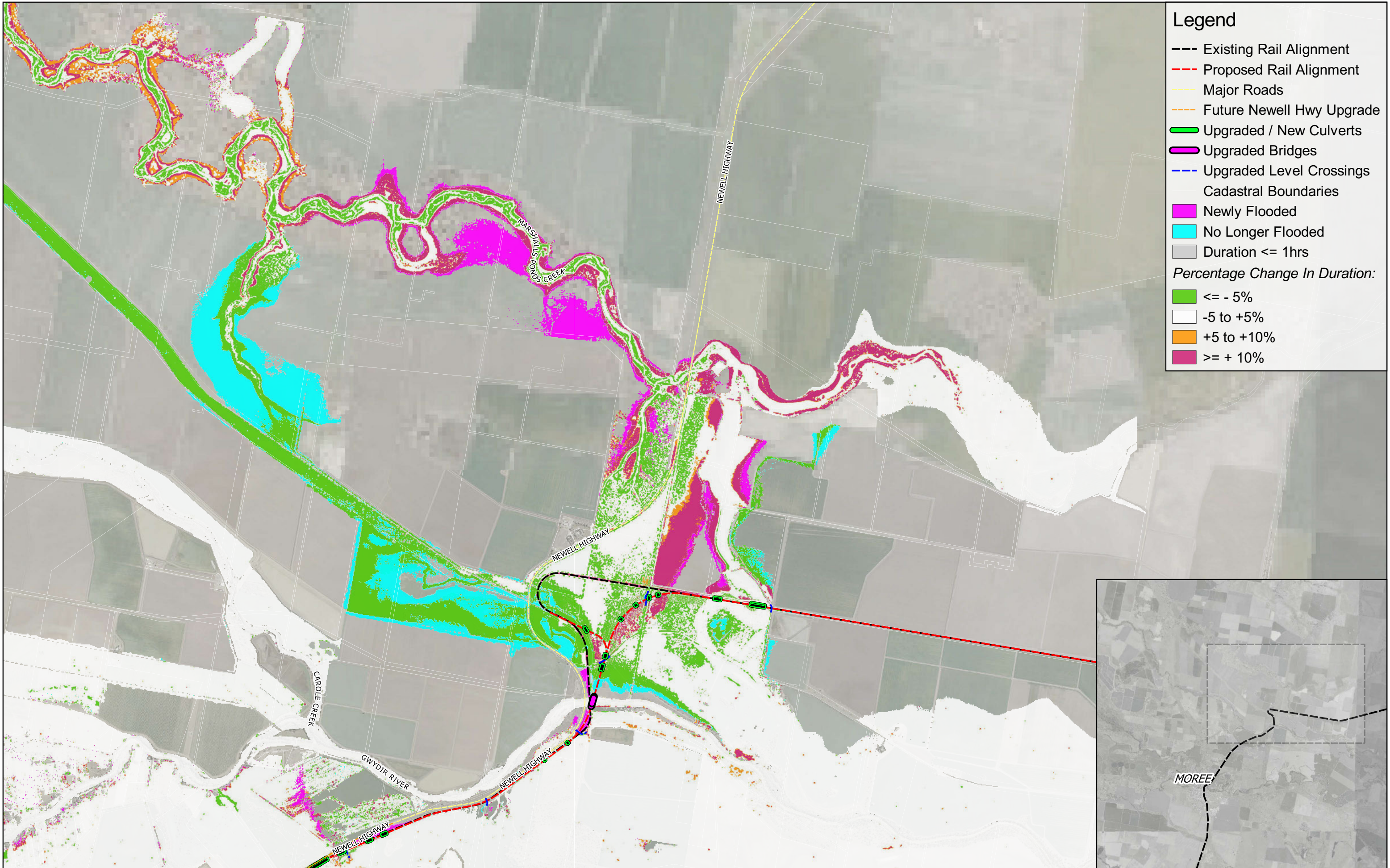




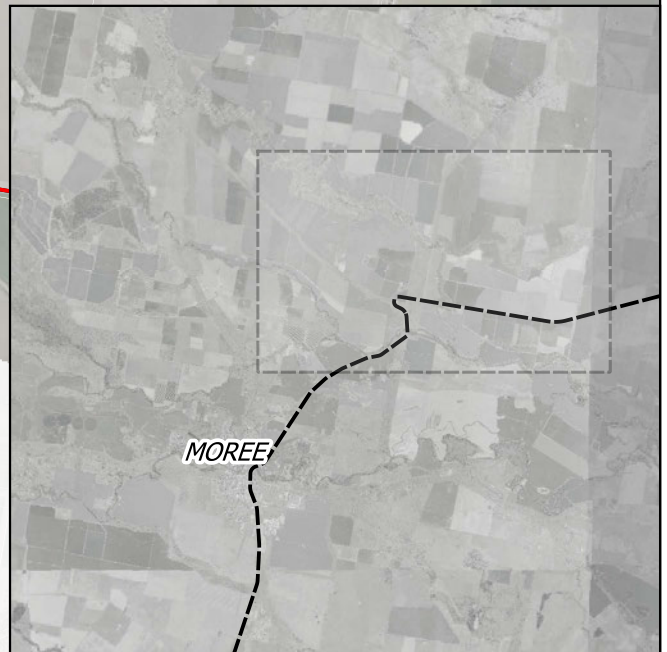


- Legend**
- Existing Rail Alignment
  - Proposed Rail Alignment
  - Major Roads
  - Future Newell Hwy Upgrade
  - Upgraded / New Culverts
  - Upgraded Bridges
  - Upgraded Level Crossings
  - Cadastral Boundaries
  - Newly Flooded
  - No Longer Flooded
  - Duration <= 1hrs
  - Percentage Change In Duration:
    - <= - 5%
    - -5 to +5%
    - +5 to +10%
    - >= + 10%





- Legend**
- Existing Rail Alignment
  - - - Proposed Rail Alignment
  - Major Roads
  - - - Future Newell Hwy Upgrade
  - Upgraded / New Culverts
  - Upgraded Bridges
  - Upgraded Level Crossings
  - Cadastral Boundaries
  - Newly Flooded
  - No Longer Flooded
  - Duration <= 1hrs
- Percentage Change In Duration:*
- <= - 5%
  - 5 to +5%
  - +5 to +10%
  - >= + 10%



Prepared for: ARTC  
Coordinate system: GDA 1994 MGA Zone 55  
Aerial Source: NSW Six Maps  
Scale ratio correct when printed at A3

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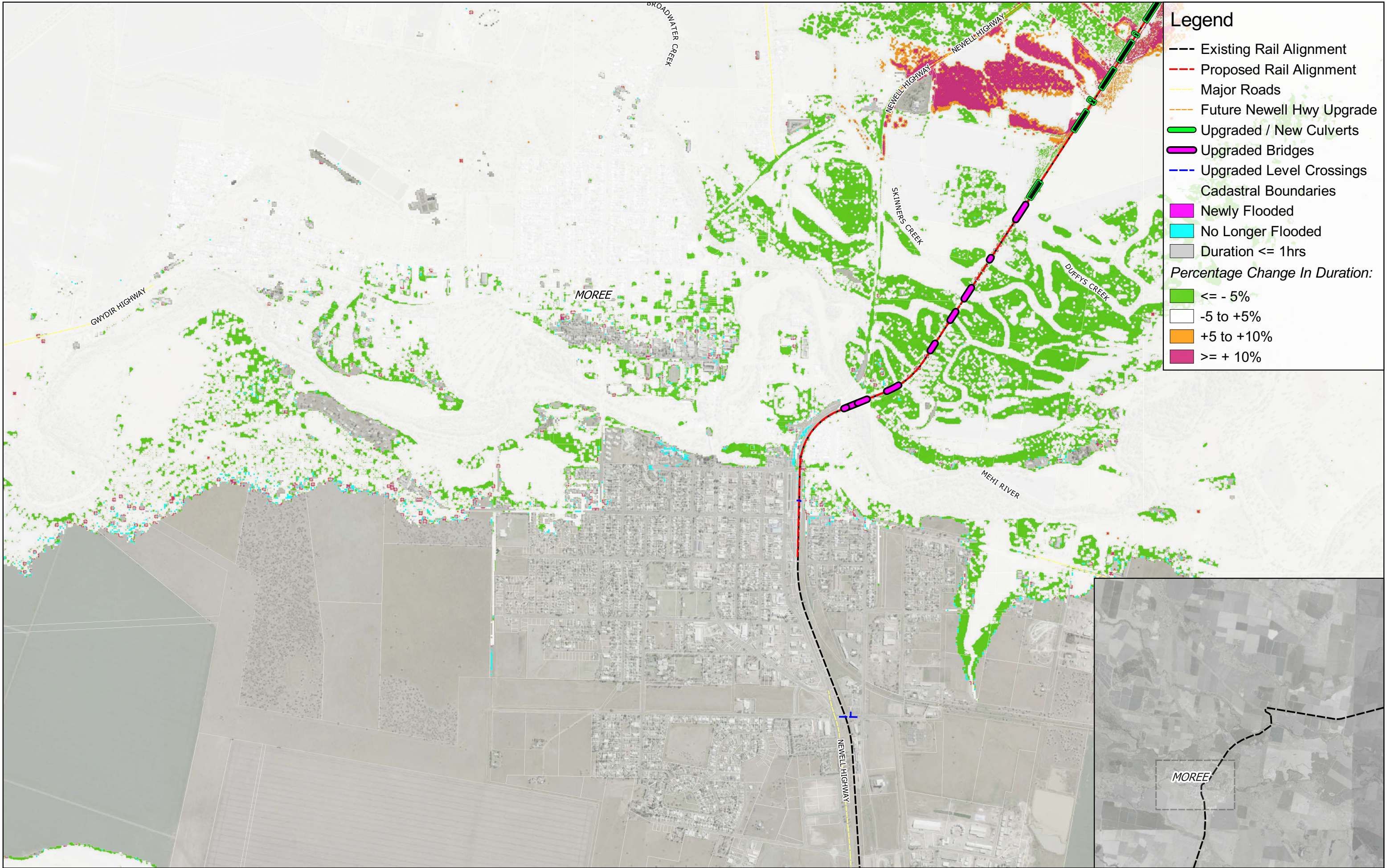
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Stage: EIS  
Version: C  
Author: JS  
Approved by: RL  
Date: 30/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
*Peak Flood Change In Duration - Proposed Design Scenario*  
Event: 5% AEP  
Cumulative Impact of N2NS and Newell Highway Upgrade - Sheet 3  
Map ID: DESNH\_CHDUR\_005\_3





Legend

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 Existing Rail Alignment

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 Proposed Rail Alignment

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 Major Roads

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 Future Newell Hwy Upgrade

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 Upgraded / New Culverts

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 Upgraded Bridges

---

 Upgraded Level Crossings

---

 Cadastral Boundaries

---

 Newly Flooded

---

 No Longer Flooded

---

 Duration <= 1hrs

Percentage Change In Duration:

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 <= - 5%

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 -5 to +5%

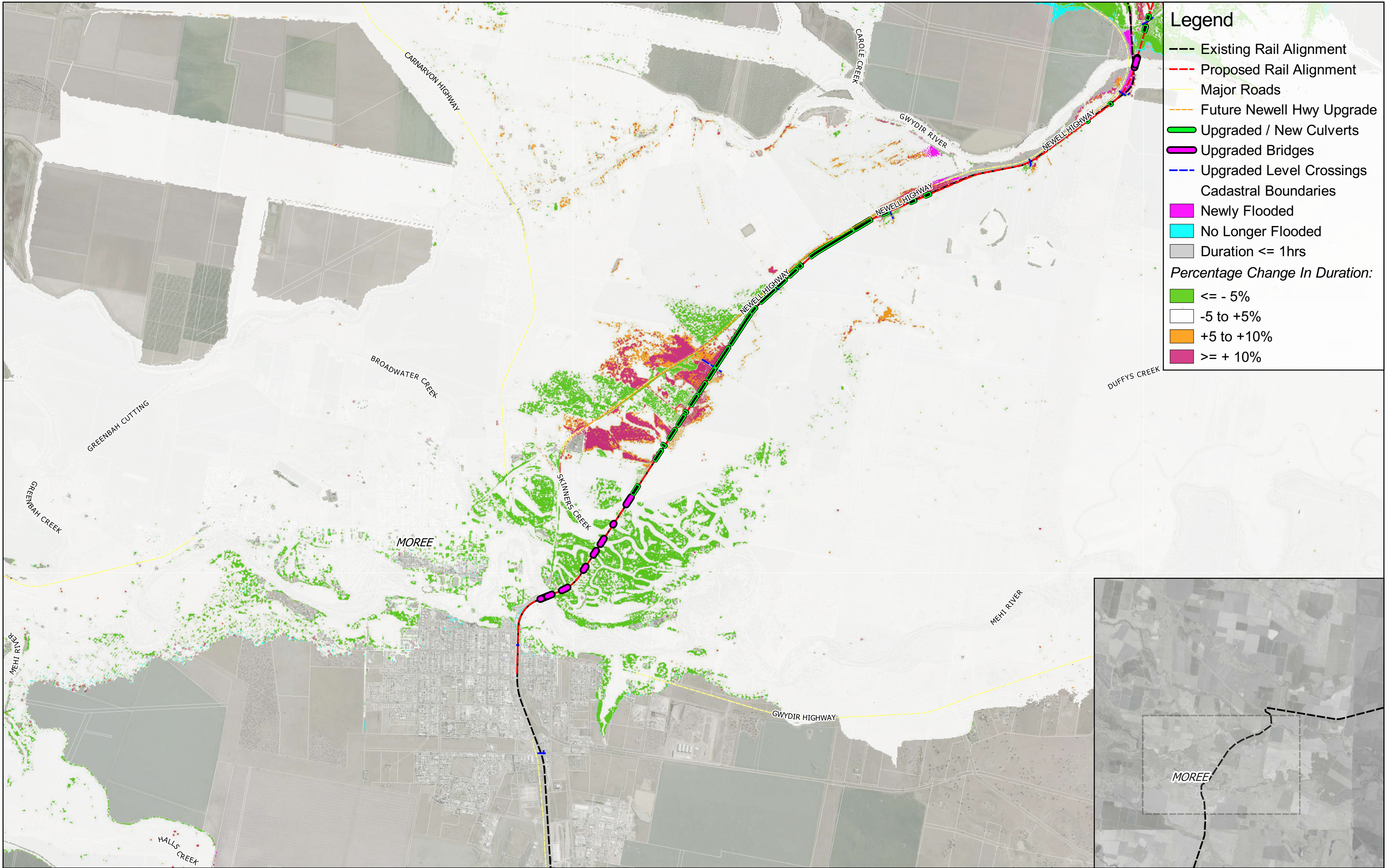
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 +5 to +10%

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 >= + 10%

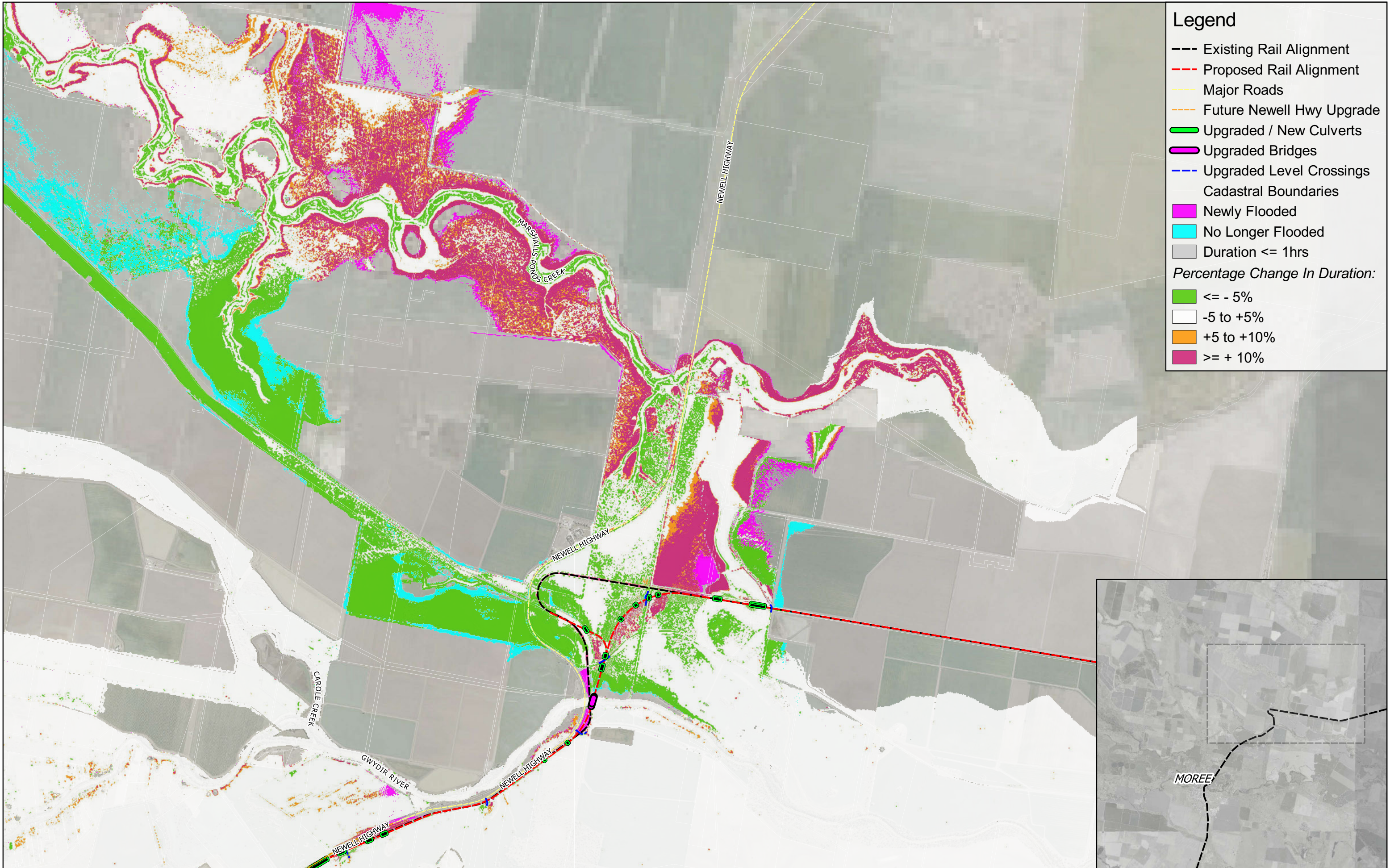




## Legend

- Existing Rail Alignment
- Proposed Rail Alignment
- Major Roads
- Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries
- Newly Flooded
- No Longer Flooded
- Duration <= 1hrs
- Percentage Change In Duration:
  - <= - 5%
  - -5 to +5%
  - +5 to +10%
  - >= + 10%





Legend

- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries
- Newly Flooded
- No Longer Flooded
- Duration <= 1hrs
- Percentage Change In Duration:
  - <= - 5%
  - 5 to +5%
  - +5 to +10%
  - >= + 10%



Prepared for: ARTC  
Coordinate system: GDA 1994 MGA Zone 55  
Aerial Source: NSW Six Maps  
Scale ratio correct when printed at A3

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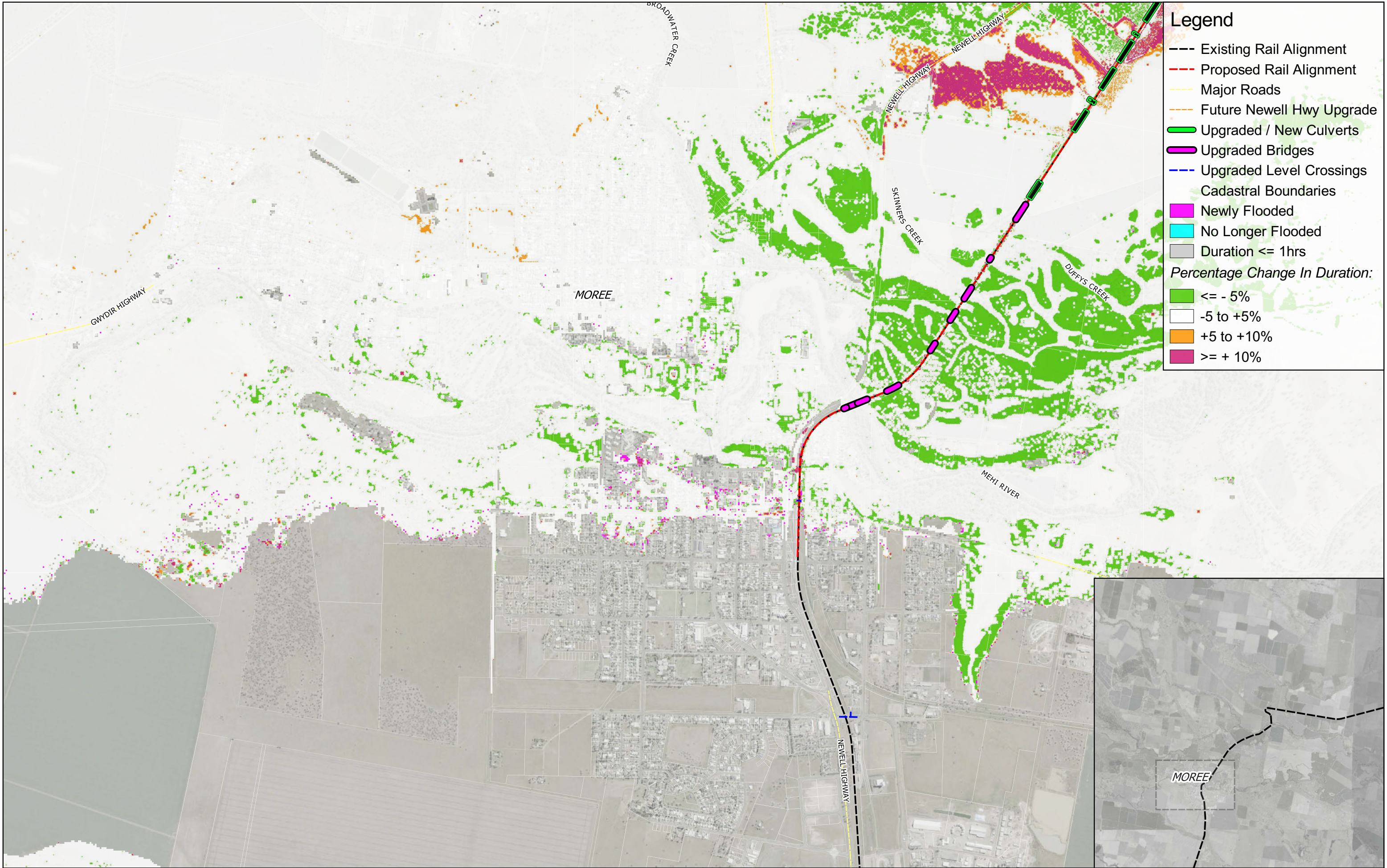
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Stage: EIS  
Version: C  
Author: JS  
Approved by: RL  
Date: 30/03/2022

**Inland Rail - Narrabri to North Star Phase 2**  
*Peak Flood Change In Duration - Proposed Design Scenario*  
Event: 2% AEP  
Cumulative Impact of N2NS and Newell Highway Upgrade - Sheet 3  
Map ID: DESNH\_CHDUR\_002\_3





Legend

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Existing Rail Alignment

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Proposed Rail Alignment

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Major Roads

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Future Newell Hwy Upgrade

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Upgraded / New Culverts

---

Upgraded Bridges

---

Upgraded Level Crossings

---

Cadastral Boundaries

---

Newly Flooded

---

No Longer Flooded

---

Duration <= 1hrs

Percentage Change In Duration:

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<= - 5%

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-5 to +5%

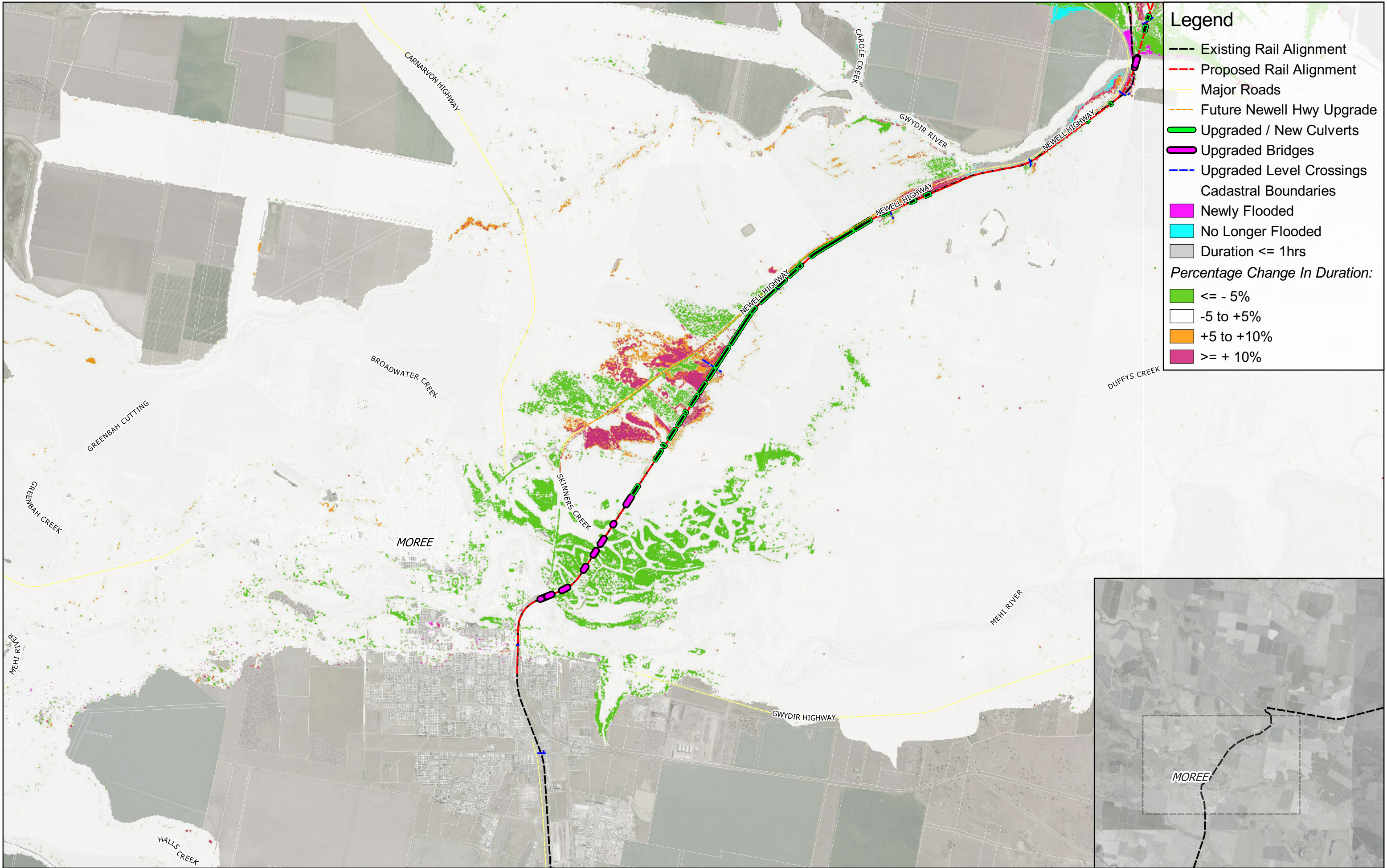
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+5 to +10%

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>= + 10%



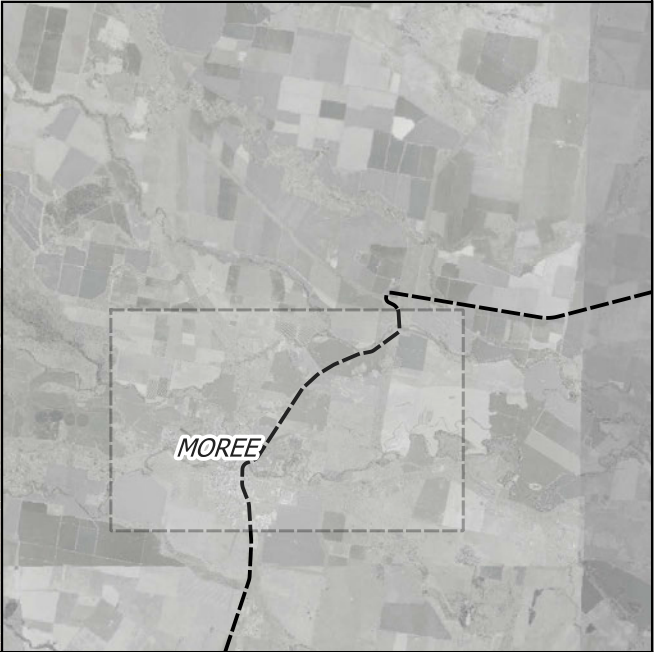


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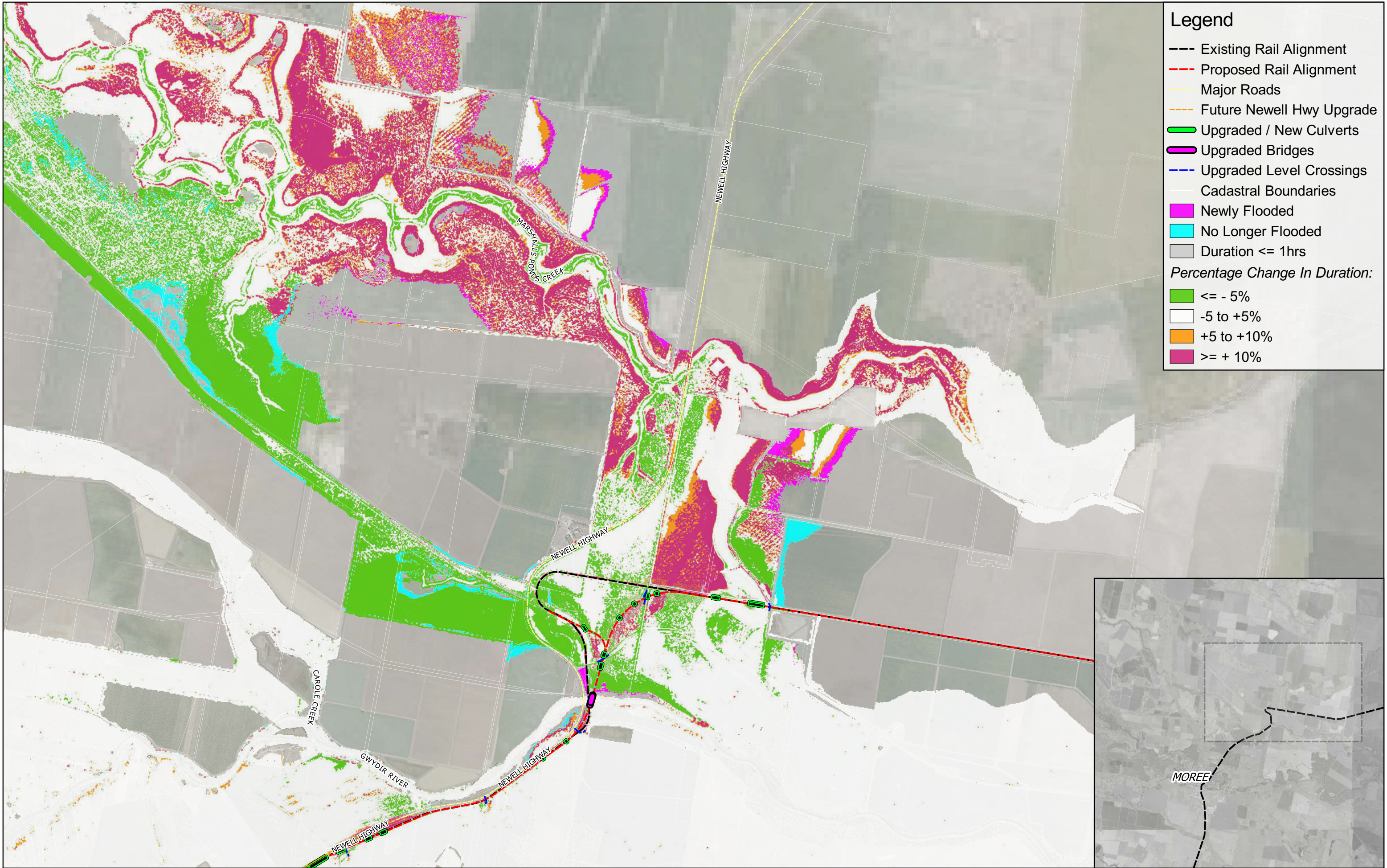
- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries
- Newly Flooded
- No Longer Flooded
- Duration <= 1hrs

**Percentage Change In Duration:**

- <= - 5%
- 5 to +5%
- +5 to +10%
- >= + 10%







Legend

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Existing Rail Alignment

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Proposed Rail Alignment

---

Major Roads

---

Future Newell Hwy Upgrade

---

Upgraded / New Culverts

---

Upgraded Bridges

---

Upgraded Level Crossings

---

Cadastral Boundaries

---

Newly Flooded

---

No Longer Flooded

---

Duration <= 1hrs

Percentage Change In Duration:

---

<= - 5%

---

-5 to +5%

---

+5 to +10%

---

>= + 10%

