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MARTINUS INLAND RAIL

FLOOD DESIGN REPORT

A2I | Albury to Illabo

Package: A2I – Wagga Wagga Station (Mothers) Footbridge

CONTRACT NUMBER: 0052

PROJECT DOCUMENT NUMBER:

5-0052-210-IHY-W8-RP-0001

Document Control

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GLOSSARY

Specific terms and acronyms used throughout this plan and sub-plans are listed and described in Table 0-1 below.

Table 0-1: Definitions

Term	Definition
A2I	Albury to Illabo
A2P	Albury to Parkes Enhancement Project
AEP	Annual Exceedance Probability
ADC	Assumptions, Dependencies and Constraints
AHD	Australian Height Datum
ALCAM	Australian Level Crossing Assessment Model
ARF	Areal Reduction Factor
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
ARTC	Australian Railway Track Corporation
BoD	Basis of Design
BoM	Bureau of Meteorology
CIZ	Construction Impact Zone
CoA	Conditions of Approval
CO	Construct Only
CRS	Coordination Reference System
CSSI	Critical State Significant Infrastructure
D&C	Design and Construct
DCN	Design Change Notice
DDR	Detailed Design Review
EMC	Electromagnetic compatibility
EDPM	Engineering, Design and Project Management
ECMP	Electromagnetic compatibility management plan
EIS	Environmental Impact Statement
FDR	Feasibility Design Review
FS	Finish-Start constraint type
FSL	Finished Surface Level
GDA	Geocentric Datum of Australia
GIR	Geotechnical Interpretative Report
GSDM	Generalised Short-Duration Method.
HF	Human Factors
I2S	Illabo to Stockinbingal
ICA	Indirectly Connected Area
IFC	Issued for Construction
IR	Inland Rail
ITC	Incentivised Target Cost
IV	Independent Verifier
Km	Kilometres
LPA	Licensed Project Area
LiDAR	Light Detection and Ranging

Term	Definition
MGA	Map Grid of Australia
MIRDA	Master Inland Rail Development Agreement
NCR	Non-Conformance Report
NLPA	Non-Licensed Project Area
NtP	Notice to Proceed
PDR	Preliminary Design Review
PMF	Probable Maximum Flood
PSR	Project Scope and Requirements
QDL	Quantitative Design Limits
RCP	Representative Concentration Pathway
REF	Review of Environmental Factors
RFI	Request for Information
SA	Source Area
S2P	Stockinbingal to Parkes
SAQP	Sampling, Analysis and Quality Plan
SDR	Systems Definition Review
SEMP	System Engineering Management Plan
TfNSW	Transport for New South Wales
TWL	Tail Water Level
UMM	Updated Mitigation Measures
V & V	Verification and Validation
WAD	Works Authorisation Deed
WAE	Work-as-Executed
WBNM	Watershed-Based Network Model is a hydrology software tool used for simulating flood hydrographs from storm rainfall hyetographs.
UMM	Updated Mitigation Measures (of the Preferred Infrastructure Report)

1 A2P PROJECT INTRODUCTION

1.1 Albury to Parkes (A2P)

As part of the Inland Rail program of projects, the Australian Rail Track Corporation (ARTC) has appointed Martinus as the delivery contractor for the Albury to Parkes (A2P) project, which comprises the brownfield sections between Albury and Illabo (A2I) and Stockinbingal to Parkes (S2P). The greenfield portion between Illabo to Stockinbingal (I2S) is not a part of the A2P project scope.

1.2 Project Scope

The S2P section will be delivered under an REF and as such construction works associated with the two (2) Construct Only packages can commence at Contract Award. The Design and Construct for the other seven (7) projects sites will also commence at Contract Award.

The A2I section will be delivered under an EIS and requires a Notice to Proceed from ARTC before works can commence on site. Design for A2I will however commence at Contract Award. The project received State Planning approval on 8th Oct 2024, and Martinus received the Notice to Proceed from IRPL on 18 Oct 2024.

Within the EIS for A2I section there are twenty (20) locations, within which there are thirty (30) Design and Construct (D&C) projects of varying degrees of design gate development. A further location and project for Junee Drivers Platforms has been added through Inland Rail Direction. Design packages are listed below:

- Murray River bridge (Structure modifications)
- Albury Station Yard (Track slews, track reconfigurations)
- Albury Station Yard Track Slews (retained 3-track alignment)
- Albury Station Yard Footbridge (footbridge replacement), both pre- and post- SDRP-response
- Riverina Highway bridge (Track lowering)
- Billy Hughes bridge (Track lowering)
- Tabletop Yard (Structure modification)
- Culcairn Station Yard (Track slews and bridge removal)
- Henty Yard (Track slews)
- Yerong Creek Yard (Track slews)
- The Rock Yard (Structure modification)
- Uranquinty Yard (Track slews)
- Pearson Street bridge (Track lowering)
- Cassidy Parade footbridge (Bridge replacement), both pre- and post- SDRP-response
- Edmondson Street Bridge (stand-alone road bridge)
- Edmondson Street Footbridge (stand-alone road bridge)
- Edmondson Street bridge and footbridge (combined Bridge replacement), post- SDRP-response
- Wagga Wagga Station Yard (Track slews)
- Wagga Wagga Footbridge (footbridge replacement), both pre- and post- SDRP-response
- Bomen Yard (Track slews)
- Harefield Yard (Track slews)
- Kemp Street Bridge (stand-alone road bridge)
- Kemp Street Footbridge (stand-along footbridge)
- Kemp Street bridge and footbridge (combined Bridge replacement)
- Junee Station Yard (Track slews and bridge removal)
- Junee Driver Platforms – JE11 and JE70
- Olympic Highway Underbridge (Track reconfiguration and Structure modification)
- Junee to I2S dual track section (Track slews)
- LX605 & LX1472 Activations
- LX605 relocation and LX1472 closure, both 16m and 4m slew options

Within the S2P section, there are two (2) Construct only projects:

- Daroobalgie New Loop

- Wyndham Avenue (Track lowering)
- and seven (7) Design and Construct (D&C) projects:
- Milvale Yard (Structure modification)
- Bribbaree Yard (Track slews)
- Quandialla Yard (Structure modification)
- Caragabal Yard (Track slews)
- Wirrinya Yard (Track slews)
- Lachlan River bridge (Structure modifications)
- Forbes Station (Track slews and awning modifications)

The D&C scope typically includes works associated with route clearance to accommodate the new F2M clearance envelope, necessary to accommodate the double-stacked freight container trains and this includes.

- Structure modifications
- Track reconfigurations
- Bridge replacements
- Track lowering
- Track slews and level crossing upgrades
- Bridge removal

1.3 Sites Description

This study conducts a flood assessment for the Wagga Wagga Station (Mothers) Footbridge (henceforth described as Wagga Mothers footbridge - refer to Figure 1-1 for site location). The background and previous studies for the site, and other Wagga sites are listed below.

Figure 1-1: Site Location

1.3.1 Background

The Wagga Mothers footbridge forms part of the Albury to Illabo Section works at Chainage (CH) 521.200km. The Wagga Mothers footbridge (Site) is located within the City of Wagga Wagga and between Railway Street and Station Place. As part of the project scope, the existing Wagga Mothers footbridge will be replaced with a new footbridge. The proposed footbridge solution will provide pedestrian crossing over the railway tracks and will have a clearance of 7.1m over the Main line to allow the passage of double-stack rail traffic underneath the bridge.

1.4 Objectives

This report has been prepared to support the delivery of the bridge replacement at the Wagga Mothers footbridge (W8) and comply with the CSSI Condition of Approval and updated mitigation measures for quantitative flood modelling demonstrating compliance with pre- and post- development criteria. This report provides a flood impact assessment for the Issued for Construction (IFC) stage. The flood assessment aims to estimate the flood behaviour within the study area and to assess the potential flood impacts, as a result of the design outside of the project boundary.

1.5 Scopes

The scope of this study includes:

- Carrying out the flood assessment for the design in the IFC stage for the design events of 10%, 5%, 2%, 1%, 0.05% AEPs, 1% AEP with climate change and PMF.
- Checking flood assessment results against the criteria, including flood impact and flood immunity.
- Proposing any mitigation measures (if required).

1.6 Previous Studies

1.6.1 Flood Studies

Table 1-1 summarises all the flood studies associated with the Wagga Wagga area.

Table 1-1: Summary of the Previous Flood Studies

Item No.	Flood Study	Description	Comments
1	Wagga Wagga Major Overland Flow Flood Study (WMAwater, 2011)	This flood study provided detailed local design flooding information for an area of 167 km^2 on a 5m grid resolution. The hydrologic and hydraulic (WBNM/TUFLOW) modelling system was utilised, calibrated and validated for historical events. ARR1987 was adopted.	-
2	Wagga Wagga Major Overland Flow Floodplain Risk Management Scoping Study – Final Report (WMAwater, 2012)	This study was conducted to contextualise findings from item 1 before a Floodplain Risk Management Study commenced and recommendations were made.	-
3	Wagga Wagga Major Overland Flow Model Update Report (WMAwater, 2015)	This flood study updated the flood models originally established in item 1 by adopting the recommendations from item 2.	-
4	Wagga Wagga Revised Murrumbidgee River Floodplain Risk Management Study and Plan (WMAwater, 2018)	This study and plan assessed and ultimately recommended a broad range of mitigation options to manage flood risk in Wagga Wagga due to Murrumbidgee River flooding.	-
5	Wagga Wagga Major Overland Flow Floodplain Risk Management Study and Plan (MOFFS) (WMAwater, 2021)	This study and plan updated the hydrology and hydraulic models used in Items 1 and 3 above. ARR2019 has been used. The ARR2019 flood level results have been compared against the ARR1987 ones, and it showed that flood levels in ARR2019 is 0.05 m - 0.3m higher than the ones from ARR1987. Therefore, ARR2019 is adopted as ARR1987 methodologies are likely to underestimate the flood risk throughout overland catchment areas. It is noted that ARR2019 flood extents remain largely unchanged compared with ARR1987 results.	TUFLOW and WBNM models in MOFFS were adopted and updated in this flood assessment. The TUFLOW model parameters can be found in Table 4-2.

1.6.2 Reference Design

The prior Reference Design report prepared by WSP is:

- Albury to Illabo (A2I) and Stockinbingal to Parkes (S2P) Projects Reference Design Report – Wagga Wagga (June 2022)

The Wagga Mothers footbridge was assessed as part of Wagga Wagga Yard in the Reference Design Report. No detailed flood assessment was undertaken for the Wagga Wagga Yard during the Reference Design, as outlined in

the report '*Albury to Illabo (A2I) and Stockinbingal to Parkes (S2P) Projects Reference Design Report – Wagga Wagga (June 2022)*'. For the Reference Design (by Others), flood mapping information that was obtained from Wagga Wagga City Council was utilised. It was assessed that the site was not impacted by major regional flooding from the Murrumbidgee River. However, overland flooding from local catchments affected the site and adjacent areas for the 1% AEP event where the maximum flood depths were estimated to be approximately 400-500 mm.

1.6.3 Environmental Impact Statement

An EIS that has been approved, supports the application for approval of the Proposal under Division 5.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act). It addresses the environmental assessment requirements set by the Secretary of the NSW Department of Planning, Industry and Environment, which is commonly referred to as the SEARs. The A2I CSSI Environmental Impact Statement contains the following relevant prior assessment documents:

- Albury to Illabo Environmental Impact Statement (EIS) Technical Paper 11 – Hydrology, flooding and water quality (July 2022)

The Wagga Mothers footbridge enhancement works were not investigated as part of the Reference Design. However, the Wagga Mothers footbridge will be constructed at the Wagga Wagga Yard, thus the Wagga Wagga Yard enhancement works' Reference Design investigation was utilised for the review.

It was found that the site was not affected by flooding from the Murrumbidgee River up to the 1% AEP event, as shown in Figure 1-2.

Nonetheless, the MOFFS report (WMAwater, 2021) indicated that the site is affected by local flooding during the 5% and 1% AEPs events (Refer to Figure 1-3). A flood assessment was undertaken using the hydraulic model data provided by Wagga Wagga City Council. Initial flood model results indicated no changes to the existing drainage catchment, as such these bridges would not significantly alter flood regimes.

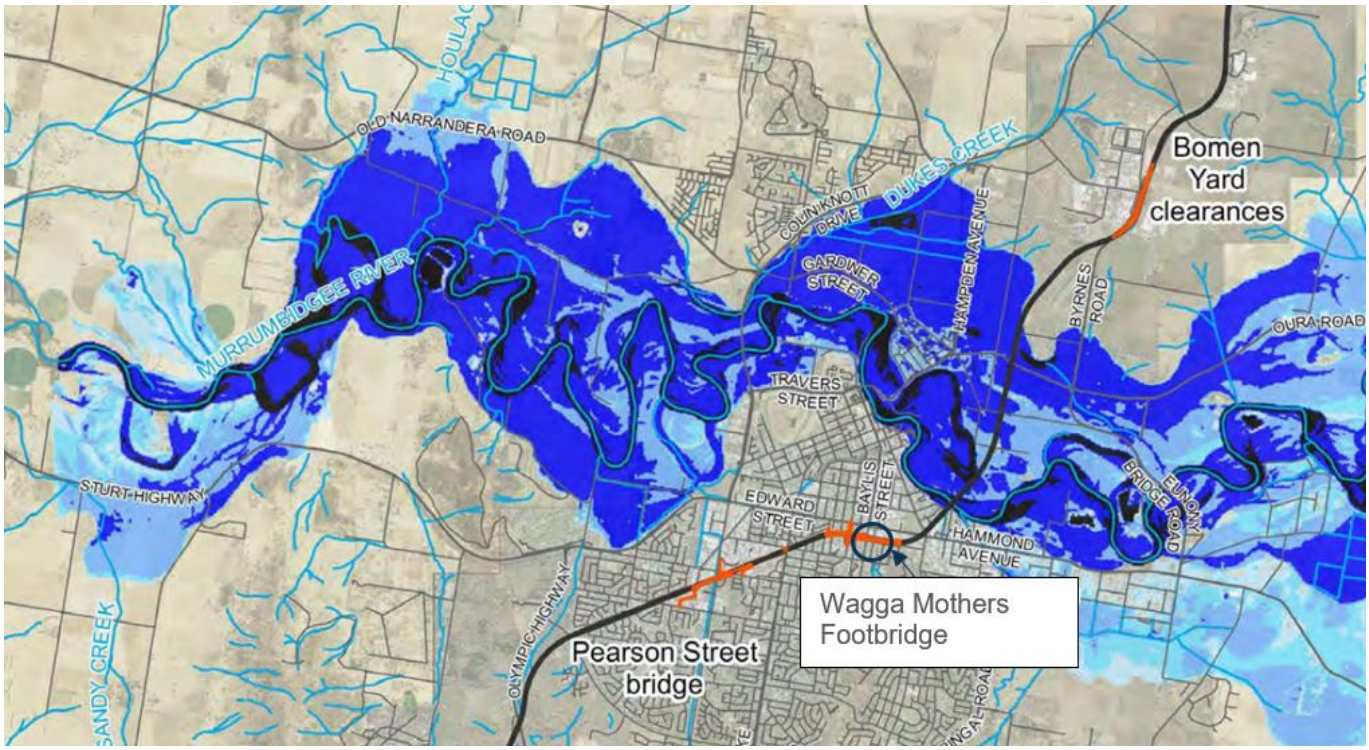


Figure 1-2: 1% AEP Regional Flooding (Image source: Albury to Illabo EIS Technical Paper 11 (July 2022))

Figure 1-3: 1% AEP Local Flooding for Wagga Wagga Station Pedestrian bridge (Wagga Mothers Footbridge) (Image source: Albury to Illabo EIS Technical Paper 11 (July 2022))

1.7 Purpose and Requirements

The primary purpose of this IFC flood assessment report is to describe how the design development and the associated review process were managed.

The secondary purpose of this report is to provide evidentiary documentation of consultation and review with and by external stakeholders, and the independent suitably-qualified flood consultant, in demonstrating compliance with the CSSI conditions of approval.

Refer to Appendix C for ARTC review, Appendix D for external consultation review, and Appendix E for the independent flood consultant review.

1.8 Information Documents

The following documents have been provided 'For Information' and have been referenced/reviewed as part of the design development:

- Wagga Wagga Major Overland Flow Floodplain Risk Management Study and Plan (WMA Water, 2021). This flood study supersedes the other flood study listed in Table 1-1 as it's the most recent flood study.
- Albury to Illabo (A2I) and Stockinbingal to Parkes (S2P) Projects Reference Design Report – Wagga Wagga (WSP, June 2022), 2-0008-210-PEN-03-RP-0002
- Albury to Illabo Environmental Impact Statement (EIS) Technical Paper 11 – Hydrology, flooding and water quality (WSP, July 2022), 2-0008-210-EAP-00-RP-0010

1.9 Inputs

The inputs to this flood assessment report include:

- Australian Standards and Guidelines: AS 7637 Railway Infrastructure – Hydrology and Hydraulics
- Australian Rainfall and Runoff: A Guide to Flood Estimation 2019 v4.1
- Austroads Guide to Bridge Technology – Part 8: Hydraulic Design of Waterway Structures
- Inland Rail Climate Change Risk Assessment Framework

1.9.1 Input Data

Table 1-2 outlines the available information relevant to the site and used for flood modelling.

Table 1-2: Available Information

Item	Information	Type	Description / Comments
General			
1	Flood model used in Wagga Wagga Major Overland Flow Floodplain Risk Management Study and Plan (WMAwater, 2021)	TUFLOW model in GDA94 projection	Received from ARTC on 29/08/2023
2	Hydrology model used in the Wagga Wagga Major Overland Flow Floodplain Risk Management Study and Plan (WMAwater, 2021)	WBN** (PMF for GSDM* only, 0.2% AEP, 0.5% AEP, 1% AEP, 2% AEP, 5% AEP, 10% AEP, 20% AEP)	Received on 29/08/2023 (refer to DJV RFI-007). WBN files (generated by Storm injector) include a single temporal pattern for durations 120 minutes, 360 minutes and 720 minutes for events 0.2% AEP, 0.5% AEP, 1% AEP, 2% AEP, 5% AEP, 10% AEP, 20% AEP and 90 minutes & 180 minutes for PMF.
3	Additional GIS files with Indirectly Connected Area (ICA) and catchment data related to Hydrology.	GIS files	Received from Wagga Wagga City Council on 22/11/2023 as part of the response to RFI 020
4	LiDAR 2020 (The data used to create this DEM has an accuracy of 0.3m (95% Confidence Interval) vertical and 0.8m (95% Confidence Interval) horizontal)	TIF format in 1m resolution in GDA2020 projection	Downloaded from https://elevation.fsdf.org.au/ on 26/09/2023
5	LiDAR 2015 and High-Resolution Aerial Imagery. The data derived points have an accuracy of 0.15m (68% confidence interval) ARTC LiDAR	TIF format in 1m resolution in GDA94	The existing 1m LiDAR (provided by ARTC) was received from Martinus on 12/11/2024. However, the LiDAR2020 (item 4) is newer and in GDA2020. Therefore, only LiDAR 2020 (item 4 above) is used.
Site Specific			
6	5-0052-210-ISV-W0-MD-0001-WAGGA_FEATURE_SURVEY.dwg	Site Survey in GDA 94 projection	Received from ARTC on 06/09/2023
7	SURVEY W7 MGA20 SURVEY DTM 21 W7 ISV.flt SURVEY W5 W6 MGA20 RAIL SURVEY DTM 21 W5 W6 ISV 000.flt	FLT grid file (1m grid)	Verified point cloud data – Site survey in the GDA2020 projection – Wagga Wagga Yard and Edmondson Street bridge Received from Civil Team on 12/04/2024
8	A2P WAG EXT GDA20Z55 COMBINED_241021.12daz	12da file	Detailed topography survey received from ARTC on 21/10/2024
9	A2P EDM EXT GDA20Z55 COMBINED_250511.12da	12Da file	Survey TIN for Edmondson. Received from Martinus on 12/05/2025.
10	20241017 Wagga Wagga Yard Assumed Existing System.pdf A2P WAG EXT GDA20Z55 COMBINED_250514.12da	PDF file 12Da file	Existing drainage data for Wagga Yard. Received from DJV Drainage team and Martinus on 25/05/2024
11	5-0052-210-DDR-W5-MD-0001-EDMONDSON_STREET_BRIDGE_EX DRAINAGE_PLAN.12daz	12Da file	IFC Existing drainage data for Edmondson Street Bridge. Received from DJV Drainage team on 14/07/2025.

Item	Information	Type	Description / Comments
12	5-0052-210-CDR-W7-MD-0001-WAGGA_WAGGA_YARD_3D_DRAINAGE_STRINGS_12DA.12da	12Da file	IFC Design drainage data. Received from DJV Drainage team on 04/09/2025
13	BALLAST 21 W7 MR21W7001.dem CAPPING 21 W7 MR21W7001.dem	Dem Grid file (0.2m grid) in GDA2020 projection	IFC Wagga Yard Civil Design Tin for ballast capping and associated channel in the GDA2020 projection Received from DJV Drainage team on 30/06/2025
14	5-0052-210-CAL-W7-MD-0003-WAGGA_WAGGA_YARD_3D_RAIL_DESIGN_STRINGS_DWG.dwg	Dwg file in GDA2020 projection	DDR Design Rail Strings received from DJV Civil team on 13/11/2024
15	Combined - 20250415 - DDR Wagga Footbridge checkprint.pdf 5-0052-210-CCW-W8-MD-2002-WAGGA_STATION_FOOTBRIDGE_2D_CIVIL_DESIGN_STRINGS_DWG.dwg	PDF and Dwg file in GDA2020 projection	DDR Wagga Mothers footbridge Design received from DJV Bridge team on 16/04/2025
16	DESI 210 DCW W8 FLOOD 20250702.dem	Dem Grid file (0.2m grid) in GDA2020 projection	IFC Civil Design received from DJV Bridge team on 02/07/2025

*: GSDM stands for Generalised Short-Duration Method.
** “WBN” is the extension of the WBNM file.

1.10 Outputs

The list of flood maps and the flood maps are included in Appendix A.

1.11 Limitations and Assumptions

The following limitations and assumptions are applied to the Wagga Mothers footbridge site.

- Existing drainage data for the Wagga Yard site was adopted based on comparing the MOFFS TUFLOW model (WMAwater, 2021) and detailed survey (Item 8 in Table 1-2) along with drainage details as provided by the DJV drainage team (Item 10 in Table 1-2).
- The site is not subjected to regional flooding as per the EIS (Technical Paper 11, Hydrology, Flooding and Water Quality, Albury to Illabo Environmental Impact Statement).
- An assessment of temporary works and staging has not been undertaken as it is out of the flooding scope.
- Blockage assessment is carried out for the 1% AEP design scenario as per the guidance set out in ARR2019 for the culverts within the project boundary, while 20% blockage is adopted for all the other culverts, pits and pipes outside the project boundary.

2 COMPLIANCE WITH REQUIREMENTS

2.1 Project Scope and Requirements

Assessment of the IFC detailed design to see if it meets the Project Scope and Requirements (PSRs) has been undertaken. This is demonstrated throughout the flood assessment with Table 2-1 below summarising the Wagga Mothers Footbridge Design's Compliance with the PSRs.

Table 2-1: Flooding Criteria within PSR Annexure B Technical Requirements

Requirement	Identifier	A2P Technical Requirements Description	Compliance Evidence Reference
Project Wide	5.4.10	Without limiting the environmental management requirements in Annexure F, section 6.1.1, all D&C Works in watercourses shall comply with the NSW Department of Primary Industries Standards: Policy and Guidelines for Fish Friendly Waterway Crossings; Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings; and Policy and Guidelines for Fish Habitat Conservation and Management Update.	N/A (structure modifications do not affect waterway flow)
Project Wide	5.4.2	Where existing flood immunity is lower than ARTC SMS minimum requirements, the functional requirements for flood immunity take precedence over the ARTC SMS.	The ARTC minimum requirement is 1% AEP. However, the top of the track is overtopped in the 10% AEP in the existing scenario. Thus, the existing immunity will be less than 10% AEP. The existing immunity is maintained under design conditions. Refer to Section 6.3.
Project Wide	5.4.3	Where existing flood immunity is higher than ARTC SMS minimum requirements, the ARTC SMS requirements for flood immunity take precedence over the functional requirements.	The ARTC minimum requirement is 1% AEP. However, the top of the track is overtopped in the 10% AEP in the existing scenario. Thus, the existing immunity will be less than 10% AEP. The existing immunity is maintained under design conditions. Refer to Section 6.3.
Project Wide	5.4.5	Bridge and culvert hydraulics shall comply with Austroads Guide to Bridge Technology Part 8: Hydraulic Design of Waterway Structures.	There are no other waterway structures within the Wagga Mothers footbridge scope.
A2I Technical Requirements	IR-SR-A2I-116	The System shall comply with 0-0000-900-ESS-00-ST-0001 Inland Rail Climate Change Risk Assessment Framework.	Climate change assessment was carried out by running the 1% AEP + 2090 RCP 8.5 and identifying that the bridge has low hazards. Refer to Section 6.5.2.
A2I Technical Requirements	IR-SR-A2I-349	The Corridor System for Enhancement Corridors shall have a flood immunity of no worse than existing.	The existing immunity is maintained under design conditions. Refer to Section 6.3.
A2I Technical Requirements	IR-SR-A2I-350	The Corridor System, where the existing track is lowered, shall maintain the existing flood immunity.	N/A (No track lowering included in the Wagga Mothers footbridge scope).
A2I Technical Requirements	IR-SR-A2I-352	The Corridor System shall prevent damage of the formation due to ponding of water.	No ponding of water. Existing Immunity is maintained. Proposed condition accommodates channels and an additional drainage pipe to drain the site. Refer to Wagga Yard Drainage Design (5-0052-210-PEN-W7-RP-0001) Refer to Sections 6.2 & 6.3.

Requirement	Identifier	A2P Technical Requirements Description	Compliance Evidence Reference
A2I Technical Requirements	IR-SR-A2I-458	The Corridor System shall prevent ponding in longitudinal open channels.	The proposed channels of Wagga Yard Design have culvert outlets which prevent ponding. Refer to Wagga Yard Drainage Design (5-0052-210-PEN-W7-RP-0001)
A2I Technical Requirements	IR-SR-A2I-459	The Corridor System for Enhancement Corridors shall provide mitigation for flood impacts no worse than existing condition.	Existing condition is maintained. Refer to Section 6.3.
A2I Technical Requirements	IR-SR-A2I-464	The Corridor System shall cause no adverse impacts either inside or outside the rail corridor when diverting water away from the track.	Existing condition is maintained. Refer to Section 6.4.
A2I Technical Requirements	IR-SR-A2I-465	The Corridor System shall minimise changes to the existing or natural flow patterns.	Existing condition is maintained. Refer to Section 6.2 and Section 6.3.
A2I Technical Requirements	IR-SR-A2I-541	The Structures System new underbridges shall withstand the 0.05% annual exceedance probability design flood event.	The 0.05% AEP event simulation was carried out and the bridge is generally outside the flooding extent and identified that the flood velocity is generally less than 1m/s and the hazard is generally low near the bridge. The flood level will not touch the bridge deck. Refer to Section 6.2. In addition, this is not a waterway bridge. So, it is low risk to the structural integrity. Refer to Section 4.6.2.12 of Design Report 5-0052-210-PEN-W8-RP-0001 for details.
A2I Technical Requirements	IR-SR-A2I-735	The Third-Party System private roads shall have flood immunity no worse than existing.	No third-party private roads are impacted. Refer to Section 6.4.
A2I (Annexure F)	6.1.1	Without limiting clauses 8 and 14 of the Deed, the Contractor shall ensure that the Contractor's Activities and the Works comply with the following for A2I, the Conditions of Approval and the environmental assessment reports available on: https://www.planningportal.nsw.gov.au/major-projects/projects/inland-rail-albury-illabo"	Refer to Table 2-2.

2.2 Conditions of Approval - Flooding

The Conditions of Approval (CoA) have been provided as part of the CSSI approval and Inland Rail Deed of Variation. The detailed design has been assessed to check if it meets the CoA and the compliance is presented in Table 2-2 below.

Table 2-2: Conditions of Approval Compliance Table – Flooding

Condition	Condition or Criteria	Compliance Evidence Reference
E38	All practicable measures must be implemented to ensure the design, construction and operation of the CSSI will not adversely affect flood behaviour, or adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.	Compliant. Refer to Section 6.
E39	The CSSI must be designed with the objective to meet or improve upon the flood performance identified in the documents listed in **Condition A1**. Variation consistent with the requirements of this	Compliant. Refer to Section 6.

Condition	Condition or Criteria	Compliance Evidence Reference
	approval at the rail corridor is permitted to effect minor changes to the design with the intent of improving the flood performance of the CSSI.	
E40	Updated flood modelling of the project's detailed design must be undertaken for the full range of flood events, including blockage of culverts and flowpaths, considered in the documents listed in **Condition A1**. This modelling must include:	Compliant. Refer to Sections 4 and 6.
E40	a) Hydrologic and hydraulic assessments consistent with *Australian Rainfall and Runoff – A Guide to Flood Estimation* (GeoScience Australia, 2019);	Compliant. Section 4.
E40	b) Use of modelling software appropriate to the relevant modelling task;	Compliant. Section 4 shows that the appropriate software (TUFLOW) was used.
E40	c) Field survey of the existing rail formation and rail levels, should be included within the models; and	Compliant. The existing rail level was used to inform the flood immunity. Refer to Section 6.
E40	d) Confirmation of predicted afflux at industrial properties adjacent to Railway Street, Wagga Wagga based on field survey.	N/A. This report relates to the Wagga Mothers footbridge. Refer to the Wagga Yard Flood design report (5-0052-210-IHY-W7-RP-0001) for confirmation of predicted afflux at industrial properties.
E40	Updated flood modelling must be made publicly available in accordance with **Condition B18**.	Flood design report and independent review of the flood design report have been provided to IR, through this submission, for IR to upload on the IR website, as per CoA B18 responsibility allocation.
E41	The Proponent's response to the requirements of **Conditions E38** and **E40** must be reviewed and endorsed by a suitably qualified flood consultant, who is independent of the project's design and construction and approved in accordance with **Condition A16,** in consultation with directly affected landowners, DCCEEW Water Group, TfNSW, DPI Fisheries, BCS, NSW State Emergency Service (SES) and relevant Councils.	Compliant. Independent review of the flood modelling, model and Flood Design Report is undertaken by the Proof Engineer's specialist contractor, who satisfies and complies with the requirements of A16. Consultation with Council and other stakeholders are being undertaken through a formal review of this IFC Flood Design Report.
E42	The CSSI must be designed and constructed to limit impacts on flooding characteristics in areas outside the project boundary during any flood event up to and including the 1% AEP flood event, to the following:	See items below
E42	(a) a maximum increase in inundation time of one hour, or 10%, whichever is greater;	Compliant. Refer to Section 6.4.4
E42	(b) a maximum increase of 10 mm in above-floor inundation to habitable rooms where floor levels are currently exceeded;	Compliant. No flood level increase of 10mm in above-floor inundation on any properties. Section 6.4.1
E42	(c) no above-floor inundation of habitable rooms which are currently not inundated;	Compliant. No increase for above floor inundation of habitable rooms on any properties. Section 6.4.1
E42	(d) a maximum increase of 50 mm in inundation of land zoned as residential, industrial or commercial;	Compliant.

Condition	Condition or Criteria	Compliance Evidence Reference
		No flood level increase of more than 50mm in residential, industrial and commercial areas. Section 6.4.1
E42	(e) a maximum increase of 100 mm in inundation of land zoned as environment zone or public recreation;	Compliant. No flood level increase of more than 100mm in the environment zone or public recreation (refer to Section 6.4.1)
E42	(f) a maximum increase of 200 mm in inundation of land zoned as rural or primary production, environment zone or public recreation;	Compliant. No flood level increase of more than 200mm in rural or primary production, environment zone or public recreation Refer to Section 6.4.1
E42	(g) no increase in the flood hazard category or risk to life; and	Compliant Refer to Section 6.4.3
E42	(h) maximum relative increase in velocity of 10%, or to 0.5m/s, whichever is greater, unless adequate scour protection measures are implemented and/or the velocity increases do not exacerbate erosion as demonstrated through site-specific risk of scour or geomorphological assessments	Compliant Refer to Section 6.4.2
E42	Where the requirements set out in clauses (d) to (f) inclusive cannot be met alternative flood levels or mitigation measures must be agreed to with the affected landowner.	Clause (d) to (f) are compliant.
E43	A **Flood Design Report** confirming the:	
E43	a) final design of the CSSI meets the requirements of **Condition E42;** and	Compliant Refer to Section 6
E43	b) the results of consultation with the relevant council in accordance with **Condition E46**	Refer to E46
E43	must be submitted to and approved by the Planning Secretary prior to the commencement of permanent works that would impact on flooding.	This report has been submitted to the Planning Secretary for approval prior to the commencement of permanent works that would impact on flooding.
E44	The **Flood Design Report** required by **Condition E43** must be approved by the Planning Secretary prior to works that may impact on flooding or the relevant council's stormwater network.	This report has been submitted to the Planning Secretary for approval prior to the commencement of permanent works that would impact on flooding.
E45	Flood information including flood reports, models and geographic information system outputs, and work as executed information from a registered surveyor certifying finished ground levels and the dimensions and finished levels of all structures within the flood prone land, must be provided to the relevant Council, BCS and the SES in order to assist in preparing relevant documents and to reflect changes in flood behaviour as a result of the CSSI. The Council, BCS and the SES must be notified in writing that the information is available no later than one (1) month following the completion of construction. Information requested by the relevant Council, BCS or the SES must be provided no later than six (6) months following the completion of construction or within another timeframe agreed with the relevant Council, BCS or the SES.	Flood information has been provided to the relevant Council, BCS and the SES in order to assist in preparing relevant documents and to reflect changes in flood behaviour as a result of the CSSI in accordance with the requirements of CoA E45
E46	The design, operation and maintenance of pumping stations and storage tanks and discharges to council's stormwater network must be developed in consultation with the relevant council. The results of the consultation are to be included in the report required in **Condition E47.**	Local drainage flow regime, catchment area and imperviousness remain the same as per existing condition, there is no additional flow towards the existing Council's stormwater network. The design has not worsened the existing condition. Discharges to the council's stormwater networks have been consulted with Wagga Wagga City Council during the briefing workshops,

Condition	Condition or Criteria	Compliance Evidence Reference
		various stages of design submissions with the Council's comments closed out, details are documented in 5-0052-210-PEN-W8-RP-0001.

2.3 Updated Mitigation Measures - Flooding

The Updated Mitigation Measures (UMM) have been provided, and the detailed design has been assessed to meet the UMM and the compliance is presented in Table 2-3 below.

Table 2-3 Updated Mitigation Measures Compliance Table - Flooding

Condition	Condition or Criteria	Compliance Evidence Reference	Comment if non-compliant
HFWQ3	Further consultation will be undertaken with local councils and other relevant authorities to identify opportunities to coordinate the proposal with flood mitigation works committed to as part of the council's flood management plans, or other strategies.	Consultation with the Council and other relevant authorities will be undertaken through a formal review of this Flood Design Report.	N/A
HFWQ4	At Wagga Wagga Yard enhancement site, flood modelling would be carried out during detailed design to confirm predicted afflux at industrial properties located at Railway Street and compliance with the Quantitative Design Limits for Inland Rail. This would be informed by topographic and building floor surveys and a review of localised drainage structures (as required). Quantitative assessment of the sites of low and moderate hydraulic complexity will be carried out during detailed design and will consider the impact of the Possible Maximum Flood event at built-up areas (where information is available) and the tenure of the upstream areas that are impacted by drainage and/or flooding. The outcomes of the assessment are to be provided to DCCEW– BCS	This report relates to the Wagga Mothers footbridge site, and so is not relevant to the Wagga Wagga Yard enhancement site, Refer to Wagga Yard Flood design report (5-0052-210-IHY-W7-RP-0001) for predicted afflux at industrial properties. Compliant. Quantitative assessment has been undertaken. Refer to Section 6.	N/A
HFWQ5	At Riverina Highway bridge enhancement site, flood and drainage network modelling (including capacity and operation of the stormwater storage and pump system) will be carried out during detailed design to confirm predicted compliance with the Quantitative Design Limits (QDLs)* for Inland Rail. The modelling would be undertaken in consultation with Albury City Council.	This report relates to the Wagga Mothers footbridge site, and so is not relevant to the Riverina Highway track lowering site.	N/A

* QDL is superseded by CoA E42.

3 CHANGE MANAGEMENT

This section summarises the changes made to this design package due to changes in the project scope and/or evolution of the design.

3.1 Concept Design to SDR

Flood modelling is not applicable to this stage.

3.2 SDR to PDR

Flood modelling was not carried out on the PDR design, as it was subject to high levels of change arising from compliance with the Conditions of Approval to engage with the State Design Review Panel. As the arrangement of structural elements in and onto the ground plane were changing, flood modelling was held off until the design was essentially fixed.

Advice from the State Design Review Panel has been responded to and is documented in the Urban Design and Landscape Plan (UDLP). The designs for the footbridge structures is largely agreed but may still be subject to change until the UDLP is approved.

3.3 PDR to DDR

Key design changes between the PDR and the DDR Design are listed in Table 3-1.

Table 3-1: Design Differences between PDR and DDR

Item	Difference	Reason for Change
1	Adopt the DDR Wagga Yard, Cassidy Parade Footbridge, Edmondson Street and Footbridge Master model	Hydraulic modelling for the site
2	Incorporation of the latest existing conditions	Update Bridge elements based on the Survey
3	Incorporation of Civil Design	New Civil Design for Wagga Mothers footbridge
4	Incorporation of Bridge Design	New Bridge design for Wagga Mothers footbridge

3.4 DDR to IFC

Key design changes between the DDR and the IFC Design are listed in Table 3-2.

Table 3-2: Design Differences between DDR and IFC

Item	Difference	Reason for Change
1	Adopt the DDR Cassidy Parade Footbridge (DDR flood assessment results was used to inform the IFC stage, due to very minor design changes between IFC and DDR. Refer to 5-0052-210-IHY-W4-RP-0001_0 Section 1.10) and IFC Wagga Yard, Edmondson Street and Footbridge Master model	Hydraulic modelling for the site were updated based on IFC Wagga Yard, Edmondson Street and Footbridge Master model design and DDR Cassidy Parade Footbridge design to assess cumulative impacts.
2	Updated footbridge with existing drainage data based on survey.	The existing drainage data for Wagga Yard, Edmondson Street and Footbridge were updated based on survey data (item 10 and 11 from Table 1-2.
3	Incorporation of IFC Civil Design	IFC Civil Design for Wagga Mothers footbridge
4	Updating sections and text throughout the report	To address the ARTC / IR / PE / TfNSW review comments

4 MODELLING METHODOLOGY

The overall approaches for flood modelling are listed below:

- Utilise the hydrological model and generate flow hydrographs for input to the hydraulic model for all events to perform critical duration analysis.
- Update the received TUFLOW model by incorporating the latest LiDAR (Section 4.1.1) and survey. Use the updated TUFLOW model to predict hydraulic behaviour, which will be formed as the existing model for this study.
- The updated existing condition TUFLOW model results compared against the received model results (Refer to Section 5).
- Update the TUFLOW model from the existing condition to the master design condition model by incorporating the Wagga Mothers footbridge design into the existing model.
- Incorporate the Wagga Wagga Yard design (5-0052-210-IHY-W7-RP-0001), Cassidy Parade (5-0052-210-IHY-W4-RP-0001), and Edmondson Street and Footbridge design (5-0052-210-IHY-W5-RP-0001) into the Master Design condition to understand the cumulative impact on the site (Refer to Section 6.4.5).
- Conduct a Climate Change Sensitivity Assessment for the 1% AEP to inform the potential impact on the railway track flood immunity.
- The flood impact was assessed up to the 1% AEP climate change and the flood results were shown including 1% AEP + Climate Change, 0.05% AEP and PMF to allow understanding regarding the bridge's flood risk.
- Conduct a blockage assessment as per ARR2019 procedures.

4.1 Hydrologic modelling

The WBNM (City Catchment) model was utilised to generate flow hydrographs for input to the hydraulic model. The hydrology model covers Glenfield Drain (at CH523.560km) as well as the Wagga Wagga CBD and outer areas lying on the southern Murrumbidgee River floodplain. Refer to Figure 4-1 for the sub-catchment extents of the hydrology model.

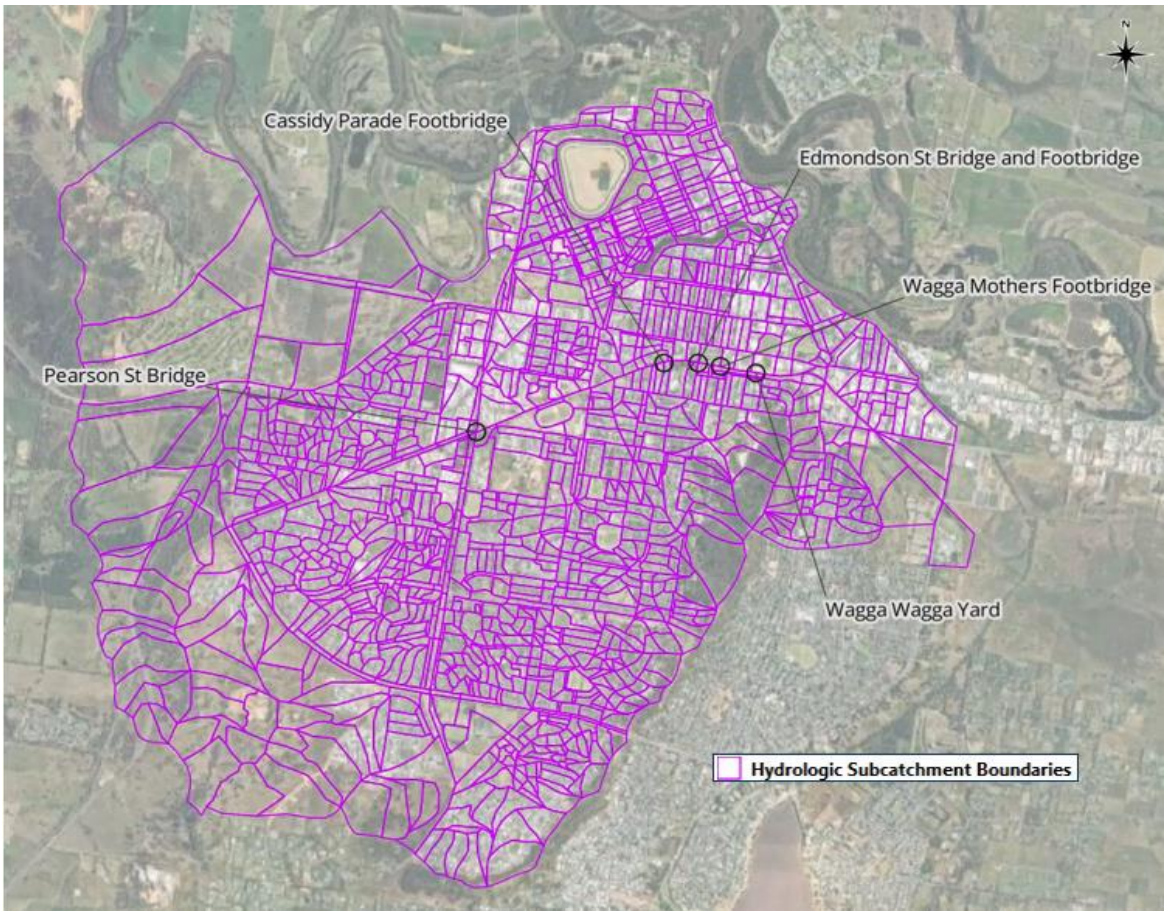


Figure 4-1: Hydrologic Subcatchment Extents

As stated in Item 2, Table 1-2, only WBN running files generated by the Storm Injector were received, and those files could not be run directly through the WBNM software due to the lack of ICA and geometry. To produce the inflow hydrographs for critical duration analysis, Storm Injector HL (V 1.3.9.0) was used alongside the provided ICA and geometry data (Item 3, Table 1-2). However, generating identical hydrograph inflow values proved challenging. As a conservative approach, slightly higher inflow values (generally 0.0035 m^3/s) than the received ones were created, which were then utilised in the hydraulic assessment. Table 4-1 presents a comparison between the received and adopted WBN files.

Flow hydrographs were generated for input to the hydraulic model for the 10% AEP, 5% AEP, 2% AEP, 1% AEP, and 1% AEP + Climate Change events, to perform critical duration analysis. Refer to Table 4-1.

Table 4-1: Model Parameters of Hydrology Model

Parameters	Received Hydrology Model	Adopted Hydrology Model
Hydrology model and version	WBNM model (V2017) with WBN files	WBNM model (V2017) using Storm injector HL(V 1.3.9.0).
Total catchment area	3835 ha (38.35 km^2).	3835 ha (38.35 km^2).
Events	PMF, 0.2% AEP, 0.5% AEP, 1% AEP, 2% AEP, 5% AEP, 10% AEP, 20% AEP	0.05% AEP, 1% AEP + Climate Change, 1% AEP, 2% AEP, 5% AEP, 10% AEP, PMF
Duration Temporal pattern received/generated	Single temporal pattern for durations 120 minutes, 360 minutes and 720 minutes for all events 90 minutes and 180 minutes for PMF	Ensemble temporal pattern for duration ranging from 10 minutes to 720 minutes
Indirectly Connected Area (ICA)	Utilised received inflow hydrographs for events 1% AEP, 2% AEP, 5% AEP and 10% AEP, which had ICA included.	The hydrology model was updated with relevant ICA values from the data received from the Wagga City Council (item 3 in Table 1-2) and relevant inflow hydrographs for the hydraulic models were generated. These inflow hydrographs were then used in the model for the flood assessment.

4.1.1 Existing Model Update

The existing model was updated based on the received TUFLOW from MOFFS (WMAwater, 2021) mentioned in Section 1.6.1. A summary of the received model and updated model parameters can be found in Table 4-2. The model extent encompasses Wagga Wagga's central business district (CBD) and surrounding regions situated along the southern floodplain of the Murrumbidgee River, spanning an area of approximately 42 km^2 (Refer to Figure 4-2).

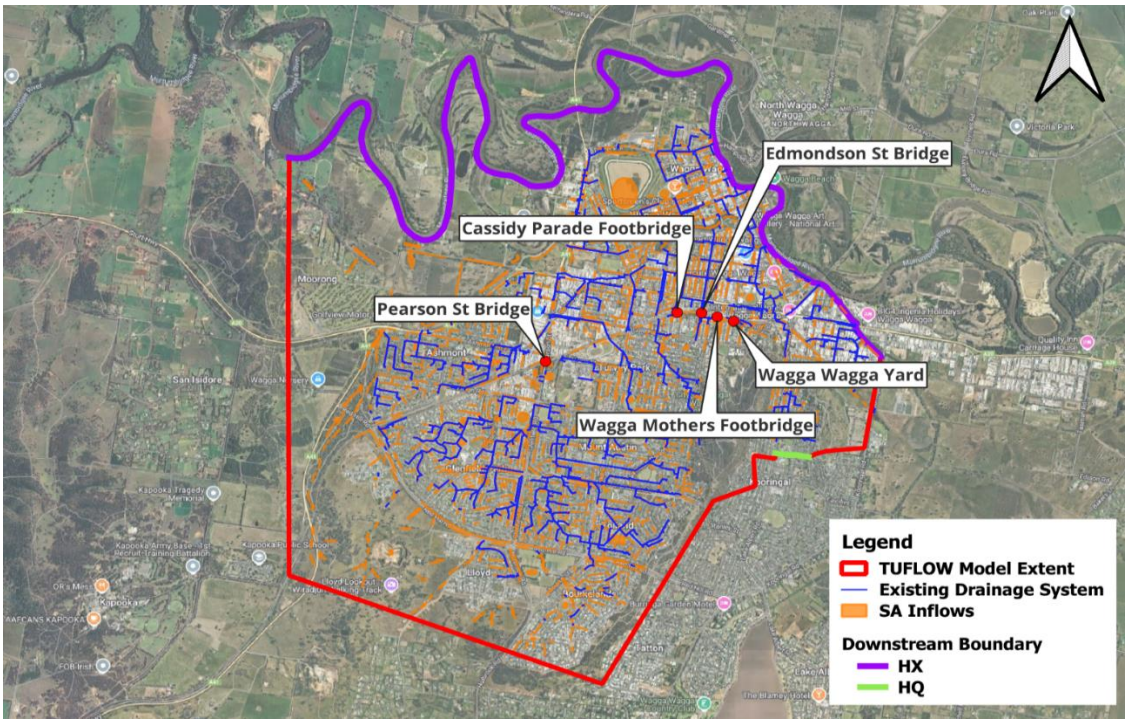


Figure 4-2: TUFLOW Model Extent

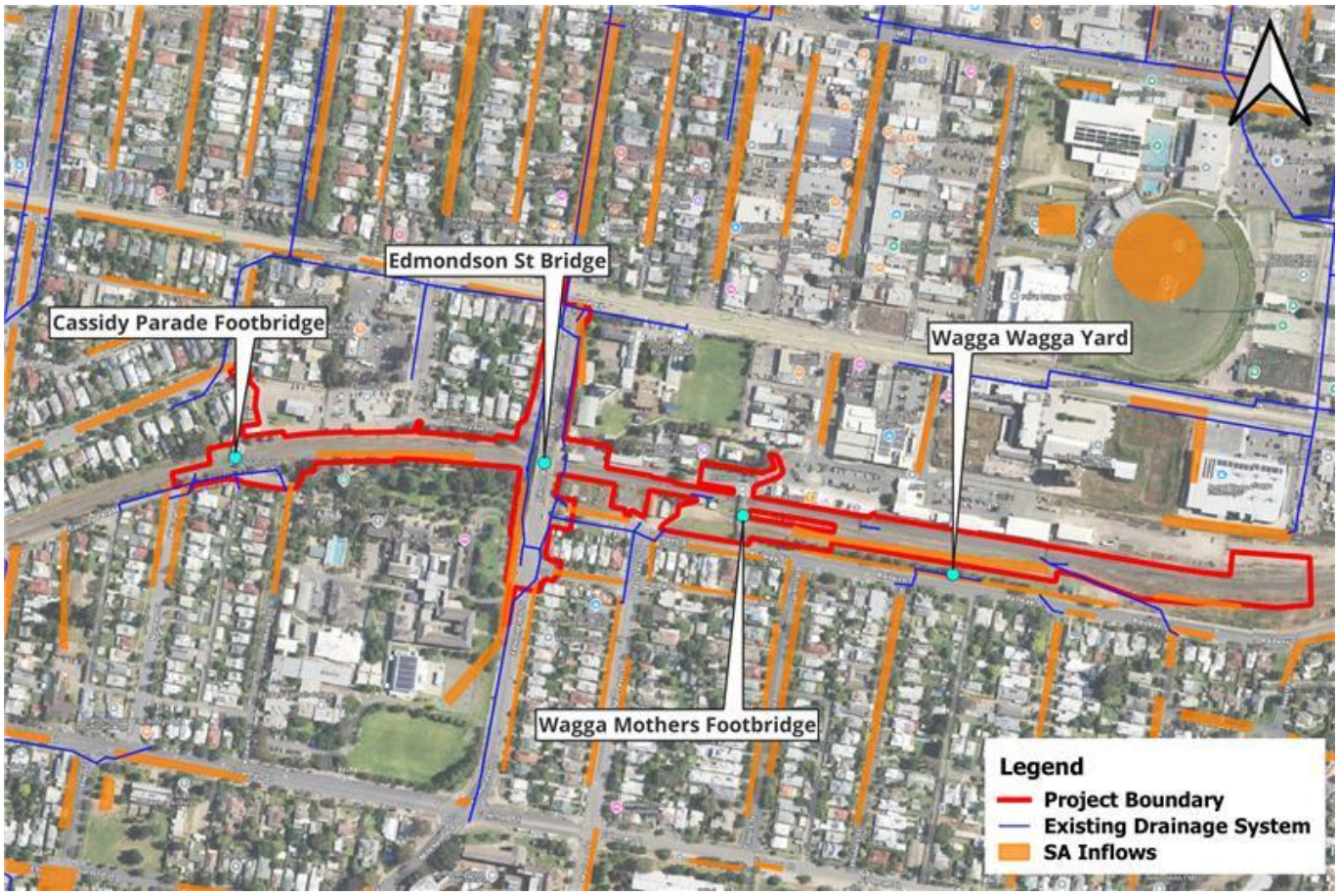


Figure 4-3: Wagga Mothers Footbridge (Zoomed in)

Table 4-2: Model Parameters in the Updated Existing Model and MOFFS 2021 TUFLOW Model

Parameters	MOFFS 2021 Model	Updated TUFLOW Model
Build	TUFLOW 2018-03-AC HPC	TUFLOW.2020-10-AF HPC (Refer to Section 4.1.1.2 – "TUFLOW model version and grid size" for more details)
Coordination Reference System (CRS)	GDA94 MGA 55	GDA2020 MGA 55
Grid Size	5m	1.25m within the quadtree area (Site area) and 5m outside of the quadtree area (Refer to Figure 4-5). (Refer to the following Section of "TUFLOW model version and grid size" for more details)
Hydrology	WBNM ARR2019	WBNM ARR2019
Inflow type	SA Polygon	SA Polygon (Figure 4-2)
Key Structures	No bridge was included.	The existing Edmondson Street Bridge and Wagga Wagga footbridge abutment were represented in the model.
Extent	Wagga Wagga's central business district (CBD) and surrounding regions are situated along the southern floodplain of the Murrumbidgee River	Wagga Wagga's central business district (CBD) and surrounding regions are situated along the southern floodplain of the Murrumbidgee River
Downstream Boundary	Dynamic downstream water boundary (HX) and slope boundary (HQ)	Dynamic downstream water boundary (HX) and slope boundary (HQ)
Timestep	Dynamic	Dynamic
Building Representation	Null polygon	Null polygon

Parameters	MOFFS 2021 Model	Updated TUFLOW Model
Topography	▪ 1 m resolution LiDAR collected in 2008 ▪ 5 m x 5 m resolution photogrammetry was obtained from Geoscience Australia – Elevation Information System (ELVIS) ▪ 2014 LiDAR was used for two basins upstream of Jubilee Park on Bourkelands Drive	▪ 1 m resolution LiDAR collected in 2008 ▪ 5 m x 5 m resolution photogrammetry was obtained from Geoscience Australia – Elevation Information System (ELVIS) ▪ 2014 LiDAR was used for two basins upstream of Jubilee Park on Bourkelands Drive ▪ 2020 LiDAR for sites ▪ Site survey and verified cloud point data (Refer to Item 6, 7, 8 and 9 in Table 1-2)
Roughness	Pasture: 0.045 1D cross section elements: 0.040 Lots: 0.060 Ponds and other water bodies: 0.030 newly built/resurfaced road: 0.018 Industrial: 0.070 Roads: 0.022 creek permanent water: 0.040 vegetation: 0.100 vegetated creek: 0.080 Railway: 0.060 1D cross section (crooked creek): 0.060	Pasture: 0.045 1D cross section elements: 0.040 Lots: 0.060 Ponds and other water bodies: 0.030 newly built/resurfaced road: 0.018 Industrial: 0.070 Roads: 0.022 creek permanent water: 0.040 vegetation: 0.100 vegetated creek: 0.080 Railway: 0.060 Design Channel: 0.035 1d cross section (Crooked Creek): 0.060 Design Channel: 0.035 Note: Some roughness areas in the site (the rail line) were refined
Design Events	PMF, 0.2% AEP, 0.5% AEP, 1% AEP, 2% AEP, 5% AEP, 10% AEP, 0.2 EY	PMF, 0.05% AEP, 1% AEP + Climate Change, 1% AEP, 2% AEP, 5% AEP, 10% AEP

4.1.1.1 GDA 2020 conversion

The conversion to the Geocentric Datum of Australia 2020 (GDA2020) represents a crucial update to modernise and align the model with the latest geodetic standards and reference systems and to meet project requirements on the CRS. The model layers and the rasters were converted into GDA2020 Map Grid of Australia (MGA) 55 from GDA94 MGA 55.

4.1.1.2 TUFLOW model version and grid size

The initial 5-meter grid size and TUFLOW 2018-03-AC HPC was adopted in the MOFFS 2021 TUFLOW model. However, a 5m grid was found to be insufficient to model the detailed specific requirements of the study area. Consequently, a more refined grid size is required. The application of a finer grid to the whole model extent, is not cost-effective in terms of the computation time as the site areas are limited compared with the model extent. As such, the approach of applying quadtree (only available in versions from 2020 onwards) with 1.25m to the site area is favoured.

2023-03-AC is the most up-to-date TUFLOW version at the time when the modelling was carried out. However, when running the model using the 2023-03-AC HPC, inconsistencies were noted near the site area, particularly at Area 1 and Area 2 (refer to Figure 4-4), in comparison to the results obtained from the 2018-03-AC HPC. Area 1, which is located near the Pearson Street Bridge, experienced an increase of around 0.1m in flood level, while Area 2 (upstream of Wagga Yard) experienced an increase of around 0.5m in flood level.

Following a series of tests, it was found that version 2020-10-AF HPC (the latest release prior to 2023) yielded results most similar to the results produced by the MOFFS 2021 model (2018-03-AC HPC), which is accepted by Wagga City Council (refer to Section 5 for more details). In Areas 1 and 2, the flood levels were increased by around 0.02m and 0.15m.

Therefore, TUFLOW 2020-10-AF HPC with a quadtree of 1.25m was adopted for this study. Refer to Figure 4-5 for the adopted quadtree extent.

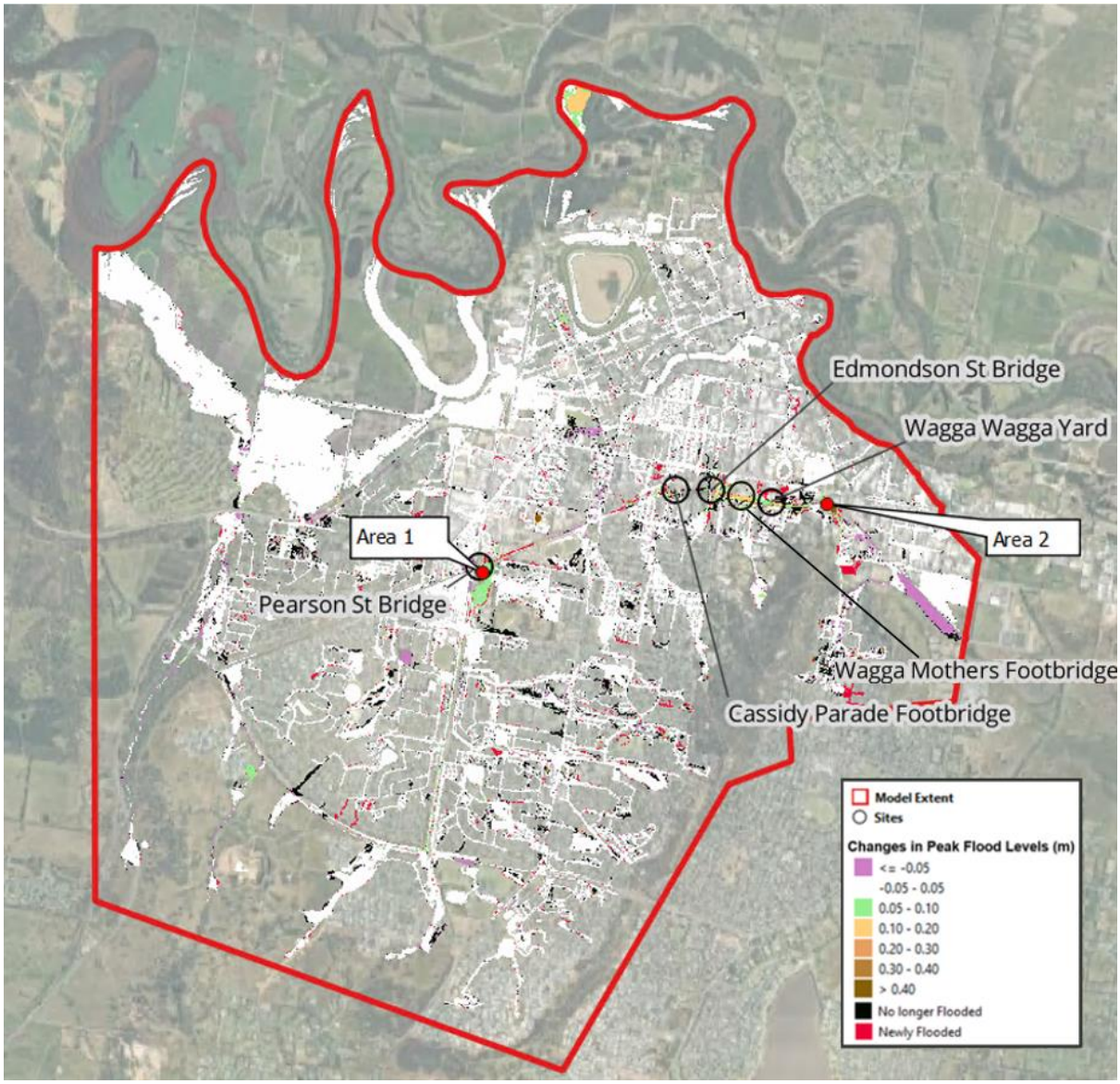


Figure 4-4: Discrepancies Between 2023-03-AC and 2018-03-AC TUFLOW Version Flood Levels (Refer to section 4.1.1.2)

Figure 4-5: Quadtree Extent

4.1.1.3 Topography

The model topography was updated by incorporating the 2020 LiDAR into site areas. The adopted 2020 LiDAR extents are shown in Figure 4-6. The model topography was updated by incorporating the site survey (Item 6, 8 & 9 in Table 1-2) and the verified point cloud data (Item 7 in Table 1-2). This update was performed to enhance the accuracy of the model, ensuring a proper representation of the most recent topography within the study area.

Figure 4-6: LiDAR Extent

4.1.1.4 Key Structures

The MOFFS TUFLOW Model (2021) did not model any bridges within the study area, including the existing Wagga Mothers footbridge. The Wagga Mothers footbridge ramp was represented in the model based on the survey (Item 8 in Table 1-2) as a solid blockage and the piers were modelled as a Layered Flow Constrictions (2d_lfcsh).

4.1.1.5 Drainage Network

Existing drainage networks (shown in Figure 4-7) were updated around the Wagga Mothers footbridge site area (based on item 10 and 11 in Table 1-2).

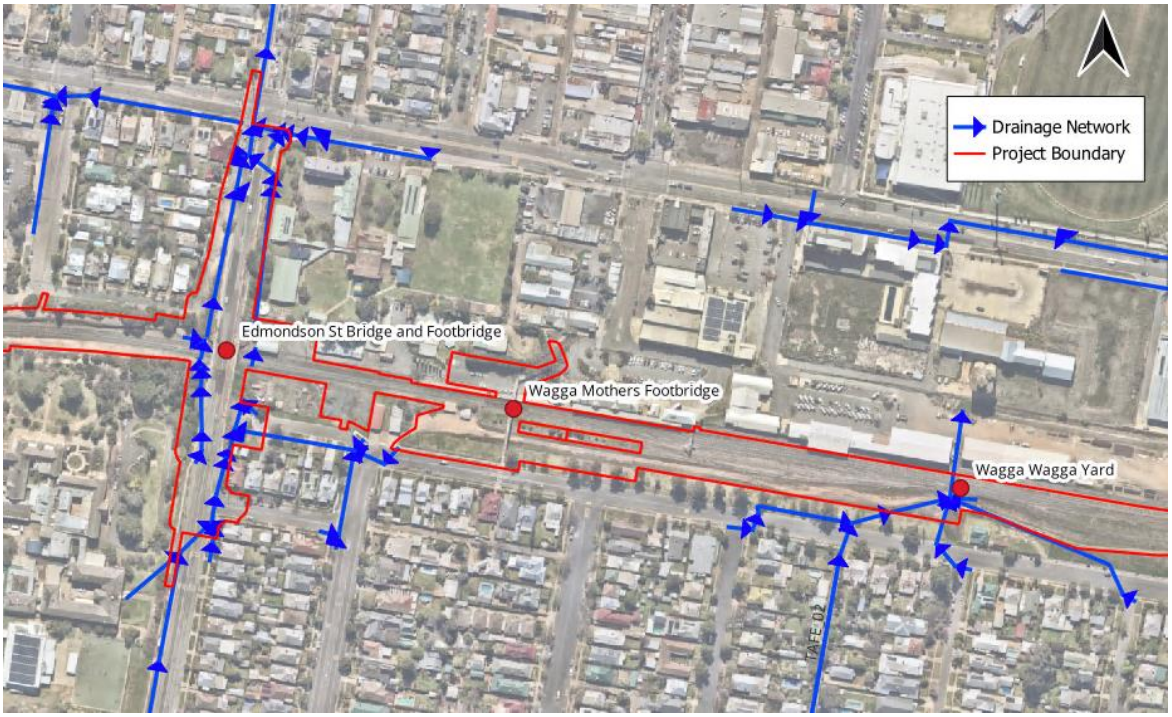


Figure 4-7: Existing Drainage Network surrounding Wagga Mothers Footbridge

4.1.2 Design Model Update

The design model was updated from the existing condition by incorporating the Inland Rail Project Works as part of the IFC stage, including:

- Civil design: The civil design for the Wagga Mothers footbridge area was incorporated into the model (item 16 in Table 1-2). Refer to Figure 4-8 for changes in Topography between the existing and design conditions.
- Design footbridge bridge ramp representation: Footbridge ramp was incorporated as a soil obstruction in the model (item 15 in Table 1-2).
- Design footbridge pier representation: The piers were modelled as a Layered Flow Constrictions (2d_lfcsh). The bridge data was adopted from the Wagga Mothers footbridge plan (item 15 in Table 1-2).

These inclusions did not result in any alterations to the sub-catchment topography (Figure 12 of Wagga Wagga Major Overland Flow Flood Study, WMAwater, 2011). Thus, the inflow locations remain consistent with the existing model.

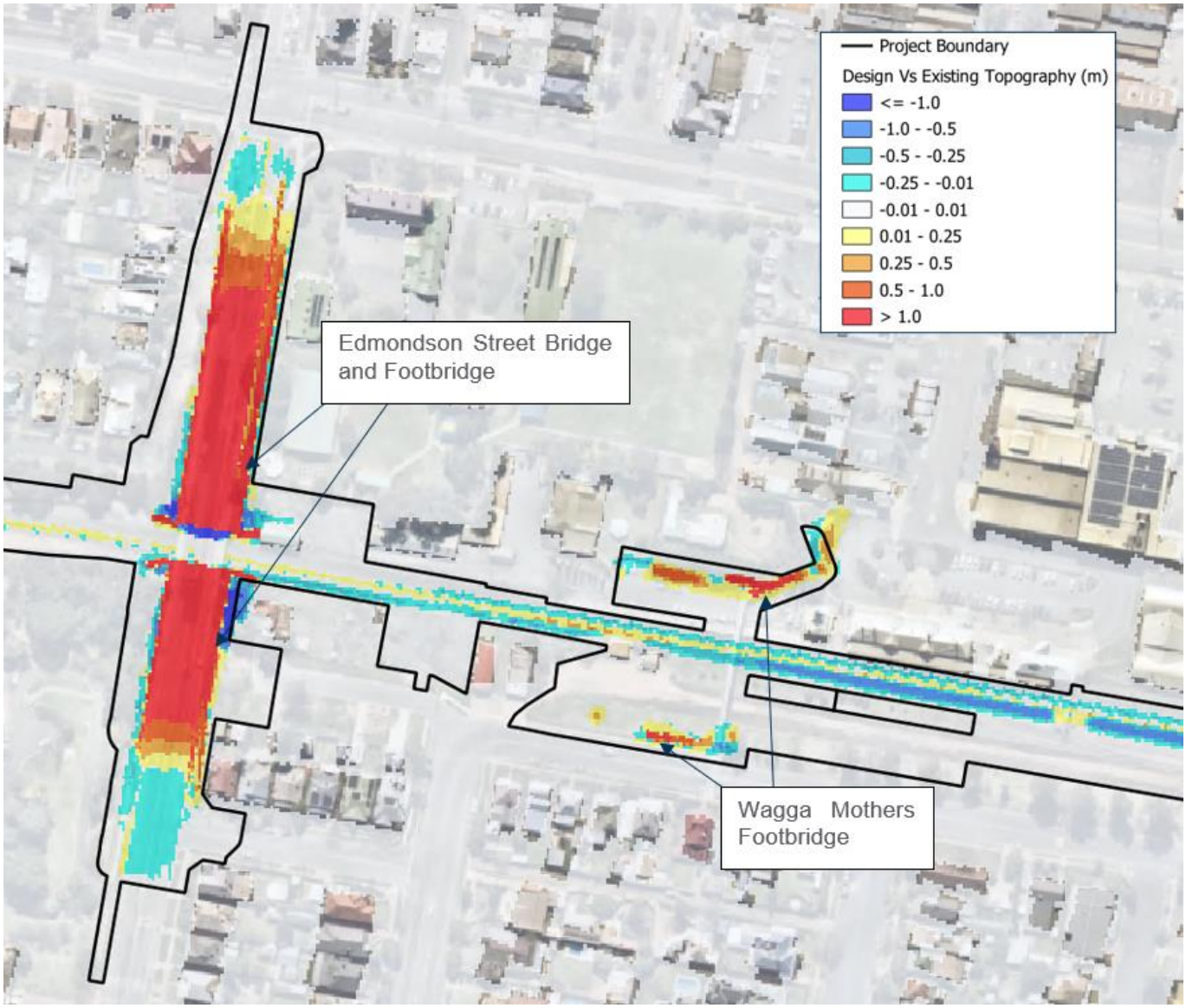


Figure 4-8: Changes in Topography Design vs Existing

4.1.3 Design Events

The storm durations of 10min, 15min, 20min, 25min, 30min, 45min, 60min, 90min, 120min, 180min, 270min, 360min, 540min and 720min were modelled. An ensemble of 10 temporal patterns was run for each duration as recommended in ARR2019. The critical durations were determined based on the maximum envelope method across the selected durations.

The model was run for the design events of 10%, 5%, 2%, 1%, 0.05% AEPs, 1% AEP with climate change and PMF. The critical duration and temporal patterns determined and elaborated below in Table 4-3 summarise the information of the design events.

Table 4-3: Summary of Events and Critical Durations Run in TUFLOW – Wagga Mothers Footbridge Master Design

Design Events	Master Design Critical Duration	Temporal Pattern
10% AEP	30 minutes, 60 minutes, 120 minutes	All 10 temporal patterns for each duration
5% AEP	30 minutes, 90 minutes, 120 minutes	
2% AEP	30 minutes, 45 minutes, 60 minutes, 90 minutes	
1% AEP & 1% AEP + Climate Change	30 minutes, 45 minutes, 60 minutes	
0.05% AEP	20 minutes, 30 minutes, 45 minutes, 60 minutes	
PMF	30 minutes, 45 minutes, 60 minutes	All 11 temporal patterns for each duration

4.1.3.1 Climate Change

There is no design criteria for flood impact on climate change. Therefore, a sensitivity assessment was conducted to evaluate the influence of climate change on flooding to anticipate future climate change flood risk. The existing WBNM model was employed to generate hydrographs for the TUFLOW model for the 1% AEP with climate change.

As per the EIS report (Section 3.3.5 of Albury to Illabo Environmental Impact Statement Technical Paper 11) and the agreement between the Contractor and ARTC for the continued use of the prior version of ARR2019 climate change method (refer to IR2140-RTRFI-000773), the Year 2090 RCP8.5 interim climate change factor sourced from the ARR Data Hub (https://data-legacy.arr-software.org/) and the associated 20.2% increase in rainfall was adopted.

5 HYDRAULIC MODEL COMPARISON

The comparison in this section involved the results from the updated IFC model existing condition against the results from the MOFFS TUFLOW model for the 1% AEP design event storm duration of 120 minutes and Temporal pattern ID 3935.

Generally, this comparison revealed a high degree of consistency in flood levels between the two sets of results, with variations typically falling within the range of +/- 50 mm (refer to Figure 5-1). In some localised areas, larger differences were found ranging around from 0.05 to 0.3 meters. The possible reasons are listed below:

- It was initially expected that transitioning to a newer version of TUFLOW, which incorporates the quadtree method, might lead to minor changes in flood levels. The quadtree method could alter the model running timestep compared to the original model, potentially contributing to an increase in flood levels of up to 0.2m at the northern downstream boundary. However, since this area is distant from the sites, any such changes in flood levels would not impact the site.
- The changes in flood levels around the sites primarily stem from the integration of the 2020 LiDAR data and the comprehensive site survey.
- The existing drainage networks were updated based on the data provided by the DJV Drainage team which involved modification in terms of pipe location, pipe size inverts etc.
- Modifications were done based on the Independent Flood Consultant Specialist's review comments on the Wagga Wagga yard flood model, regarding the SA (Source Area) inflow polygons which additional flows were directed to the open channel at Colemans Street, creating more flows to the site

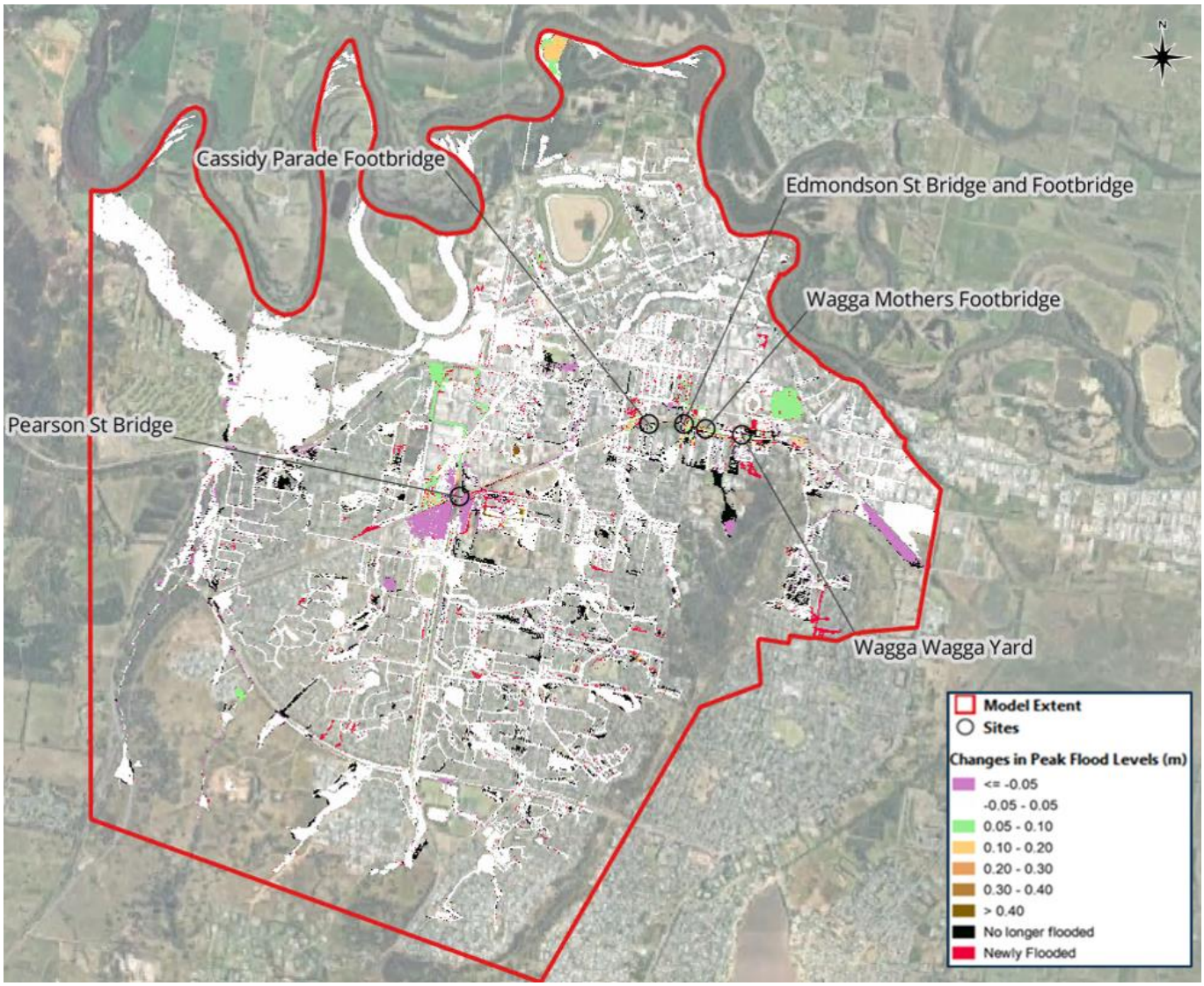


Figure 5-1: Comparison – 1% AEP (120 minutes TP 3935) Changes in Peak Flood Levels (updated TUFLOW model VS MOFFS 2021 TUFLOW model)

6 FLOOD ASSESSMENT

6.1 Existing Condition

Existing flood maps, including peak flood depth and levels, peak flood velocity, and peak flood hazard for the modelled events, are provided in Appendix A.

In the existing scenario, the floodwaters generally flow from the upper part of the catchment in the south towards the railway line on the site. The Wagga Mothers footbridge encounters minor flooding at its southern side, while the northern section remains unaffected. The southern side is mainly impacted due to overtopping of overland flow channelled along Railway Street (refer to Figure 6-1 for flow path). The flood depths are generally shallow along the Railway Street.

Figure 6-1 summarises the peak flood level results for the existing condition at the Wagga Mothers footbridge site.

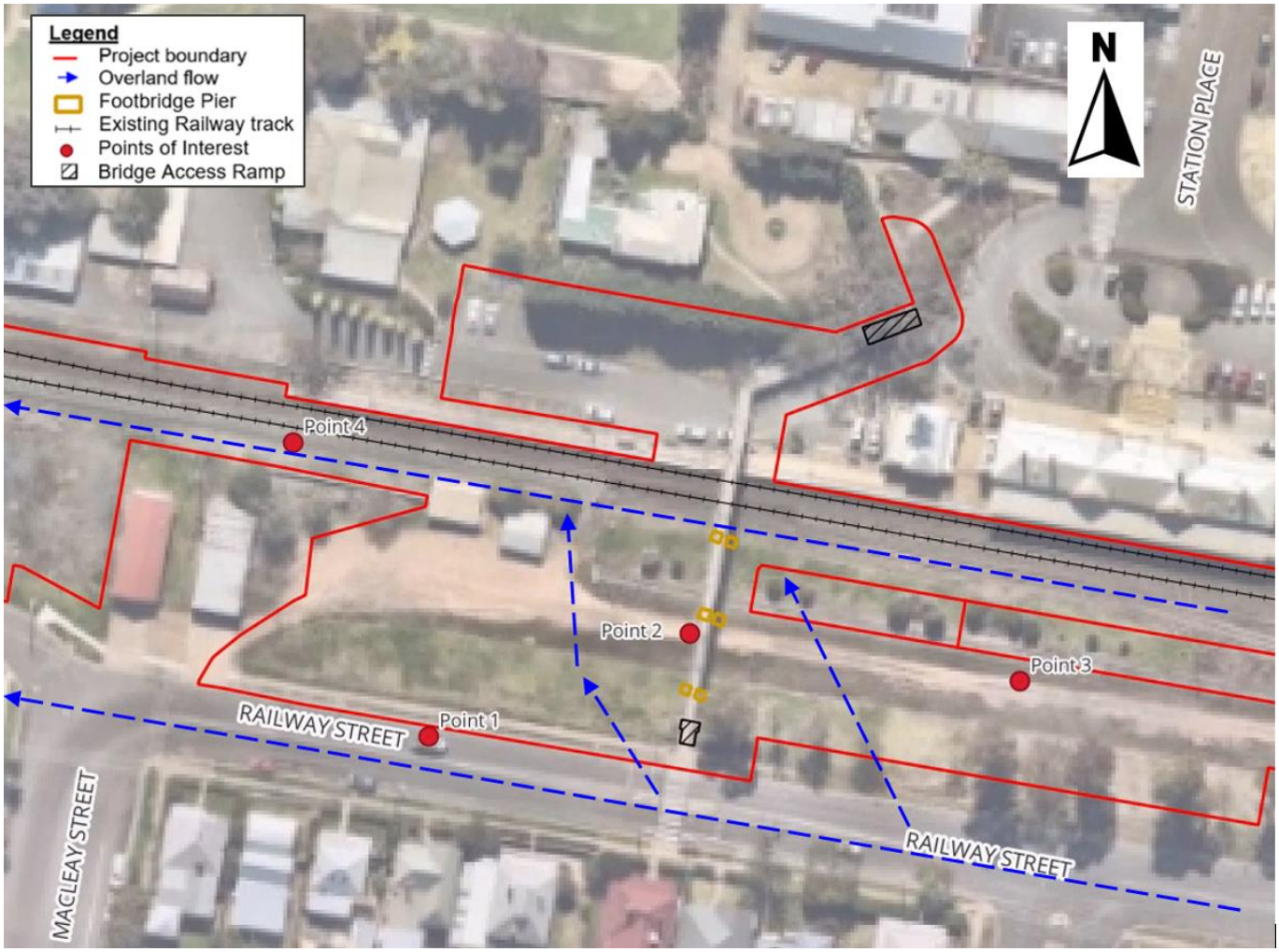


Figure 6-1: Wagga Mothers Footbridge Site Flow Paths

The table below describes the Points of Interest as indicated above.

Table 6-1: Points of Interest

Points of Interest	Notes
1	Location downstream of site outside the project boundary
2	Location below the Wagga Mothers footbridge
3	Location upstream of the Wagga Mothers Footbridge inside the site
4	Location downstream of site at railway corridor channel.

Table 6-2: Peak Flood Levels – Existing Condition

Design Events	Flood Levels
10% AEP	▪ The flood waters overtop the top of the rail within a 50m vicinity from the site for all events in the existing condition. The flood immunity is less than 10% AEP. ▪ The overtopping flood depth is generally less than 0.3m up to 0.05% AEP and less than 1m in the PMF event. ▪ Refer to Table 6-3 for flood level comparison based on points of interest.
5% AEP	
2% AEP	
1% AEP	
1% AEP + Climate Change	
0.05% AEP	
PMF	

The table below shows the reduced levels (RLs) at the points of interest (refer to Table 6-3) in the existing condition.

Table 6-3: Points of Interest Data – Peak Flood Levels (mAHD) – Existing Condition

Locations	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	185.88	185.88	185.89	185.89	185.89	185.90	185.94
Point 2	184.23	184.28	184.32	184.38	184.45	184.50	185.18
Point 3	184.24	184.29	184.34	184.40	184.47	184.52	185.21
Point 4	184.17	184.19	184.23	184.28	184.33	184.37	184.95

The flow velocity is generally low along the railway corridor open channel. Table 6-4 summarises the peak flood velocity results for existing conditions at the Wagga Mothers footbridge.

Table 6-4: Peak Flood Velocity – Existing Condition

Design Events	Flood Velocity
10% AEP	▪ Refer to Table 6-5 for flood velocity comparison based on points of interest. ▪ The peak velocity along the rail corridor open channel is generally less than 0.45m/s
5% AEP	▪ Refer to Table 6-5 for flood velocity comparison based on points of interest. ▪ The peak velocity along the rail corridor open channel is generally less than 0.5m/s
2% AEP	▪ Refer to Table 6-5 for flood velocity comparison based on points of interest. ▪ The peak velocity along the rail corridor open channel is generally less than 0.6m/s
1% AEP	▪ Refer to Table 6-5 for flood velocity comparison based on points of interest. ▪ The peak velocity along the rail corridor open channel is generally less than 0.75m/s
1% AEP + Climate Change	▪ Refer to Table 6-5 for flood velocity comparison based on points of interest. ▪ The peak velocity along the rail corridor open channel is generally less than 0.85m/s
0.05% AEP	▪ Refer to Table 6-5 for flood velocity comparison based on points of interest. ▪ The peak velocity along the rail corridor open channel is generally less than 0.9m/s
PMF	▪ Refer to Table 6-5 for flood velocity comparison based on points of interest. ▪ The peak velocity along the rail corridor open channel is generally less than 2m/s

The table below shows the peak flood velocities at the points of interest (refer Table 6-5) in the existing condition.

Table 6-5: Points of Interest Data – Peak Flood Velocity (m/s) – Existing Condition

Locations	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	0.5	0.5	0.6	0.6	0.6	0.7	1.0
Point 2	0.1	0.2	0.2	0.2	0.3	0.3	0.6
Point 3	0.2	0.2	0.2	0.3	0.3	0.4	0.7

Locations	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 4	0.3	0.4	0.4	0.6	0.7	0.8	1.6

The flood hazard assessment is based on the general flood hazard classification set by the Australian Institute for Disaster Resilience in the Australian Disaster Resilience Handbook Collection - Flood Hazard, 2017. The Figure 6-2 and the tables below describe the hazards.

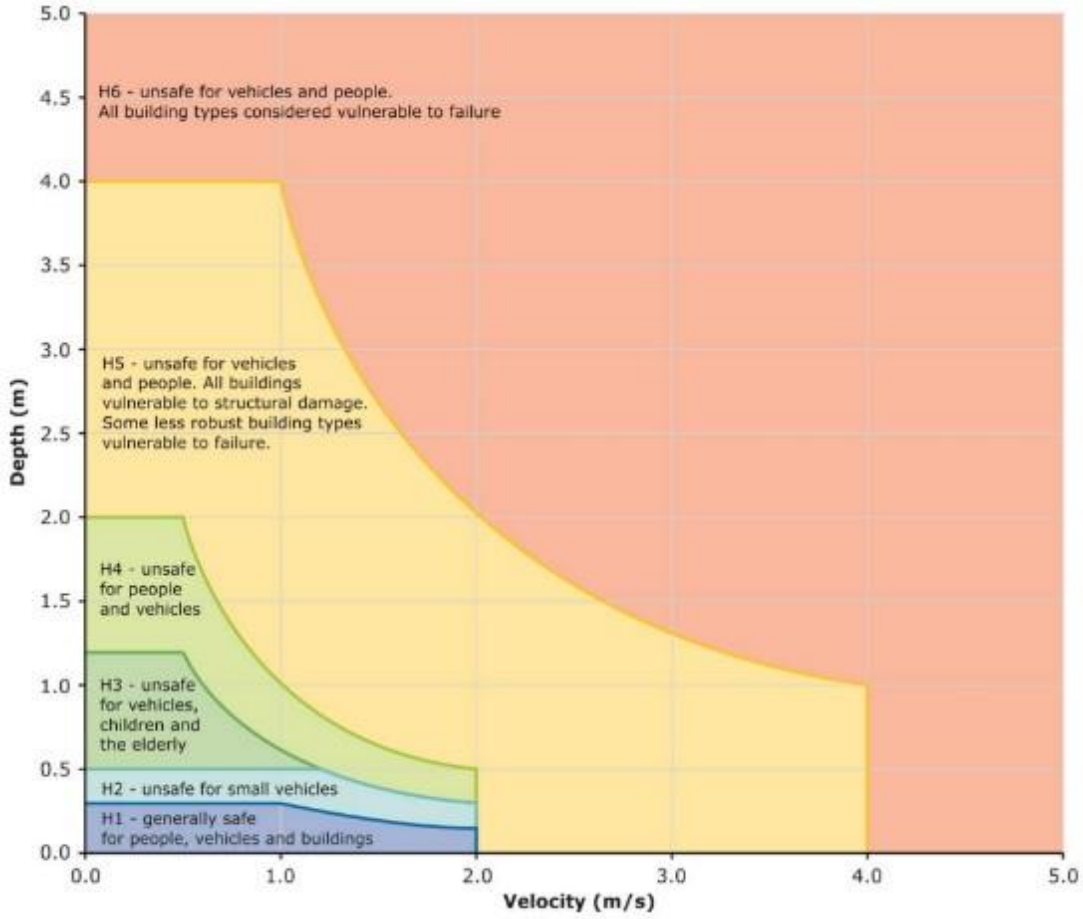


Figure 6-2: Hazard Category Classification

The flood hazard is generally low (H1 to H2) around the site area. The flood hazards for the existing case at the site area are presented in Table 6-6 and the maps are shown in Appendix A.

Table 6-6: Flood Hazard – Existing Condition

Design Events	Flood Hazard
10% AEP	▪ Refer to Table 6-7 for flood hazard comparison based on points of interest. ▪ The peak hazard along the rail corridor open channel is generally H3 or less.
5% AEP	
2% AEP	
1% AEP	
1% AEP + Climate Change	
0.05% AEP	
PMF	▪ Refer to Table 6-7 for flood hazard comparison based on points of interest. ▪ The peak hazard at the rail corridor open channel experiences up to H5.

The table below shows the hazard category at the points of interest (refer Table 6-7) in the existing condition.

Table 6-7: Points of Interest Data – Peak Flood Hazard – Existing Condition

Locations	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate change	0.05% AEP	PMF
Point 1	H1	H1	H1	H1	H1	H1	H1
Point 2	H1	H1	H2	H2	H2	H3	H3
Point 3	H2	H2	H2	H2	H3	H3	H4
Point 4	H3	H3	H3	H3	H3	H4	H5

6.2 Design Condition

Design condition flood maps, including peak flood depth and levels, peak flood velocity, and peak flood hazard for the events modelled, are provided in Appendix A.

During design conditions, flooding is mainly impacted by the southern bridge access ramp, as the southern access ramp blocks overtopping of overland flow channelled along Railway Street (Refer to Figure 6-3).

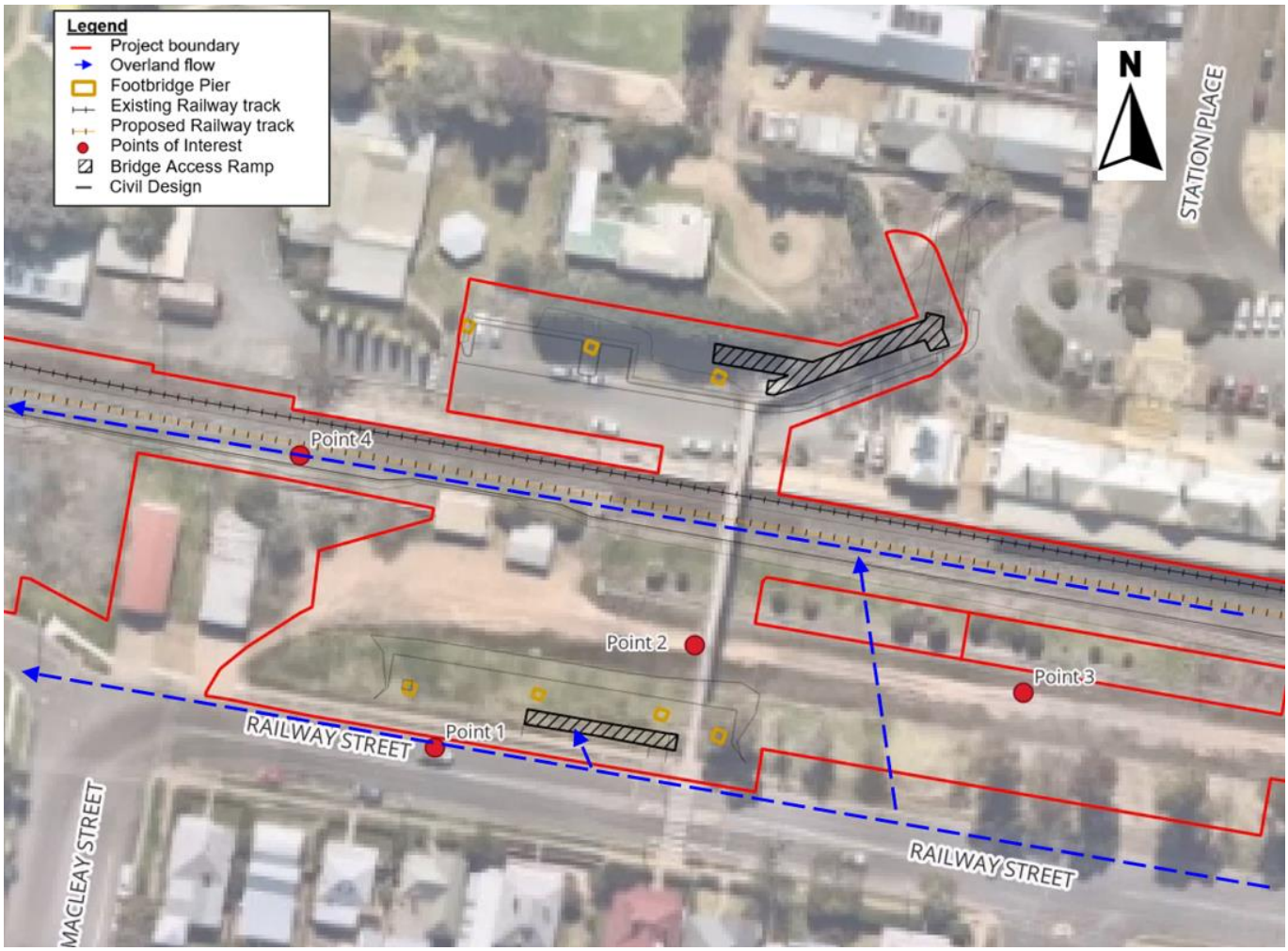


Figure 6-3: Design Condition Flow Characteristics

Table 6-8 summarises the peak flood level results for design conditions at the Wagga Mothers footbridge.

Table 6-8: Peak Flood Levels – Design Condition

Design Events	Flood Levels
10% AEP	▪ The flood waters do not overtop the top of rail within 50m vicinity from the site. However, the flood waters overtop the top of rail levels only at CH 521.500km far west of the site. ▪ Refer to Table 6-9 for flood level comparison based on points of interest.
5% AEP	▪ The flood waters overtop the top of rail within 50m vicinity from the site.

Design Events	Flood Levels
2% AEP	▪ The overtopping flood depth is generally less than 0.3m up to 0.05% AEP and less than 1m in PMF event. ▪ Refer to Table 6-9 for flood level comparison based on points of interest.
1% AEP	
1% AEP + Climate Change	
0.05% AEP	
PMF	

The table below shows the reduced levels (RLs) at the points of interest (refer to Figure 6-3) in the design condition.

Table 6-9: Points of Interest Data – Peak Flood Levels (mAHD) – Design Condition

Locations	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	185.88	185.88	185.89	185.89	185.89	185.90	185.94
Point 2	184.19	184.27	184.32	184.37	184.44	184.51	185.17
Point 3	184.19	184.28	184.33	184.38	184.45	184.52	185.20
Point 4	184.12	184.18	184.22	184.24	184.30	184.35	184.94

In the design condition, the flow velocity is generally low along the railway corridor open channel. Table 6-10 summarises the peak flood velocity results for design conditions at the Wagga Mothers footbridge.

Table 6-10: Peak Flood Velocity – Design Condition

Design Events	Flood Velocity
10% AEP	▪ The peak velocity along the rail corridor open channel is generally less than 0.35m/s. ▪ Refer to Table 6-11 for flood velocity comparison based on points of interest.
5% AEP	▪ The peak velocity along the rail corridor open channel is generally less than 0.45m/s. ▪ Refer to Table 6-11 for flood velocity comparison based on points of interest.
2% AEP	▪ The peak velocity along the rail corridor open channel is generally less than 0.47m/s. ▪ Refer to Table 6-11 for flood velocity comparison based on points of interest.
1% AEP	▪ The peak velocity along the rail corridor open channel is generally less than 0.50m/s. ▪ Refer to Table 6-11 for flood velocity comparison based on points of interest.
1% AEP + Climate Change	▪ The peak velocity along the rail corridor open channel is generally less than 0.70m/s. ▪ Refer to Table 6-11 for flood velocity comparison based on points of interest.
0.05% AEP	▪ The peak velocity along the rail corridor open channel is generally less than 0.80m/s. ▪ Refer to Table 6-11 for flood velocity comparison based on points of interest.
PMF	▪ The peak velocity along the rail corridor open channel is generally less than 1.8m/s. ▪ Refer to Table 6-11 for flood velocity comparison based on points of interest.

The table below shows the peak flood velocities at the points of interest (refer to Figure 6-3) in the design condition

Table 6-11: Points of Interest Data – Peak Flood Velocity (m/s) – Design Condition

Location	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	0.5	0.5	0.6	0.6	0.6	0.7	1.0
Point 2	0.1	0.1	0.1	0.2	0.2	0.3	0.5
Point 3	0.2	0.2	0.2	0.2	0.3	0.3	0.6
Point 4	0.2	0.3	0.4	0.5	0.7	0.8	1.7

The flood hazard is generally low at the site area in the design condition. The flood hazard for the design conditions at the Wagga Mothers footbridge study area are presented in Table 6-12, and the maps are presented in Appendix A.

Table 6-12: Flood Hazard – Design Condition

Design Events	Flood Hazard
10% AEP	▪ The peak hazard near the access ramps and piers is generally H1 – H3. ▪ Refer to Table 6-13 for a comparison of flood hazard based on points of interest.
5% AEP	
2% AEP	
1% AEP	
1% AEP + Climate Change	
0.05% AEP	
PMF	▪ The peak hazard at the rail corridor open channel experiences up to H5. ▪ Refer to Table 6-13 for a comparison of flood hazards based on points of interest.

The table below shows the hazard category at the points of interest (refer to Figure 6-3) in the design condition.

Table 6-13: Points of Interest Data – Peak Flood Hazard – Design Condition

Location	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	H1	H1	H1	H1	H1	H1	H1
Point 2	H1	H1	H2	H2	H2	H3	H3
Point 3	H1	H2	H2	H2	H3	H3	H4
Point 4	H1	H1	H1	H2	H2	H2	H5

6.3 Flood Immunity and Scour Protection

During the existing scenario, the top of rail is overtopped in 10% AEP. The existing immunity is maintained, with reduced overtopping extent during the design scenario. The design overtopping extent is less than the existing scenario in all the design events, which is attributed to the introduction of the proposed Wagga Wagga Yard channel south of the Main Line (refer to Wagga Wagga Yard design report, 5-0052-210-IHY-W7-RP-0001). Scour protection is applied on the ends of the proposed channels at the proposed culvert headwalls. The channels are also grass lined with jute-mesh for local scouring protection (refer to Section 4.5 of the Wagga Wagga Yard Design report, 5-0052-210-PEN-W7-RP-0001). The proposed design results in an improvement to the extent of the immunity of the rail in terms of overtopping, which complies with the criteria in PSRs and CoA.

The Wagga Mothers footbridge does not significantly alter the flooding condition at the site. Flooding is mainly impacted by the southern bridge access ramp, as the southern access ramp blocks overflow of flood water channelled along Railway Street.

Furthermore, in the design condition, the flood velocity outside the project boundary complied with the CoA Scour/ Erosion potential criteria (less than 10% increase or less than 0.5m/s changes in velocity- refer to Clause E42 (h) in Table 2-2) up to the 1% AEP storm event. Hence, there is no need for scour protection measures outside the project boundary.

The proposed design results in an improvement to the immunity of the rail in terms of overtopping (refer to Table 6-14 and Table 6-15), which complies with the criteria in PSRs and CoA to provide a no-worse outcome.

Table 6-14: Comparison of Flood Immunity at Overtopping Locations

Overtopping Location	Existing Condition Overtopping AEP	Design Condition Overtopping AEP
CH521.300km	10% AEP event	5% AEP event

An assessment of the flood immunity at the noted locations of overtopping along the rail is seen in Table 6-15 for CH521.300km where overtopping of the rail occurs.

Table 6-15: Overtopping Details at CH521.300km

Chainage	Top of the Rail Level (mAHD)		Top of the Formation Level (mAHD)		10% AEP Flood Level (mAHD)		5% AEP Flood Level (mAHD)	
	Existing	Design	Existing	Design	Existing	Design	Existing	Design
CH521.300km	184.108	184.137	183.441 *	183.470*	184.140	184.085	184.158	184.165

*Note that the existing top of the formation level has been assumed to be 667mm below the existing top of the rail level

The flood depths are generally less than 1m in the 0.05% AEP at the railway corridor and are well below the bridge deck in all events up to the PMF. At around the bridge abutments, footbridge access ramps and piles, flood hazard is generally lower (H1 and H2) in the 0.05% AEP event, where the flooding is not expected to cause any surface damage to the bridge due to abrasion/erosion.

6.4 Flood Impact Assessment

Due to elevated earthwork levels of the southern footbridge access ramp, the overland flow from the Railway Street is obstructed, causing floodwater to keep flowing along the Railway Street. This redirection results in a new dry area north of the southern footbridge access ramp. The northern footbridge access ramp is not impacted by flooding. The discussion about the peak level, velocity and hazard effect due to the design is illustrated in the following sections.

6.4.1 Changes in Peak Flood Level

Table 6-16 provides details regarding the peak flood level changes during the Design Scenario.

Table 6-16: Flood Level Impact Assessment

Design Events	Changes in Peak Flood Levels
10% AEP	• The changes in flood level outside the project boundary are less than 0.05m and no residential, commercial or industrial properties are impacted (Refer to Figure A43 in Appendix A). • No third-party private roads are impacted. • Newly wet areas created outside the project boundary are less than 0.01m.
5% AEP 2% AEP 1% AEP	• The changes in flood level outside the project boundary are less than 0.05m and no residential, commercial or industrial properties are impacted (Refer to Figure A44 to A43 in Appendix A). • No third-party private roads are impacted. • The corner lot (DP1006140 Lot 2) (Refer to Figure 6-3) upstream of the railway corridor between Edmondson Street and Railway Street experiences afflux up to 75 mm due to the Eastern wing wall of the Edmondson Street bridge Design. Although the lot is outside the boundary, it is classified as ARTC land. Therefore, this afflux is deemed compliant. • Newly wet areas created outside the project boundary are less than 0.01m.

Table 6-17: Changes in Flood Level (m) at Points of Interest

Location	10% AEP	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change
Point 1	Negligible impacts*	Negligible impacts*	Negligible impacts*	Negligible impacts*	Negligible impacts*
Point 2	-0.04	-0.01	Negligible impacts*	-0.01	-0.01
Point 3	-0.04	-0.02	-0.01	-0.02	-0.02
Point 4	-0.07	-0.01	-0.02	-0.03	-0.03

*impact less than 0.01m is considered as negligible impact

The changes in flood level outside the project boundary are less than 0.05m and no residential, commercial or industrial properties are impacted. The changes in flood levels outside the project boundary comply with PSR and CoA project requirements.

6.4.2 Changes in Peak Flood Velocity

Table 6-18 details changes in peak flood velocity during the Design scenario.

Table 6-18: Flood Velocity Impact Assessment

Design Events	Changes in Peak Flood Velocity
10% AEP	▪ The changes in velocity outside the site is less than 0.5m/s. (Refer to Figure A48 to A51 in Appendix A). ▪ No third-party private roads are impacted. ▪ Newly wet area created outside the project boundary has a velocity of less than 0.5m/s.
5% AEP	
2% AEP	
1% AEP	

Points 1 to 4 experience less than 0.5 m/s of velocity increase for events 10% AEP, 5% AEP, 2% AEP and 1% AEP. The changes in flood velocity outside the project boundary comply with the PSR and CoA project requirements.

6.4.3 Changes in Flood Hazard

Table 6-19 details the peak flood velocity changes during the design scenario.

Table 6-19: Flood Hazard Impact Assessment

Design Events	Changes in Peak Flood Hazard
10% AEP	▪ There is no increase in flood hazard outside the project boundary. (Refer to Figure A53 to A56 in Appendix A). ▪ No third-party private roads are impacted. ▪ The Corner lot (DP1006140 Lot 2) upstream of the railway corridor between Edmondson Street and Railway Street experiences a general increase in Hazard by one category due to additional flow from the culvert from the Edmondson Street bridge transverse pipe. Although the lot is outside the boundary, it is classified as ARTC land. Therefore, this afflux is deemed compliant. ▪ Newly created wet area outside the project boundary experiences H1 Hazard, which is generally safe for people, vehicles, and buildings.
5% AEP	
2% AEP	
1% AEP	

Points 1 to 4 do not experience any increase in hazard for events 10% AEP, 5% AEP, 2% AEP and 1% AEP. The changes in flood hazard outside the project boundary comply with the PSR and CoA project requirements.

6.4.4 Changes in Duration of Inundation

The analysis around the changes in the duration of inundation was undertaken by comparing the existing and design flood level vs time in selected locations. The locations adopted for the comparison are shown in Figure 6-4.

Figure 6-5 and Figure 6-6 show the comparison of flow level vs time for Reporting Locations 1 and 2, respectively. Both the existing and design flood level vs time, is mostly similar for Locations 1 and 2. These demonstrate that the design will not create an extra duration of inundation upstream and downstream outside the project boundary. Consequently, the changes in the duration of inundation comply with the CoA E42(a).

Figure 6-4: Reporting Locations for the Changes in Duration of Inundation

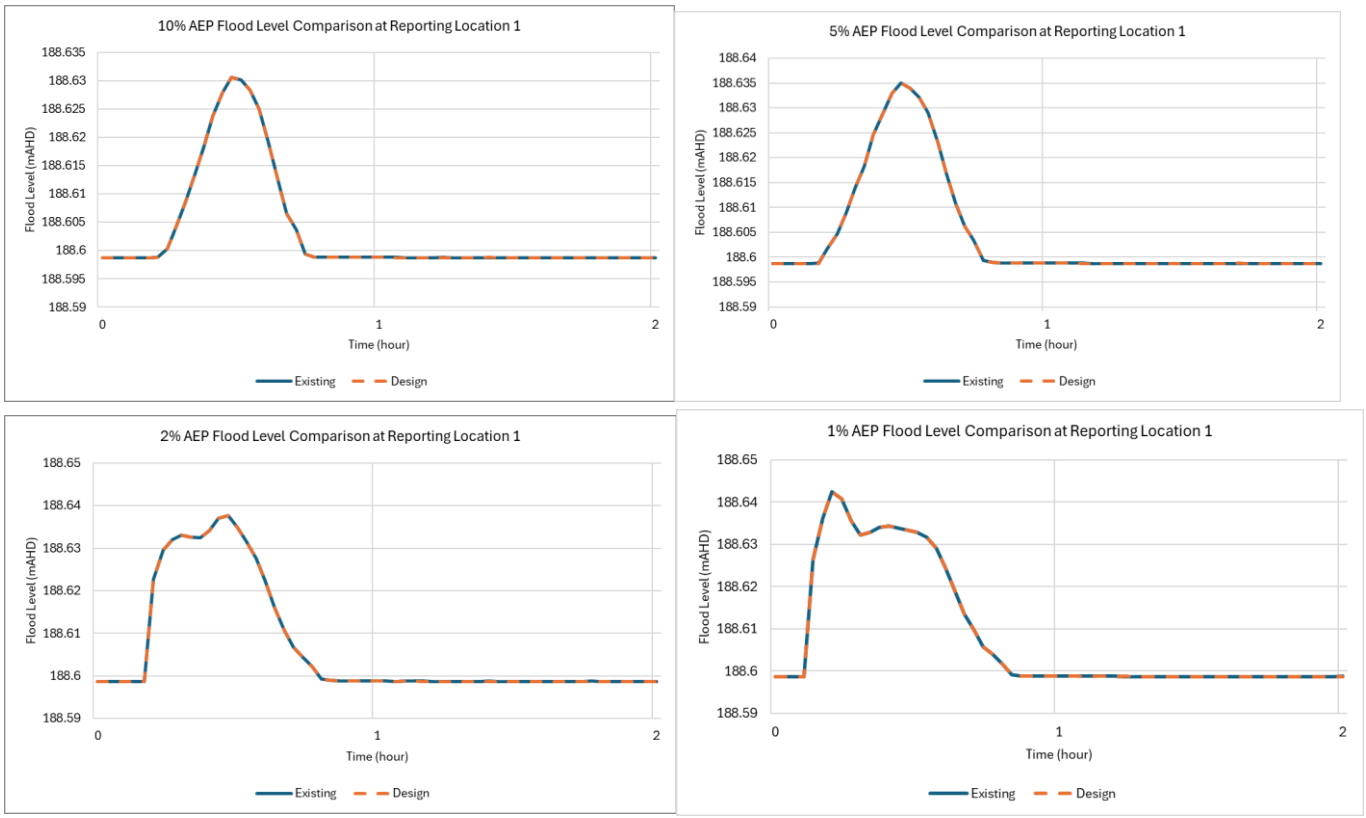


Figure 6-5: Comparison of Flood Level vs. Time at Reporting Location 1

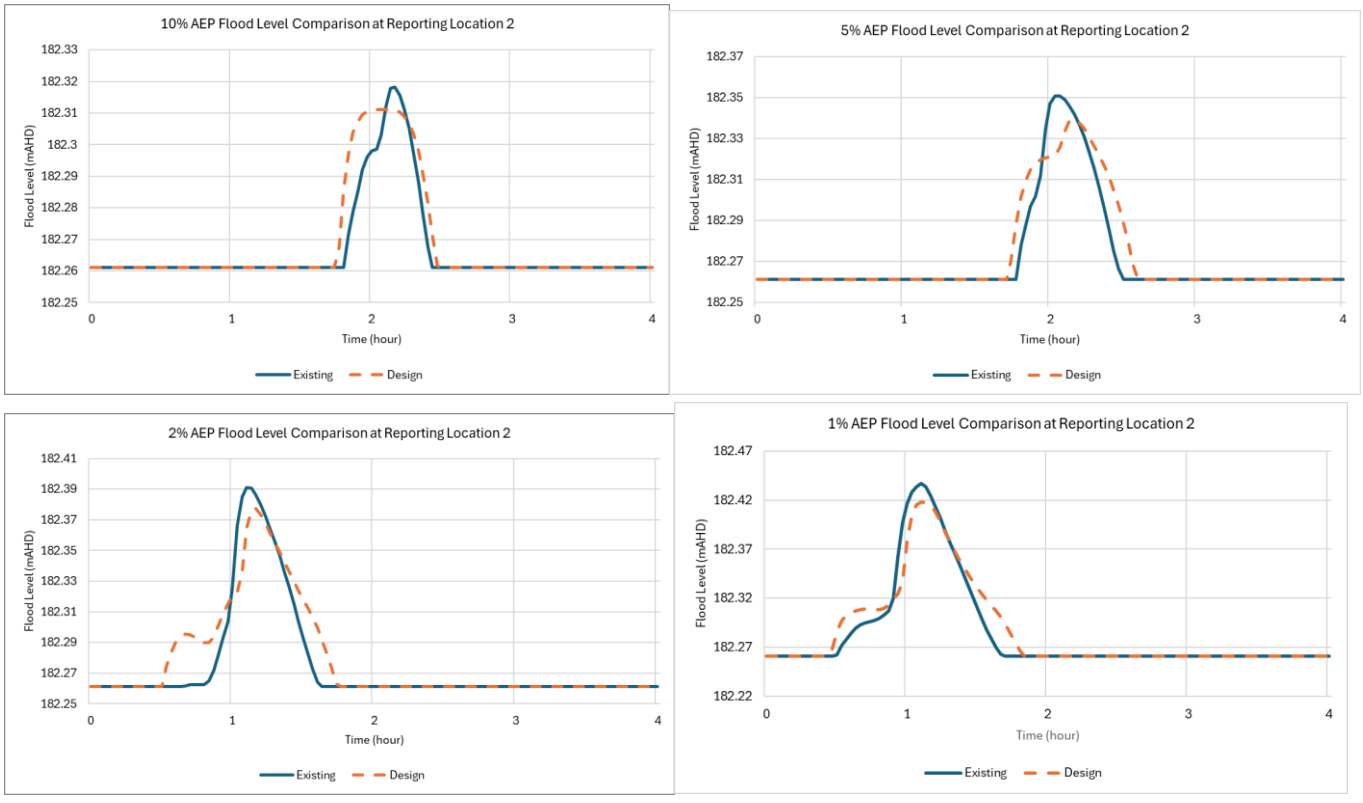


Figure 6-6: Comparison of Flood Level vs. Time at Reporting Location 2

6.4.5 Cumulative impact

As stated in Section 4 under “Modelling Methodology”, the master design condition incorporated the Wagga Wagga Yard design (5-0052-210-IHY-W7-RP-0001), Edmondson Street Overbridge and Footbridge design (5-0052-210-IHY-W5-RP-0001), Cassidy Parade Footbridge (5-0052-210-IHY-W4-RP-0001) and Wagga Mothers Footbridge designs to understand an overall cumulative impact on the site. The changes in flood level maps indicate that there are no impacts on Wagga Mothers Footbridge caused by Cassidy Parade Footbridge, Wagga Yard design, Edmondson Street Overbridge and Footbridge for all events up to 1% AEP.

The widespread improvement near the site caused by the Wagga Wagga Yard design (refer to report 5-0052-210-IHY-W7-RP-0001 for more details). The proposed channel, which runs south of the rail, distributes more floodwaters towards both the eastern and the western end of the rail line while providing additional storage for the site (generally up to 0.5m depth). This reduces the floodwater levels south of the railway. The reduction in water level in the south leads to a reduction in the flood water overtopping the rail to the north, resulting in widespread improvement of flood levels.

The widespread improvement in the vicinity of the site is due to the Wagga Wagga Yard design (for further details, refer to report 5-0052-210-IHY-W7-RP-0001). The proposed Wagga Wagga Yard design channel, located to the south of the railway provides additional flood storage for the area (generally up to a depth of 0.5 metres) and the channel increases the flow conveyance allowing flood water to flow west more efficiently. These factors lower floodwater levels to the south of the railway. Additionally, the minor track lifts reduce the flood water over the topping, resulting in a reduction of flood water levels to the north.

6.5 Sensitivity Test

6.5.1 Blockage Assessment

A hydraulic blockage assessment was carried out for the 1% AEP design scenario as per the guidance set out in ARR2019. The assessment involved assessing the site area for debris availability, mobility and transportability and this, in conjunction with culvert size was used to determine the relevant blockage factors shown (refer to Table 6-20 and Table 6-21), below 20% blockage was adopted for all the other culverts, pits and pipes outside the project boundary (refer to Table 6-20 and to Figure 6-7).

Table 6-20: Culvert Blockage Percentage

Culvert	Blockage Percentage (1% AEP)	Comments
W7_P4_01t02 (1 cell 0.200m in diameter)	25%	Inside the project boundary
W7_P3_01t02 (1 cell 0.300m in diameter)	25%	Inside the project boundary
Stormwater network	20% (on grade pit), 50% (sag pits)	Inside the project boundary
All others (culvert, pit and pipe)	20%	Outside of the project boundary

Table 6-21: Culvert Blockage Parameters

Culvert	Debris Availability	Debris Mobility	Debris Transportability	AEP Adjusted Debris Potential
W7_P4_01t02	Low	Medium	Low	Low
W7_P3_01t02	Low	Medium	Low	Low

Note: L10 value of 1.0m was adopted for the site culverts blockage calculation.

Figure 6-7: Culverts at Wagga Mothers Footbridge Site

A flood level comparison between the blockage scenario and the design is shown in Figure 6-8. A general water level increase of up to 0.090 m is mainly found within the site. As a consequence of implementing the blockage for site culverts, a general rise in water levels of up to 0.025m occurs outside of the project boundary at north. Refer to Figure 6-8.

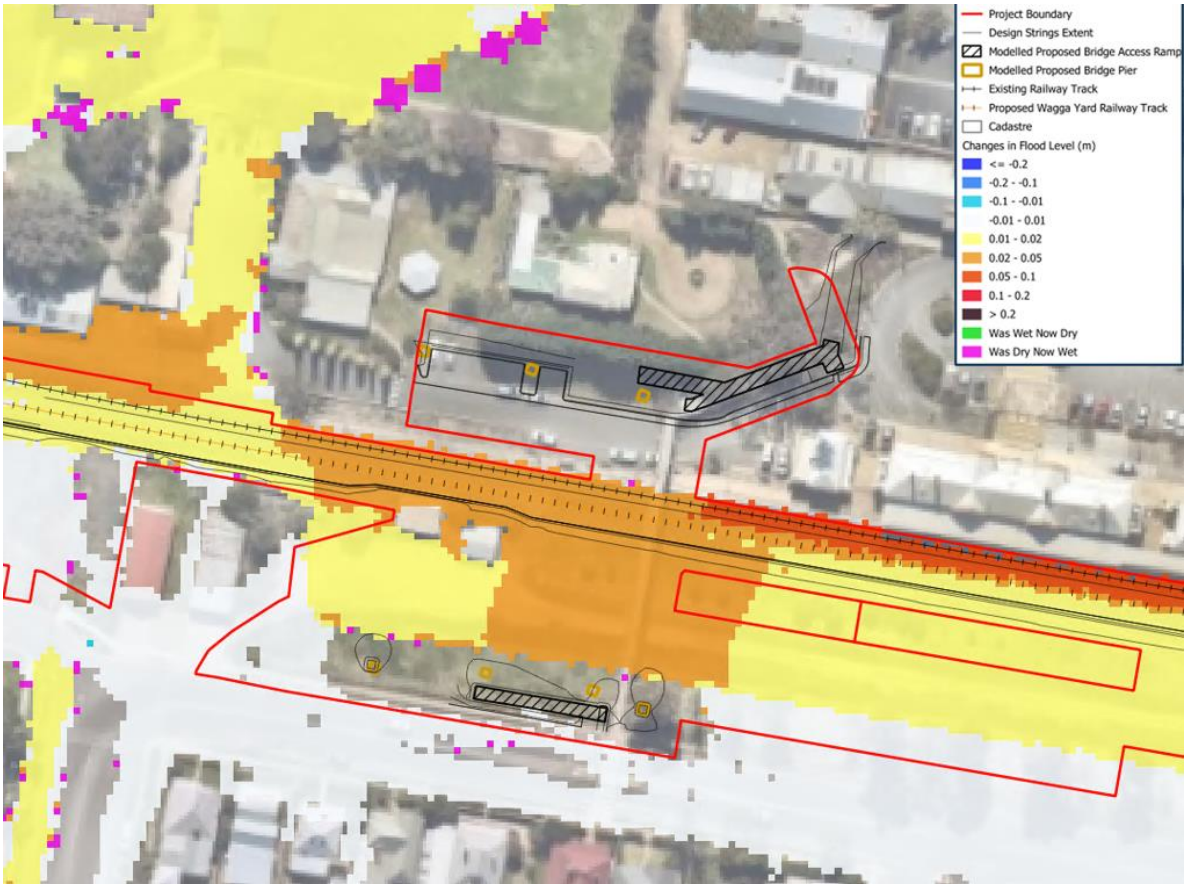


Figure 6-8: Flood Level Comparison for 1% AEP Design Condition – Blockage vs Design

6.5.2 Climate Change Risk Assessment

A Climate Change risk assessment was carried out by running the 1% AEP with the Year 2090 RCP8.5 interim climate change factor (refer to Section 4.1.3.1 for details of the approach) and the results of flood depth, flood velocity and flood hazard can be found in Section 6.1 and Section 6.2. The corresponding flood maps can be found in Appendix A. The assessment is summarised below:

- The flood depth along the southern access ramp is less than 0.1m
- The flood depth at the railway corridor ranges from 0.1-1.0m.
- The bridge access ramps generally experience H1 hazard which is generally safe.

7 MITIGATION MEASURES

No instances of non-compliance in terms of flood impact were documented. Therefore, no additional mitigation measures are necessary at this stage.

8 RECOMMENDATIONS AND NEXT STAGE

This is the IFC stage of the report, and the following are finalised:

- No instances of non-compliance have been identified through the assessment.
- All comments raised by relevant parties have been resolved (refer to Appendices C, D and E)

Consequently, there are no further recommendations.

APPENDICES

APPENDIX A

Flood Maps

Table A- 1: List of Maps in Appendix A

Map ID	Map description
Figure A01	10% AEP Peak Flood Depth and Levels - Existing Condition
Figure A02	5% AEP Peak Flood Depth and Levels - Existing Condition
Figure A03	2% AEP Peak Flood Depth and Levels - Existing Condition
Figure A04	1% AEP Peak Flood Depth and Levels - Existing Condition
Figure A05	1% AEP Climate Changes Peak Flood Depth and Levels - Existing Condition
Figure A06	0.05% AEP Peak Flood Depth and Levels - Existing Condition
Figure A07	PMF Peak Flood Depth and Levels - Existing Condition
Figure A08	10% AEP Peak Flood Velocity - Existing Condition
Figure A09	5% AEP Peak Flood Velocity - Existing Condition
Figure A10	2% AEP Peak Flood Velocity - Existing Condition
Figure A11	1% AEP Peak Flood Velocity - Existing Condition
Figure A12	1% AEP Climate Changes Peak Flood Velocity - Existing Condition
Figure A13	0.05% AEP Peak Flood Velocity - Existing Condition
Figure A14	PMF AEP Peak Flood Velocity - Existing Condition
Figure A15	10% AEP Peak Flood Hazard - Existing Condition
Figure A16	5% AEP Peak Flood Hazard - Existing Condition
Figure A17	2% AEP Peak Flood Hazard - Existing Condition
Figure A18	1% AEP Peak Flood Hazard - Existing Condition
Figure A19	1% AEP Climate Changes Peak Flood Hazard - Existing Condition
Figure A20	0.05% AEP Peak Flood Hazard - Existing Condition
Figure A21	PMF AEP Peak Flood Hazard - Existing Condition
Figure A22	10% AEP Peak Flood Depth and Levels - Master Design Condition
Figure A23	5% AEP Peak Flood Depth and Levels - Master Design Condition
Figure A24	2% AEP Peak Flood Depth and Levels - Master Design Condition
Figure A25	1% AEP Peak Flood Depth and Levels - Master Design Condition
Figure A26	1% AEP Climate Changes Peak Flood Depth and Levels - Master Design Condition
Figure A27	0.05% AEP Peak Flood Depth and Levels - Master Design Condition
Figure A28	PMF Peak Flood Depth and Levels - Master Design Condition
Figure A29	10% AEP Peak Flood Velocity - Master Design Condition
Figure A30	5% AEP Peak Flood Velocity - Master Design Condition
Figure A31	2% AEP Peak Flood Velocity - Master Design Condition
Figure A32	1% AEP Peak Flood Velocity - Master Design Condition
Figure A33	1% AEP Climate Changes Peak Flood Velocity - Master Design Condition
Figure A34	0.05% AEP Peak Flood Velocity - Master Design Condition
Figure A35	PMF Peak Flood Velocity - Master Design Condition
Figure A36	10% AEP Peak Flood Hazard - Master Design Condition
Figure A37	5% AEP Peak Flood Hazard - Master Design Condition
Figure A38	2% AEP Peak Flood Hazard - Master Design Condition
Figure A39	1% AEP Peak Flood Hazard - Master Design Condition
Figure A40	1% AEP Climate Changes Peak Flood Hazard - Master Design Condition

Map ID	Map description
Figure A41	0.05% AEP Peak Flood Hazard - Master Design Condition
Figure A42	PMF Peak Flood Hazard - Master Design Condition
Figure A43	Changes in Peak Flood Levels for 10% AEP - Master Design Condition vs Existing Condition
Figure A44	Changes in Peak Flood Levels for 5% AEP - Master Design Condition vs Existing Condition
Figure A45	Changes in Peak Flood Levels for 2% AEP - Master Design Condition vs Existing Condition
Figure A46	Changes in Peak Flood Levels for 1% AEP - Master Design Condition vs Existing Condition
Figure A47	Changes in Peak Flood Levels for 1% AEP Climate Changes - Master Design Condition vs Existing Condition
Figure A48	Changes in Peak Flood Velocity for 10% AEP - Master Design Condition vs Existing Condition
Figure A49	Changes in Peak Flood Velocity for 5% AEP - Master Design Condition vs Existing Condition
Figure A50	Changes in Peak Flood Velocity for 2% AEP - Master Design Condition vs Existing Condition
Figure A51	Changes in Peak Flood Velocity for 1% AEP - Master Design Condition vs Existing Condition
Figure A52	Changes in Peak Flood Velocity for 1% AEP Climate Changes - Master Design Condition vs Existing Condition
Figure A53	Changes in Peak Flood Hazard for 10% AEP - Master Design Condition vs Existing Condition
Figure A54	Changes in Peak Flood Hazard for 5% AEP - Master Design Condition vs Existing Condition
Figure A55	Changes in Peak Flood Hazard for 2% AEP - Master Design Condition vs Existing Condition
Figure A56	Changes in Peak Flood Hazard for 1% AEP - Master Design Condition vs Existing Condition
Figure A57	Changes in Peak Flood Hazard for 1% AEP Climate Changes - Master Design Condition vs Existing Condition
Figure A58	1% AEP Peak Flood Depth and Levels - Master Design Blockage Condition
Figure A59	1% AEP Peak Flood Velocity - Master Design Blockage Condition
Figure A60	1% AEP Peak Flood Hazard - Master Design Blockage Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

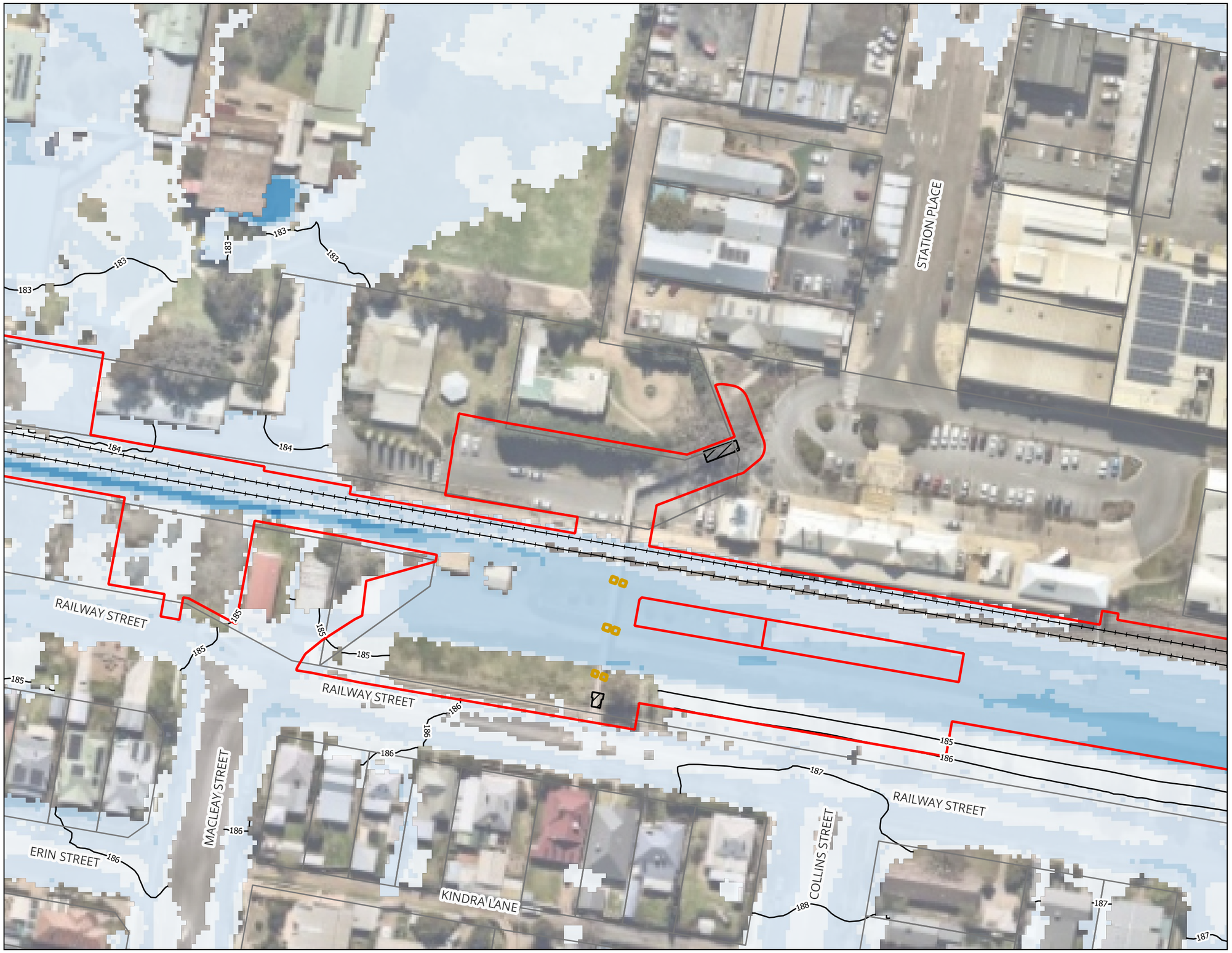
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A01 : 10% AEP Peak Flood Depth and Levels - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

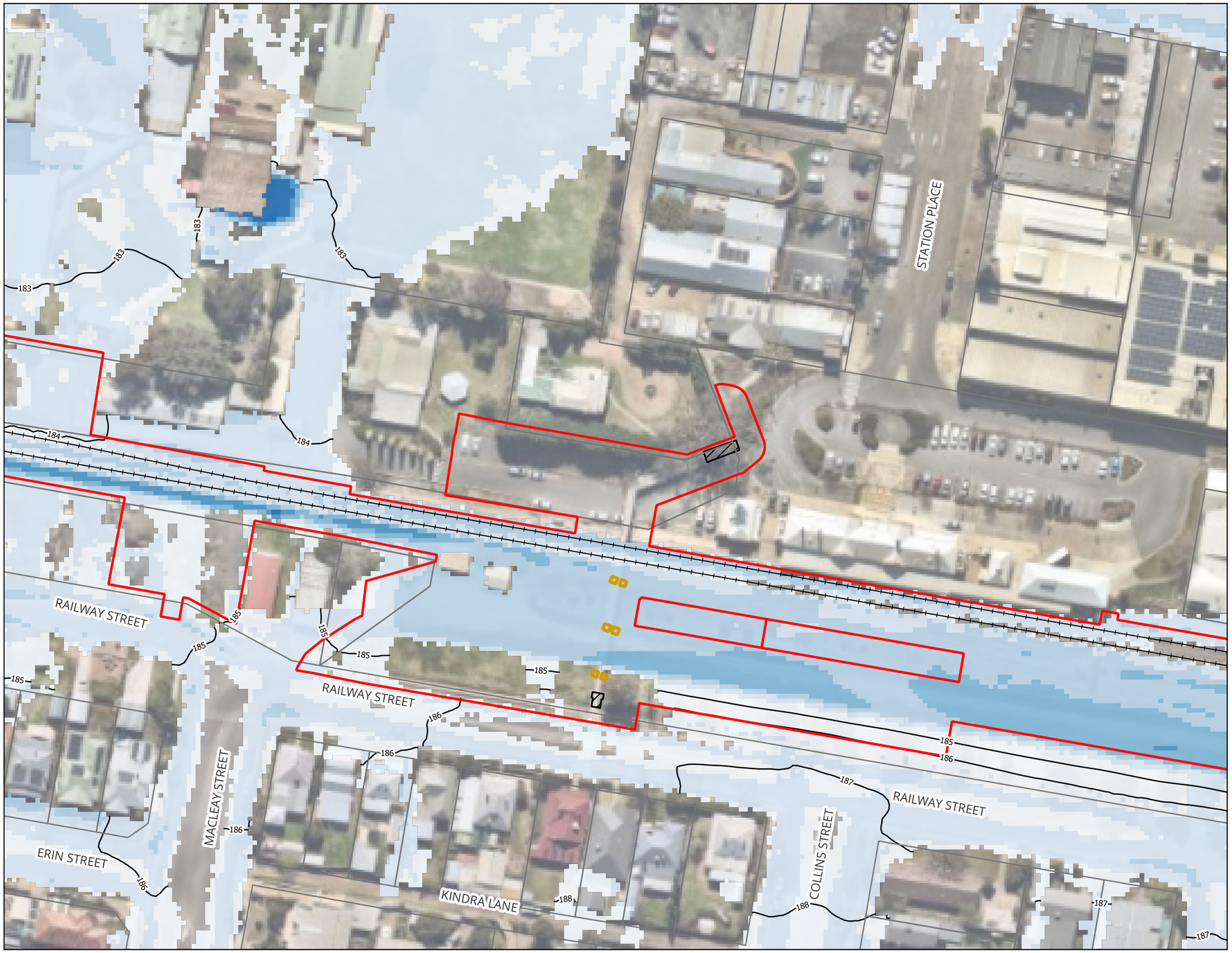
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A02 : 5% AEP Peak Flood Depth and Levels - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

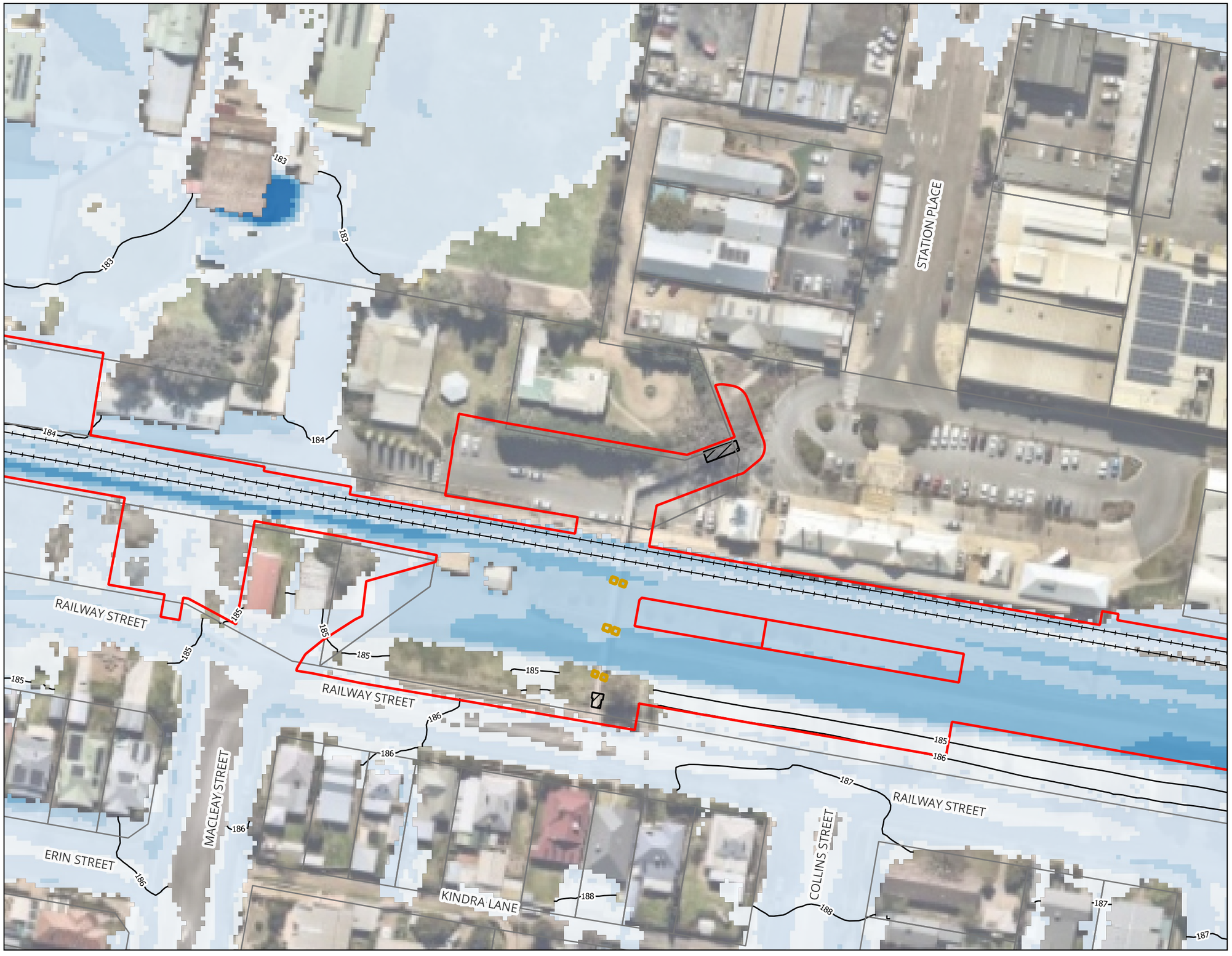
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A03 : 2% AEP Peak Flood Depth and Levels - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

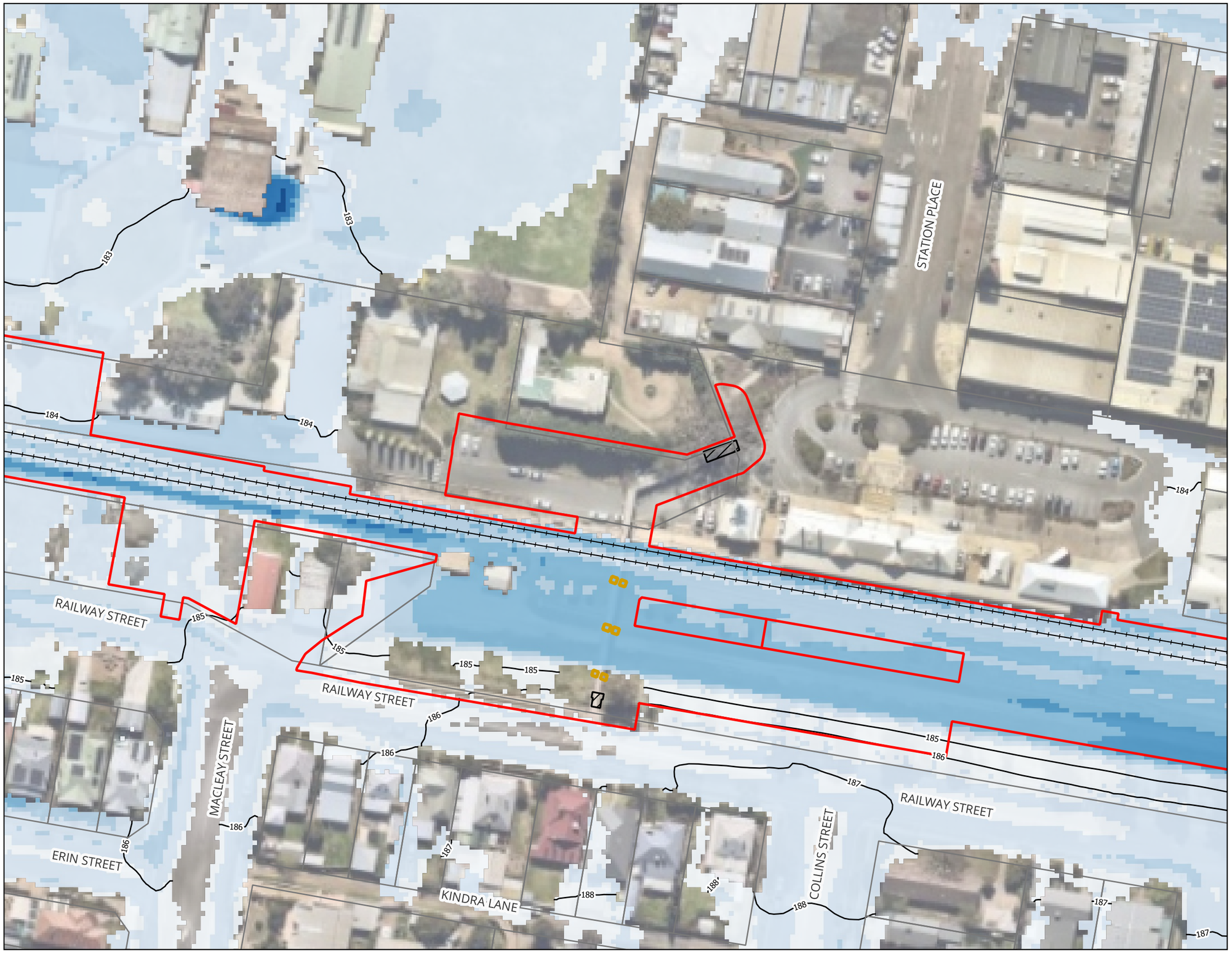
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A04 : 1% AEP Peak Flood Depth and Levels - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

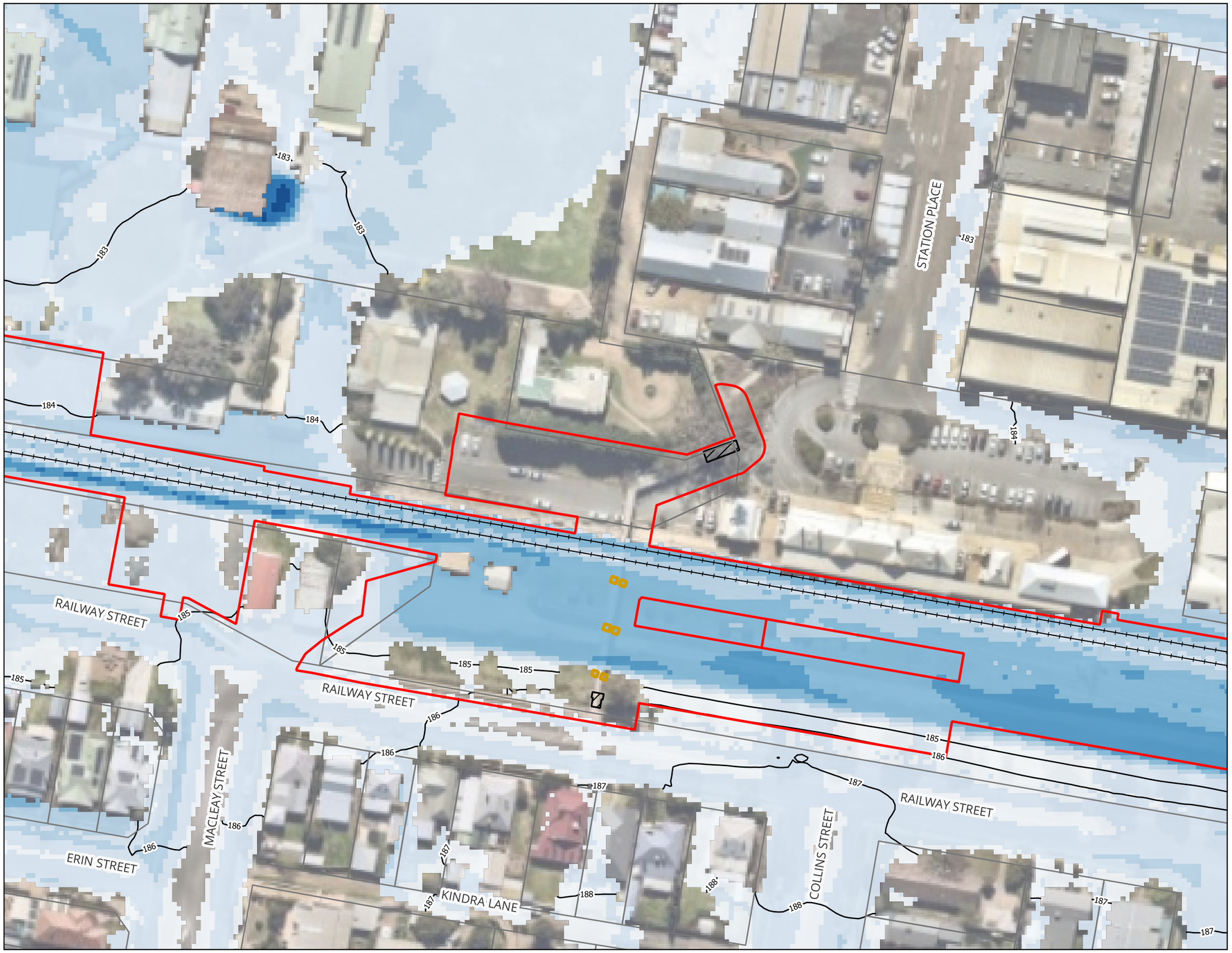
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A05 : 1% AEP Climate Changes Peak Flood Depth and Levels - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

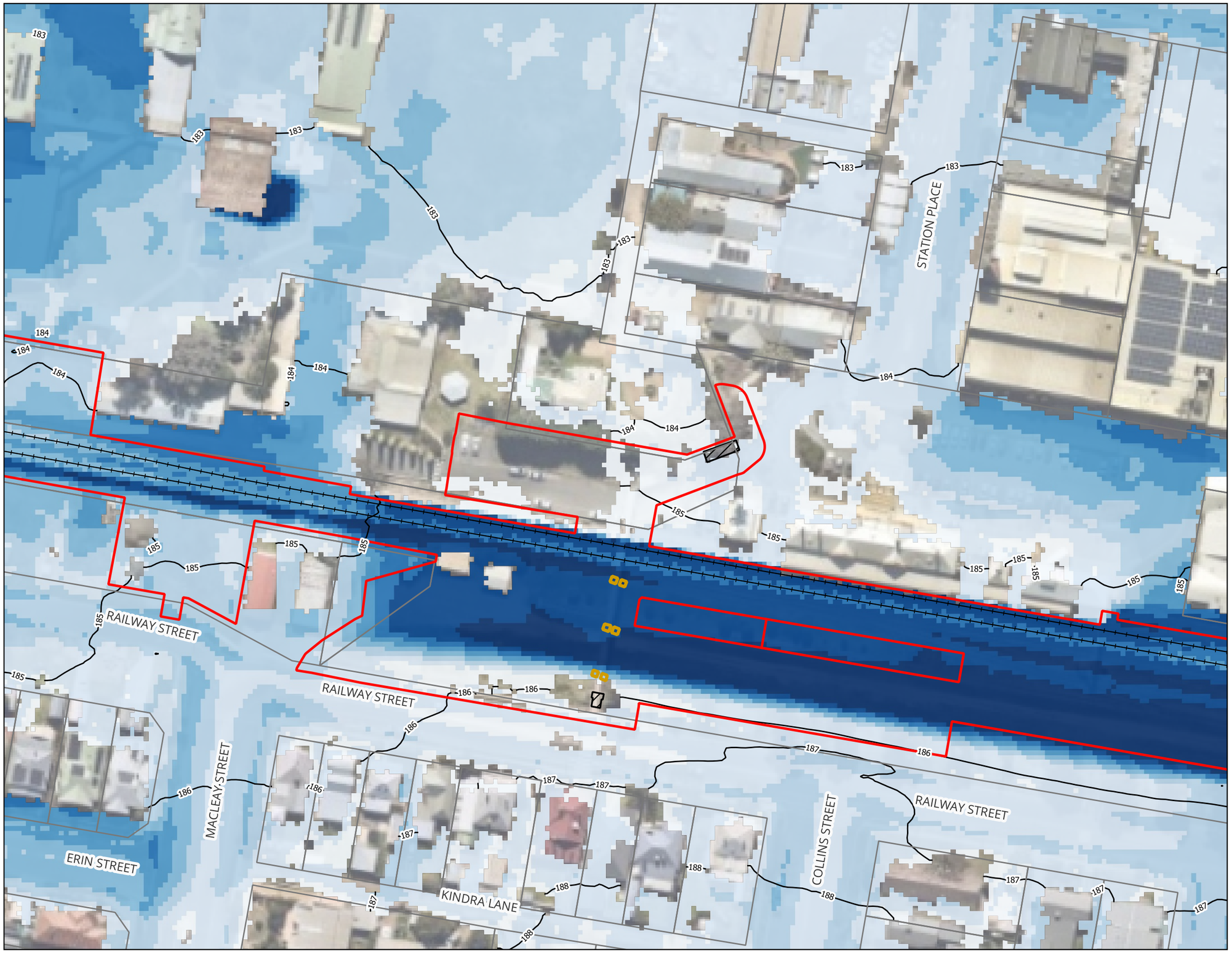
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A06 : 0.05% AEP Peak Flood Depth and Levels - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A07 : PMF Peak Flood Depth and Levels - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A08 : 10% AEP Peak Flood Velocity - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A09 : 5% AEP Peak Flood Velocity - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A10 : 2% AEP Peak Flood Velocity - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

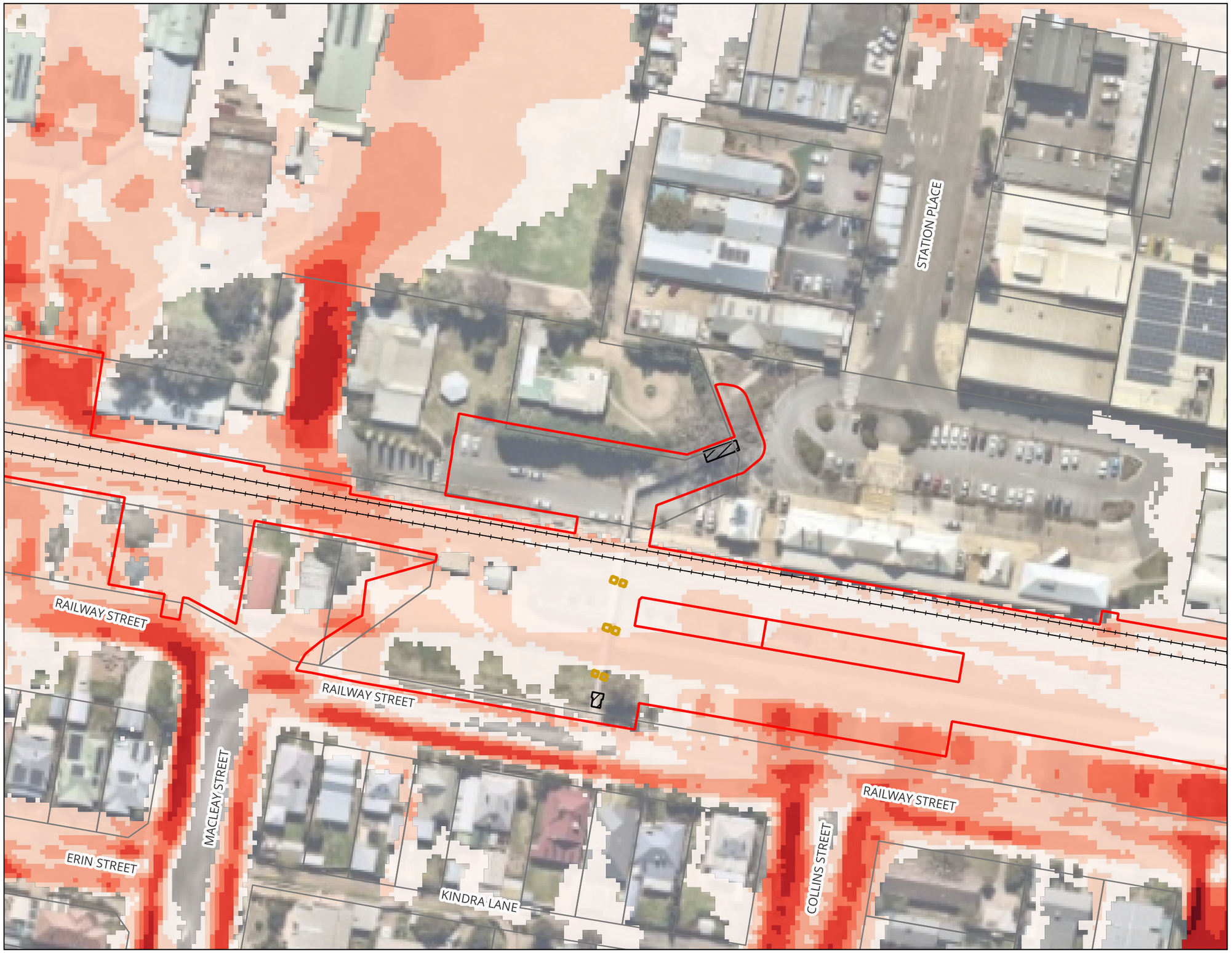
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A11 : 1% AEP Peak Flood Velocity - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A12 : 1% AEP Climate Changes Peak Flood Velocity - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

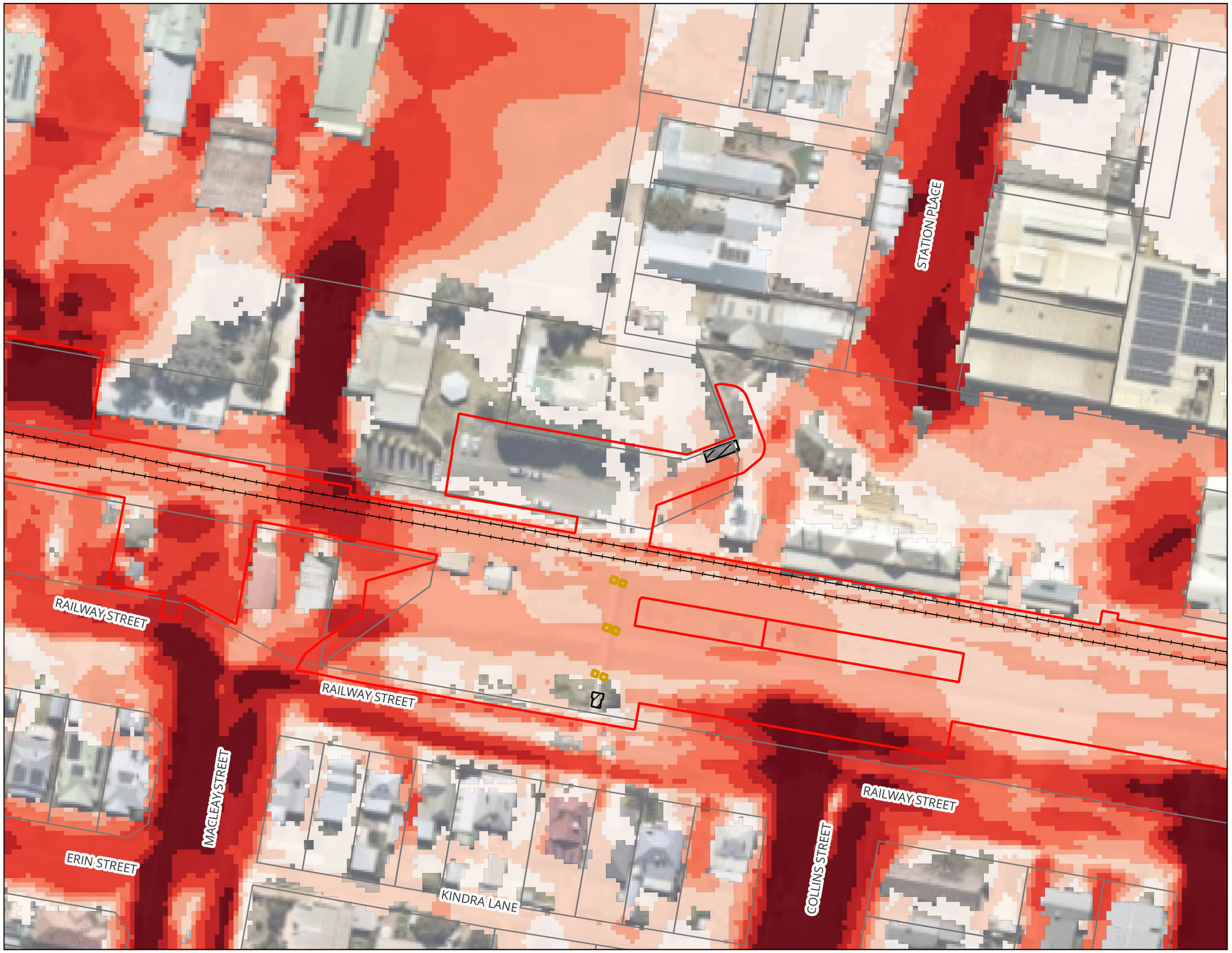
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A13 : 0.05% AEP Peak Flood Velocity - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A14 : PMF AEP Peak Flood Velocity - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A15 : 10% AEP Peak Flood Hazard - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A16 : 5% AEP Peak Flood Hazard - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A17 : 2% AEP Peak Flood Hazard - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A18 : 1% AEP Peak Flood Hazard - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A19 : 1% AEP Climate Changes Peak Flood Hazard - Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

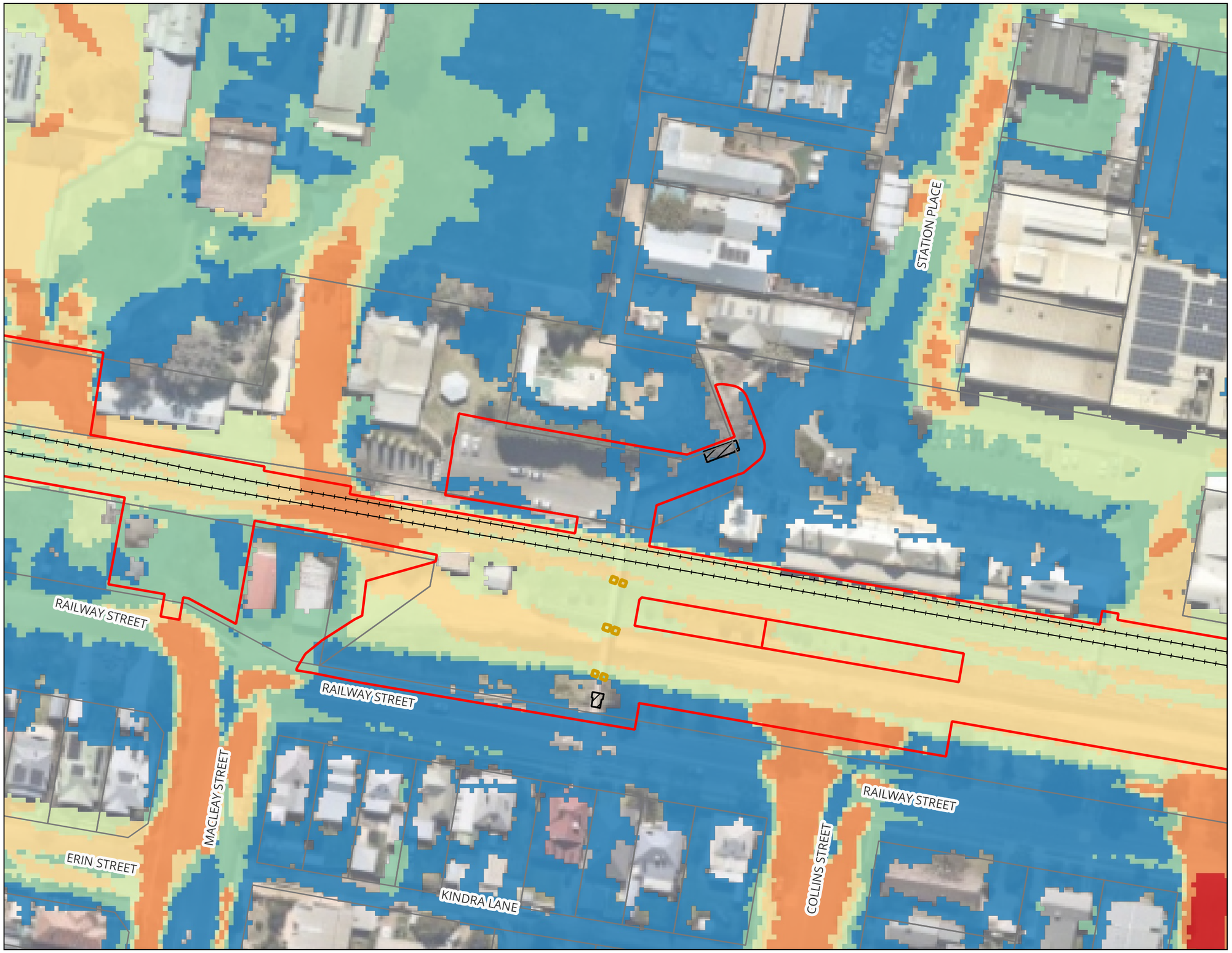
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A20 : 0.05% AEP Peak Flood Hazard - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Existing Bridge Pier
- Modelled Existing Bridge Access Ramp
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

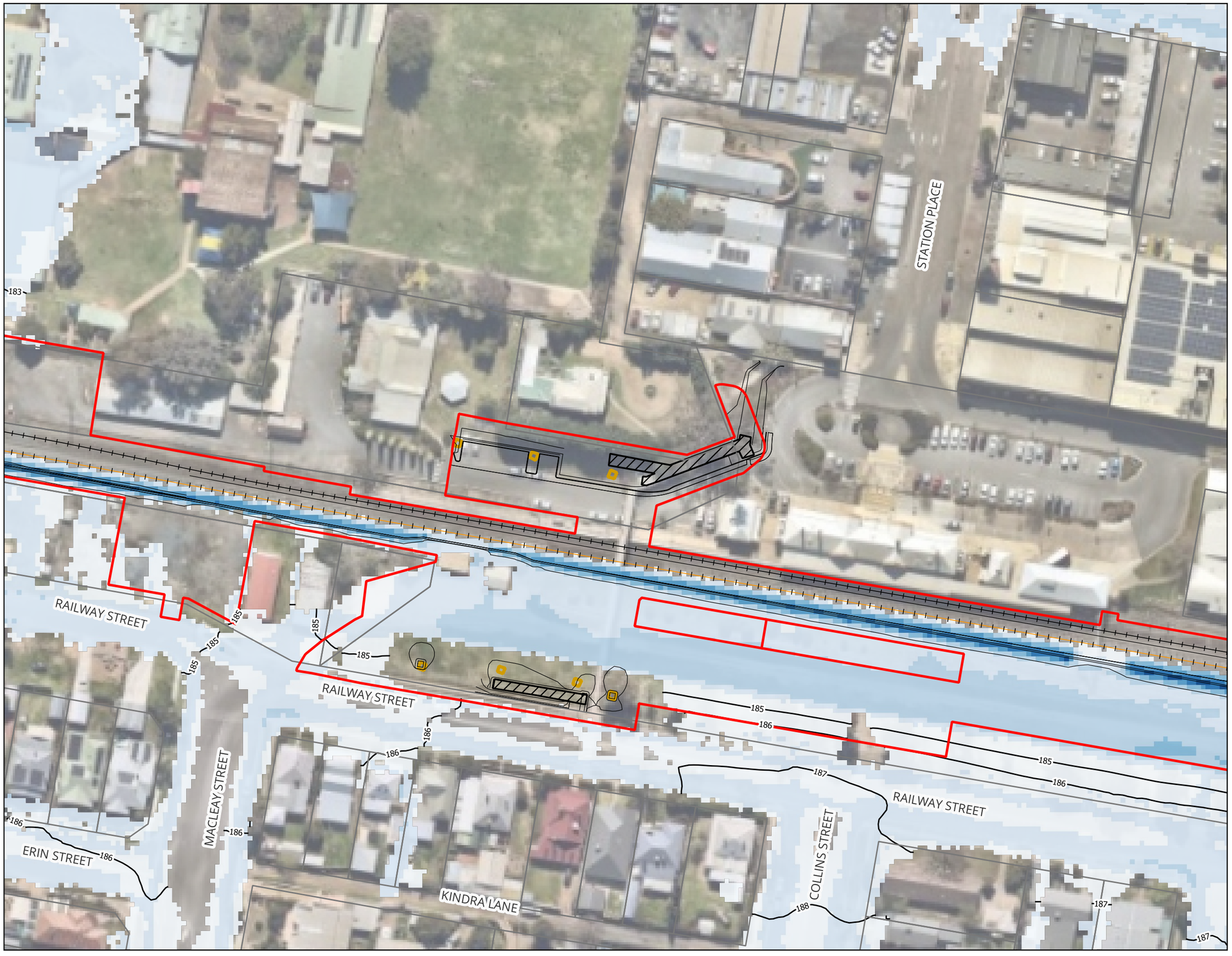
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A21 : PMF AEP Peak Flood Hazard - Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A22 : 10% AEP Peak Flood Depth and Levels - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

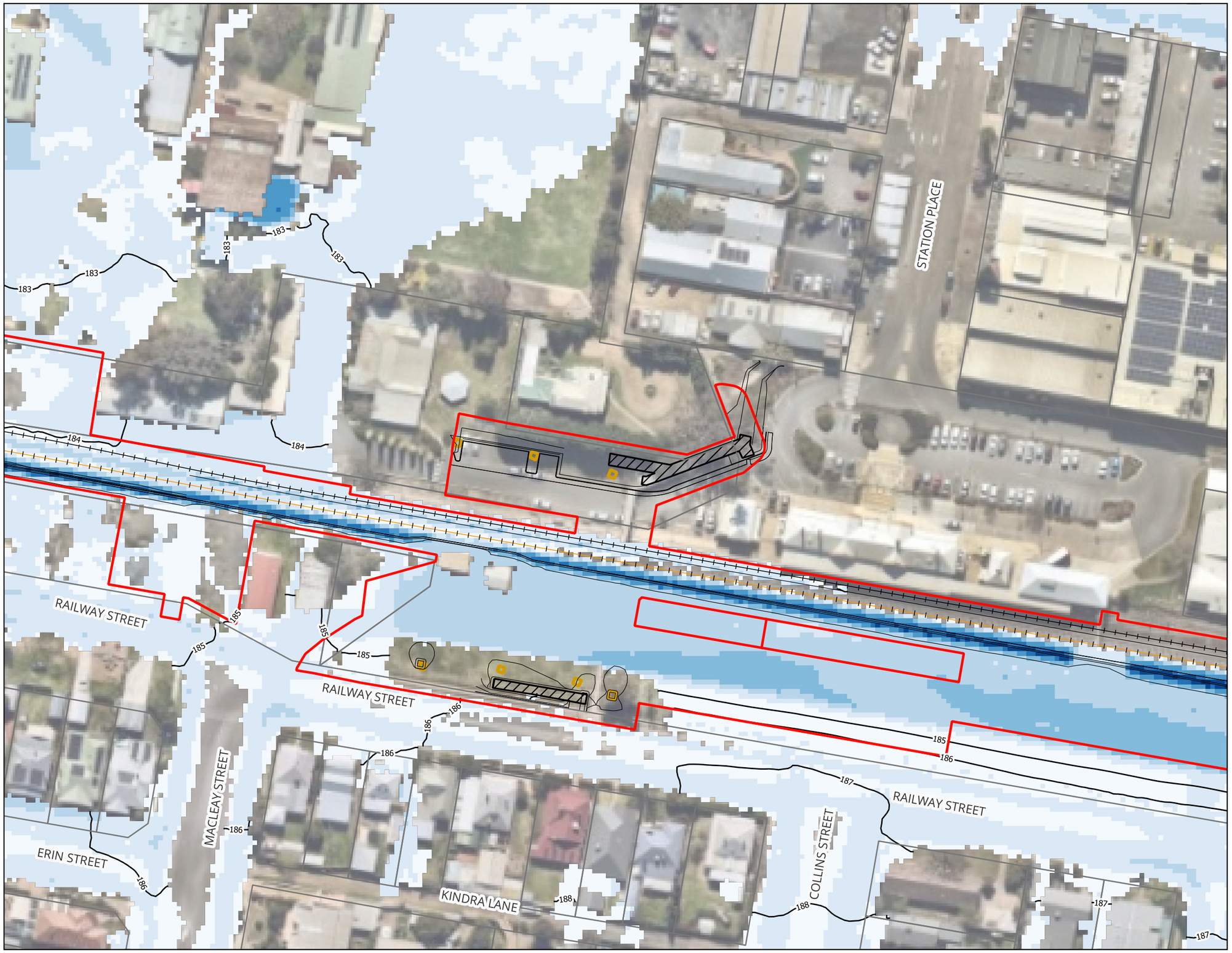
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A23 : 5% AEP Peak Flood Depth and Levels - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

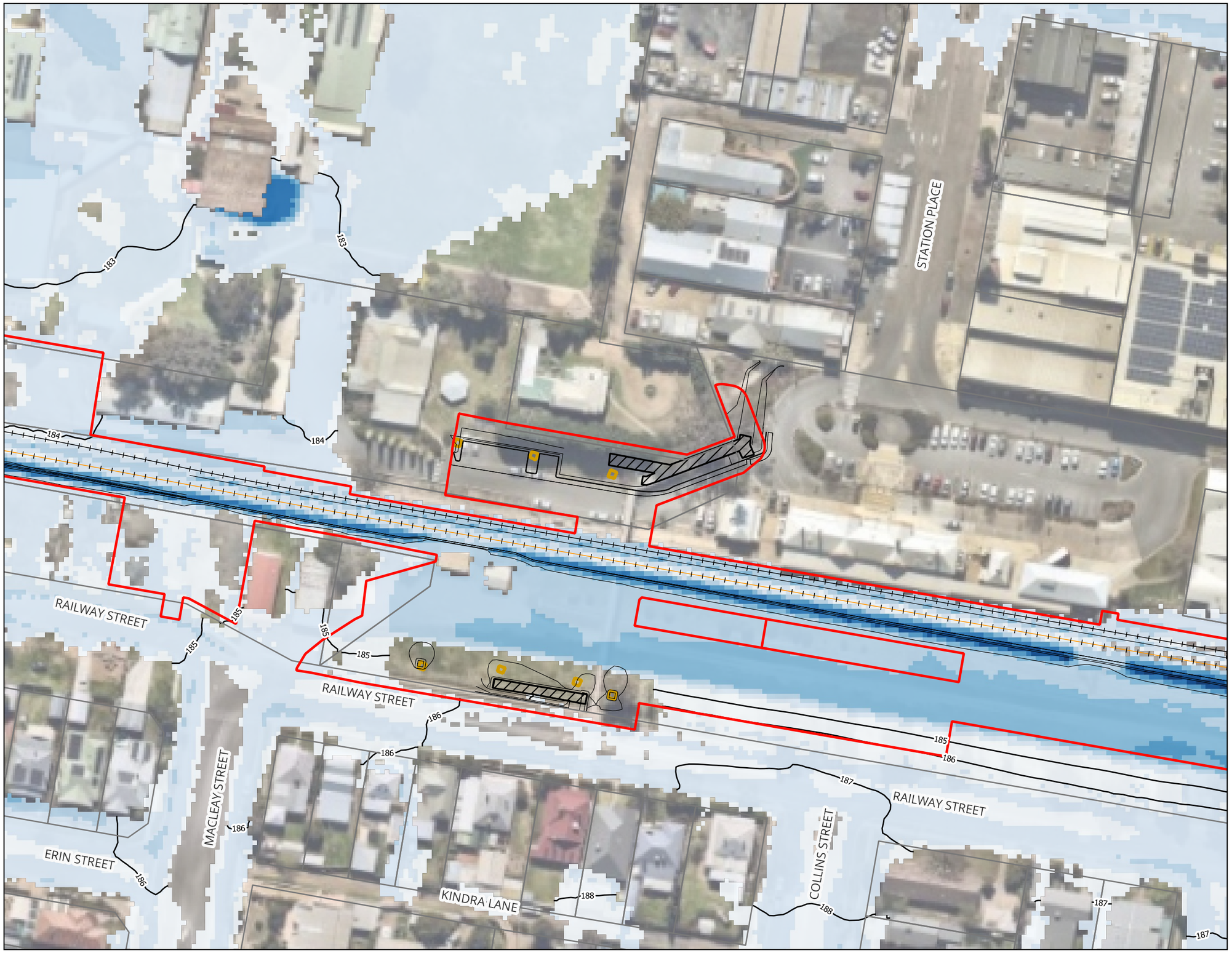
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A24 : 2% AEP Peak Flood Depth and Levels - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

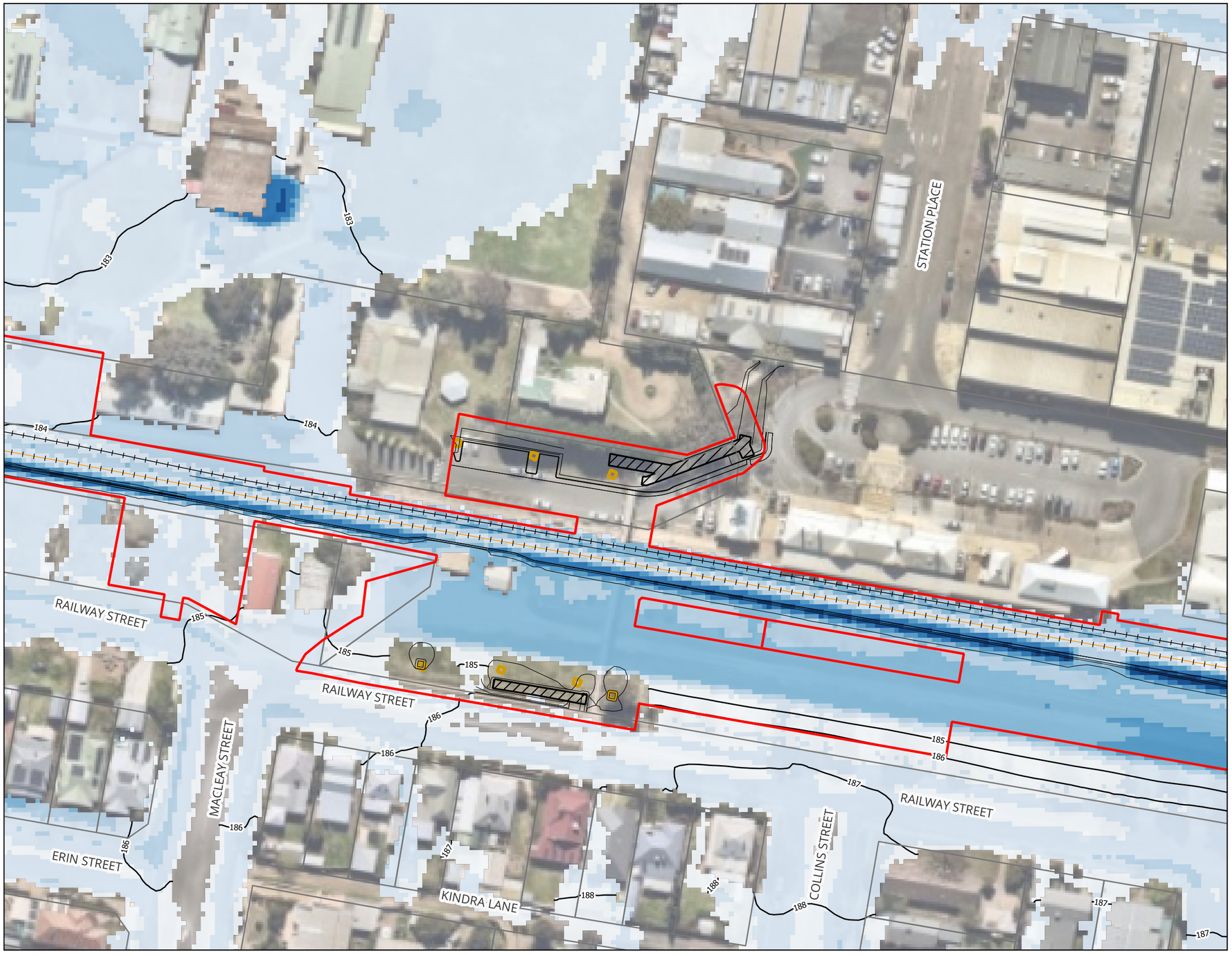
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A25 : 1% AEP Peak Flood Depth and Levels - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

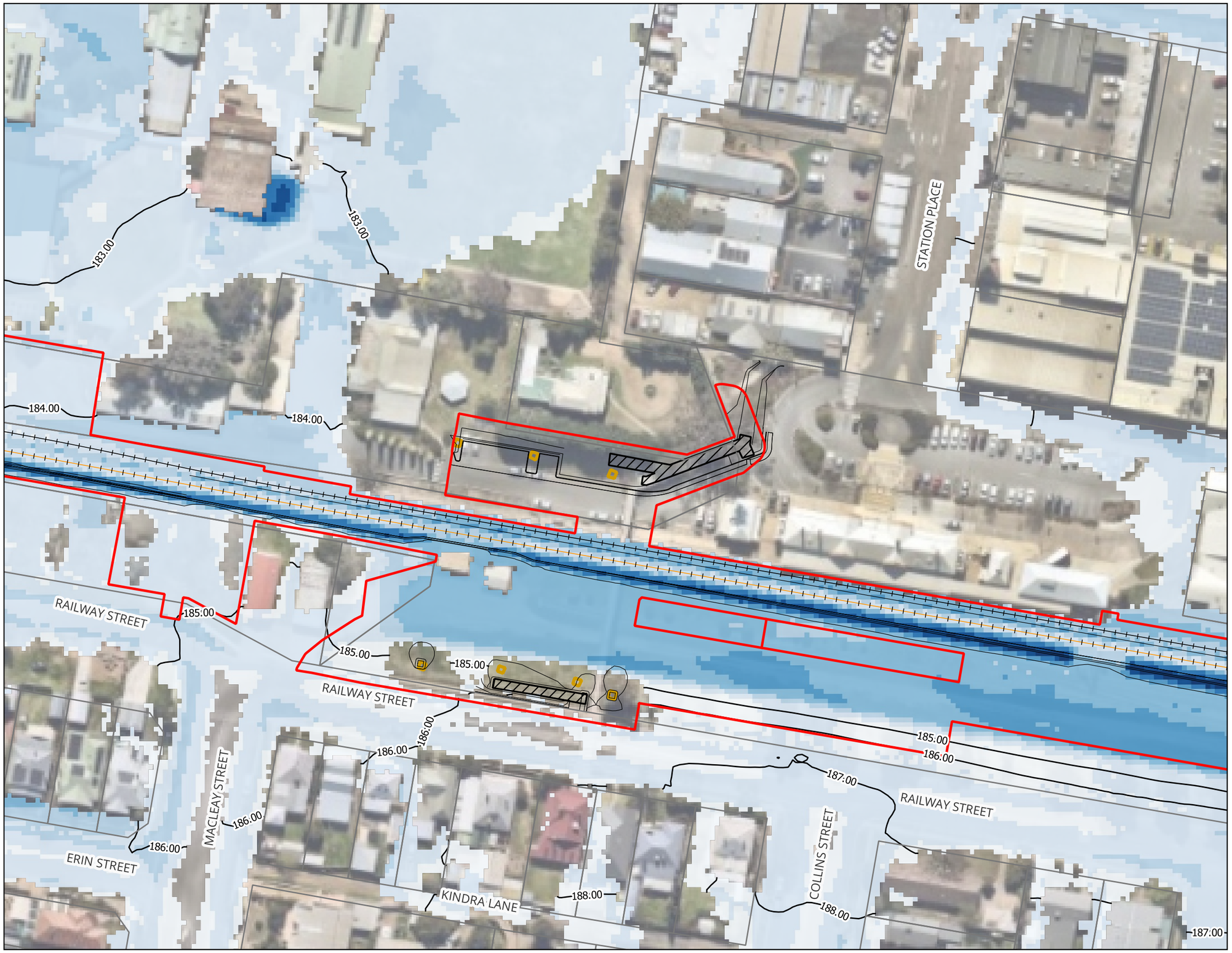
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A26 : 1% AEP Climate Changes Peak Flood Depth and Levels - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

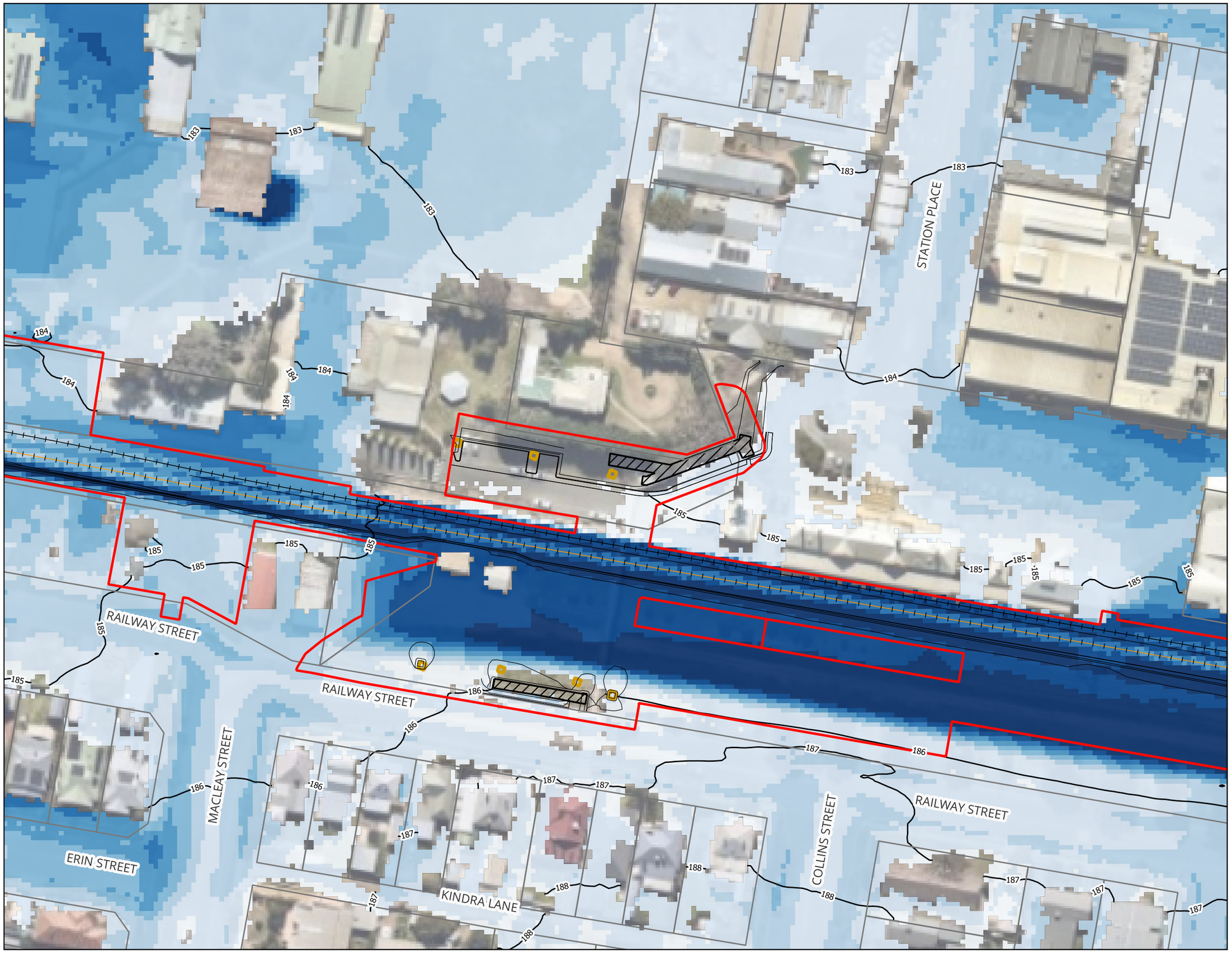
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A27 : 0.05% AEP Peak Flood Depth and Levels - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A28 : PMF Peak Flood Depth and Levels - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A29 : 10% AEP Peak Flood Velocity - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A30 : 5% AEP Peak Flood Velocity - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A31 : 2% AEP Peak Flood Velocity - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A32 : 1% AEP Peak Flood Velocity - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A33 : 1% AEP Climate Changes Peak Flood Velocity - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

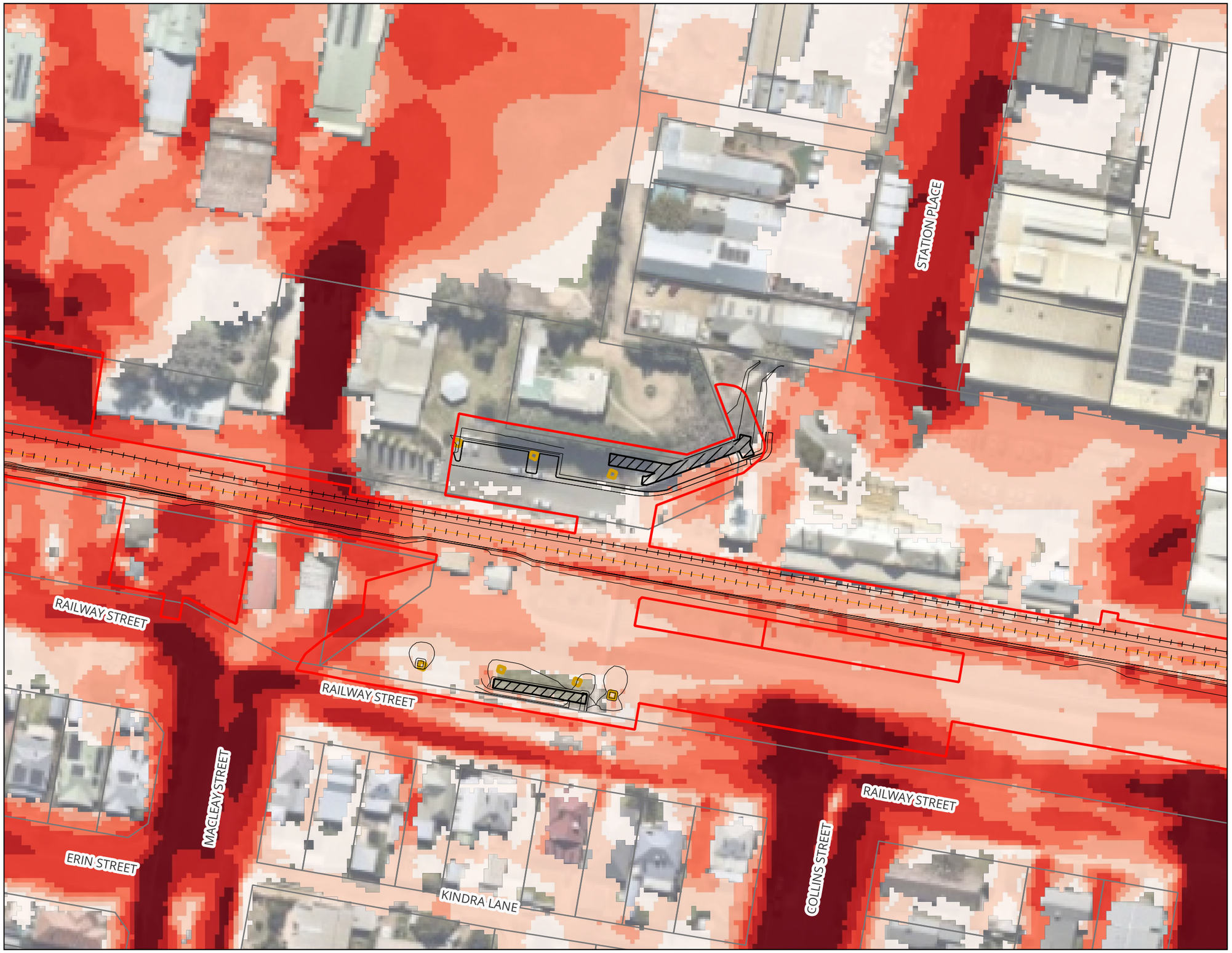
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A34 : 0.05% AEP Peak Flood Velocity - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A35 : PMF Peak Flood Velocity - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A36 : 10% AEP Peak Flood Hazard - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A37 : 5% AEP Peak Flood Hazard - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A38 : 2% AEP Peak Flood Hazard - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A39 : 1% AEP Peak Flood Hazard - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A40 : 1% AEP Climate Changes Peak Flood Hazard - Master Design Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

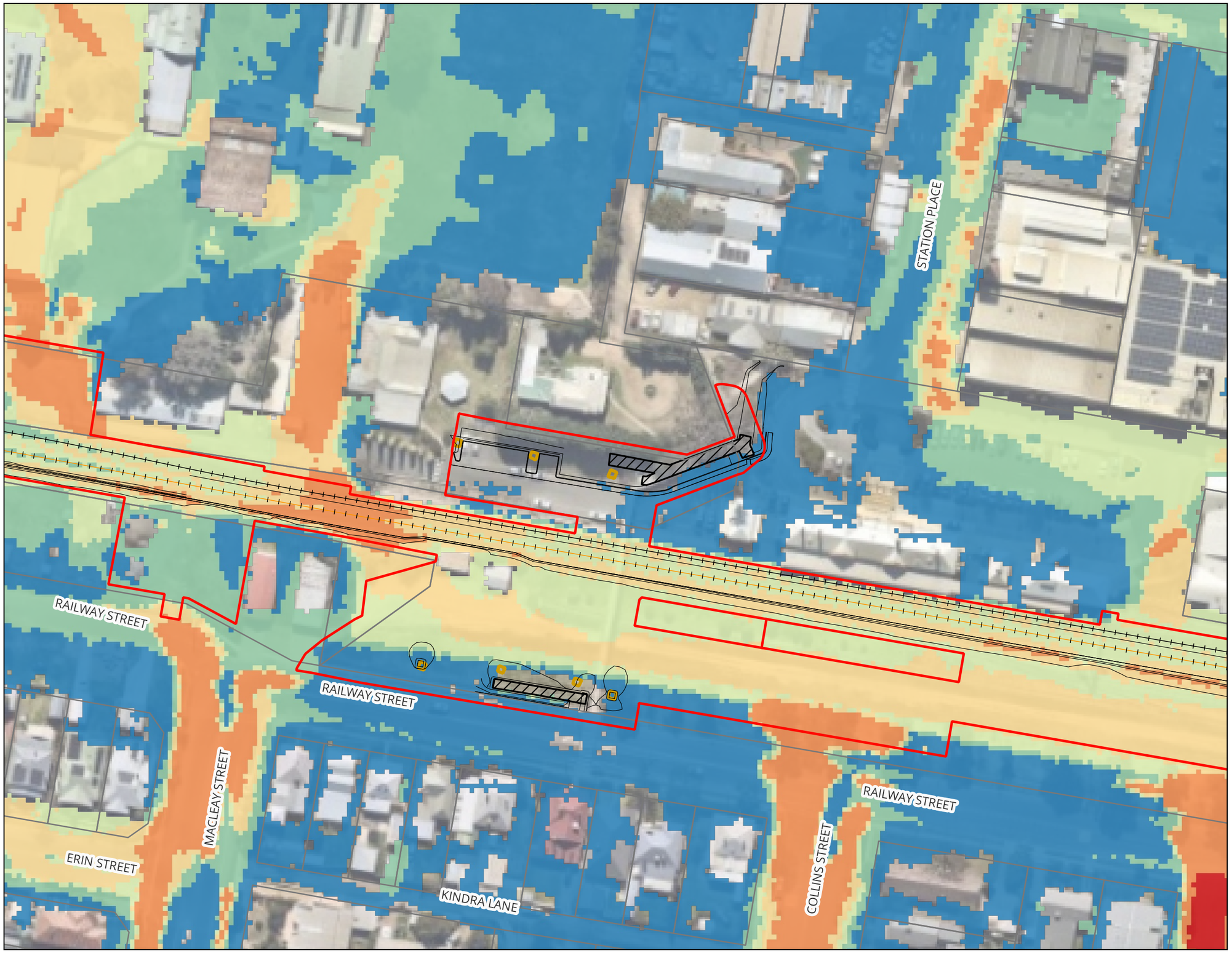
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A41 : 0.05% AEP Peak Flood Hazard - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

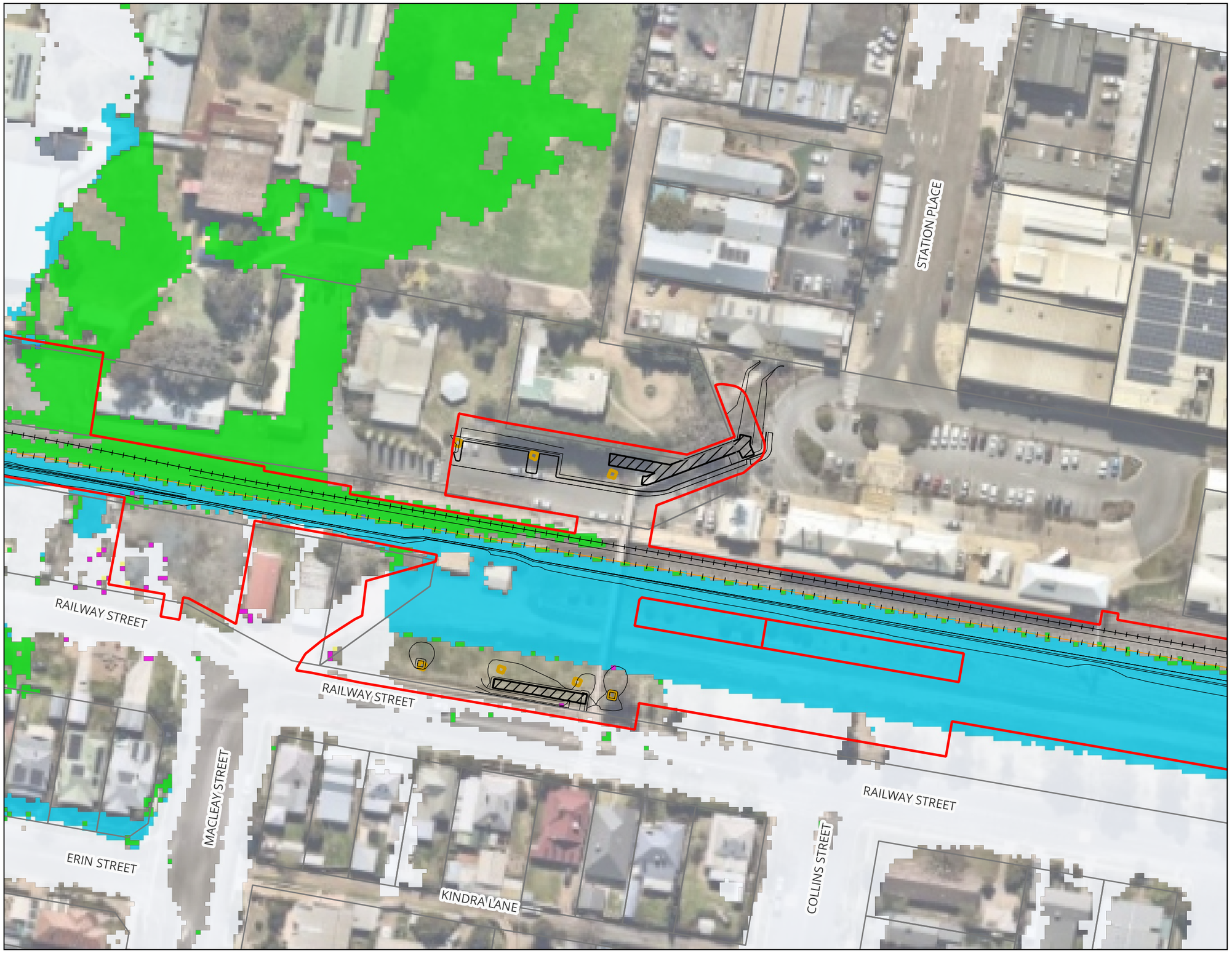
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A42 : PMF Peak Flood Hazard - Master Design Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Flood Level (m)

- <= -0.2
- -0.2 - -0.1
- -0.1 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- > 0.2
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

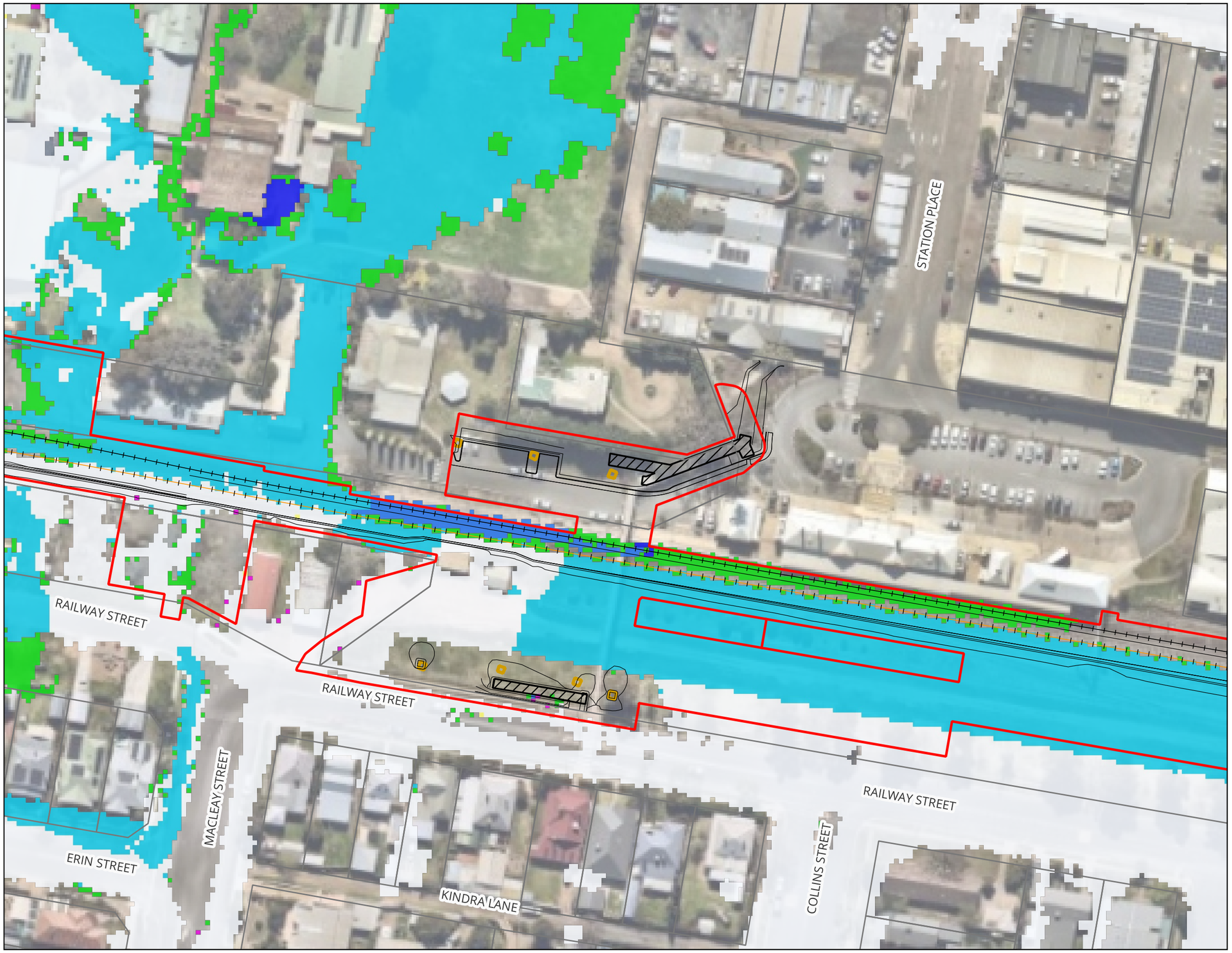
0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A43 : Changes in Peak Flood Levels for 10% AEP - Master Design Condition vs Existing Condition



MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Flood Level (m)

- <= -0.2
- -0.2 - -0.1
- -0.1 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- > 0.2
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A44 : Changes in Peak Flood Levels for 5% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Flood Level (m)

- <= -0.2
- -0.2 - -0.1
- -0.1 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- > 0.2
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A45 : Changes in Peak Flood Levels for 2% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Flood Level (m)

- <= -0.2
- -0.2 - -0.1
- -0.1 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- > 0.2
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A46 : Changes in Peak Flood Levels for 1% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Flood Level (m)

- <= -0.2
- -0.2 - -0.1
- -0.1 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.1
- 0.1 - 0.2
- > 0.2
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A47 : Changes in Peak Flood Levels for 1% AEP Climate Changes - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Velocity (m/s)

- <= 0.50

Changes in Velocity (%)

- <= 10%
- 10% - 20%
- > 20%
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A48 : Changes in Peak Flood Velocity for 10% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Velocity (m/s)

<= 0.50

Changes in Velocity (%)

- <= 10%
- 10% - 20%
- > 20%
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A49 : Changes in Peak Flood Velocity for 5% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Velocity (m/s)

- <= 0.50

Changes in Velocity (%)

- <= 10%
- 10% - 20%
- > 20%
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A50 : Changes in Peak Flood Velocity for 2% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Velocity (m/s)

- <= 0.50

Changes in Velocity (%)

- <= 10%
- 10% - 20%
- > 20%
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A51 : Changes in Peak Flood Velocity for 1% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Velocity (m/s)

- <= 0.50

Changes in Velocity (%)

- <= 10%
- 10% - 20%
- > 20%
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A52 : Changes in Peak Flood Velocity for 1% AEP Climate Changes - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Hazard

- Reduced 5 Classes
- Reduced 4 Classes
- Reduced 3 Classes
- Reduced 2 Classes
- Reduced 1 Class
- No Change
- Increased 1 Class
- Increased 2 Classes
- Increased 3 Classes
- Increased 4 Classes
- Increased 5 Classes
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A53 : Changes in Peak Flood Hazard for 10% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Hazard

- Reduced 5 Classes
- Reduced 4 Classes
- Reduced 3 Classes
- Reduced 2 Classes
- Reduced 1 Class
- No Change
- Increased 1 Class
- Increased 2 Classes
- Increased 3 Classes
- Increased 4 Classes
- Increased 5 Classes
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A54 : Changes in Peak Flood Hazard for 5% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Hazard

- Reduced 5 Classes
- Reduced 4 Classes
- Reduced 3 Classes
- Reduced 2 Classes
- Reduced 1 Class
- No Change
- Increased 1 Class
- Increased 2 Classes
- Increased 3 Classes
- Increased 4 Classes
- Increased 5 Classes
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A55 : Changes in Peak Flood Hazard for 2% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Hazard

- Reduced 5 Classes
- Reduced 4 Classes
- Reduced 3 Classes
- Reduced 2 Classes
- Reduced 1 Class
- No Change
- Increased 1 Class
- Increased 2 Classes
- Increased 3 Classes
- Increased 4 Classes
- Increased 5 Classes
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A56 : Changes in Peak Flood Hazard for 1% AEP - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Changes in Hazard

- Reduced 5 Classes
- Reduced 4 Classes
- Reduced 3 Classes
- Reduced 2 Classes
- Reduced 1 Class
- No Change
- Increased 1 Class
- Increased 2 Classes
- Increased 3 Classes
- Increased 4 Classes
- Increased 5 Classes
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A57 : Changes in Peak Flood Hazard for 1% AEP Climate Changes - Master Design Condition vs Existing Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre
- Flood Level Contours (mAHD)

Peak Flood Depth (m)

- <= 0.03
- 0.03 - 0.2
- 0.2 - 0.4
- 0.4 - 0.6
- 0.6 - 0.8
- 0.8 - 1.0
- 1.0 - 1.2
- > 1.2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A58 : 1% AEP Peak Flood Depth and Levels - Master Design Blockage Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Velocity (m/s)

- <= 0.25
- 0.25 - 0.5
- 0.5 - 0.75
- 0.75 - 1
- 1 - 1.5
- 1.5 - 2
- > 2

Notes:

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A59 : 1% AEP Peak Flood Velocity - Master Design Blockage Condition

MARTINUS

aurecon BG&E

Legend

- Project Boundary
- Design Strings Extent
- Modelled Proposed Bridge Access Ramp
- Modelled Proposed Bridge Pier
- Existing Railway Track
- Proposed Wagga Yard Railway Track
- Cadastre

Peak Flood Hazard

- H1
- H2
- H3
- H4
- H5
- H6

Notes:

H1 : Generally safe for vehicles, people and buildings.
H2 : Unsafe for small vehicles.
H3 : Unsafe for vehicles. children and the elderly.
H4 : Unsafe for vehicles and people.
H5 : Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6 : Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

0 40 80 m

A3 Scale: 1:1,000

9/9/2025 GDA2020 / MGA zone 55

Wagga Mothers Footbridge - Inland Rail (A2P) - IFC Stage

Figure A60 : 1% AEP Flood Hazard - Master Design Blockage Condition

APPENDIX B

ARR Data Hub Data

Results - ARR Data Hub

[STARTTXT]

Input Data Information

[INPUTDATA]

Latitude,-35.122268

Longitude,147.367080

[END_INPUTDATA]

River Region

[RIVREG]

Division,Murray-Darling Basin

River Number,12

River Name,Murrumbidgee River

[RIVREG_META]

Time Accessed,18 June 2024 01:04PM

Version,2016_v1

[END_RIVREG]

ARF Parameters

[LONGARF]

Zone,Southern Temperate

a,0.158

b,0.276

c,0.372

d,0.315

e,0.000141

f,0.41

g,0.15

h,0.01

i,-0.0027

[LONGARF_META]

Time Accessed,18 June 2024 01:04PM

Version,2016_v1

[END_LONGARF]

Storm Losses

[LOSSES]

ID,30818.0

Storm Initial Losses (mm),26.0

Storm Continuing Losses (mm/h),4.7

[LOSSES_META]

Time Accessed,18 June 2024 01:04PM

Version,2016_v1

[END_LOSSES]

Temporal Patterns

[TP]

code,MB

Label,Murray Basin

[TP_META]

Time Accessed,18 June 2024 01:04PM

Version,2016_v2

[END_TP]

Areal Temporal Patterns

[ATP]

code,MB

arealabel,Murray Basin

[ATP_META]

Time Accessed,18 June 2024 01:04PM

Version,2016_v2

[END_ATP]

Median Preburst Depths and Ratios

[PREBURST]

min (h)\AEP(%),50,20,10,5,2,1

60 (1.0),1.8 (0.089),1.6 (0.057),1.5 (0.044),1.4 (0.034),0.9 (0.019),0.5 (0.010)

90 (1.5),2.8 (0.123),1.9 (0.059),1.3 (0.033),0.7 (0.016),0.6 (0.011),0.5 (0.009)

120 (2.0),4.4 (0.178),3.2 (0.093),2.5 (0.059),1.7 (0.035),0.8 (0.013),0.1 (0.001)

180 (3.0),3.0 (0.108),2.9 (0.075),2.8 (0.062),2.8 (0.052),1.6 (0.025),0.7 (0.010)

360 (6.0),2.2 (0.065),1.3 (0.027),0.7 (0.012),0.1 (0.001),1.2 (0.016),2.1 (0.025)

720 (12.0),0.1 (0.002),1.0 (0.018),1.5 (0.024),2.1 (0.028),4.0 (0.045),5.4 (0.055)

1080 (18.0),0.0 (0.000),0.3 (0.005),0.5 (0.006),0.6 (0.008),2.5 (0.025),3.8 (0.035)

1440 (24.0),0.0 (0.000),0.2 (0.002),0.3 (0.003),0.4 (0.004),0.6 (0.006),0.8 (0.007)

2160 (36.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

2880 (48.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

4320 (72.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

[PREBURST_META]

Time Accessed,18 June 2024 01:04PM

Version,2018_v1

Note,Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

[END_PREBURST]From preburst class

10% Preburst Depths

[PREBURST10]

min (h)\AEP(%),50,20,10,5,2,1

60 (1.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

90 (1.5),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

120 (2.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

180 (3.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

360 (6.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

720 (12.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

1080 (18.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

1440 (24.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

2160 (36.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

2880 (48.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

4320 (72.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

[PREBURST10_META]

Time Accessed,18 June 2024 01:04PM

Version,2018_v1

Note,Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

[END_PREBURST10]From preburst class

25% Preburst Depths

[PREBURST25]

min (h)\AEP(%),50,20,10,5,2,1

60 (1.0),0.1 (0.005),0.1 (0.002),0.0 (0.001),0.0 (0.000),0.0 (0.000),0.0 (0.000)

90 (1.5),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

120 (2.0),0.1 (0.004),0.1 (0.001),0.0 (0.001),0.0 (0.000),0.0 (0.000),0.0 (0.000)

180 (3.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

360 (6.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

720 (12.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

1080 (18.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

1440 (24.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

2160 (36.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

2880 (48.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

4320 (72.0),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000),0.0 (0.000)

[PREBURST25_META]

Time Accessed,18 June 2024 01:04PM

Version,2018_v1

Note,Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

[END_PREBURST25]From preburst class

75% Preburst Depths

[PREBURST75]

min (h)\AEP(%),50,20,10,5,2,1

60 (1.0),15.3 (0.750),13.8 (0.480),12.7 (0.369),11.7 (0.291),11.8 (0.246),11.9 (0.220)

90 (1.5),15.3 (0.666),13.0 (0.404),11.5 (0.297),10.0 (0.222),10.5 (0.196),10.9 (0.180)

120 (2.0),16.6 (0.664),16.4 (0.471),16.3 (0.391),16.2 (0.334),12.4 (0.215),9.6 (0.147)

180 (3.0),11.8 (0.423),15.8 (0.410),18.5 (0.401),21.0 (0.393),20.3 (0.320),19.8 (0.278)

360 (6.0),12.7 (0.380),12.2 (0.265),11.8 (0.216),11.4 (0.181),17.4 (0.233),21.9 (0.261)

720 (12.0),5.5 (0.136),9.1 (0.167),11.5 (0.178),13.8 (0.185),18.3 (0.207),21.6 (0.219)

1080 (18.0),2.9 (0.064),6.1 (0.102),8.3 (0.117),10.4 (0.126),13.2 (0.136),15.4 (0.141)

1440 (24.0),0.2 (0.004),3.5 (0.054),5.7 (0.074),7.8 (0.088),9.1 (0.088),10.1 (0.087)

2160 (36.0),0.0 (0.000),0.9 (0.012),1.4 (0.017),2.0 (0.020),3.1 (0.027),4.0 (0.031)

2880 (48.0),0.0 (0.000),0.4 (0.006),0.7 (0.008),1.0 (0.010),1.1 (0.009),1.2 (0.009)

4320 (72.0),0.0 (0.000),0.0 (0.000),0.1 (0.001),0.1 (0.001),0.0 (0.000),0.0 (0.000)

[PREBURST75_META]

Time Accessed,18 June 2024 01:04PM

Version,2018_v1

Note,Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

[END_PREBURST75]From preburst class

90% Preburst Depths

[PREBURST90]

min (h)\AEP(%),50,20,10,5,2,1

60 (1.0),36.2 (1.772),29.9 (1.042),25.7 (0.746),21.7 (0.539),29.0 (0.603),34.4 (0.636)

90 (1.5),38.3 (1.665),34.2 (1.061),31.4 (0.814),28.8 (0.640),30.3 (0.566),31.5 (0.522)

120 (2.0),39.0 (1.565),36.1 (1.038),34.1 (0.821),32.3 (0.667),32.3 (0.561),32.3 (0.499)

180 (3.0),26.5 (0.953),31.5 (0.816),34.7 (0.755),37.9 (0.709),41.0 (0.647),43.4 (0.609)

360 (6.0),26.9 (0.804),28.0 (0.611),28.8 (0.528),29.5 (0.467),41.5 (0.555),50.5 (0.601)

720 (12.0),16.1 (0.400),24.9 (0.457),30.8 (0.477),36.4 (0.488),39.8 (0.451),42.3 (0.428)

1080 (18.0),16.2 (0.362),19.2 (0.318),21.1 (0.297),23.0 (0.280),30.3 (0.312),35.7 (0.328)

1440 (24.0),6.7 (0.138),13.4 (0.207),17.9 (0.234),22.2 (0.252),23.2 (0.223),23.9 (0.206)

2160 (36.0),1.1 (0.021),9.3 (0.131),14.8 (0.176),20.0 (0.208),17.3 (0.152),15.2 (0.119)

2880 (48.0),0.4 (0.007),6.8 (0.089),11.0 (0.123),15.1 (0.147),17.3 (0.143),18.9 (0.140)

4320 (72.0),0.0 (0.000),3.1 (0.037),5.1 (0.052),7.0 (0.063),13.9 (0.106),19.0 (0.130)

[PREBURST90_META]

Time Accessed,18 June 2024 01:04PM

Version,2018_v1

Note,Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

[END_PREBURST90]From preburst class

Interim Climate Change Factors

[CCF]

,RCP 4.5,RCP6,RCP 8.5

2030,0.816 (4.1%),0.726 (3.6%),0.934 (4.7%)

2040,1.046 (5.2%),1.015 (5.1%),1.305 (6.6%)

2050,1.260 (6.3%),1.277 (6.4%),1.737 (8.8%)

2060,1.450 (7.3%),1.520 (7.7%),2.214 (11.4%)

2070,1.609 (8.2%),1.753 (8.9%),2.722 (14.2%)

2080,1.728 (8.8%),1.985 (10.2%),3.246 (17.2%)

2090,1.798 (9.2%),2.226 (11.5%),3.772 (20.2%)

[CCF_META]

Time Accessed,18 June 2024 01:04PM

Version,2019_v1

Note,ARR recommends the use of RCP4.5 and RCP 8.5 values. These have been updated to the values that can be found on the climate change in Australia website.

[END_CCF]

Probability Neutral Burst Initial Loss

[BURSTIL]

min (h)\AEP(%),50.0,20.0,10.0,5.0,2.0,1.0

60 (1.0),17.6,10.7,10.6,11.3,10.9,9.0

90 (1.5),17.1,11.2,10.9,11.8,11.9,9.3

120 (2.0),16.3,10.8,10.5,11.4,11.1,9.4

180 (3.0),17.7,12.1,10.9,11.3,9.7,7.3

360 (6.0),18.1,13.6,13.3,14.1,12.4,8.1

720 (12.0),21.1,15.8,14.6,14.6,12.5,8.5

1080 (18.0),22.0,17.3,16.6,17.1,14.3,9.0

1440 (24.0),24.3,19.2,18.7,19.1,17.1,11.5

2160 (36.0),25.6,21.0,20.4,21.2,19.3,15.9

2880 (48.0),26.2,21.5,21.4,22.4,20.6,15.4

4320 (72.0),26.6,22.1,23.3,24.0,21.9,15.7

[BURSTIL_META]

Time Accessed,18 June 2024 01:04PM

Version,2018_v1

Note,As this point is in NSW the advice provided on losses and pre-burst on the NSW Specific Tab of the ARR Data Hub is to be considered. In NSW losses are derived considering a hierarchy of approaches depending on the available loss information. Probability neutral burst initial loss values for NSW are to be used in place of the standard initial loss and pre-burst as per the losses hierarchy.

[END_BURSTIL]

Transformational Pre-burst Rainfall

[PREBURST_TRANS]

min (h)\AEP(%),50.0,20.0,10.0,5.0,2.0,1.0

60 (1.0),8.4,15.3,15.4,14.7,15.1,17.0

90 (1.5),8.9,14.8,15.1,14.2,14.1,16.7

120 (2.0),9.7,15.2,15.5,14.6,14.9,16.6

180 (3.0),8.3,13.9,15.1,14.7,16.3,18.7

360 (6.0),7.9,12.4,12.7,11.9,13.6,17.9

720 (12.0),4.9,10.2,11.4,11.4,13.5,17.5

1080 (18.0),4.0,8.7,9.4,8.9,11.7,17.0

1440 (24.0),1.7,6.8,7.3,6.9,8.9,14.5

2160 (36.0),0.4,5.0,5.6,4.8,6.7,10.1

2880 (48.0),0.0,4.5,4.6,3.6,5.4,10.6

4320 (72.0),0.0,3.9,2.7,2.0,4.1,10.3

[PREBURST_TRANS_META]

The tranformational pre-burst is intended for software suppliers in the NSW area and is simply the Initial Loss - Burst Initial Loss. It is not appropriate to use these values if considering a calibrated initial loss.

[END_PREBURST_TRANS]

[ENDTXT]

APPENDIX C

ARTC Review

Document Control Information			
	Contractor DC to update for re-submission	**Submitted Document No. or Transmittal No.:**	Martinus-PTRAN-001637
Project:	2100 - A2I	**Date Submission Received:**	30/07/2025
Comment Sheet Number_Revision:	5-0052-210-IHY-W8-CS-0001_C	**Comment Sheet Title:**	***External Comment Sheet - Flood Design Report - Wagga Wagga Station (Mothers) Footbridge***
Revision Date:	4/09/2025	**Documents related in Aconex** (by IR DC)	*Yes*

Review Comments (Reviewer)									Responses (Document Owner)					Close-Out			
#	PSR ID No. **or** Compliance Reference Document *(State the fully qualified reference the deliverable is non-compliant with)*	Document / drawing number - Revision Number	Section # / page #	Engineering Assurance Stage	Comment *(for example must be specific on non compliance. Reference mark-ups, if required)*	Comment Type	Full Name	Date	Full Name	Company	Date	Response *(must be specific on how the comment has been addressed. Agreed approach for re-submission)*	Documentation Section # / Figure #	Full Name	Date	Comment Status	Close-Out Comment
Example	*IR-SR-A2I-517 or 01-3500-PD-P00-DE-0008-A*	*0-0000-900-PEN-00-TE-0020_A*		*CRR*	*Is there sufficient space for a 10m maintenance vehicle to turn around at the end of the RMAR?*	*Non-Compliant*	*Joe Bloggs*	*15/02/2023*	*Fred Bloggs*	*Designer*	*15/03/2023*	*The area has been increased - now possible to turn 12.5m vehicle. The drawings are updated.*	*01-3500-PD-P00-DE-0008-A 01-3500-PD-P00-DE-0015-C*	*Jane Doe*	*27/09/2023*	CLOSED	
1	PSR Ann F	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 2, 5-0052-210-IHY-W8-RP-0001_A, Document Control	DDR	Thinesh Thirumurugan, No EDPM Competency	Non-Compliant	Mick Parnell	21/05/2025	Lorraine Jiang/Zoe Cruice/Andre Wepener	DJV/MR		DJV in process with ARTC Competency application forms for Flooding team , to still be assessed by Assessor. We plan to have this in place by latest mid-Aug 25		Mick Parnell	4/09/2025	CLOSED	
2	PSR Ann F	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 2, 5-0052-210-IHY-W8-RP-0001_A, Document Control	DDR	Yucen Lu, No EDPM Competency	Non-Compliant	Mick Parnell	21/05/2025	Lorraine Jiang/Zoe Cruice/Andre Wepener	DJV/MR		DJV in process with ARTC Competency application forms for Flooding team , to still be assessed by Assessor. We plan to have this in place by latest mid-Aug 25		Mick Parnell	4/09/2025	CLOSED	
3	PSR Ann F	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 2, 5-0052-210-IHY-W8-RP-0001_A, Document Control	DDR	Jasmine Lee, No EDPM Competency	Non-Compliant	Mick Parnell	21/05/2025	Lorraine Jiang/Zoe Cruice/Andre Wepener	DJV/MR		DJV in process with ARTC Competency application forms for Flooding team , to still be assessed by Assessor. We plan to have this in place by latest mid-Aug 25		Mick Parnell	4/09/2025	CLOSED	
4	*NA*	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 15, 5-0052-210-IHY-W8-RP-0001_A, Table 2-1	DDR	There appears to be a typo in the reference.	Opportunity	Ayub Ali	12/05/2025	Thinesh Thirumurugan	DJV	25/07/2025	Format issue for section refernce corrected and checked thoughout the report	5-0052-210-IHY-W8-RP-0001_0, Table 2-1	Ayub Ali	31/07/2025	CLOSED	This item is closed base on the submitted screen shot.
5	*NA*	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 17, 5-0052-210-IHY-W8-RP-0001_A, Table 2-2	DDR	References to Section 0 in this table appears to be a typo. Hence correction is required.	Opportunity	Ayub Ali	12/05/2025	Thinesh Thirumurugan	DJV	25/07/2025	Format issue for section refernce corrected and checked thoughout the report	5-0052-210-IHY-W8-RP-0001_0, Table 2-12	Ayub Ali	31/07/2025	CLOSED	This item is closed base on the submitted screen shot.
6	*NA*	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 21, 5-0052-210-IHY-W8-RP-0001_A	DDR	Reference of Section 0 through the entire report to be checked and corrected.	Opportunity	Ayub Ali	12/05/2025	Thinesh Thirumurugan	DJV	25/07/2025	Format issue for section refernce corrected and checked thoughout the report	5-0052-210-IHY-W8-RP-0001_0, Section 4	Ayub Ali	31/07/2025	CLOSED	This item is closed base on the submitted screen shot.
7	*NA*	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 21, 5-0052-210-IHY-W8-RP-0001_A	DDR	Reference of Section 0 through the entire report to be checked and corrected.	Opportunity	Ayub Ali	12/05/2025	Thinesh Thirumurugan	DJV	25/07/2025	Format issue for section refernce corrected and checked thoughout the report	5-0052-210-IHY-W8-RP-0001_0, Section 4	Ayub Ali	31/07/2025	CLOSED	This item is closed base on the submitted screen shot.
8	*NA*	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 22, 5-0052-210-IHY-W8-RP-0001_A	DDR	Reference of Section 0 through the entire report to be checked and corrected.	Opportunity	Ayub Ali	12/05/2025	Thinesh Thirumurugan	DJV	25/07/2025	Format issue for section refernce corrected and checked thoughout the report		Ayub Ali	31/07/2025	CLOSED	This item is closed base on the submitted screen shot.
9	*NA*	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 23, 5-0052-210-IHY-W8-RP-0001_A	DDR	Reference of Section 0 throughout the report to be checked and corrected.	Opportunity	Ayub Ali	12/05/2025	Thinesh Thirumurugan	DJV	25/07/2025	Format issue for section refernce corrected and checked thoughout the report		Ayub Ali	31/07/2025	CLOSED	This item is closed base on the submitted screen shot.
10	*NA*	5-0052-210-IHY-W8-RP-0001_A.pdf	Page 42, 5-0052-210-IHY-W8-RP-0001_A	DDR	Reference of Section 0 throughout the report to be checked and corrected.	Opportunity	Ayub Ali	12/05/2025	Thinesh Thirumurugan	DJV	25/07/2025	Format issue for section refernce corrected and checked thoughout the report		Ayub Ali	31/07/2025	CLOSED	This item is closed base on the submitted screen shot.

Non-Compliant:	Non-compliance which requires correction before further design development occurs.
Opportunity:	Comment which identifies an opportunity to save capex, achieve increased quality or operational outcome. Not a non-compliance.

OPEN:	Comment has not been addressed.
CLOSED:	Comment is closed. No further action.
NEXT PHASE:	Comment response has been accepted. Resulting actions have been deferred to the next Phase of the Project (for Doc Control purposes the comment is considered OPEN)
TRANSFERRED:	Response is not acceptable or review has been split and the comment has been transferred to another comment sheet. (for Doc Control purposes comment is considered CLOSED)

APPENDIX D

External Consultation Review

D1 – CPHR Comments

D2 – TfNSW Comments

(No WWCC Comments Received – refer A8/E41 Consultation Report)

APPENDIX D1

CPHR Comments

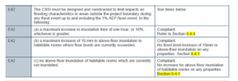
A2I Flood Design Report CONSULTATION - COMMENTS REGISTER

Stakeholder Category	Stakeholder Name	Flood Design Report name	Document reference (e.g. section, figure, table)	Date raised	Topic that comment relates to	Comments	Responder Name	Date	Response	Doc Evidence	RD comments 10/09 2025
	CPHR	A2I-Wagga Wagga Station (Mothers) Footbridge-Flood Design Report (5-0052-210-PEN-W8-RP-0001)	Generally	6/02/2025	Generally	The flood impacts of the proposed works is negligible. As such no major concerns from a flood impact perspective.	Thinesh Thirumurugan	18/08/2025	Yes, that's correct		Resolved.
	CPHR	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001_A	Generally	6/11/2025	Flood maps	No supporting infromation has been supplied (ie peer review). As this is the DDR we need to understand the review process.	Thinesh Thirumurugan	18/08/2025	The DDR stage is the initial stage where the model and report will be provided for Peer review. The evidentiary documentation will be attached in the IFC stage	5-0052-210-IHY-W8-RP-0001 Appendix C,D,E	Inconsistencies exist with how the different phases (ie. DDR, IFC etc.) are approached. It would be helpful if a summary marix was provided which describes the information supplied in each report. This information would make review easier and the design and impact assessment more transparent.
	CPHR	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001_A	Appendix A	6/11/2025	Flood maps	No afflux maps (especially for 1% AEP) were found. These should be included in all reporting.	Thinesh Thirumurugan	18/08/2025	The Afflux maps, including the Afflux for events 1% AEP, were provided to Martinus as Appendix A. Maps A43 to A57 present the change in water level, velocity and Hazard.	Appendix A 	Resolved.

APPENDIX D2

TfNSW Comments

A2I Flood Design Report CONSULTATION - COMMENTS REGISTER

Stakeholder Category	Stakeholder Name	Flood Design Report name	Document reference (e.g. section, figure, table)	Date raised	Topic that comment relates to	Comments	Responder Name	Date	Response	Doc Evidence
State Government Agency	TfNSW	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001_A	2.2. Conditions of Approval - Flooding	23/06/2025	Conditions of approval	In Table 2-2 for Condition of Approval E41 this should read "The Proponent's response to the requirements of Conditions E38 and E40..." - please correct.	Thinesh Thirumurugan / Zoe Cruice	6/26/2025	COA E41 reference has been corrected in Table 2-2.	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001 _D Table 2-2 
State Government Agency	TfNSW	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001_A	2.2. Conditions of Approval - Flooding	23/06/2025	Editorial	There are broken cross-references in the document, e.g. many Compliance Evidence References in Table 2-2 refer to Section 0. Please rectify all broken cross-references in the document for readability.	Thinesh Thirumurugan	6/26/2025	The formatting issue in the table has been corrected and checked throughout the report	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001 _D Table 2-1 and Table 2-2 
State Government Agency	TfNSW	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001_A	6.2 Design Condition and Appendix A - Flood Maps	23/06/2025	Flood impacts	Please provide further clarification to explain how such widespread flood improvements are achieved in the design scenario.	Thinesh Thirumurugan	6/26/2025	The widespread improvement in the vicinity of the site is due to the Wagga Wagga Yard design (for further details, please refer to report 5-0052-210-IHY-W7-RP-0001). The proposed Wagga Wagga Yard design channel, located to the south of the railway, provides additional flood storage for the area (generally up to a depth of 0.5 metres). This effectively lowers floodwater levels to the south of the railway. The reduction in water levels results in a reduction of floodwater overtopping the railway track to the north, resulting in an overall improvement in flood levels.	Wagga Footbridge Flood Design Report 5-0052-210-IHY-W8-RP-0001 _D section 6.4.5

APPENDIX E

Independent Flood Consultant Review

Project: 2300 **Deliverable:** Wagga Wagga Footbridge

Comment Sheet Reference: 5-0052-210-IHY-W8-CS-0001_A

Review Comments (Reviewer)										Responses (Document Owner)					Close-Out				
#	Document number / drawing number - Revision Number	Section # / page #	Company	Full Name	Functional Area	Date	Design Gate	Comment (for example must be specific on non compliance. Reference mark-ups, if required)	Comment Type	Full Name	Role	Date	Response (must be specific on how the comment has been addressed)	Where addressed (Section # / Figure #)	Full Name	Company	Date	Comment Outcome	Close-Out Comment
1	5-0052-210-IHY-W8-RP-0001_0_IFC		Hatch	Daniel Williams	Flood Assessment	19/09/2025	IFC	The minor nature of the works have a negligible impact on flooding, with flood impacts mapped in the FDR being related to the other local work packages. No response required.		Zoe Cruice	Eng Man	20/09/2025	Noted. No action					CLOSED	
2	5-0052-210-IHY-W8-RP-0001_0_IFC		Hatch	Daniel Williams	Flood Assessment	19/09/2025	IFC	No further comments.		Zoe Cruice	Eng Man	20/09/2025	Noted. No action					CLOSED	

MARTINUS

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