

TECHNICAL PAPER

04

Hydrology and flooding impact assessment

Appendix B Design case flood impact maps

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT



TECHNICAL PAPER

04

Hydrology and flooding impact assessment

Appendix B Design case flood impact maps

Appendix B1 Afflux maps

NARRABRI TO NORTH STAR—PHASE 2 ENVIRONMENTAL IMPACT STATEMENT



Appendix B – Design case flood impact maps

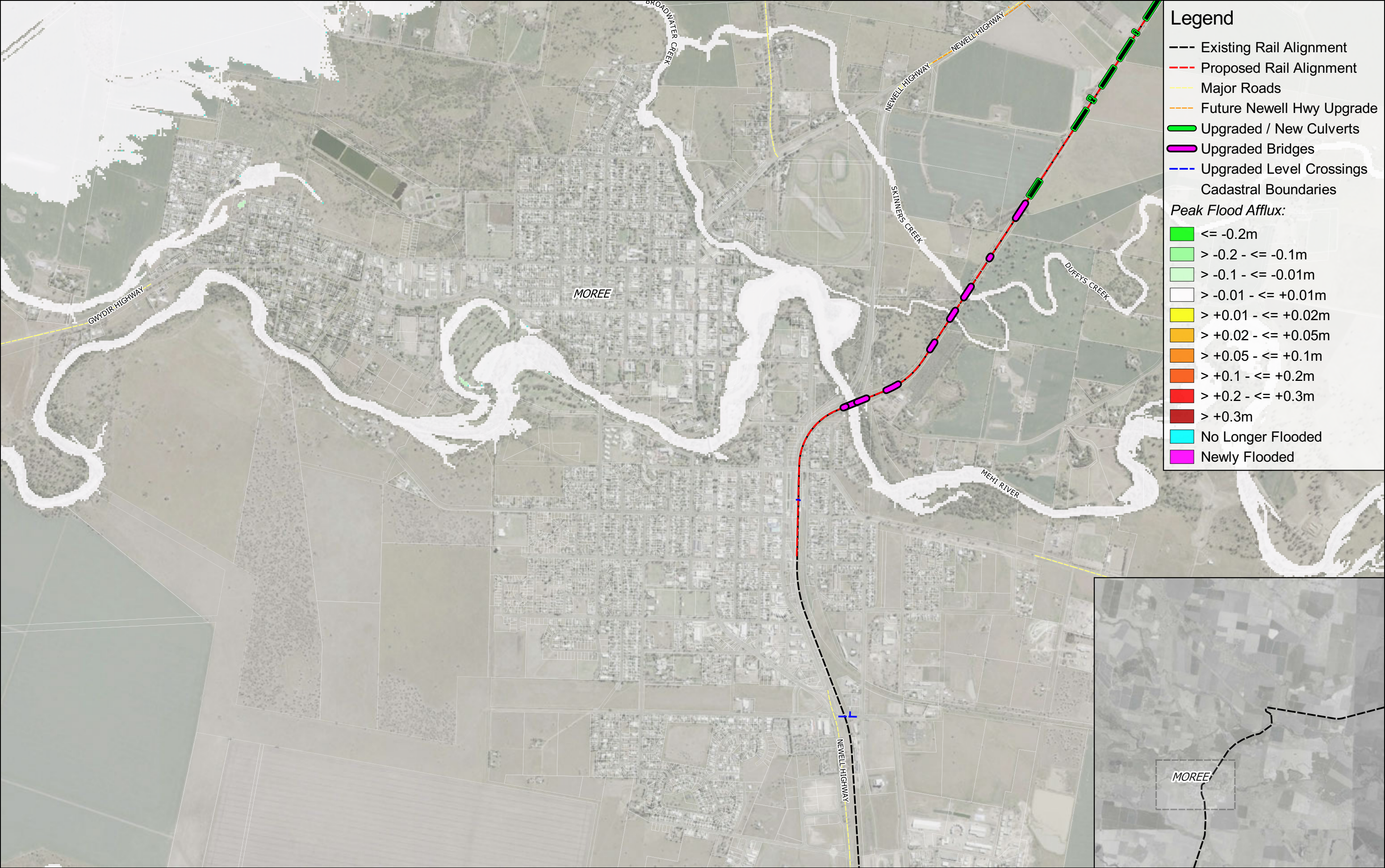
Map list

MAP SET ID	MAP CONTENTS
DES_AFF_020	Flood Level Change (Afflux) – Design Case, 20% AEP Event
DES_AFF_010	Flood Level Change (Afflux) – Design Case, 10% AEP Event
DES_AFF_005	Flood Level Change (Afflux) – Design Case, 5% AEP Event
DES_AFF_002	Flood Level Change (Afflux) – Design Case, 2% AEP Event
DES_AFF_001	Flood Level Change (Afflux) – Design Case, 1% AEP Event
DES_AFF_001CC	Flood Level Change (Afflux) – Design Case, 1% AEP Event with Climate Change
DES_AFF_PMF	Flood Level Change (Afflux) – Design Case, PMF Event
DES_CHV_020	Flood Velocity Change – Design Case, 20% AEP Event
DES_CHV_010	Flood Velocity Change – Design Case, 10% AEP Event
DES_CHV_005	Flood Velocity Change – Design Case, 5% AEP Event
DES_CHV_002	Flood Velocity Change – Design Case, 2% AEP Event
DES_CHV_001	Flood Velocity Change – Design Case, 1% AEP Event
DES_CHV_001CC	Flood Velocity Change – Design Case, 1% AEP Event with Climate Change
DES_CHV_PMF	Flood Velocity Change – Design Case, PMF Event
DES_CHDUR_020	Flood Duration Change – Design Case, 20% AEP Event
DES_CHDUR_010	Flood Duration Change – Design Case, 10% AEP Event
DES_CHDUR_005	Flood Duration Change – Design Case, 5% AEP Event
DES_CHDUR_002	Flood Duration Change – Design Case, 2% AEP Event
DES_CHDUR_001	Flood Duration Change – Design Case, 1% AEP Event
DES_CHDUR_001CC	Flood Duration Change – Design Case, 1% AEP Event with Climate Change
DES_CHDUR_PMF	Flood Duration Change – Design Case, PMF Event
DES_CHHAZ_020	Flood Hazard (Velocity x Depth) Change – Design Case, 20% AEP Event
DES_CHHAZ_010	Flood Hazard (Velocity x Depth) Change – Design Case, 10% AEP Event
DES_CHHAZ_005	Flood Hazard (Velocity x Depth) Change – Design Case, 5% AEP Event
DES_CHHAZ_002	Flood Hazard (Velocity x Depth) Change – Design Case, 2% AEP Event
DES_CHHAZ_001	Flood Hazard (Velocity x Depth) Change – Design Case, 1% AEP Event
DES_CHHAZ_001CC	Flood Hazard (Velocity x Depth) Change – Design Case, 1% AEP Event with Climate Change
DES_CHHAZ_PMF	Flood Hazard (Velocity x Depth) Change – Design Case, PMF Event

B.1 Afflux

Map list

MAP SET ID	MAP CONTENTS
DES_AFF_020	Flood Level Change (Afflux) – Design Case, 20% AEP Event
DES_AFF_010	Flood Level Change (Afflux) – Design Case, 10% AEP Event
DES_AFF_005	Flood Level Change (Afflux) – Design Case, 5% AEP Event
DES_AFF_002	Flood Level Change (Afflux) – Design Case, 2% AEP Event
DES_AFF_001	Flood Level Change (Afflux) – Design Case, 1% AEP Event
DES_AFF_001CC	Flood Level Change (Afflux) – Design Case, 1% AEP Event with Climate Change
DES_AFF_PMF	Flood Level Change (Afflux) – Design Case, PMF Event

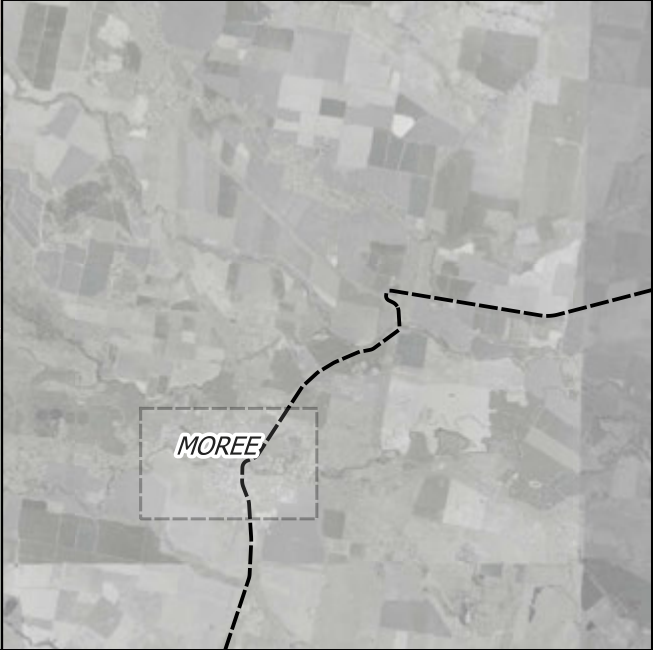


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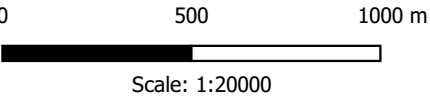
- Existing Rail Alignment
- Proposed Rail Alignment
- Major Roads
- Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries

Peak Flood Afflux:

- <= -0.2m
- > -0.2 - <= -0.1m
- > -0.1 - <= -0.01m
- > -0.01 - <= +0.01m
- > +0.01 - <= +0.02m
- > +0.02 - <= +0.05m
- > +0.05 - <= +0.1m
- > +0.1 - <= +0.2m
- > +0.2 - <= +0.3m
- > +0.3m
- No Longer Flooded
- Newly Flooded

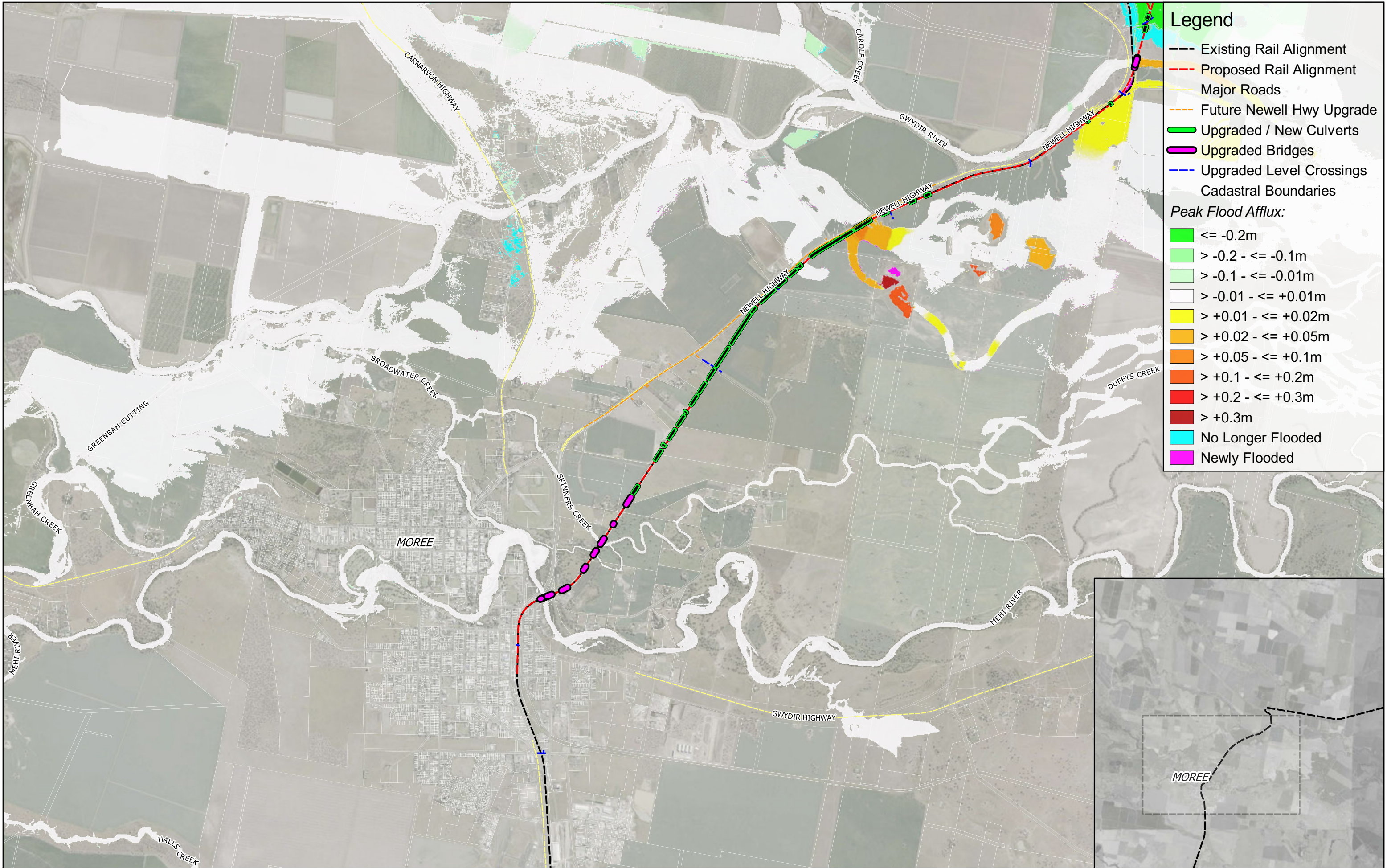


Prepared for: ARTC
Coordinate system: GDA 1994 MGA Zone 55
Aerial Source: NSW Six Maps
Scale ratio correct when printed at A3



Stage: EIS
Version: C
Author: JS
Approved by: RL
Date: 18/03/2022

Inland Rail - Narrabri to North Star Phase 2
Peak Flood Afflux - Proposed Design Scenario
Event: 20% AEP
Sheet 1
Map ID: DES_AFF_020_1



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

 $\leq -0.2\text{m}$

 $> -0.2 - \leq -0.1\text{m}$

 $> -0.1 - \leq -0.01\text{m}$

 $> -0.01 - \leq +0.01\text{m}$

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 $> +0.02 - \leq +0.05\text{m}$

 $> +0.05 - \leq +0.1\text{m}$

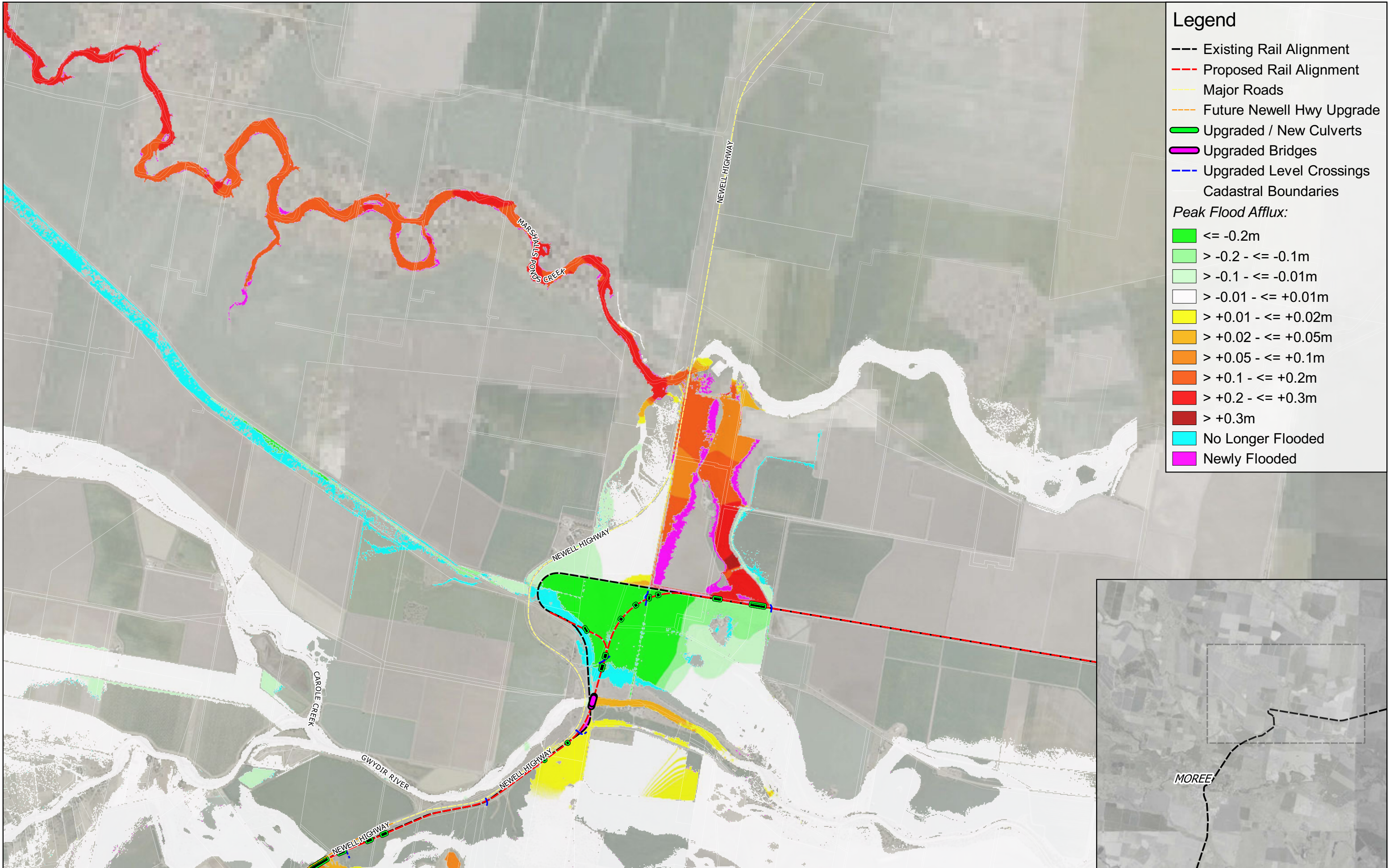
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 $> +0.2 - \leq +0.3\text{m}$

 $> +0.3\text{m}$

No Longer Flooded

Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

○

Upgraded / New Culverts

○

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

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> +0.05 - <= +0.1m

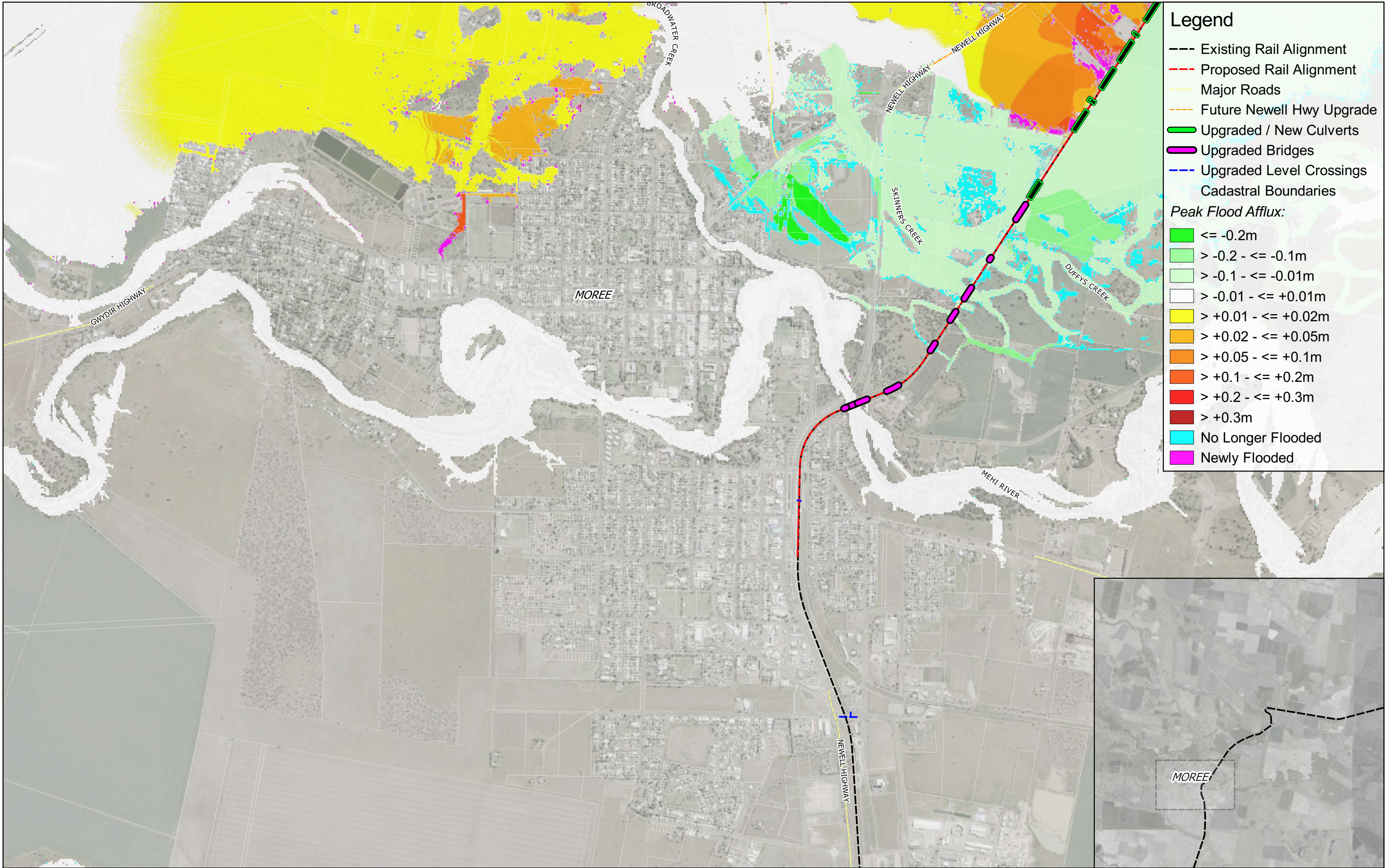
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> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

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> +0.01 - <= +0.02m

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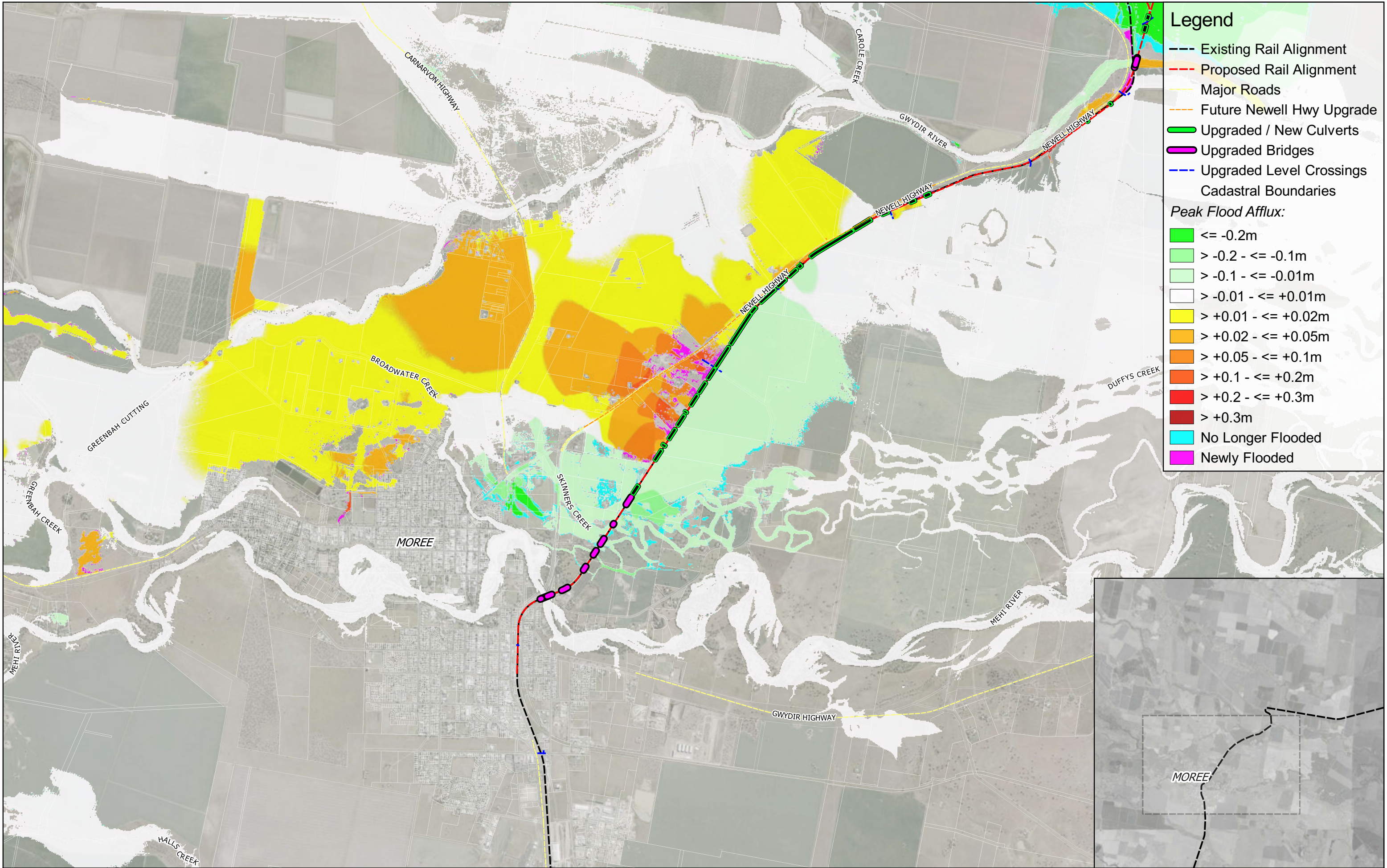
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No Longer Flooded

Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

 $\leq -0.2\text{m}$

 $> -0.2 - \leq -0.1\text{m}$

 $> -0.1 - \leq -0.01\text{m}$

 $> -0.01 - \leq +0.01\text{m}$

 $> +0.01 - \leq +0.02\text{m}$

 $> +0.02 - \leq +0.05\text{m}$

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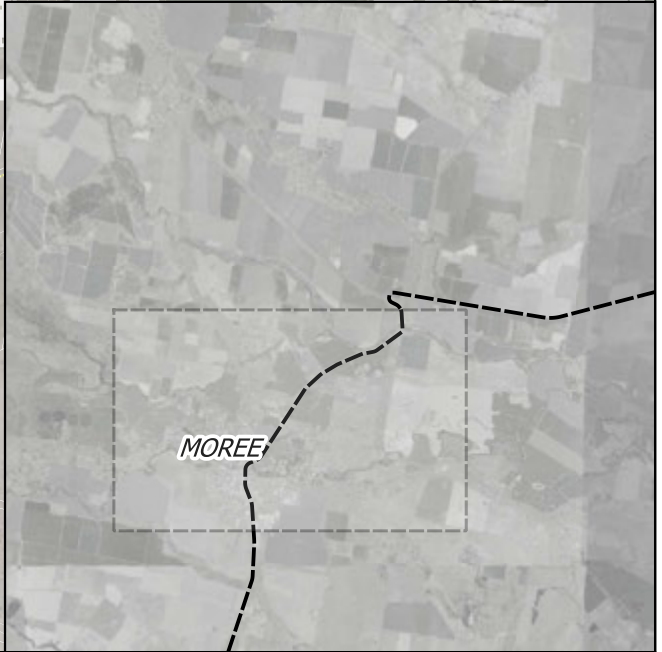
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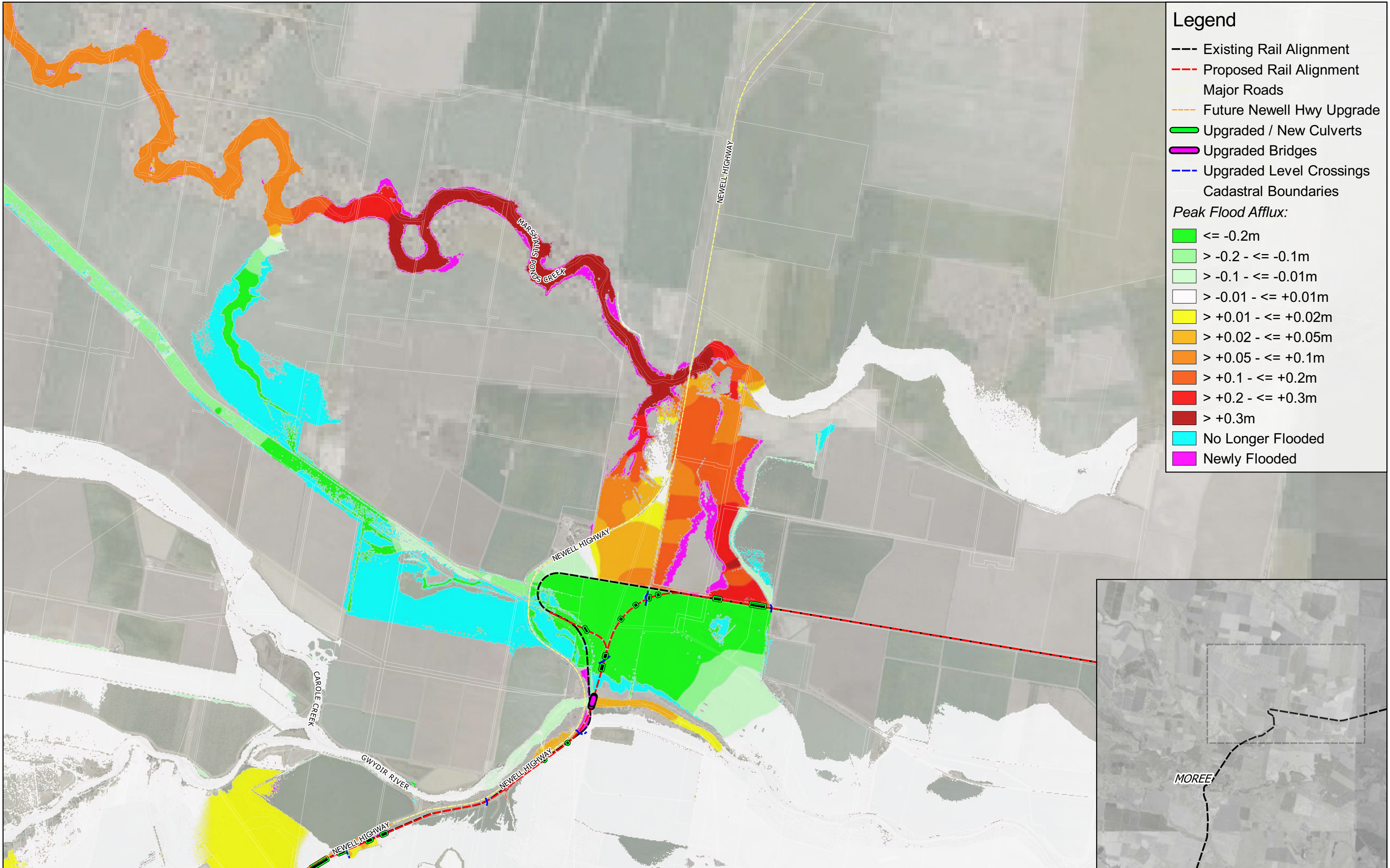
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 $> +0.3\text{m}$

No Longer Flooded

Newly Flooded





Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

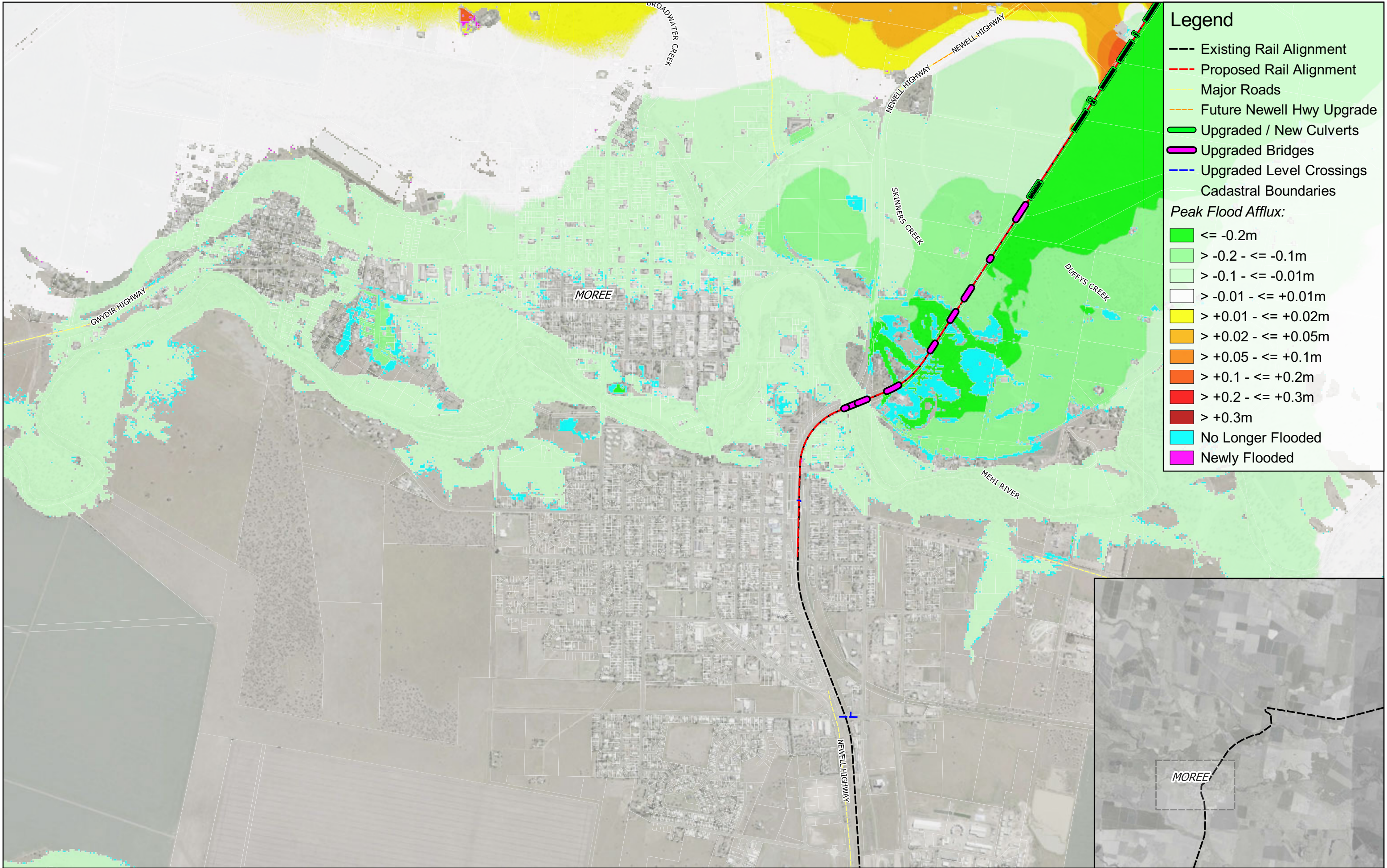
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> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

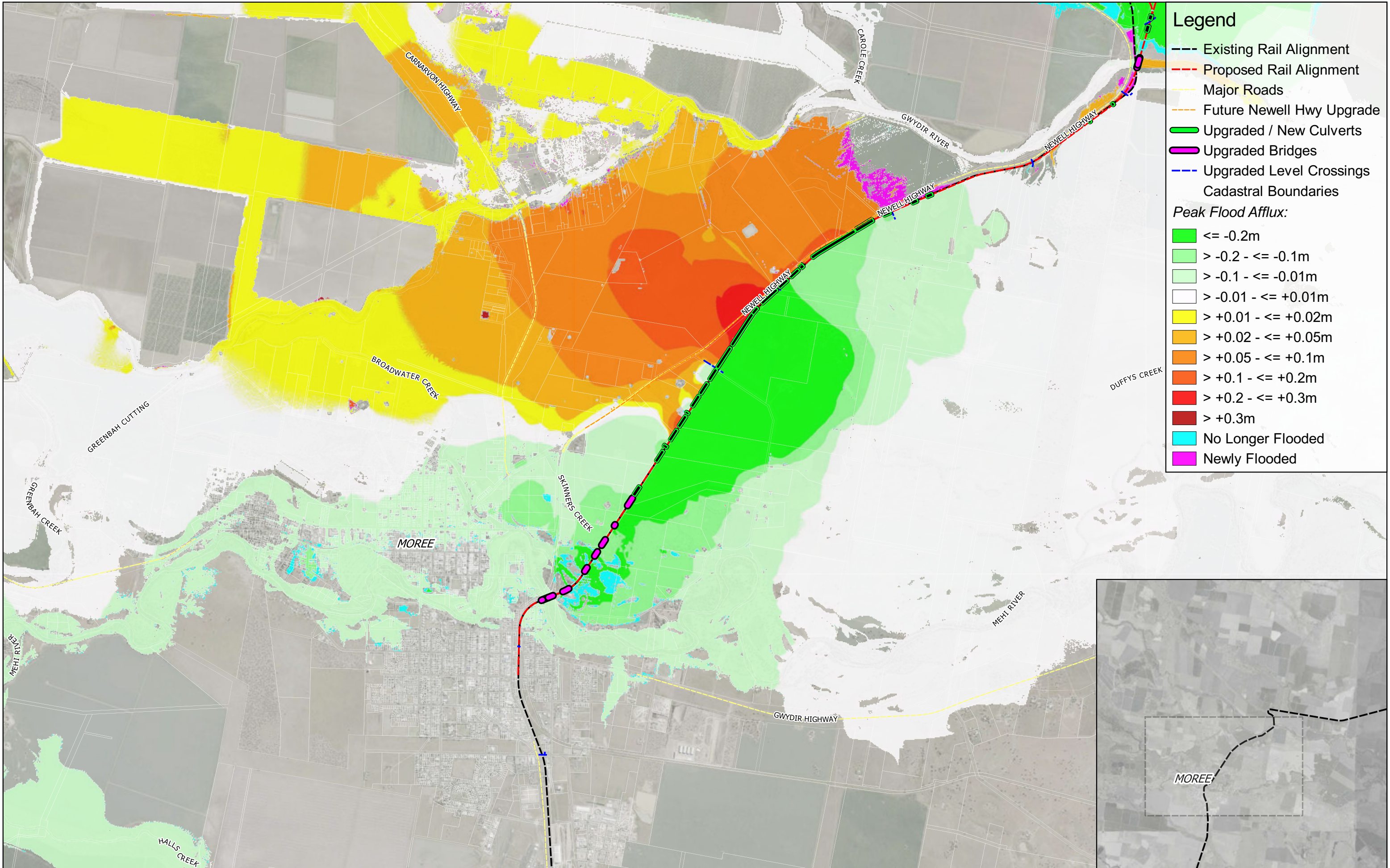
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> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

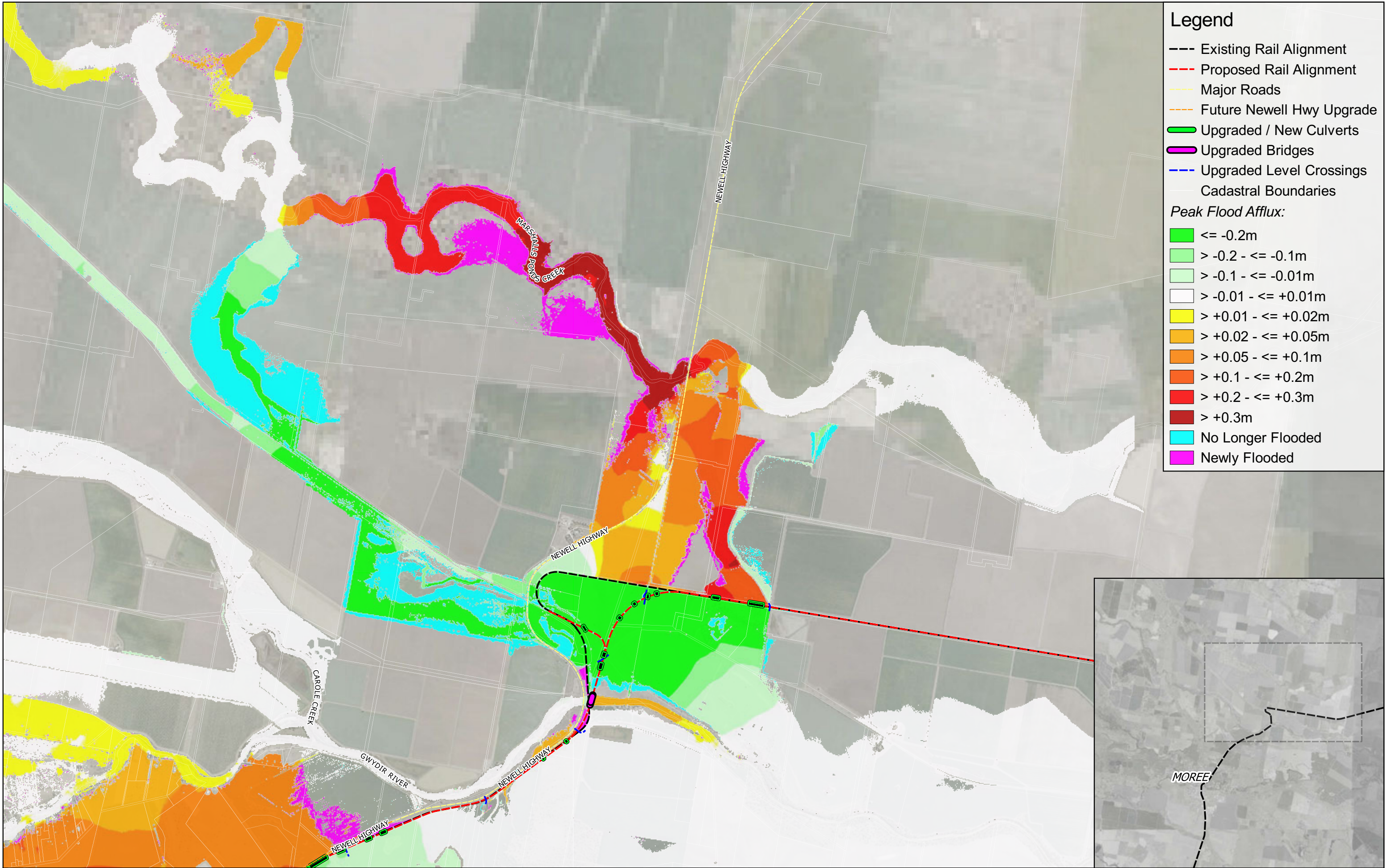
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> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

> +0.1 - <= +0.2m

> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded

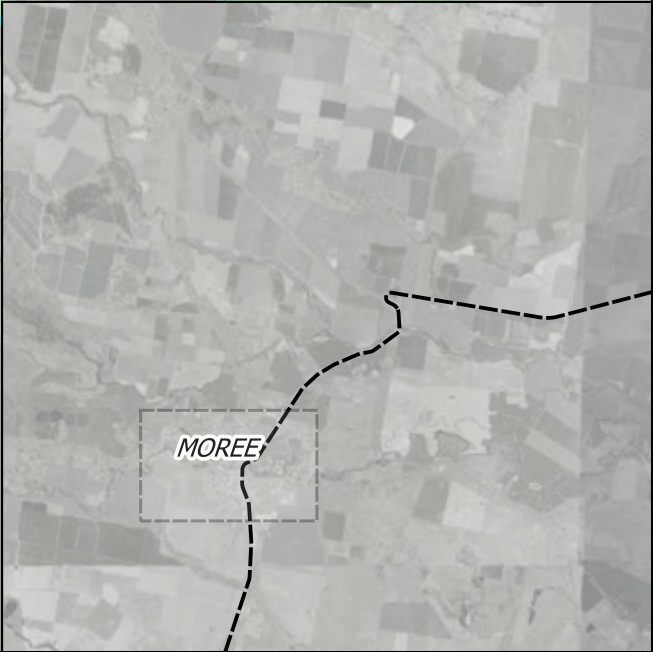


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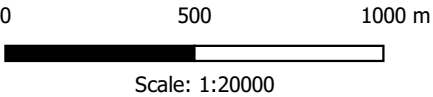
- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- █ Upgraded / New Culverts
- █ Upgraded Bridges
- - - Upgraded Level Crossings
- ▭ Cadastral Boundaries

Peak Flood Afflux:

- █ $\leq -0.2\text{m}$
- █ $> -0.2 - \leq -0.1\text{m}$
- █ $> -0.1 - \leq -0.01\text{m}$
- █ $> -0.01 - \leq +0.01\text{m}$
- █ $> +0.01 - \leq +0.02\text{m}$
- █ $> +0.02 - \leq +0.05\text{m}$
- █ $> +0.05 - \leq +0.1\text{m}$
- █ $> +0.1 - \leq +0.2\text{m}$
- █ $> +0.2 - \leq +0.3\text{m}$
- █ $> +0.3\text{m}$
- █ No Longer Flooded
- █ Newly Flooded

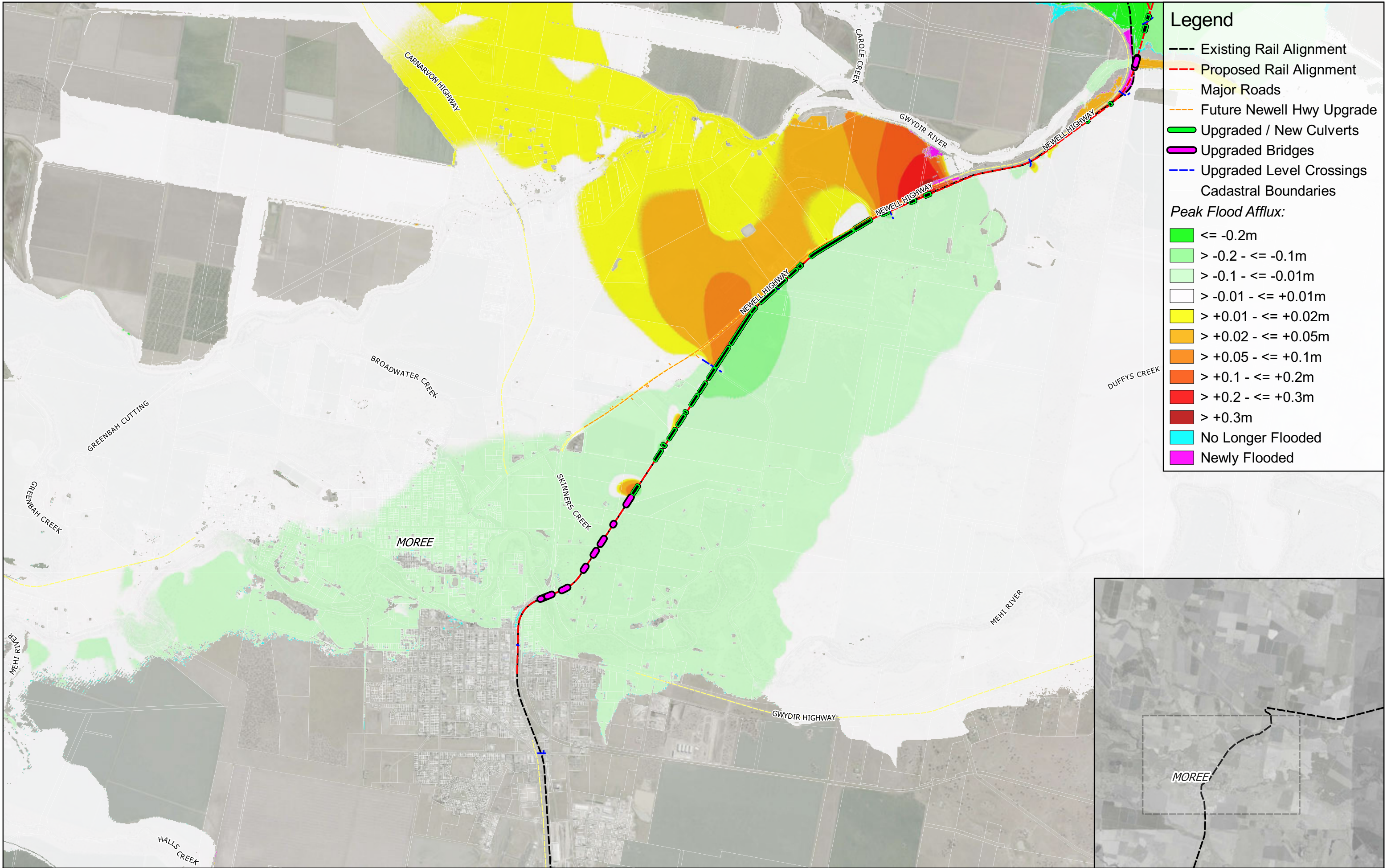


Prepared for: ARTC
Coordinate system: GDA 1994 MGA Zone 55
Aerial Source: NSW Six Maps
Scale ratio correct when printed at A3



Stage: EIS
Version: C
Author: JS
Approved by: RL
Date: 18/03/2022

Inland Rail - Narrabri to North Star Phase 2
Peak Flood Afflux - Proposed Design Scenario
Event: 2% AEP
Sheet 1
Map ID: DES_AFF_002_1



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

> +0.1 - <= +0.2m

> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded

N

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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MOTT
MACDONALD

Stage: EIS

Version: C

Author: JS

Approved by: RL

Date: 18/03/2022

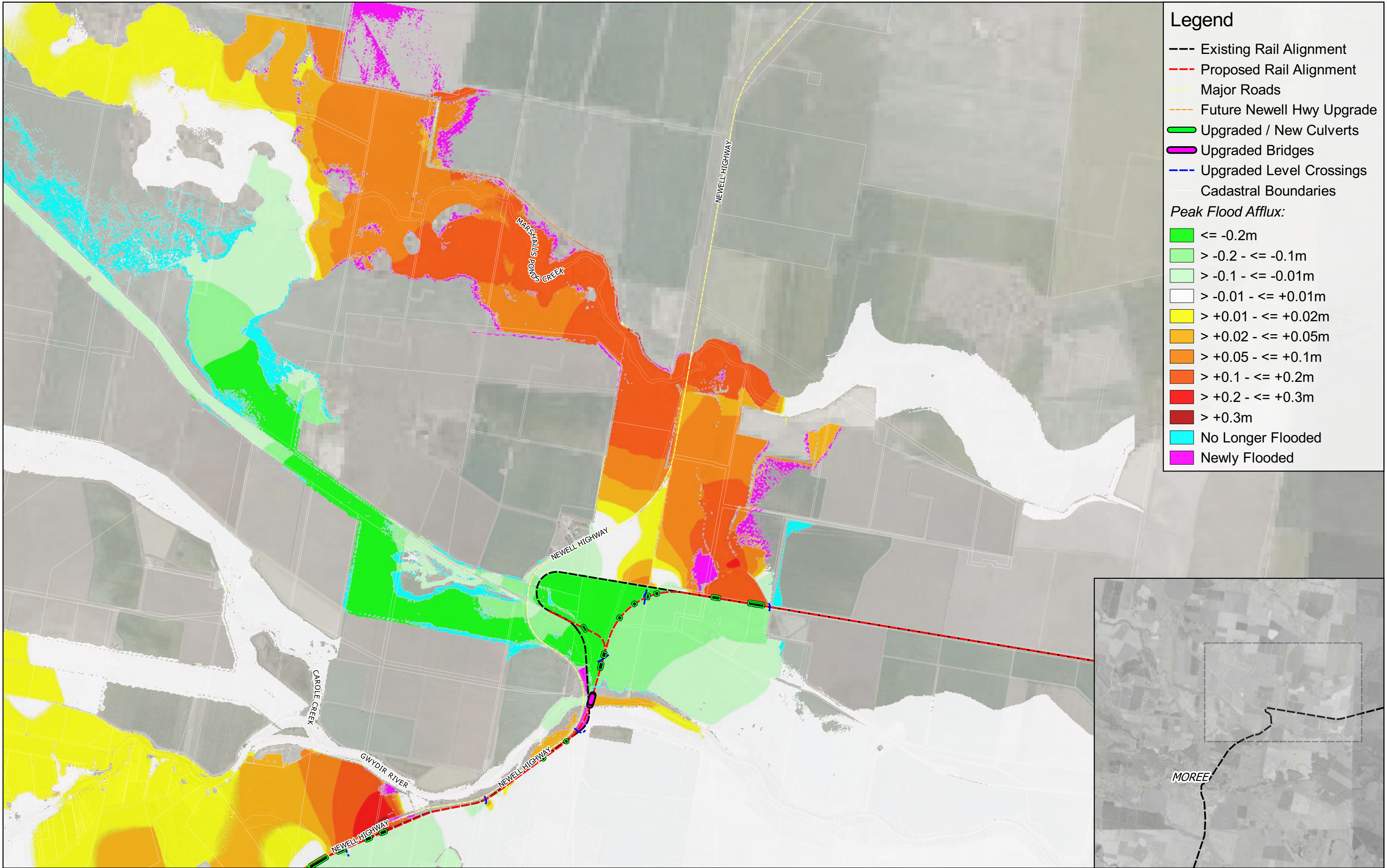
Inland Rail - Narrabri to North Star Phase 2

Peak Flood Afflux - Proposed Design Scenario

Event: 2% AEP

Sheet 2

Map ID: DES_AFF_002_2

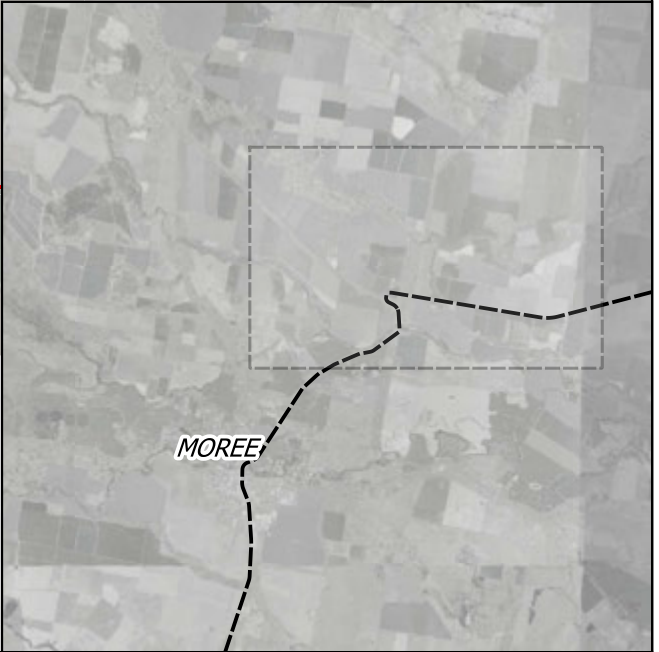


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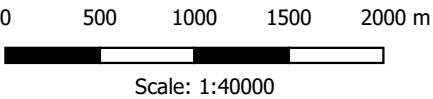
- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries

Peak Flood Afflux:

- <= -0.2m
- > -0.2 - <= -0.1m
- > -0.1 - <= -0.01m
- > -0.01 - <= +0.01m
- > +0.01 - <= +0.02m
- > +0.02 - <= +0.05m
- > +0.05 - <= +0.1m
- > +0.1 - <= +0.2m
- > +0.2 - <= +0.3m
- > +0.3m
- No Longer Flooded
- Newly Flooded

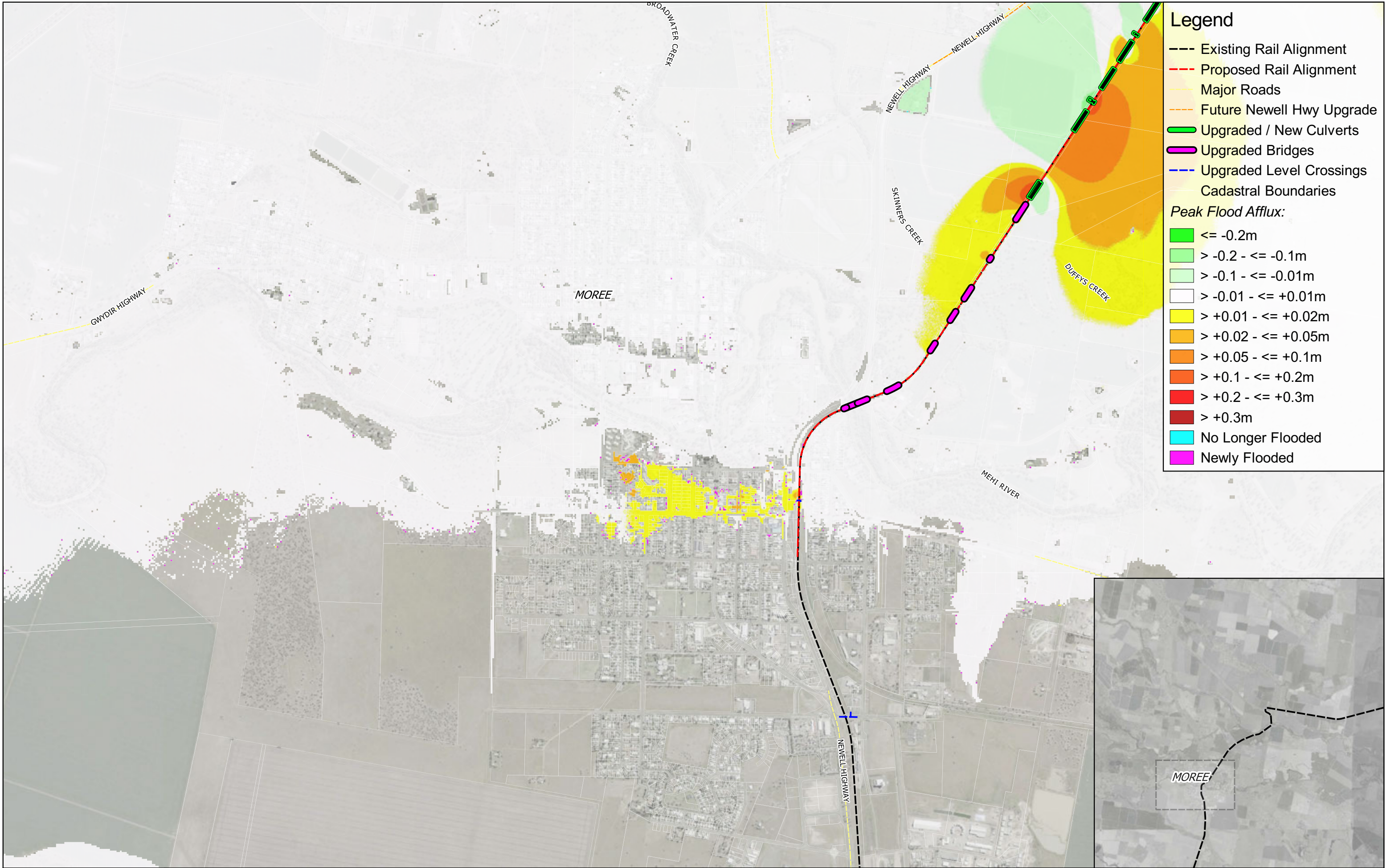


Prepared for: ARTC
Coordinate system: GDA 1994 MGA Zone 55
Aerial Source: NSW Six Maps
Scale ratio correct when printed at A3



Stage: EIS
Version: C
Author: JS
Approved by: RL
Date: 18/03/2022

Inland Rail - Narrabri to North Star Phase 2
Peak Flood Afflux - Proposed Design Scenario
Event: 2% AEP
Sheet 3
Map ID: DES_AFF_002_3

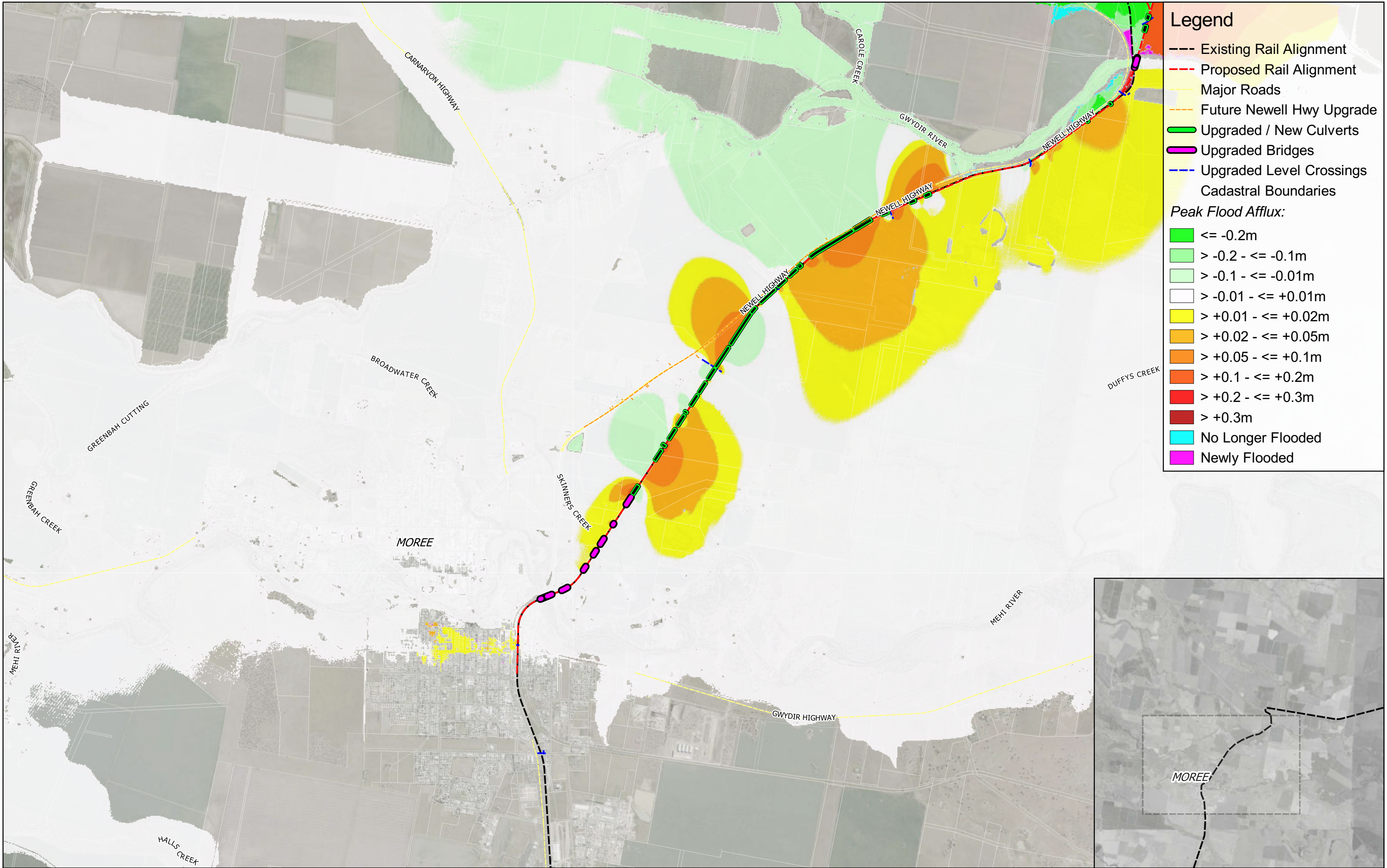


Legend

- Existing Rail Alignment
- Proposed Rail Alignment
- Major Roads
- Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries

Peak Flood Afflux:

- <= -0.2m
- > -0.2 - <= -0.1m
- > -0.1 - <= -0.01m
- > -0.01 - <= +0.01m
- > +0.01 - <= +0.02m
- > +0.02 - <= +0.05m
- > +0.05 - <= +0.1m
- > +0.1 - <= +0.2m
- > +0.2 - <= +0.3m
- > +0.3m
- No Longer Flooded
- Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

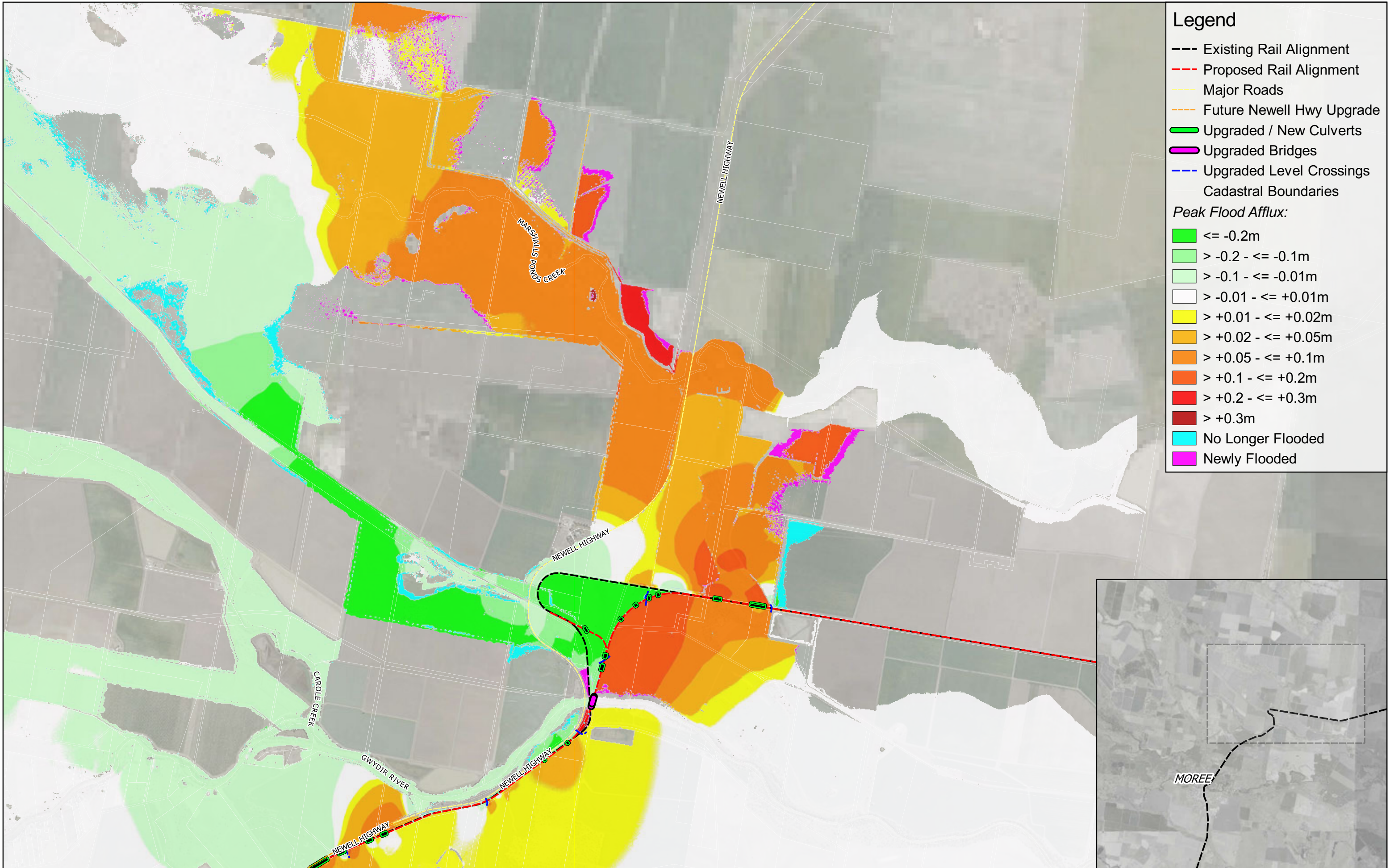
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> +0.3m

No Longer Flooded

Newly Flooded



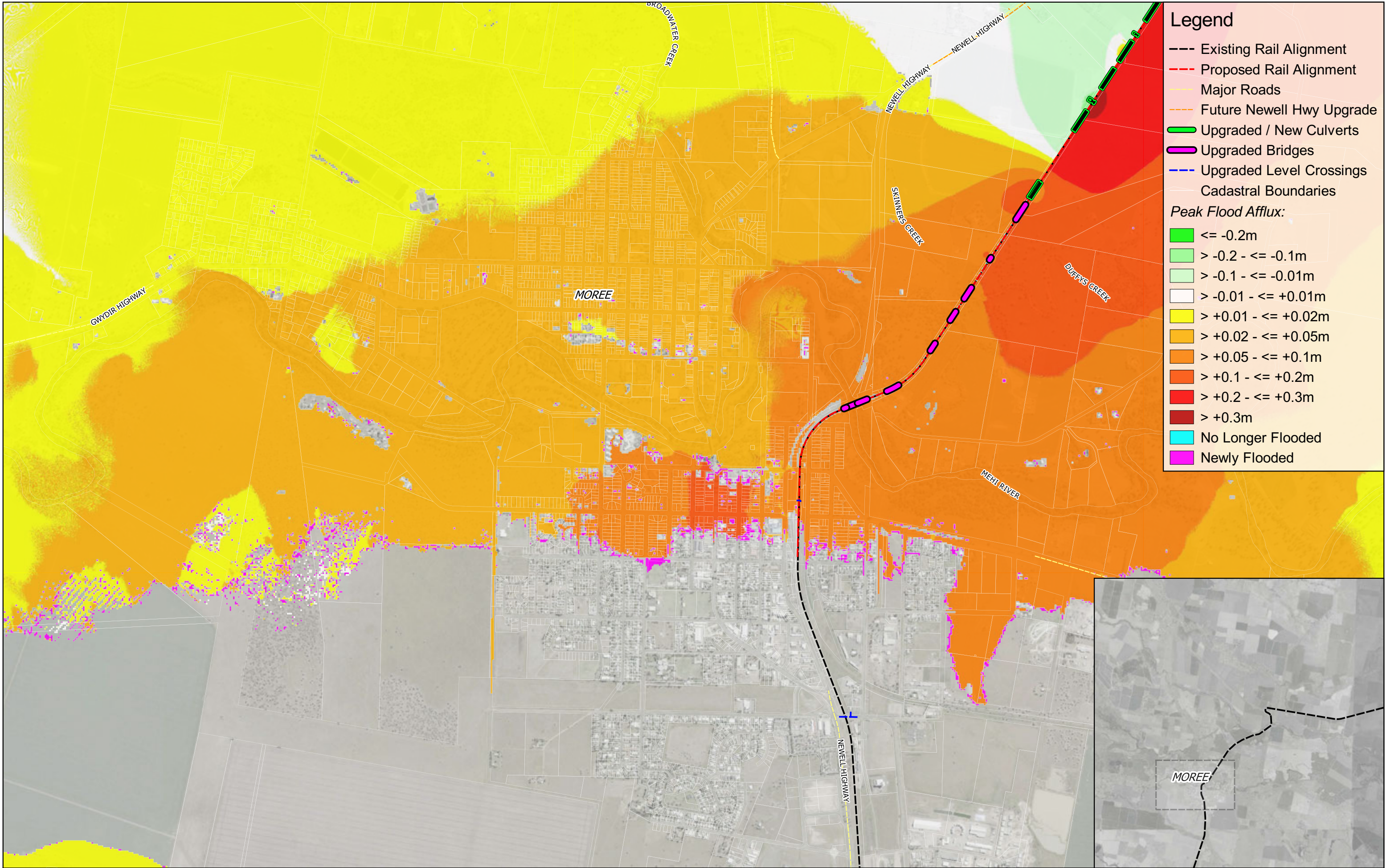
Legend

- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries

Peak Flood Afflux:

- <= -0.2m
- > -0.2 - <= -0.1m
- > -0.1 - <= -0.01m
- > -0.01 - <= +0.01m
- > +0.01 - <= +0.02m
- > +0.02 - <= +0.05m
- > +0.05 - <= +0.1m
- > +0.1 - <= +0.2m
- > +0.2 - <= +0.3m
- > +0.3m
- No Longer Flooded
- Newly Flooded





Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

 $\leq -0.2\text{m}$

 $> -0.2 - \leq -0.1\text{m}$

 $> -0.1 - \leq -0.01\text{m}$

 $> -0.01 - \leq +0.01\text{m}$

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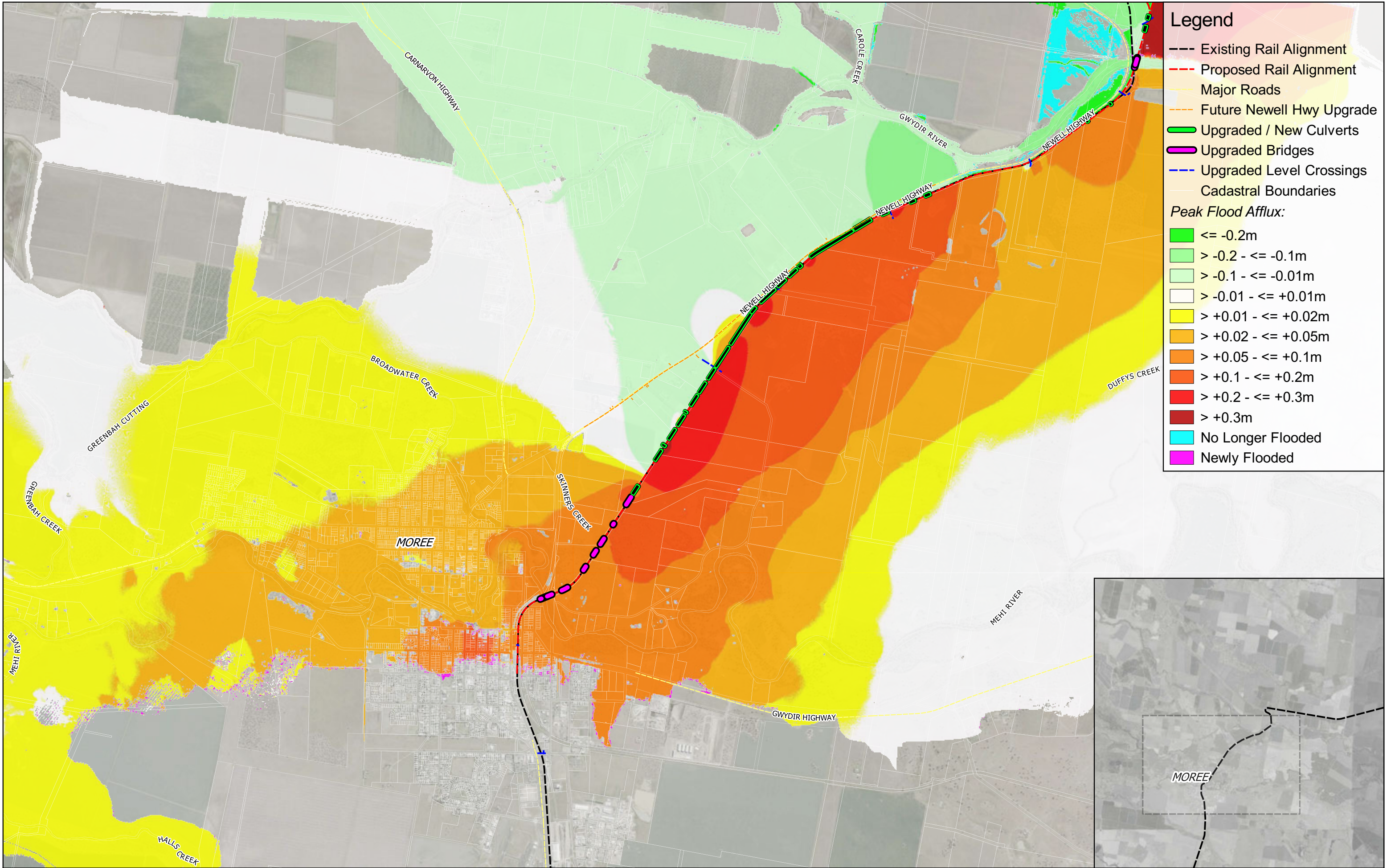
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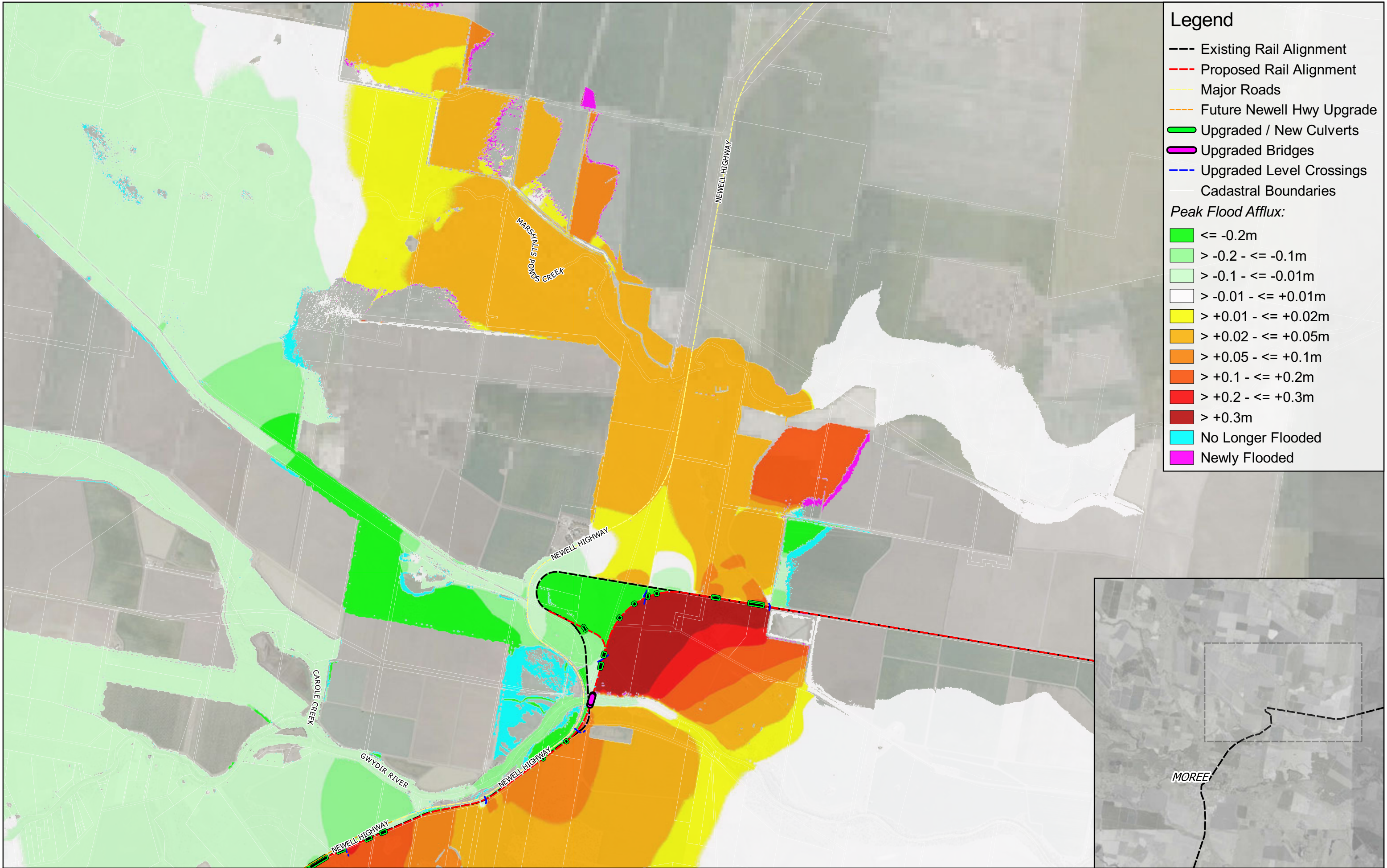
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No Longer Flooded

Newly Flooded



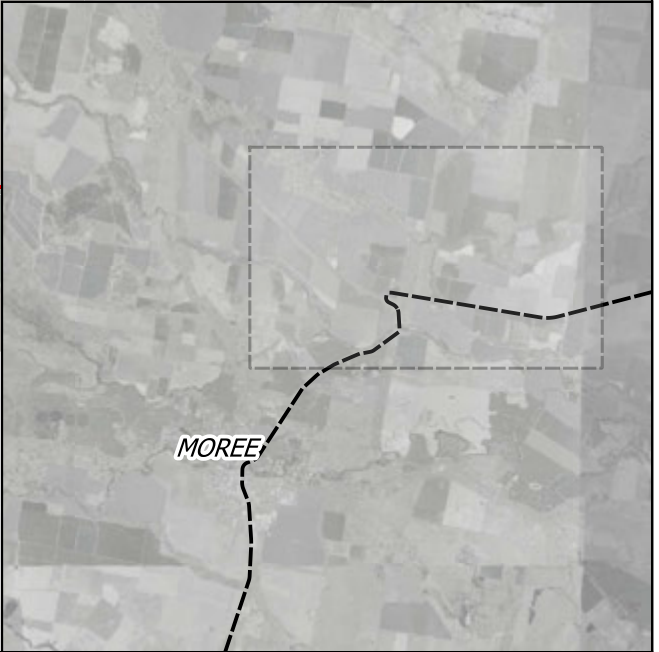


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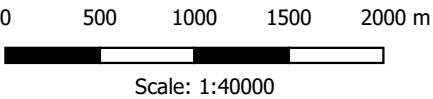
- Existing Rail Alignment
- - - Proposed Rail Alignment
- Major Roads
- - - Future Newell Hwy Upgrade
- Upgraded / New Culverts
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Peak Flood Afflux:

- <= -0.2m
- > -0.2 - <= -0.1m
- > -0.1 - <= -0.01m
- > -0.01 - <= +0.01m
- > +0.01 - <= +0.02m
- > +0.02 - <= +0.05m
- > +0.05 - <= +0.1m
- > +0.1 - <= +0.2m
- > +0.2 - <= +0.3m
- > +0.3m
- No Longer Flooded
- Newly Flooded

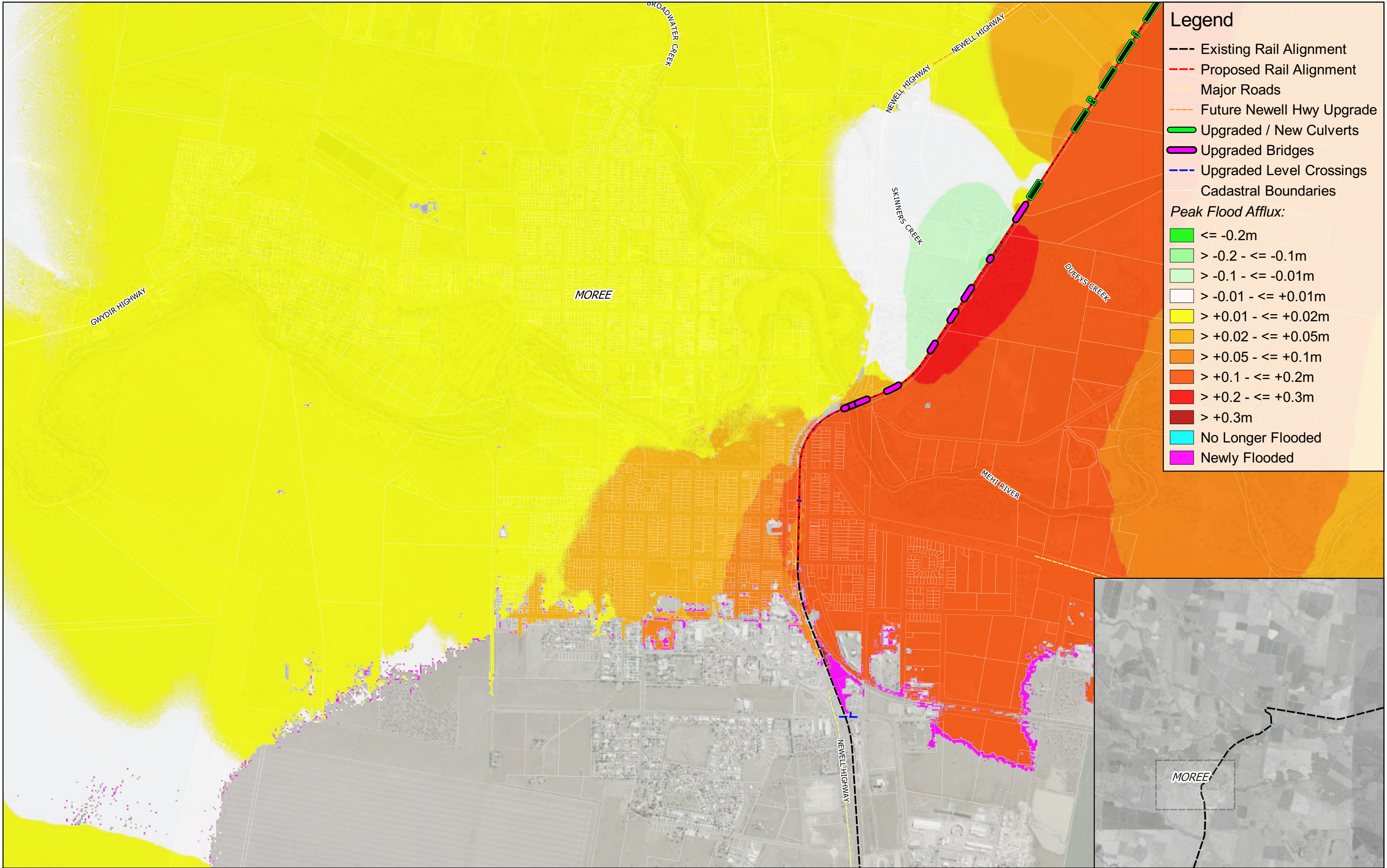


Prepared for: ARTC
Coordinate system: GDA 1994 MGA Zone 55
Aerial Source: NSW Six Maps
Scale ratio correct when printed at A3



Stage: EIS
Version: C
Author: JS
Approved by: RL
Date: 18/03/2022

Inland Rail - Narrabri to North Star Phase 2
Peak Flood Afflux - Proposed Design Scenario
Event: 1% AEP Climate Change
Sheet 3
Map ID: DES_AFF_001CC_3



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

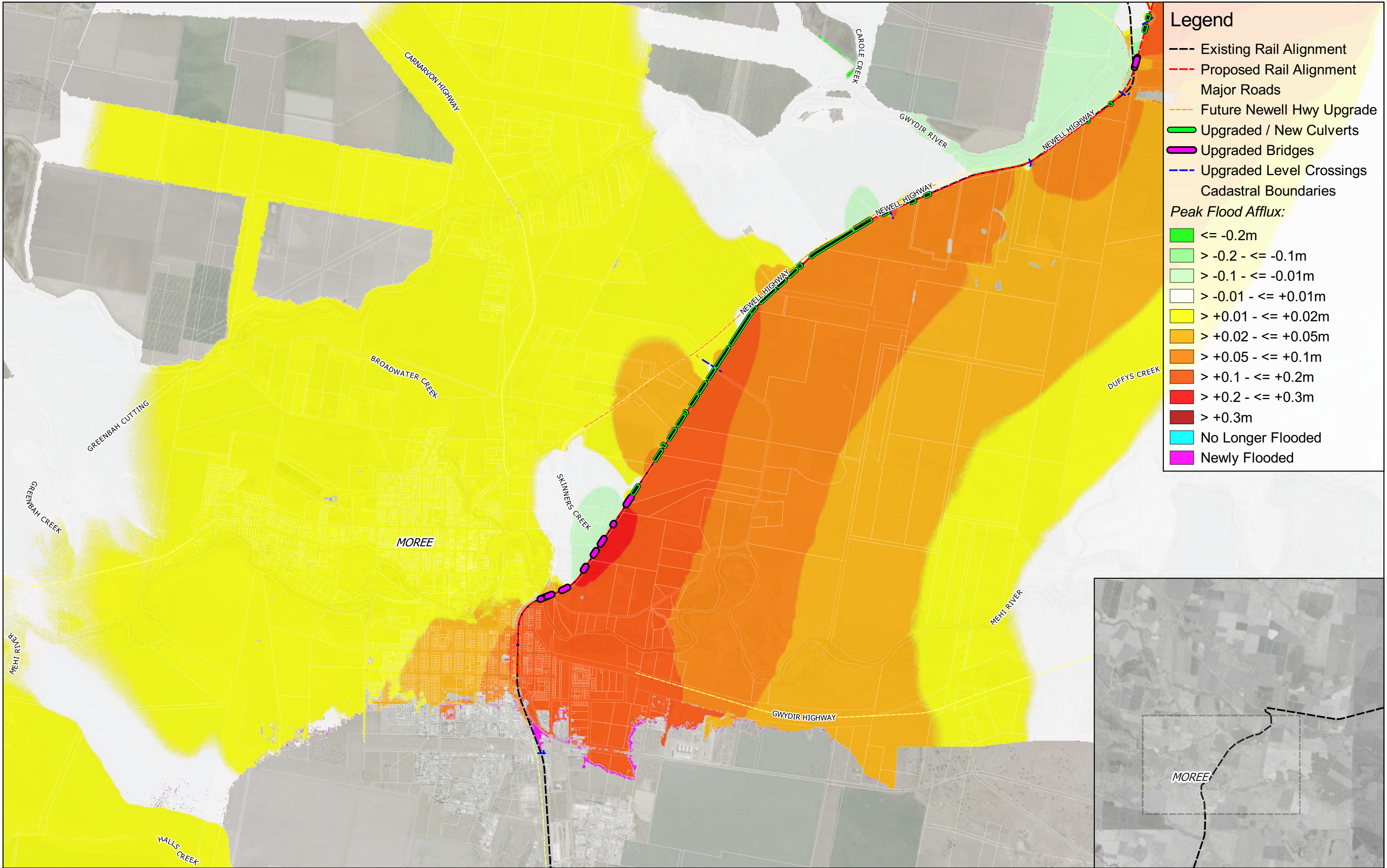
> +0.1 - <= +0.2m

> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded



Legend

Existing Rail Alignment

Proposed Rail Alignment

Major Roads

Future Newell Hwy Upgrade

Upgraded / New Culverts

Upgraded Bridges

Upgraded Level Crossings

Cadastral Boundaries

Peak Flood Afflux:

<= -0.2m

> -0.2 - <= -0.1m

> -0.1 - <= -0.01m

> -0.01 - <= +0.01m

> +0.01 - <= +0.02m

> +0.02 - <= +0.05m

> +0.05 - <= +0.1m

> +0.1 - <= +0.2m

> +0.2 - <= +0.3m

> +0.3m

No Longer Flooded

Newly Flooded

N

Prepared for: ARTC

Coordinate system: GDA 1994 MGA Zone 55

Aerial Source: NSW Six Maps

Scale ratio correct when printed at A3

0500100015002000 m

Scale: 1:40000

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MOTT MACDONALD

Stage: EIS

Version: C

Author: JS

Approved by: RL

Date: 22/03/2022

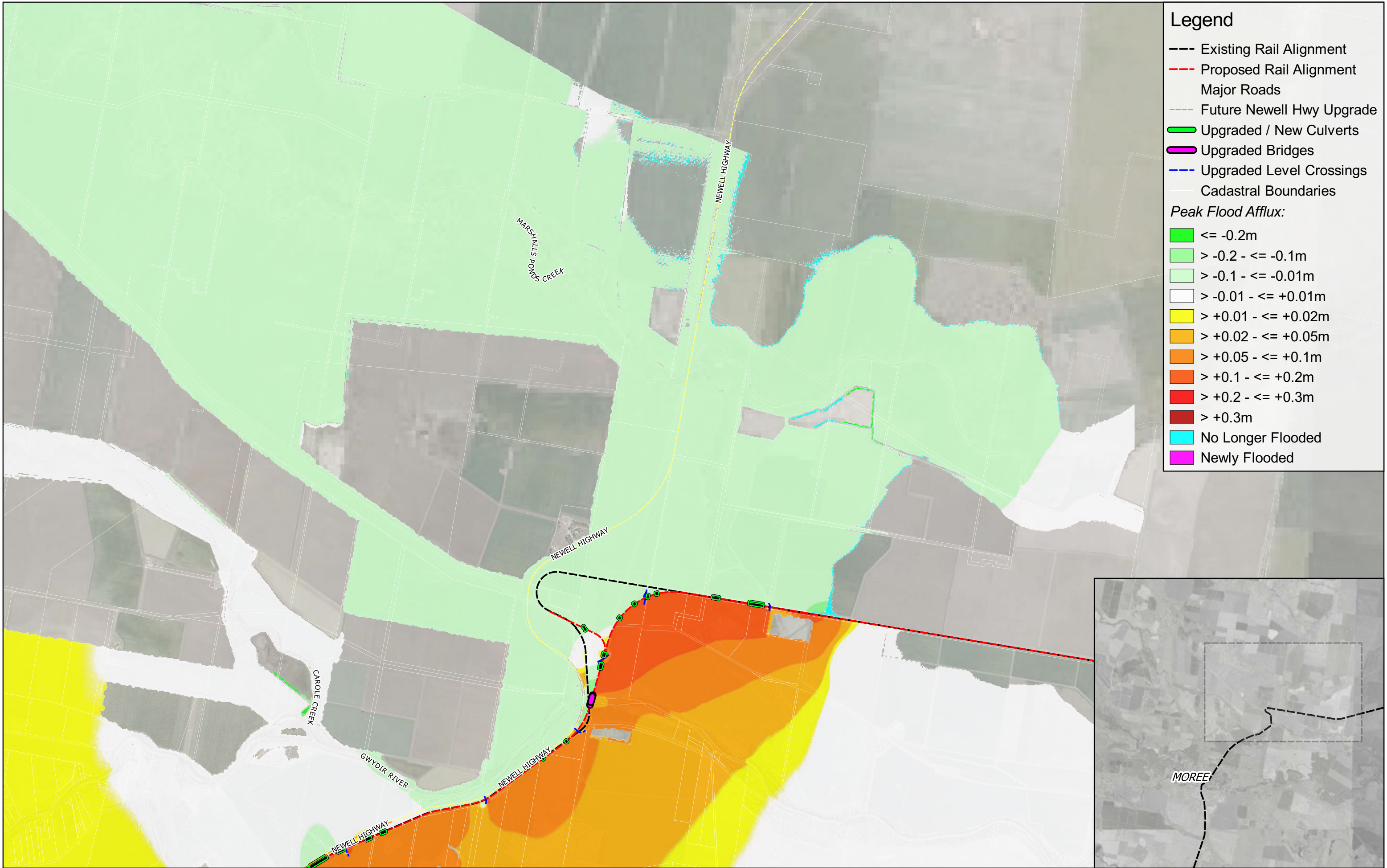
Inland Rail - Narrabri to North Star Phase 2

Peak Flood Afflux - Proposed Design Scenario

Event: PMF

Sheet 2

Map ID: DES_AFF_PMF_2

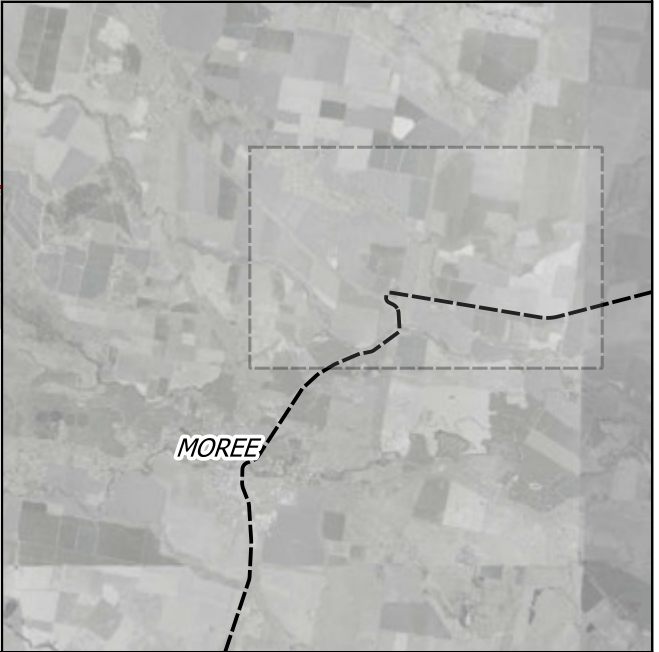


Legend

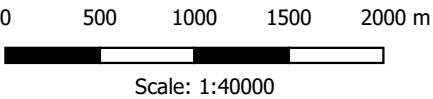
- Existing Rail Alignment
- Proposed Rail Alignment
- Major Roads
- Future Newell Hwy Upgrade
- Upgraded / New Culverts
- Upgraded Bridges
- Upgraded Level Crossings
- Cadastral Boundaries

Peak Flood Afflux:

- <= -0.2m
- > -0.2 - <= -0.1m
- > -0.1 - <= -0.01m
- > -0.01 - <= +0.01m
- > +0.01 - <= +0.02m
- > +0.02 - <= +0.05m
- > +0.05 - <= +0.1m
- > +0.1 - <= +0.2m
- > +0.2 - <= +0.3m
- > +0.3m
- No Longer Flooded
- Newly Flooded



Prepared for: ARTC
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: 22/03/2022

Inland Rail - Narrabri to North Star Phase 2
Peak Flood Afflux - Proposed Design Scenario
Event: PMF
Sheet 3
Map ID: DES_AFF_PMF_3