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MARTINUS INLAND RAIL

FLOOD DESIGN REPORT

A2I | Albury to Illabo

Package A2I: Albury Station Yard and Footbridge

Contract Number: 0052

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GLOSSARY

Specific terms and acronyms used throughout this plan and sub-plans are listed and described in that table below.

TABLE 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
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
FRMSP	Albury Floodplain Risk Management Study and Plan
FS	Finish-Start constraint type
FSL	Finished Surface Level
GDA	Geocentric Datum of Australia
GIR	Geotechnical Interpretative Report
HF	Human Factors
I2S	Illabo to Stockinbingal
IFC	Issued for Construction
IR	Inland Rail
ITC	Incentivised Target Cost

Term	Definition
IV	Independent Verifier
Km	Kilometres
LPA	Licensed Project Area
LiDAR	Light Detection and Ranging
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
REF	Review of Environmental Factors
RFI	Request for Information
RMAR	Rail Maintenance Access Road
S2P	Stockinbingal to Parkes
SA	Source Area
SAQP	Sampling, Analysis and Quality Plan
SDR	Systems Definition Review
SEMP	System Engineering Management Plan
SMS	ARTC Safety Management System
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

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 Site Description

This study conducts a flood assessment for the Albury Station Yard and Footbridge (refer to the figure below for the site location). The background and previous studies for the site are listed below.

FIGURE 1: SITE LOCATIONS

1.3.1 Background

The site of Albury Station Yard and Albury Station Footbridge (hereby known as Albury Station Yard and Footbridge) forms part of the Albury to Illabo Section, with the proposed track slew works and footbridge replacement located between Chainage (CH) 645.350km to 646.630km and Chainage 646.000km respectively. The proposed footbridge solution will provide a pedestrian crossing over the railway tracks and will have a clearance of 7.1m over the Main, Loop and Platform Lines to allow the passage of double-stack rail traffic underneath the bridge. Young Street, Riverina Highway and Hume Highway are classified road which is located near the site (Refer to Figure 1).

1.4 Objectives

This report has been prepared to support the delivery of the Albury Station Yard and Footbridge to comply with the CSSI Conditions of Approval (CoA) and Updated Mitigation Measures (UMM) 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) design for Albury Station Footbridge, and the Detailed Design Review (DDR) for Albury Station Yard, as the Albury Station Yard design is not yet completed to IFC at the time of preparing this report. Any potential flood impact from Albury Station Yard design finalisation on Albury Footbridge design and the flood modelling, is analysed and detailed in Section 6.4.5.

The flood assessment aims to estimate the flood behaviour within the study area and assess the potential flood impacts as a result of the design outside of the project boundary.

This report should be read in conjunction with the Detailed Design Report – Albury Yard Track Slews (5-0052-210-PEN-B7-RP-0001) and Albury Station Footbridge (5-0052-210-PEN-B3-RP-0001).

1.5 Scope

The scope of this study includes:

- Carrying out the flood assessment for the design in the IFC stage for Albury Footbridge and DDR stage for Albury Station Yard stage for the design events of 5%, 2%, 1% AEPs and 1% AEP with Climate Change, 0.05% AEP and PMF (Probable Maximum Flood).
- 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

The table below summarises the flood studies associated with the Albury Station Yard and Footbridge site.

TABLE 2: SUMMARY OF THE PREVIOUS STUDIES

Item No.	Flood Study	Description	Comments
1	Bungambrawatha Creek, Lavington, South Albury and West Albury flood study (Lyall & Associates, 2011)	This flood study defines flood behaviour under the conditions of the model that was built in 2011. The hydrologic models were developed in RAFTS and DRAINS software packages and the 2D hydraulic model was developed using TUFLOW software. The hydrologic model was calibrated using historical flood data. The TUFLOW model was simulated for design rainfall events ranging between the 20% and 0.2% AEPs based on the Australian Rainfall and Runoff 1987 (ARR87).	-
2	Albury Floodplain Risk Management Study and Plan (FRMSP) (WMA Water, 2016)	This report assessed flood behaviour, flood risk, and flood management issues in the Albury LGA. It used the Lyall & Associates (2011) model and updated it to consider the elevated water levels in the Murray River and the terrain changes for recently developed land throughout the catchment.	The TUFLOW model from this FRMSP has been adopted to be updated and used for flood assessment in the current assessment. A summary of the TUFLOW model parameters is provided in Table 10

Item No.	Flood Study	Description	Comments
3	Albury to Illabo (A2I) and Stockinbingal to Parkes (S2P) Projects Reference Design Report – Wagga Wagga (June 2022)	No detailed flood modelling is documented in the Reference Design report. The Bungambrawatha Creek, Lavington, South Albury and West Albury flood study (Lyall & Associates, 2011) was adopted to inform the flooding across the site. A DRAINS model was built to estimate the peak flows associated with the Reference Design and this indicated that the track could achieve 1% AEP flood immunity resulting from the design and is not expected to produce an increase in downstream flood levels of more than 100 mm.	-
4	Albury to Illabo Environmental Impact Statement (EIS) Technical Paper 11 – Hydrology, Flooding and Water quality (July 2022)	No detailed flood modelling is documented in the EIS report. The Bungambrawatha Creek, Lavington, South Albury and West Albury flood study (Lyall & Associates, 2011) was adopted to inform the flooding across the site. Four design events, including the 20%, 5%, 1% AEP events and the Probable Maximum Flood (PMF) event were assessed and modelling demonstrated that the three box culverts (CH644.770km) do not have sufficient capacity to convey the upstream runoff. As a consequence, water spills into the rail corridor during the 20% AEP and greater events. The portion of overland flow that spills into the rail corridor proceeds in a south-west direction, following the terrain slope. A DRAINS model was developed to assess rail flood immunity. Modelling confirmed that the railway line can achieve 1% AEP flood immunity with the proposed drainage system and that there was no adverse flood impact associated with the proposed works.	-

1.6.2 Reference Design

The report below was produced by WSP as part of the Reference Design.

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

The reference design assessed that the site is located within the South Albury catchment, which is the smallest of the subject catchments discharging to the Murray River. The site is not subject to flooding up to and including the 1 % AEP flood event. The site is affected by overland flooding in the PMF. The proposed works are not expected to affect flooding up to the 1 % AEP flood event.

1.6.3 Environmental Impact Statement

The report below was produced by Others as part of the Environmental Impact Assessment.

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

There is no detailed flood modelling within this report. A qualitative assessment was undertaken to assess the overland flood condition of the site based on the Bungambrawatha Creek, Lavington, South Albury and West Albury flood study (Lyall & Associates, 2011) and regional flood conditions based on the Albury Floodplain Risk Management Study and Plan (WMA Water, 2016). The site is not affected by regional flooding from the Murray River (refer to Figure 2, Figure 3 and Figure 4) and is not affected by local overland flooding during the 20 % AEP, 5% AEP, 1% AEP events, but is affected during the PMF flood event (refer to Figure 2 below).

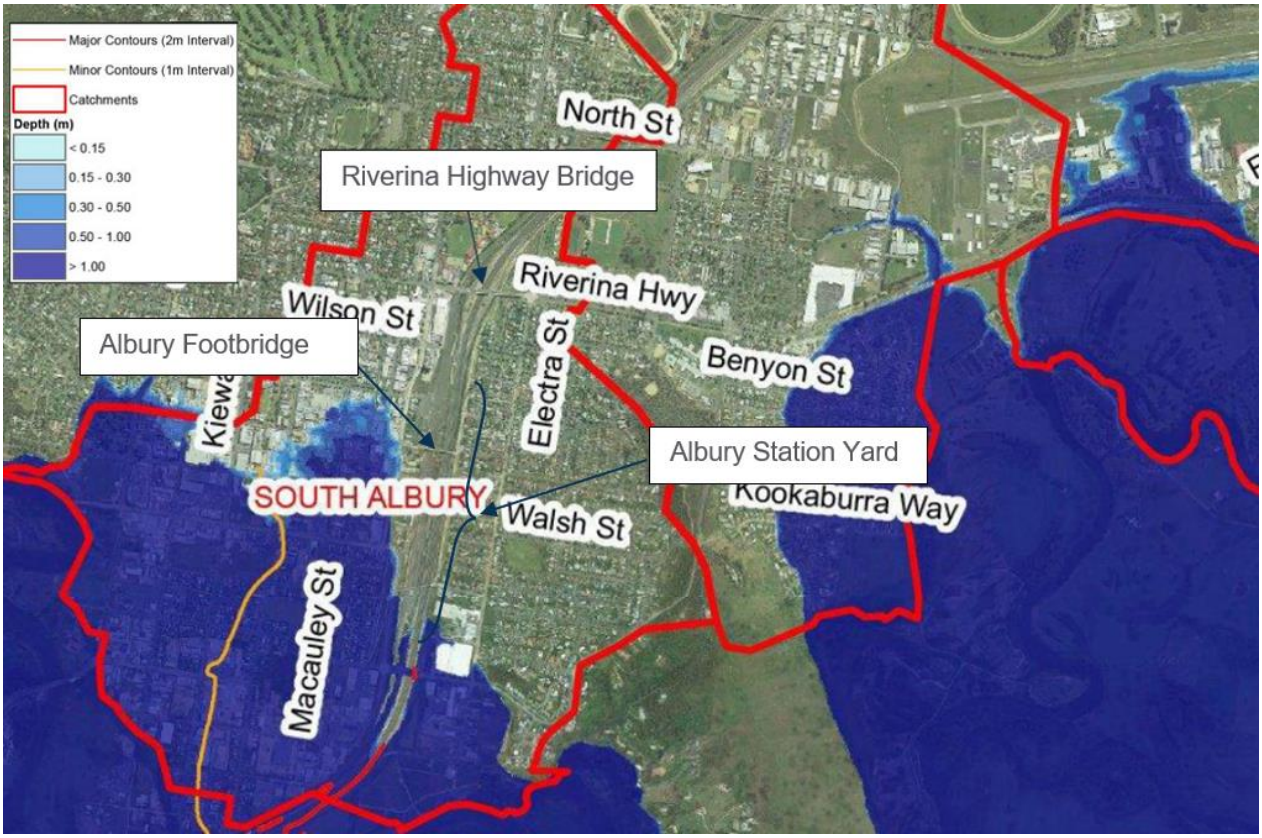

FIGURE 2: PMF MURRAY CATCHMENT REGIONAL FLOODING (IMAGE SOURCE: ALBURY TO ILLABO EIS TECHNICAL PAPER 11, JULY 2022)

FIGURE 3: 1% AEP LOCAL FLOODING ALBURY YARD CLEARANCE (ALBURY STATION YARD) (IMAGE SOURCE: ALBURY TO ILLABO EIS TECHNICAL PAPER 11 (JULY 2022))

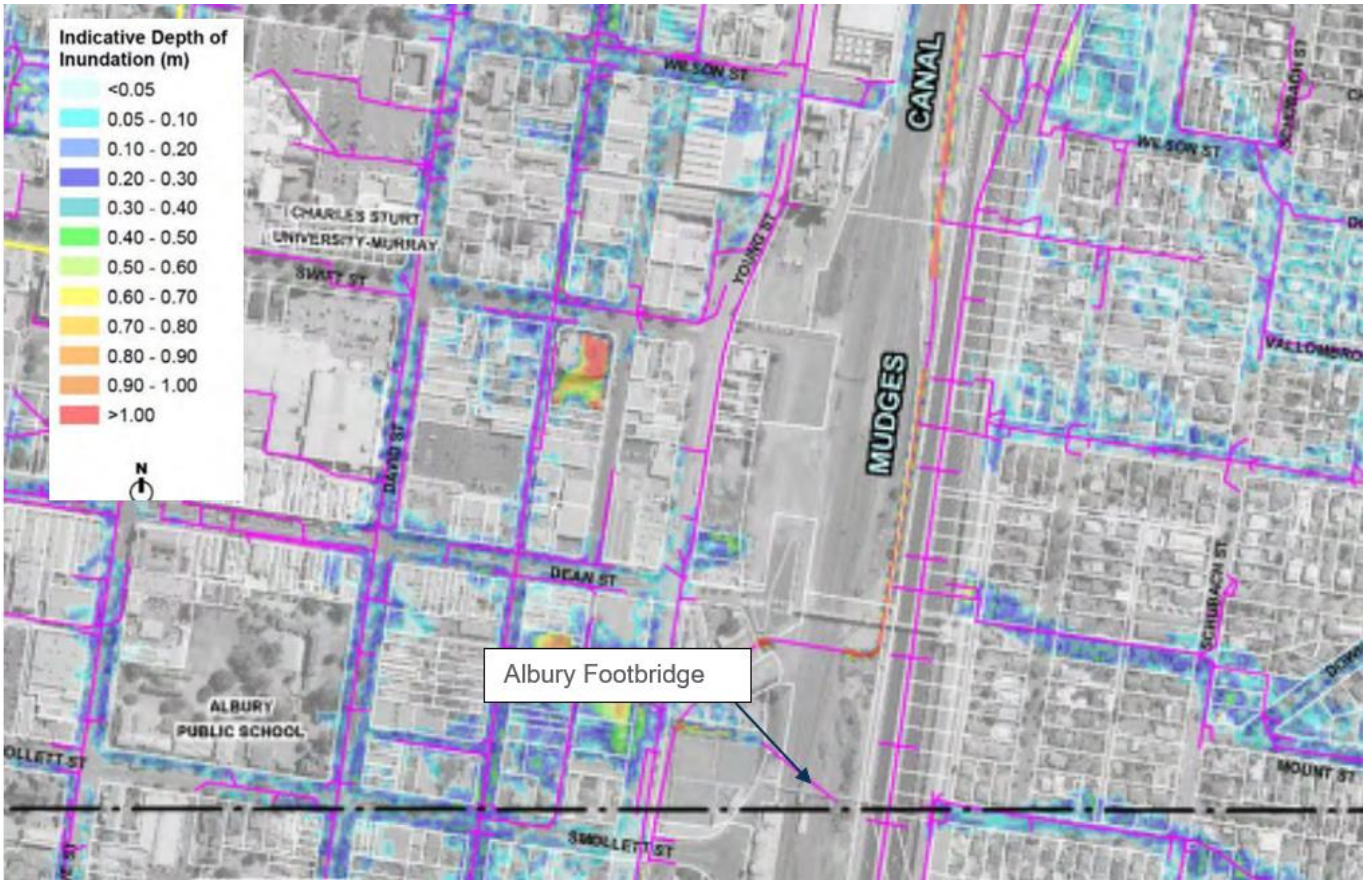

FIGURE 4: 1% AEP LOCAL FLOODING ALBURY FOOTBRIDGE (IMAGE SOURCE: BUNGAMBRAWATHA CREEK, LAVINGTON, SOUTH ALBURY AND WEST ALBURY FLOOD STUDY (LYALL & ASSOCIATES, 2011) (JULY 2022))

1.7 Purpose and Requirements

The primary purpose of this IFC flood design report is to investigate the flood behaviour and its potential flood impact associated with the Albury Station yard Track Slews and Albury Station Footbridge packages.

The secondary purpose of this report is to provide evidentiary documentation on consultation with external stakeholders, and review conducted by the independent suitably qualified flood consultant, in demonstrating compliance with the CSSI conditions of approval. Refer to Appendix D for ARTC review, Appendix E for external consultation review, and Appendix F 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:

- Albury Floodplain Risk Management Study and Plan (FRMSP), WMA Water, 2016
- Albury to Illabo (A2I) and Stockinbingal to Parkes (S2P) Projects Reference Design Report – Albury (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

The table below outlines the available information relevant to the site and used for flood modelling.

TABLE 3: AVAILABLE INFORMATION

Item	Information	Type	Description / Comments
1	Flood model used in the Albury Floodplain Risk Management Study and Plan (WMA water, 2016)	TUFLOW model	Received from Martinus on 29/08/2023
2	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	Downloaded from https://elevation.fsdf.org.au/ on 08/09/2023
3	1m 2015 LiDAR and High-Resolution Aerial Imagery. The data derived points have an accuracy of 0.15m (68% confidence interval) ARTC LiDAR	TIF format in GDA94	The existing 1m LiDAR (flown by ARTC in 2015) was received from Martinus on 12/11/2024. However, the LiDAR2020 (item 2) is newer and in GDA2020. Therefore, only LiDAR 2020 (item 2) is used.
4	A2P RVR RAIL EXT GDA20Z55.12da A2P RVR ROAD EXT GDA20Z55.12da	12da	Point cloud survey Received from DJV civil team on 15/04/2024
5	A2P ABY EXT GDA20Z55 COMBINED 250506.12da	12Da file	Detailed topography survey and existing track levels Received from DJV survey team on 06/05/2025
6	Albury Yard Existing Drainage Export.12daz 5-0052-210-CDR-B7-CA-0101-ALBURY_YARD_3_TRACK_ALTERNATIVE_DRAINAGE.dwg	12da and Dwg file	Existing drainage system Received from DJV Drainage team on 04/03/2023
7	5-0052-210-CAL-B7-MD-0002-ALBURY_STATION_YARD_3D_RAIL_DESIGN_STRINGS_DWG.dwg	Dwg file in GDA2020 projection	DDR Rail Design Strings for Albury Yard Received from DJV Rail team on 08/05/2025
8	ALBURY YARD FLOOD EXPORT.12daz 5-0052-210-CDR-B7-SC-0001 ALBURY YARD DRAINAGE PIT SCHEDULE.xlsx Pit inlet curves.xlsx	12Da file and Excel file	DDR Drainage Design system for Albury yard Received from DJV Drainage team on 30/05/2025
9	DDR - ALBURY YARD B7 0.5m GRID.dem DDR - ALBURY YARD B7 BALLAST 0.5m GRID.dem	Dem Grid file (0.05m grid) in GDA2020 projection	DDR Civil Design for ballast, capping in the GDA2020 projection Received from DJV Civil team on 30/05/2025
10	TRIA DESI 210 DCW B3 ROAD 250815.dem	Dem Grid file (0.05m grid) in GDA2020 projection	IFC Civil Design for footbridge work extents GDA2020 projection Received from DJV Civil team on 15/08/2025
11	5-0052-210-SBD-B3-MD-2001-ALBURY_STATION_FOOTBRIDGE_3D_STRUCTURAL_DESIGN_BRIDGE_MODEL_DWG Structures - 20250521 - Albury Station Footbridge Check Print.pdf	Dwg file in GDA2020 projection and PDF plan	DDR Albury footbridge structure design in GDA2020 projection Received from DJV Structure team on 21/05/2025 This design remains the same in the IFC stage

Item	Information	Type	Description / Comments
12	5-0052-210-CDR-B3-MD-2103-ALBURY_STATION_FOOTBRIDGE_3D_DRAINAGE_DESIGN_STRINGS_DWG.dwg 150825 ALBURY YARD DRAINAGE SCHEDULE	12Da file and Excel file	IFC Drainage Design system for footbridge Received from DJV Drainage team on 16/08/2025
13	Albury TfNSW Footbridge As-Builts.pdf Existing bridge as-builts.pdf	PDF	Existing footbridge structure drawings Received from DJV Bridge team on 01/04/2025

1.10 Outputs

The list of flood maps, along with the flood maps are included in Appendix A.

1.11 Limitations and Assumptions

The hydrologic and hydraulic modelling assumptions and constraints are listed below:

- An assessment of temporary works and staging has not been undertaken as it is out of the flooding scope.
- According to Clause 5.4.2 and Clause 5.4.3 in Annexure B of PSR, the highest flood event shall be the one stipulated by the ARTC Safety Management System (SMS). As per Section 10.1.3 of Track and Civil Code of Practice Section 10 Flooding, the 1% AEP shall be used. The flood impact would be assessed up to the 1% AEP for the project
- 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 (Refer to 5-0052-210-IHY-99-ME-0001).

2 COMPLIANCE WITH REQUIREMENTS

2.1 Project Scope and Requirements

Assessment of the detailed design to see if it meets the Project Scope and Requirements (PSRs) has been undertaken. This is demonstrated throughout the flood assessment, with the table below summarising the Albury Station Yard and Footbridge Design's Compliance with the PSRs.

TABLE 4: 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. The top of the track is overtopped in the 1% AEP in the existing scenario and the existing immunity is up to 2% AEP. Thus, the flood immunity of the track should be 2% AEP. The existing immunity is improved 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. The top of the track is overtopped in the 1% AEP in the existing scenario, and the existing immunity is up to 2% AEP. The flood immunity of the track should be 2% AEP. The existing immunity is improved 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 Albury Station Yard and Footbridge scope. The Albury Footbridge is not a waterway bridge.
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.	A Climate Change assessment was carried out by running the 1% AEP + 2090 RCP 8.5 scenario and identifying potential flood behaviour. 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.	The existing immunity is maintained under design conditions. Refer to Section 6.3.

Requirement	Identifier	A2P Technical Requirements Description	Compliance Evidence Reference
A2I Technical Requirements	IR-SR-A2I-352	The Corridor System shall prevent damage of the formation due to ponding of water.	No damage to the formation. Existing Immunity is maintained. The proposed condition accommodates ballast drain and additional drainage pipes to drain the site. Refer to Sections 6.2 & 6.3.
A2I Technical Requirements	IR-SR-A2I-458	The Corridor System shall prevent ponding in longitudinal open channels.	The proposed ballast drain has grading that prevents ponding. Refer to Section 4.5 (Drainage Design) in the Albury Station Yard Report (5-0052-210-PEN-B7-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.	The existing condition is maintained. Flood impacts are no worse than existing conditions. Refer to Section 6.4.
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.	The existing condition is maintained. Flood impacts no worse than the existing condition. 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.	The corridor system has minimised changes to the existing flow patterns. Flood impacts no worse than the existing condition. Refer to Section 6.4.
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 it was identified that the flood velocity is generally less than 1m/s and the hazard is generally low. 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 a low risk to the structural integrity. Refer to Section 4.6 Structure in 5-0052-210-PEN-B3-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 6.4.1.
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 5.

*A2I Technical requirements are used in A2P as A2P is a part of A2I.

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 the table below.

TABLE 5: 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 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.	Compliant. Refer to Section 6.
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. Refer to 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 6.1 and 6.2.
E40	d) Confirmation of predicted afflux at industrial properties adjacent to Railway Street, Wagga Wagga based on field survey.	N/A. This criterion is related to the Wagga Wagga Yard enhancement site but not the Albury Station Yard and Footbridge, which is the subject of this report.
E40	Updated flood modelling must be made publicly available in accordance with **Condition B18**.	A flood design report and an independent review of the flood design report shall be 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.	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 will be undertaken through a formal review of this Flood Design Report. Consultation with

Condition	Condition or Criteria	Compliance Evidence Reference
		other stakeholders will occur prior to finalisation of the 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. Refer 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. Refer Section 6.4.1.
E42	(d) a maximum increase of 50 mm in inundation of land zoned as residential, industrial or commercial;	Compliant. No flood level increase of more than 50mm in residential, industrial and commercial areas. Refer 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. Both a relative velocity increase of 10%, and relative velocity increase of 0.5m/s, have been considered, and the criteria of relative velocity increase of 0.5m/s has been adopted as it is the governing and worse-case criteria
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.	N/A, Clause (d) to (f) are compliant

Condition	Condition or Criteria	Compliance Evidence Reference
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 will be 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 will be 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 will 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 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 the existing conditions. The design has not worsened the existing condition. Discharges to the Council's stormwater network have been provided to the Albury City Council during briefing workshops, at various stages of design submissions. No comments were received. Refer to Section 4.5 (Drainage Design) in Albury Station Yard Design report (5-0052-210-PEN-B7-RP-0001) and Section 4.5 in Albury Footbridge Design Report (5-0052-210-PEN-B3-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 the table below.

TABLE 6: UPDATED MITIGATION MEASURES COMPLIANCE TABLE - FLOODING

Condition	Condition or Criteria	Compliance Evidence Reference
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.
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 criterion is related to the Wagga Wagga Yard enhancement site lowering site but not the Albury Station Yard and Footbridge, which is the subject of this report. Compliant. Quantitative assessment has been undertaken. Refer to Section 4.3 & 6.
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 criterion is related to the Riverina Highway bridge enhancement site but not the Albury Station Yard and Footbridge, which is the subject of this report.

* QDL is superseded by CoA E42.

3 CHANGE MANAGEMENT

This section summarises the changes made to this design package for flooding assessment purposes, 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 is not applicable to this stage.

3.3 PDR to DDR

Key design changes between the PDR and the DDR Design are listed in the table below.

TABLE 7: DESIGN DIFFERENCES BETWEEN PDR AND DDR

Item	Difference	Reason for Change
1	Incorporation of the latest existing condition survey	DDR detailed topography survey was provided
2	Incorporation of the existing drainage data	Existing drainage data for the site
3	Incorporation of drainage design	DDR drainage design for the site
4	Incorporation of civil design	DDR civil design for the site
5	Incorporation of railway track design	DDR rail design for the site
6	Incorporation of footbridge design	DDR footbridge design for the site

3.4 DDR to IFC

Key design changes between the DDR and the IFC Design are listed in the table below. This stage incorporated IFC design for Albury Footbridge site.

TABLE 8: DESIGN DIFFERENCES BETWEEN DDR AND IFR

Item	Difference	Reason for Change
1	Incorporation of Albury footbridge drainage design	IFC drainage design for Albury footbridge
2	Incorporation of Albury footbridge civil design	IFC civil design for the Albury footbridge

4 MODELLING METHODOLOGY

Detailed hydraulic modelling using TUFLOW software was undertaken for this flood and impact assessment.

The overall approaches for flood modelling are listed below:

- Update the Hydrology from ARR 1987 to ARR 2019 and produce inflows to be used in the hydraulic model.
- Updating the received TUFLOW model by incorporating the latest LiDAR (2020) and survey data (Items 2, 4 and 5 from Table 2)
- Comparison of the TUFLOW results against the FRMSP 2016 TUFLOW model around the site area.
- Using the updated TUFLOW model to predict existing hydraulic behaviour, which forms the existing case against which the implementation of the design works is assessed.
- Incorporate the Riverina track lowering package design (5-0052-210-IHY-B4-RP-0001) into the Master Design condition to understand the cumulative impact on the site (Refer to Section 6.4.5).
- Updating the TUFLOW model from existing conditions to design conditions by incorporating the design into the existing case model.
- Conducting a Climate Change sensitivity test for the 1% AEP to inform the potential impact on the railway track flood immunity.
- Conduct a blockage assessment as per ARR 2019 procedures.

4.1 Catchment Description

The Albury Station Yard and Footbridge are located within the urban area of Albury and away from the Murray River. Thus, it is not subject to regional flooding. However, the site is affected by overland flooding. The flood water coming from the northern catchment of The Scots School Albury runs along the rail corridor in a south-east direction. This surface runoff flows through an open channel on the eastern side of the railway, followed by a piped section that connects to Mudges Canal. Mudges Canal continues about 1.5km to the south before discharging into the Murray River. Refer to track lowering package design at Riverina Highway Bridge (5-0052-210-IHY-B4-RP-0001) for its local catchment description.

4.2 Hydrologic Modelling

4.2.1 ARR2019 Approach

The hydrology models (DRAINS-RAFTS and DRAINS-ILSAX) related to Albury FRMSP (WMAwater, 2016) and Bungambrawatha Creek, Lavington, South Albury and West Albury Flood Study (Lyall & Associates, 2011) were originally built based on ARR1987, by Others. An excerpt from the study report is shown in the figure below.

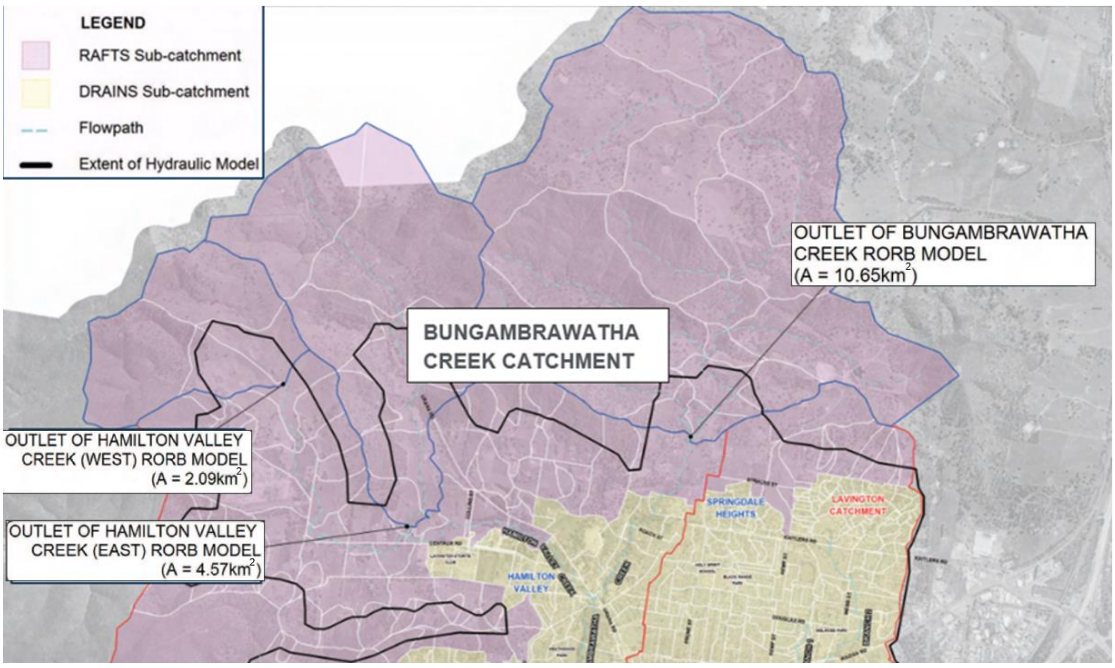

FIGURE 5: SUB-CATCHMENT PLAN FROM BUNGAMBRAWATHA CREEK, LAVINGTON, SOUTH ALBURY AND WEST ALBURY FLOOD STUDY (SOURCE: FIGURE 3.1-1 OF BUNGAMBRAWATHA CREEK, LAVINGTON, SOUTH ALBURY AND WEST ALBURY FLOOD STUDY, LYALL & ASSOCIATES, 2011).

Figure 5 describes that a RAFTS model was used for the upstream catchment while the DRAINS model was used for the densely populated catchment within the Bungambrawatha Creek, Lavington, South Albury and West Albury Flood Study. These hydrology models were not received from the Council and consequently, hydrology models have been built adopting ARR2019 to provide inflows to TUFLOW as part of the detailed design engagement. The sub-catchments delineation is shown in Figure 6. The DRAINS-RAFTS model was used to provide the SA (source-area) inflow for the upstream catchment and the catchment within the study area, but does not contain any drainage network (this inflow approach is consistent with the one adopted by the hydraulic model from Bungambrawatha Creek, Lavington, South Albury and West Albury Flood Study). Instead of DRAINS-ILSAX (ARR2019 recommended initial loss and continue losses cannot be used in DRAINS-ILSAX), Rainfall Excess was calculated to be applied to the urbanised catchment with the drainage network. The parameters for the two types of models were summarised in Table 9. The PMF Hydrology model was based on the ARR1987 guidelines. This was then updated as per ARR2019 guidelines incorporating an ensemble of 11 temporal patterns for GSDM PMF from 15 minutes to 180 minutes.

TABLE 9: HYDROLOGY MODELS PARAMETERS

Parameters	Hydrology model for the upstream catchment and the catchment within the study area but does not contain any drainage network	Hydrology approach for urbanised catchment
Model Type	DRAINS-RAFTS[1]	Rainfall Excess only
Areal Reduction Factor	Not Applied (As per Bungambrawatha Creek, Lavington, South Albury and West Albury Flood Study)	
Temporal Patterns	ARR2019 Temporal patterns (refer to Appendix B)	
Rainfall Losses	Refer to Section 4.2.3 and Appendix B	
Rainfall Depth	Refer to Appendix C	
Output	Routed hydrograph	Rainfall excess
Design Events	5% AEP, 2% AEP, 1%AEP, 1%AEP with Climate Change, 0.05% AEP, PMF	

Note 1: DRAINS software with RAFTS storage routing module, enables detailed simulation of the storage and routing of stormwater through various catchment elements. It also supports the latest guidelines and methodologies outlined in the Australian Rainfall and Runoff 2019 (ARR2019).

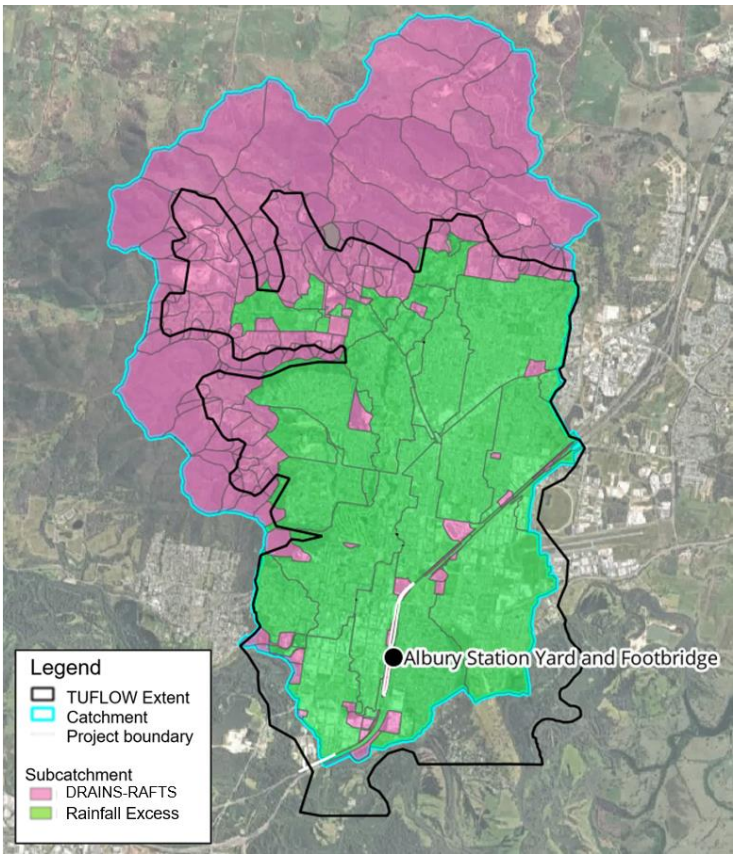

FIGURE 6: EXCERPT FROM THE FLOOD STUDY SHOWING SUB-CATCHMENTS

4.2.2 Climate Change

An assessment was conducted to evaluate the influence of climate change on flooding to anticipate any future climate change flood risk. 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 (V4.1) 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.arr-software.org/) was adopted.

Sea level rise will not affect the site as it is far away from the sea. In addition, as per Figure 2, the site is outside of the Murray River PMF extent. Therefore, the water level resulting from climate change in the Murray River will not affect the site.

4.2.3 Input Data for Design Flood Estimation

This study adopted the ARR 2019 procedure for the NSW-specific data to run the hydrological model. Probability Neutral Burst Initial Loss and storm continuing losses times 0.4 (1.8 mm/h) were used for pervious area. An initial loss of 1mm and continuing losses of 0 mm/h were adopted for impervious area. The design events of 5%, 2%, 1%, 0.05% AEPs, PMF and 1% AEP with Climate Change were selected to run.

Flow hydrographs were generated for input to the hydraulic model for the 5% AEP, 2% AEP, 1% AEP, 0.05% AEP, PMF and 1% AEP + Climate Change events, to perform critical duration analysis (Refer to Section 4.3.1).

4.3 Hydraulic Modelling

4.3.1 Existing TUFLOW Model Update

The TUFLOW hydraulic model was updated with modelling based on the received Albury FRMSP (WMAwater, 2016) detailed in Section 1.9.1. A summary of the received Albury FRMSP 2016 TUFLOW Model (Item 1 from Table 2) and updated IFC model parameters can be found in Table 10 below. The model extent encompasses Bungambrawatha Creek, South Albury and Lavington catchments (figure below).

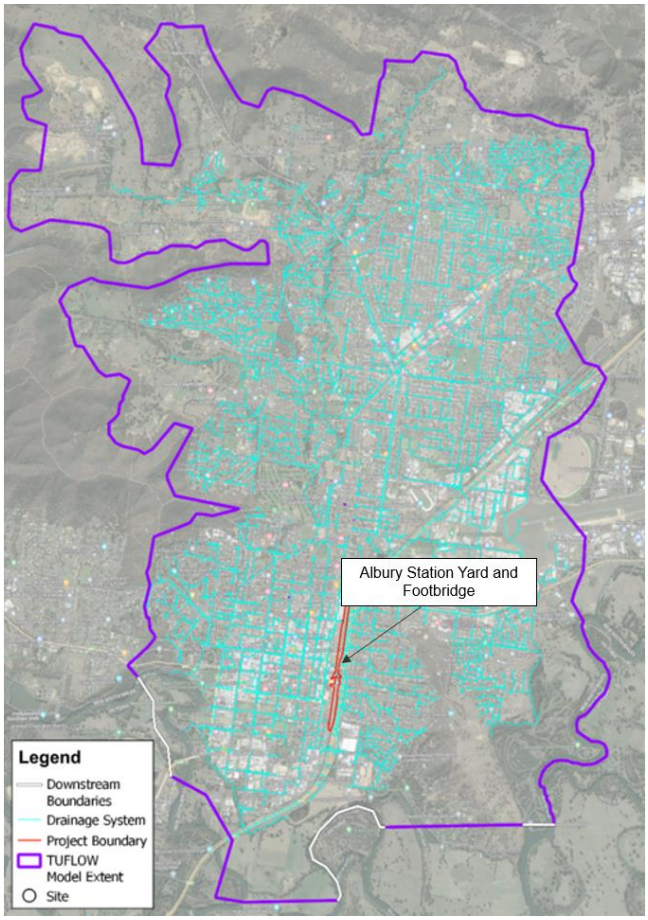

FIGURE 7: TUFLOW MODEL EXTENT

TABLE 10: MODEL PARAMETERS IN THE ALBURY FRMSP 2016 TUFLOW MODEL AND THE UPDATED IFC EXISTING CASE TUFLOW MODEL

Parameters	Albury FRMSP 2016 TUFLOW Model	Updated IFC TUFLOW Model (Existing Case)
Software Version	TUFLOW 2012-05-AB-w64 Classic	TUFLOW.2020-10-AF HPC
Coordination Reference System (CRS)	GDA94 MGA 55	GDA2020 MGA 55 Refer to the following Section 4.3.1.3 for more details.
Grid Size	5m	1.25m within the quadtree area (Site area) and 5m outside of the quadtree area
Hydrology	DRAINS-RAFTS and DRAINS-ILSAX (ARR1987)	DRAINS-RAFTS and DRAINS-RORB (ARR2019)
Inflow type	External inflow and SA Polygons	External inflow, Rainfall Excess, and SA Polygons
Key Features	Existing railway track was not defined	Survey of the existing railway track was included
Extent	Bungambrawatha Creek, South Albury and Lavington catchments	Bungambrawatha Creek, South Albury and Lavington catchments
Downstream Boundary	Constant downstream water boundary	Constant downstream water boundary
Timestep	0.5s	Dynamic
Building Representation	High Manning's (10)	High Manning's (10)
Topography	▪ DTM (5m resolution) based on Airborne Laser Scanning (ALS) survey in May 2005. The accuracy is ±100mm for urban area and ±250mm for wider Albury LGA. ▪ Cross section data for major trunk infrastructure	▪ DTM (5m resolution) based on Airborne Laser Scanning (ALS) survey in May 2005. The accuracy is ±100mm for the urban area and ±250mm for the wider Albury LGA. ▪ Cross-section data for major trunk infrastructure ▪ 2020 LiDAR for sites ▪ Point cloud survey and detailed survey for railway corridor (Items 4 and 5 in Table 2 respectively)
Roughness	▪ Asphalt or concrete road surface: 0.02 ▪ Concrete Surfaces: 0.015 ▪ Well Maintained Grassed Cover e.g. sporting oval: 0.03 ▪ Grass or Lawns: 0.045 ▪ Macrophytes: 0.06 ▪ Lightly Vegetated Areas: 0.07 ▪ Trees: 0.08 ▪ Trees and Shrub: 0.09 ▪ Mildly Dense Vegetation: 0.12 ▪ Dense vegetation: 0.135 ▪ Buildings: 10 ▪ Water Bodies/Wetlands: 0.035 ▪ Pastoral Grass, Tough Scrub Grass: 0.05 ▪ Rock Riprap: 0.06 ▪ Selected Roads in the Bungambrawatha Creek catchment: 0.06	▪ Asphalt or concrete road surface: 0.02 ▪ Concrete Surfaces: 0.015 ▪ Well Maintained Grassed Cover e.g. sporting oval: 0.03 ▪ Grass or Lawns: 0.045 ▪ Macrophytes: 0.06 ▪ Lightly Vegetated Areas: 0.07 ▪ Trees: 0.08 ▪ Trees and Shrub: 0.09 ▪ Mildly Dense Vegetation: 0.12 ▪ Dense vegetation: 0.135 ▪ Buildings: 10 ▪ Water Bodies/Wetlands: 0.035 ▪ Pastoral Grass, Tough Scrub Grass: 0.05 ▪ Rock Riprap: 0.06 ▪ Selected Roads in the Bungambrawatha Creek catchment: 0.06

Parameters	Albury FRMSP 2016 TUFLOW Model	Updated IFC TUFLOW Model (Existing Case)
	▪ Allotments where fences and outbuildings are present: 0.1	▪ Allotments where fences and outbuildings are present: 0.1 ▪ Concrete Open channel: 0.02 (adapted to be in line with the drainage design) ▪ Proposed Channel (grass lining): 0.03
Design Events	PMF, 0.2% AEP, 0.5% AEP, 1%AEP, 2% AEP, 5% AEP, 10% AEP, 20% AEP	PMF, 0.05% AEP, 1% AEP with Climate Change, 1% AEP, 2% AEP, 5% AEP

4.3.1.1 GDA2020 conversion

The conversion to GDA2020 of the TUFLOW data received from Albury Council, 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 MGA 55 from GDA94 MGA 55.

4.3.1.2 Topography

The model topography was updated by incorporating the 2020 LiDAR, point cloud survey and detailed survey. This update was performed to enhance the accuracy of the model, ensuring a proper representation of the most recent topography within the study area.

4.3.1.3 TUFLOW Model Version and Grid Size

To capture the design including the railway track, ballast drain in the model, a fine grid was required. Therefore, a newer TUFLOW model version needed to be adopted to provide a finer grid for the required area (this function is called “quadtree” and is available in TUFLOW versions from 2020 onwards). For this purpose, a finer resolution of 1.25m was adopted for the site and 5m outside the site to enable detailed representation and assessment of the design.

The model is set up using point terrain data (*.mid) instead of the grid (ASCII) for topography outside the LiDAR extent (as per the original received model). The latest TUFLOW version 2023-03-AC does not support point terrain data when using with quadtree. Therefore, TUFLOW release 2023 onwards cannot be used. However, the version before the 2023 release would run without any issues (as long as the quadtree extent does not extend into the point terrain data). Thus, TUFLOW 2020-10-AF HPC (the latest version prior to the 2023 release) was selected to conduct this flood assessment.

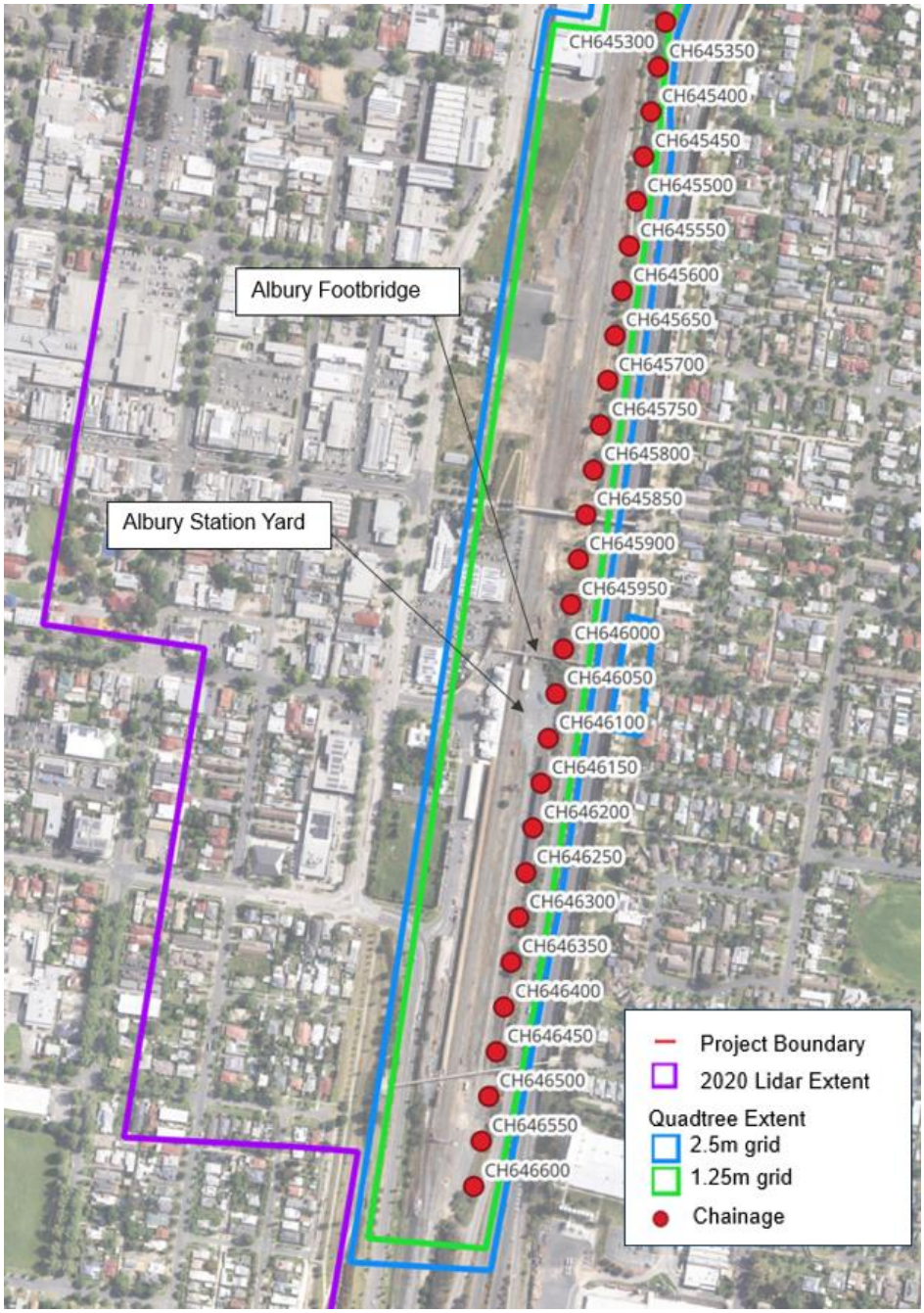

FIGURE 8: ADOPTED LIDAR 2020 EXTENT AND GRID SIZE EXTENT

4.3.1.4 Key Features

The Albury FRMSP TUFLOW did not model the railway track line and 3 existing footbridges within the study area. As the key feature, ignoring the railway track and footbridges will result in inaccurate results. As such, the existing railway track and footbridge piers was included in the updated existing case TUFLOW model (refer to Items 5 and 13 in Table 2).

4.3.1.5 Drainage Network

The drainage data based on detailed survey was incorporated into the updated IFC TUFLOW model (refer to Item 6 in Table 2). The Albury FRMSP TUFLOW model drainage data is used outside the site and updated in relation to the 2020 LiDAR.

In the existing condition, a short pipe connects to the Mudges Canal culvert at the site. This pipe causes instability in the flow, which affects the water levels within the canal. To address this issue, nodal storage was added. The pipe's configuration and impact will be reviewed during, at the IFC stage of the Albury Station Yard site. However, this will have negligible impact on the Albury footbridge flooding conditions.

4.3.1.6 Design Events

The storm durations of 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 5%, 2%, 1% and 1% AEP with Climate Change. The critical duration and temporal patterns determined and elaborated are summarise in the table below with the information of the design events.

TABLE 11: SUMMARY OF EVENTS AND CRITICAL DURATIONS RUN IN TUFLOW – ALBURY STATION YARD AND FOOTBRIDGE.

Design Events	Master Design Critical Duration and Temporal Pattern	Temporal Pattern
5% AEP	30 minutes, 60 minutes, 120 minutes, 270 minutes	All 10 temporal patterns for each duration
2% AEP	30 minutes, 60 minutes, 120 minutes, 270 minutes	
1% AEP	30 minutes, 90 minutes, 120 minutes, 270 minutes	
1% AEP + Climate Change	30 minutes, 90 minutes, 120 minutes	
0.05% AEP	30 minutes, 120 minutes	
PMF	180 minutes	All 11 temporal patterns for each duration

4.3.2 Design TUFLOW Model Update

4.3.2.1 Key Features

To establish the model for design condition, updates were undertaken to incorporate the Inland Rail Project Works as part of the DDR stage for Albury Yard and IFC stage for Albury footbridge stage. The table below includes the proposed work details.

TABLE 12: DESIGN CONDITION KEY FEATURES

Item	Design	Details
1	Track	The railway tracks within the site underwent a significant modification by slewing and level changes from the existing track extent (Refer to Section 4.2 of 5-0052-210-PEN-B7-RP-0001_D for more details regarding track design changes)
2	Drainage	Ballast Drainage network pipe network connecting to major culverts within the site and Footbridge Drainage network. (Refer to Section 4.5 of 5-0052-210-PEN-B7-RP-0001_D and 5-0052-210-PEN-B3-RP-0001_D for more details regarding Drainage design)
3		Inclusion of Ballast Drain parallel to the proposed Railway tracks (Refer to Drawing 5-0052-210-CDR-B7-DR-0202 to 5-0052-210-CDR-B7-DR-0202 for ballast drain long section respectively). (Refer to Section 4.5 of 5-0052-210-PEN-B7-RP-0001_D for more details regarding Drainage design)
4	Civil	Railway capping, ballast and footbridge earthworks. Refer to Figure 9 & 10 for changes in topography between existing and design scenario. (Refer to Section 4.3 of 5-0052-210-PEN-B7-RP-0001_D for more details regarding civil design)
5	Structural	Footbridge ramp was incorporated as a soil obstruction in the model. The piers were modelled as a Layered Flow Constrictions (2d_lfcsh). The bridge data was adopted from the Albury Footbridge plan (item 13 in Table 2) (Refer to Section 4.6 of 5-0052-210-PEN-B3-RP-0001_0 for more details regarding the civil design)

The figures below provide a visualisation of the changes in topography: the rail has been lifted slightly (yellow areas) to accommodate the slewing construction methodology, and ballast drains constructed (blue areas) to provide positive drainage to any new formation works.

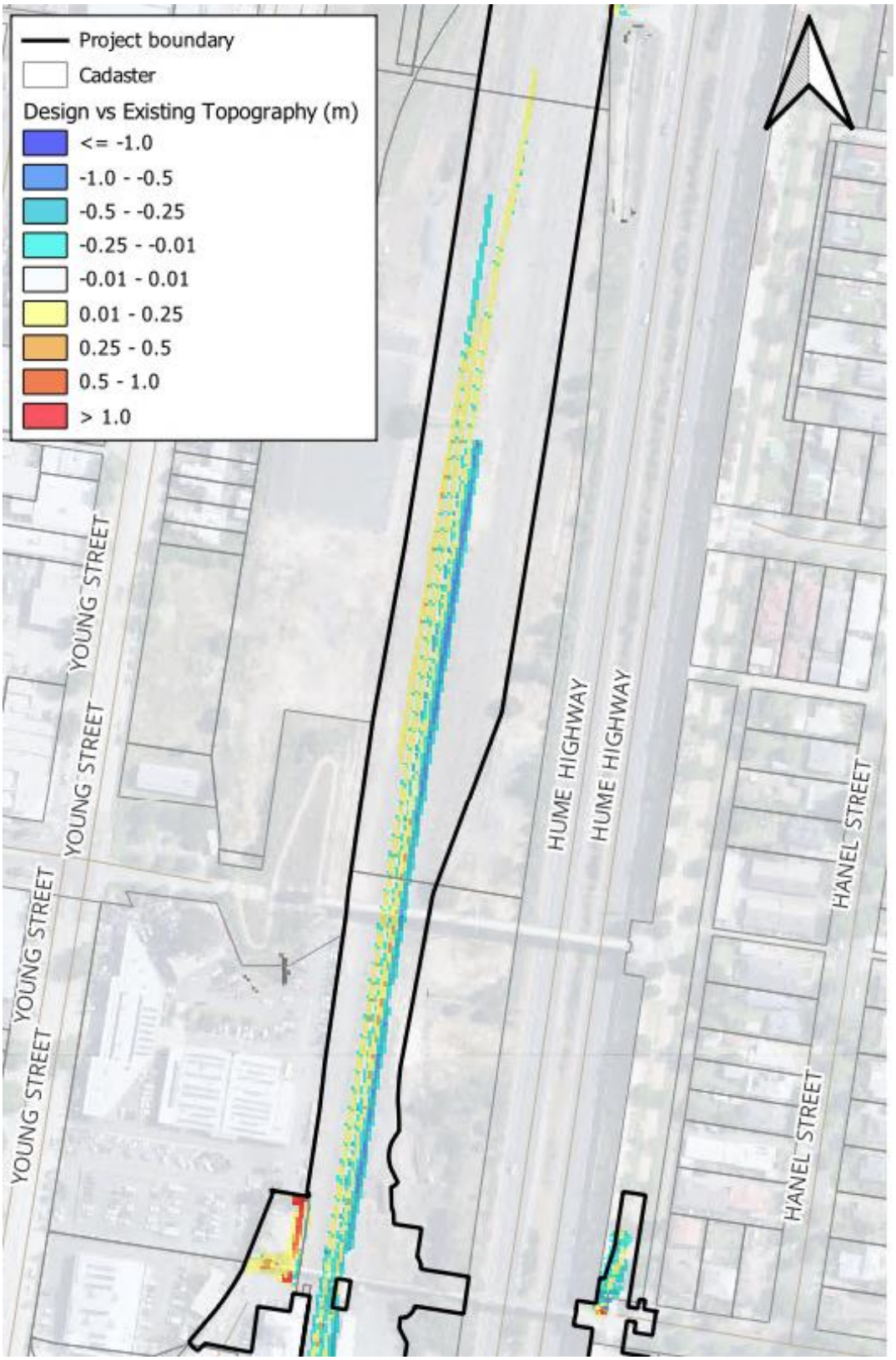

FIGURE 9: CHANGES IN TOPOGRAPHY DESIGN VS EXISTING – PART 1

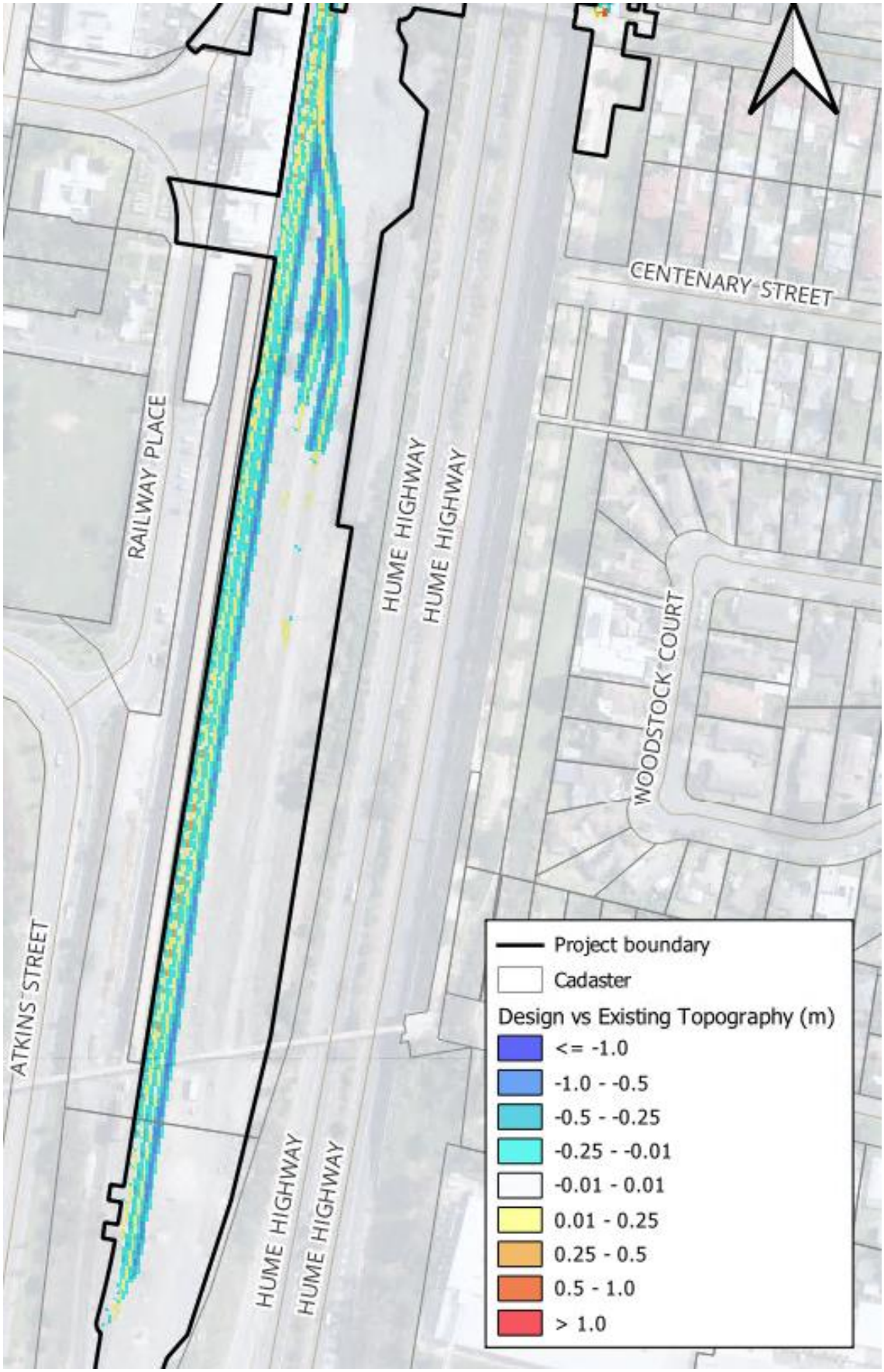

FIGURE 10: CHANGES IN TOPOGRAPHY DESIGN VS EXISTING -PART 2

5 EXISTING FLOOD RESULTS COMPARISON

The updated existing case TUFLOW model with ARR2019 was compared against the TUFLOW model results from Albury FRMSP 2016 TUFLOW model for 1% AEP, 120 minutes (indicated in figure below). While the Albury FRMSP 2016 TUFLOW model indicates that the site remains dry, the updated TUFLOW modelling shows some instances of flooding in this area.

The updated modelling of this project now demonstrates that there are flooding water at the site. This is due to:

- The existing railway track was not represented in the Albury FRMSP 2016 TUFLOW Model. Subsequent updates to the TUFLOW model, which included incorporating data from an existing rail survey and employing a finer grid size within the site, have improved the accuracy of the TUFLOW model and the presentation of the actual rail line levels.
- The inflow polygons covering the railway corridor at Albury Station Yard were updated based on the review of the LiDAR 2020 and detailed site survey.

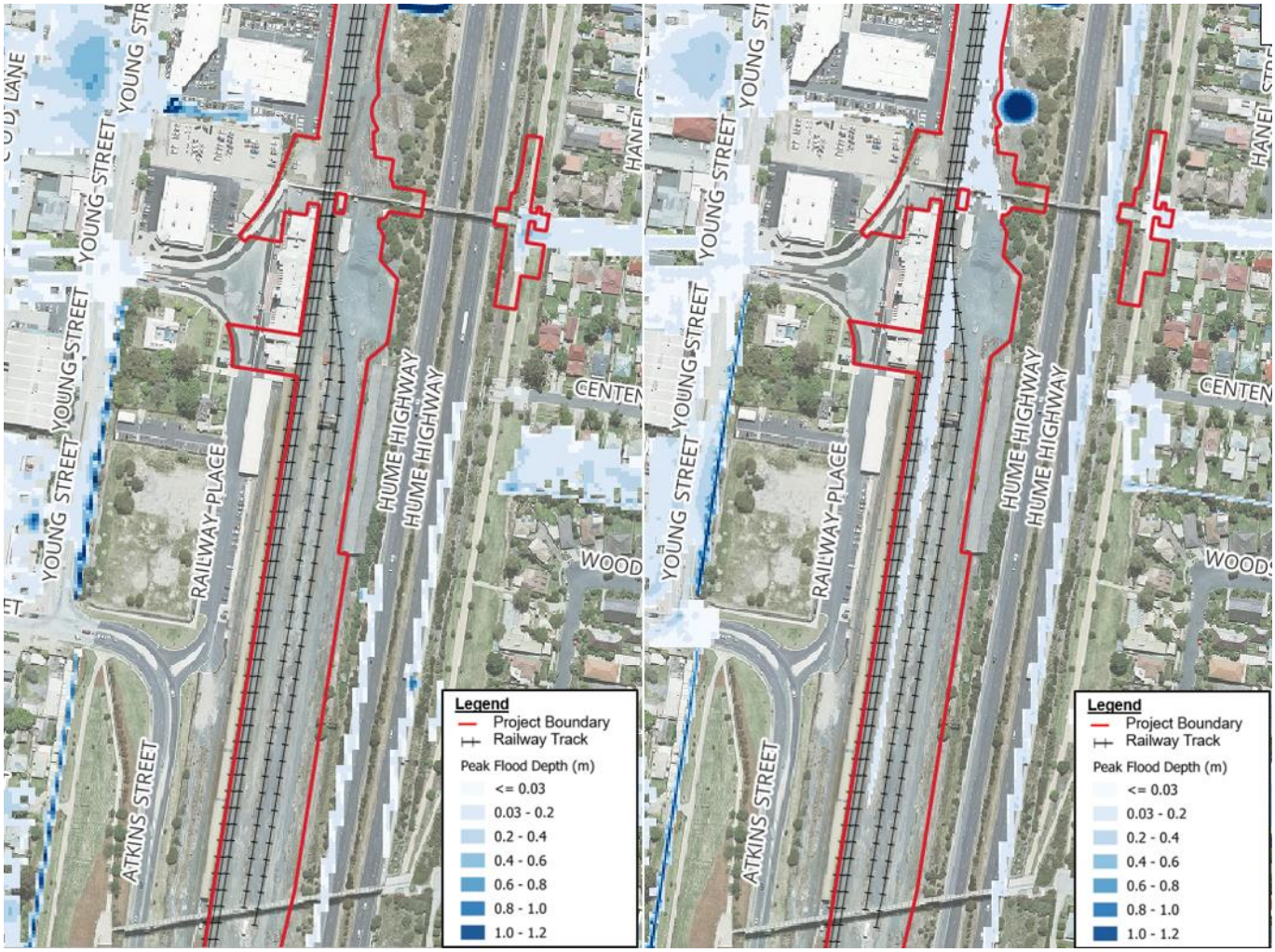

FIGURE 11: FLOOD RESULTS COMPARISON (LEFT -ALBURY FRMSP 2016 TUFLOW MODEL, RIGHT – UPDATED TUFLOW MODEL)

6 FLOOD ASSESSMENT

6.1 Existing Condition

Existing flood maps presenting peak flood depths and level contours, peak velocities, and flood hazard for the events modelled are provided in Appendix A.

The Albury Station Yard and Footbridge are prone to flooding due to overland flow originating from the northern catchments of the railway corridor, in conjunction with local catchment runoff. The site is generally situated at a higher elevation compared to the surrounding surface levels. There are two primary culverts that facilitate the effective drainage of floodwaters from the area within the site. The northern culvert mainly drains the northern overland flow, and the southern culvert drains the local catchment runoff within the site. The existing rail level remains immune to overtopping up to the 2% AEP event at the site.

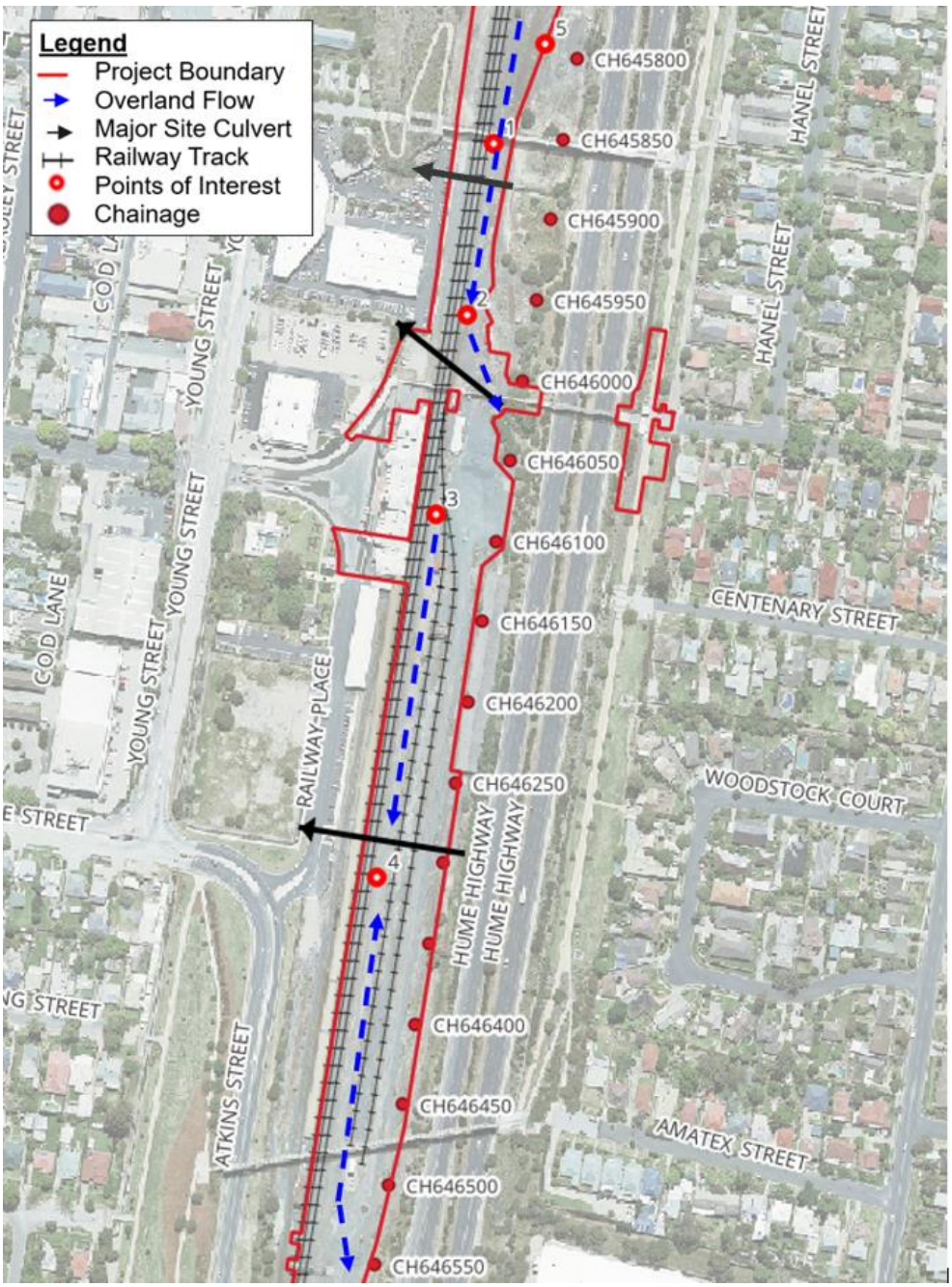

FIGURE 12: ALBURY STATION YARD AND FOOTBRIDGE SITE EXISTING SCENARIO OVERLAND FLOW PATHS FOR 1% AEP

TABLE 13: POINTS OF INTERESTS

Points of Interest	Notes
1	Location parallel to the main line at the proposed ballast drain.
2	Location parallel to the main line at the proposed ballast drain.
3	Location parallel to the main line at the proposed ballast drain.
4	Location parallel to the main line at the proposed ballast drain.
5	Location between Mudges Canal and main line.

The tables below summarise the peak flood level results for the existing condition in the study area and points of interest (refer to Figure 12 for the location).

TABLE 14: PEAK FLOOD LEVELS – EXISTING CONDITION

Design Events	Flood Levels
5% AEP	▪ The flood waters do not overtop the existing railway tracks. (Refer to Figure A01 in Appendix A). ▪ The flood depth along the existing rail corridor is generally up to 0.130 m.
2% AEP	▪ The flood waters do not overtop the existing railway tracks. (Refer to Figure A02 in Appendix A). ▪ The flood depth along the existing rail corridor is generally up to 0.150 m.
1% AEP	▪ The flood waters overtop the existing railway tracks at Ch645.900km with an overtopping depth of up to 0.03m. (Refer to Figure A03 in Appendix A). ▪ The flood depth along the existing rail corridor is generally up to 0.160 m.
1% AEP + Climate Change	▪ The flood waters overtop at multiple locations over the existing railway tracks, generally with a depth of less than 0.100m. (Refer to Figure A04 in Appendix A). ▪ The flood depth along the existing rail corridor is generally up to 0.2m.
0.05% AEP	▪ The flood waters overtop at multiple locations over the existing railway tracks, generally with a depth of less than 0.150m. (Refer to Figure A05 in Appendix A). ▪ The flood depth along the existing rail corridor is generally up to 0.3m.
PMF	▪ The flood waters overtop at multiple locations over the existing railway tracks south to Riverina Highway bridge generally with a depth of less than 0.6m. (Refer to Figure A06 in Appendix A). ▪ The flood depth along the existing rail corridor is generally less than 0.8 m.

TABLE 15: POINTS OF INTEREST DATA – PEAK FLOOD LEVELS (MAHD) – EXISTING CONDITION

Locations	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	160.75	160.80	160.88	160.95	161.11	161.46
Point 2	160.82	160.83	160.83	160.91	161.02	161.16
Point 3	160.77	160.78	160.79	160.80	160.86	161.04
Point 4	160.63	160.63	160.64	160.64	160.77	161.04
Point 5	160.76	160.83	160.89	160.99	161.10	161.43

The table below summarises the Peak flood velocity results.

TABLE 16: PEAK FLOOD VELOCITY – EXISTING CONDITION

Design Events	Flood Velocity
5% AEP	▪ The peak velocity along the rail corridor is generally less than 0.2 m/s. (Refer to Figure A07 to A10 in Appendix A).
2% AEP	
1% AEP	
1% AEP + Climate Change	
0.05% AEP	▪ The peak velocity along the rail corridor is generally less than 0.5 m/s. (Refer to Figure A11 in Appendix A).
PMF	▪ The peak velocity along the rail corridor is generally less than 1.5 m/s. (Refer to Figure A12 in Appendix A).

The table below summarises the Peak flood velocity at points of interest for the existing condition in the study area.

TABLE 17: POINTS OF INTEREST DATA – PEAK FLOOD VELOCITY (M/S) – EXISTING CONDITION

Locations	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	<0.1	0.1	0.2	0.2	0.4	0.6
Point 2	<0.1	<0.1	<0.1	0.1	0.2	0.5
Point 3	<0.1	<0.1	<0.1	<0.1	0.1	0.2
Point 4	<0.1	0.1	0.1	0.1	0.1	0.3
Point 5	<0.1	<0.1	0.1	0.2	0.4	0.6

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. Figure 13 and the tables below describe the hazards.

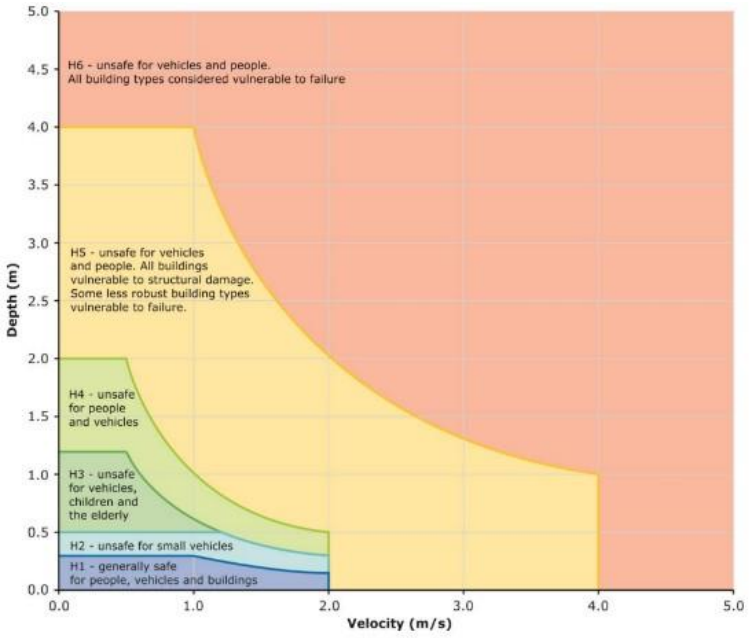

FIGURE 13: HAZARD CATEGORY CLASSIFICATION

The tables below summarise the Peak flood hazard results and Peak flood hazard at points of interest for the existing conditions in the study area.

TABLE 18: FLOOD HAZARD – EXISTING CONDITION

Design Events	Flood Hazard
5% AEP	▪ The flood hazard along the rail corridor open channel is generally H1. (Refer to Figure A13 to Figure A16, respectively, in Appendix A).
2% AEP	
1% AEP	
1% AEP + Climate Change	
0.05% AEP	▪ The flood hazard along the rail corridor open channel is generally H2 or less. (Refer to Figure A13 to Figure A17, respectively, in Appendix A).
PMF	▪ The flood hazard along the rail corridor open channel is generally H2 or less. (Refer to Figure A13 to Figure A18, respectively, in Appendix A).

TABLE 19: POINTS OF INTEREST DATA – PEAK FLOOD HAZARD – EXISTING CONDITION

Locations	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	H1	H1	H1	H1	H2	H3
Point 2	H1	H1	H1	H1	H1	H2
Point 3	H1	H1	H1	H1	H1	H2
Point 4	H1	H1	H1	H1	H1	H2
Point 5	H1	H1	H1	H1	H2	H3

6.2 Design Condition

Design condition flood maps, including peak flood depths and level contours, peak velocities, and flood hazard for the events modelled are provided in Appendix A.

The table below summarises the peak flood level results for the design condition within the study area.

Generally, under the proposed design conditions, the inclusion of ballast drains and proposed drainage pipes improves the flooding condition in most areas of the site, while maintaining the existing immunity in the design condition. This minimised the overland flow to the culvert at CH646.000 km.

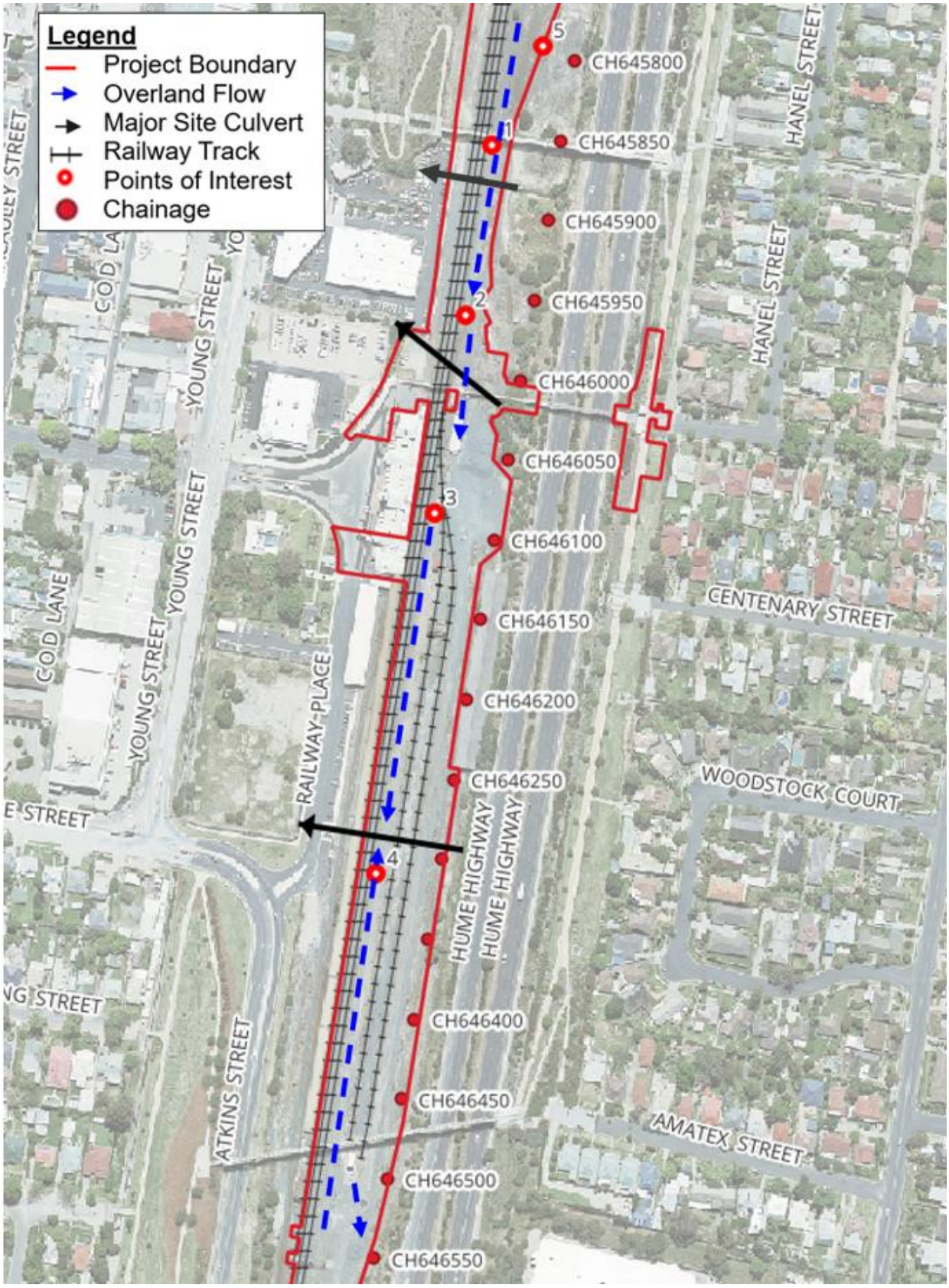

FIGURE 14: ALBURY STATION YARD AND FOOTBRIDGE SITE DESIGN SCENARIO OVERLAND FLOW PATHS FOR THE 1% AEP

TABLE 20: PEAK FLOOD LEVELS – DESIGN CONDITION

Design Events	Flood Levels
5% AEP	▪ The flood waters do not overtop the proposed railway tracks. (Refer to Figure A19 in Appendix A). ▪ The flood depth along the proposed ballast drain is generally less than 0.15 m.
2% AEP	▪ The flood waters do not overtop the proposed railway tracks. (Refer to Figure A20 in Appendix A). ▪ The flood depth along the proposed ballast drain is generally less than 0.20 m.
1% AEP	▪ The flood waters do not overtop the proposed railway tracks. (Refer to Figure A21 in Appendix A). ▪ The flood depth along the proposed overland flow channel is generally less than 0.5 m.
1% AEP + Climate Change	▪ The flood waters do not overtop the proposed railway tracks. (Refer to Figure A23 in Appendix A). ▪ The flood depth along the proposed overland flow channel is generally less than 0.65m.
0.05% AEP	▪ The flood waters overtop the proposed railway tracks with up to 0.1m in flood depth. (Refer to Figure A24 in Appendix A). ▪ The railway corridor is significantly flooded, with flood depth reaching up to 0.7m.
PMF	▪ The flood waters do not overtop the proposed railway tracks with up to 1m in flood depth. (Refer to Figure A25 in Appendix A). ▪ The flood depth along the proposed overland flow channel is generally less than 1.2m.

TABLE 21: POINTS OF INTEREST DATA – PEAK FLOOD LEVELS (MAHD) – DESIGN CONDITION

Locations	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	160.43	160.68	160.81	160.94	161.07	161.52
Point 2	160.28	160.31	160.79	160.91	161.01	161.21
Point 3	160.17	160.19	160.23	160.28	160.55	161.06
Point 4	160.13	160.18	160.20	160.23	160.53	161.04
Point 5	Not flooded	Not flooded	160.82	160.96	161.07	161.48

The table below summarises the peak flood velocity results for the design condition within the study area.

TABLE 22: PEAK FLOOD VELOCITY – DESIGN CONDITION

Design Events	Flood Velocity
5% AEP	The flood velocity along the proposed ballast drain is generally less than 0.2m/s. (Refer to Figure A26 in Appendix A).
2% AEP	The flood velocity along the proposed ballast drain is generally less than 0.2m/s. (Refer to Figure A27 in Appendix A).
1% AEP	The flood velocity along the proposed ballast drain is generally less than 0.3m/s. (Refer to Figure A28 in Appendix A).
1% AEP + Climate Change	The flood velocity along the proposed ballast drain is generally less than 0.3m/s. (Refer to Figure A30 in Appendix A).
0.05% AEP	The flood velocity along the proposed ballast drain is generally less than 0.4m/s. (Refer to Figure A31 in Appendix A).

Design Events	Flood Velocity
PMF	The flood velocity along the proposed ballast drain is generally less than 1.0m/s. (Refer to Figure A32 in Appendix A).

TABLE 23: POINTS OF INTEREST DATA – PEAK FLOOD VELOCITY (M/S) – DESIGN CONDITION

Locations	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	0.2	0.2	0.3	0.4	0.6	1.1
Point 2	< 0.1	< 0.1	0.1	0.2	0.5	0.9
Point 3	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.4
Point 4	< 0.1	0.1	0.1	0.2	0.3	0.4
Point 5	Not flooded	Not flooded	< 0.1	0.2	0.3	0.6

The flood hazard for the design condition at the Albury Station Yard and Footbridge study area is presented in the table below and the maps are presented in Appendix A.

TABLE 24: FLOOD HAZARD – DESIGN CONDITION

Design Events	Flood Hazard
5% AEP	▪ The flood hazard along the ballast drain is generally H2 or less. (Refer to Figures A33 and A34 in Appendix A).
2% AEP	
1% AEP	▪ The flood hazard along the ballast drain is generally H3 or less. (Refer to Figures A35, A37 and A38 in Appendix A).
1% AEP + Climate Change	
0.05% AEP	
PMF	▪ The flood hazard along the rail corridor open channel is generally less than H4. (Refer to Figure A39 in Appendix A).

TABLE 25: POINTS OF INTEREST DATA – PEAK FLOOD HAZARD – DESIGN CONDITION

Locations	5% AEP	2% AEP	1% AEP	1% AEP + Climate Change	0.05% AEP	PMF
Point 1	H1	H2	H2	H3	H3	H4
Point 2	H1	H1	H3	H3	H3	H4
Point 3	H1	H1	H1	H1	H2	H3
Point 4	H1	H1	H1	H1	H2	H3
Point 5	Not flooded	Not flooded	H1	H1	H2	H3

In the design condition, track flood immunity is up to the 1% AEP. The design condition velocities are generally less than 1m/s and have low hazard values.

6.3 Flood Immunity and Scour Protection

During the existing scenario, the top of the rail is overtopped in 1% AEP. However, the flood immunity is improved in design scenario where the top of rail is not overtopped at 1% AEP. Immunity improvement is attributed to the introduction of the new ballast drains and balance of drainage design. The ballast drains will be wrapped in a Class A geotextile fabric, which

will protect the pipes, prevent soil erosion, and provide local scour protection (refer to Drainage Design at Section 4.5.6 of the Albury Station Yard Track Slews Report (5-0052-210-PEN-B7-RP-0001)). The Albury Footbridge does not significantly alter the flooding condition at the site. The eastern access ramp experiences minor flood impact while the western access ramp remains dry. 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 5) 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 of the immunity of the rail in terms of overtopping, which complies with the criteria in PSRs and CoA.

TABLE 26: COMPARISON OF FLOOD IMMUNITY AT OVERTOPPING LOCATIONS

Overtopping Location	Existing Condition Overtopping AEP	Design Condition Overtopping AEP
CH645.900km	1% AEP event	PMF

An assessment of the flood immunity at the noted locations of overtopping along the rail is seen in the table below for CH645.900km where overtopping of the rail occurs.

TABLE 27: OVERTOPPING DETAILS AT CH645.900KM

Chainage	Top of the Rail Level (mAHD)		Top of the Formation Level (mAHD)		1% AEP Flood Level (mAHD)		PMF Flood Level (mAHD)	
	Existing	Design	Existing	Design	Existing	Design	Existing	Design
CH645.900 km	160.85	161.06	160.18*	160.40*	160.87	160.79	161.29	161.33

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

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 5) up to the 1% AEP storm event. Hence, there is no need for scour protection measures outside the project boundary.

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

6.4 Flood Impact Assessment

The flood level generally decreases within the project boundary due to the proposed ballast drain. An increase in flood depths, generally up to 0.5m during the 1% AEP event, occurs within the proposed ballast drain.

Water is drained from the site at three locations via drainage pipes, which include Mudges Canal and two other major site culverts at Albury Station Yard. The flow regime is maintained as per the existing condition (Refer to Section 4.5.6.4 of 5-0052-210-PEN-B7-RP-0001).

The proposed design is compliant with PSR Annexure B items IR-SR-A2I-459 (no worse than existing), IR-SR-A2I-464 (no adverse impacts), and IR-SR-A2I-465 (maintain existing/natural flow paths).

6.4.1 Changes in Peak Flood Level

The tables below details the changes in peak flood levels that occur and are associated with the proposed works.

TABLE 28: FLOOD LEVEL IMPACT ASSESSMENT

Design Events	Changes in Peak Flood Levels
5% 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 A40 in Appendix A) ▪ Young Street experiences changes in water level of less than 15mm which is within the CoA Afflux limit. ▪ Less than 80 mm of afflux within the Mudges Canal (Riverina Highway bridge site mainly contributes to this afflux, refer to flood design report 5-0052-210-IHY-B4-RP-0001).
2% 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 A41 in Appendix A).

Design Events	Changes in Peak Flood Levels
	▪ Young Street experiences an afflux of less than 10mm ▪ Less than 20 mm of afflux within the Mudges Canal. (Riverina Highway bridge site mainly contributes to this afflux, refer to flood design report 5-0052-210-IHY-B4-RP-0001).
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 A42 in Appendix A). ▪ Young Street experiences an afflux of less than 10mm ▪ Less than 70 mm of afflux within the Mudges Canal. (Riverina Highway bridge site mainly contributed to this afflux, refer to flood design report 5-0052-210-IHY-B4-RP-0001).

The changes in flood level outside the project boundary comply with the PSR and CoA clause E42 (b), (c), (d), (e) & (f) project requirements.

TABLE 29: POINTS OF INTEREST DATA – CHANGES IN PEAK FLOOD LEVEL (M) – DESIGN CONDITION

Locations	5% AEP	2% AEP	1% AEP
Point 1*	-0.32	-0.13	-0.07
Point 2*	-0.54	-0.52	-0.04
Point 3*	-0.60	-0.59	-0.57
Point 4*	-0.50	-0.45	-0.44
Point 5	No more inundated	No more inundated	-0.07

*Points located at the proposed ballast drain

6.4.2 Changes in Peak Flood Velocity

The table below provides details of changes in peak flood velocity for the design condition.

TABLE 30: FLOOD VELOCITY IMPACT ASSESSMENT

Design Events	Changes in Peak Flood Velocity
5% AEP	The changes in velocity outside the site are less than 0.5m/s. (Refer to Figure A44 to A46 in Appendix A).
2% AEP	
1% AEP	

Points of interest from 1 to 5 inside the site, experiences less than 0.5m/s of velocity increase for events 5% AEP, 2% AEP and 1% AEP.

As stated in Table 30, the changes in flood velocity outside the project boundary comply with the PSR and CoA clause E42 (h) project requirements.

6.4.3 Changes in Flood Hazard

The table below details the changes in peak flood hazard for the design scenario.

TABLE 31: FLOOD HAZARD IMPACT ASSESSMENT

Design Events	Changes in Peak Flood Hazard
5% AEP	▪ Generally, no increase in hazard outside the project boundary. (Refer to Figure A48 to A50 in Appendix A).
2% AEP	
1% AEP	

Changes in flood hazard for the points of interest are provided in the table below.

TABLE 32: POINTS OF INTEREST DATA – CHANGES IN HAZARD – DESIGN CONDITION

Locations	5% AEP	2% AEP	1% AEP
Point 1*	No change in hazard	Increased 1 Class	Increased 2 Classes
Point 2*	No change in hazard	No change in hazard	Increased 2 Classes
Point 3*	No change in hazard	No change in hazard	No change in hazard
Point 4*	No change in hazard	No change in hazard	No change in hazard
Point 5	No more inundated	No more inundated	No change in hazard

*Points located at the proposed ballast drain

As the Points 1-4 is located within the proposed ballast drain within the site which the Hazard increase is expected and localised. The changes in flood hazard outside the project boundary comply with the PSR and CoA clause E42 (g) project requirements.

6.4.4 Changes in Duration of Inundation

The analysis around the changes in duration of inundation was undertaken by comparing the existing and design flood levels vs time in selected locations. The locations adopted for the comparison are shown in the figure below.

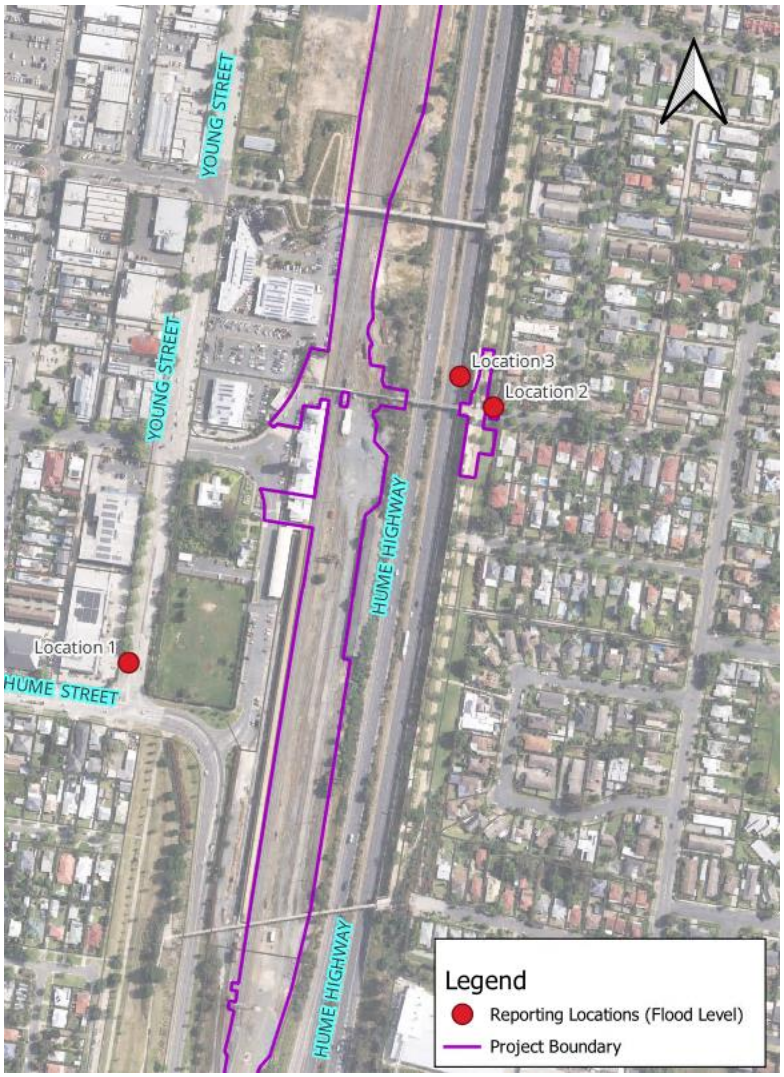

FIGURE 15: REPORTING LOCATIONS 1 AND 2 FOR THE CHANGES IN DURATION OF INUNDATION

The figures below show the comparison of flood level vs time for Reporting Locations 1, 2 and 3. Both the existing and design flood level vs time are mostly similar for Locations 1, 2 and 3. 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).

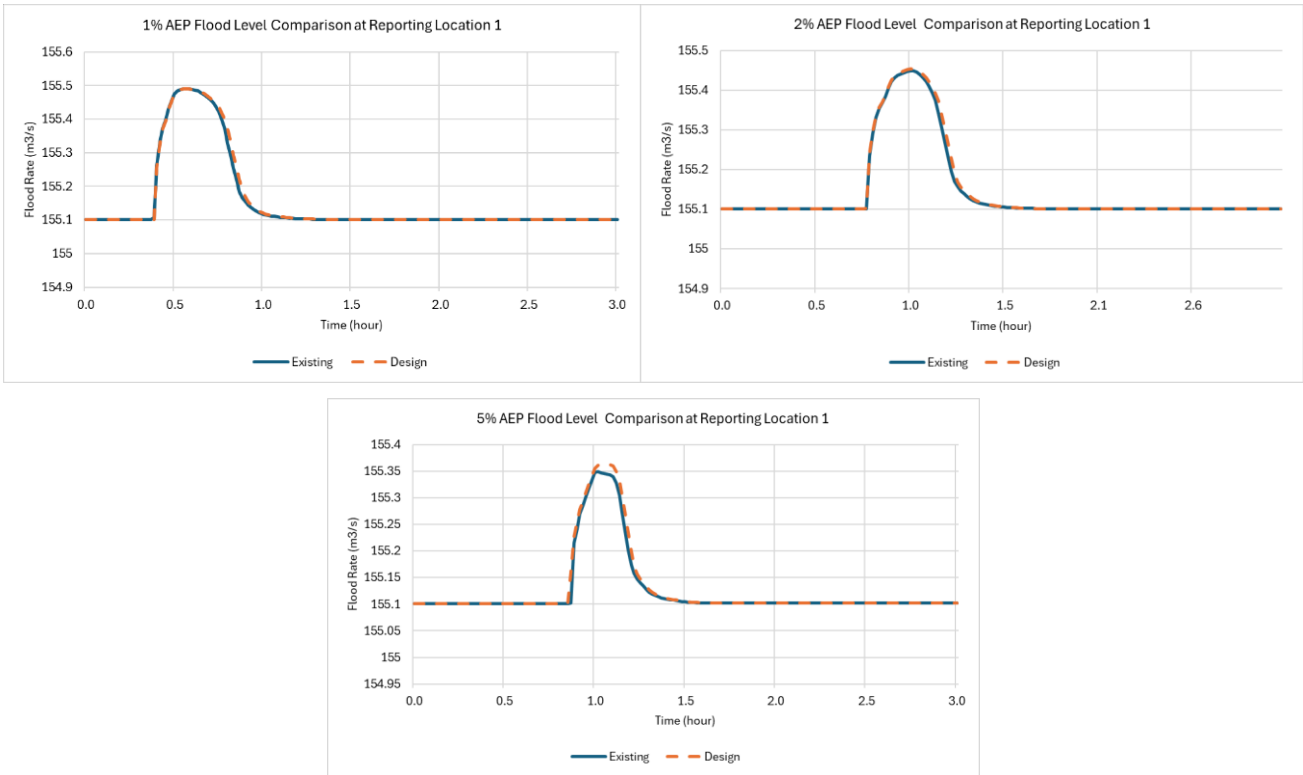

FIGURE 16: Comparison of Flood Level vs. Time at Reporting Location 1

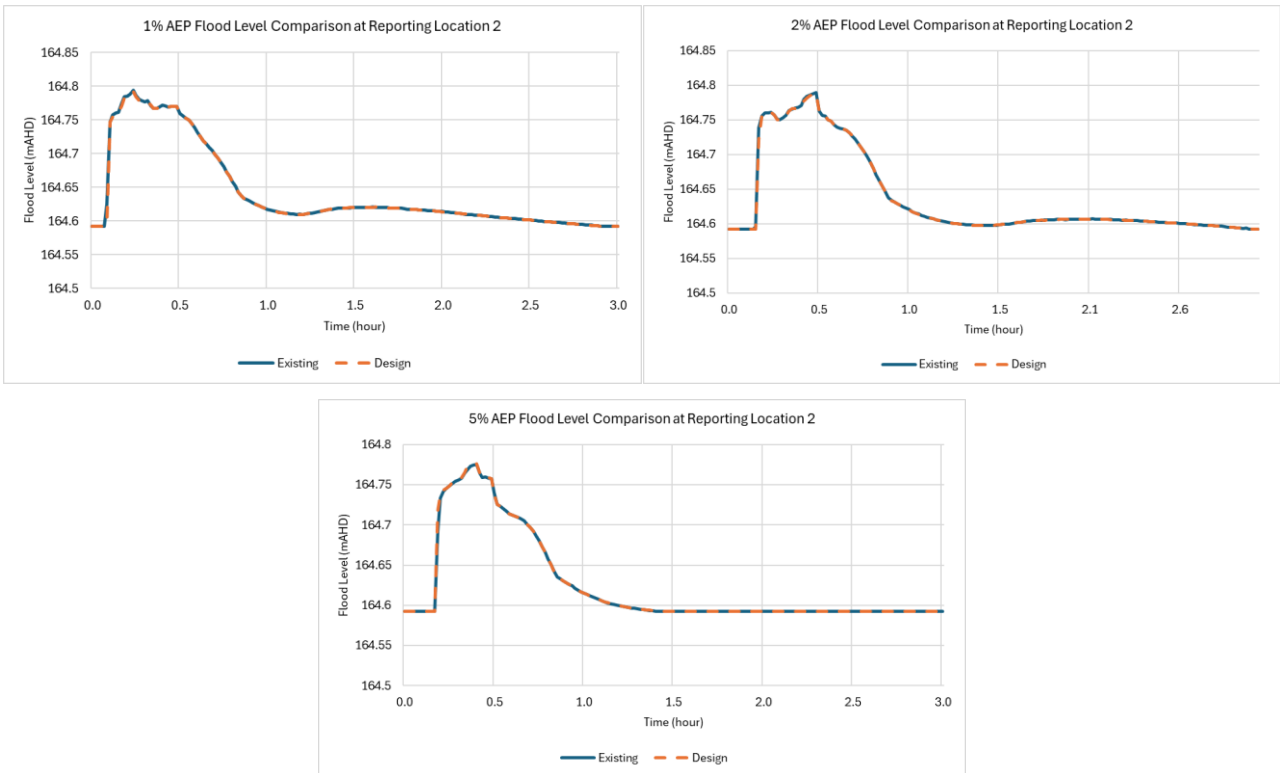

FIGURE 17: COMPARISON OF FLOW LEVEL VS. TIME AT REPORTING LOCATION 2

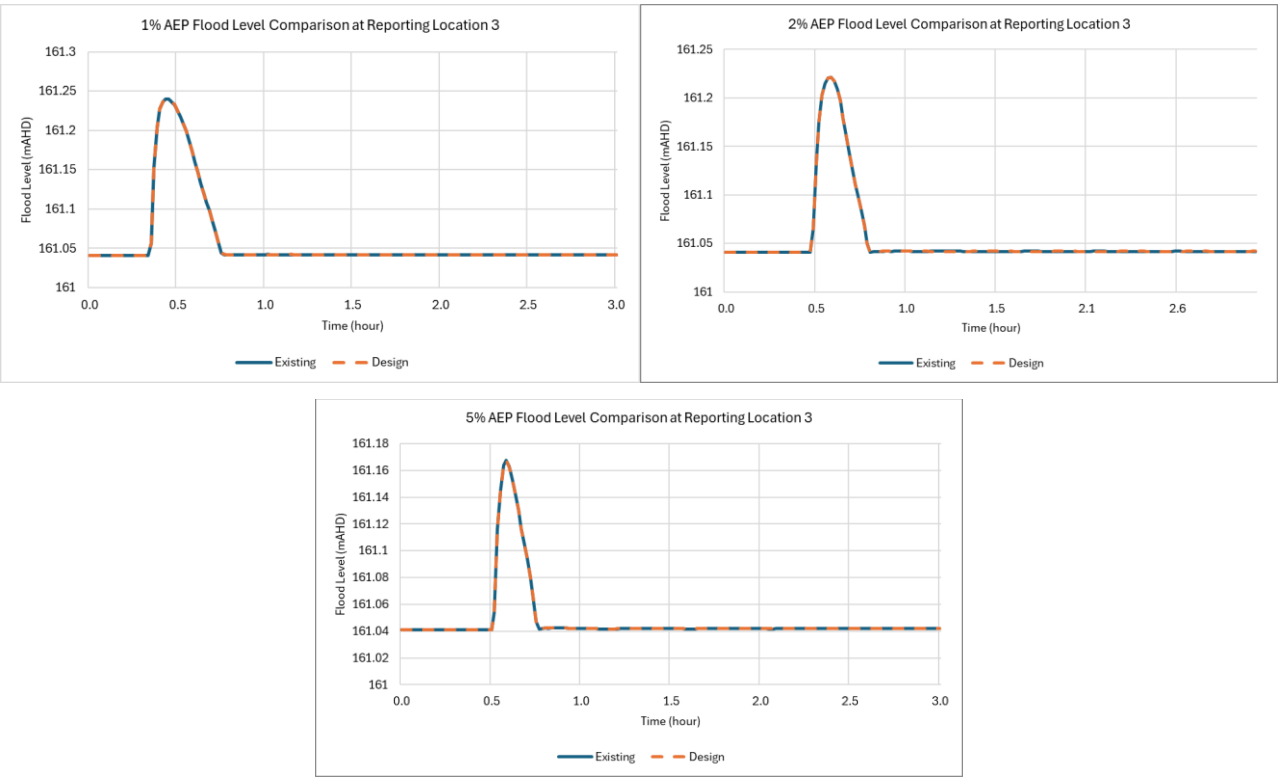

FIGURE 18: COMPARISON OF FLOW LEVEL VS. TIME AT REPORTING LOCATION 3

6.4.5 Cumulative impact

As stated in Section 4 under "Modelling Methodology", the master design condition incorporated the Riverina Highway bridge design (Flood Report 5-0052-210-IHY-B4-RP-0001) to understand an overall cumulative impact on the site. The changes in flood level maps indicate that there are no impacts on the Albury Station Yard and Footbridge caused by the Riverina Highway bridge for all events up to 1% AEP. The Mudges Canal experiences cumulative impacts from Riverina Highway bridge (Refer to Section 6.4.5). However, the flood water is contained within the channel. The cumulative impacts downstream of Mudges Canal and outside the project boundary complies with the PSR and CoA conditions. (Refer to Sections 6.3 and 6.4)

As discussed in Section 1.4, This IFC flood design report includes flood impact assessment for the IFC design of the Albury Station Footbridge, and the DDR design of the Albury Station Yard, as the IFC design for the Albury Station Yard was not completed at the time of report preparation.

The Albury Station Footbridge access ramps are located outside the railway corridor away from any flood related influence from the Albury Station Yard IFC design. Although the footbridge piers are situated within the railway corridor, they lie outside the 1% AEP flood extent under existing conditions. As such, the Albury Station Yard IFC design will not be expected to worsen flooding conditions, and any potential impact on the footbridge piers would be minimal.

Based on these considerations, Albury Station Yard IFC design will be unlikely to cause adverse flood impact on the Albury Footbridge IFC design.

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 in the tables below. 20% blockage was adopted for all the other culverts, pits and pipes outside the project boundary (Refer to the figures under the tables).

A flood level comparison between the blockage design scenario and the design is shown in the tables below. The overall flood behaviour is subject to the blockage of the site drainage, where a change in water level up to 0.04 m can be observed. The Culvert S00100500285LC and 36120 within the project boundary do not have any blockage due to large culvert width and height and lower debris potential (The ARR hydraulic blockage assessment resulted in 0% of blockage). As a consequence of implementing the 20% blockage in the Mudges Canal culverts, the downstream experiences improvement in water levels while the Mudges Canal open channel overflows into the site by creating additional wet area (Refer to Figure 21 and Figure 22).

TABLE 33: CULVERT BLOCKAGE PERCENTAGE

Culvert	Blockage Percentage (1% AEP)	Comments
S00100500285LC (1 cell 2.4m x 1.5m)	0%	Inside the project boundary
36120 (2 cell 1.5m x 1.5m)	0%	Inside the project boundary
All other pits	20% (on grade pit), 50% (Sag pits)	Inside the project boundary
All others (culvert, pit and pipe)	20%	Outside of the project boundary

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

TABLE 34: CULVERT BLOCKAGE PARAMETERS

Culvert	Debris Availability	Debris Mobility	Debris Transportability	AEP Adjusted Debris Potential
S00100500285LC	Low	Medium	Medium	Low
36120	Low	Medium	Medium	Low

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

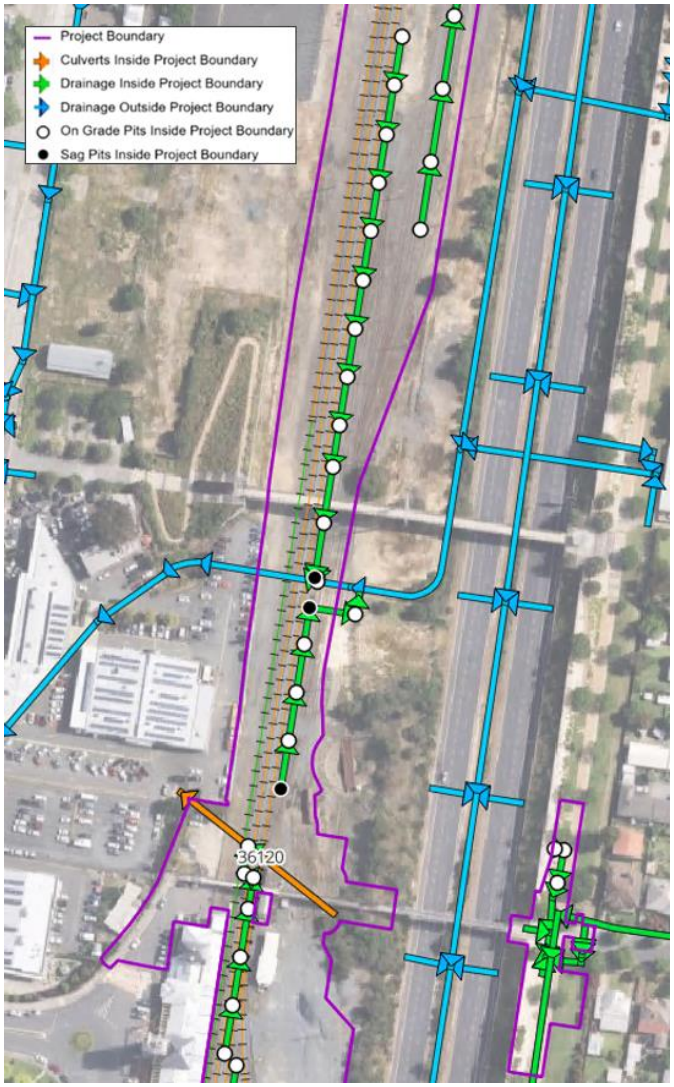

FIGURE 19: CULVERTS AT ALBURY YARD AND FOOTBRIDGE PART-1

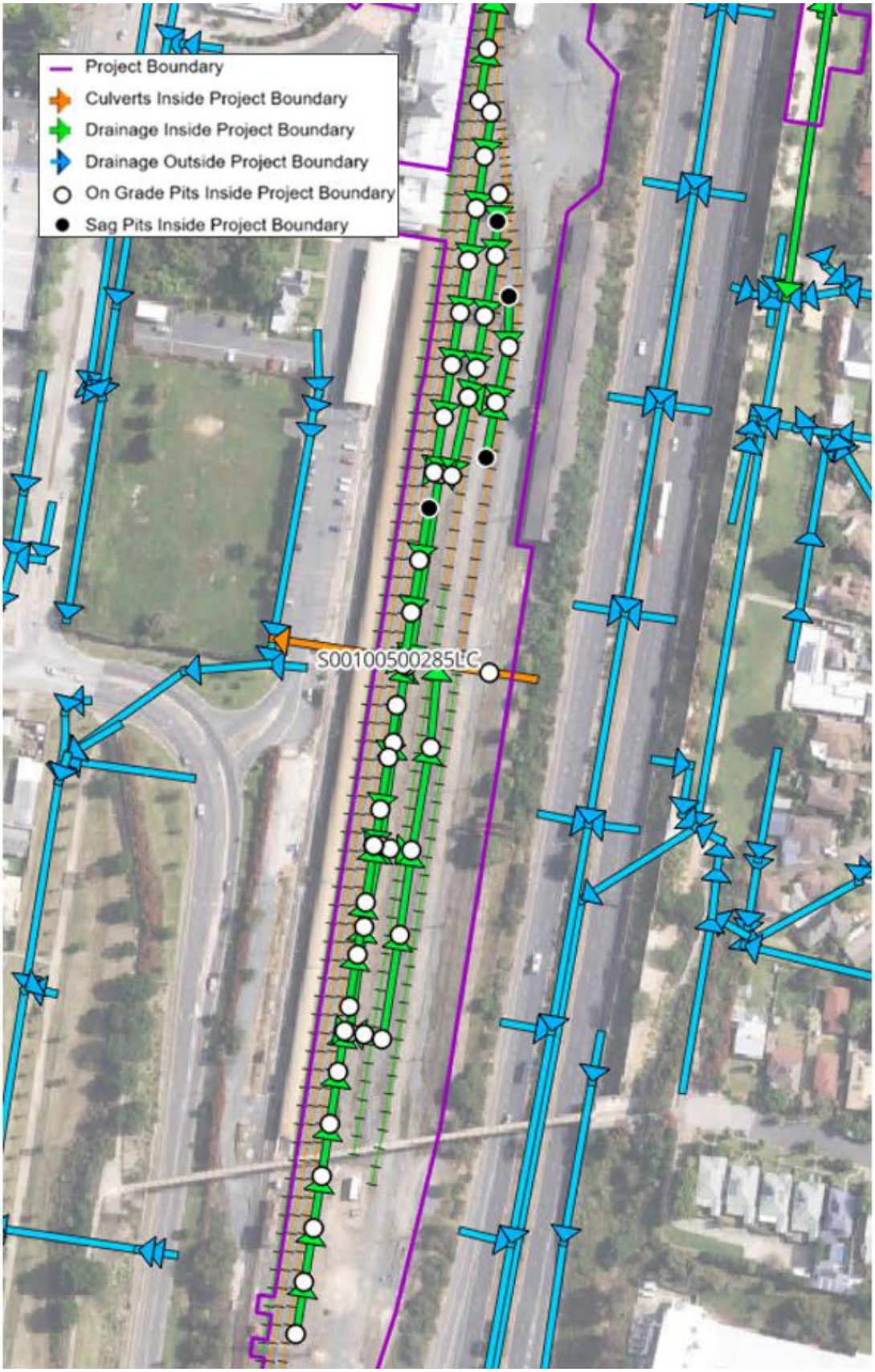

FIGURE 20: CULVERTS AT ALBURY YARD AND FOOTBRIDGE PART-2

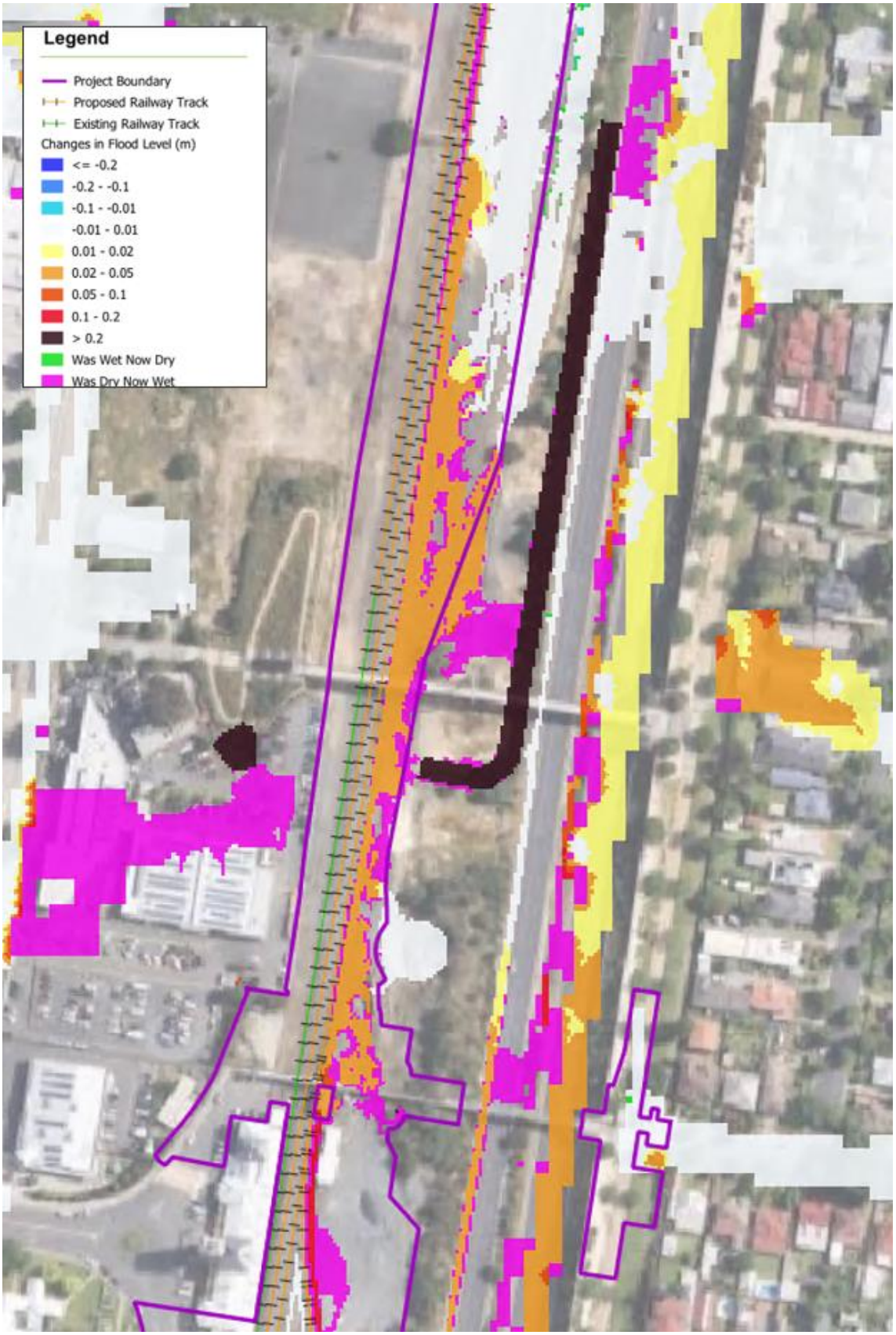

FIGURE 21: FLOOD LEVEL COMPARISON FOR 1% AEP DESIGN CONDITION – BLOCKAGE VS DESIGN - PART 1

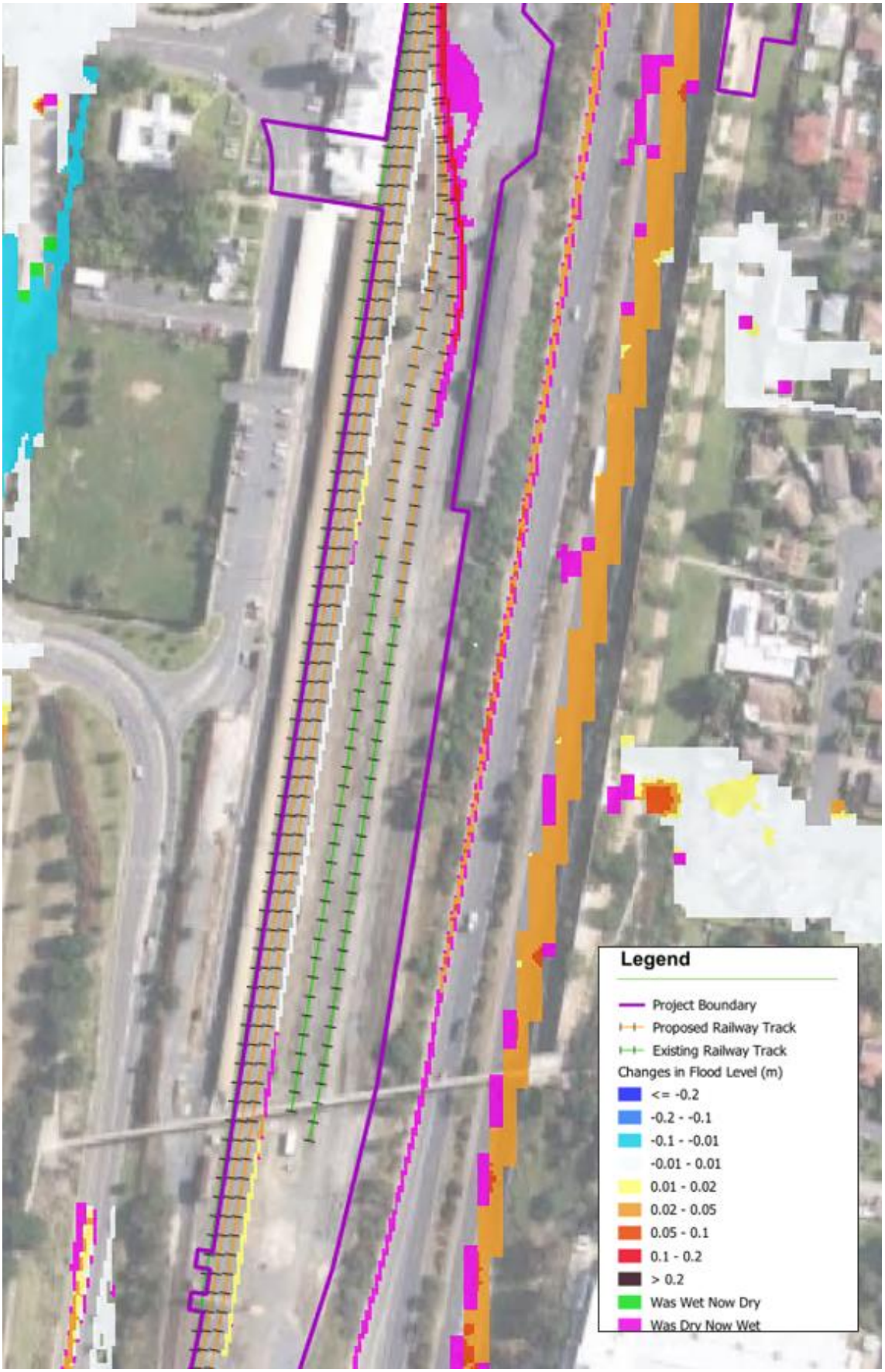

FIGURE 22: FLOOD LEVEL COMPARISON FOR 1% AEP DESIGN CONDITION – BLOCKAGE VS DESIGN - PART 2

6.5.2 Climate Change Risk Assessment

As discussed in Section 4.2.2, Climate Change risk assessment was carried out by running the 1% AEP design event with the use of the Year 2090 RCP8.5 interim climate change factor and the associated 20.2% increase in rainfall (refer to Section 4.2.2 for details of the approach and section 6.1 and 6.2 for the results). Flood depth, flood velocity and flood hazard and corresponding flood maps can be found in Appendix A. The assessment is summarised below:

- Within the study area, both the existing railway track and the proposed track cannot achieve flood immunity in climate change conditions.
- Within the study area, the flood velocity in climate change conditions increased by generally up to 0.1 m/s compared with 1% AEP.
- The site experiences up to the H1 flood hazard, which was classified as a low hazard in climate change condition.

7 MITIGATION MEASURES

No other instances of non-compliance in terms of flood impact were documented. Therefore, no additional mitigation measures are necessary unless the design changes.

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 for the Albury footbridge site.
- All comments raised by relevant parties have been resolved (refer to Appendices C, D and E)
- The model needs to be updated to incorporate Albury Station Yard IFC design.

Consequently, there are no further recommendations.

APPENDIX A

Flood Maps

TABLE A- 1: LIST OF MAPS IN APPENDIX A

Map ID	Map description
Figure A01-A	5% AEP Peak Flood Depth and Levels - Existing Condition
Figure A01-B	5% AEP Peak Flood Depth and Levels - Existing Condition
Figure A02-A	2% AEP Peak Flood Depth and Levels - Existing Condition
Figure A02-B	2% AEP Peak Flood Depth and Levels - Existing Condition
Figure A03-A	1% AEP Peak Flood Depth and Levels - Existing Condition
Figure A03-B	1% AEP Peak Flood Depth and Levels - Existing Condition
Figure A04-A	1% AEP Climate Change Peak Flood Depth and Levels - Existing Condition
Figure A04-B	1% AEP Climate Change Peak Flood Depth and Levels - Existing Condition
Figure A05-A	0.05% AEP Peak Flood Depth and Levels - Existing Condition
Figure A05-B	0.05% AEP Peak Flood Depth and Levels - Existing Condition
Figure A06-A	PMF Peak Flood Depth and Levels - Existing Condition
Figure A06-B	PMF Peak Flood Depth and Levels - Existing Condition
Figure A07-A	5% AEP Peak Flood Velocity - Existing Condition
Figure A07-B	5% AEP Peak Flood Velocity - Existing Condition
Figure A08-A	2% AEP Peak Flood Velocity - Existing Condition
Figure A08-B	2% AEP Peak Flood Velocity - Existing Condition
Figure A09-A	1% AEP Peak Flood Velocity - Existing Condition
Figure A09-B	1% AEP Peak Flood Velocity - Existing Condition
Figure A10-A	1% AEP Climate Change Peak Flood Velocity - Existing Condition
Figure A10-B	1% AEP Climate Change Peak Flood Velocity - Existing Condition
Figure A11-A	0.05% AEP Peak Flood Velocity - Existing Condition
Figure A11-B	0.05% AEP Peak Flood Velocity - Existing Condition
Figure A12-A	PMF Peak Flood Velocity - Existing Condition
Figure A12-B	PMF Peak Flood Velocity - Existing Condition
Figure A13-A	5% AEP Peak Flood Hazard - Existing Condition
Figure A13-B	5% AEP Peak Flood Hazard - Existing Condition
Figure A14-A	2% AEP Peak Flood Hazard - Existing Condition
Figure A14-B	2% AEP Peak Flood Hazard - Existing Condition
Figure A15-A	1% AEP Peak Flood Hazard - Existing Condition
Figure A15-B	1% AEP Peak Flood Hazard - Existing Condition
Figure A16-A	1% AEP Climate Change Peak Flood Hazard - Existing Condition
Figure A16-B	1% AEP Climate Change Peak Flood Hazard - Existing Condition
Figure A17-A	0.05% AEP Peak Flood Hazard - Existing Condition
Figure A17-B	0.05% AEP Peak Flood Hazard - Existing Condition
Figure A18-A	PMF Peak Flood Hazard - Existing Condition
Figure A18-B	PMF Peak Flood Hazard - Existing Condition
Figure A19-A	5% AEP Peak Flood Depth and Levels - Design Condition
Figure A19-B	5% AEP Peak Flood Depth and Levels - Design Condition
Figure A20-A	2% AEP Peak Flood Depth and Levels - Design Condition

Map ID	Map description
Figure A20-B	2% AEP Peak Flood Depth and Levels - Design Condition
Figure A21-A	1% AEP Peak Flood Depth and Levels - Design Condition
Figure A21-B	1% AEP Peak Flood Depth and Levels - Design Condition
Figure A22-A	1% AEP Peak Flood Depth and Levels - Design Blockage Condition
Figure A22-B	1% AEP Peak Flood Depth and Levels - Design Blockage Condition
Figure A23-A	1% AEP Climate Change Peak Flood Depth and Levels - Design Condition
Figure A23-B	1% AEP Climate Change Peak Flood Depth and Levels - Design Condition
Figure A24-A	0.05% AEP Peak Flood Depth and Levels - Design Condition
Figure A24-B	0.05% AEP Peak Flood Depth and Levels - Design Condition
Figure A25-A	PMF Peak Flood Depth and Levels - Design Condition
Figure A25-B	PMF Peak Flood Depth and Levels - Design Condition
Figure A26-A	5% AEP Peak Flood Velocity - Design Condition
Figure A26-B	5% AEP Peak Flood Velocity - Design Condition
Figure A27-A	2% AEP Peak Flood Velocity - Design Condition
Figure A27-B	2% AEP Peak Flood Velocity - Design Condition
Figure A28-A	1% AEP Peak Flood Velocity - Design Condition
Figure A28-B	1% AEP Peak Flood Velocity - Design Condition
Figure A29-A	1% AEP Peak Flood Velocity - Design Blockage Condition
Figure A29-B	1% AEP Peak Flood Velocity - Design Blockage Condition
Figure A30-A	1% AEP Climate Change Peak Flood Velocity - Design Condition
Figure A30-B	1% AEP Climate Change Peak Flood Velocity - Design Condition
Figure A31-A	0.05% AEP Climate Change Peak Flood Velocity - Design Condition
Figure A31-B	0.05% AEP Climate Change Peak Flood Velocity - Design Condition
Figure A32-A	PMF Peak Flood Velocity - Design Condition
Figure A32-B	PMF Peak Flood Velocity - Design Condition
Figure A33-A	5% AEP Peak Flood Hazard - Design Condition
Figure A33-B	5% AEP Peak Flood Hazard - Design Condition
Figure A34-A	2% AEP Peak Flood Hazard - Design Condition
Figure A34-B	2% AEP Peak Flood Hazard - Design Condition
Figure A35-A	1% AEP Peak Flood Hazard - Design Condition
Figure A35-B	1% AEP Peak Flood Hazard - Design Condition
Figure A36-A	1% AEP Peak Flood Hazard - Design Blockage Condition
Figure A36-B	1% AEP Peak Flood Hazard - Design Blockage Condition
Figure A37-A	1% AEP Climate Change Peak Flood Hazard - Design Condition
Figure A37-B	1% AEP Climate Change Peak Flood Hazard - Design Condition
Figure A38-A	0.05% AEP Climate Change Peak Flood Hazard - Design Condition
Figure A38-B	0.05% AEP Climate Change Peak Flood Hazard - Design Condition
Figure A39-A	PMF Peak Flood Hazard - Design Condition
Figure A39-B	PMF Peak Flood Hazard - Design Condition
Figure A40-A	Changes in Peak Flood Levels for 5% AEP - Design Condition vs Existing Condition

Map ID	Map description
Figure A40-B	Changes in Peak Flood Levels for 5% AEP - Design Condition vs Existing Condition
Figure A41-A	Changes in Peak Flood Levels for 2% AEP - Design Condition vs Existing Condition
Figure A41-B	Changes in Peak Flood Levels for 2% AEP - Design Condition vs Existing Condition
Figure A42-A	Changes in Peak Flood Levels for 1% AEP - Design Condition vs Existing Condition
Figure A42-B	Changes in Peak Flood Levels for 1% AEP - Design Condition vs Existing Condition
Figure A43-A	Changes in Peak Flood Levels for 1% AEP Climate Change - Design Condition vs Existing
Figure A43-B	Changes in Peak Flood Levels for 1% AEP Climate Change - Design Condition vs Existing
Figure A44-A	Changes in Peak Flood Velocity for 5% AEP - Design Condition vs Existing Condition
Figure A44-B	Changes in Peak Flood Velocity for 5% AEP - Design Condition vs Existing Condition
Figure A45-A	Changes in Peak Flood Velocity for 2% AEP - Design Condition vs Existing Condition
Figure A45-B	Changes in Peak Flood Velocity for 2% AEP - Design Condition vs Existing Condition
Figure A46-A	Changes in Peak Flood Velocity for 1% AEP - Design Condition vs Existing Condition
Figure A46-B	Changes in Peak Flood Velocity for 1% AEP - Design Condition vs Existing Condition
Figure A47-A	Changes in Peak Flood Velocity for 1% AEP Climate Change - Design Condition vs Existing
Figure A47-B	Changes in Peak Flood Velocity for 1% AEP Climate Change - Design Condition vs Existing
Figure A48-A	Changes in Peak Flood Hazard for 5% AEP - Design Condition vs Existing Condition
Figure A48-B	Changes in Peak Flood Hazard for 5% AEP - Design Condition vs Existing Condition
Figure A49-A	Changes in Peak Flood Hazard for 2% AEP - Design Condition vs Existing Condition
Figure A49-B	Changes in Peak Flood Hazard for 2% AEP - Design Condition vs Existing Condition
Figure A50-A	Changes in Peak Flood Hazard for 1% AEP - Design Condition vs Existing Condition
Figure A50-B	Changes in Peak Flood Hazard for 1% AEP - Design Condition vs Existing Condition
Figure A51-A	Changes in Peak Flood Hazard for 1% AEP Climate Change - Design Condition vs Existing Condition
Figure A51-B	Changes in Peak Flood Hazard for 1% AEP Climate Change - Design Condition vs Existing Condition

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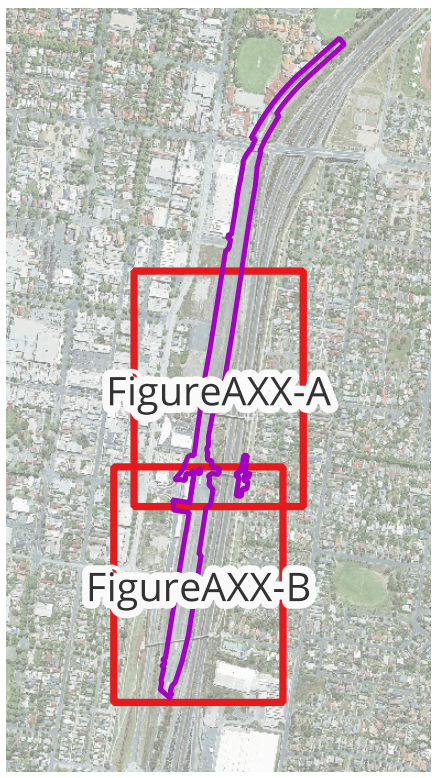
Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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 70 140 m

A3 Scale: 1:1,800

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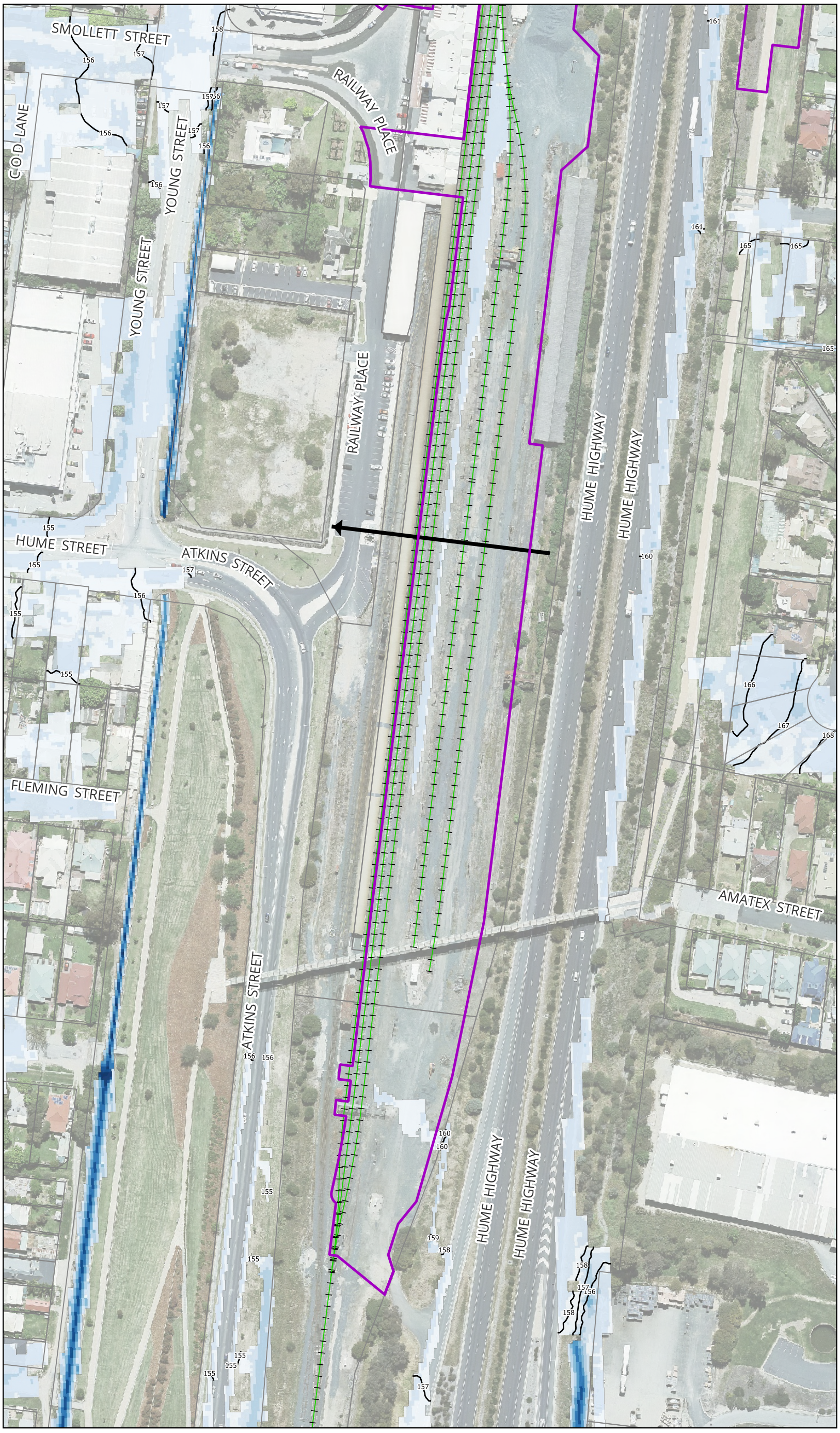
Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A01-A: 5% AEP Peak Flood Depth and Levels - Existing Condition



Map by: TT

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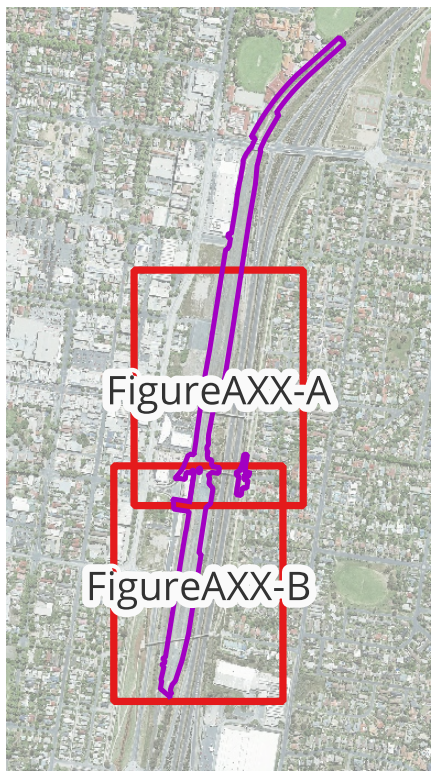
Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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:

0 70 140 m

A3 Scale: 1:1,800

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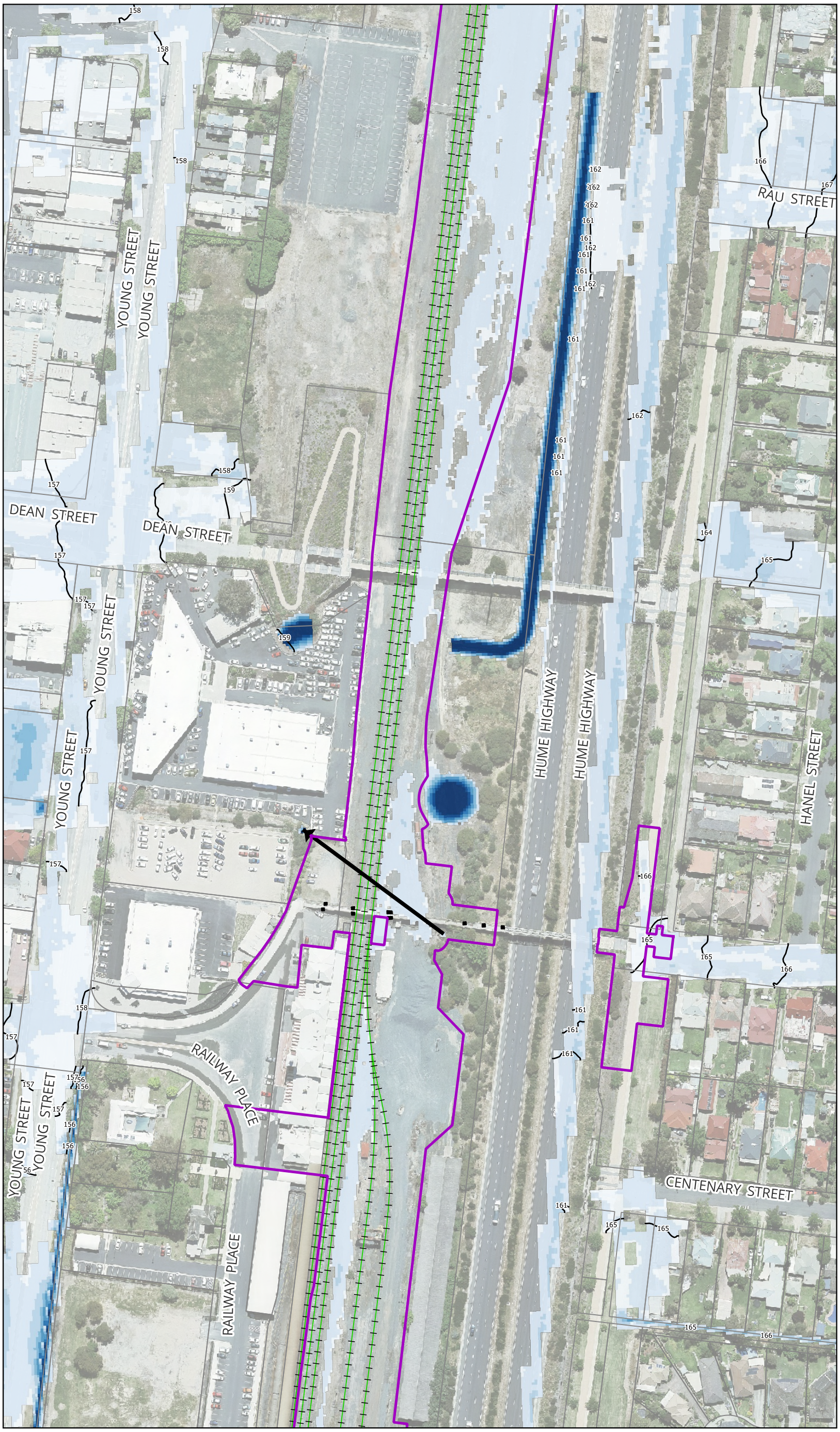
Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A01-B: 5% AEP Peak Flood Depth and Levels - Existing Condition



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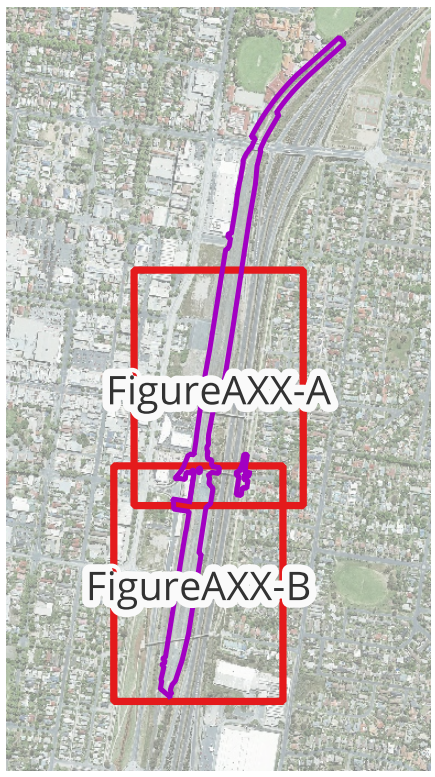
Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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 70 140 m

A3 Scale: 1:1,800

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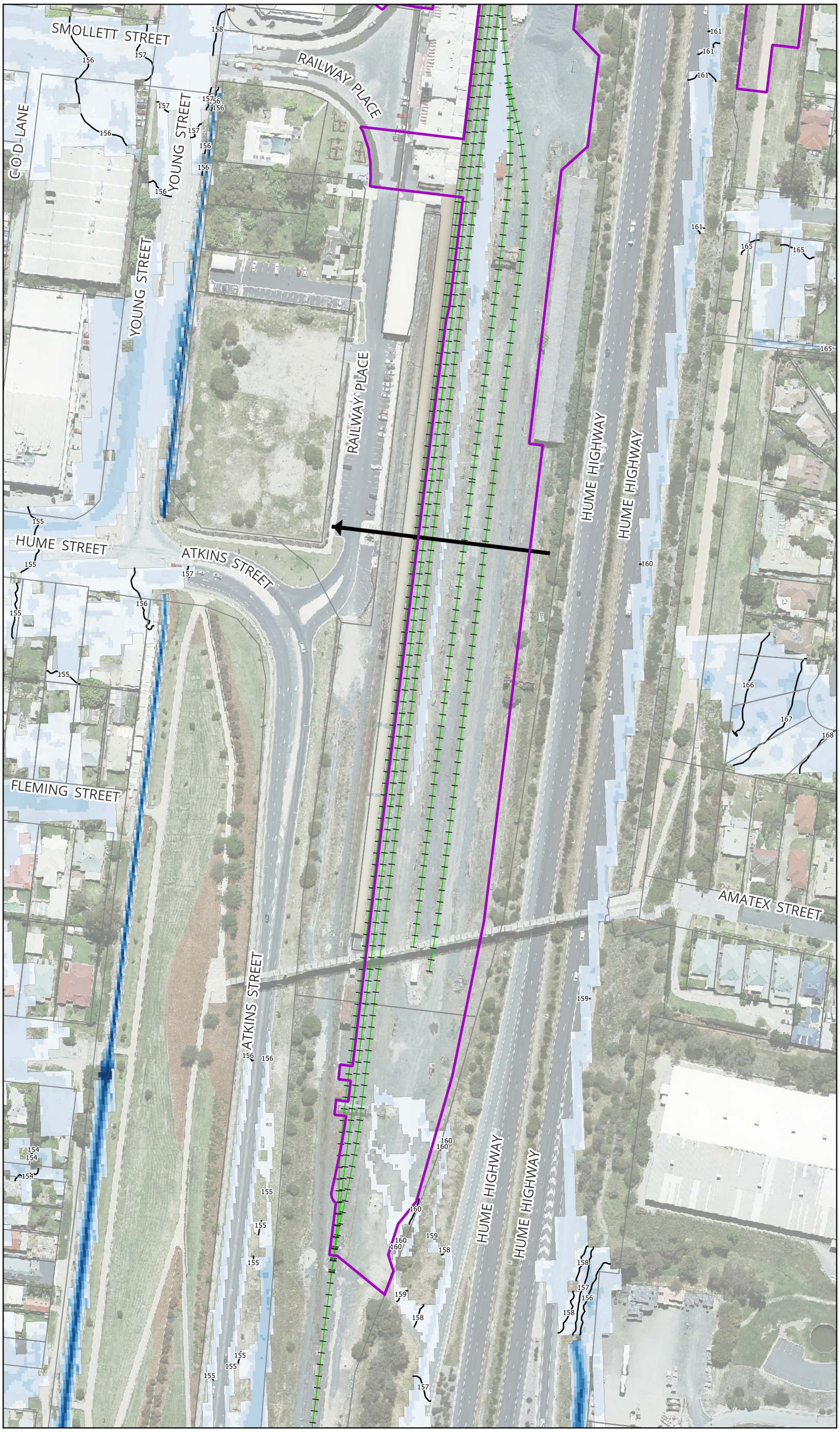
Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A02-A: 2% AEP Peak Flood Depth and Levels - Existing Condition



Map by: TT

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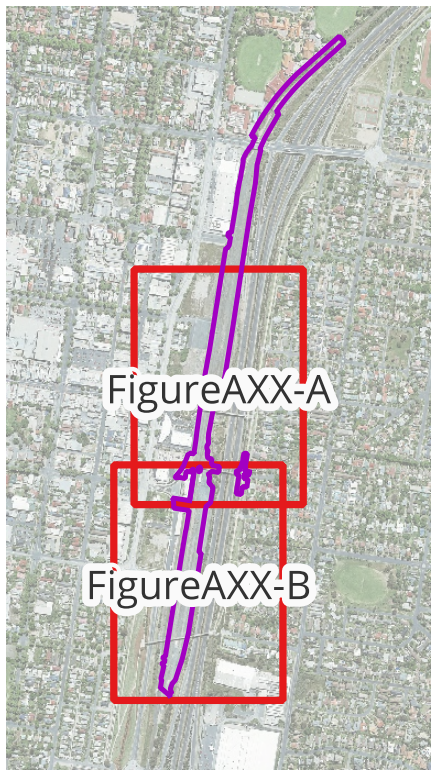
Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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:

0 70 140 m

A3 Scale: 1:1,800

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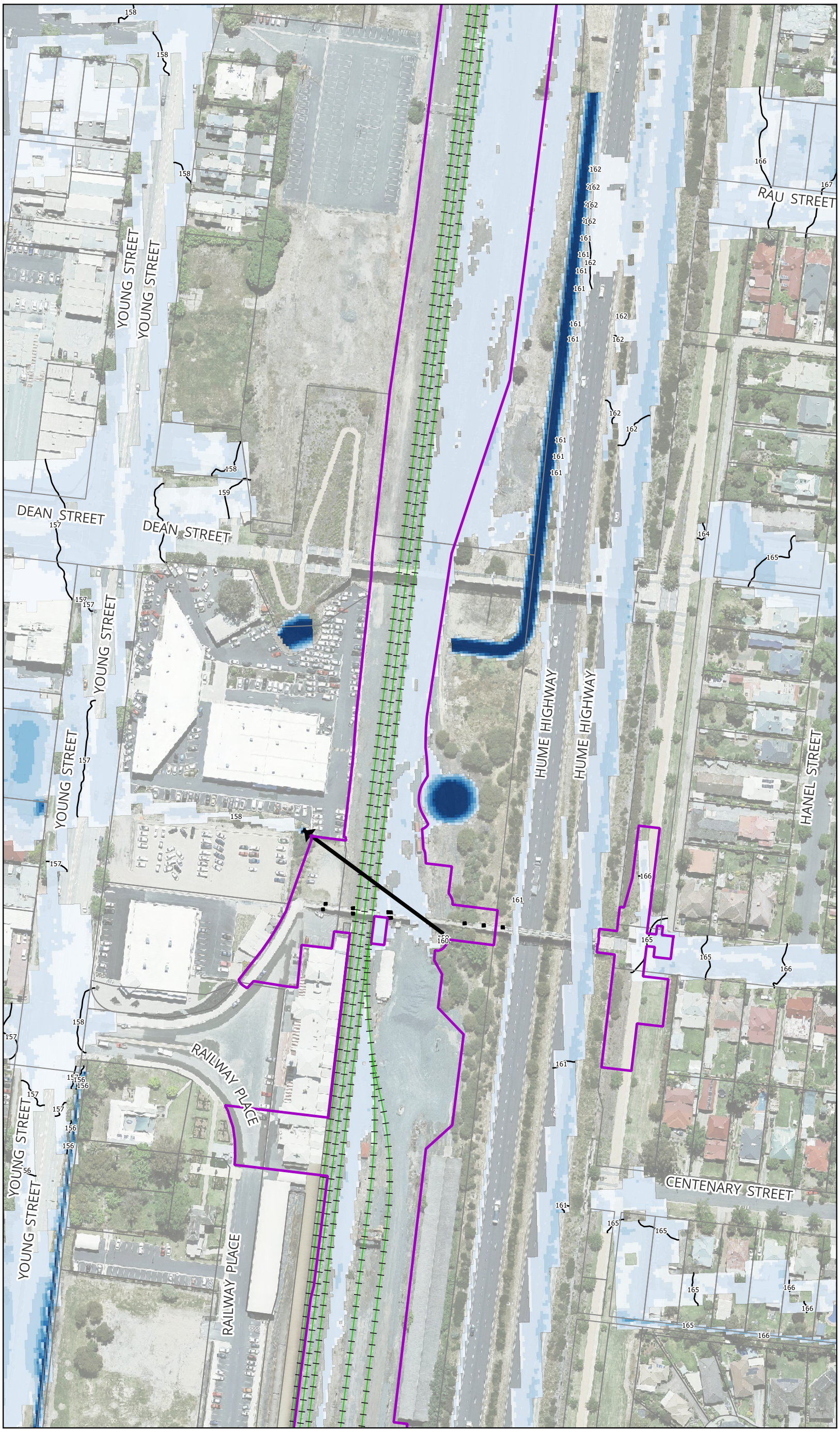
Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A02-B: 2% AEP Peak Flood Depth and Levels - Existing Condition



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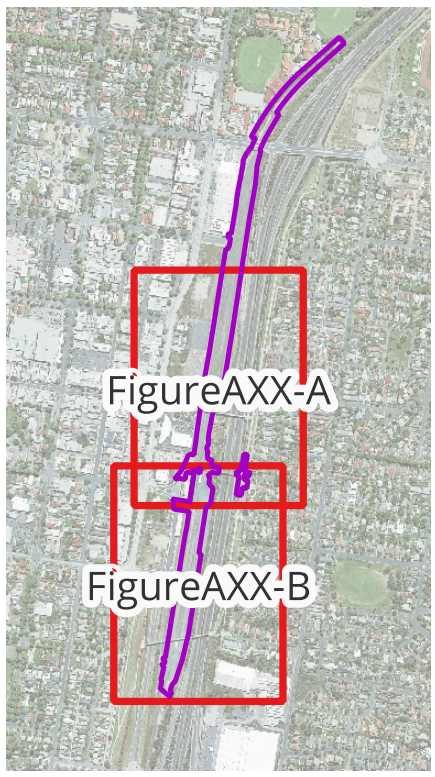
Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

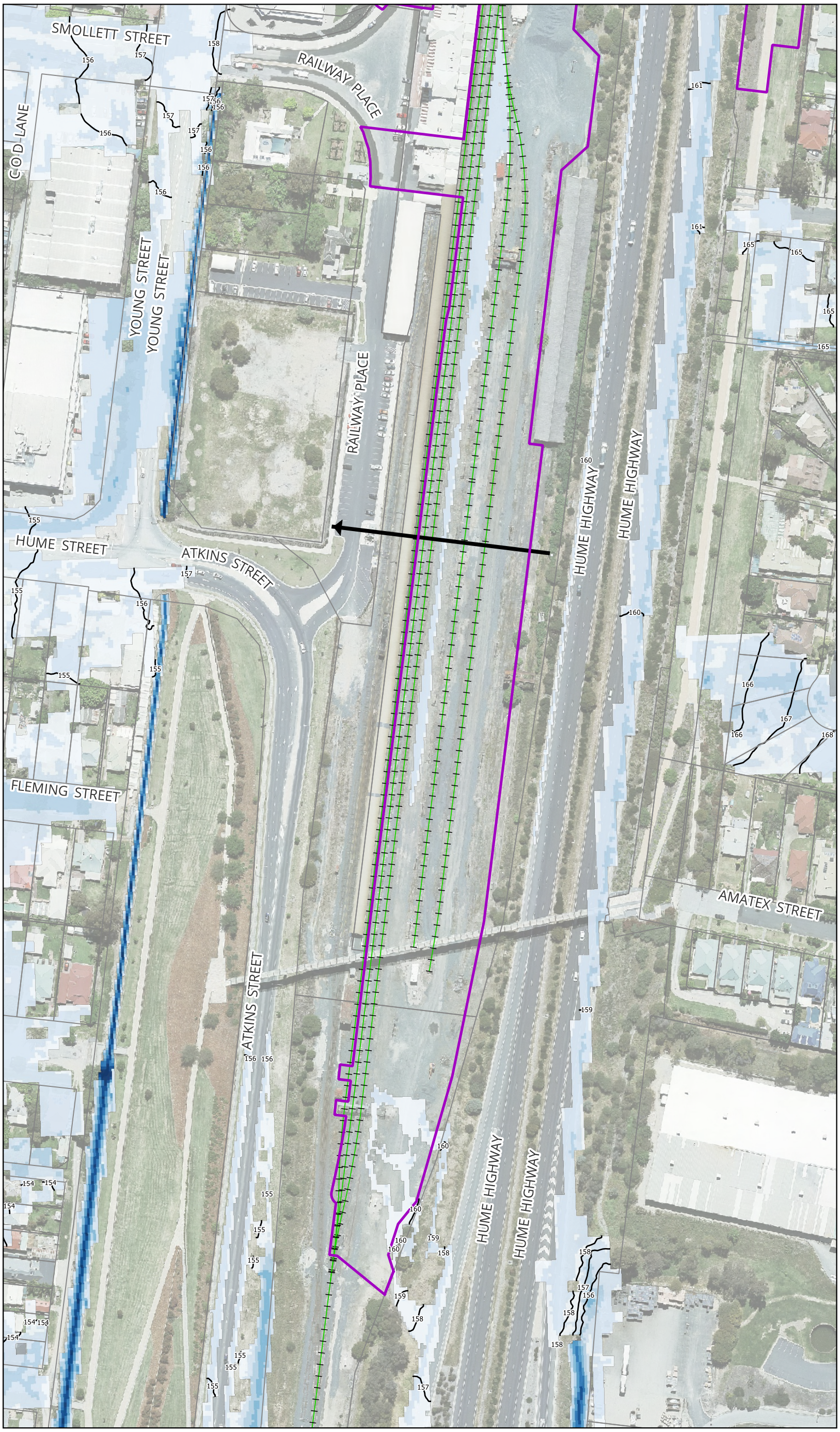
0 70 140 m

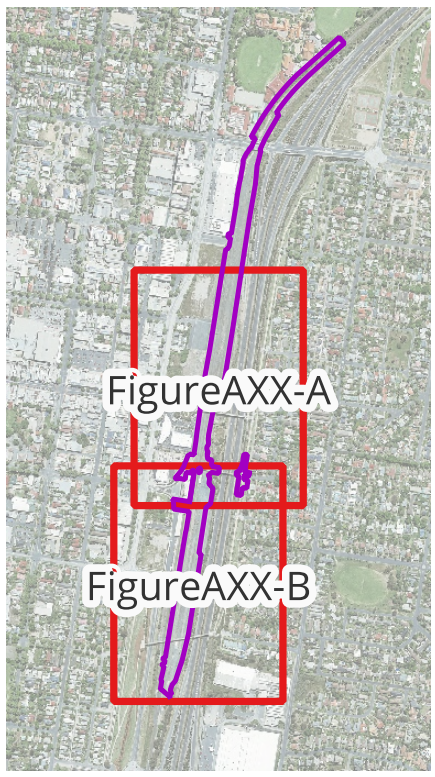
A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A03-A: 1% AEP Peak Flood Depth and Levels - Existing Condition





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Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

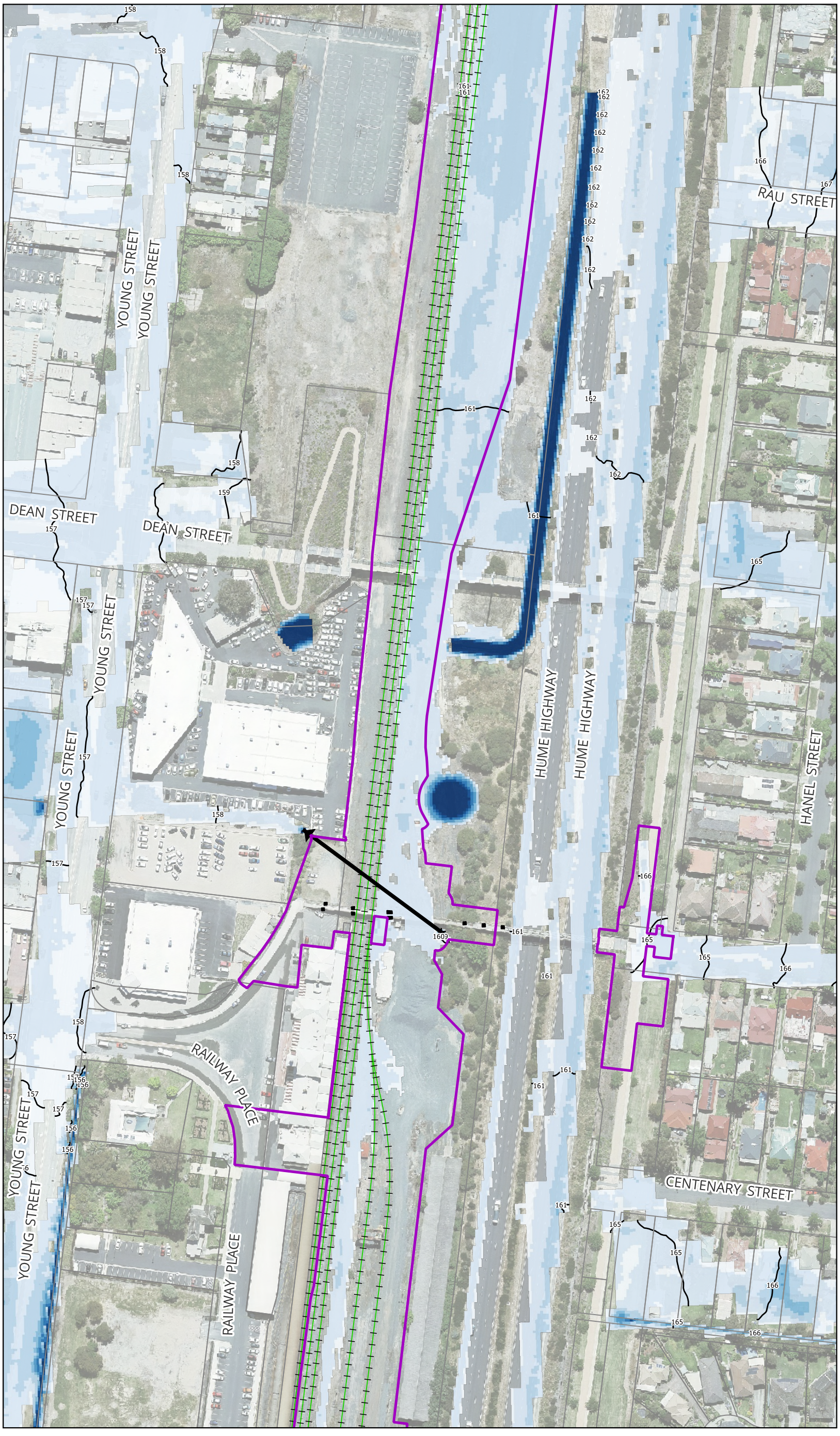
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A03-B: 1% AEP Peak Flood Depth and Levels - Existing Condition



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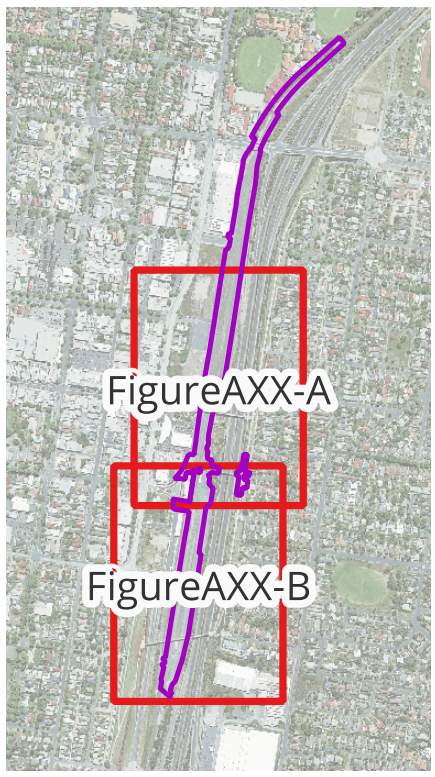
Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

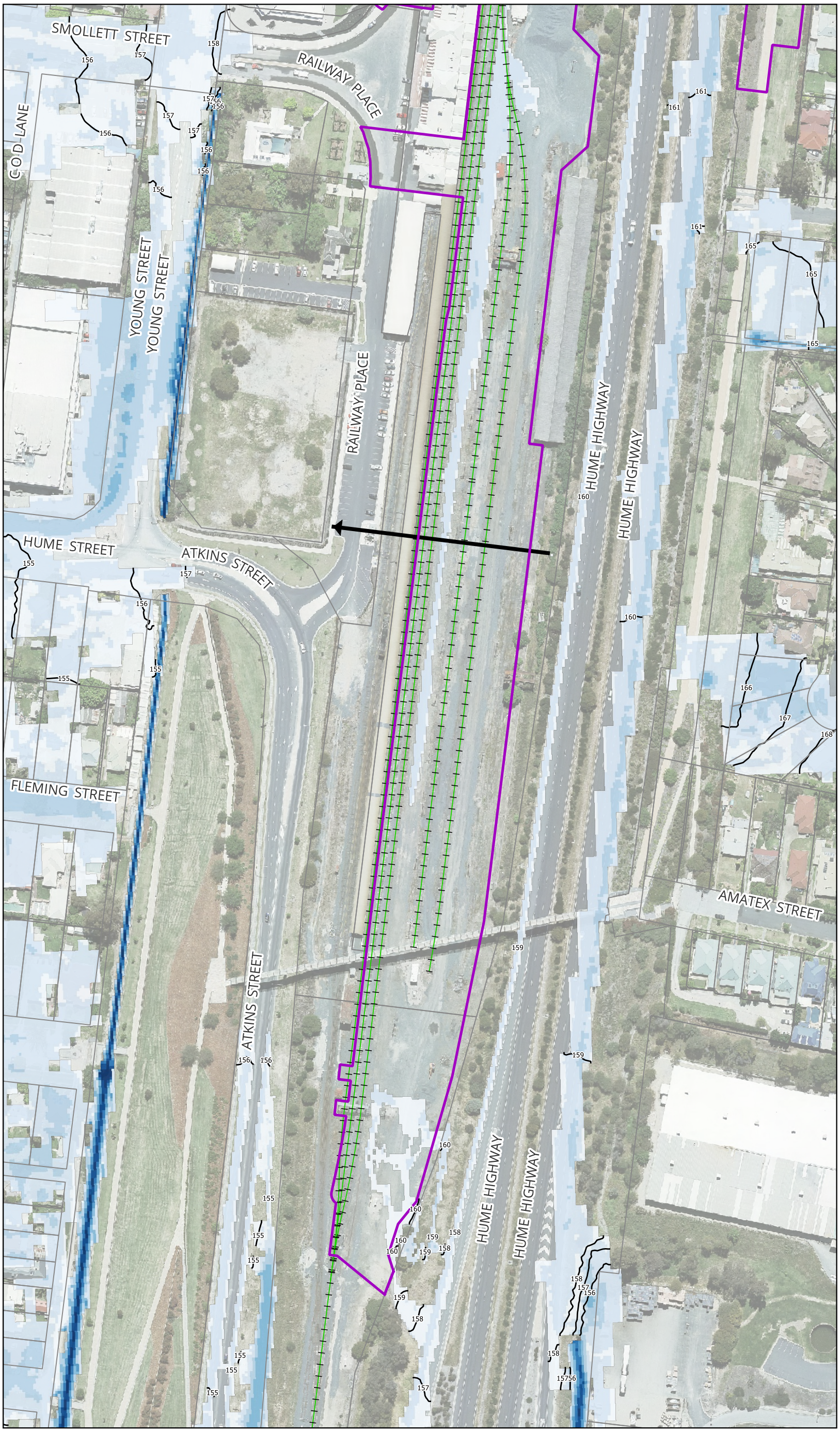
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



Map by: TT

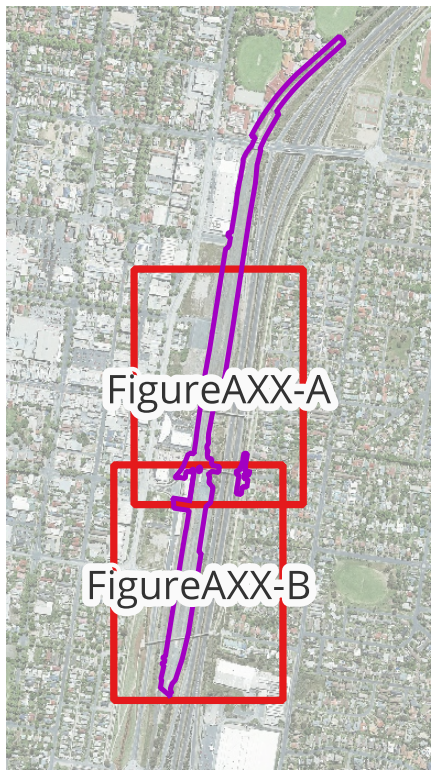
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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:

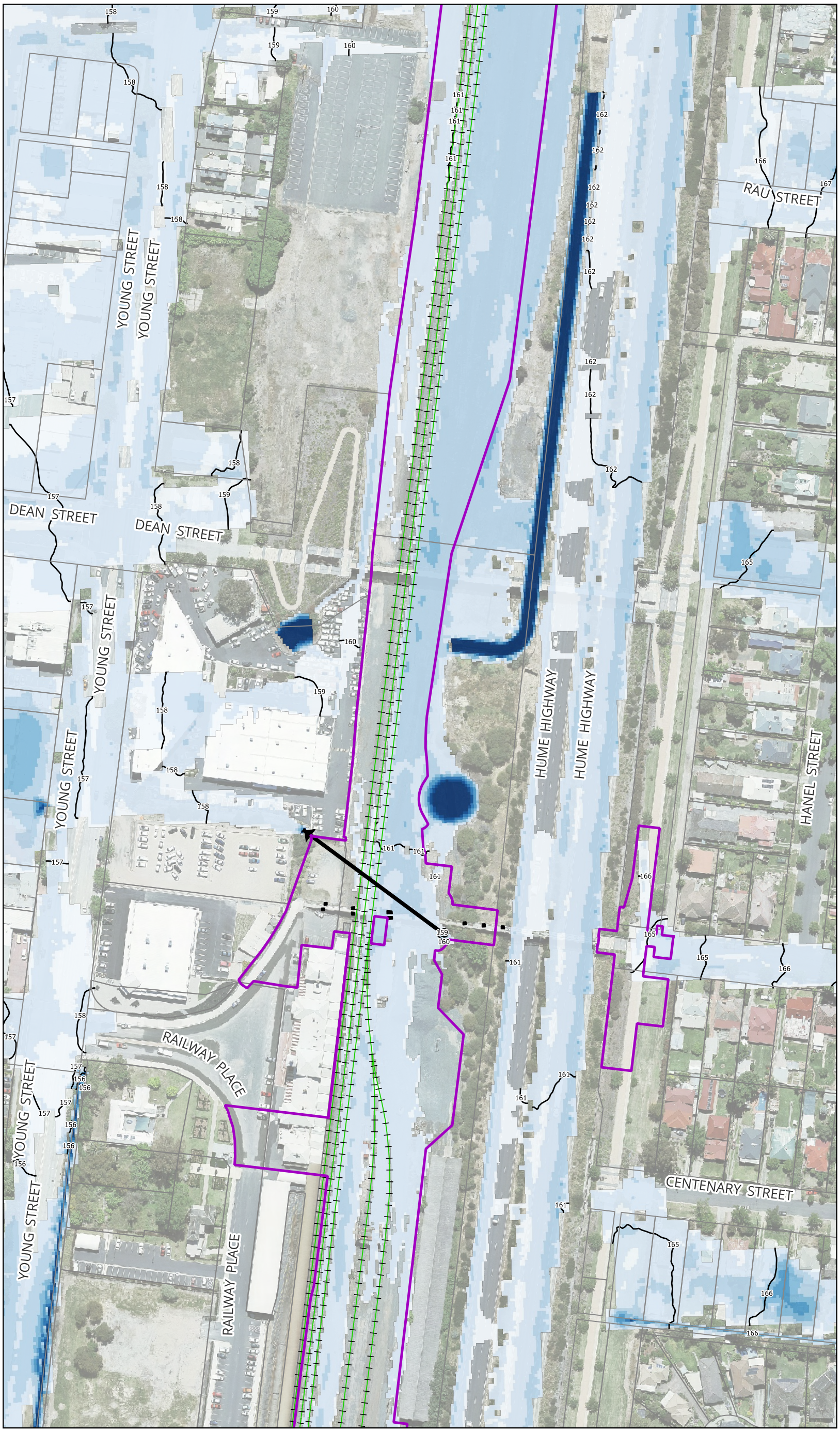
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



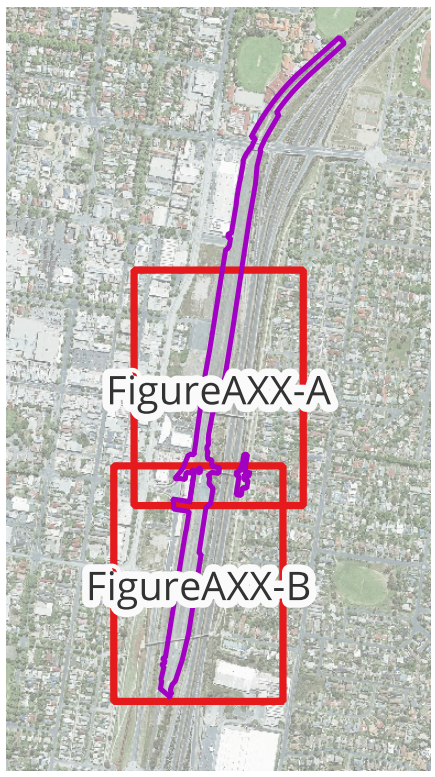
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

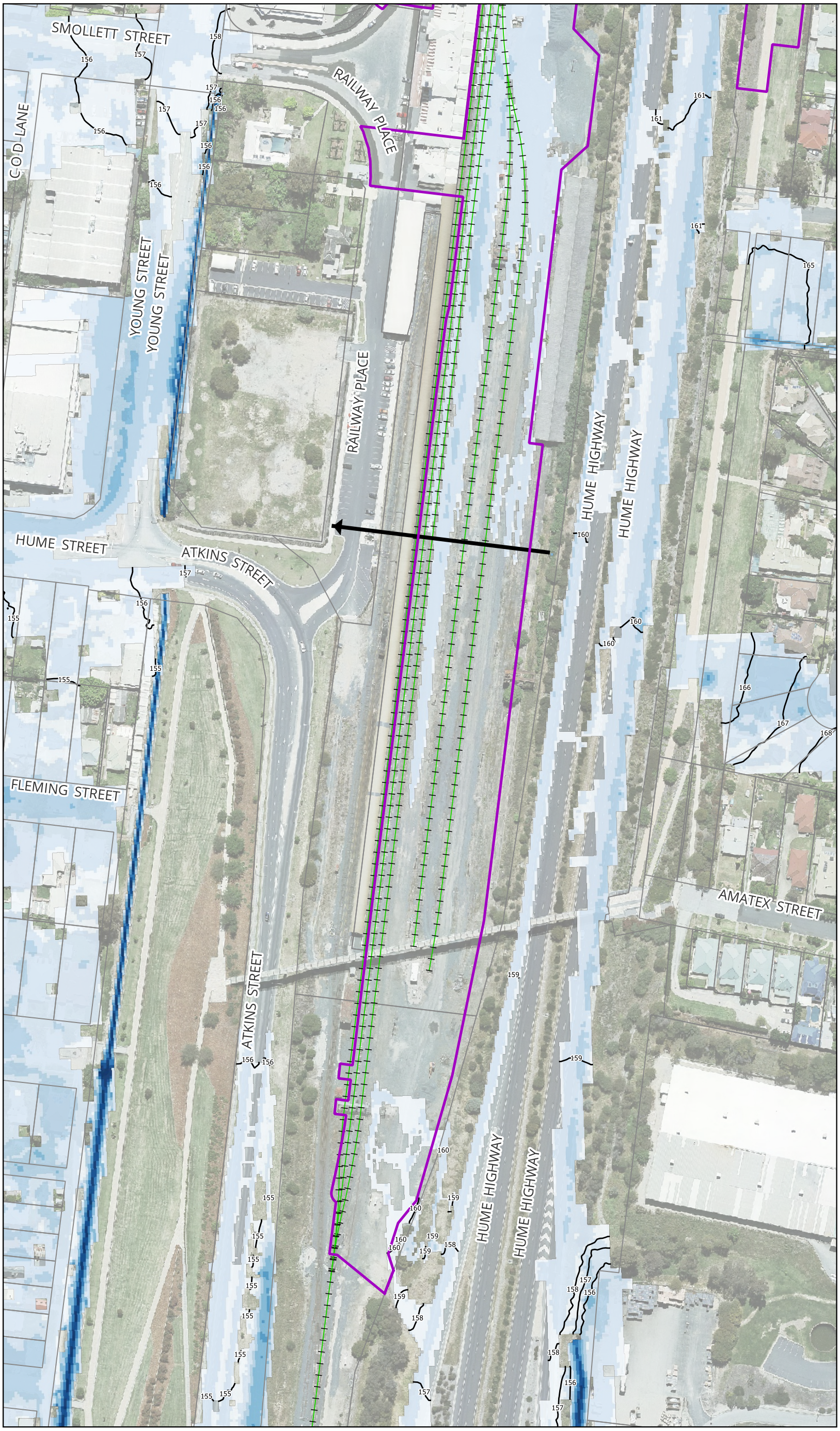
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A05-A: 0.05% AEP Peak Flood Depth and Levels - Existing Condition



Map by: TT

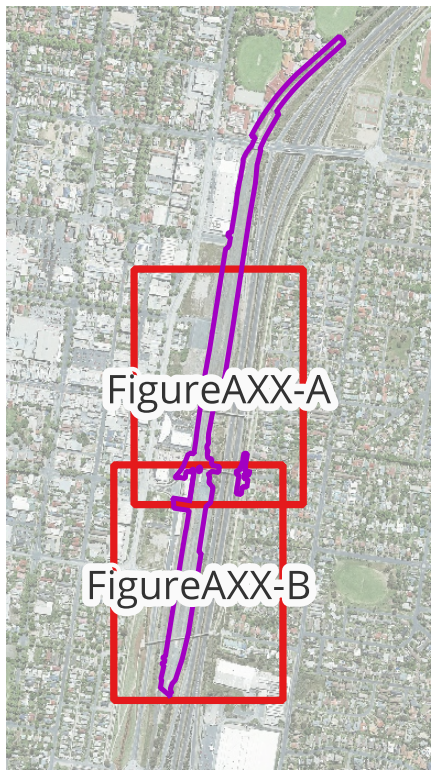
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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:

0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A05-B: 0.05% AEP Peak Flood Depth and Levels - Existing Condition

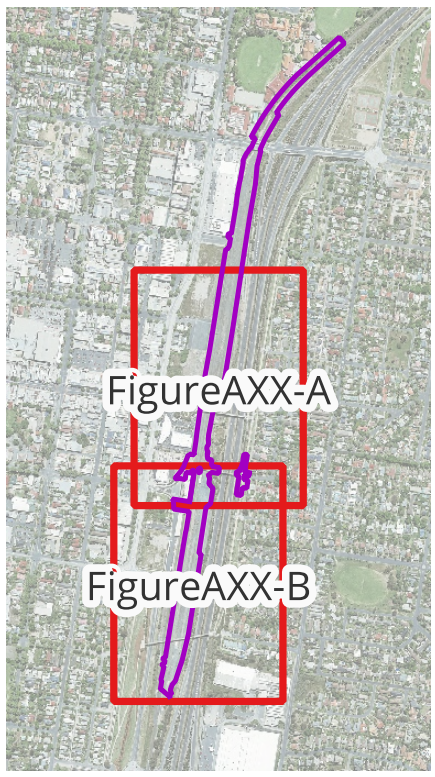
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

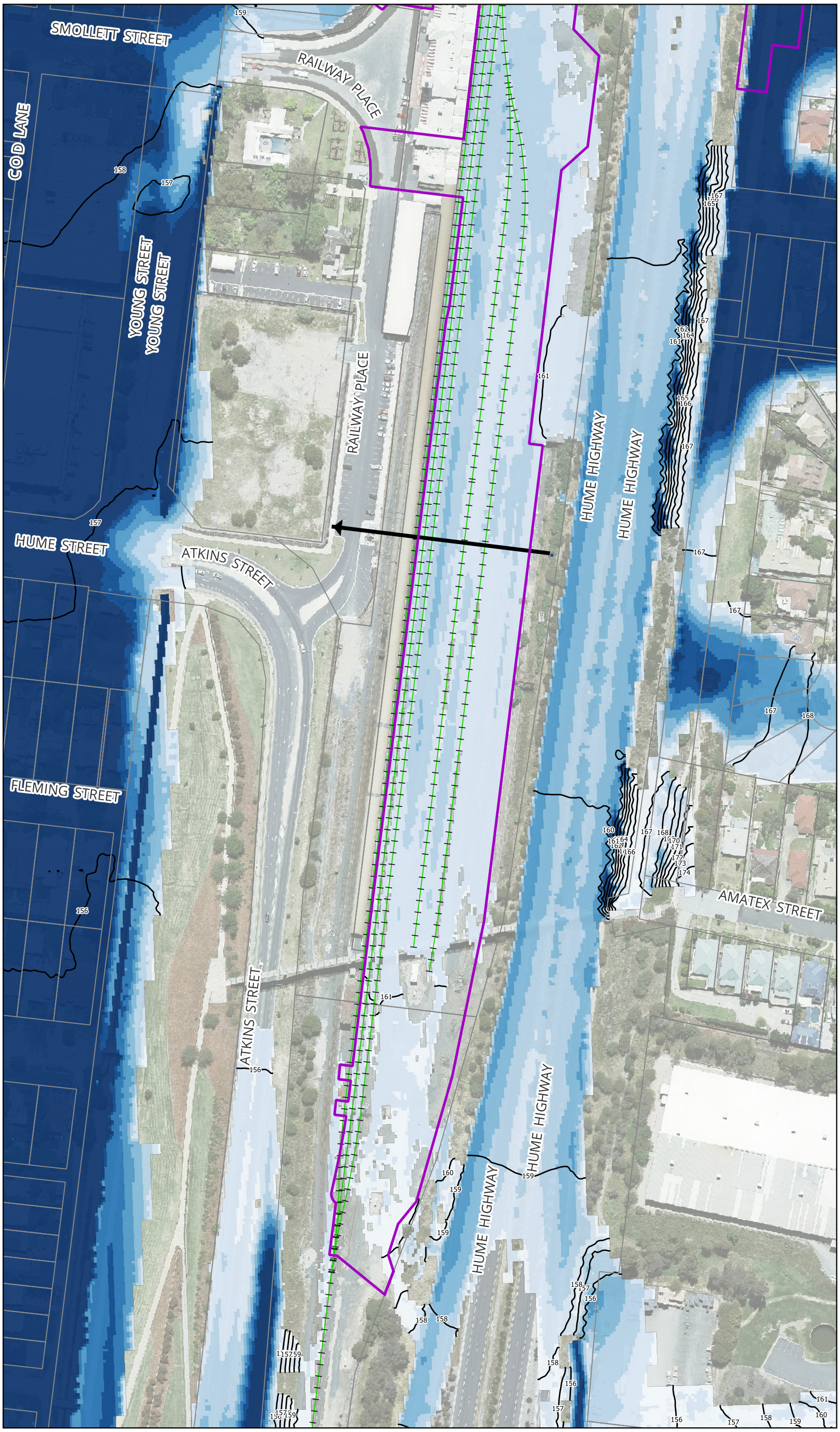
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A06-A: PMF Peak Flood Depth and Levels - Existing Condition



Map by: TT

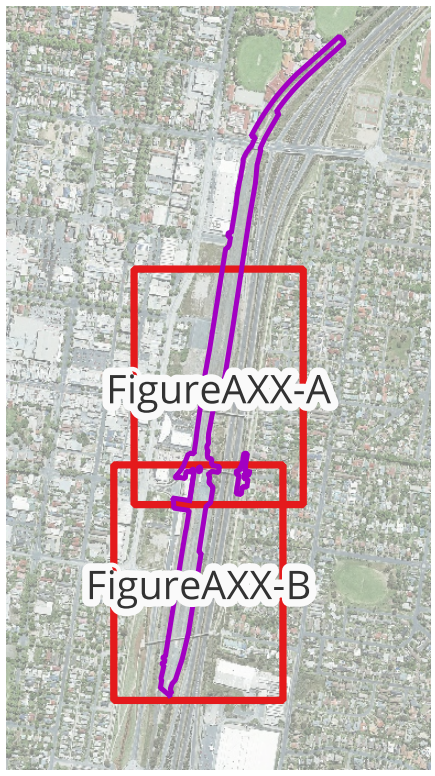
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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:

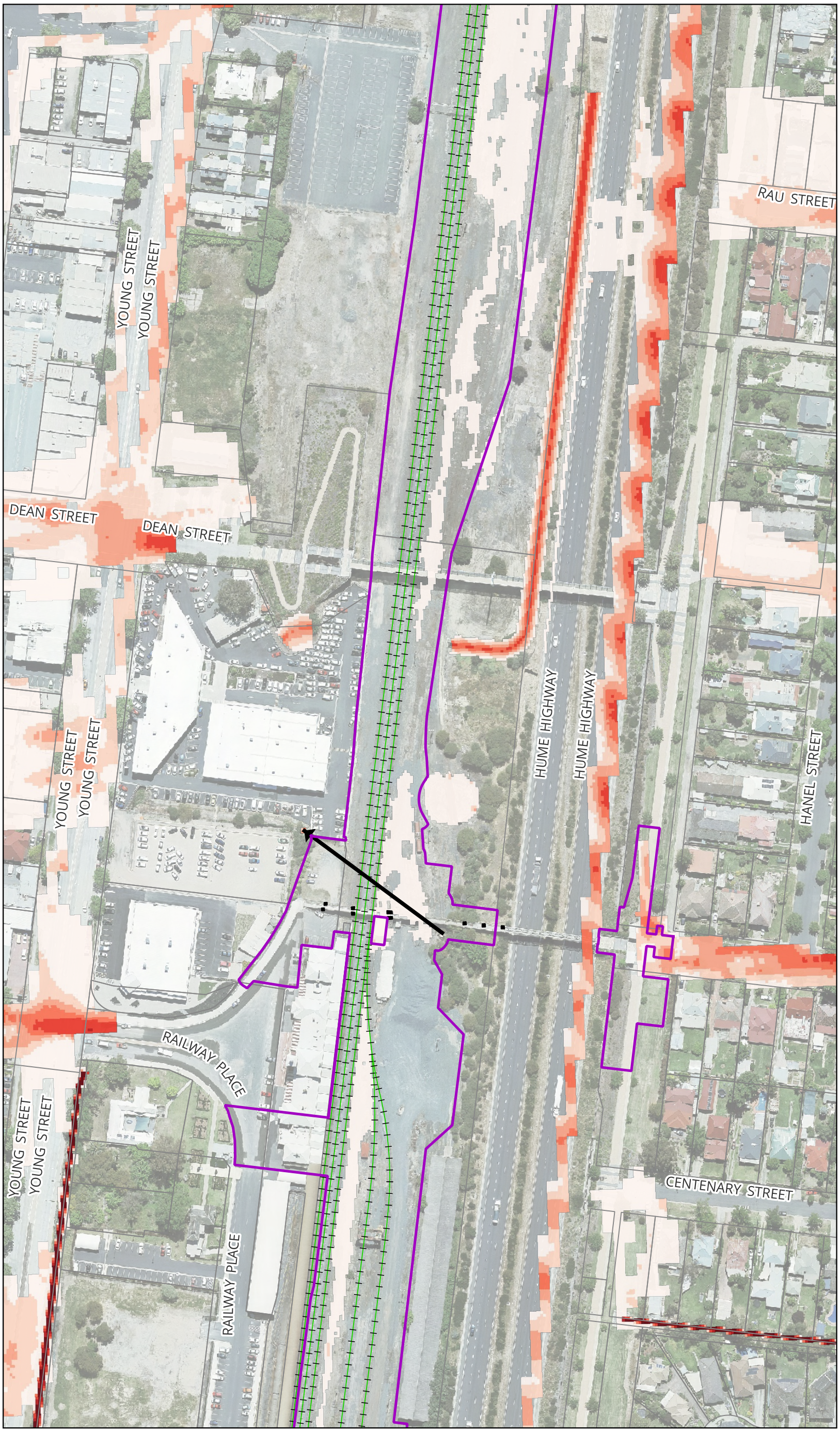
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A06-B: PMF Peak Flood Depth and Levels - Existing Condition



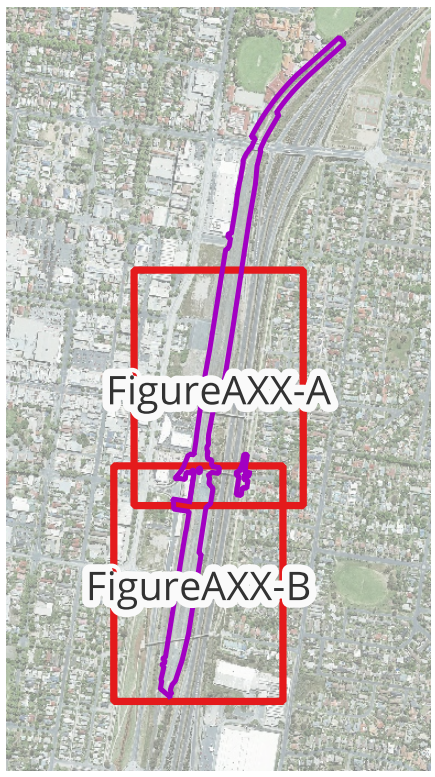
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

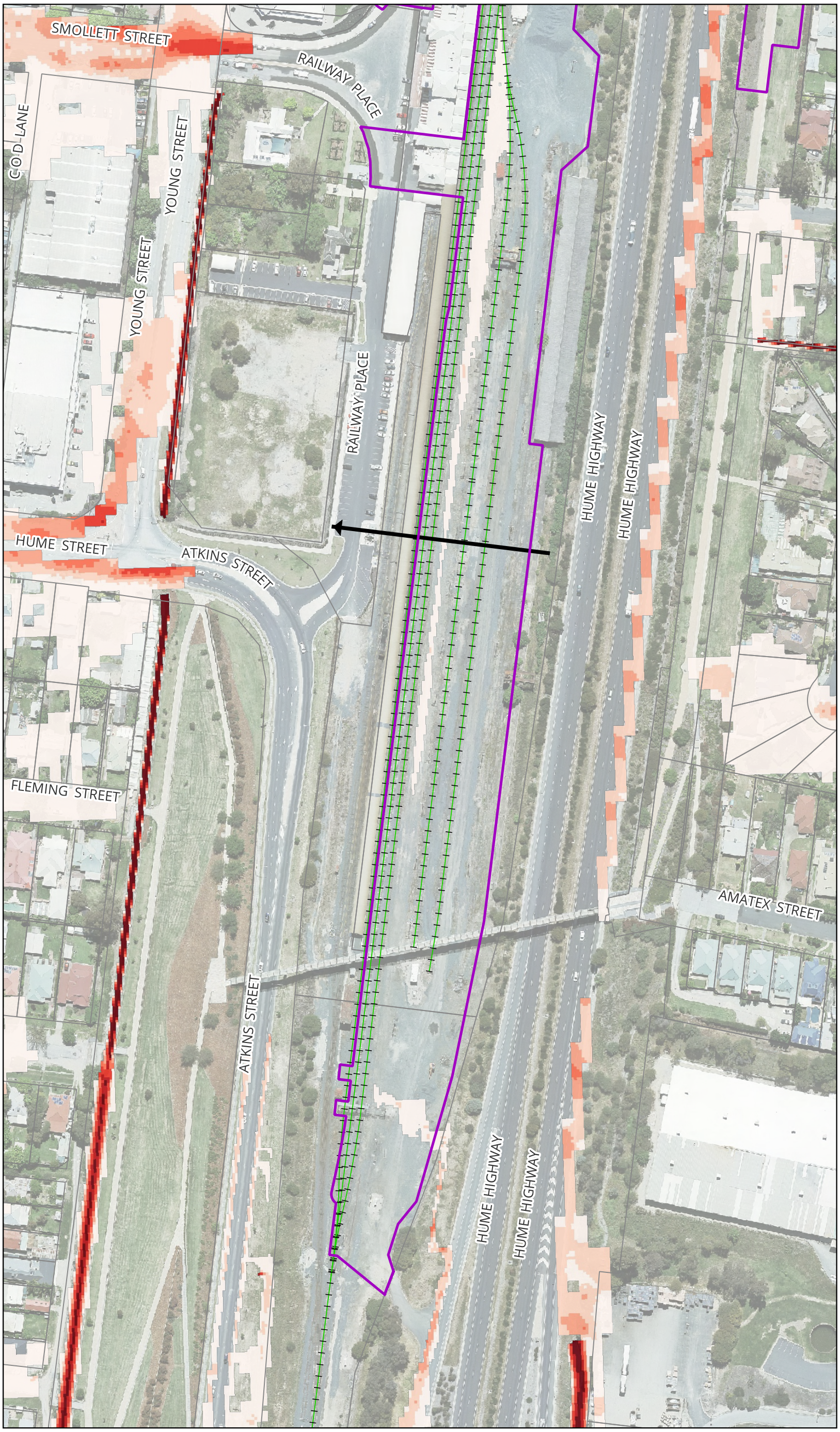
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A07-A: 5% AEP Peak Flood Velocity - Existing Condition



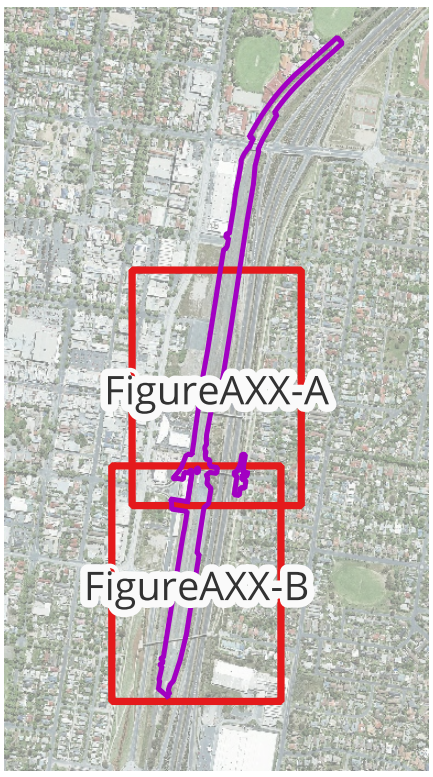
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

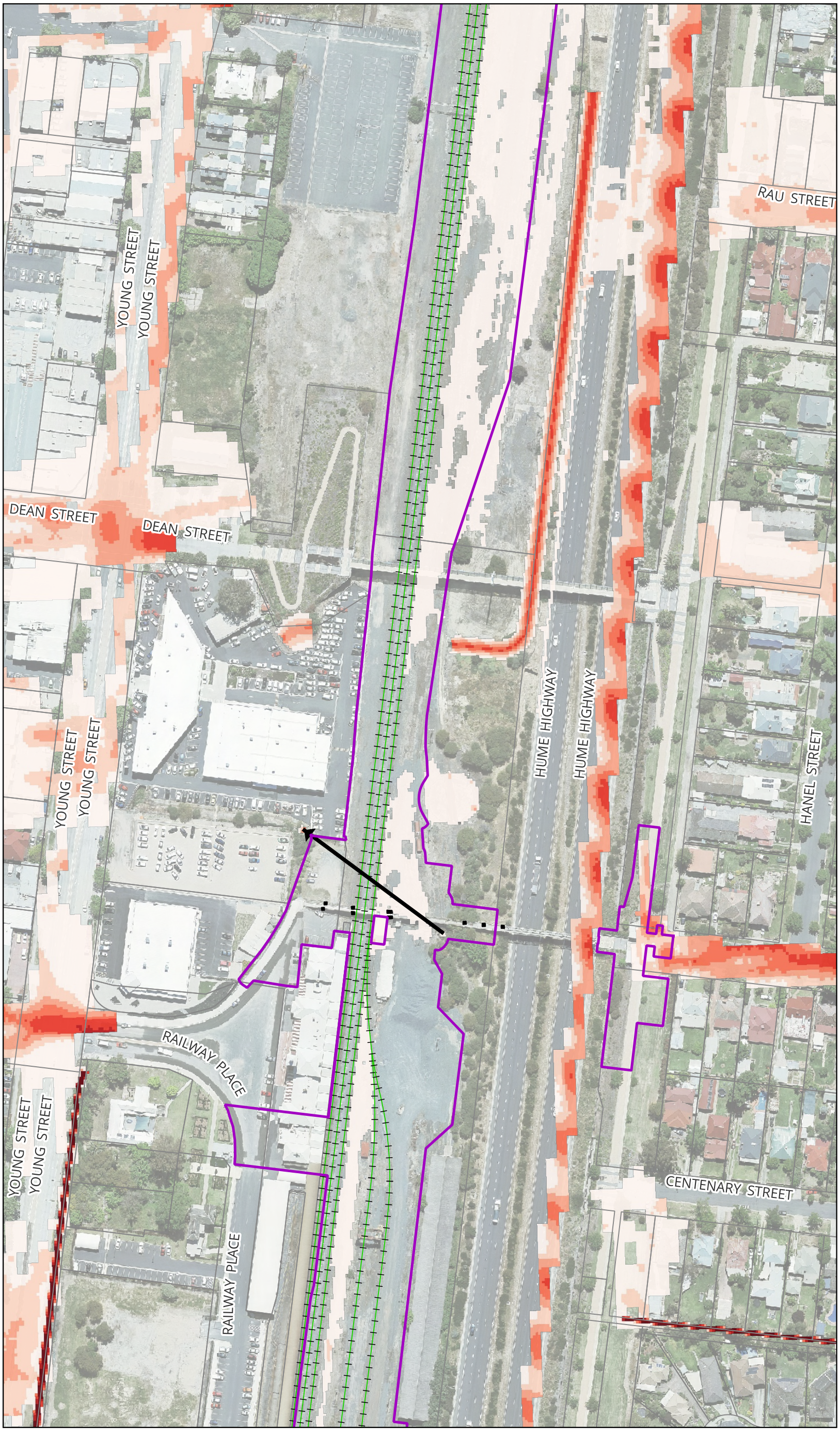
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A07-B: 5% AEP Peak Flood Velocity - Existing Condition



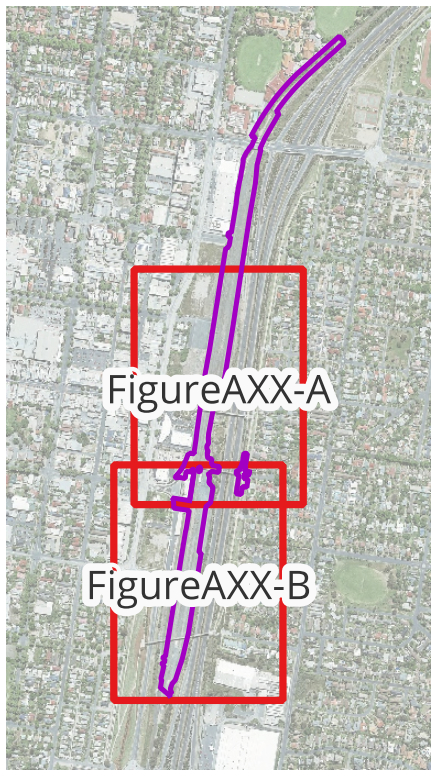
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

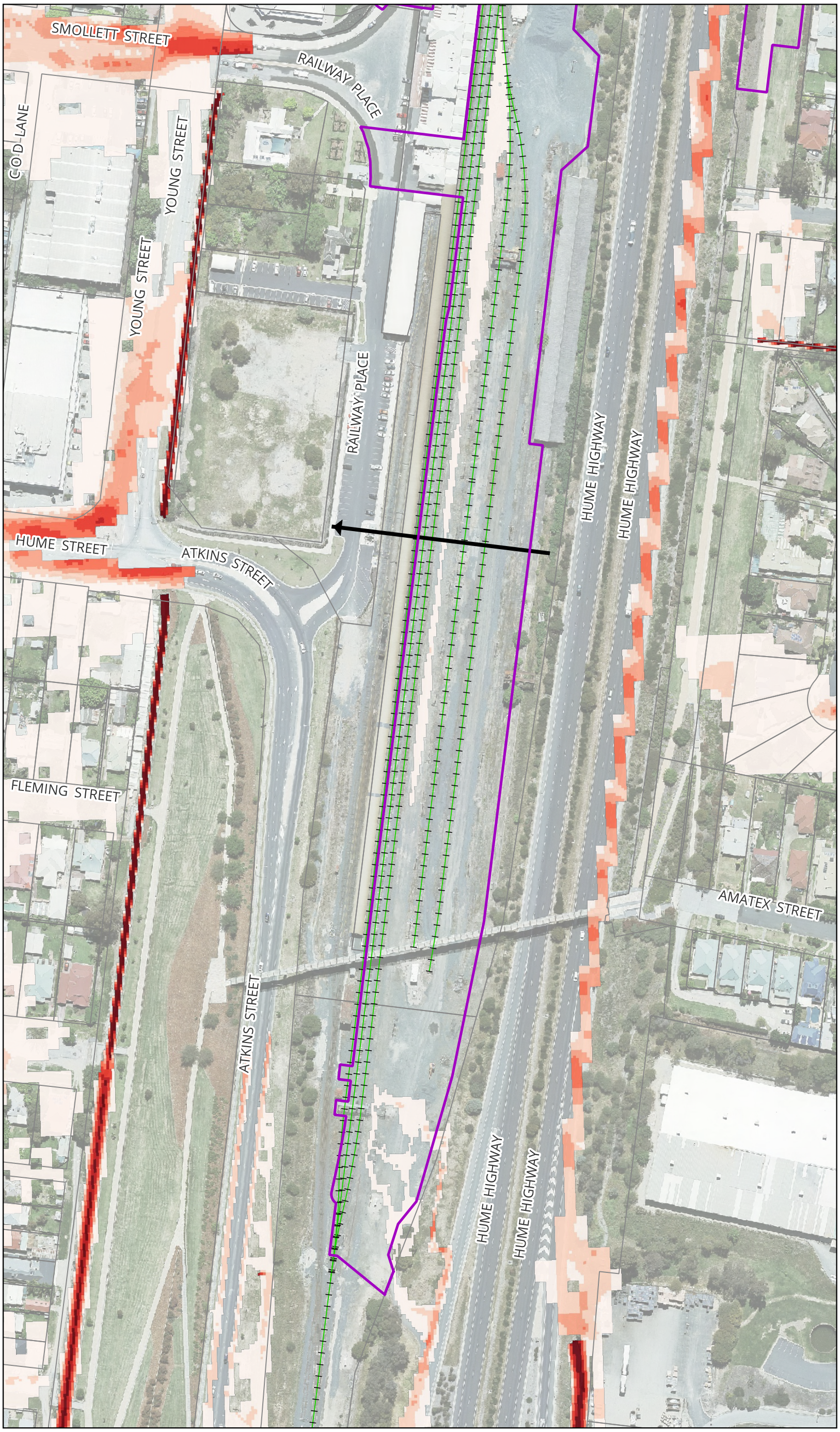
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A08-A: 2% AEP Peak Flood Velocity - Existing Condition



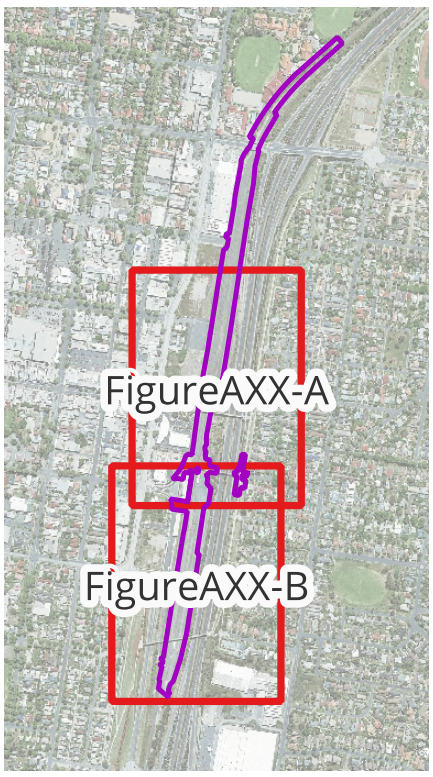
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

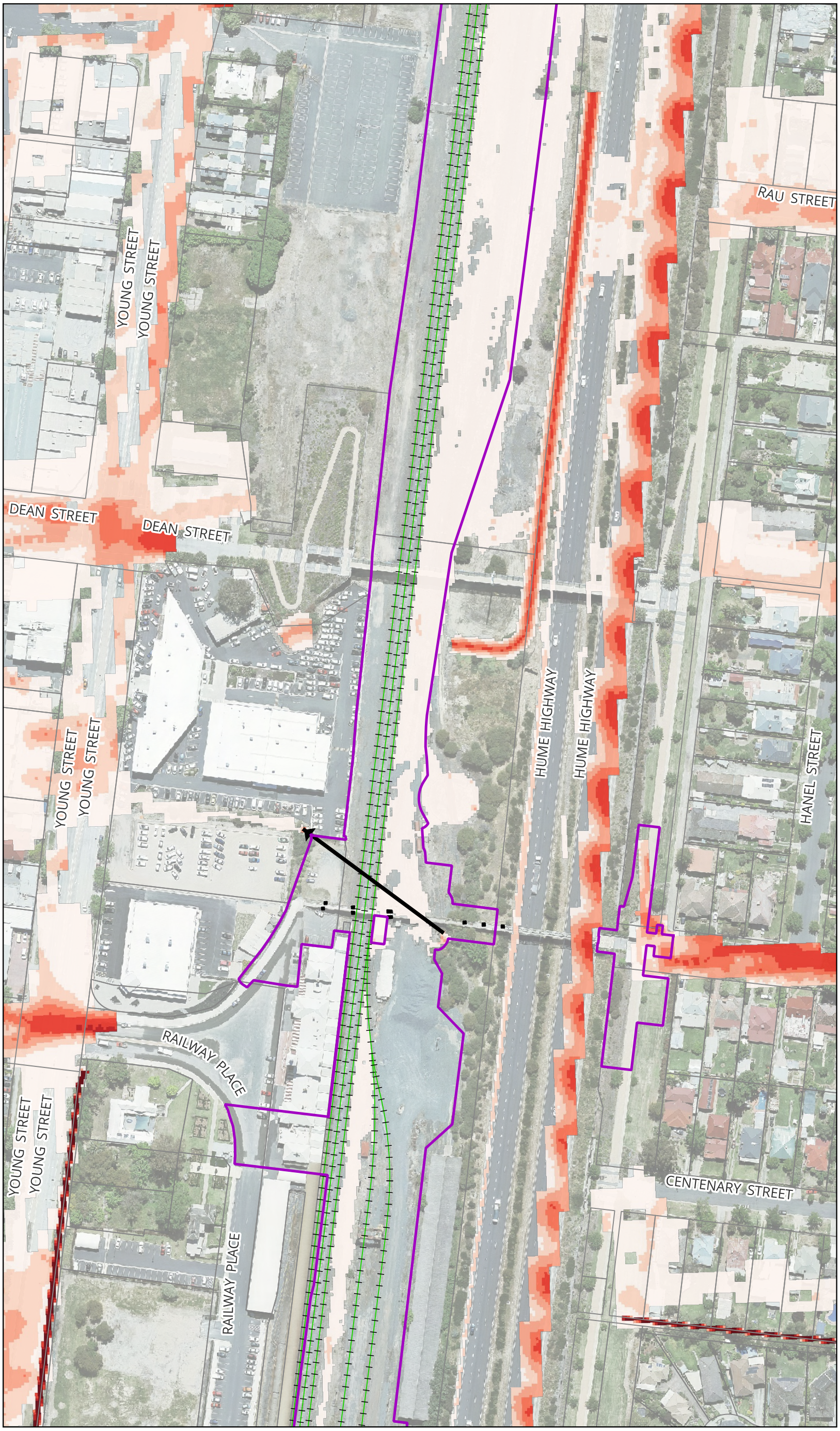
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A08-B: 2% AEP Peak Flood Velocity - Existing Condition



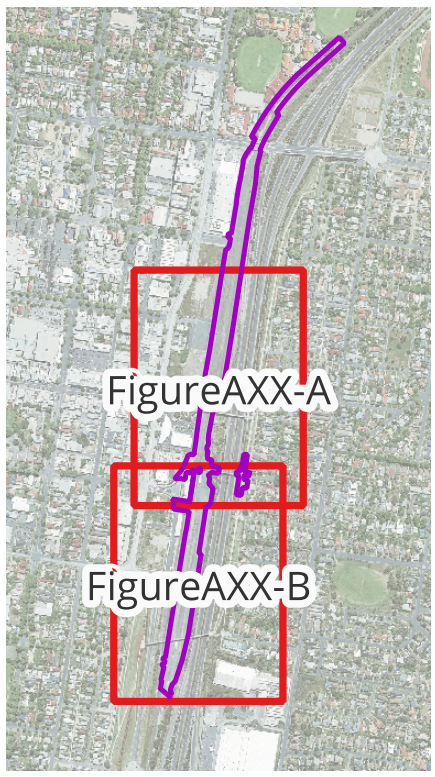
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

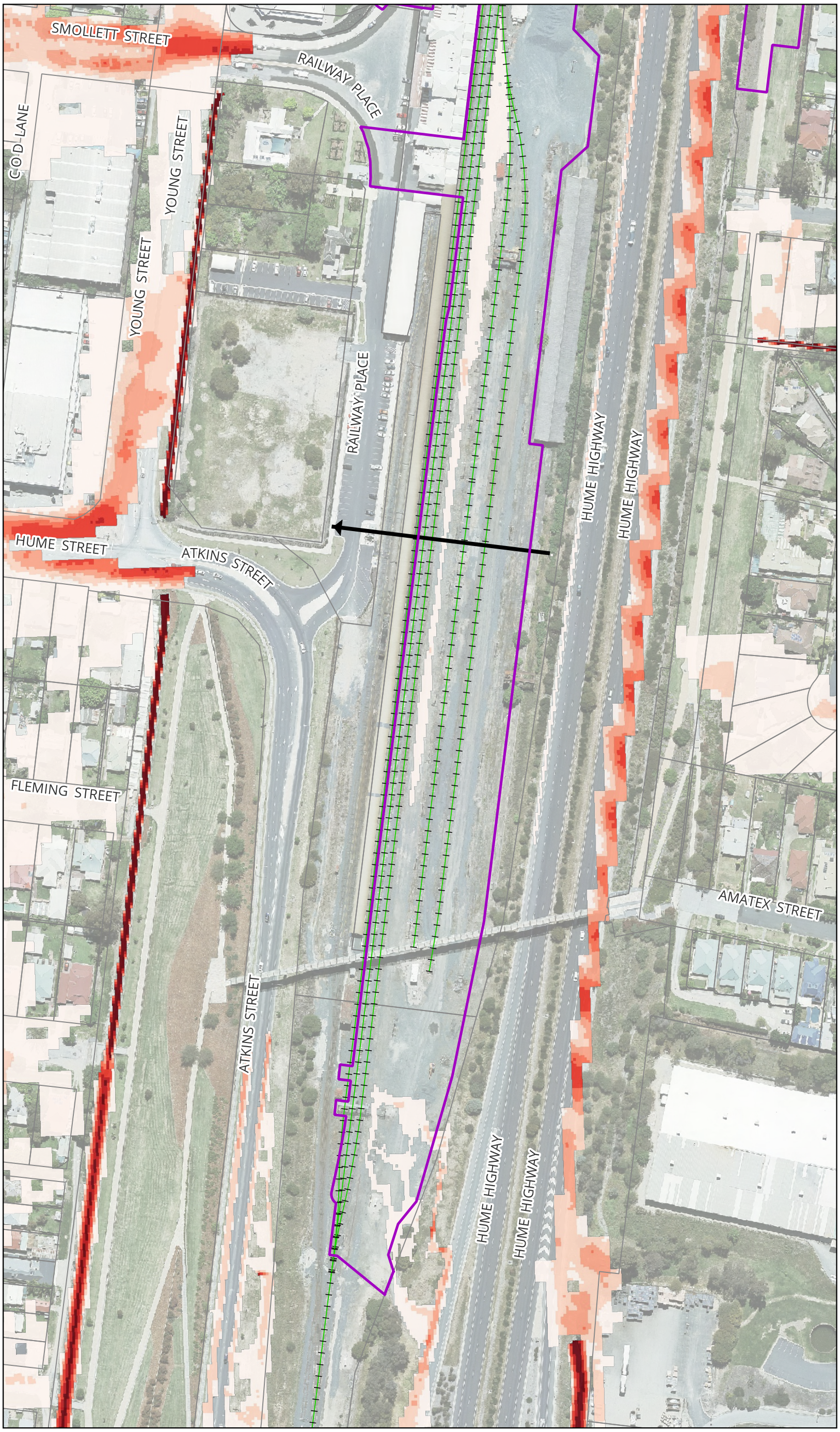
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A09-A: 1% AEP Peak Flood Velocity - Existing Condition



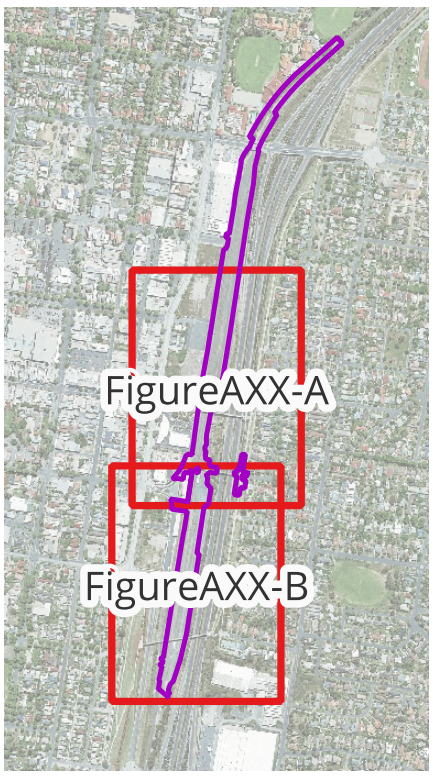
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

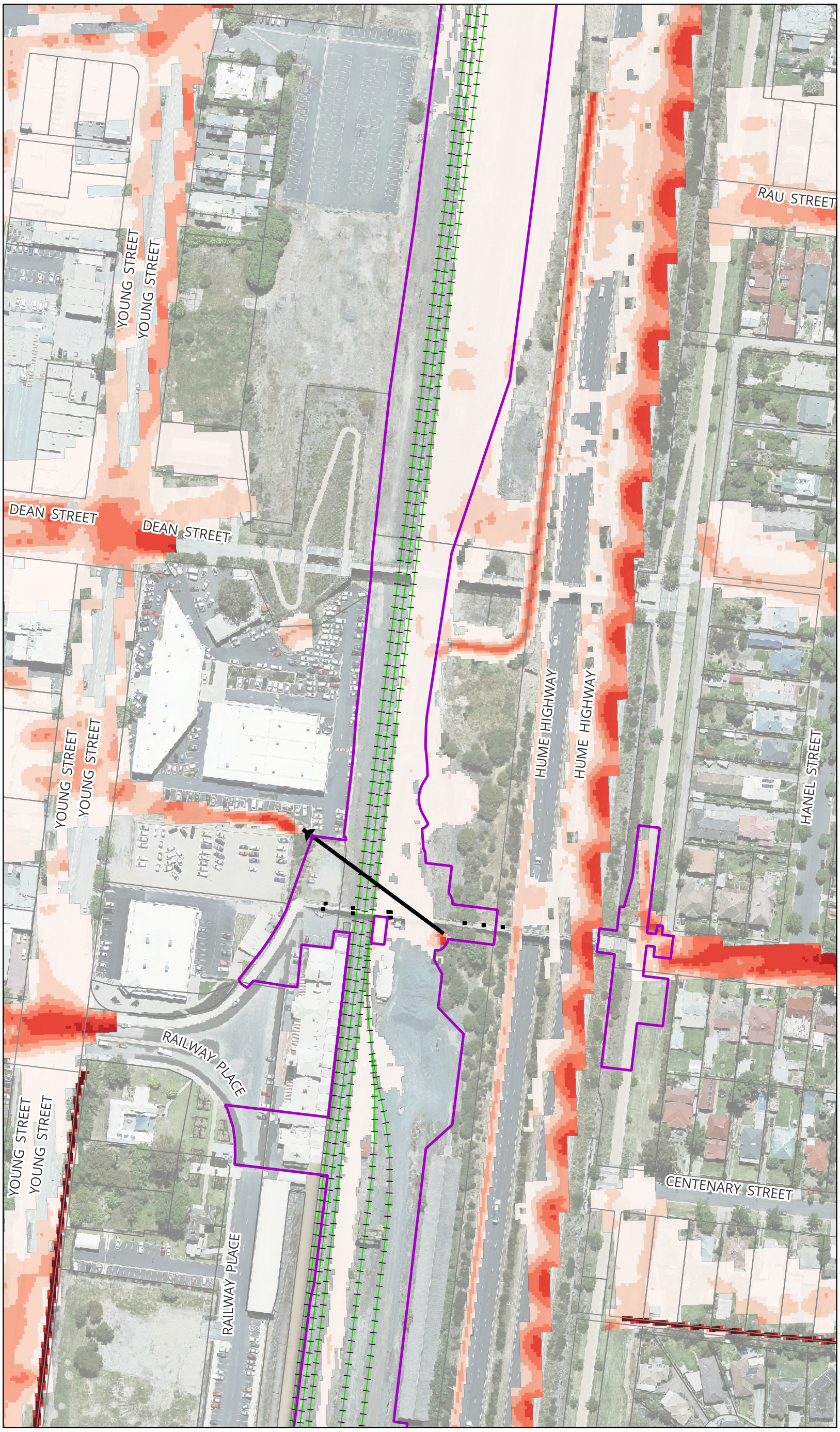
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A09-B: 1% AEP Peak Flood Velocity - Existing Condition



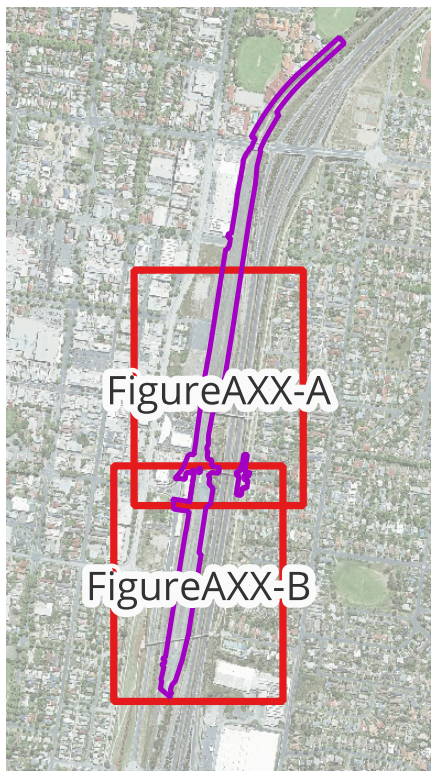
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

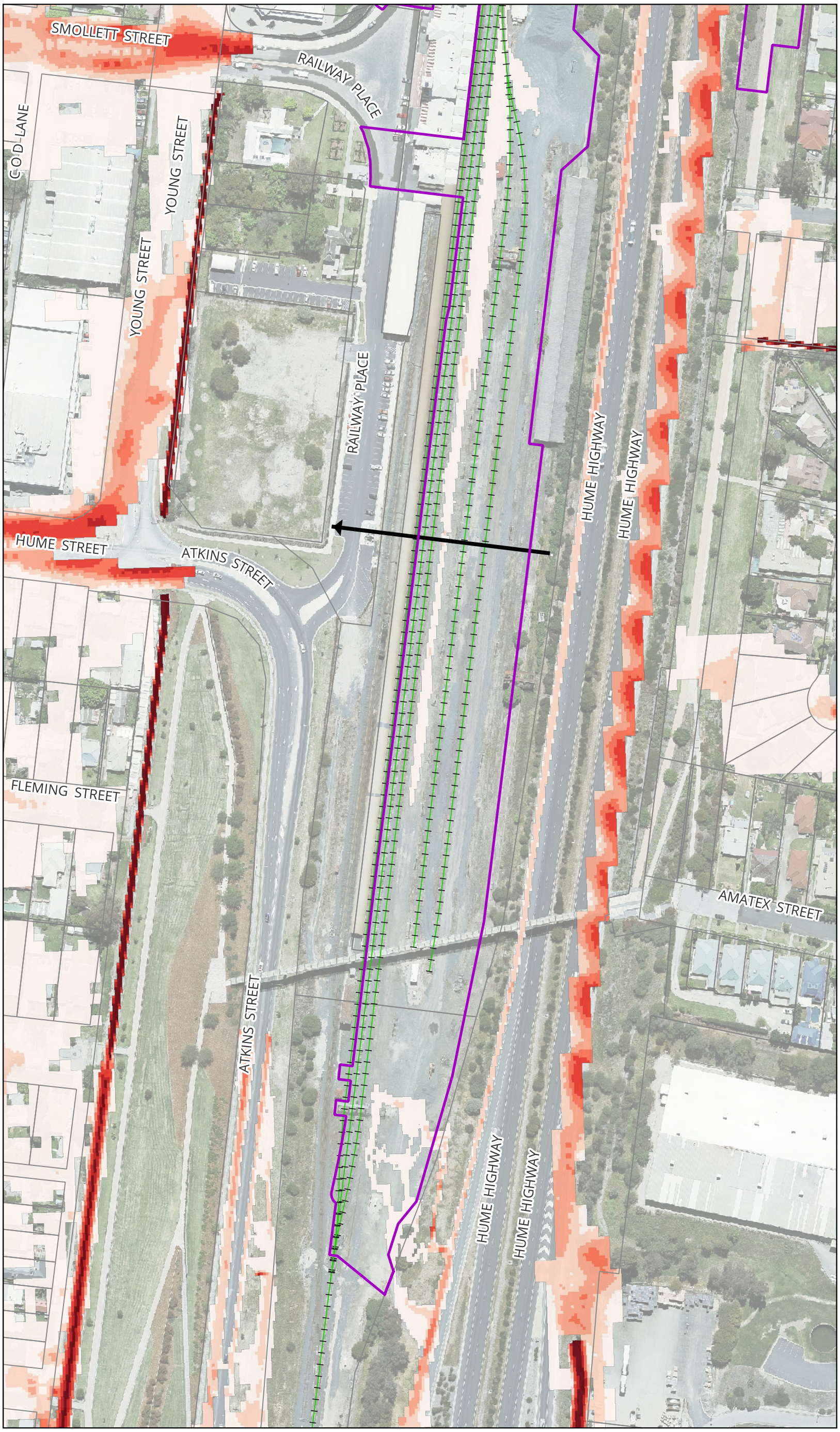
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A10-A: 1% AEP Climate Change Peak Flood Velocity - Existing Condition



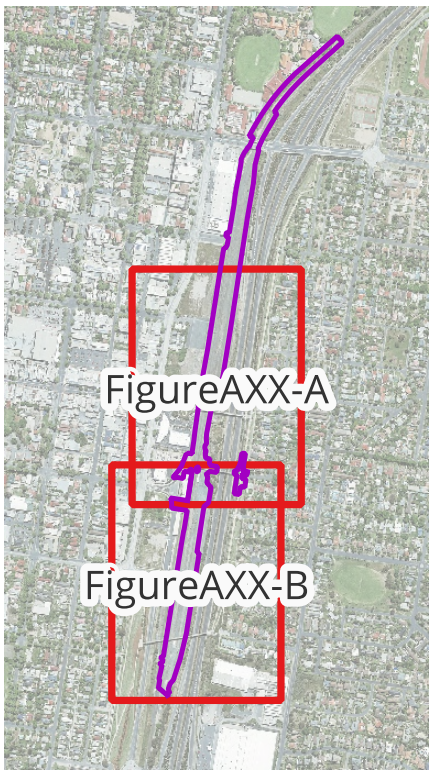
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

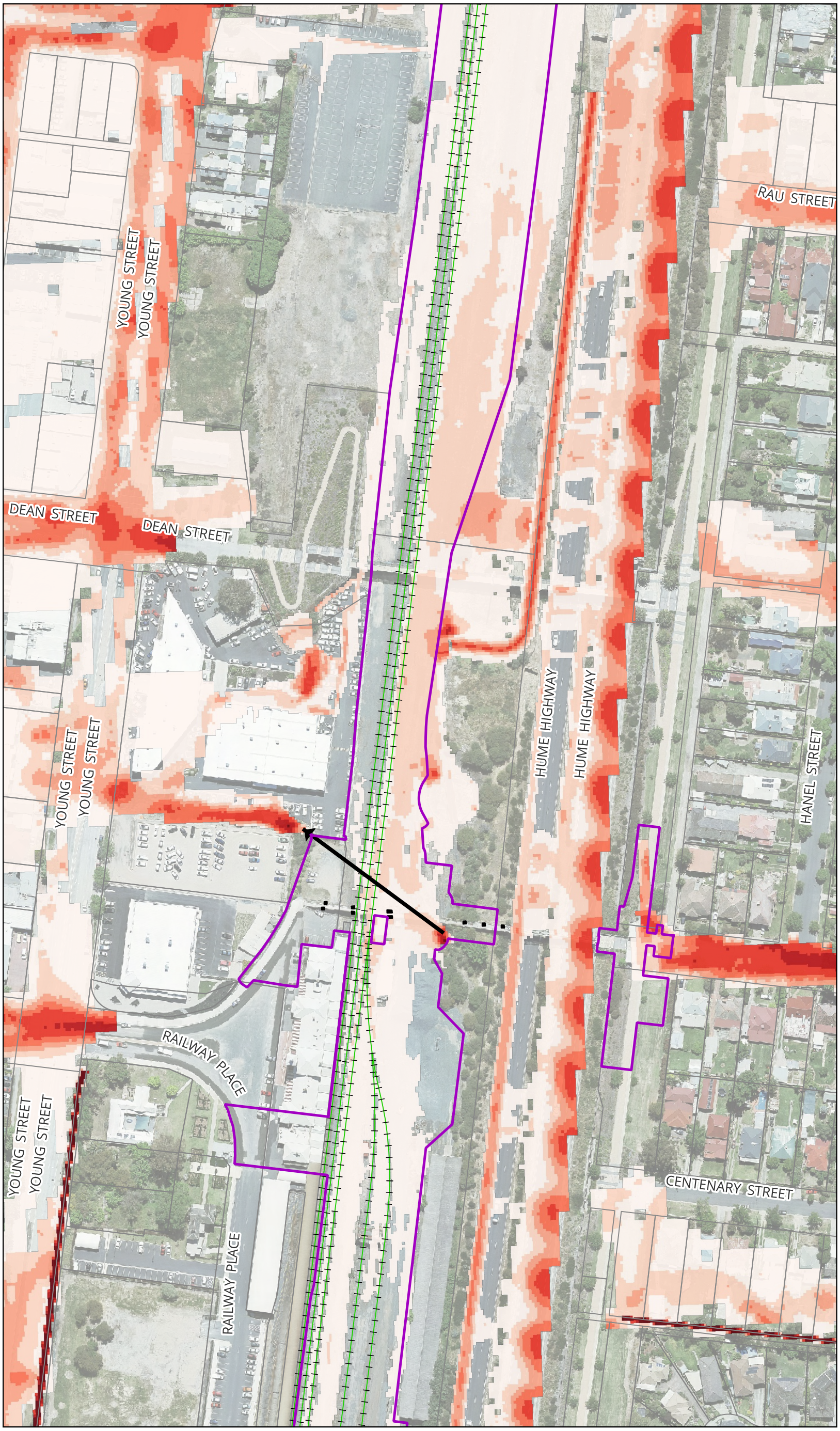
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A10-B: 1% AEP Climate Change Peak Flood Velocity - Existing Condition



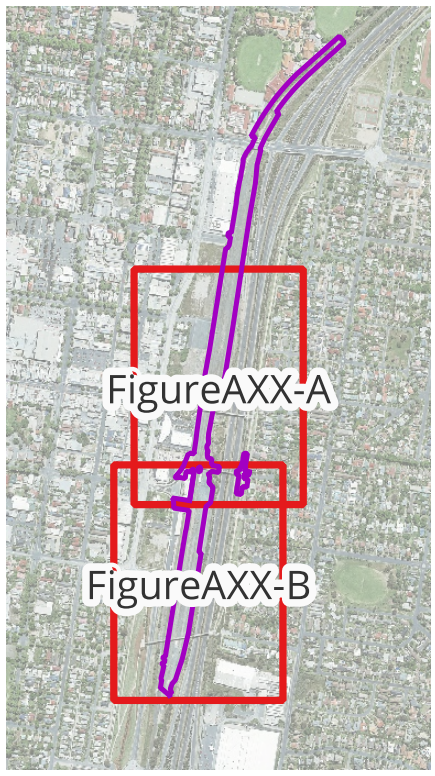
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

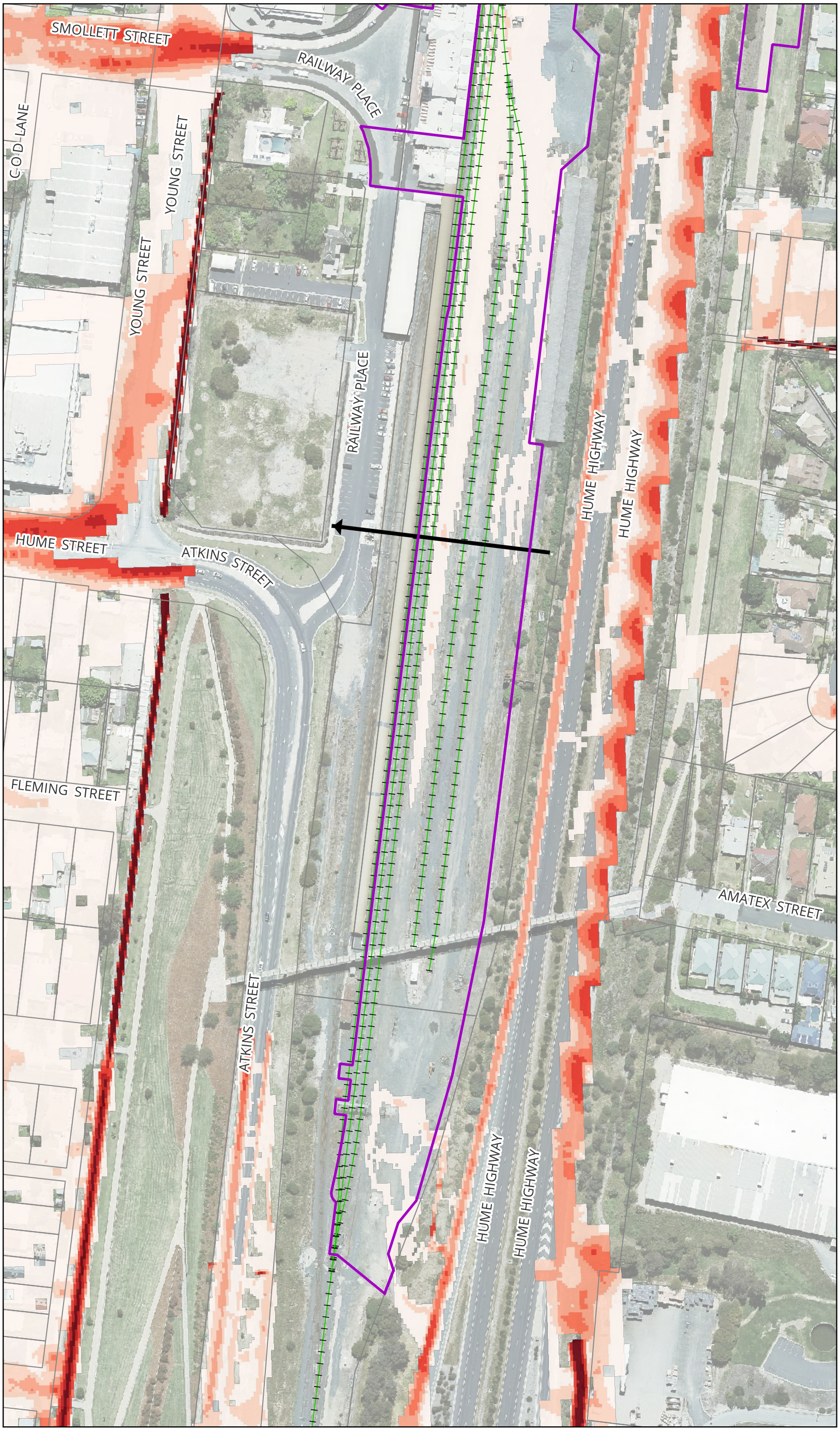
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A11-A: 0.05% AEP Peak Flood Velocity - Existing Condition



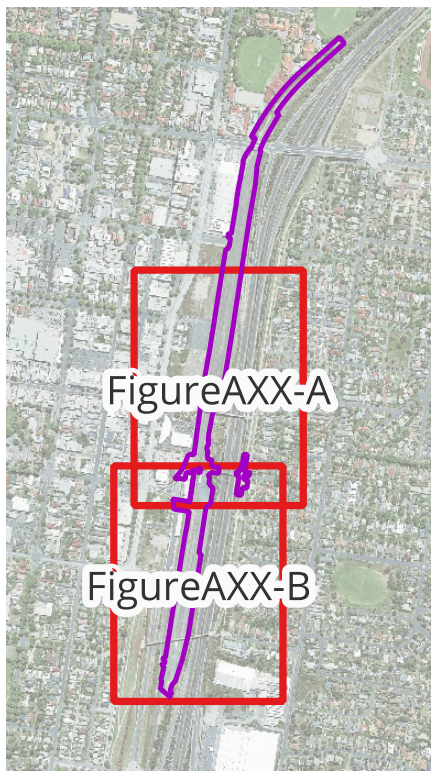
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

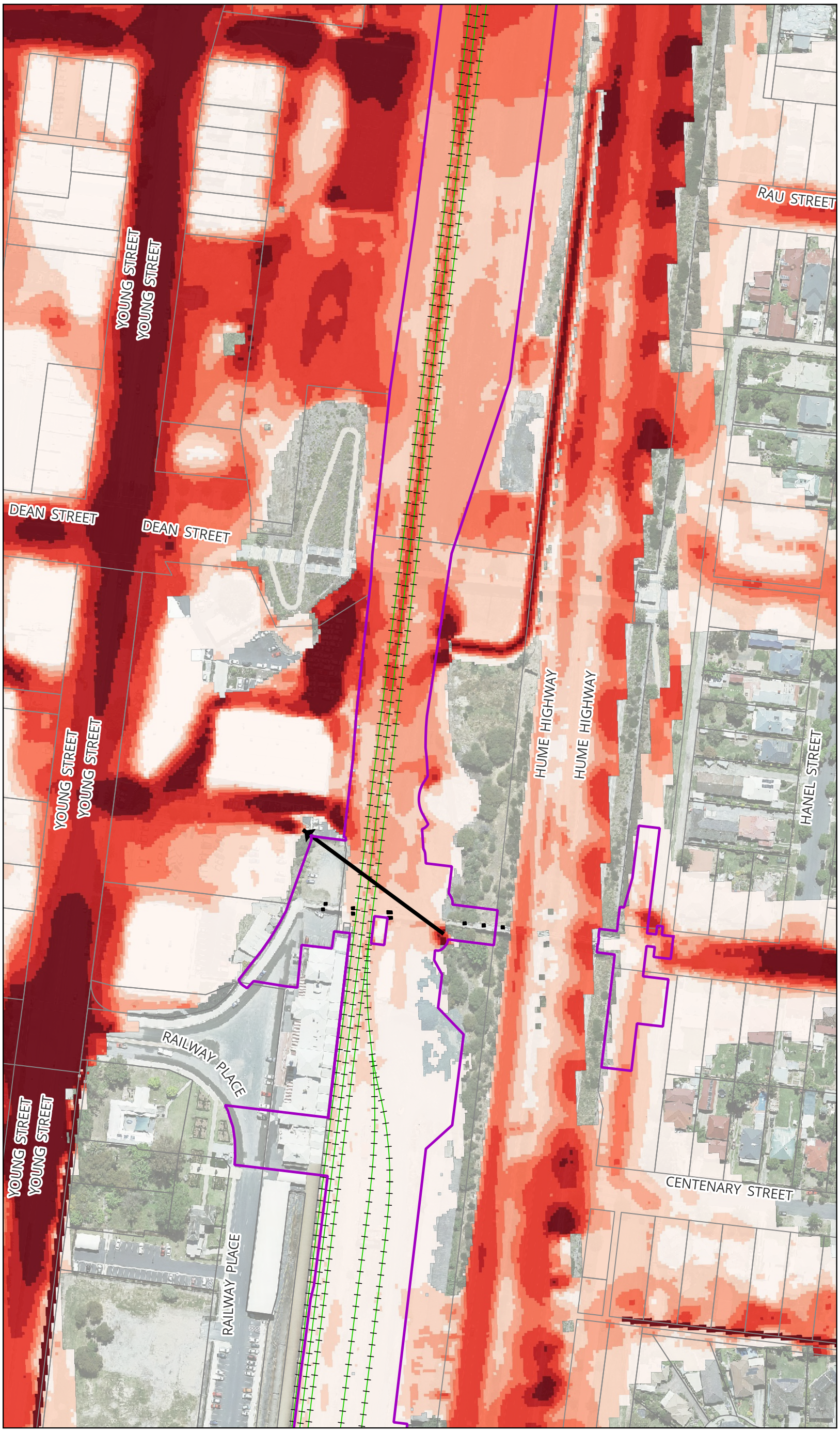
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A11-B: 0.05% AEP Peak Flood Velocity - Existing Condition



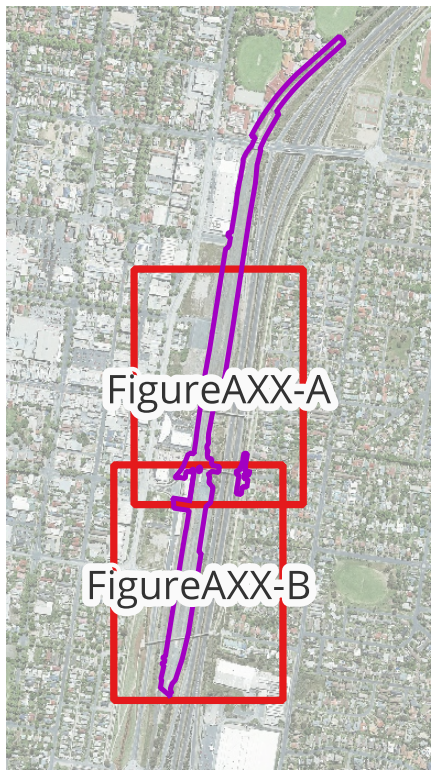
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

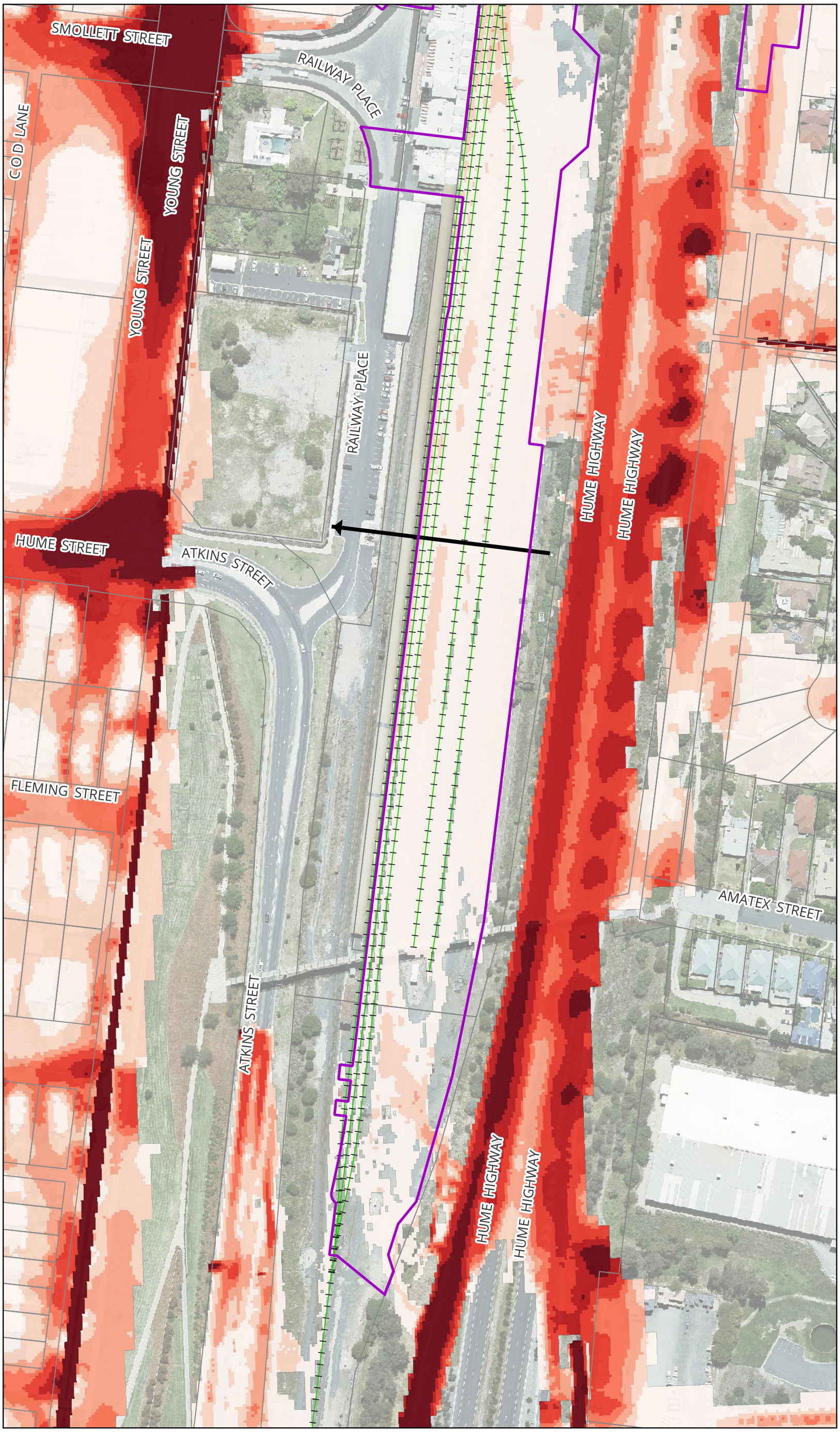
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A12-A: PMF Peak Flood Velocity - Existing Condition



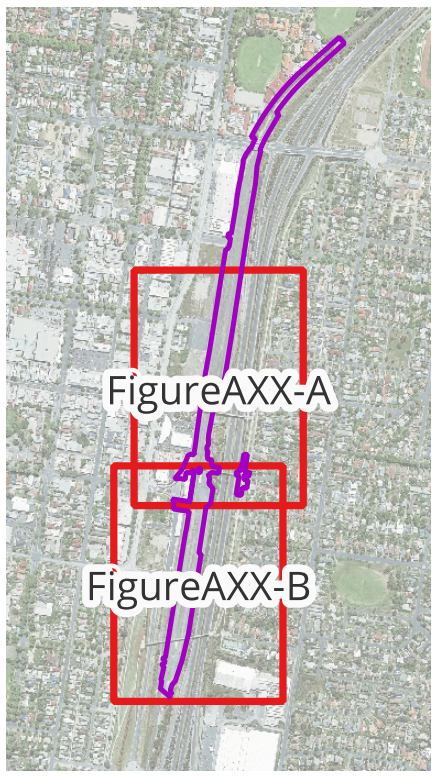
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

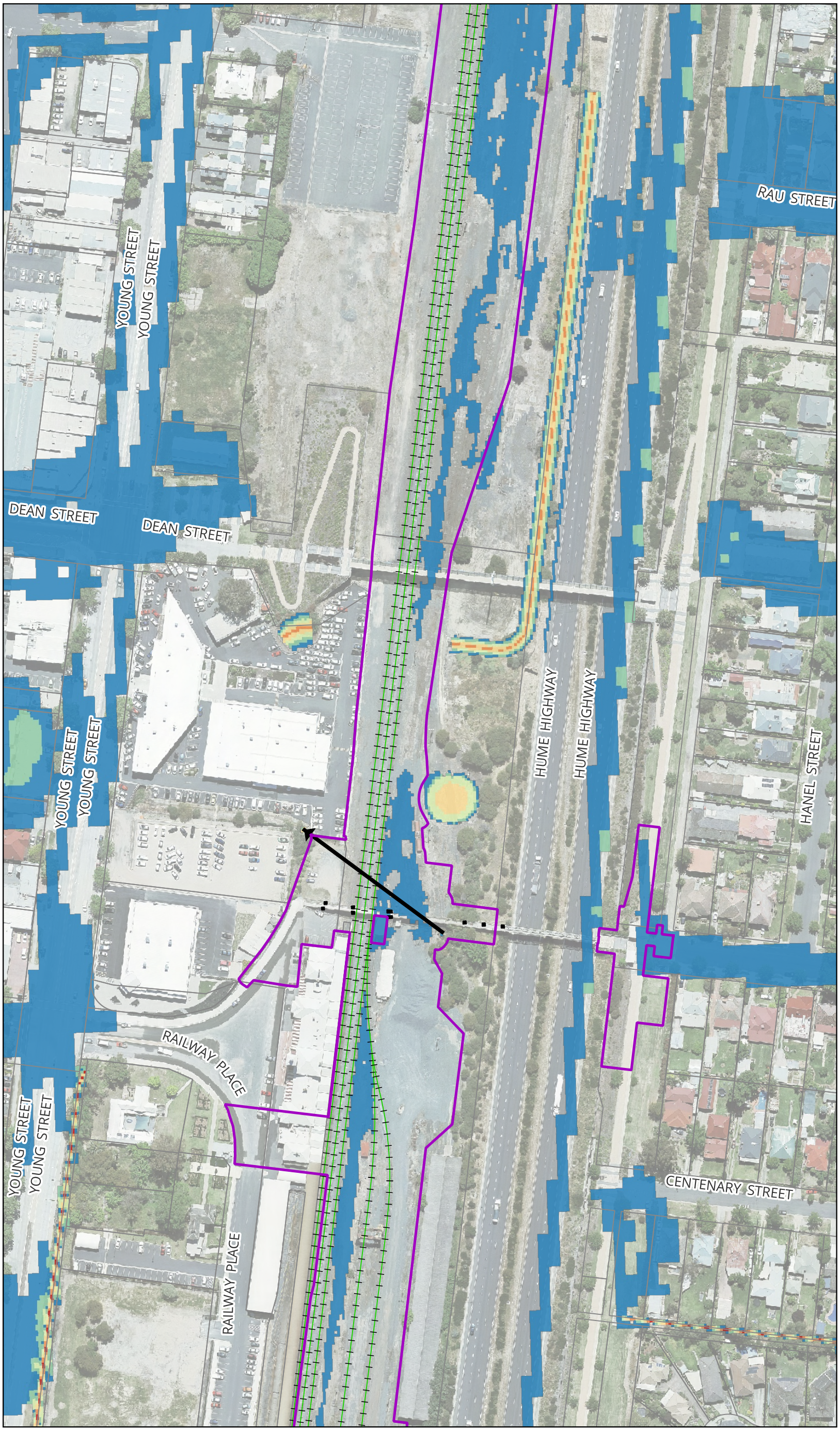
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A12-B: PMF Peak Flood Velocity - Existing Condition



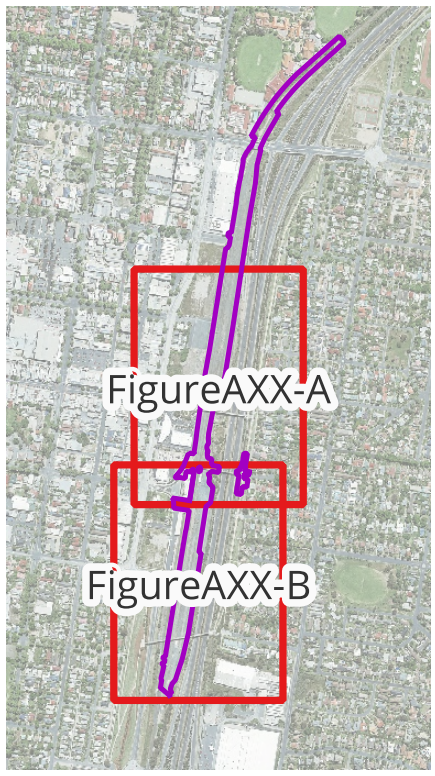
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

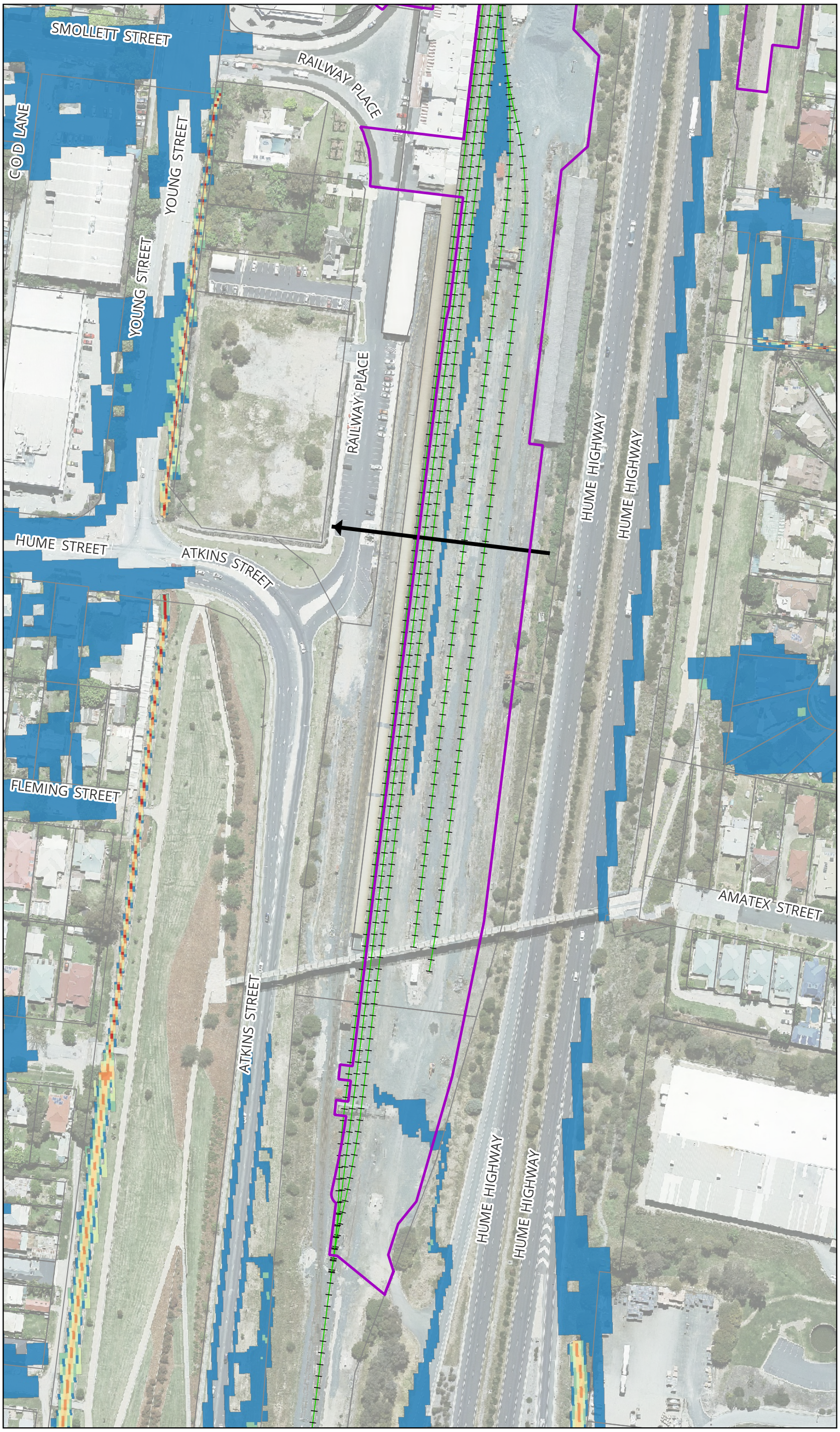
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A13-A: 5% AEP Peak Flood Hazard - Existing Condition



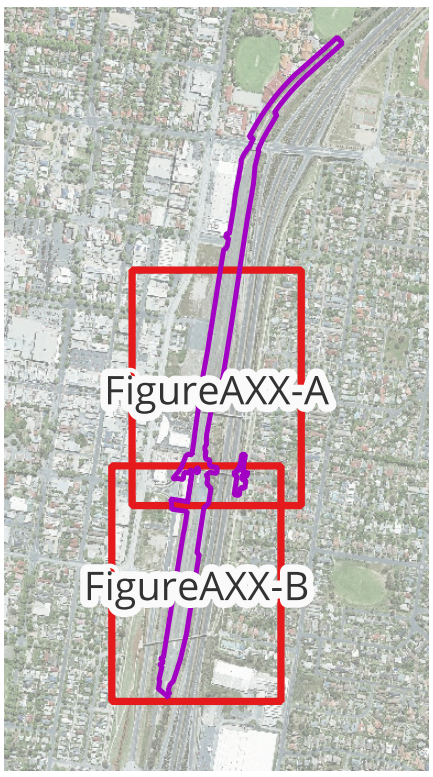
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

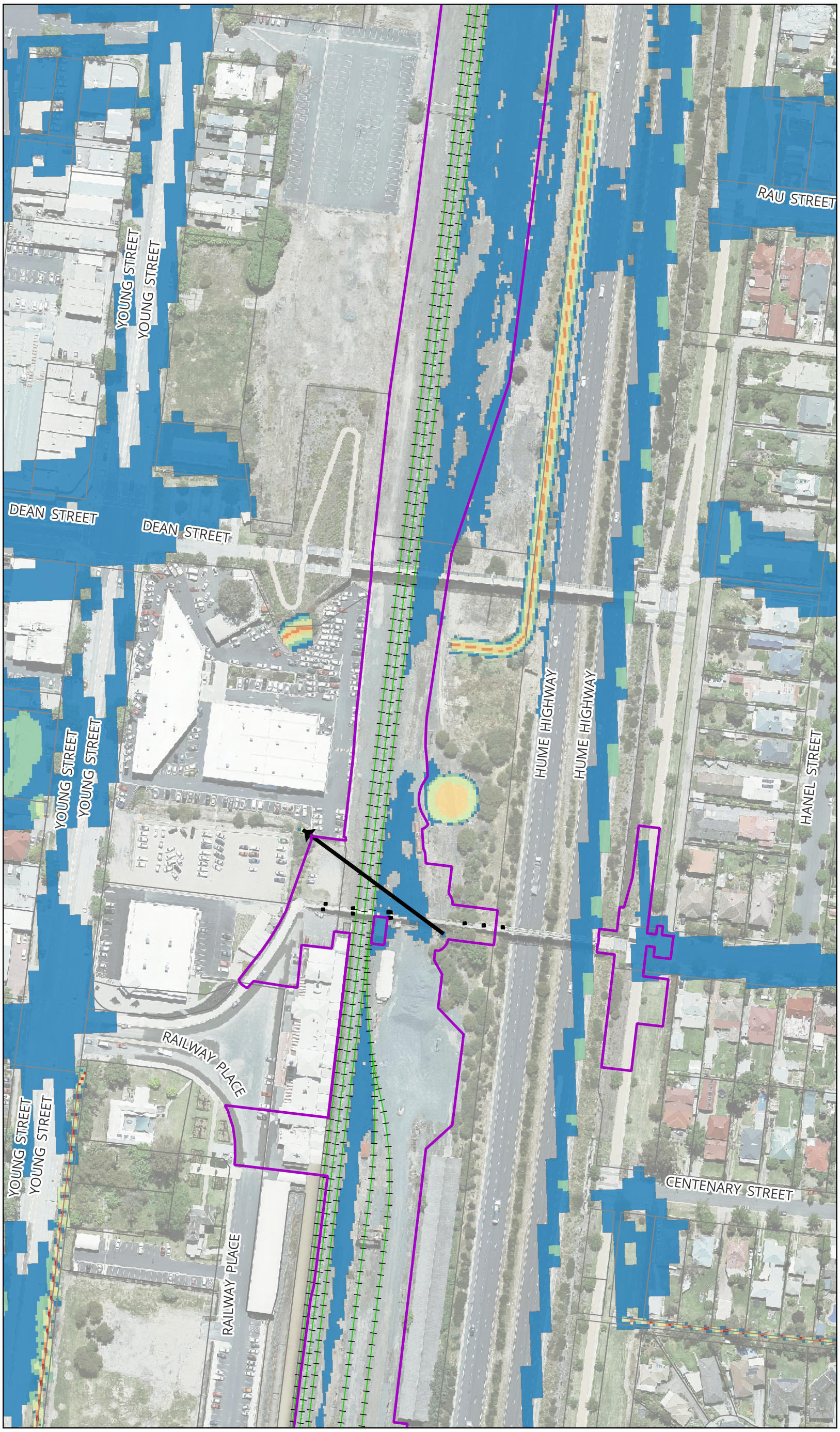
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A13-B: 5% AEP Peak Flood Hazard - Existing Condition



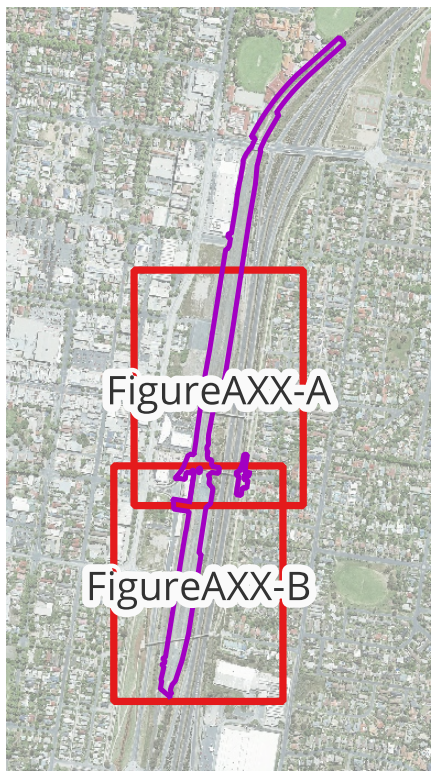
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- Cadastre

Peak Flood Hazard

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



Notes:

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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

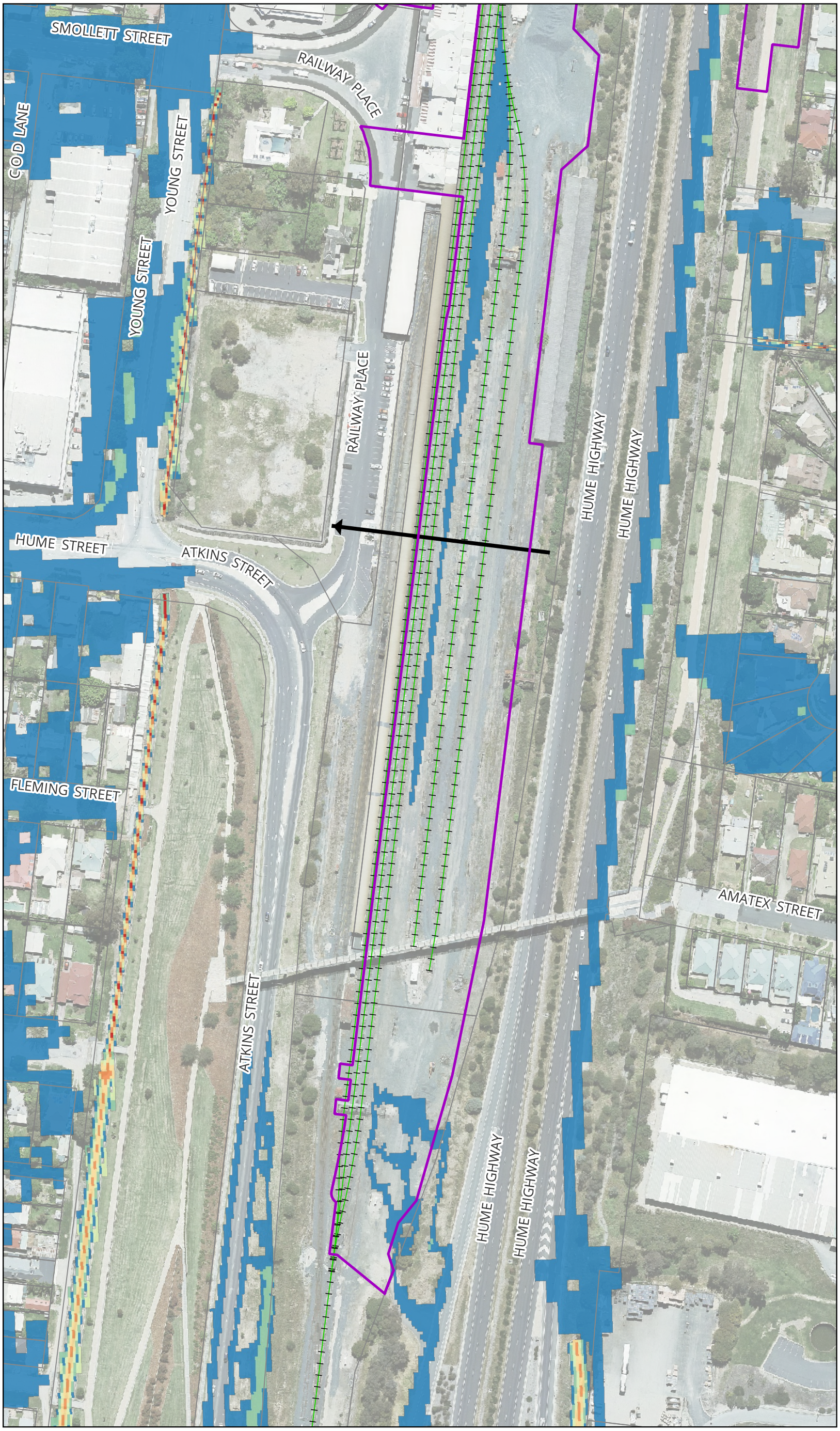
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A14-A: 2% AEP Peak Flood Hazard - Existing Condition



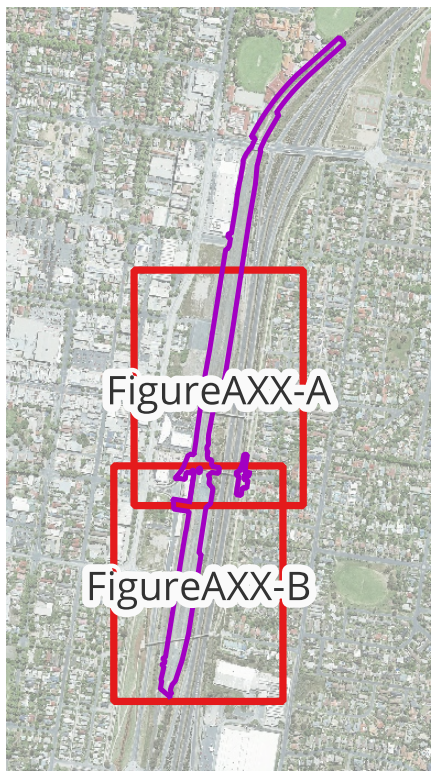
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

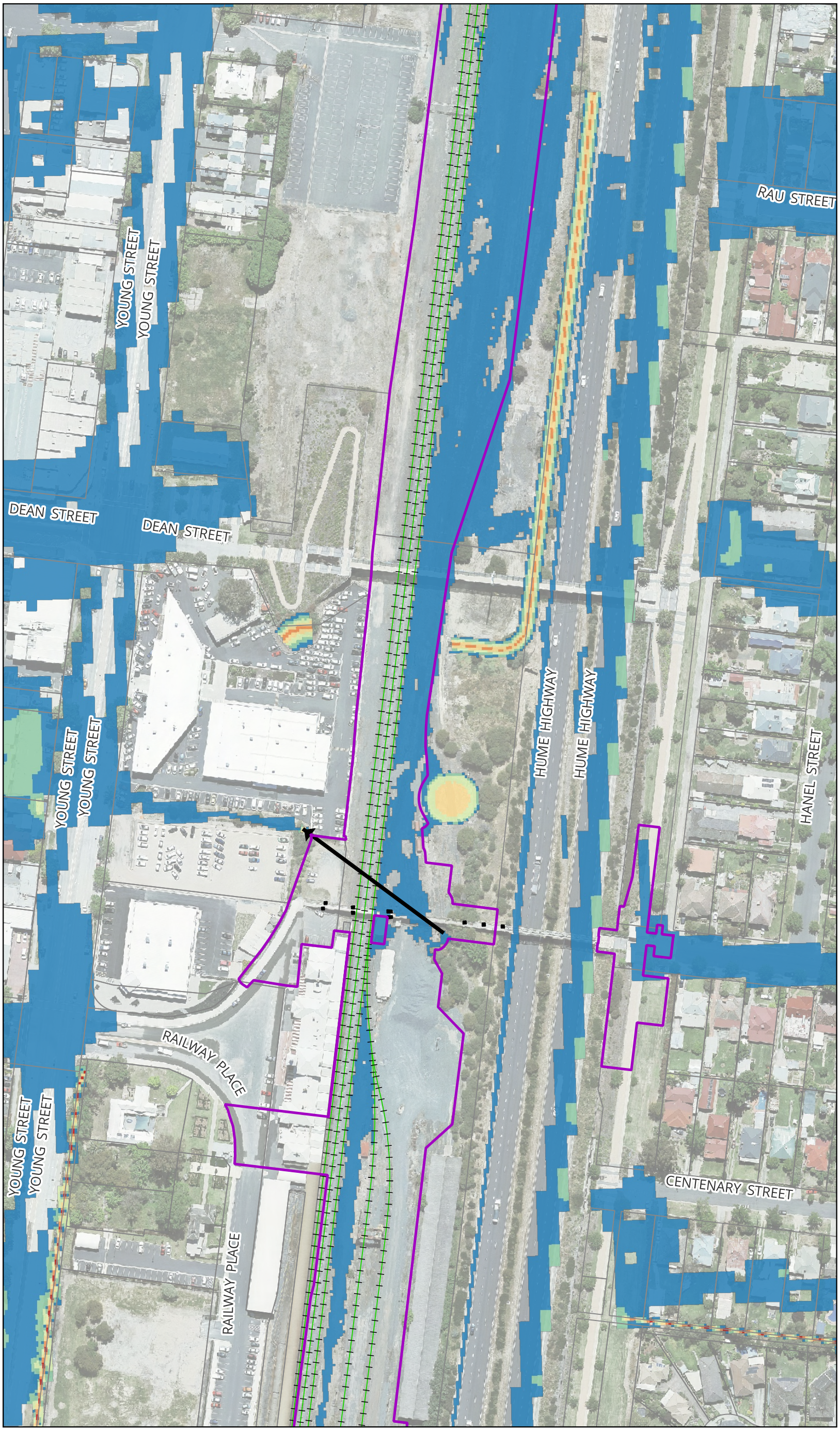
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A14-B: 2% AEP Peak Flood Hazard - Existing Condition



MARTINUS
aurecon
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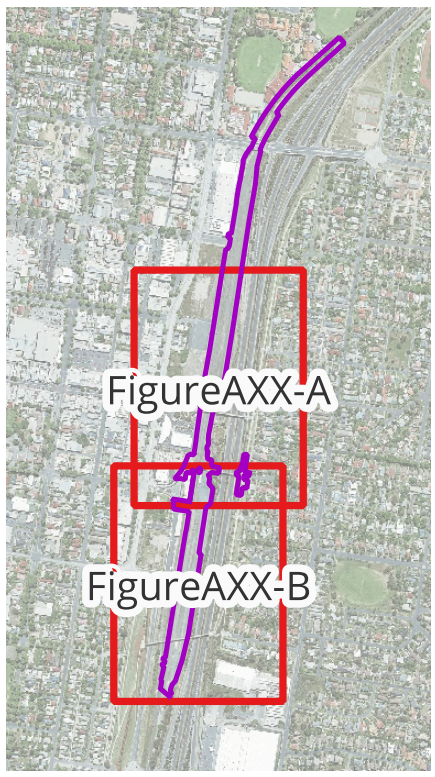
Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

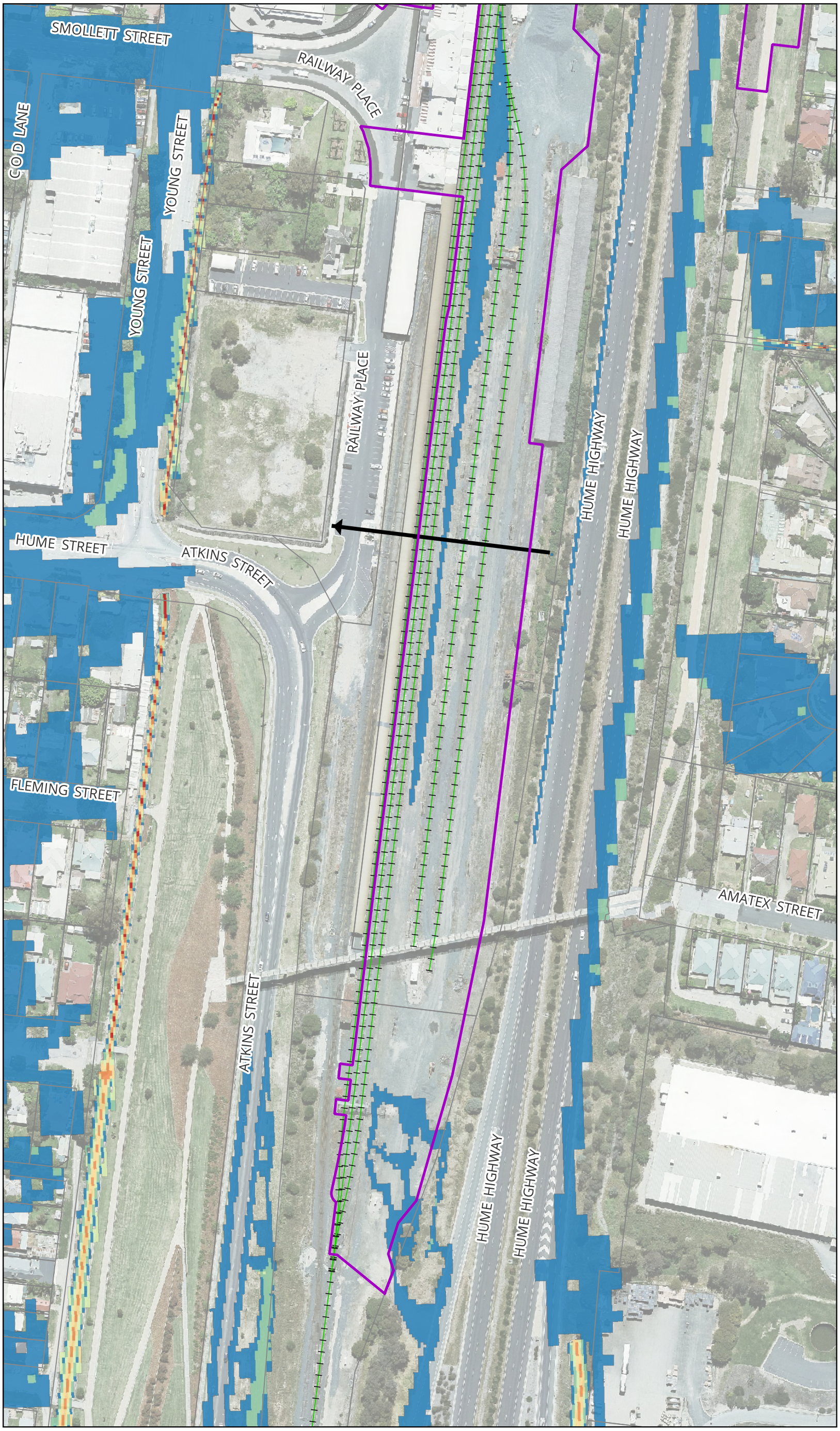
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A15-A: 1% AEP Peak Flood Hazard - Existing Condition



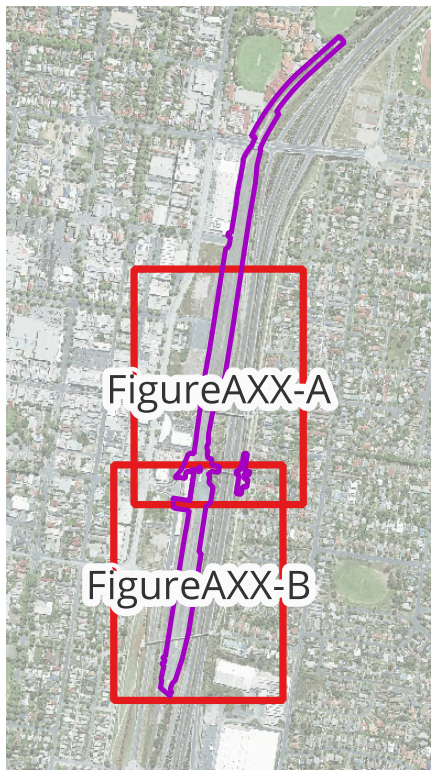
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- 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

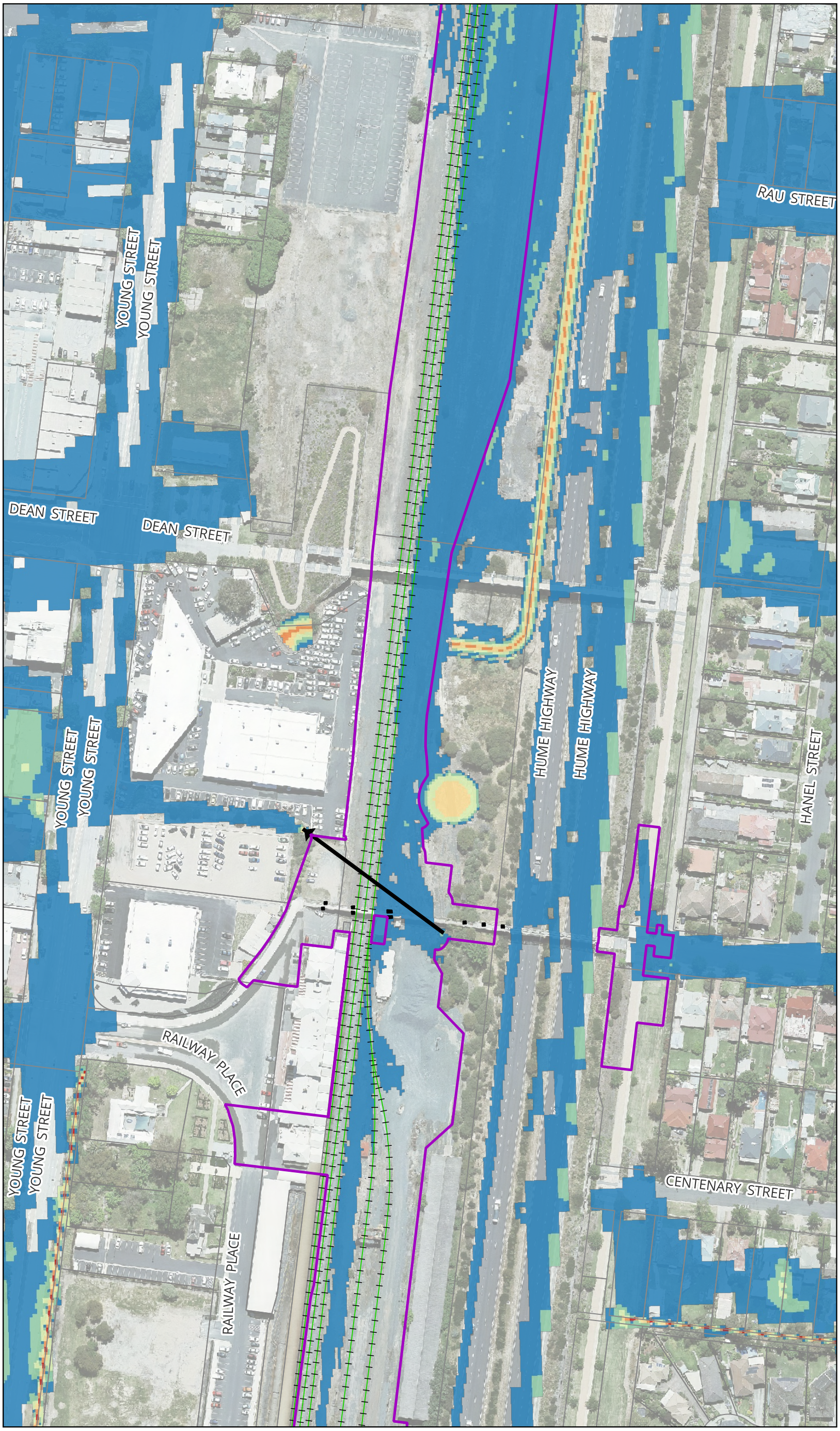
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A15-B: 1% AEP Peak Flood Hazard - Existing Condition



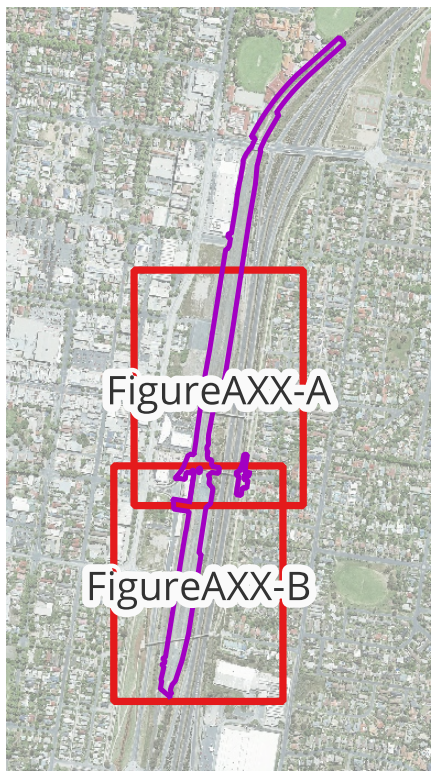
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- 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

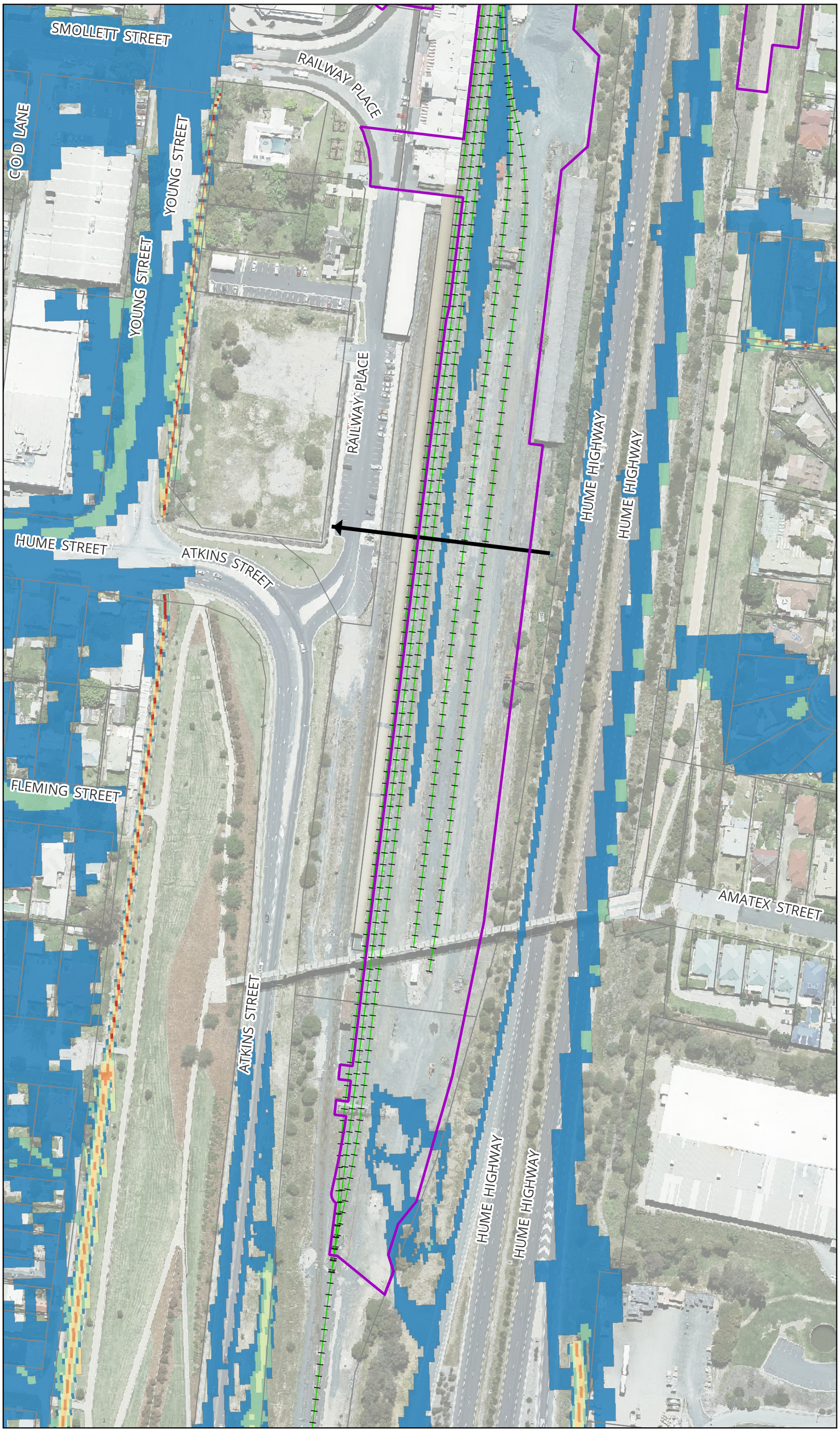
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A16-A: 1% AEP Climate Change Peak Flood Hazard - Existing Condition



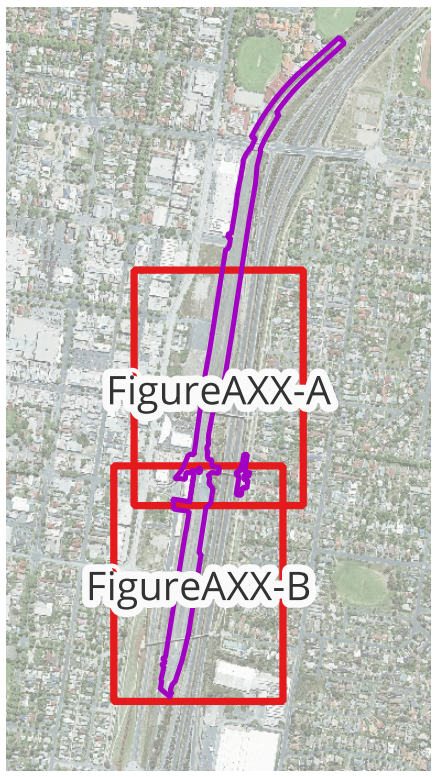
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Peak Flood Hazard

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



Notes:

H1: Generally safe for vehicles, people and buildings.
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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

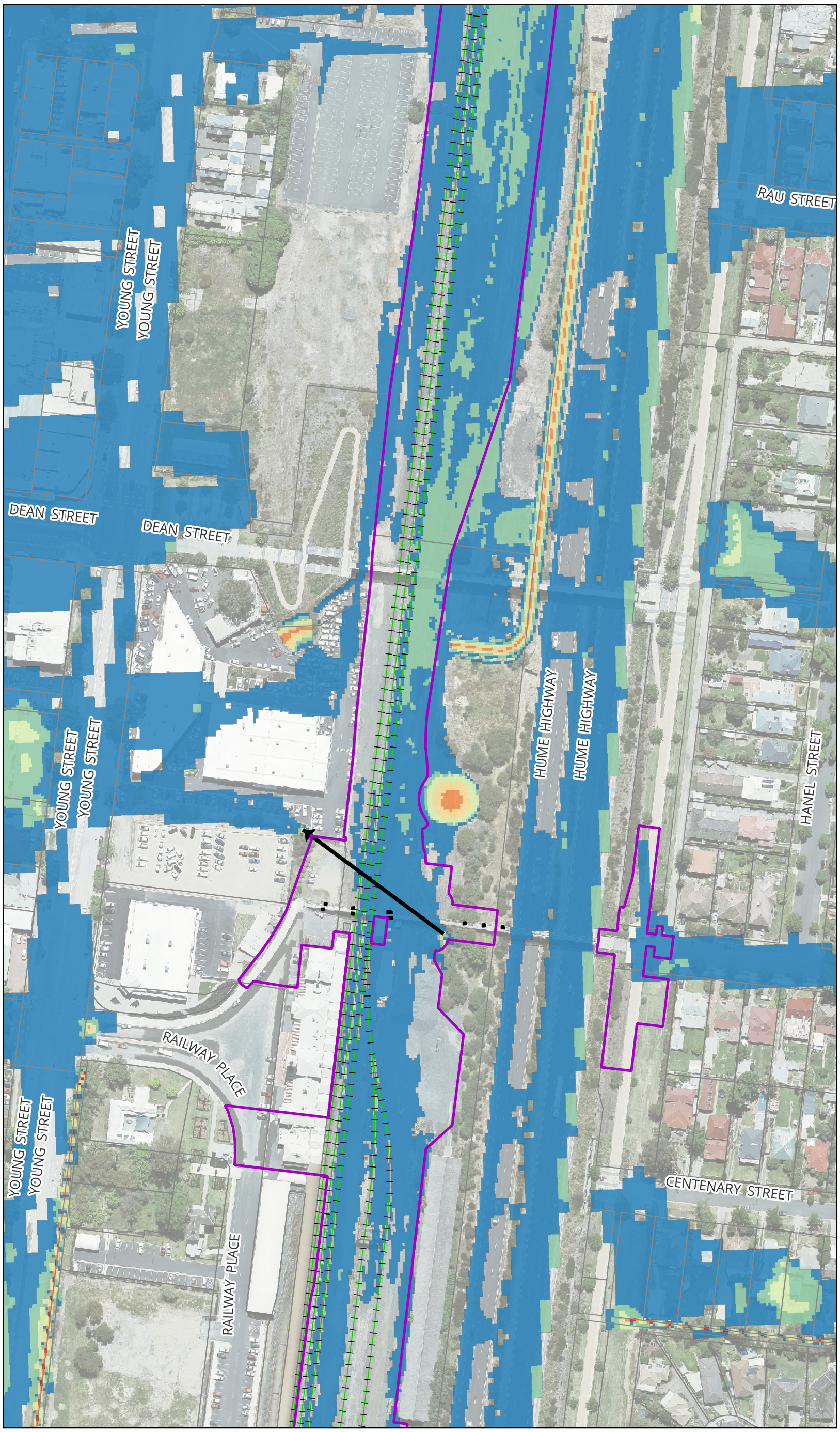
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A16-B: 1% AEP Climate Change Peak Flood Hazard - Existing Condition



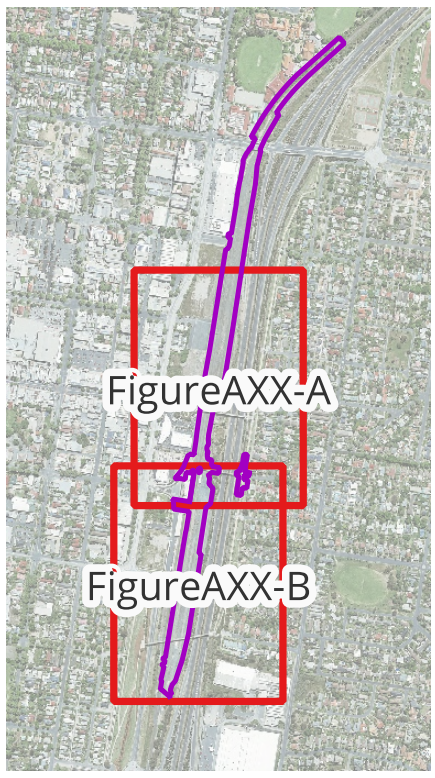
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- Cadastre

Peak Flood Hazard

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



Notes:

H1: Generally safe for vehicles, people and buildings.
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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.
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Map by: TT

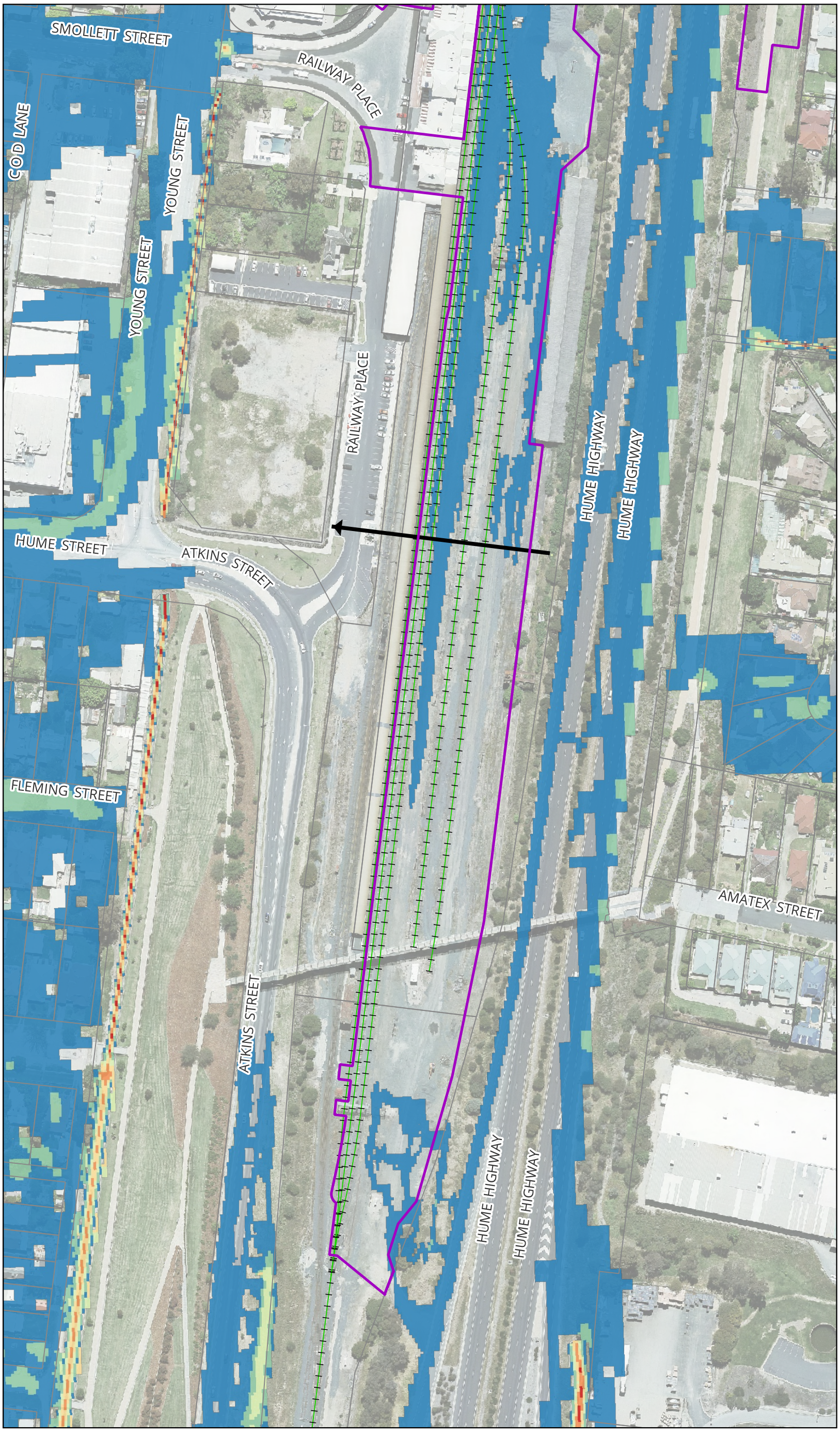
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A17-A: 0.05% AEP Peak Flood Hazard - Existing Condition



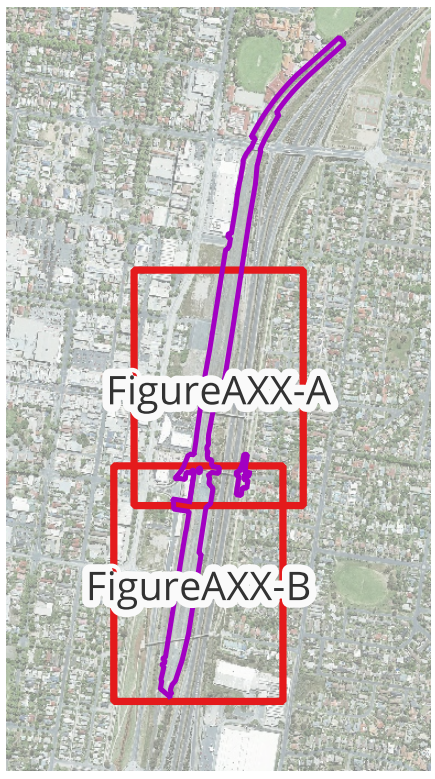
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Peak Flood Hazard

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



Notes:

H1: Generally safe for vehicles, people and buildings.
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H6: Unsafe for vehicles and people. All building types considered vulnerable to failure.

Map by: TT

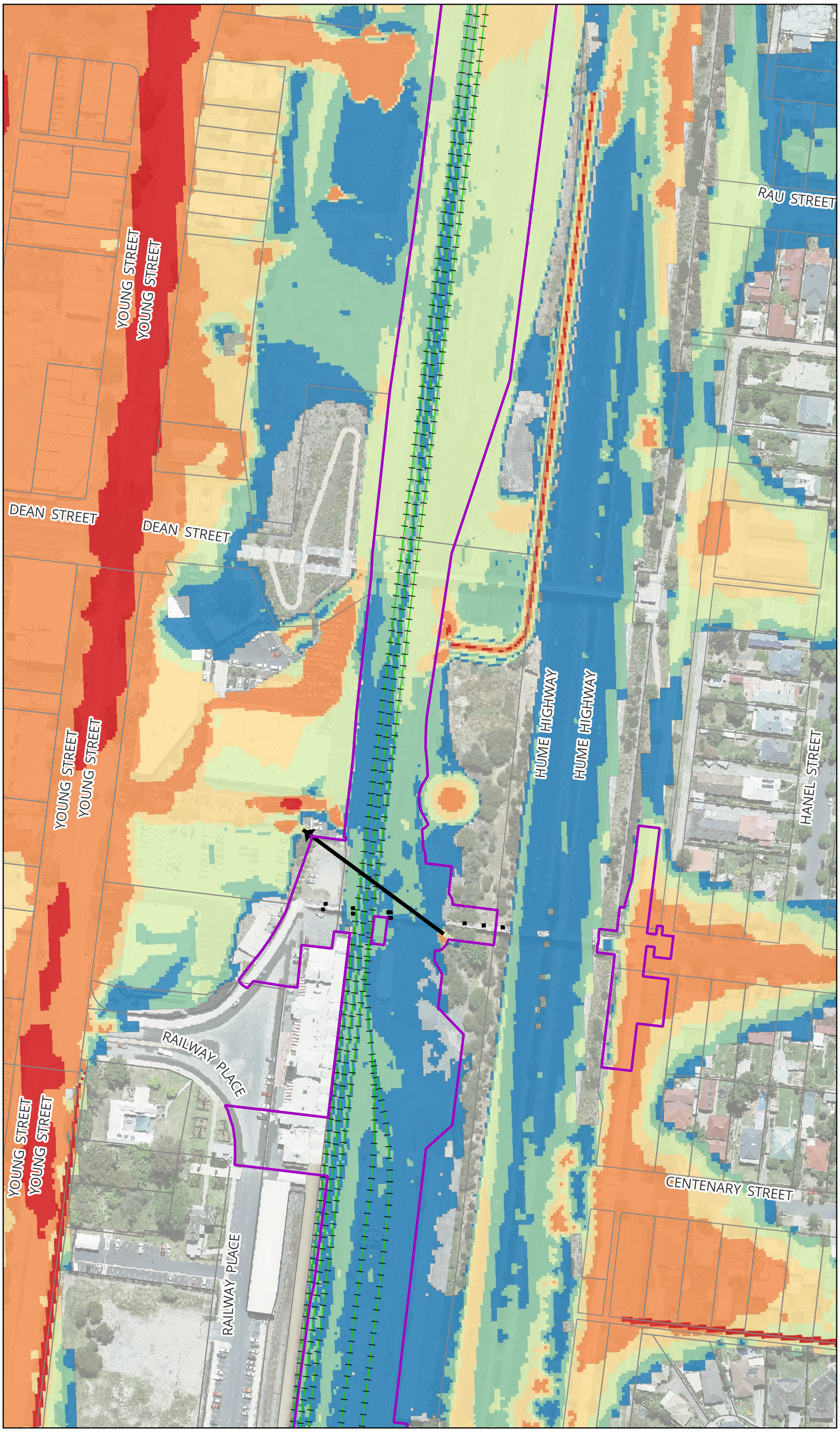
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A17-B: 0.05% AEP Peak Flood Hazard - Existing Condition



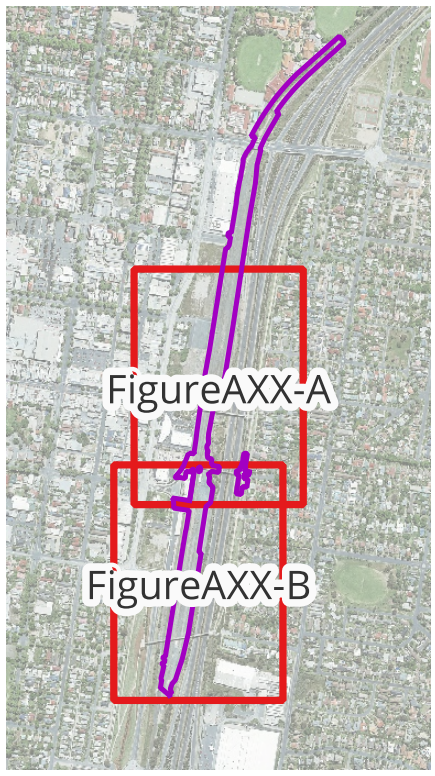
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Modelled Bridge Pier (Existing)
- Existing Major Site Culvert
- Cadastre

Peak Flood Hazard

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



Notes:

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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

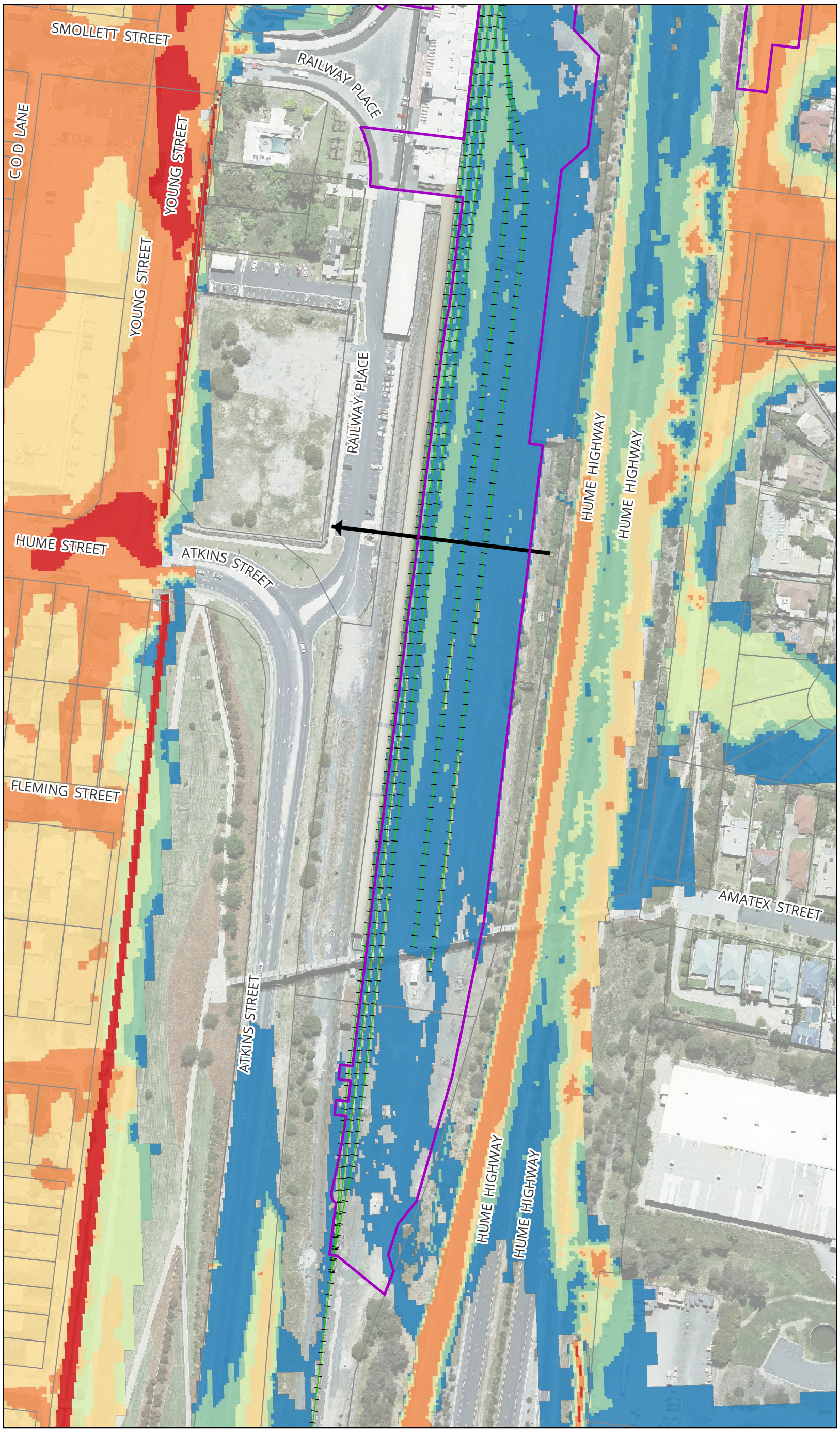
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A18-A: PMF Peak Flood Hazard - Existing Condition



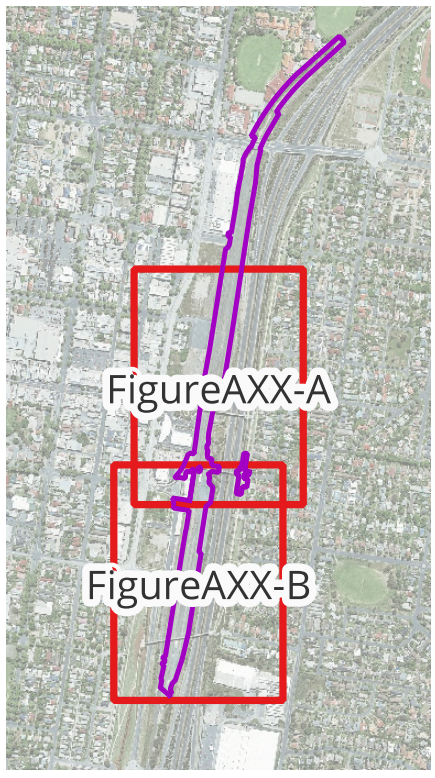
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Peak Flood Hazard

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



Notes:

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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

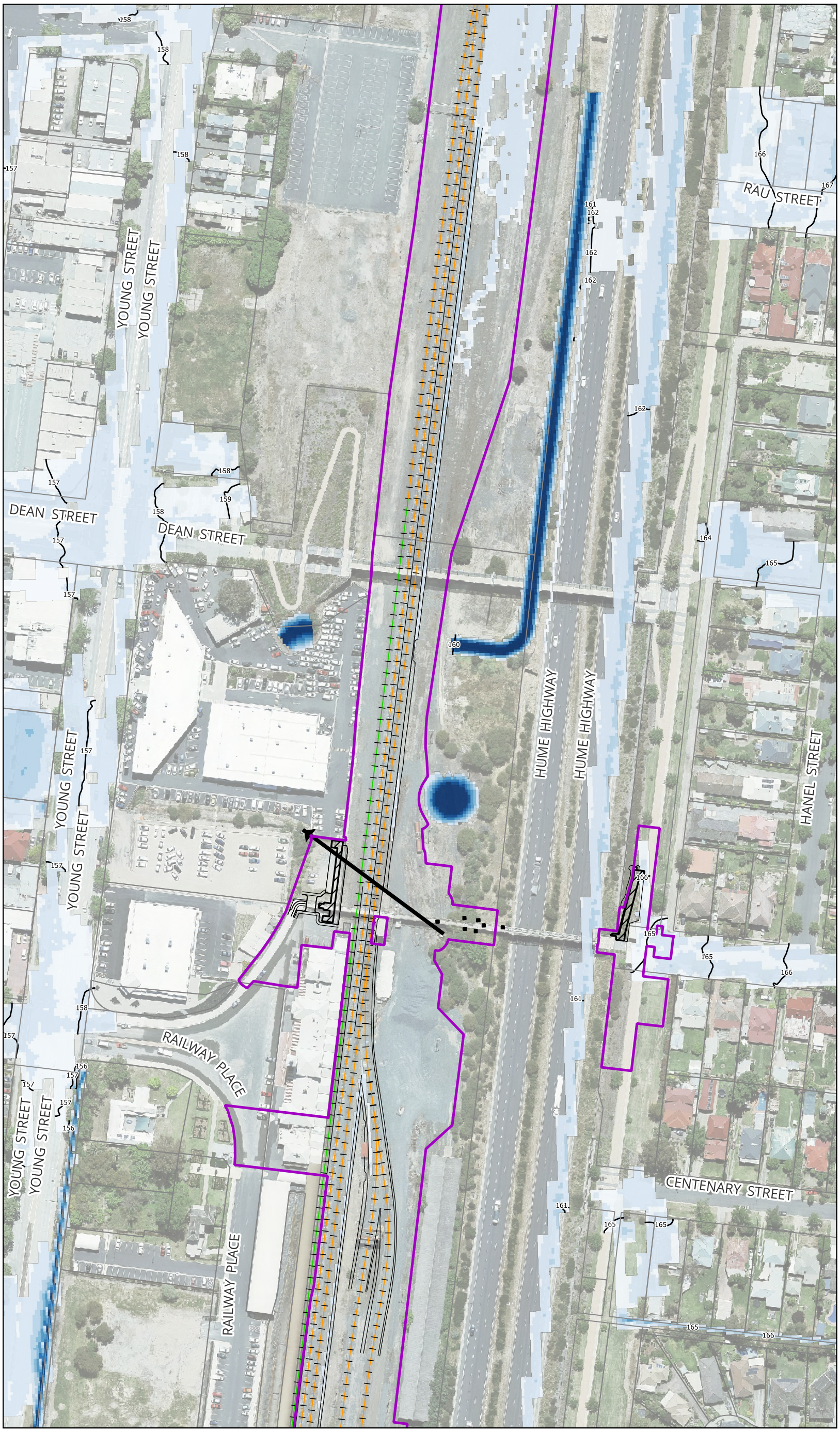
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A18-B: PMF Peak Flood Hazard - Existing Condition



MARTINUS
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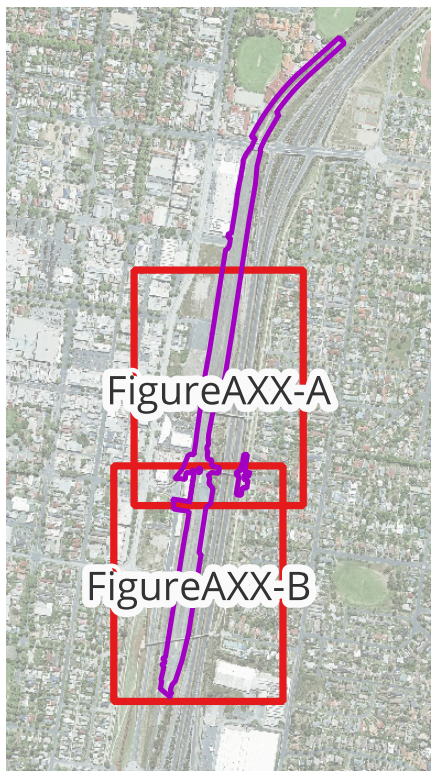
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

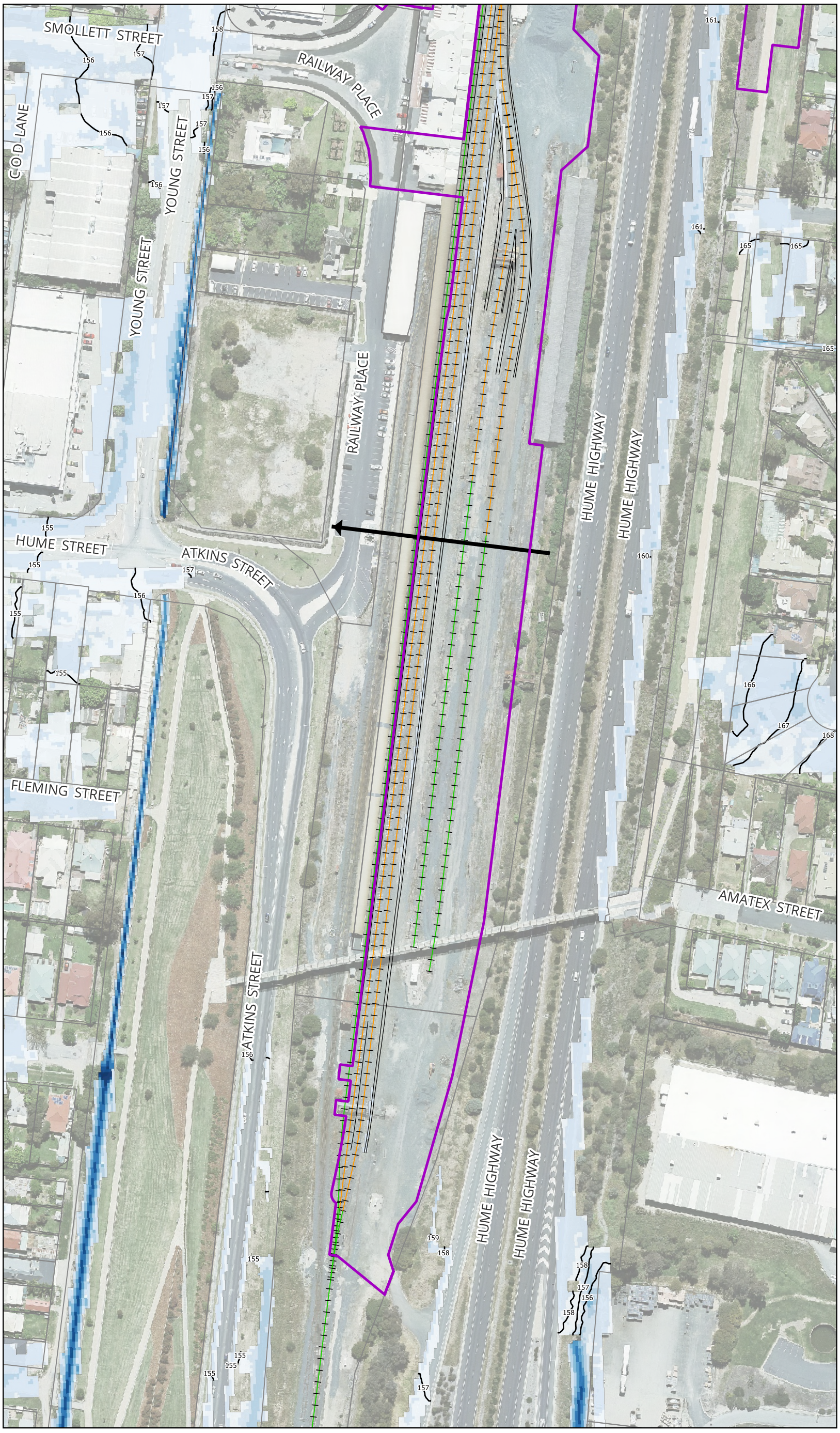
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A19-A: 5% AEP Peak Flood Depth and Levels - Design Condition



MARTINUS
aurecon
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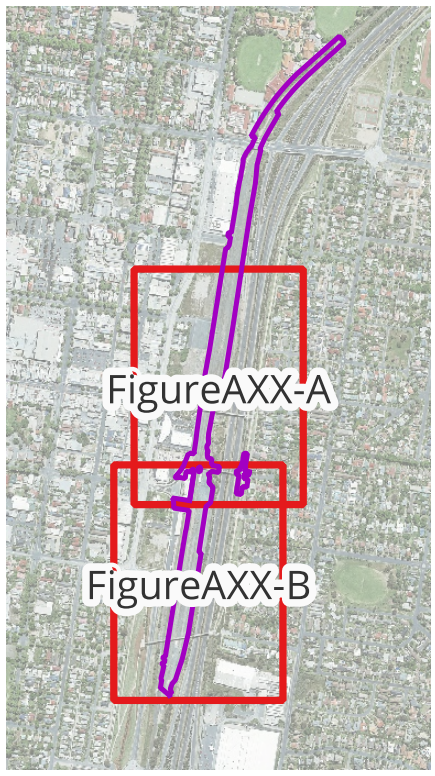
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

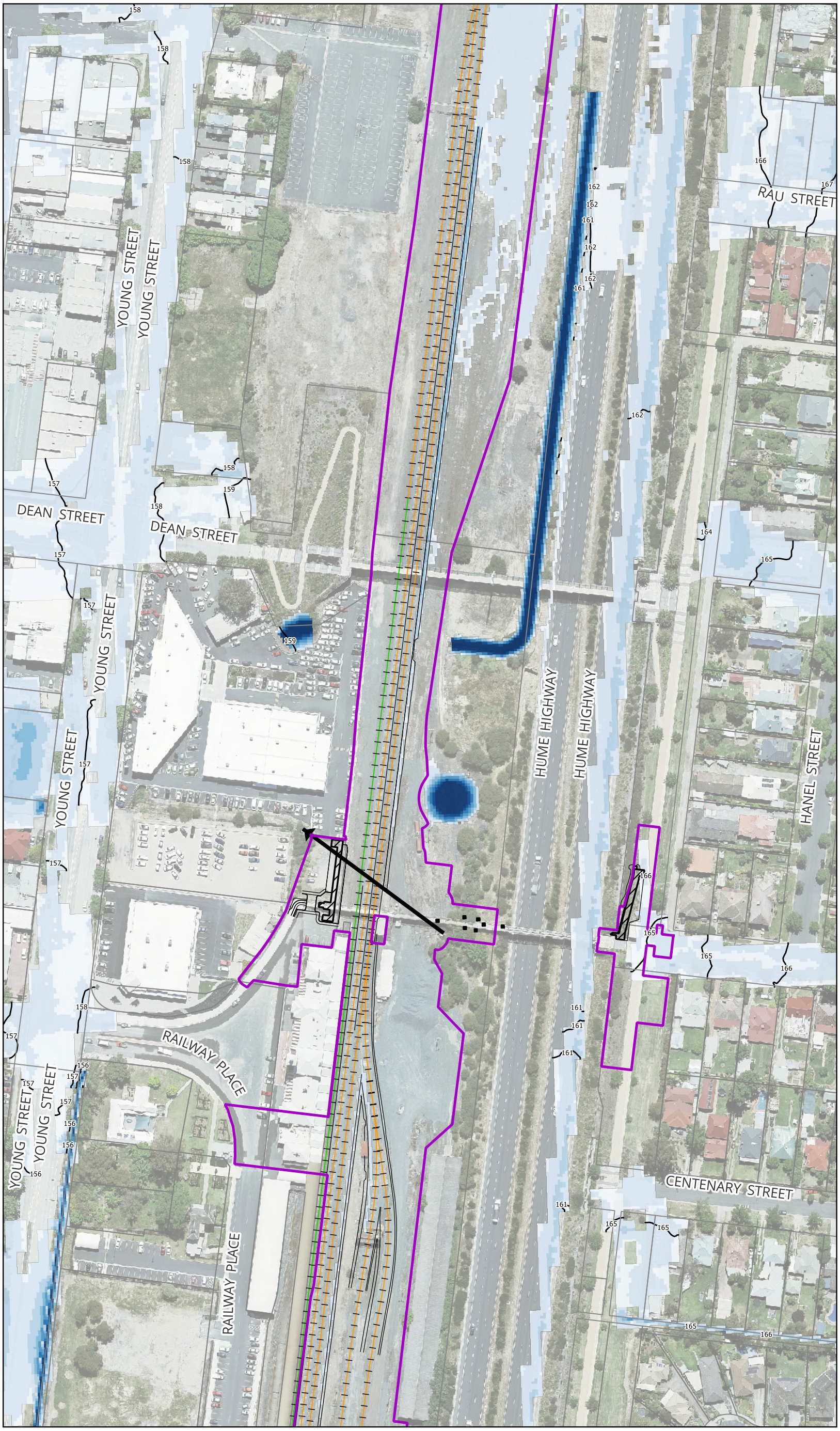
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A19-B: 5% AEP Peak Flood Depth and Levels - Design Condition



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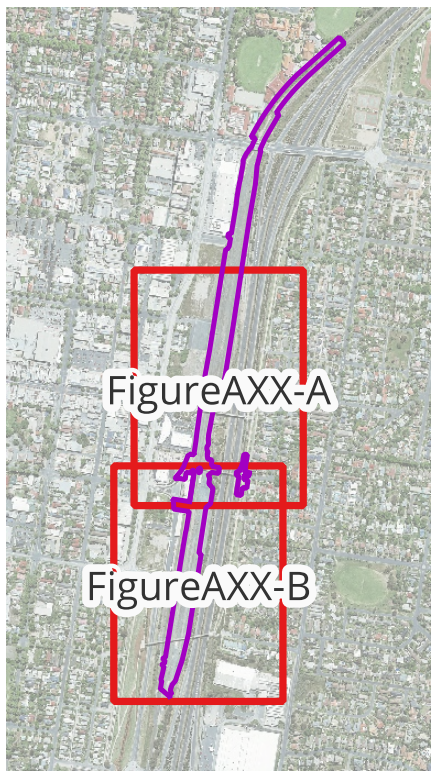
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

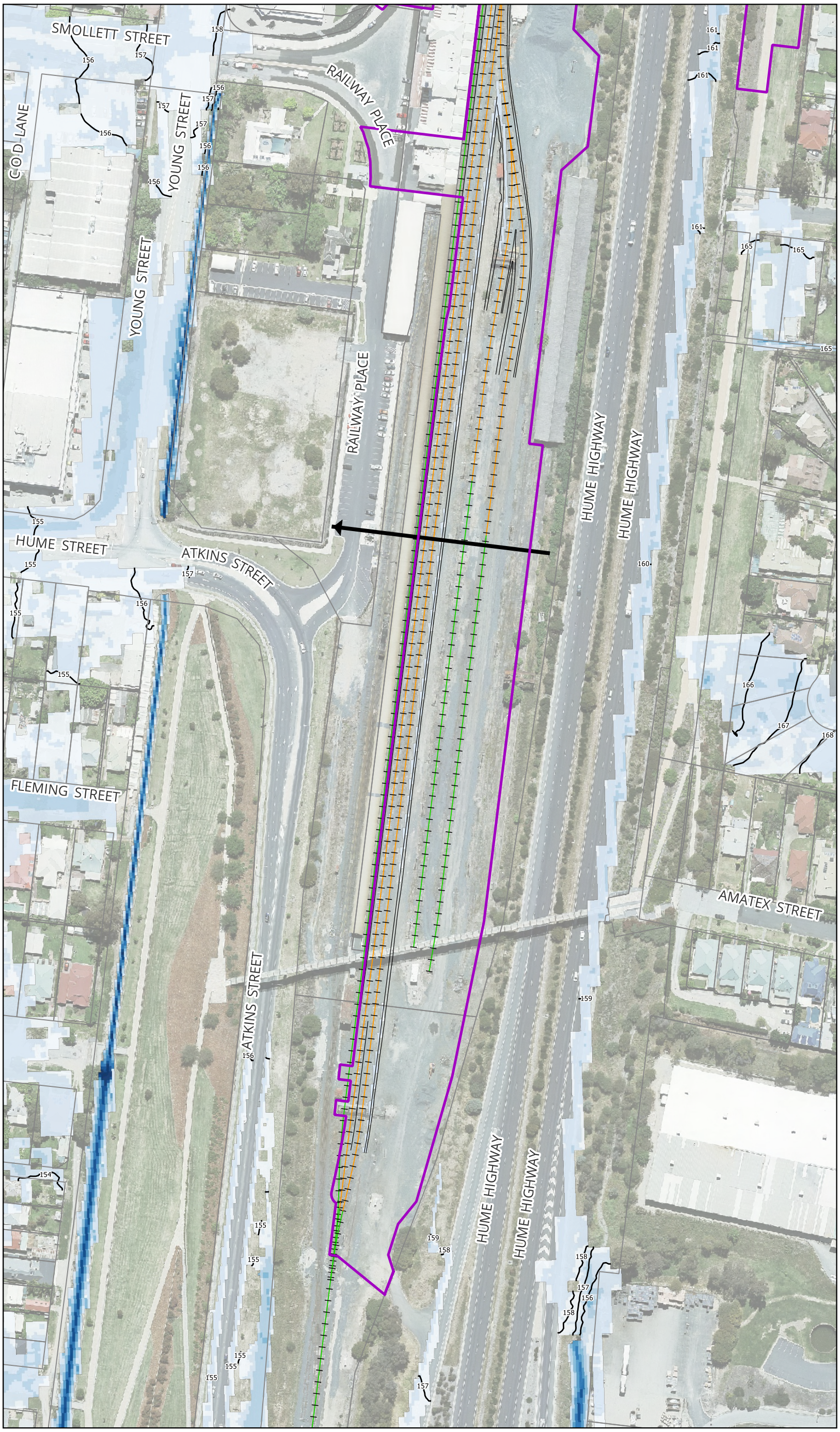
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A20-A: 2% AEP Peak Flood Depth and Levels - Design Condition



Map by: TT

MARTINUS
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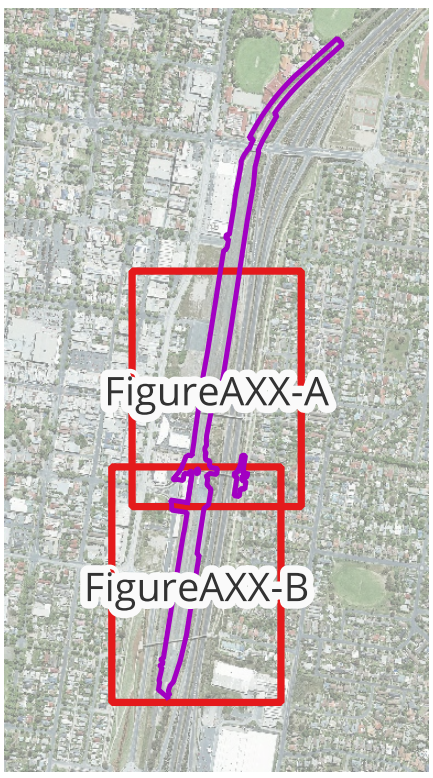
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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:

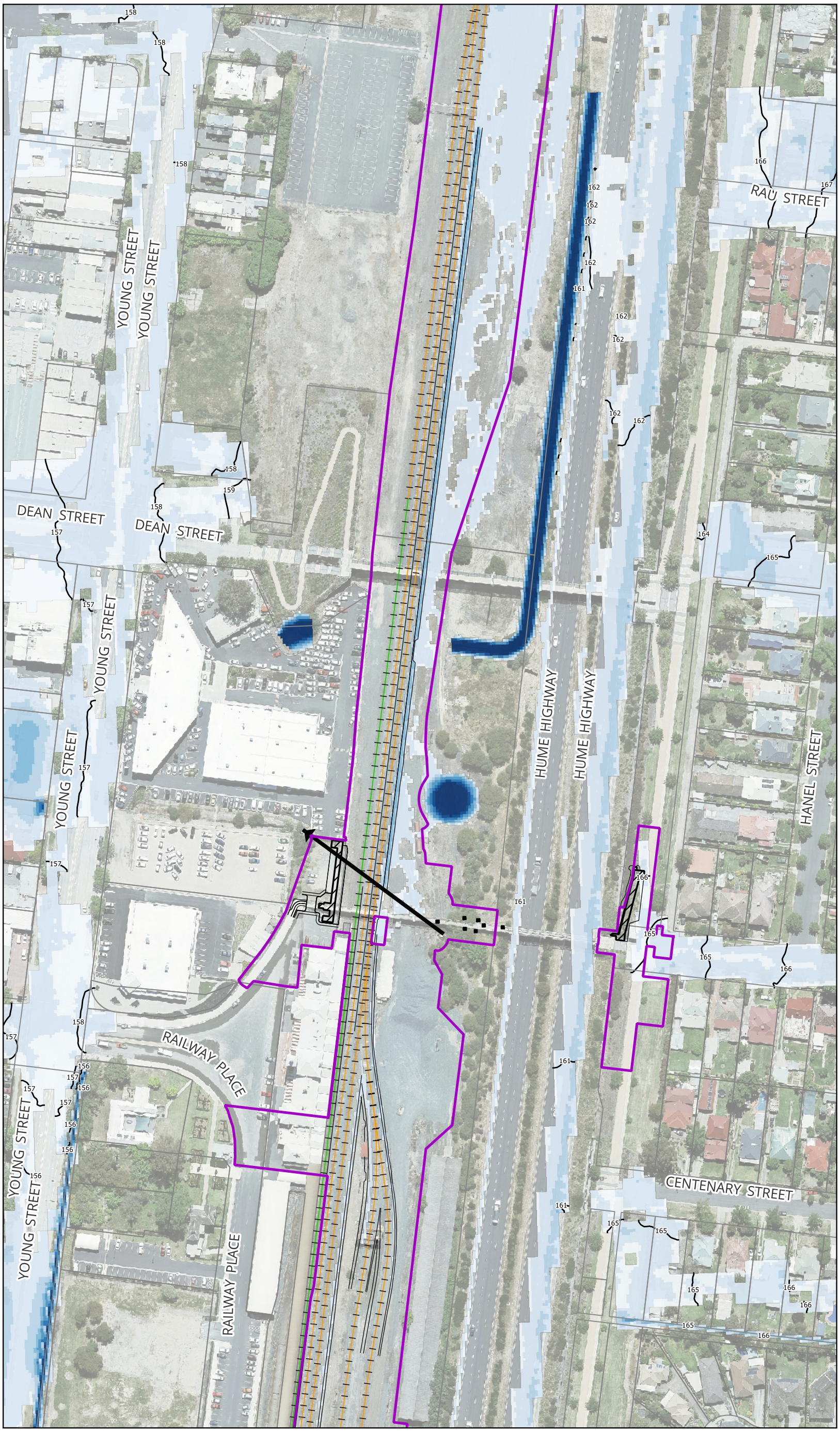
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A20-B: 2% AEP Peak Flood Depth and Levels - Design Condition



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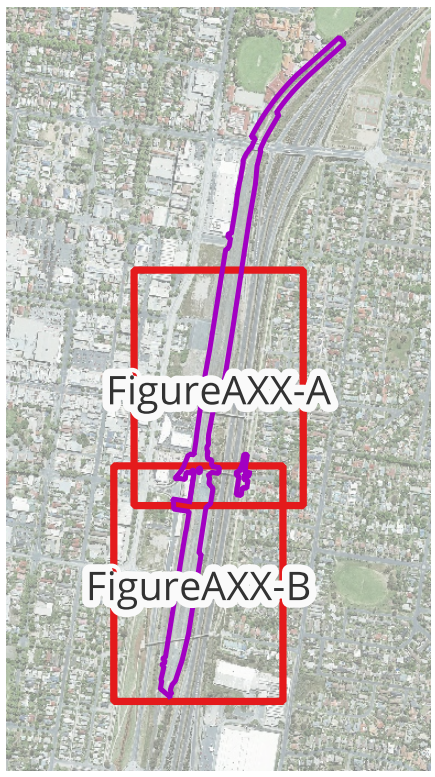
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

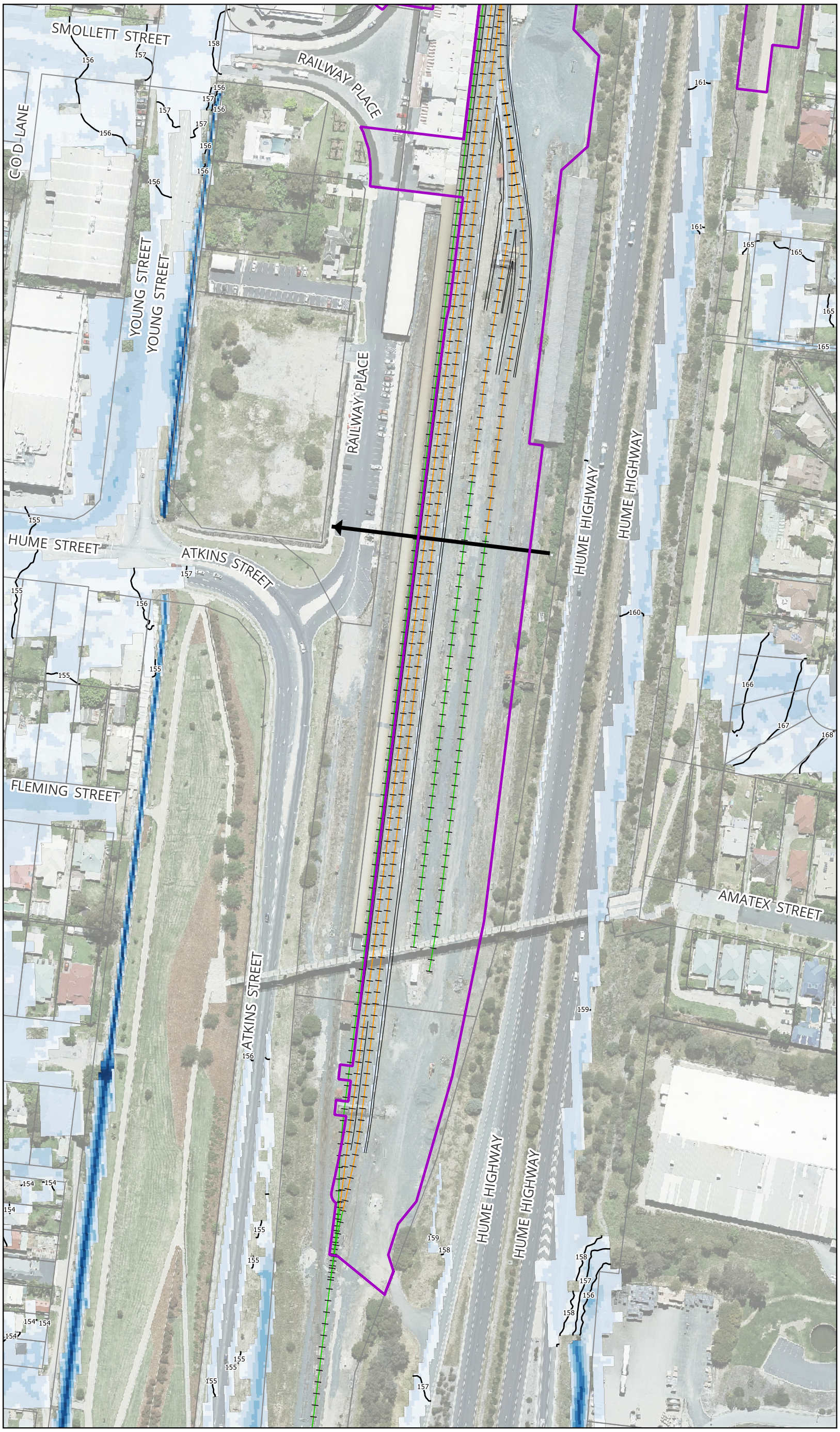
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A21-A: 1% AEP Peak Flood Depth and Levels - Design Condition



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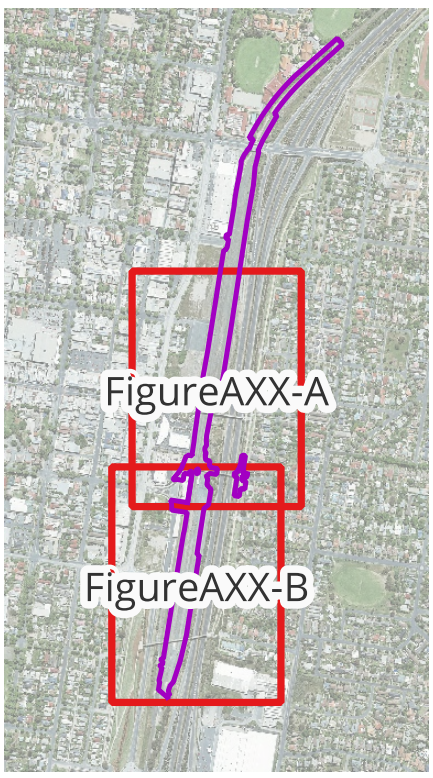
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

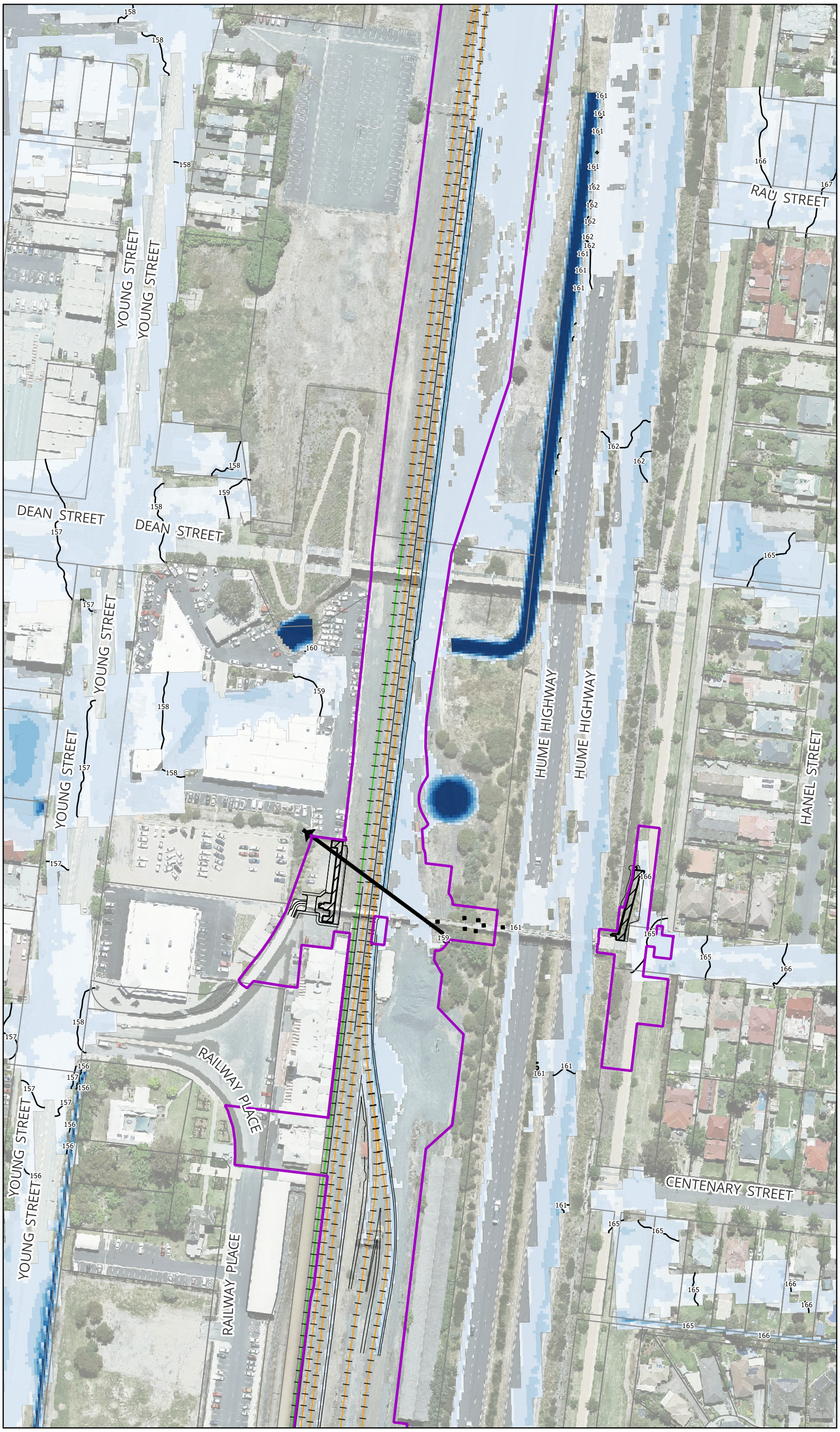
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A21-B: 1% AEP Peak Flood Depth and Levels - Design Condition



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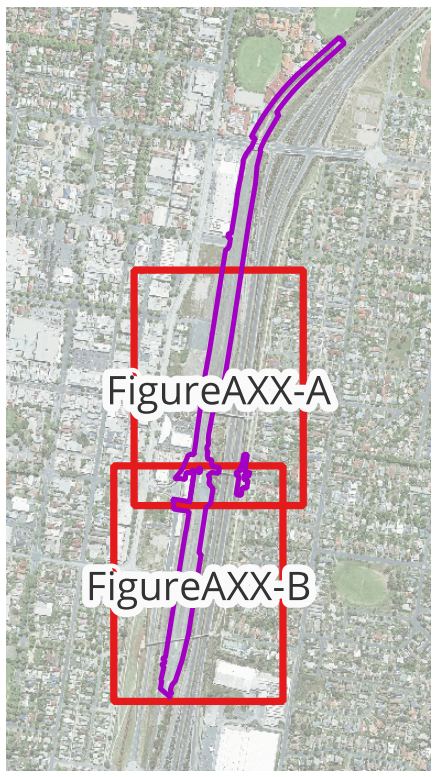
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

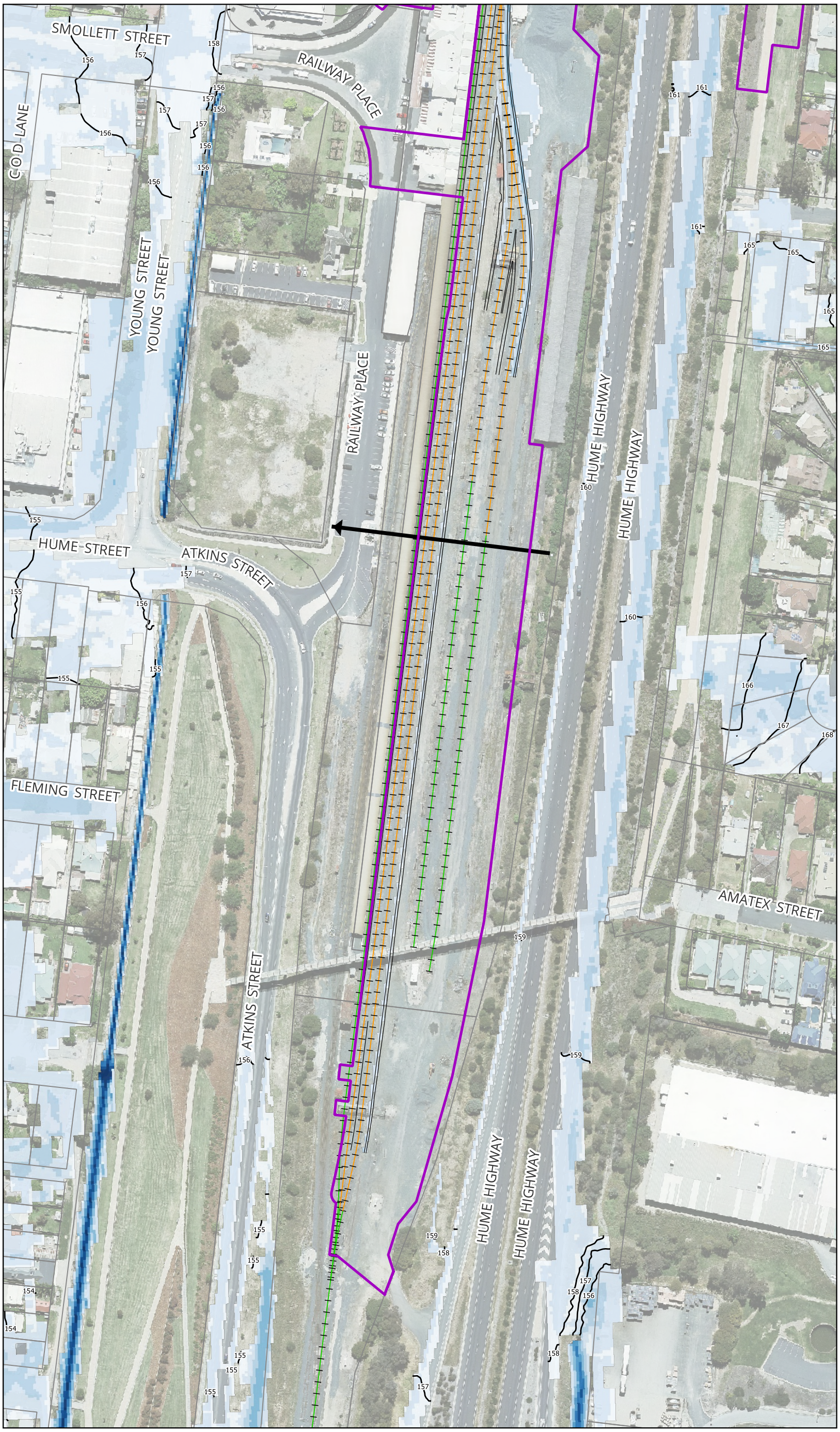
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A22-A: 1% AEP Peak Flood Depth and Levels - Design Blockage Condition



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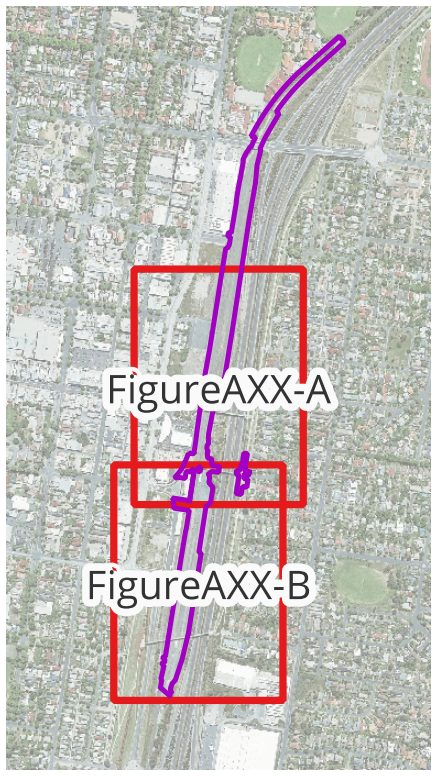
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

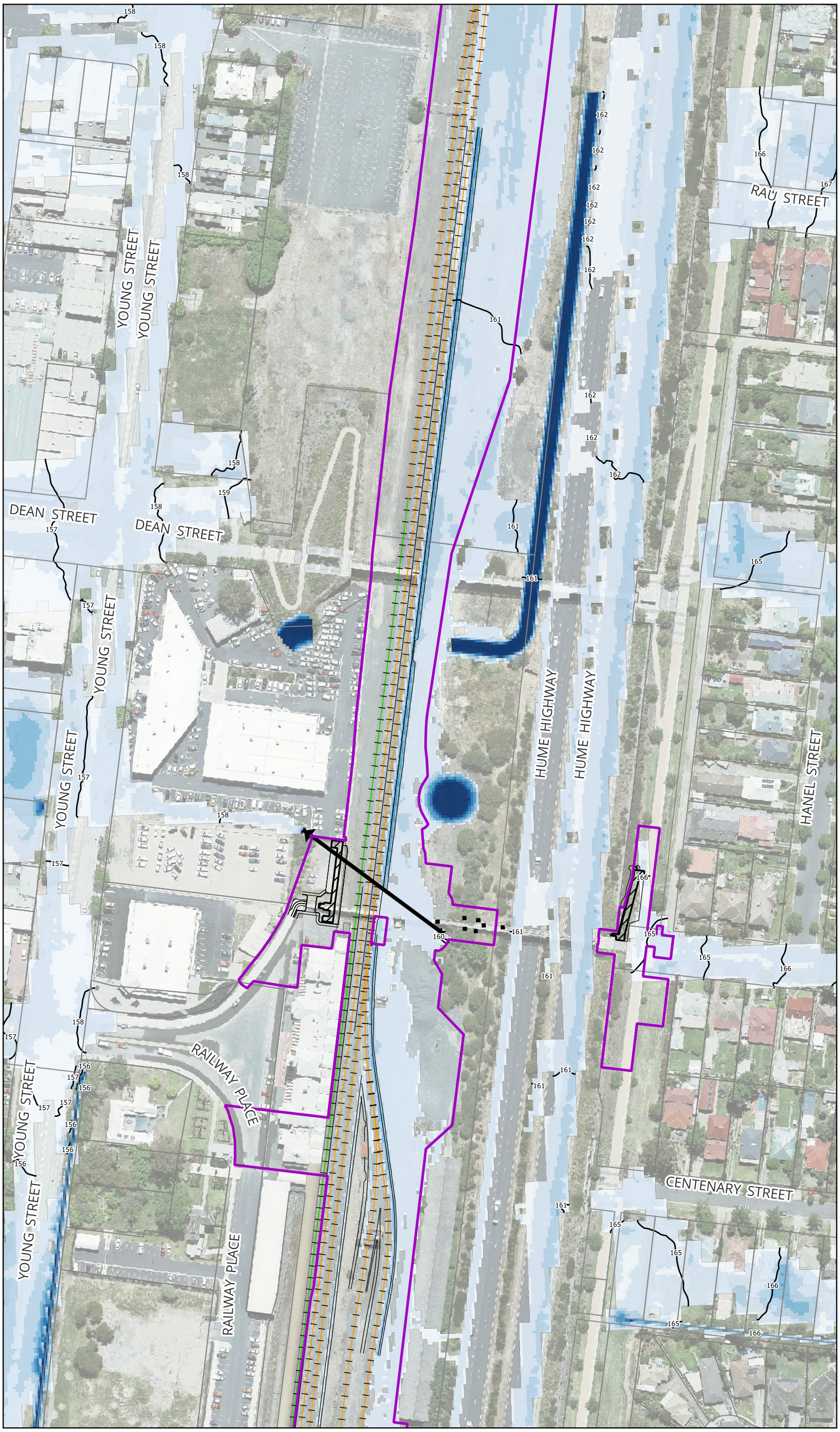
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A22-B: 1% AEP Peak Flood Depth and Levels - Design Blockage Condition



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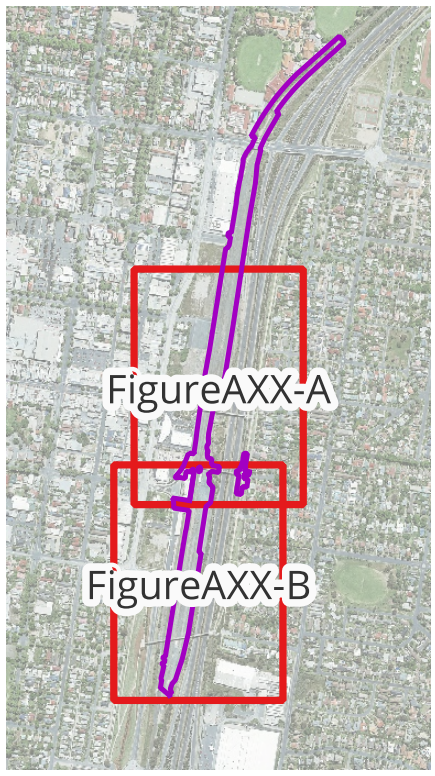
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

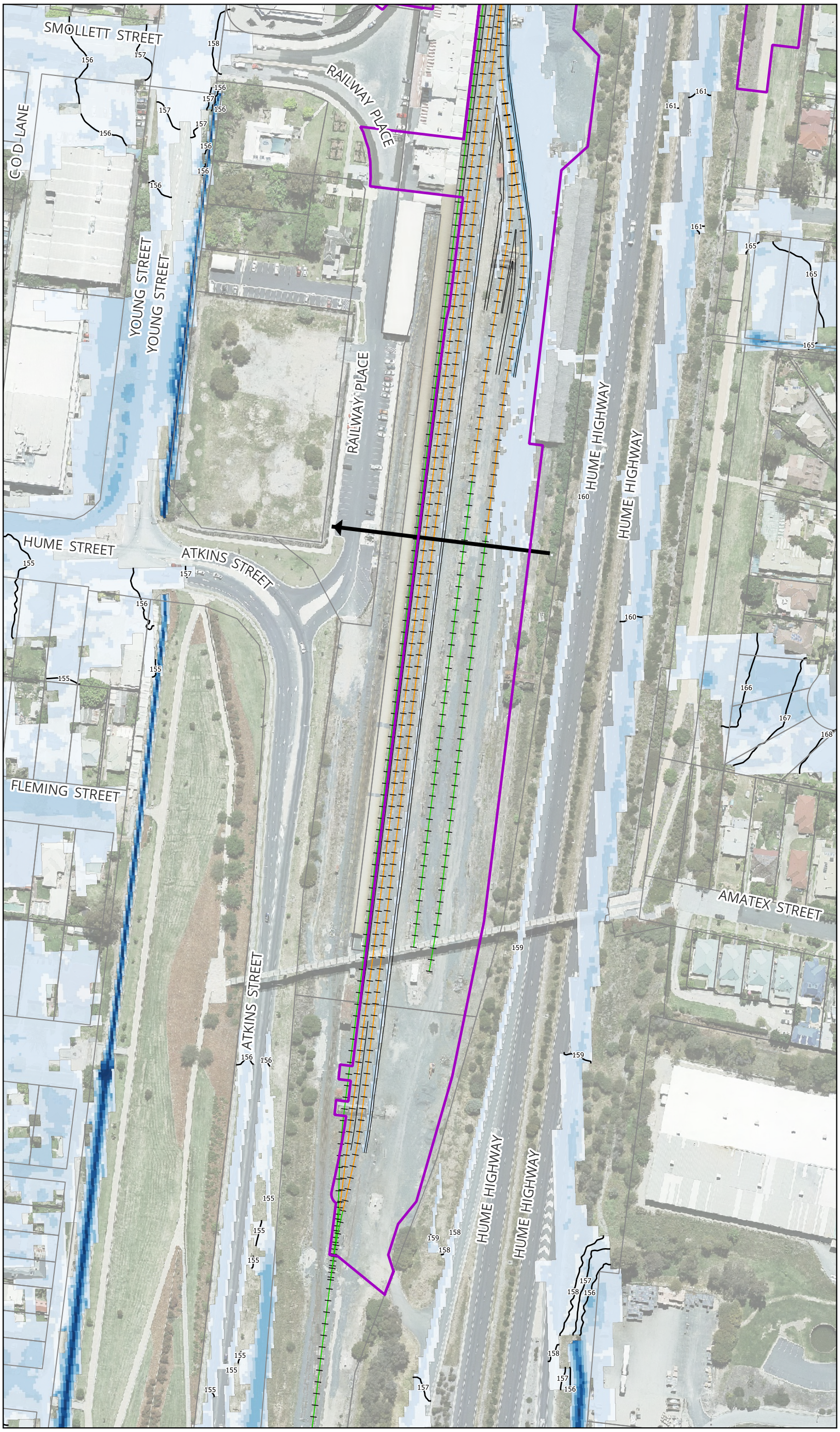
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A23-A: 1% AEP Climate Change Peak Flood Depth and Levels - Design Condition



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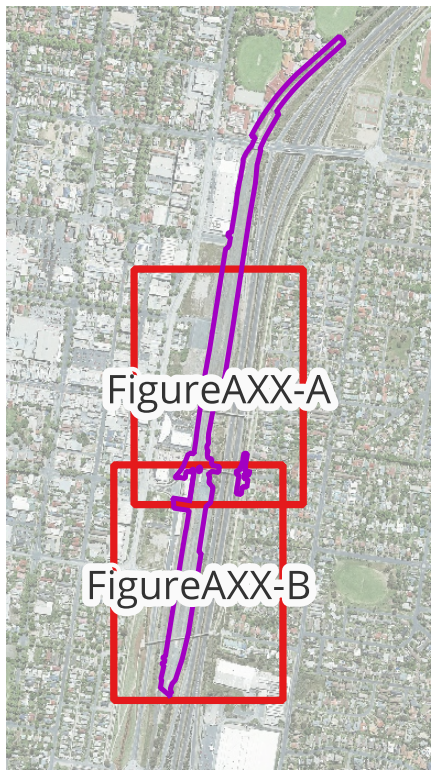
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

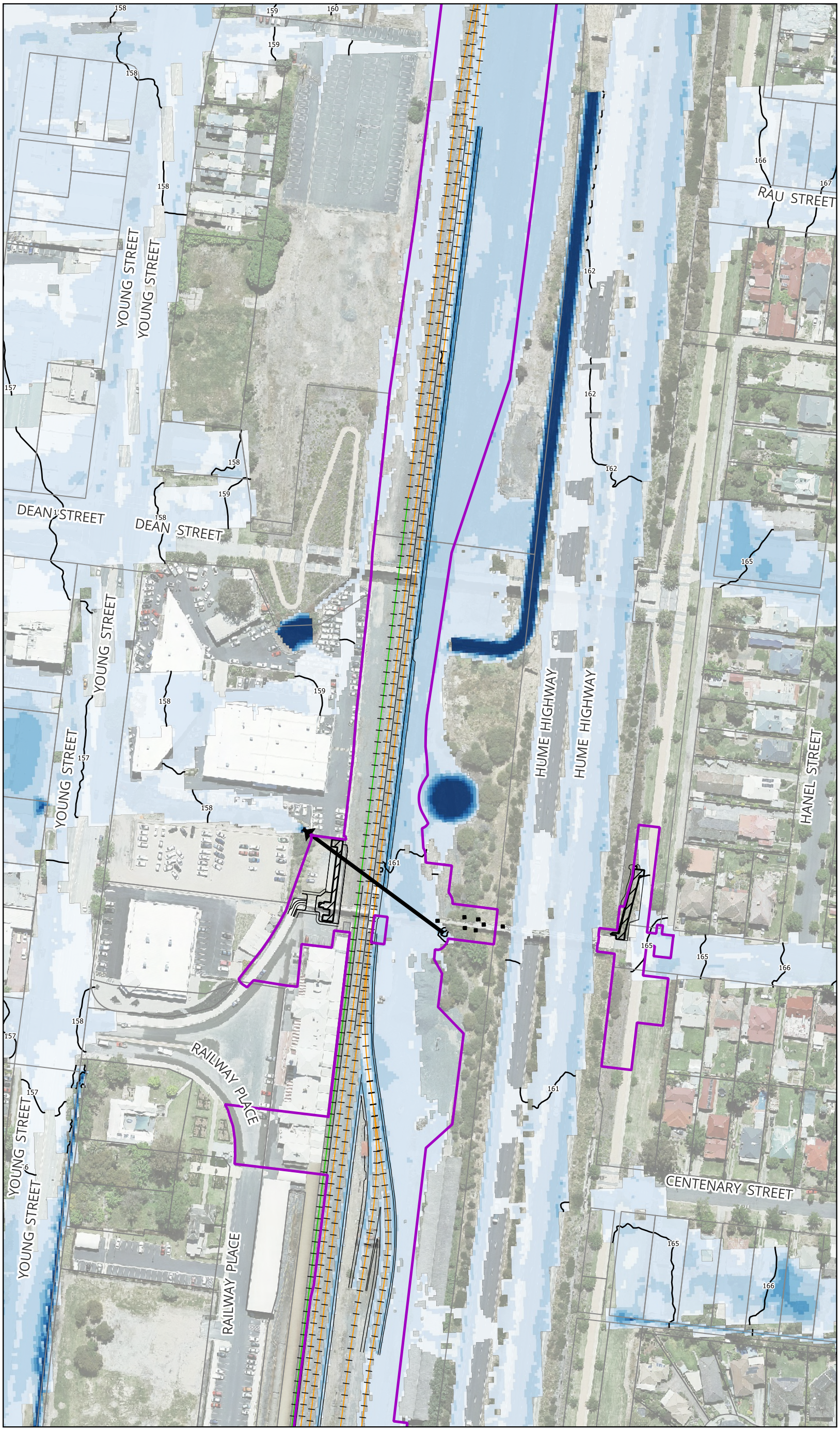
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A23-B: 1% AEP Climate Change Peak Flood Depth and Levels - Design Condition



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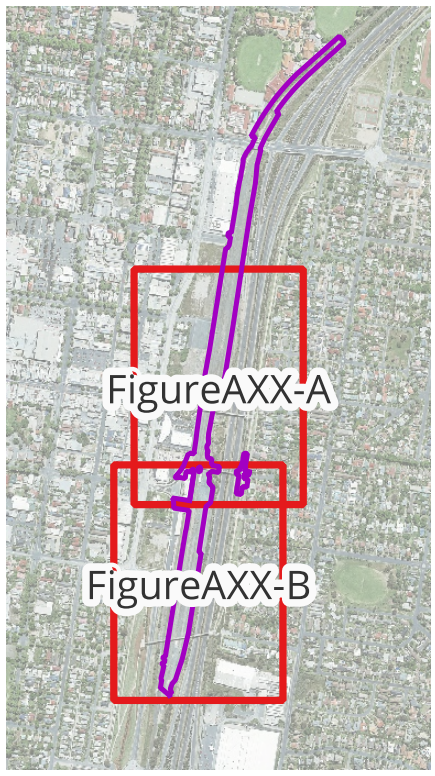
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

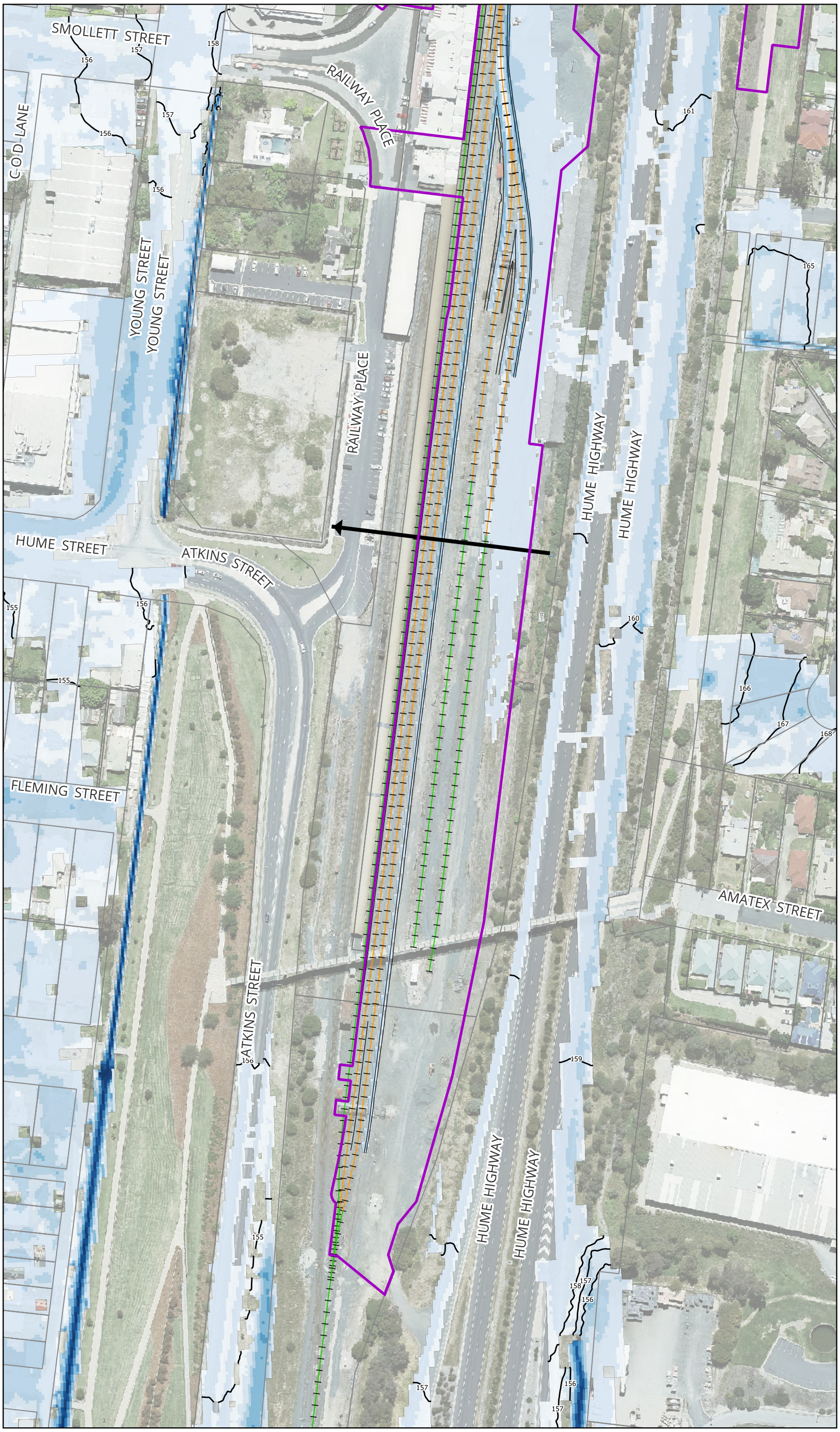
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A24-A: 0.05% AEP Peak Flood Depth and Levels - Design Condition



MARTINUS
aurecon
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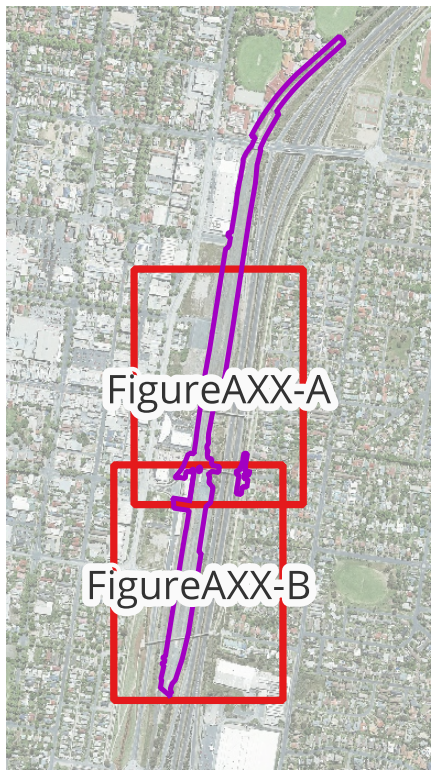
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

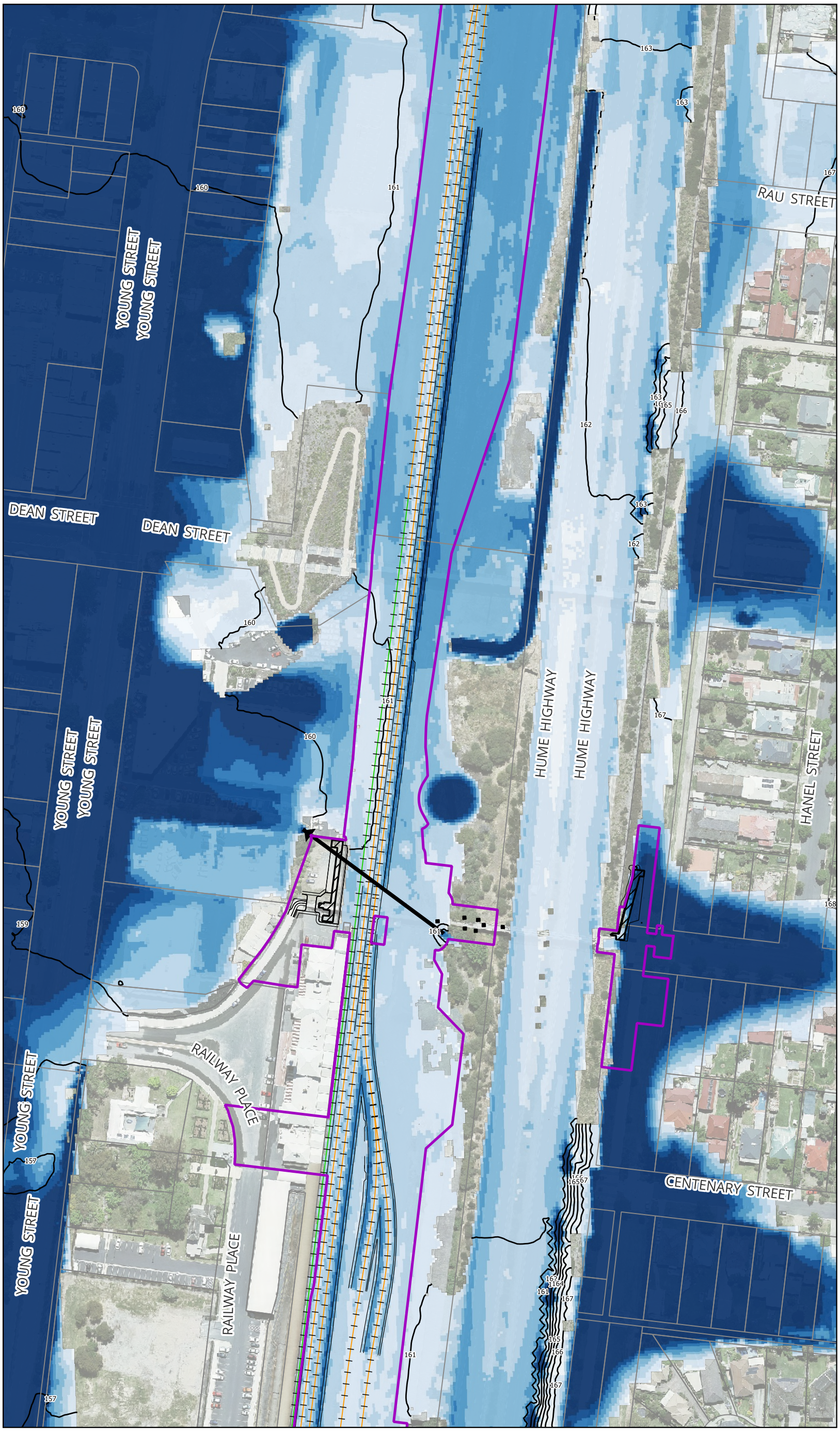
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A24-B: 0.05% AEP Peak Flood Depth and Levels - Design Condition



MARTINUS
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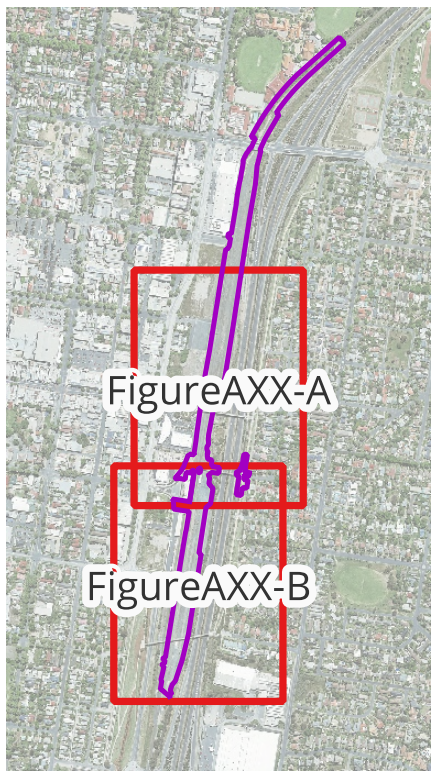
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

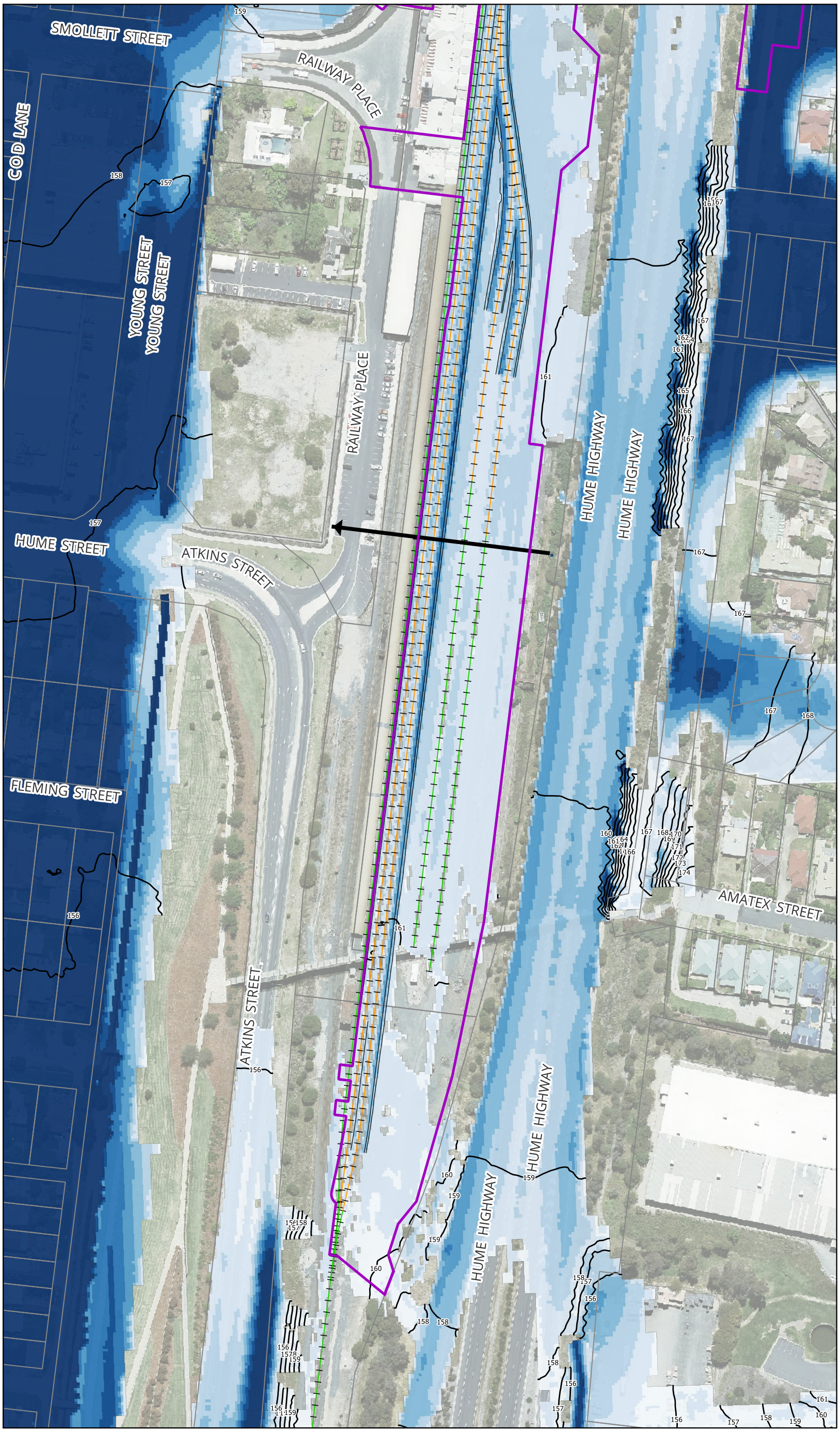
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A25-A: PMF Peak Flood Depth and Levels - Design Condition



MARTINUS
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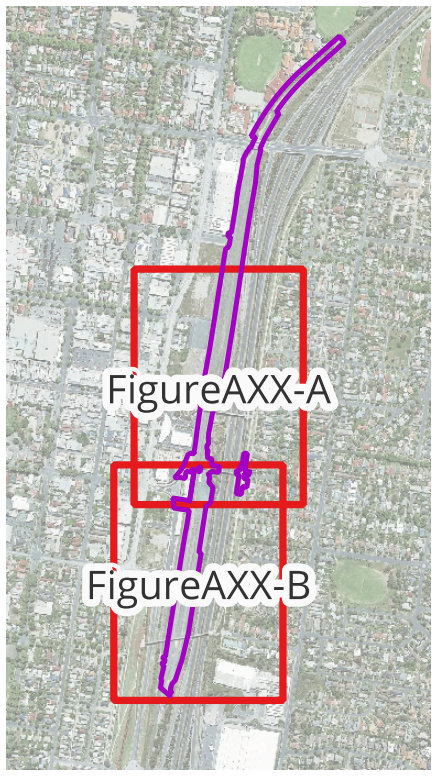
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

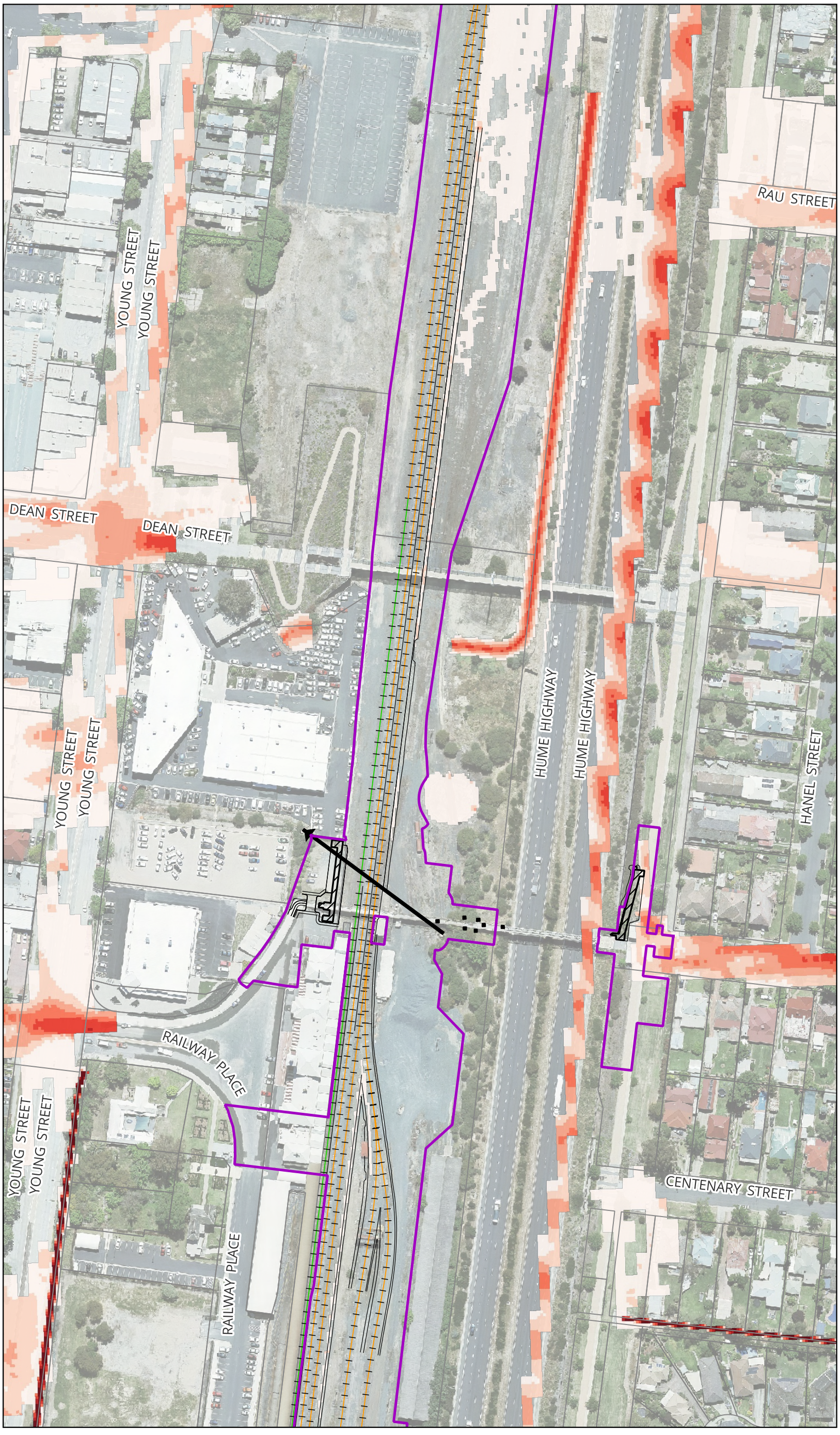
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A25-B: PMF Peak Flood Depth and Levels - Design Condition



MARTINUS
aurecon
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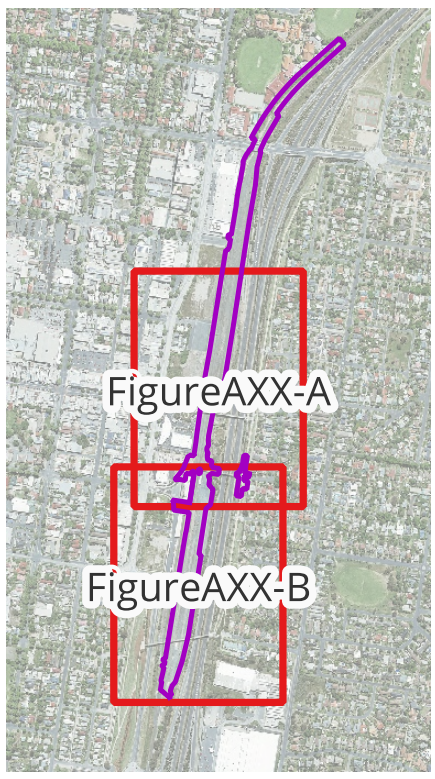
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

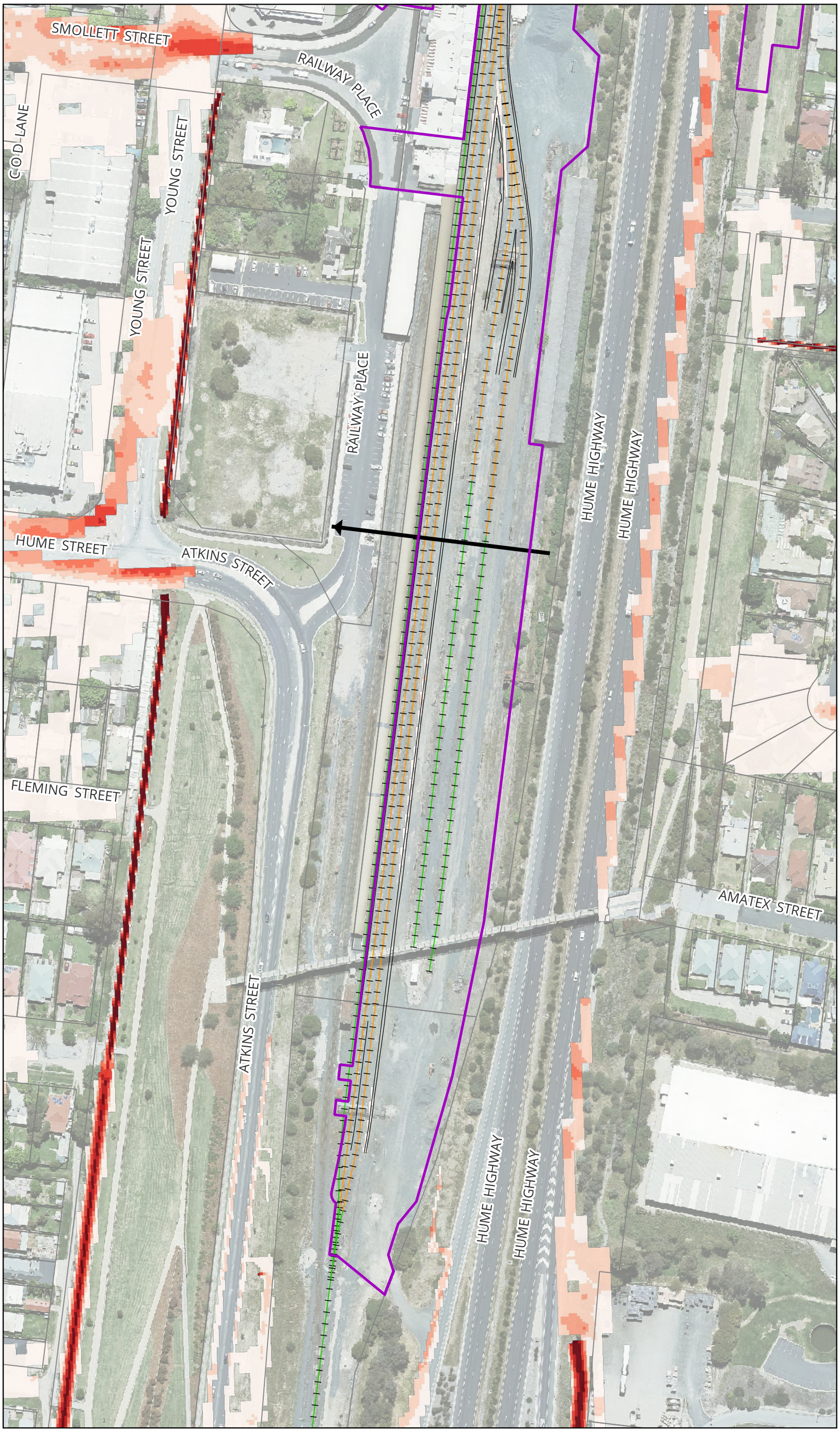
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A26-A: 5% AEP Peak Flood Velocity - Design Condition



MARTINUS
aurecon
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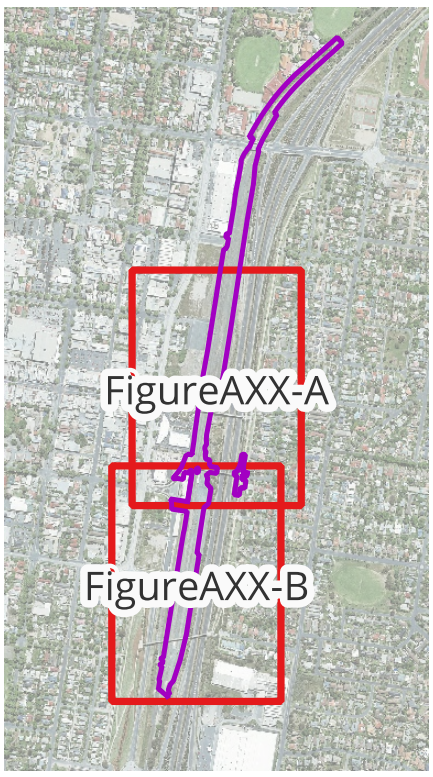
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

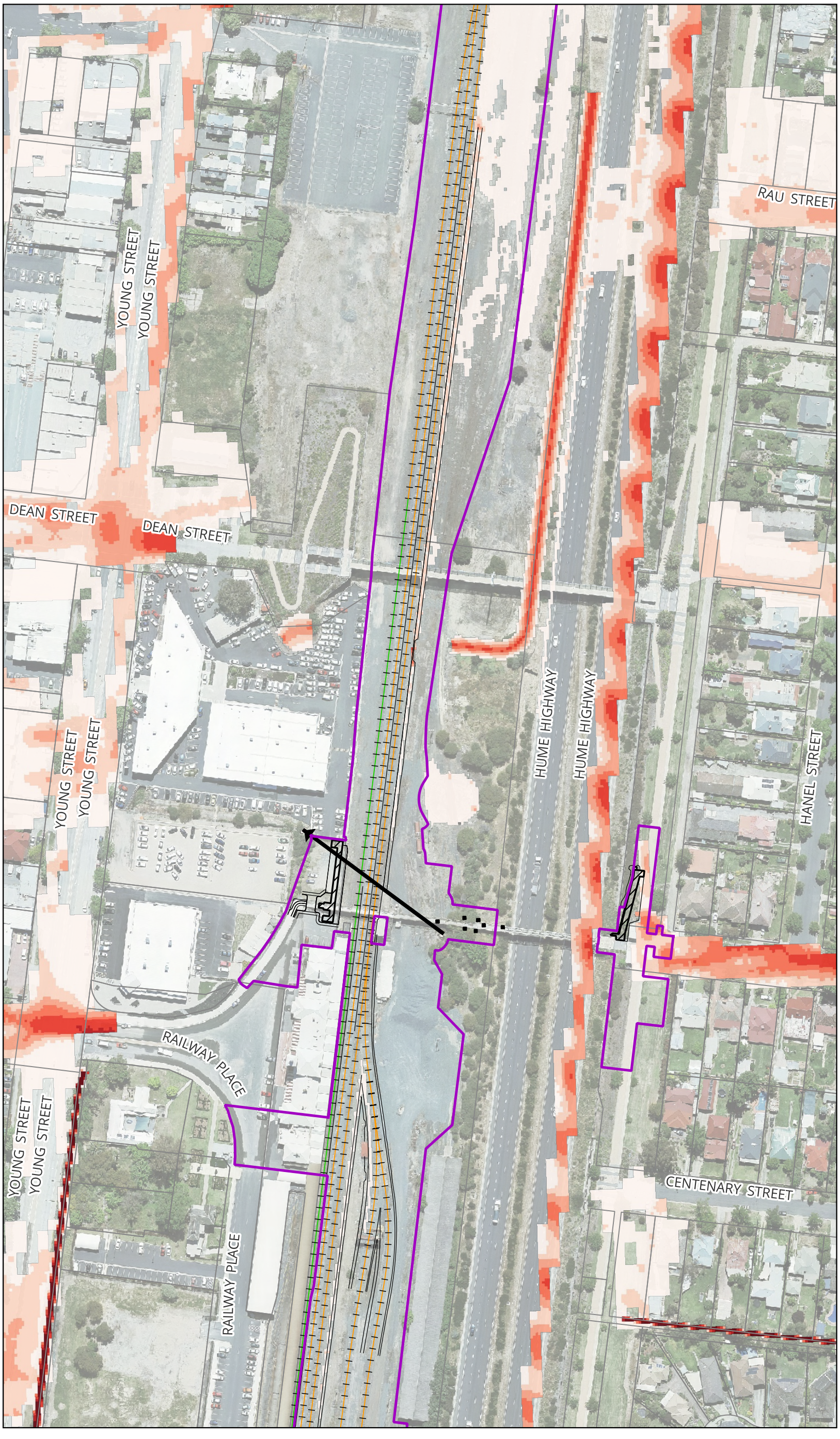
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A26-B: 5% AEP Peak Flood Velocity - Design Condition



MARTINUS
aurecon
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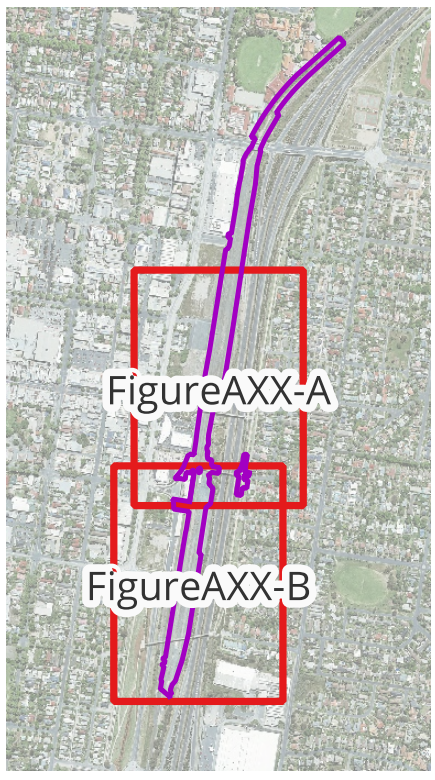
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

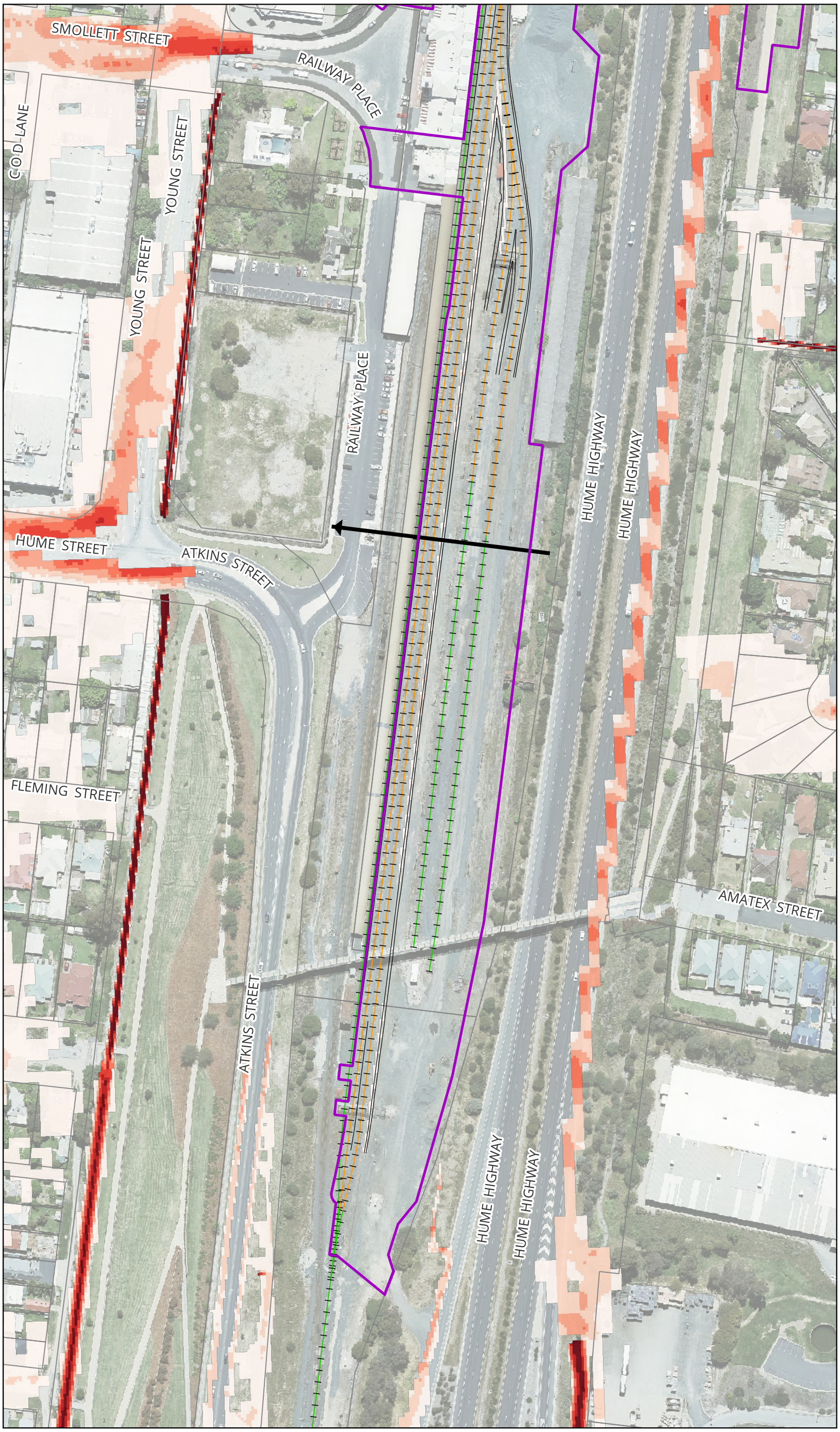
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A27-A: 2% AEP Peak Flood Velocity - Design Condition



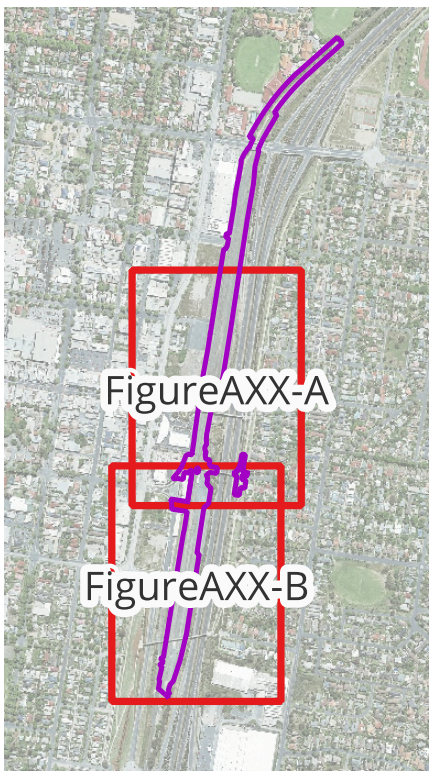
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

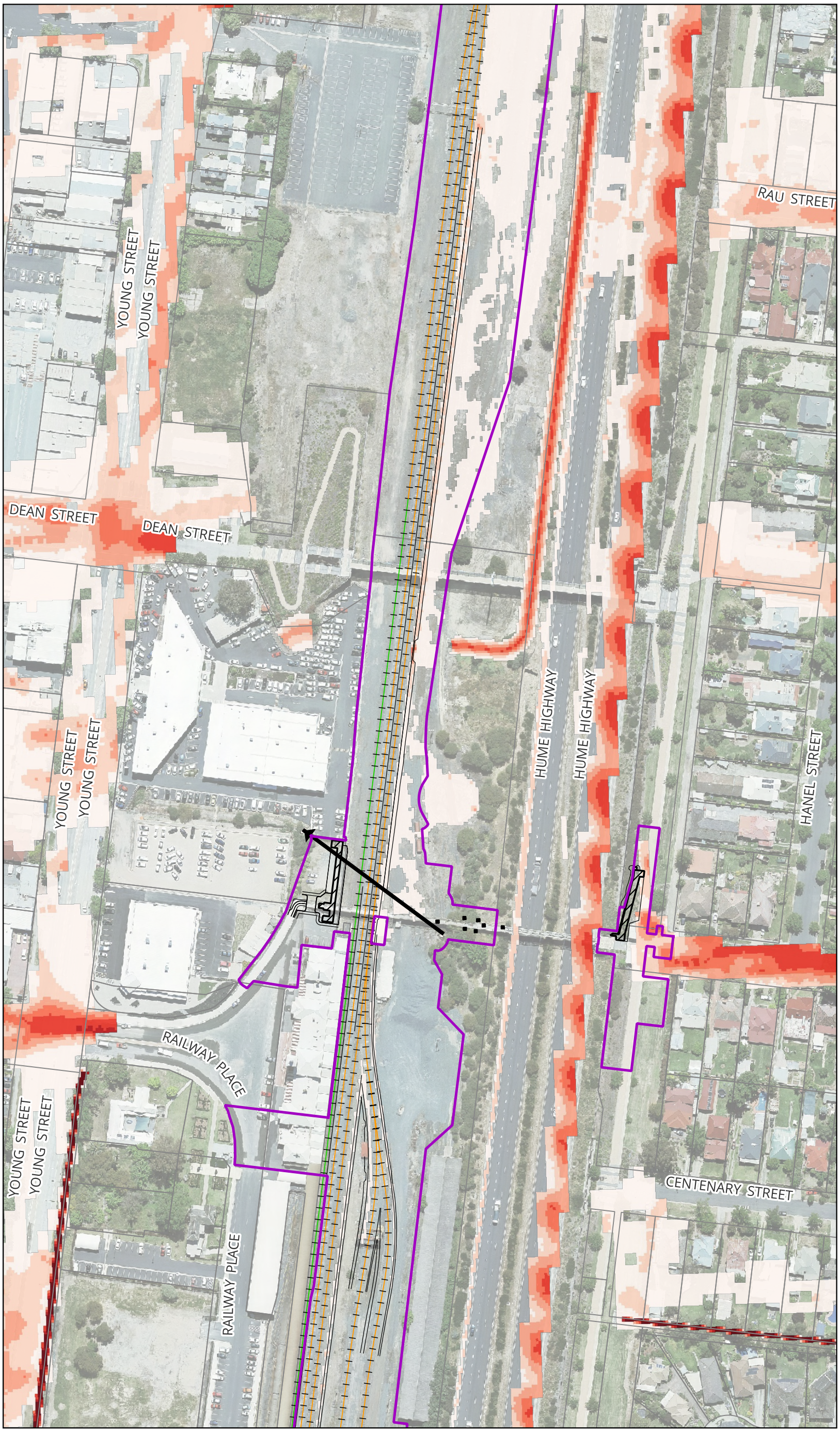
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A27-B: 2% AEP Peak Flood Velocity - Design Condition



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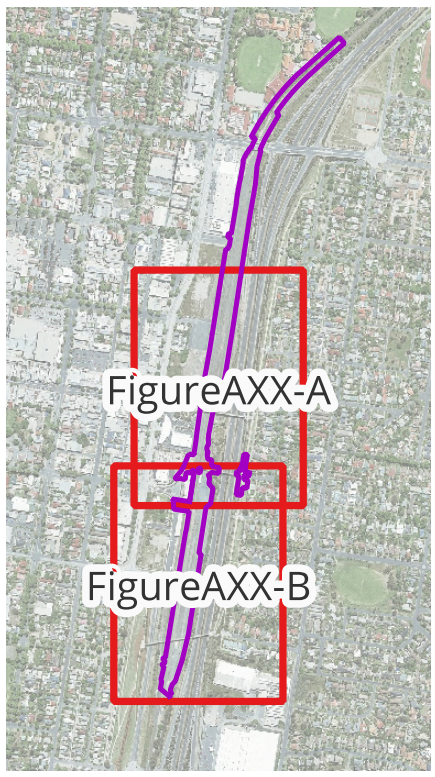
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

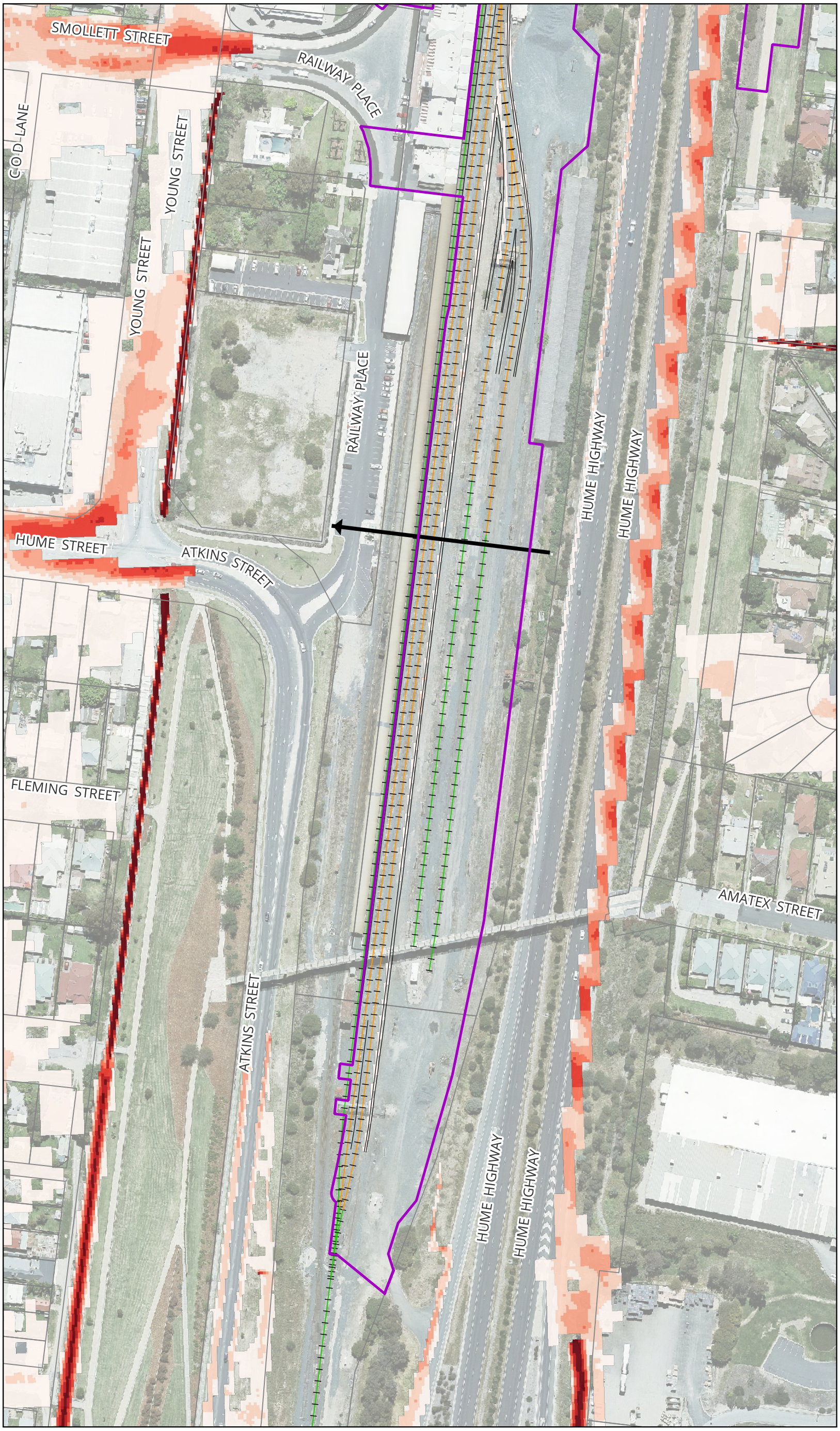
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A28-A: 1% AEP Peak Flood Velocity - Design Condition



MARTINUS
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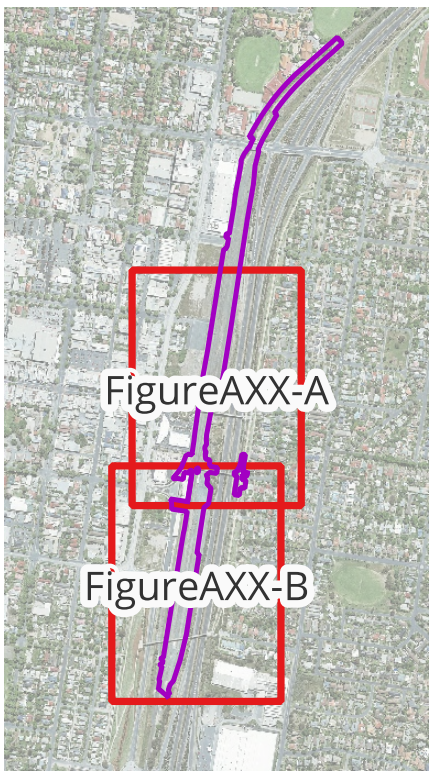
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

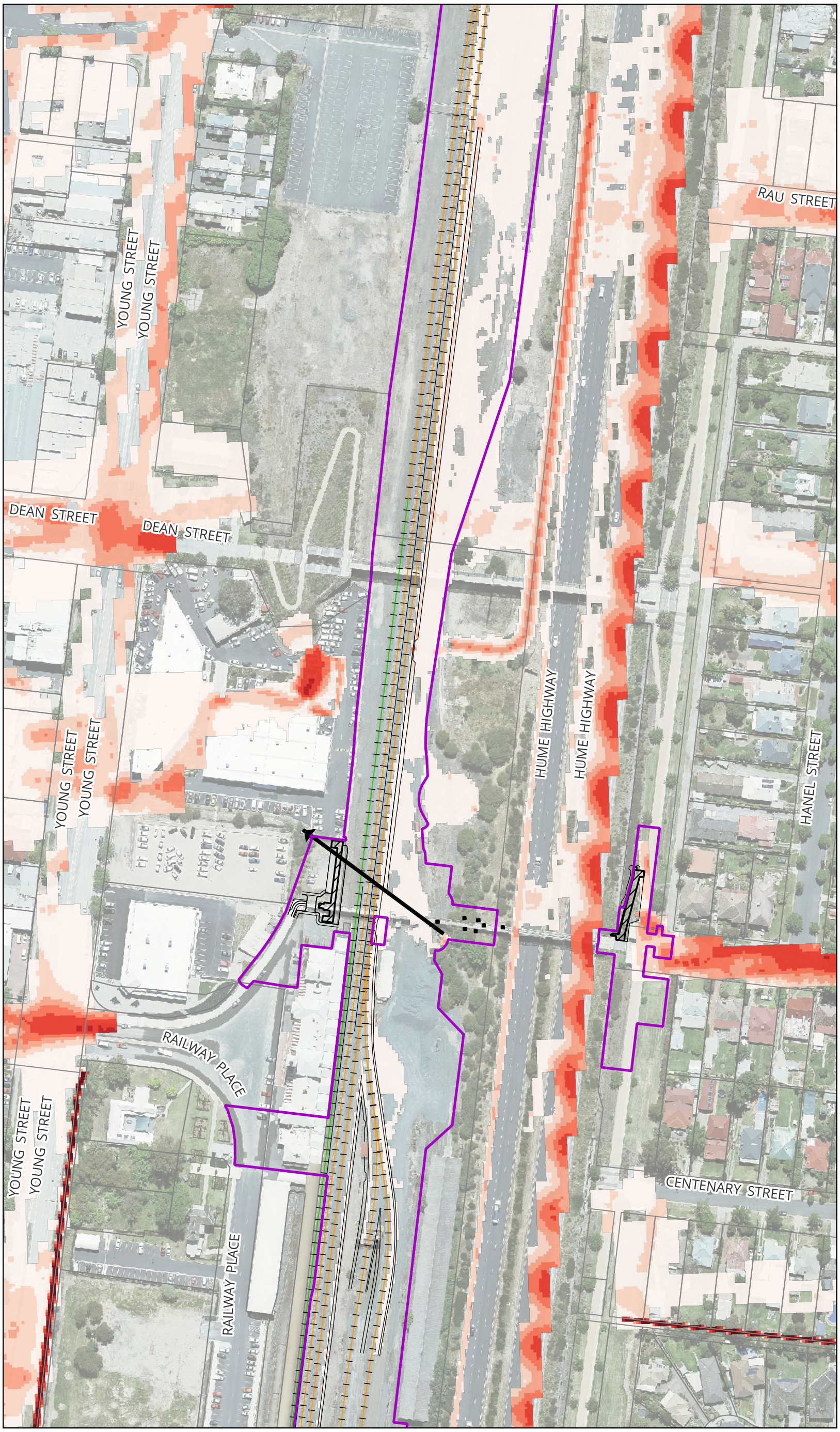
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A28-B: 1% AEP Peak Flood Velocity - Design Condition



MARTINUS
aurecon
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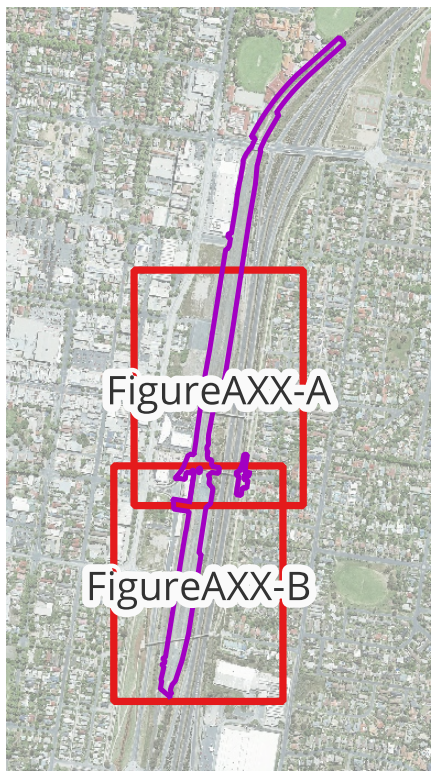
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

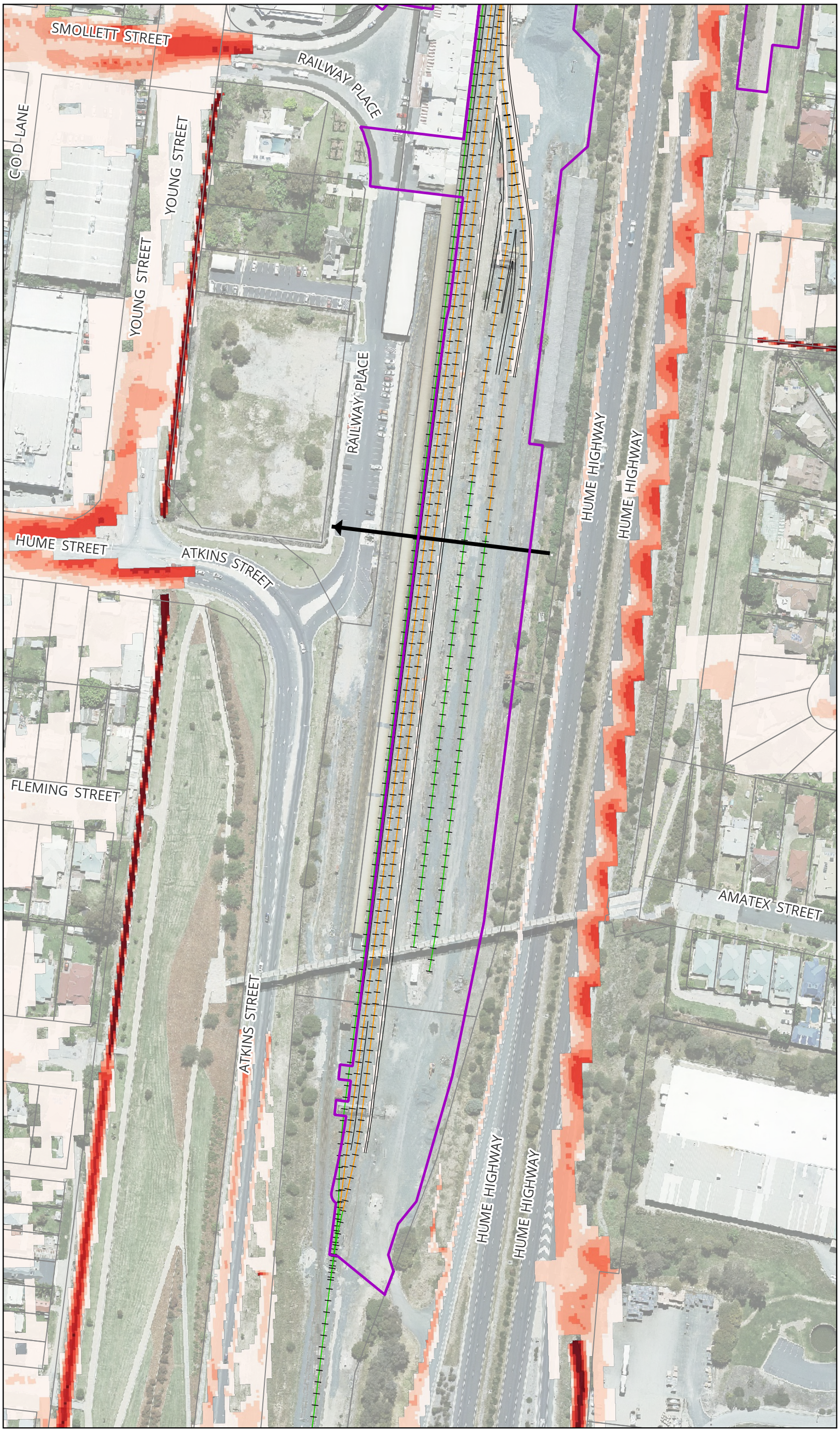
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A29-A: 1% AEP Peak Flood Velocity - Design Blockage Condition



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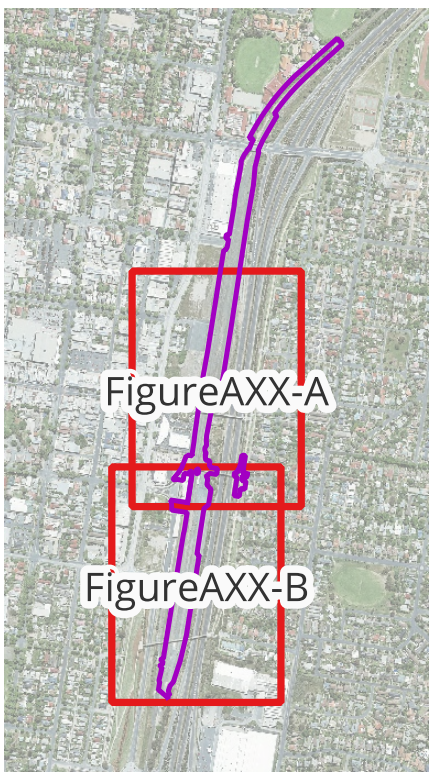
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

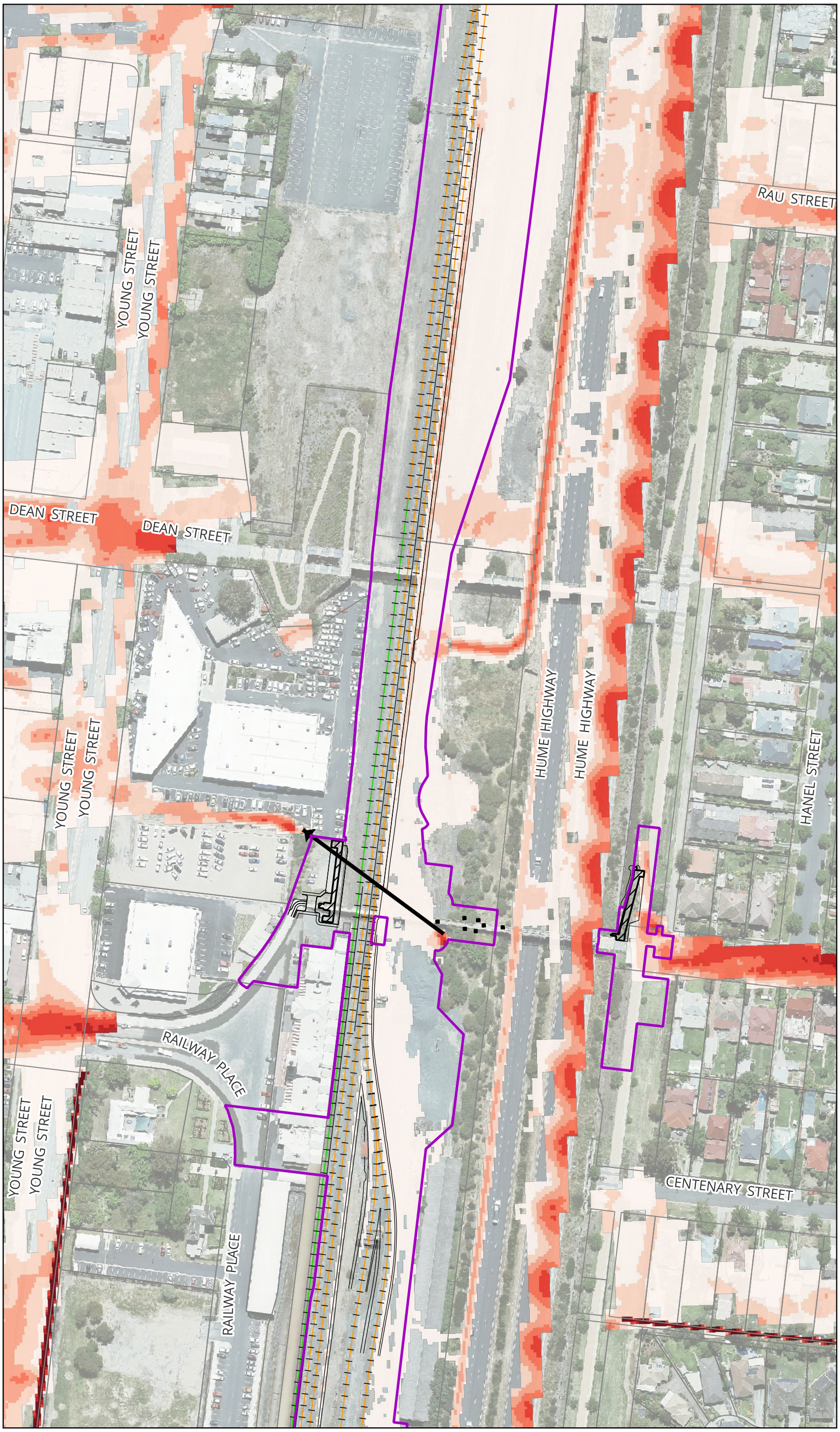
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A29-B: 1% AEP Peak Flood Velocity - Design Blockage Condition



MARTINUS
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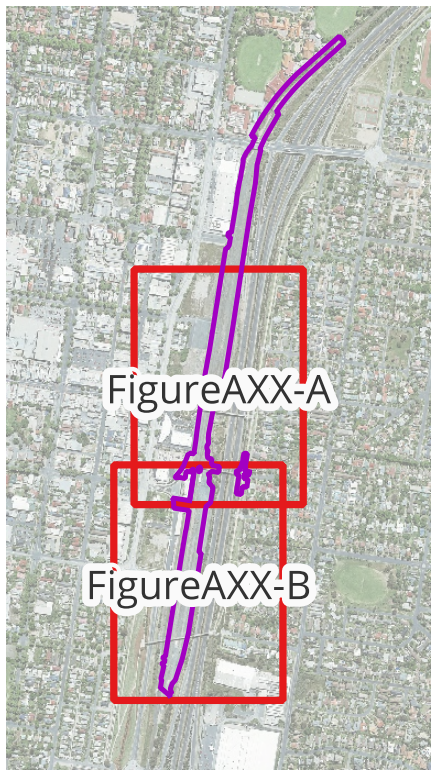
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

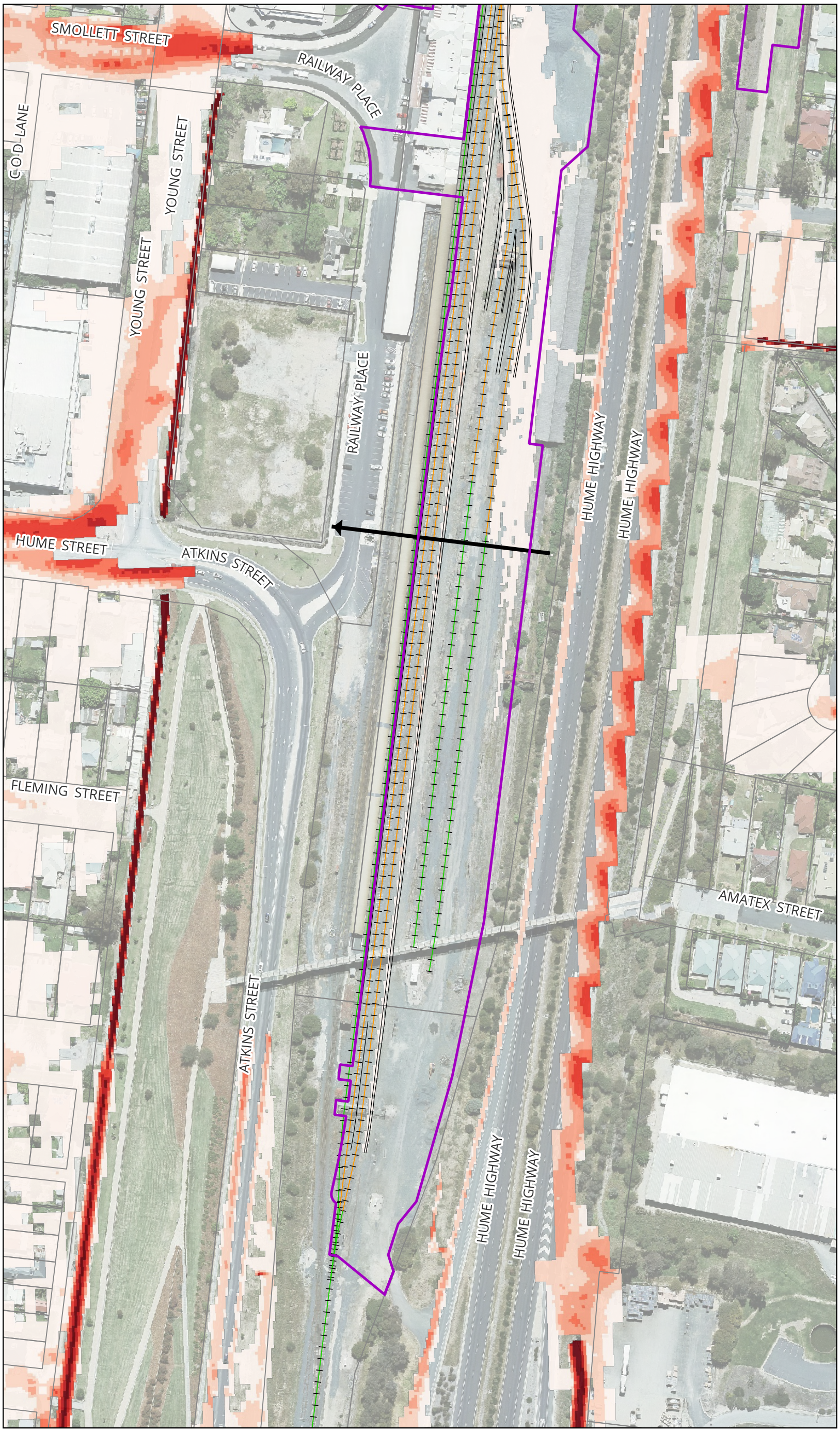
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A30-A: 1% AEP Climate Change Peak Flood Velocity - Design Condition



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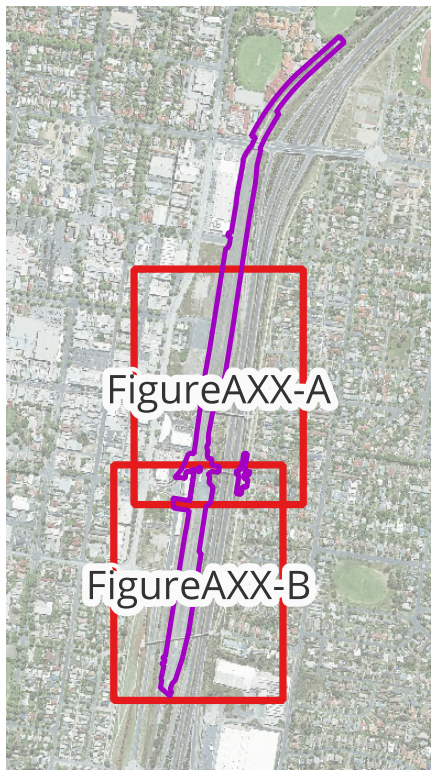
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

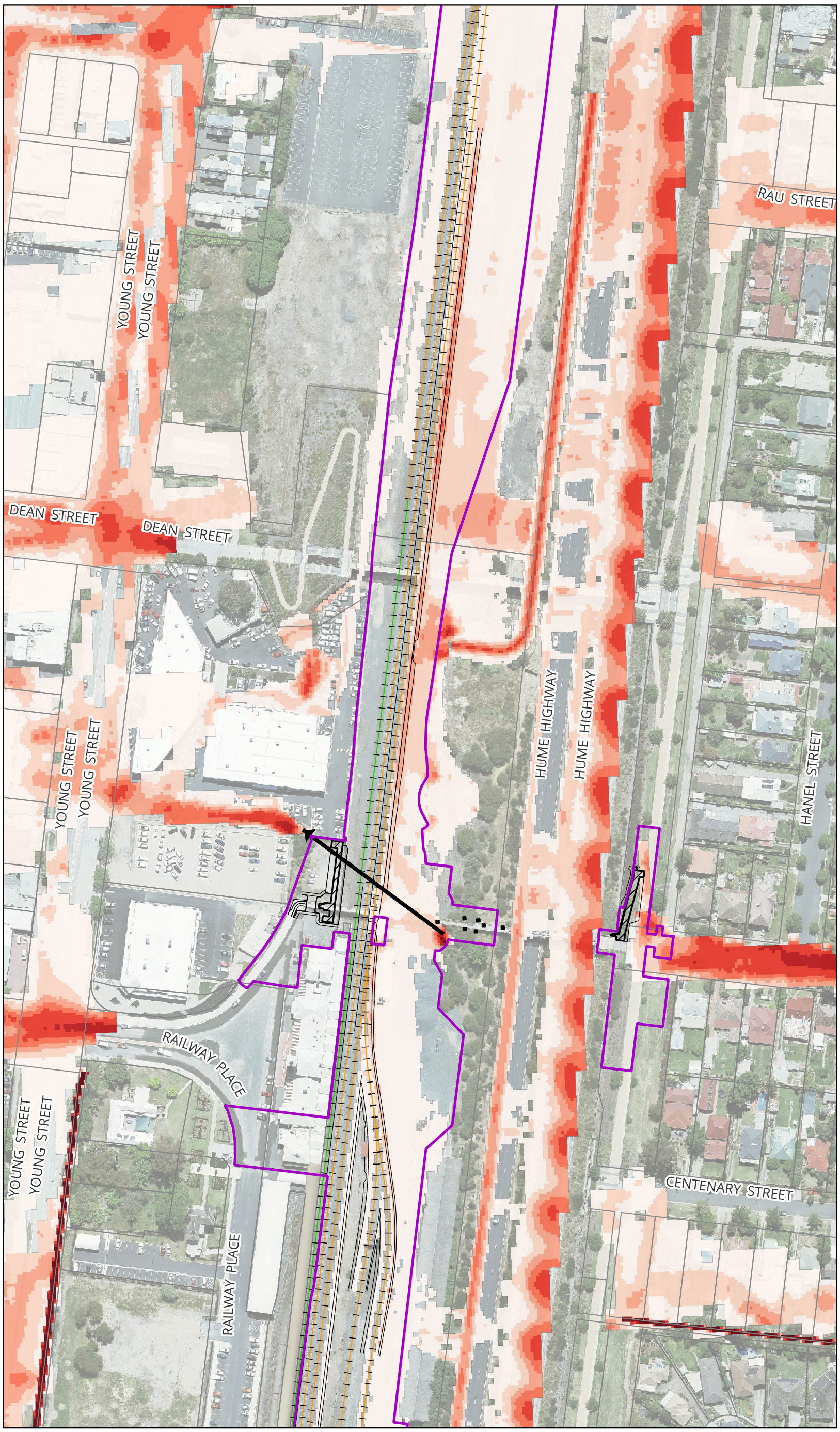
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A30-B: 1% AEP Climate Change Peak Flood Velocity - Design Condition



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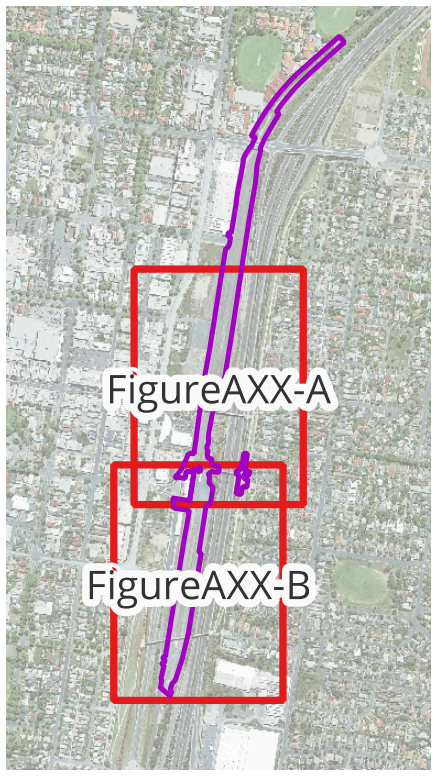
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Peak Flood Velocity (m/s)
Band 1 (Gray)

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



Notes:

Map by: TT

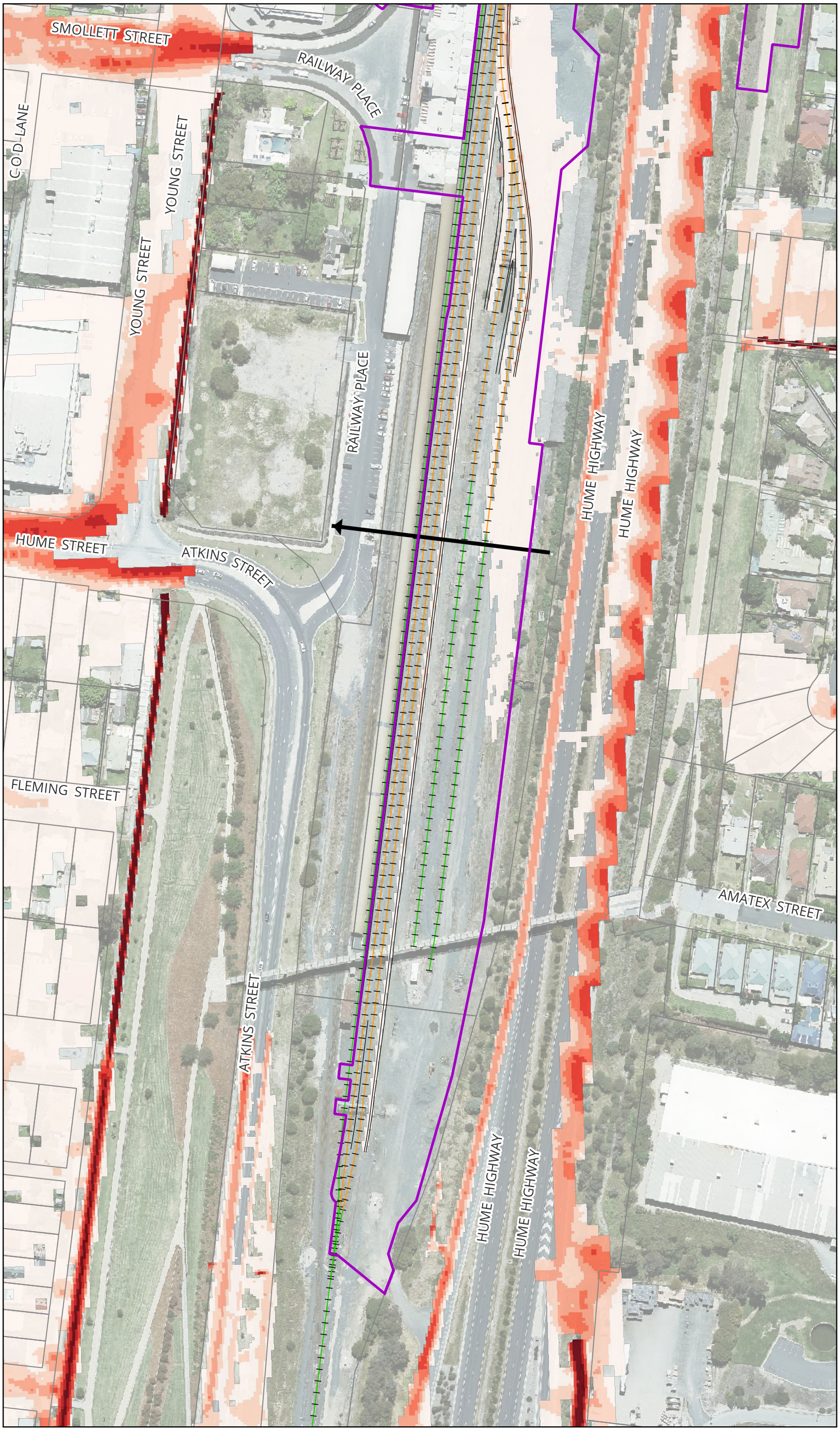
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A31-A: 0.05% AEP Climate Change Peak Flood Velocity - Design Condition



MARTINUS
aurecon
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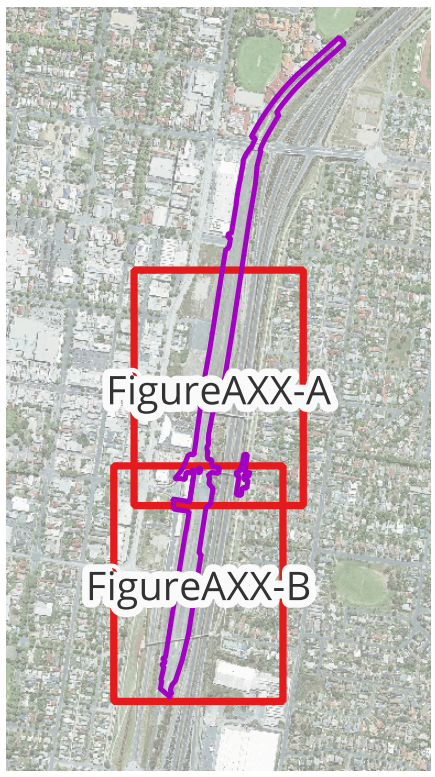
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Peak Flood Velocity (m/s)
Band 1 (Gray)

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



Notes:

Map by: TT

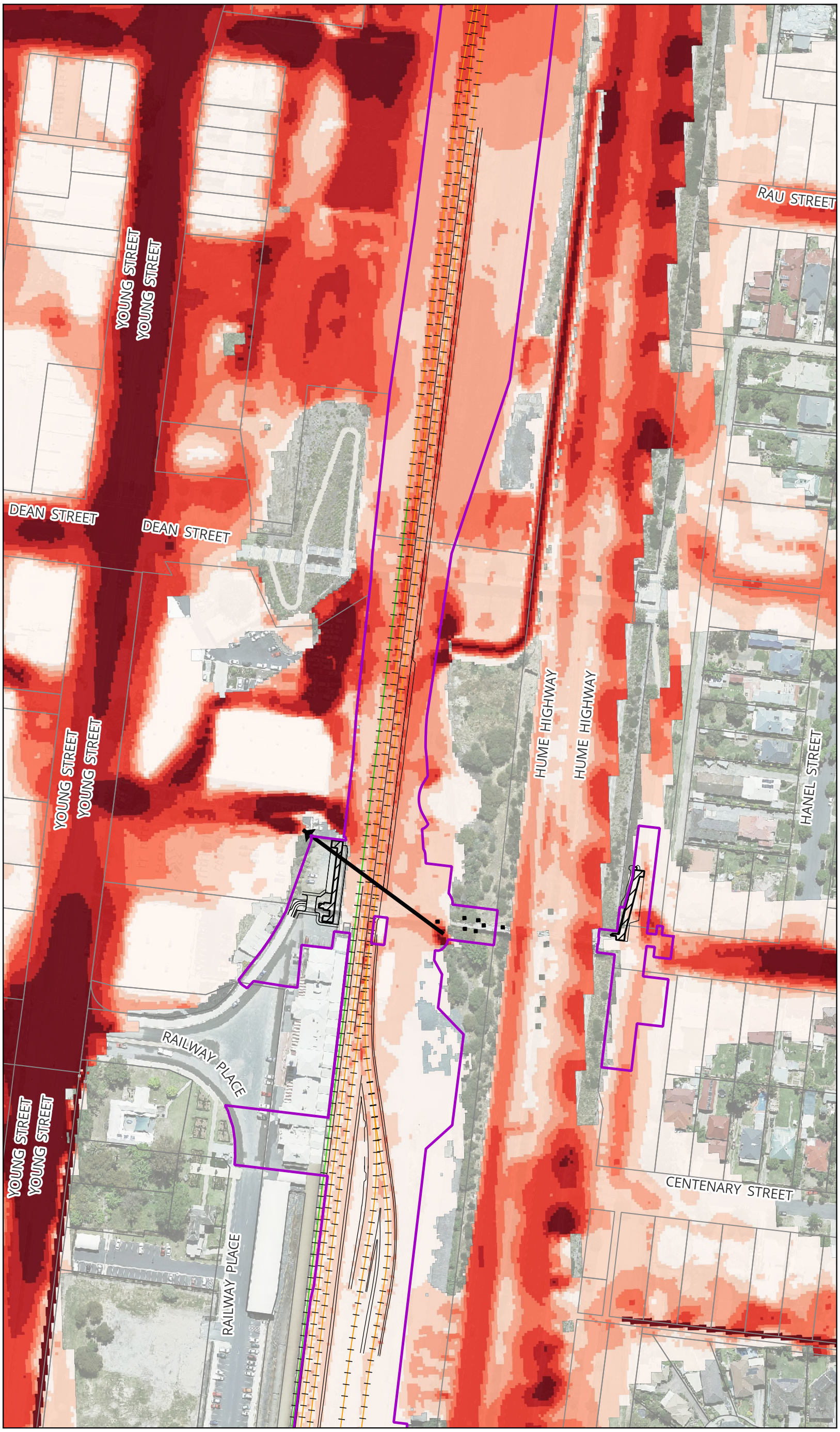
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A31-B: 0.05% AEP Climate Change Peak Flood Velocity - Design Condition



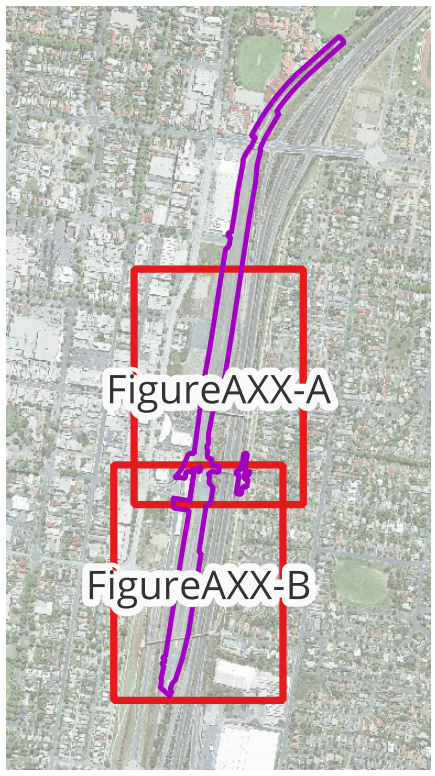
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

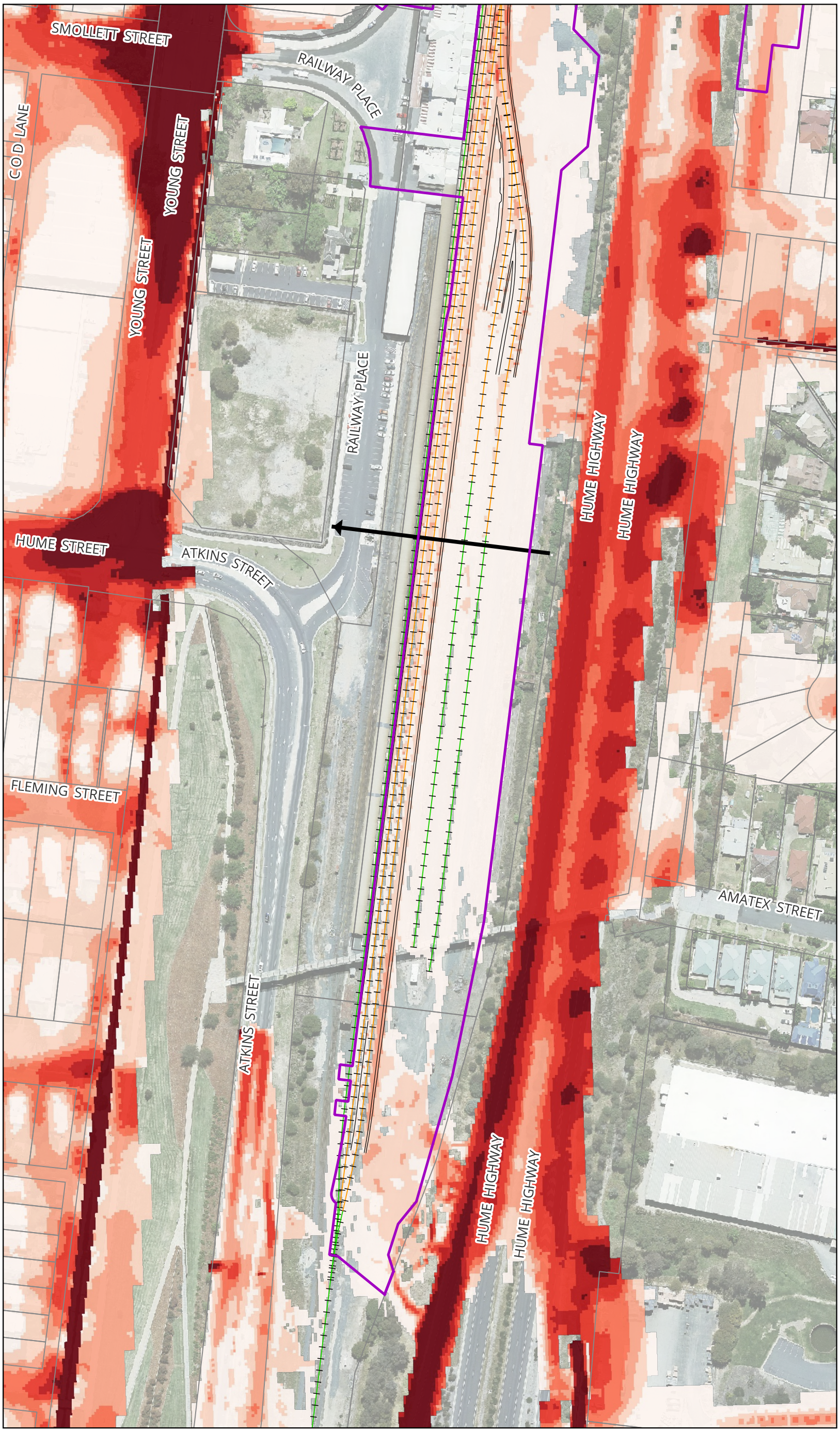
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A32-A: PMF Peak Flood Velocity - Design Condition



MARTINUS
aurecon
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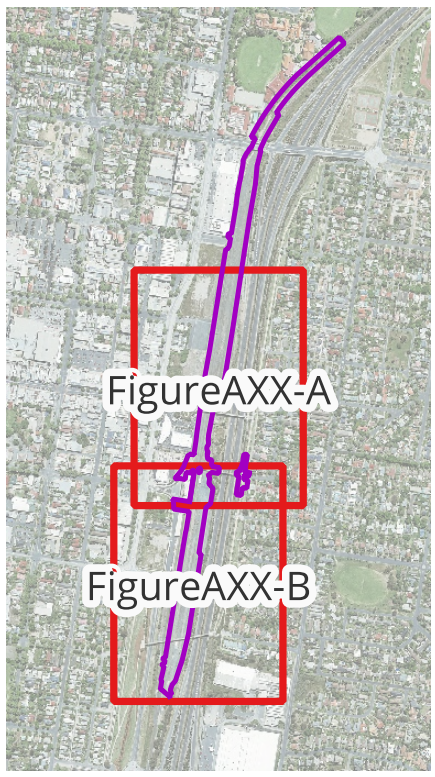
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

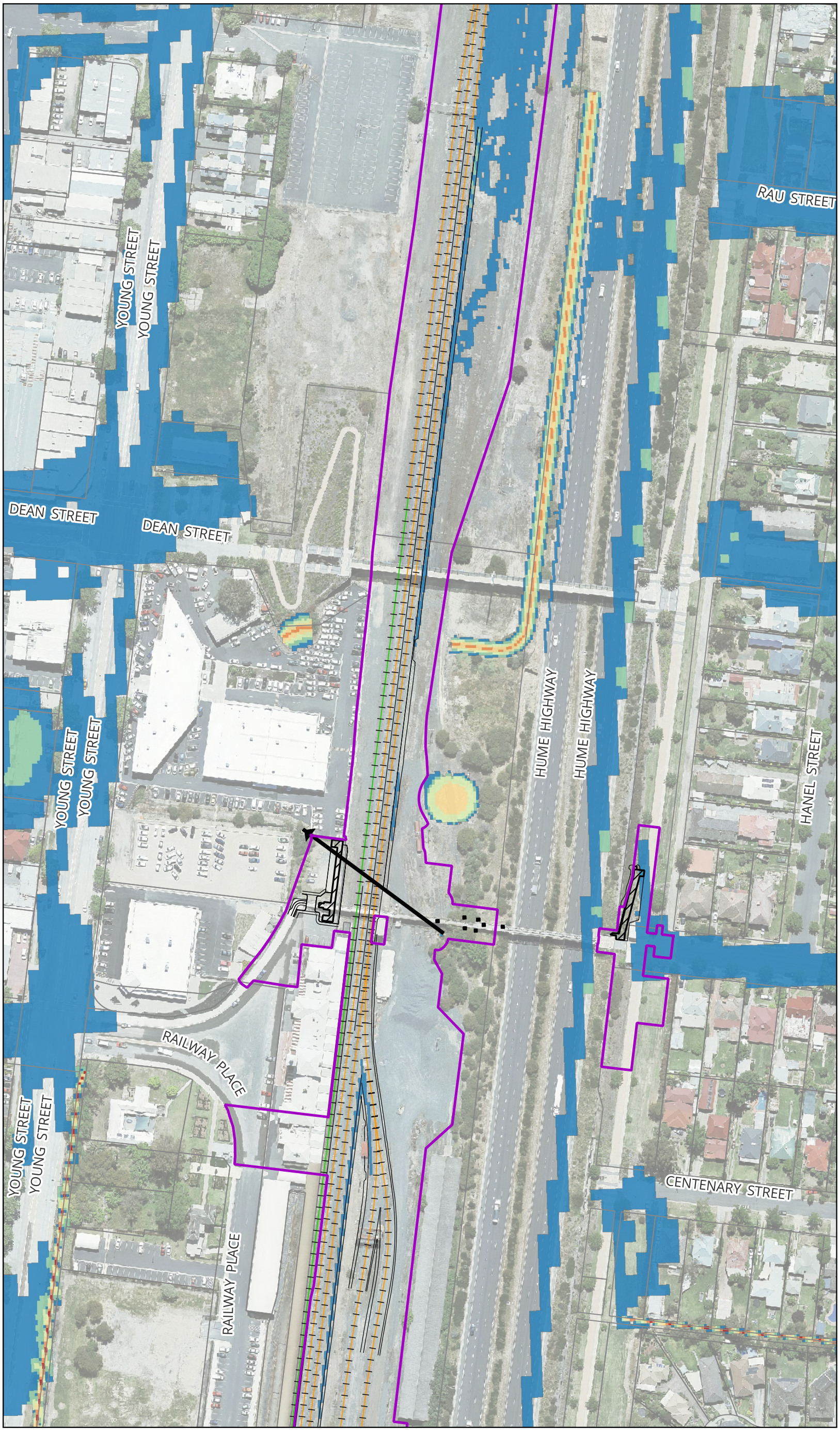
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A32-B: PMF Peak Flood Velocity - Design Condition



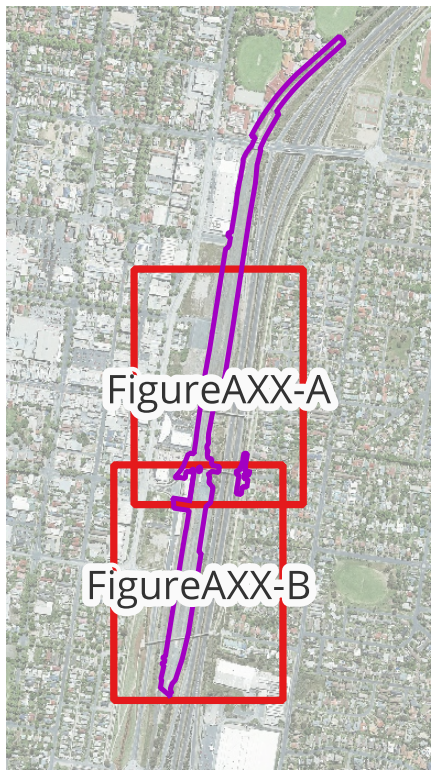
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

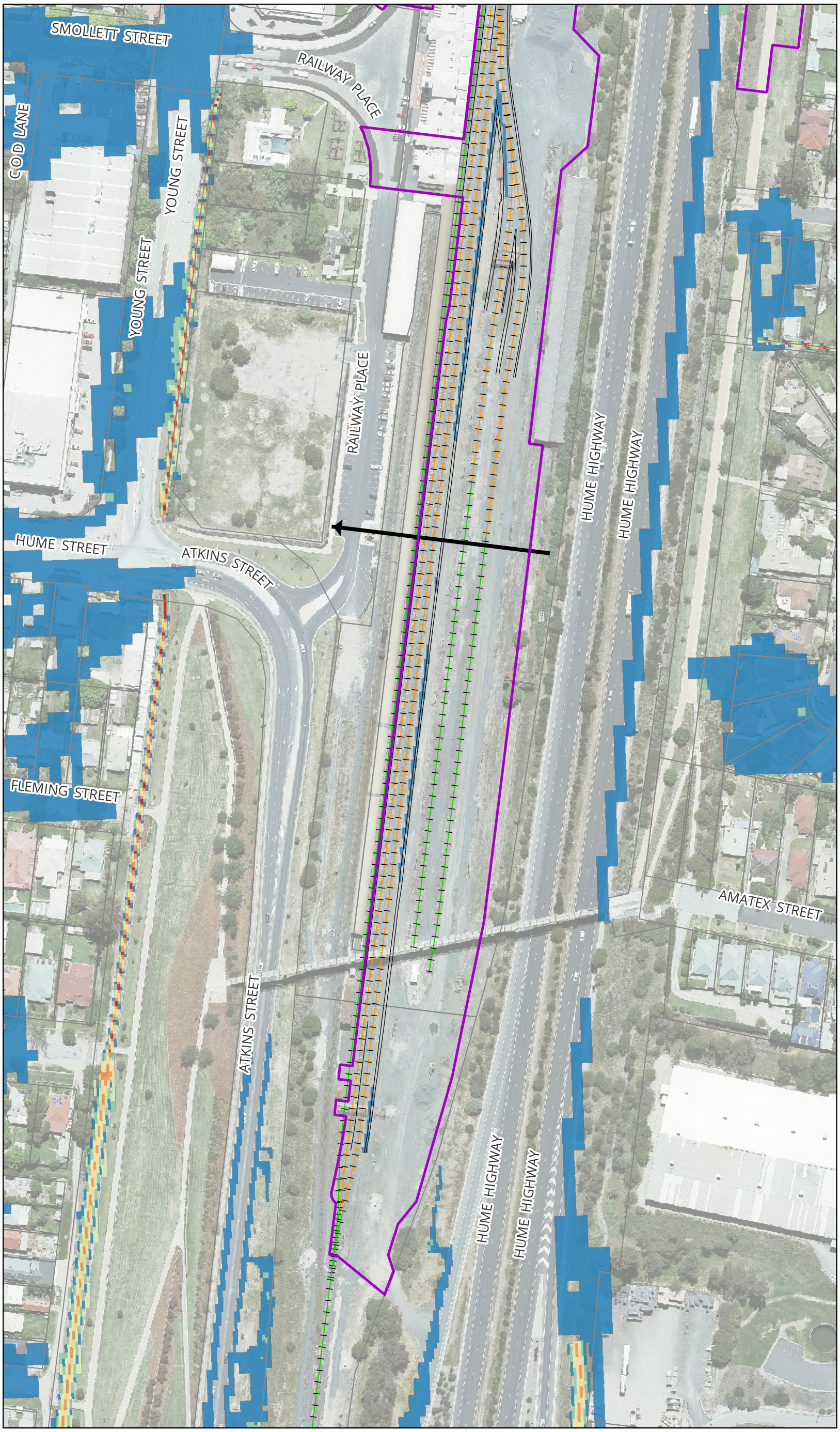
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A33-A: 5% AEP Peak Flood Hazard - Design Condition



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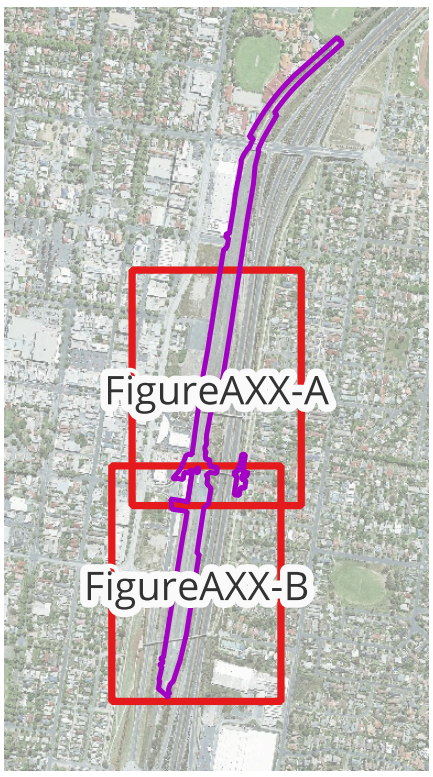
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

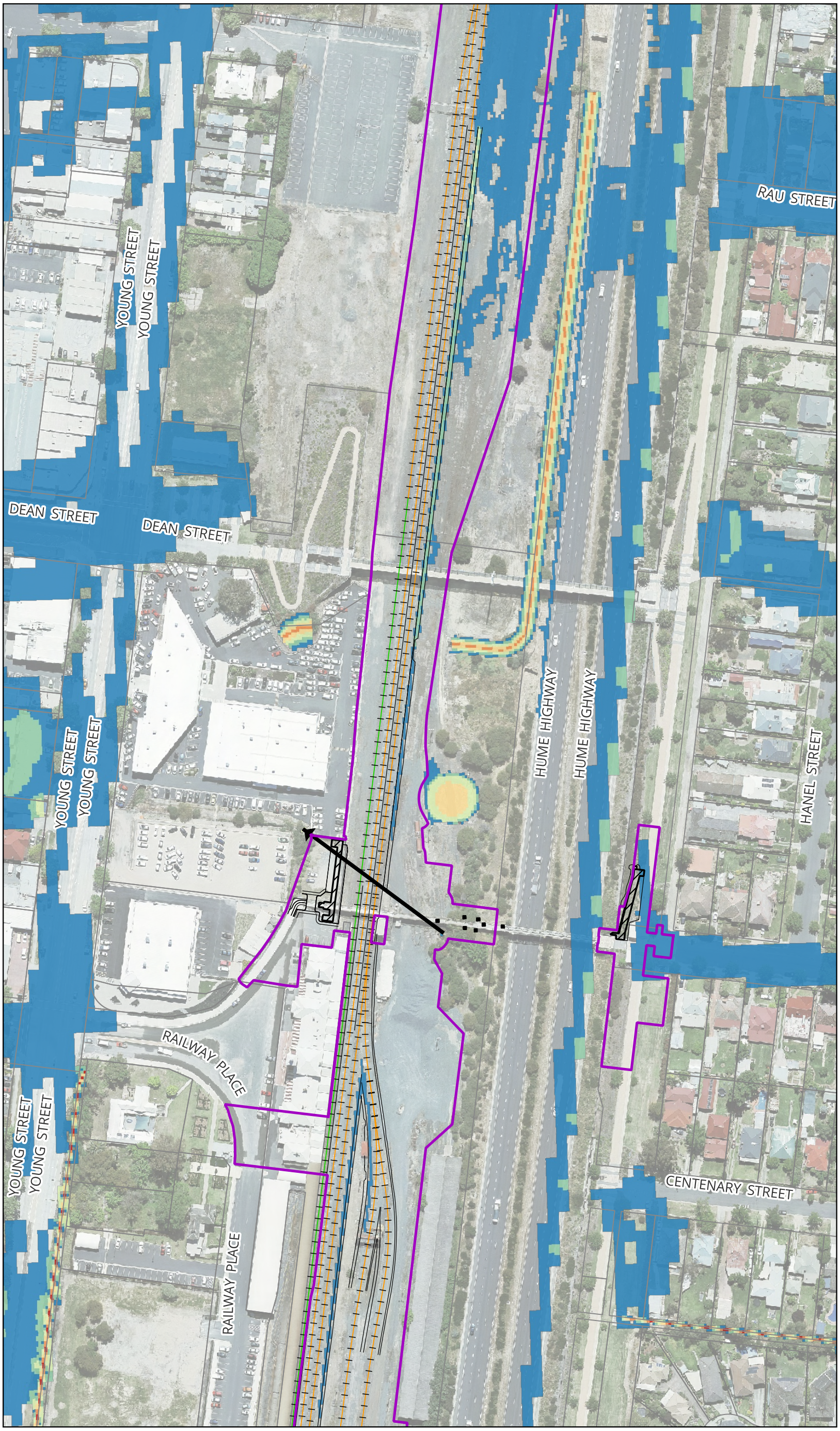
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A33-B: 5% AEP Peak Flood Hazard - Design Condition



MARTINUS
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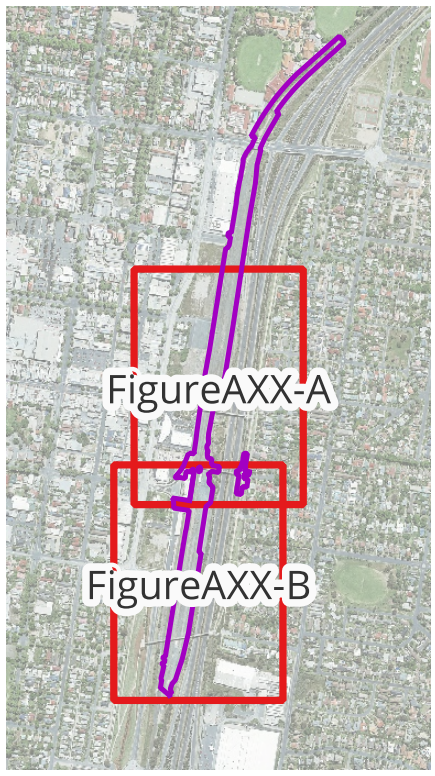
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

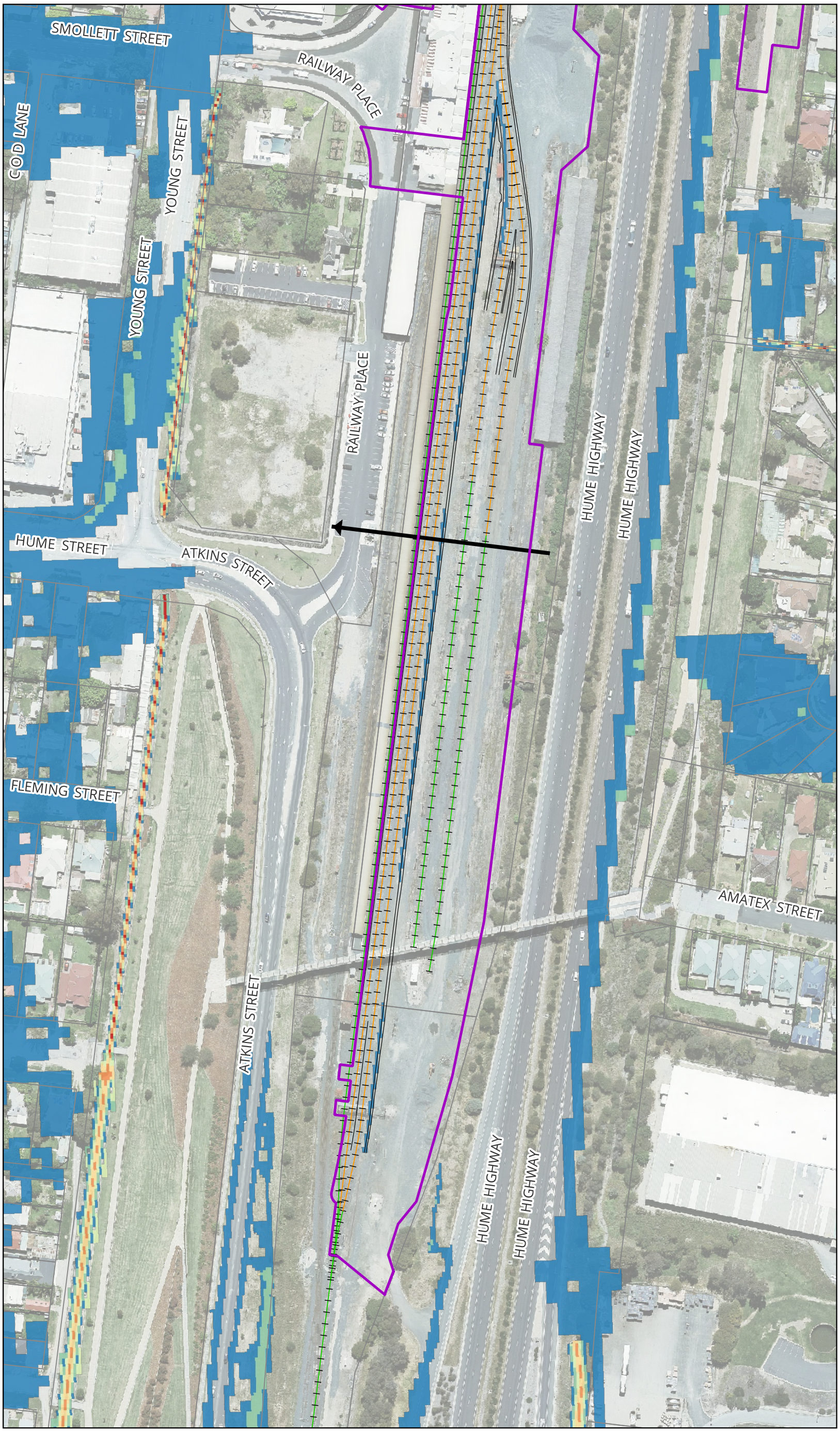
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A34-A: 2% AEP Peak Flood Hazard - Design Condition



MARTINUS
aurecon
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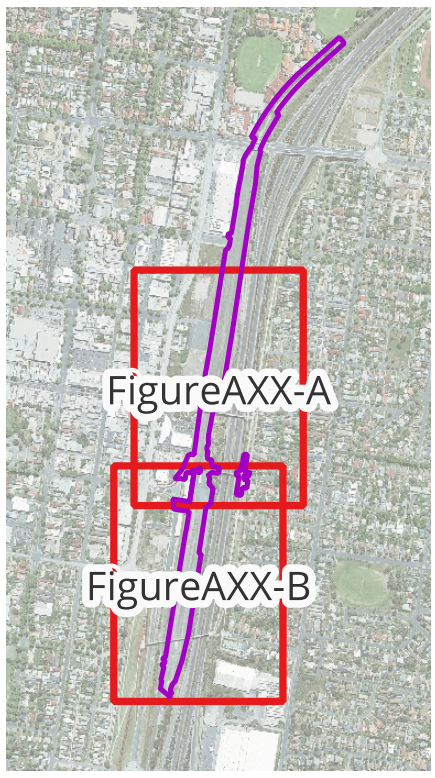
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

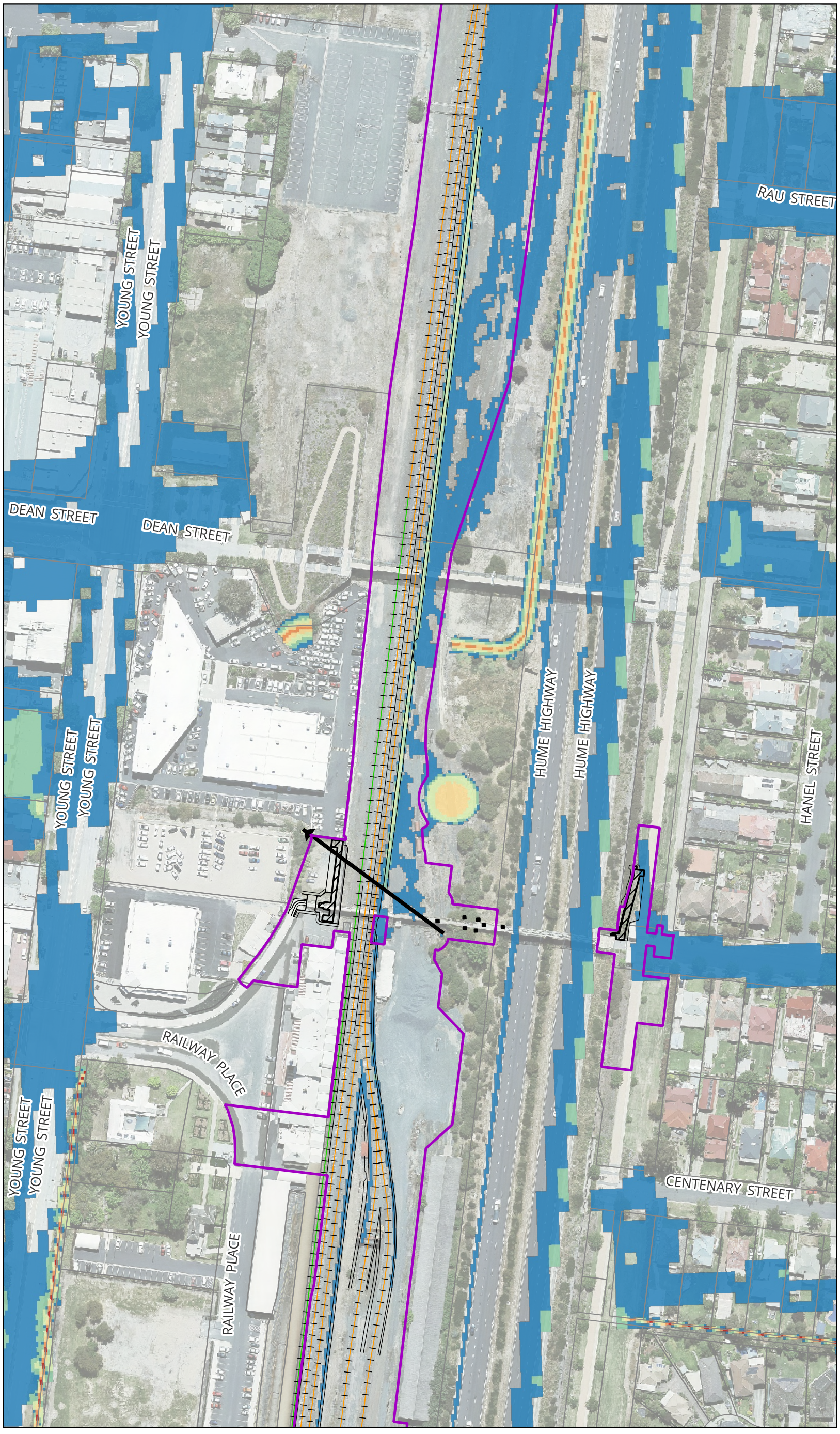
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A34-B: 2% AEP Peak Flood Hazard - Design Condition



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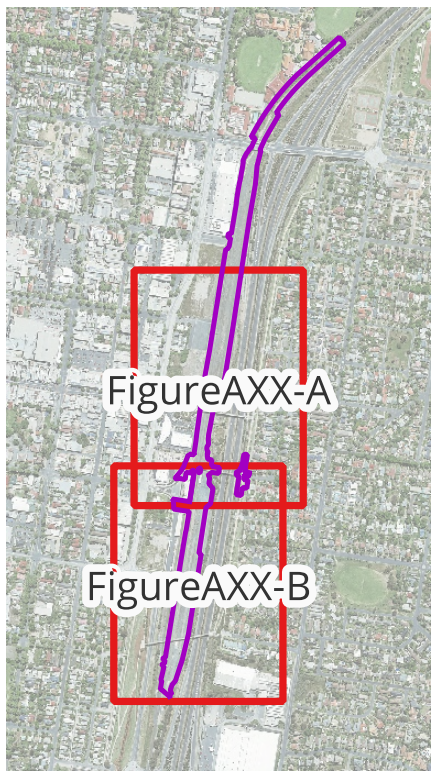
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

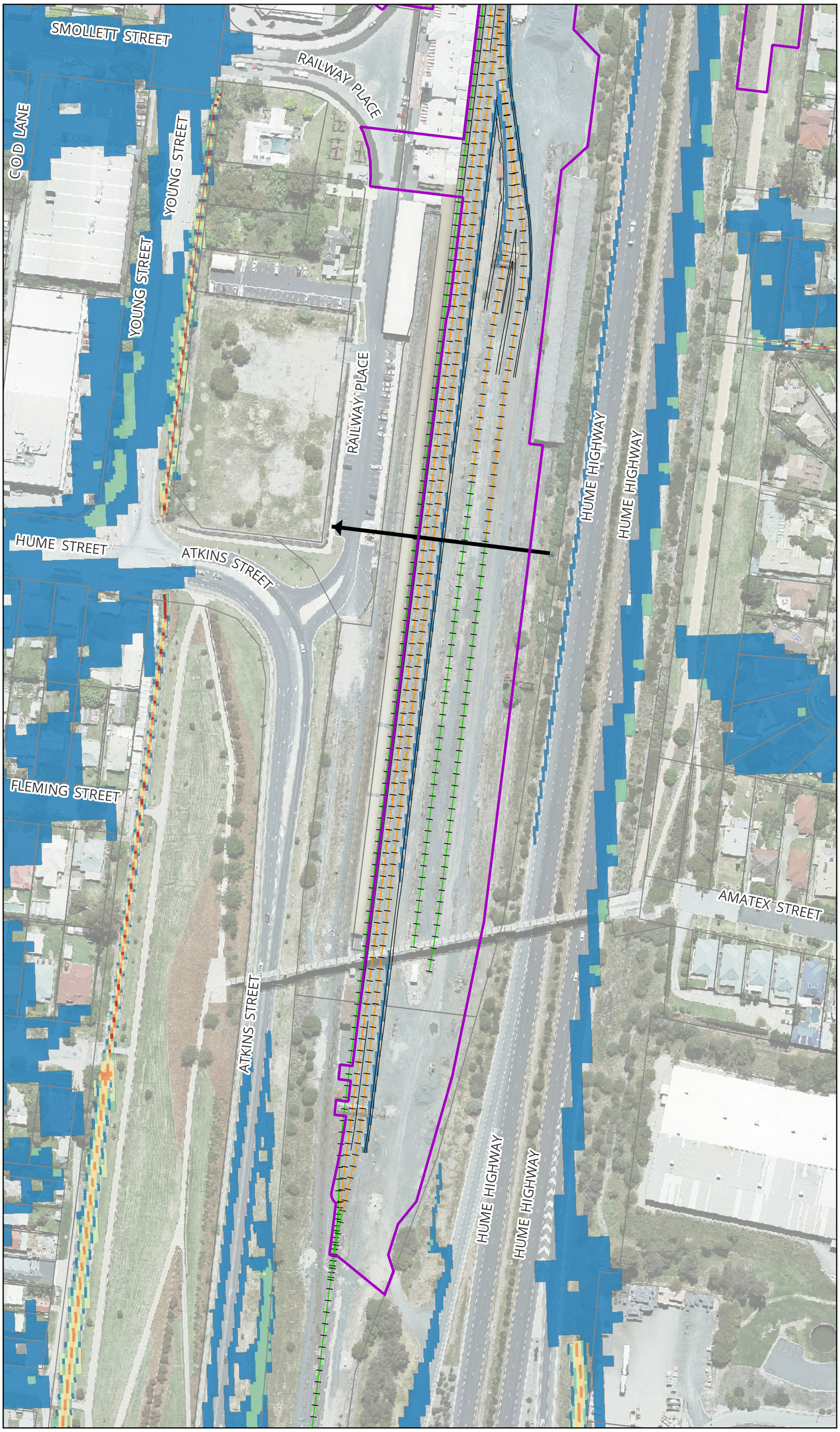
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A35-A: 1% AEP Peak Flood Hazard - Design Condition



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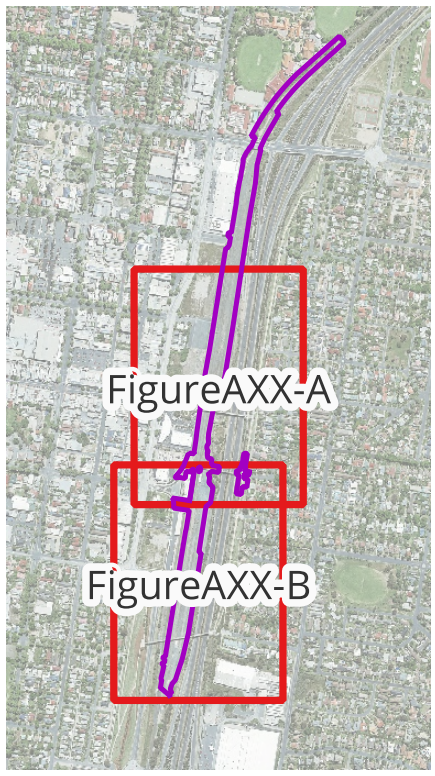
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

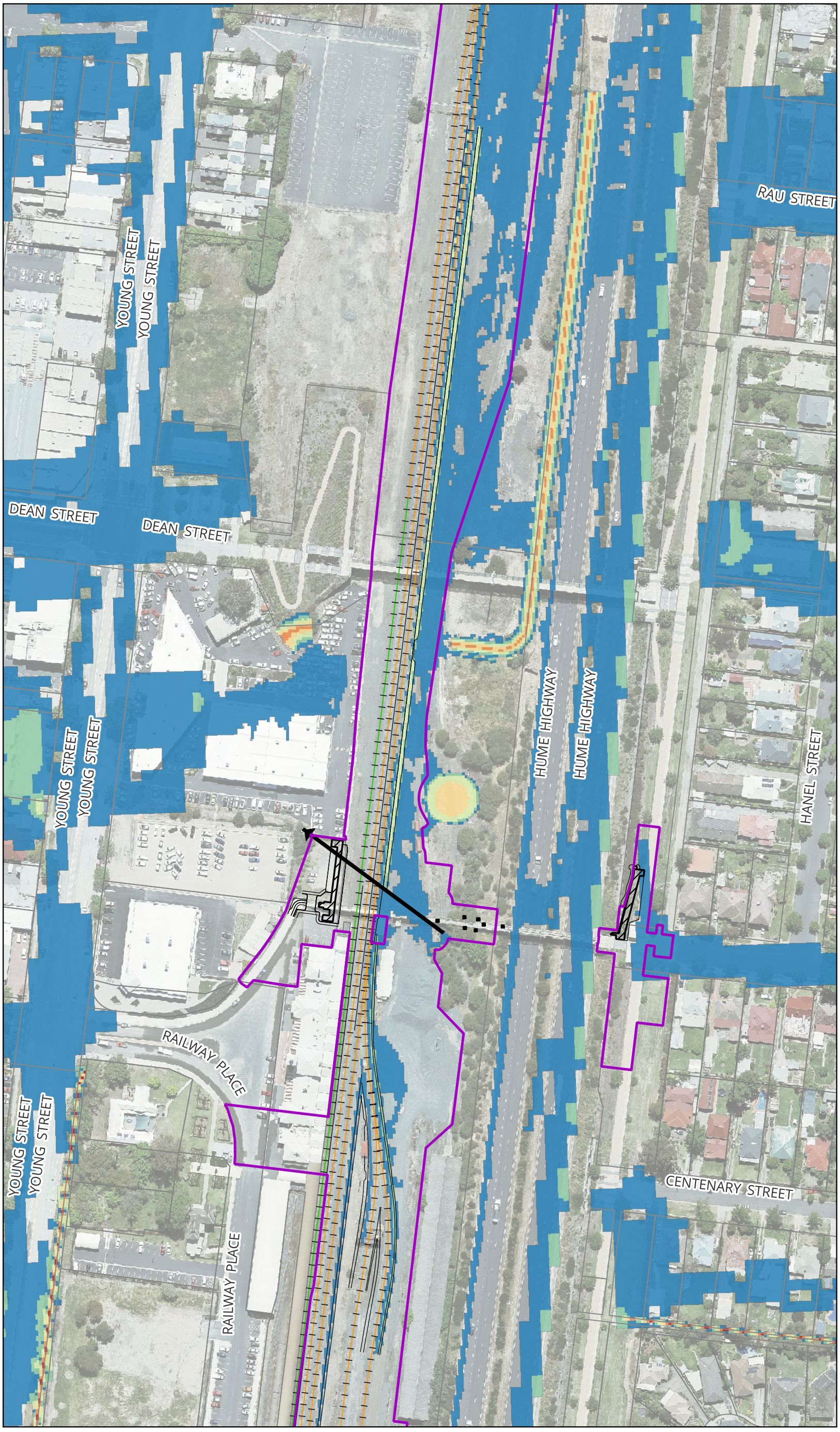
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A35-B: 1% AEP Peak Flood Hazard - Design Condition



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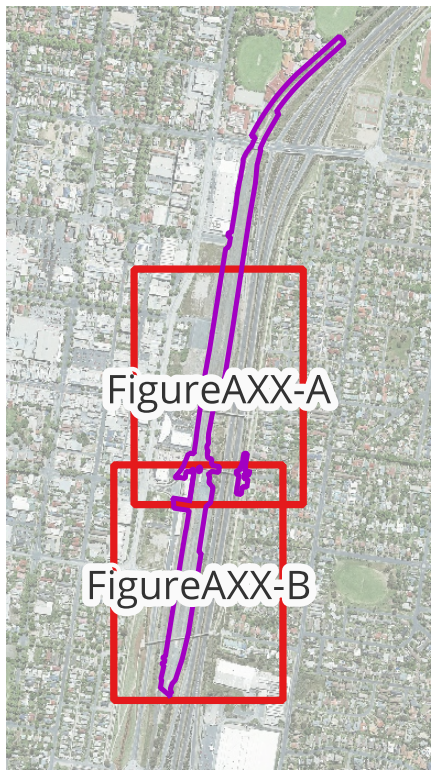
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

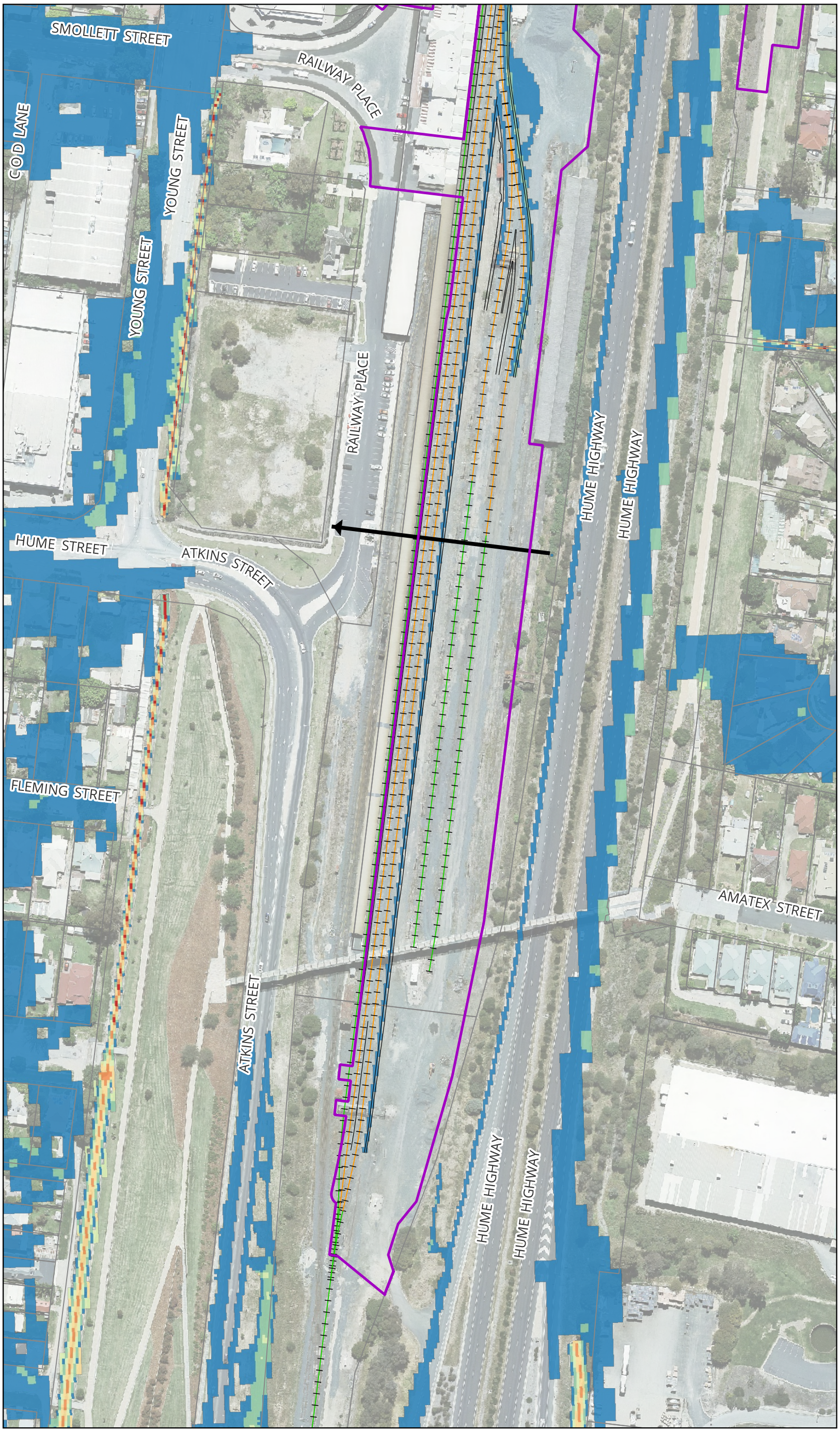
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A36-A: 1% AEP Peak Flood Hazard - Design Blockage Condition



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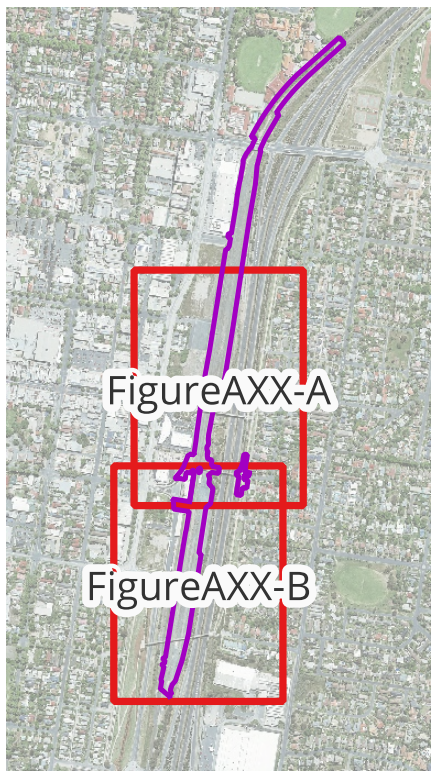
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

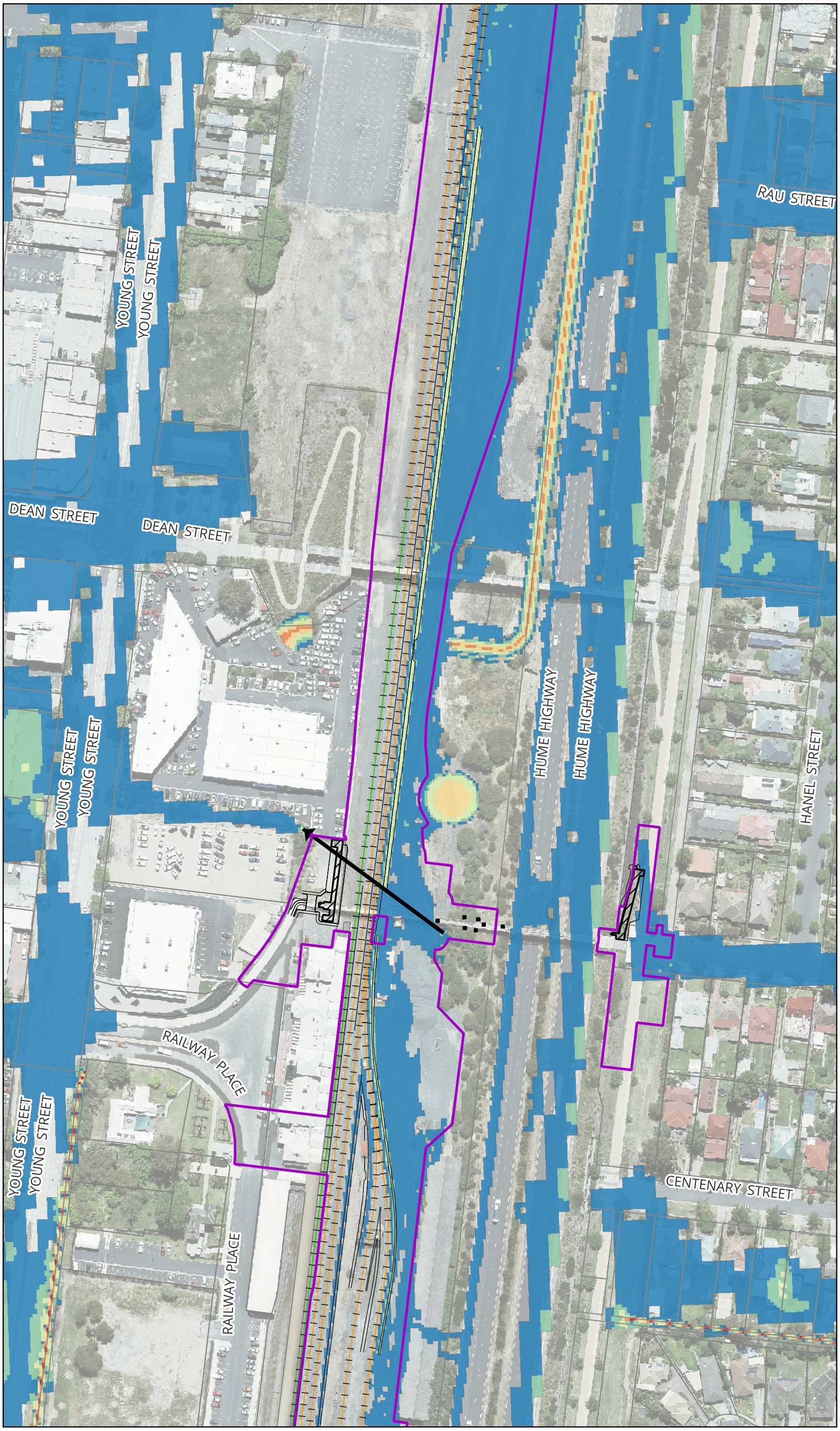
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A36-B: 1% AEP Peak Flood Hazard - Design Blockage Condition



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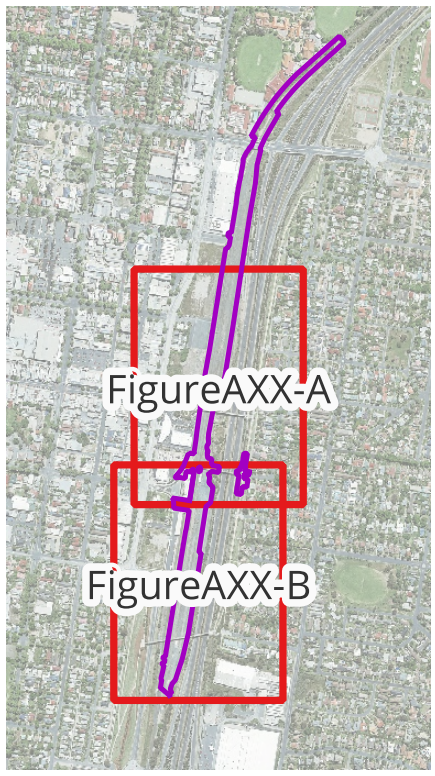
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

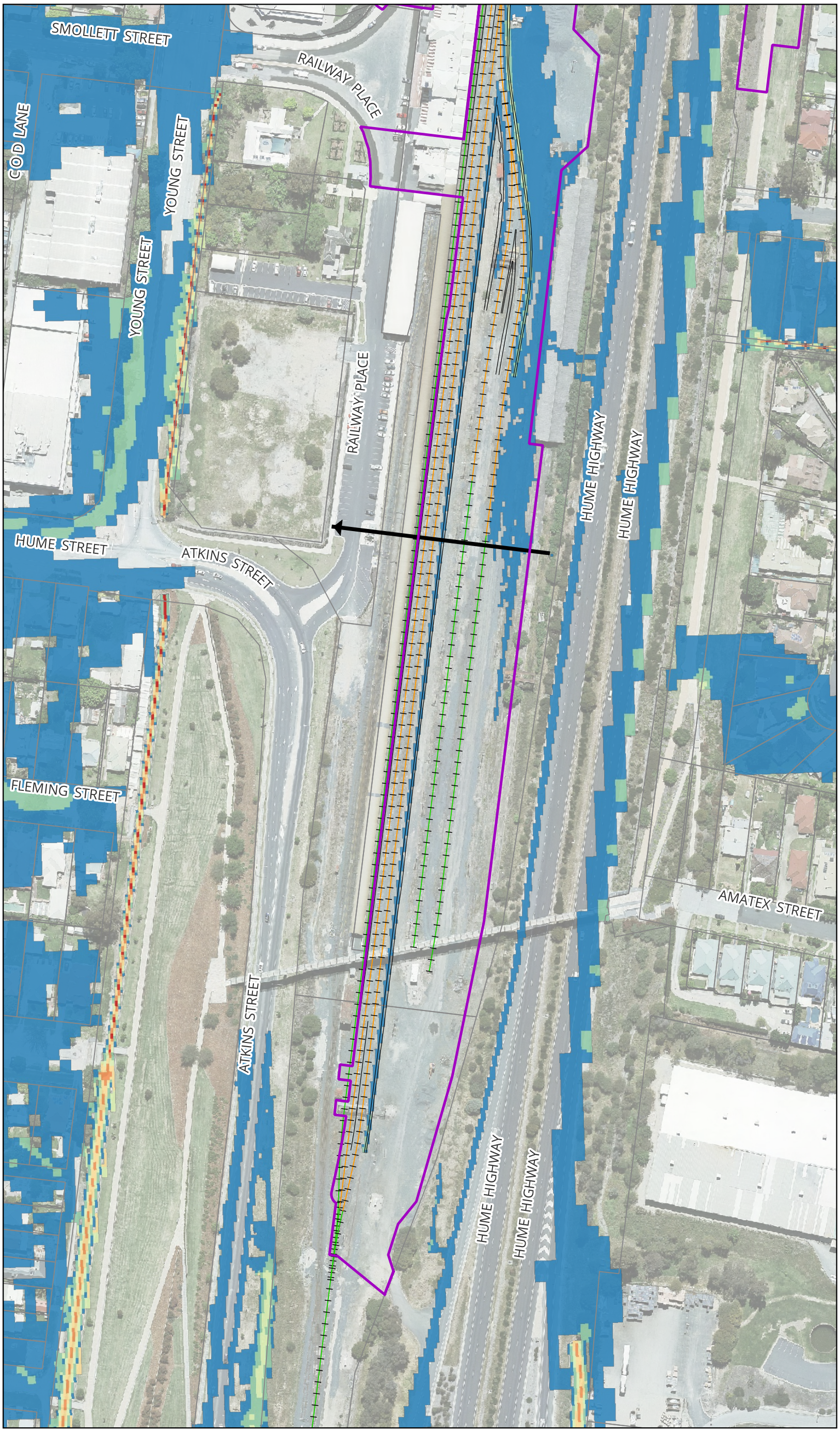
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A37-A: 1% AEP Climate Change Peak Flood Hazard - Design Condition



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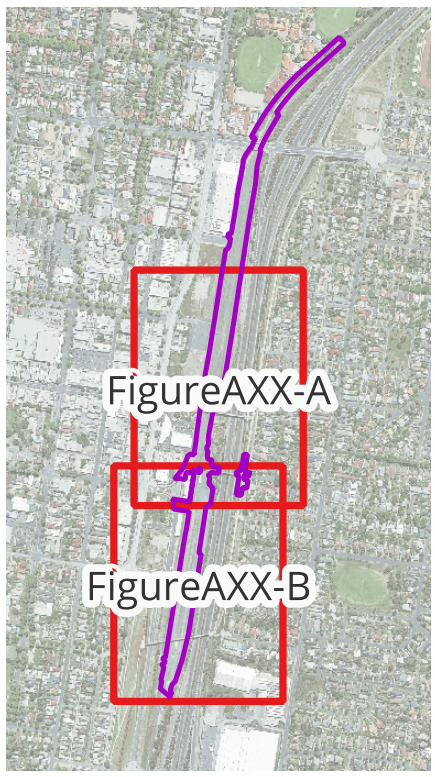
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

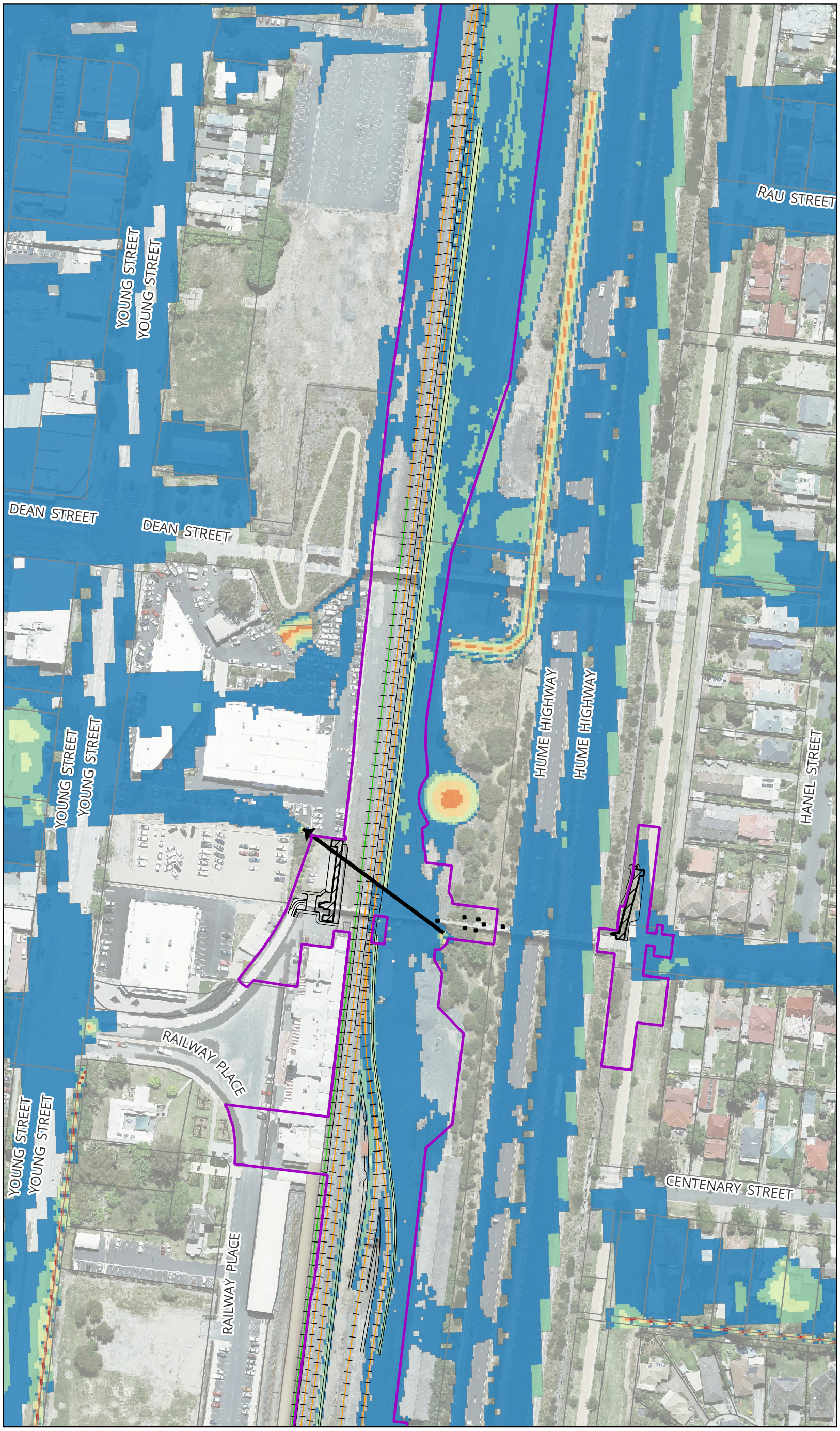
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A37-B: 1% AEP Climate Change Peak Flood Hazard - Design Condition



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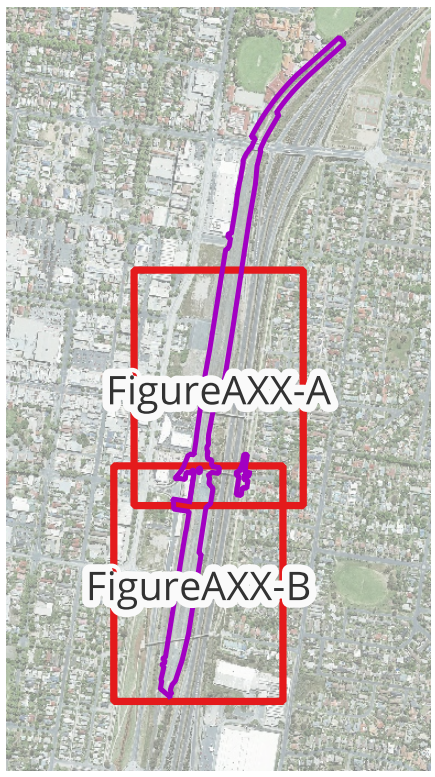
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Peak Flood Hazard

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



Notes:

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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

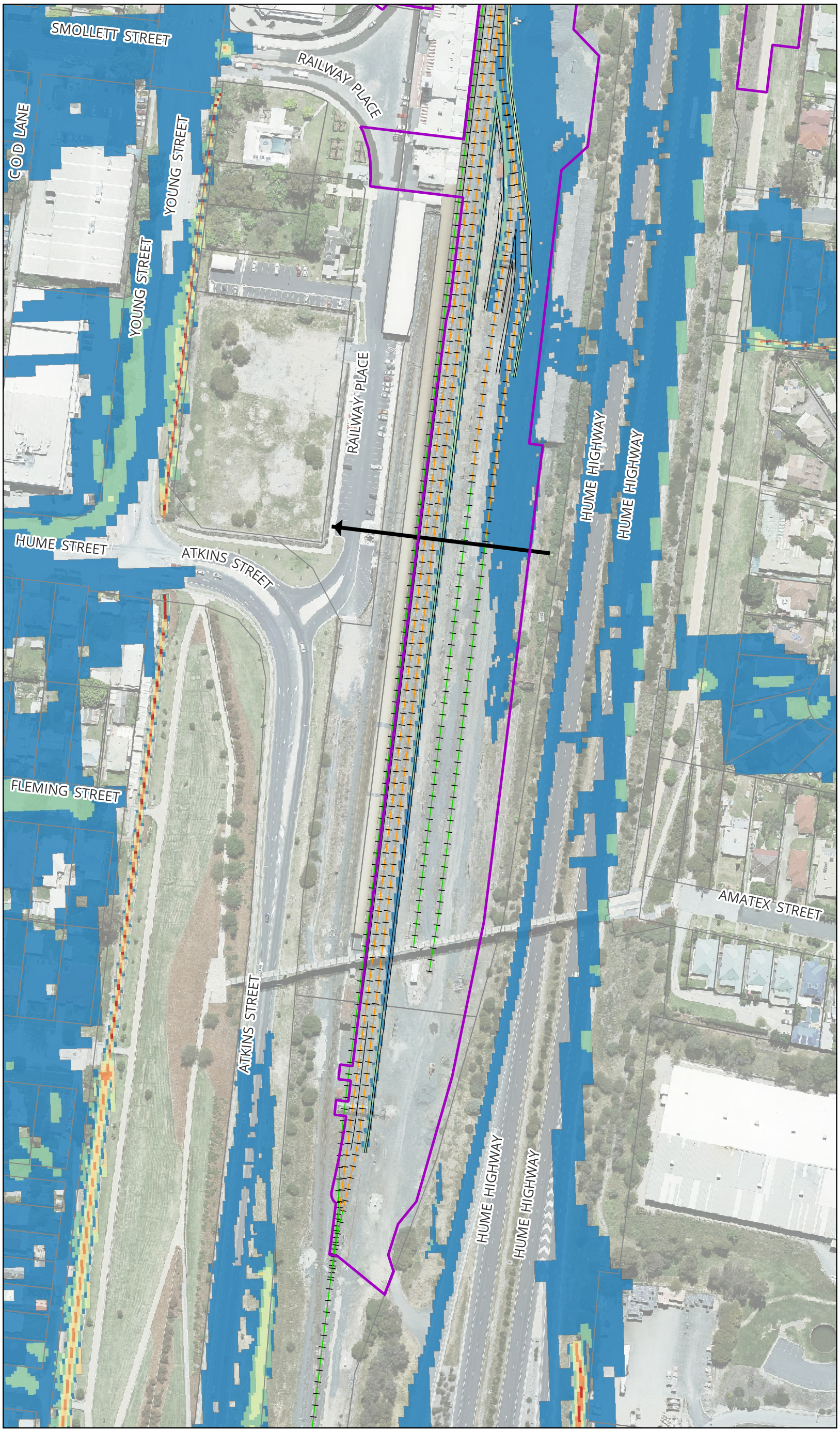
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A38-A: 0.05% AEP Climate Change Peak Flood Hazard - Design Condition



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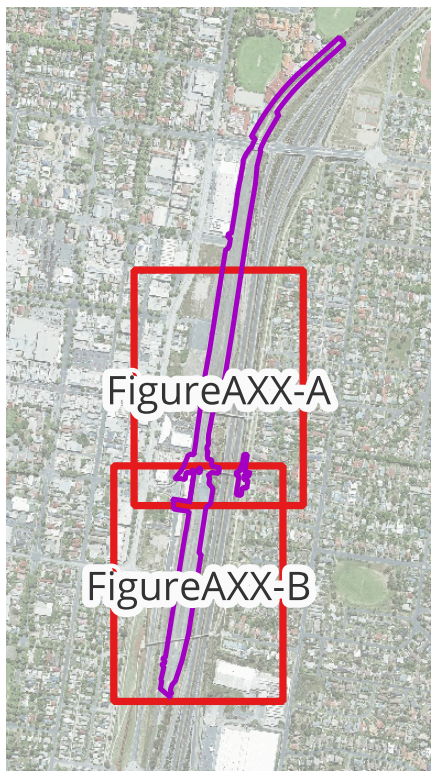
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

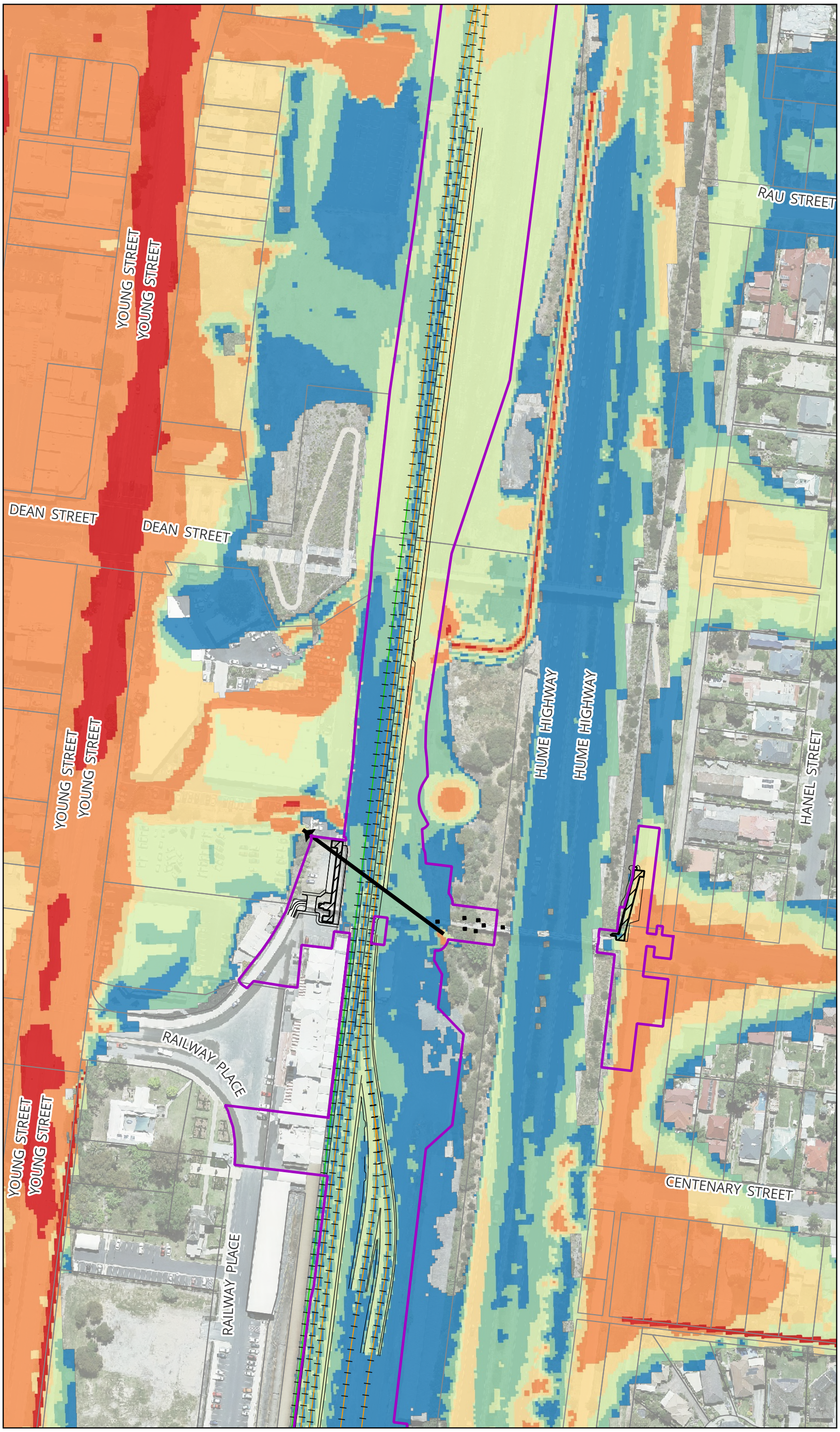
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A38-B: 0.05% AEP Climate Change Peak Flood Hazard - Design Condition



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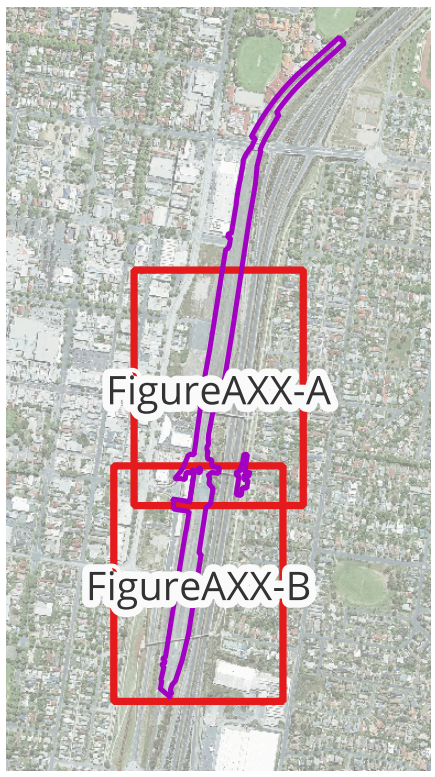
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

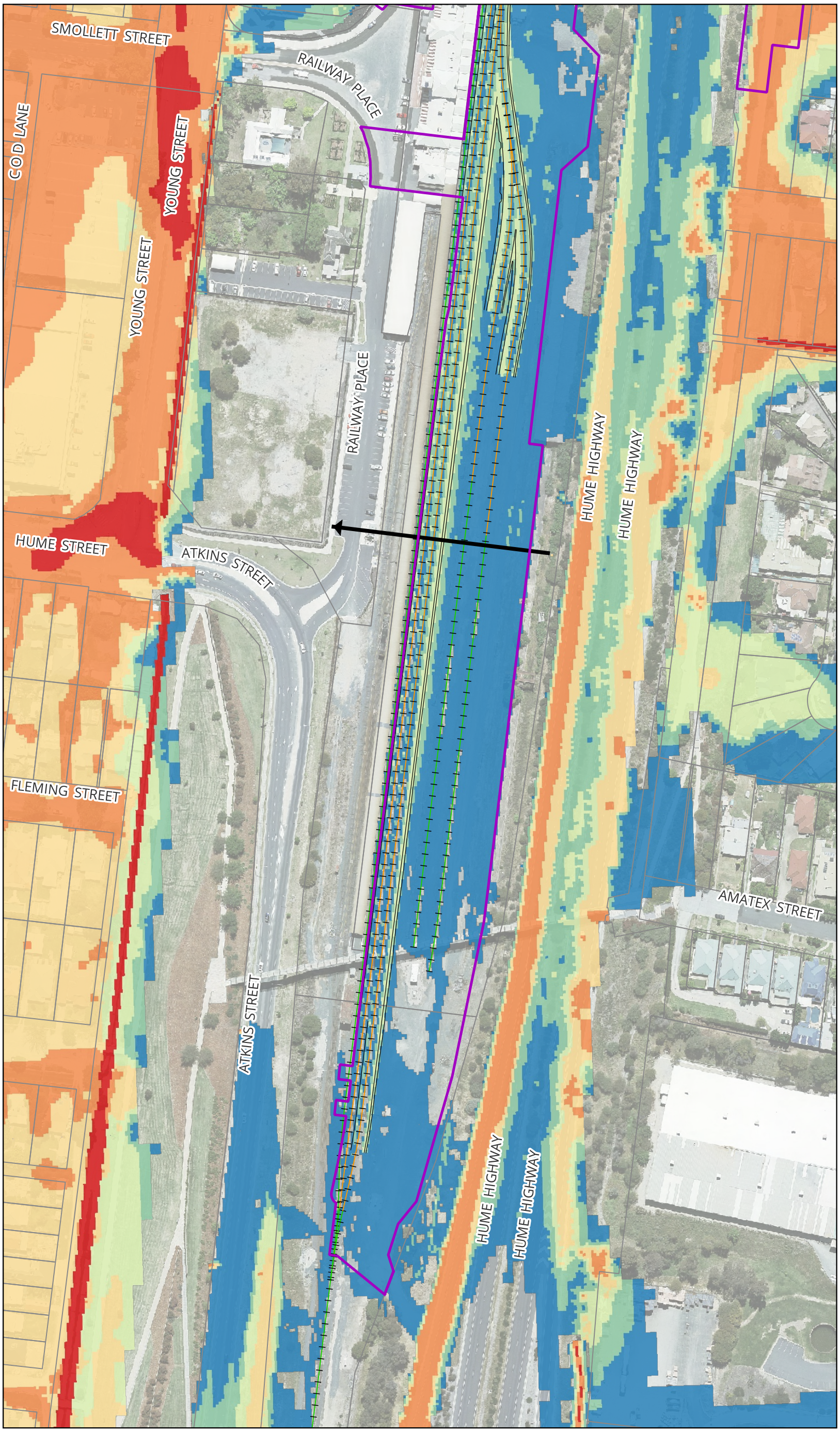
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A39-A: PMF Peak Flood Hazard - Design Condition



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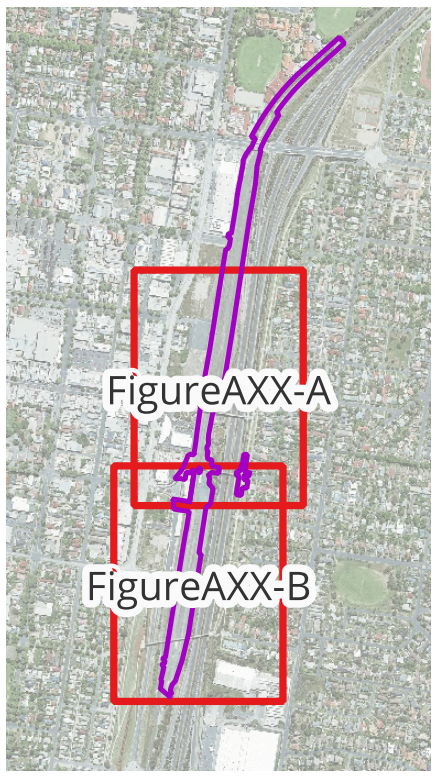
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

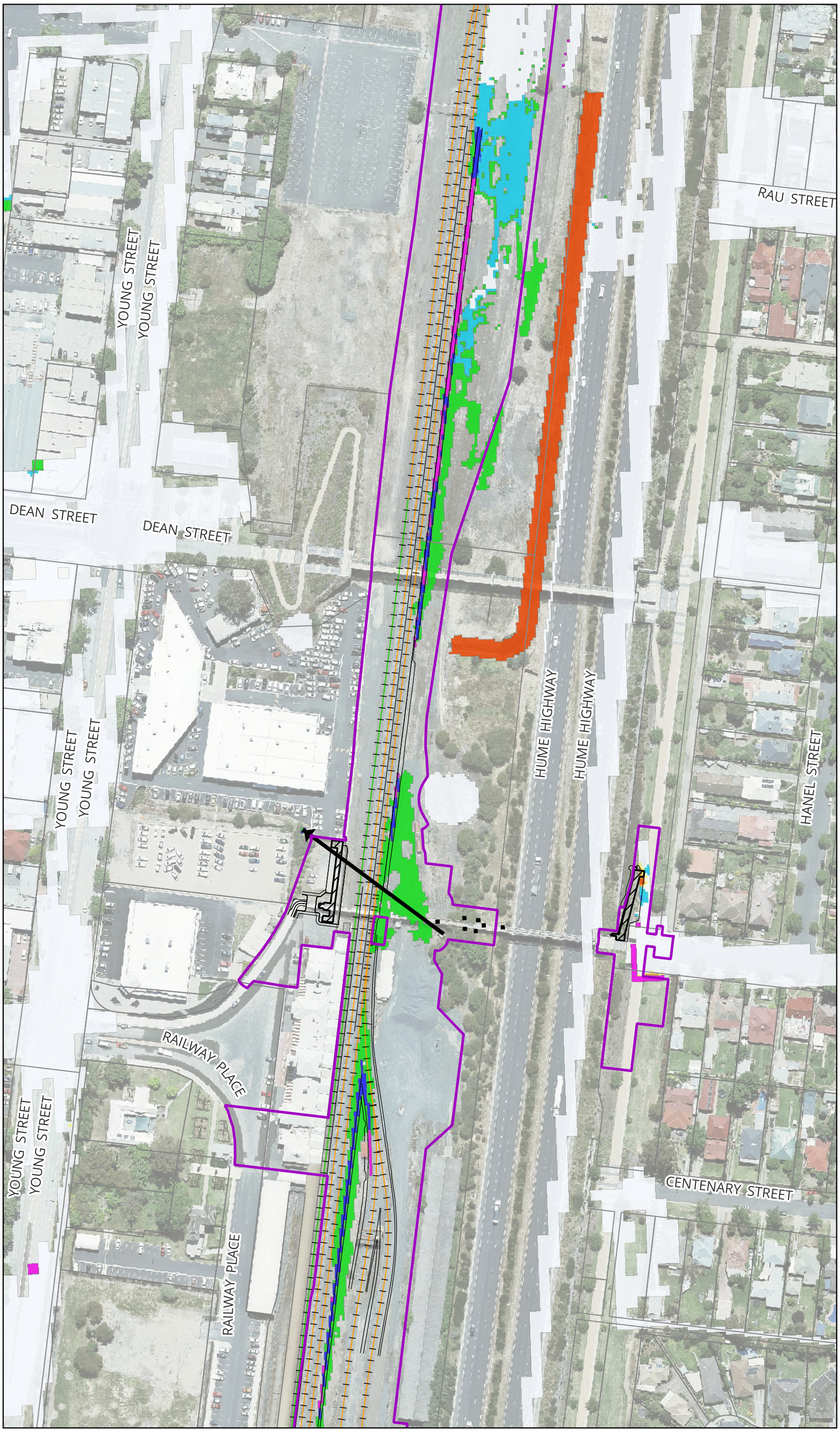
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A39-B: PMF Peak Flood Hazard - Design Condition



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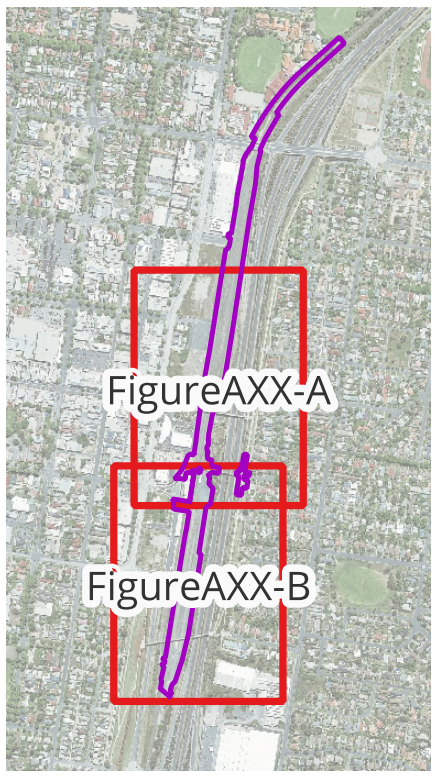
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

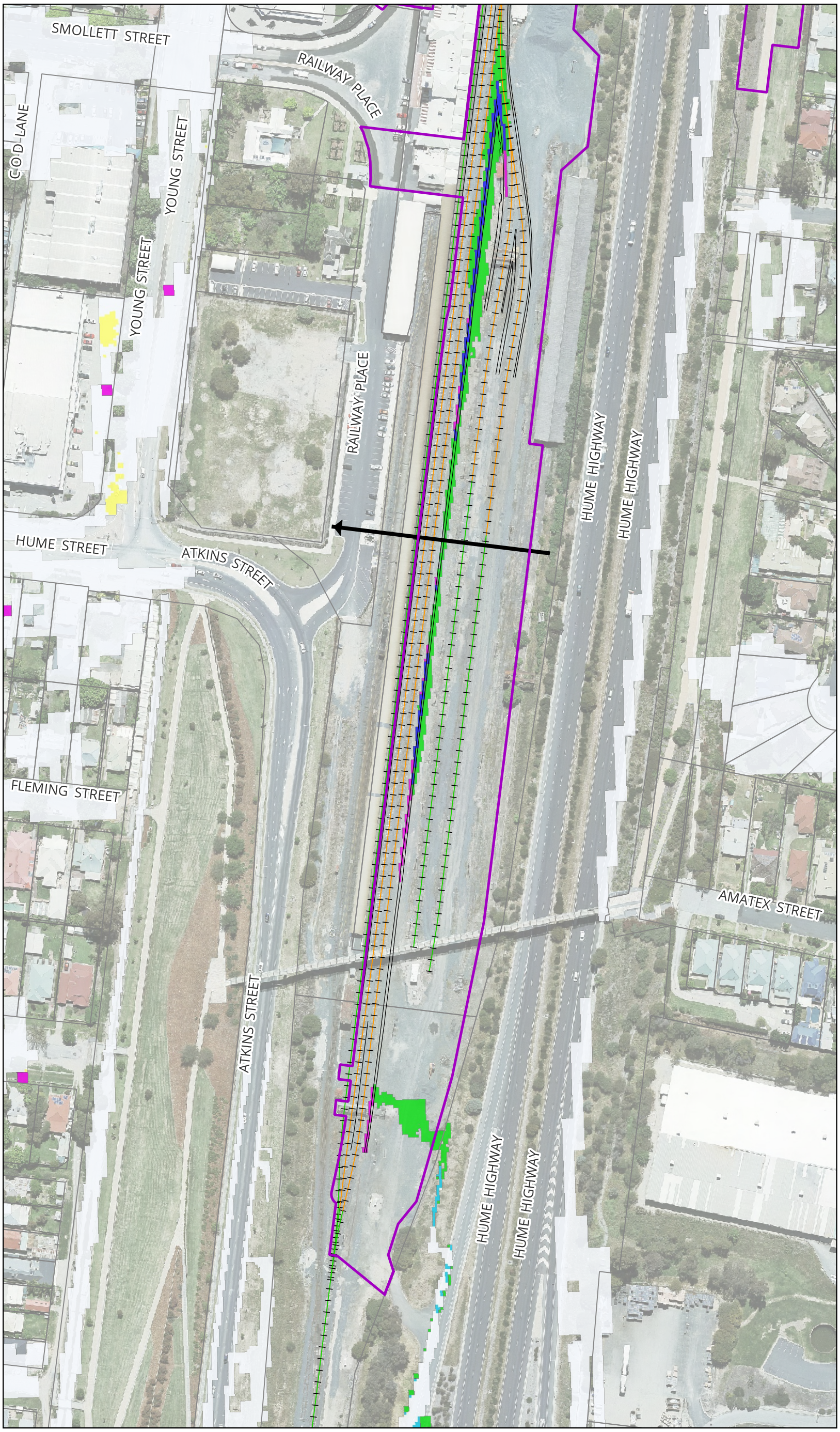
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A40-A: Changes in Peak Flood Levels for 5% AEP - Design Condition vs Existing Condition



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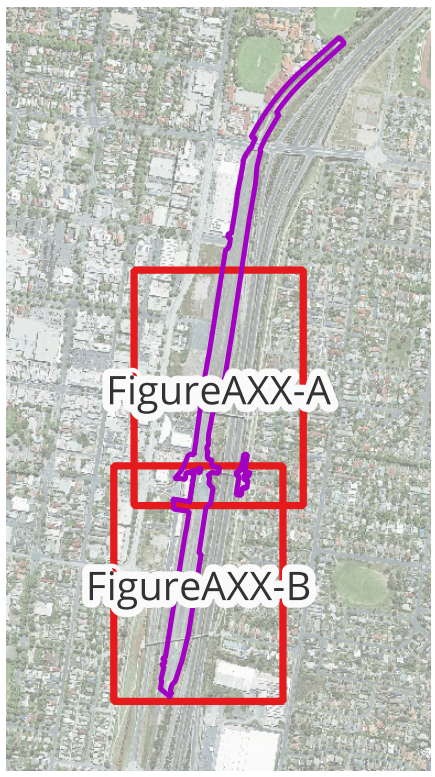
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

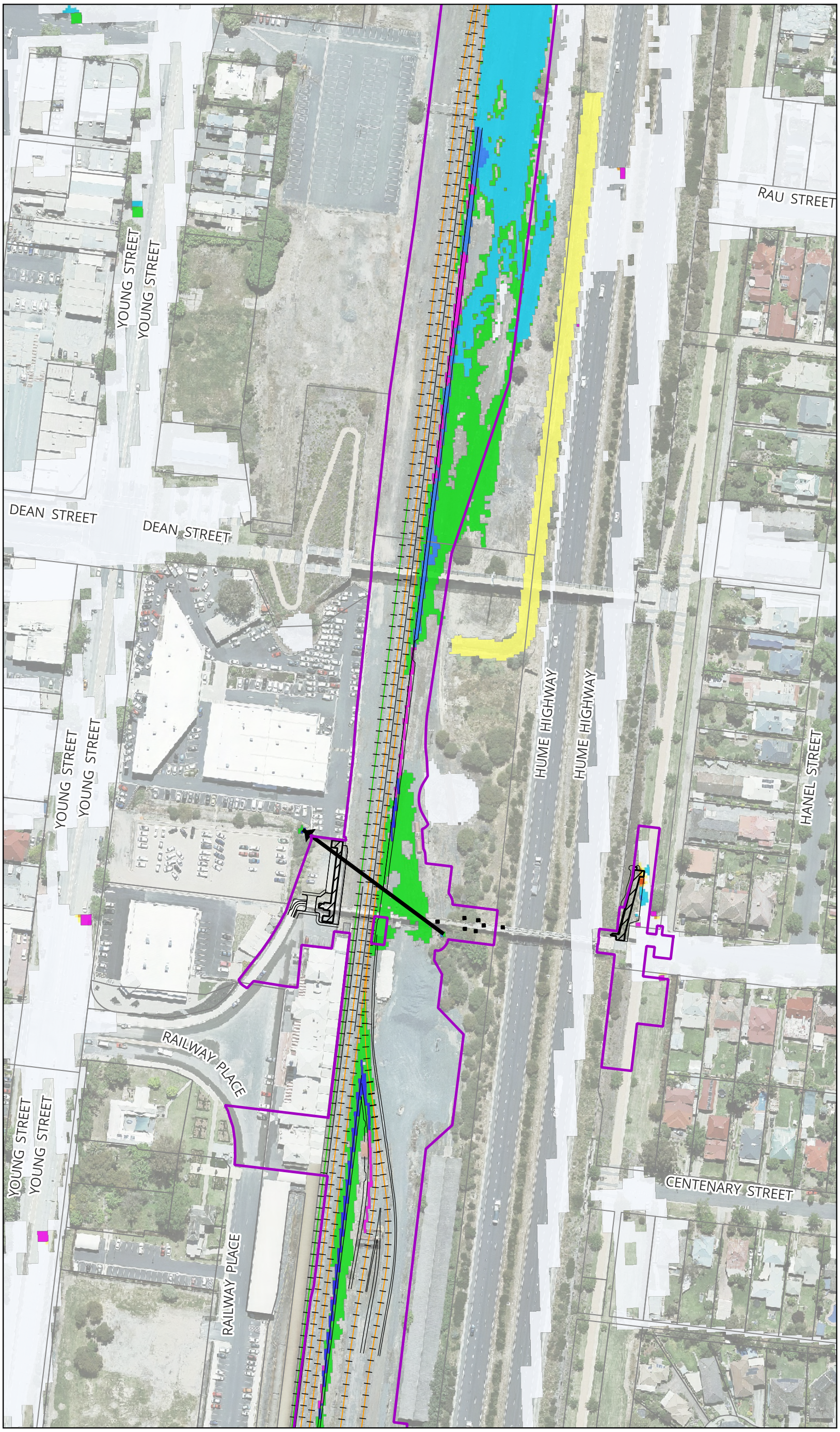
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A40-B: Changes in Peak Flood Levels for 5% AEP - Design Condition vs Existing Condition



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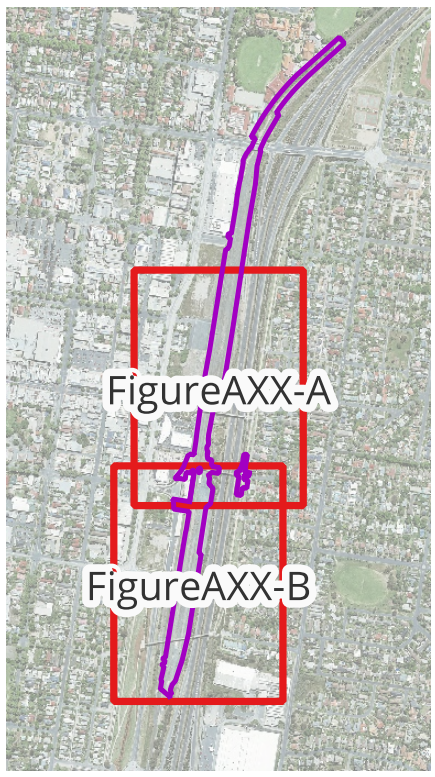
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

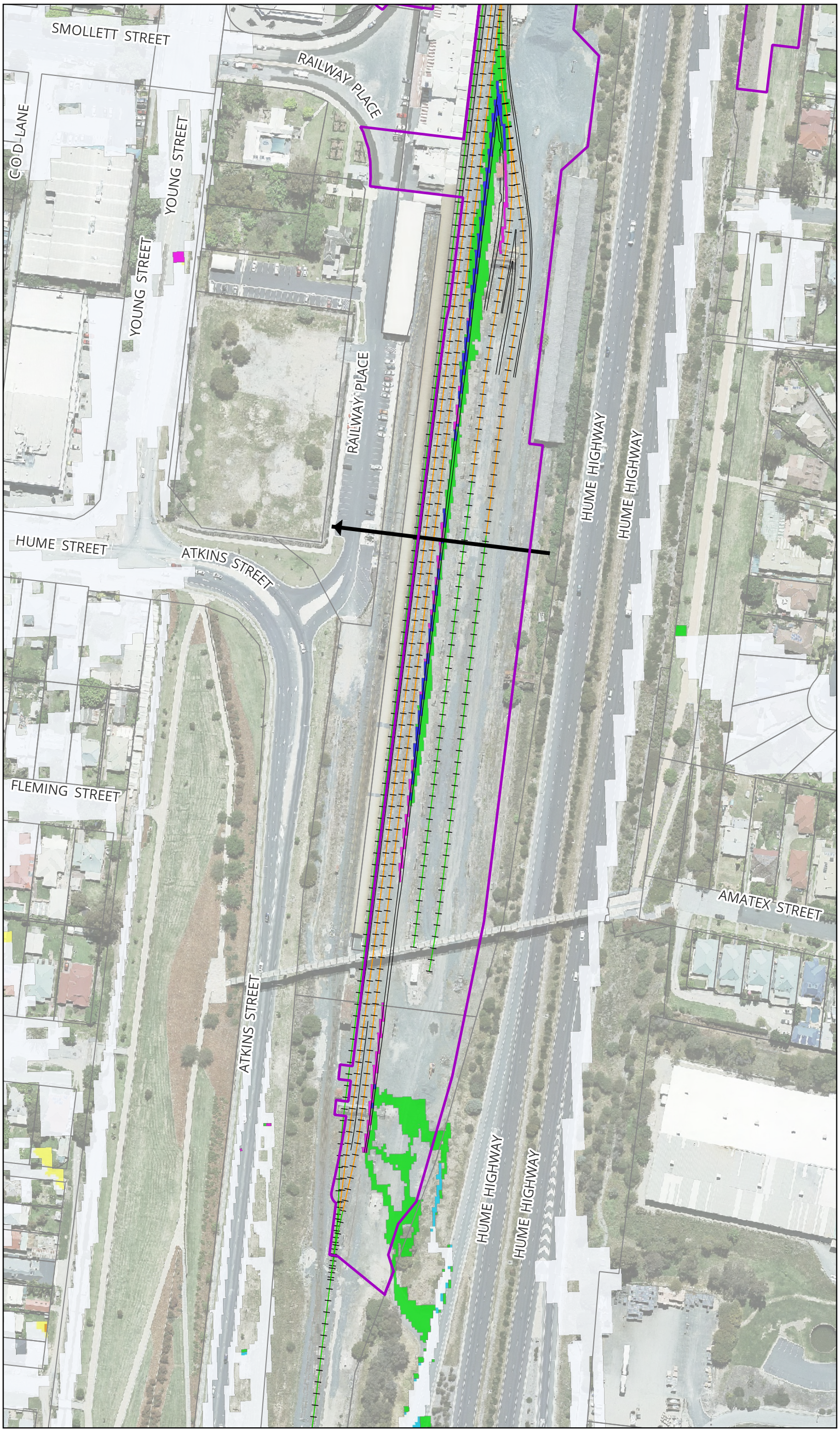
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A41-A: Changes in Peak Flood Levels for 2% AEP - Design Condition vs Existing Condition



MARTINUS
aurecon
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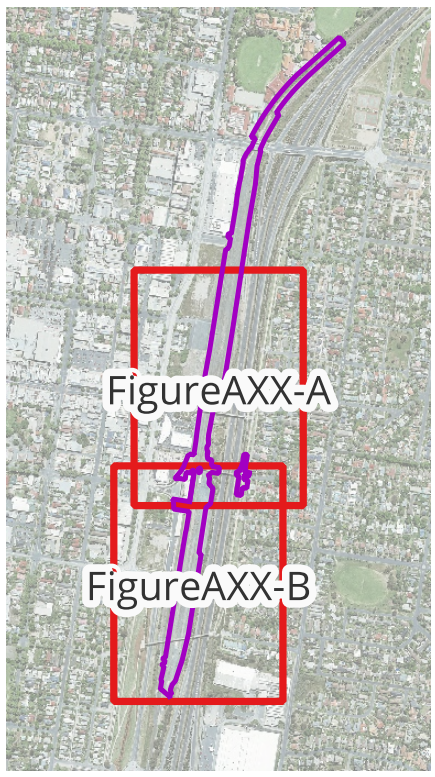
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

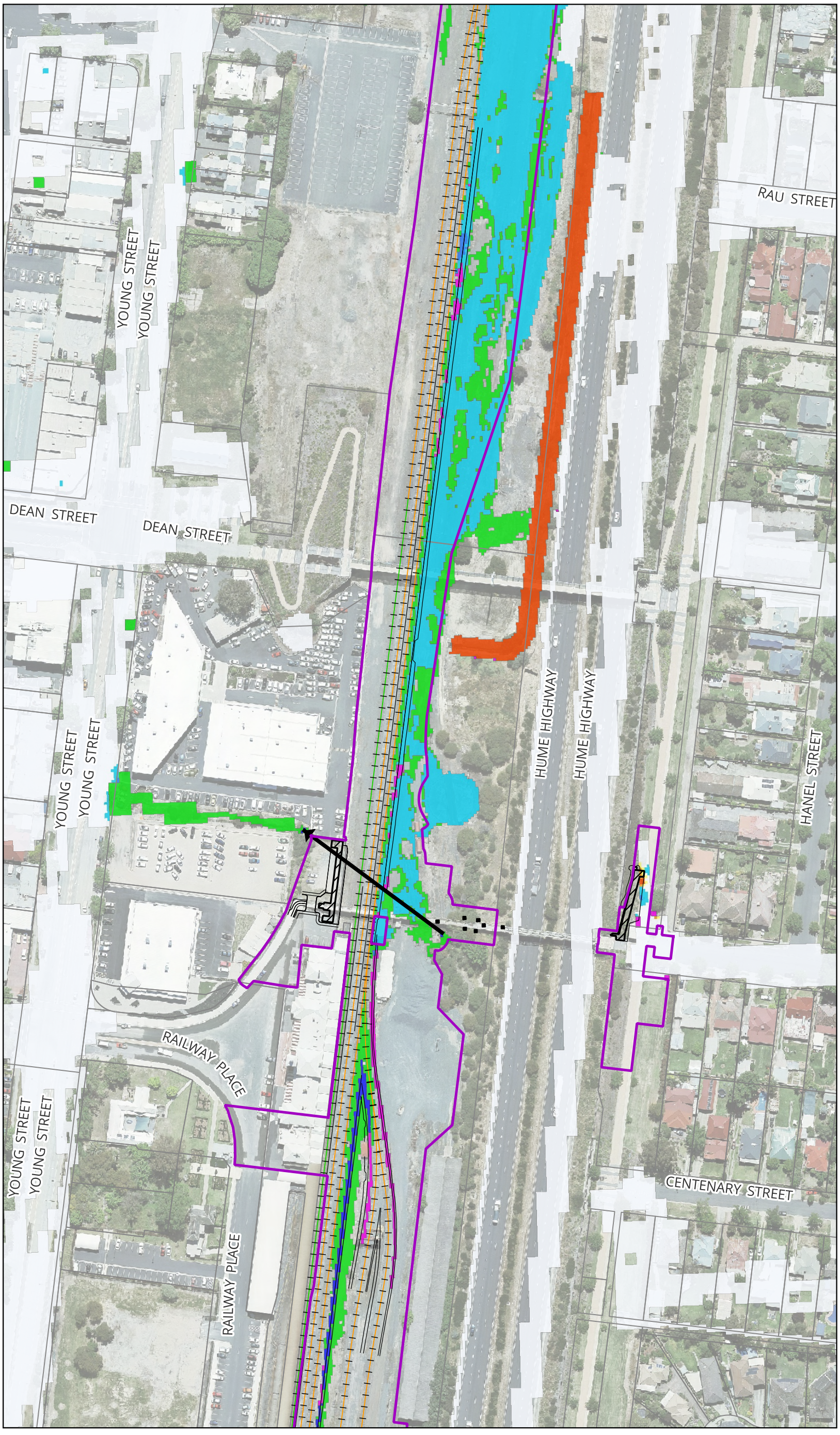
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A41-B: Changes in Peak Flood Levels for 2% AEP - Design Condition vs Existing Condition



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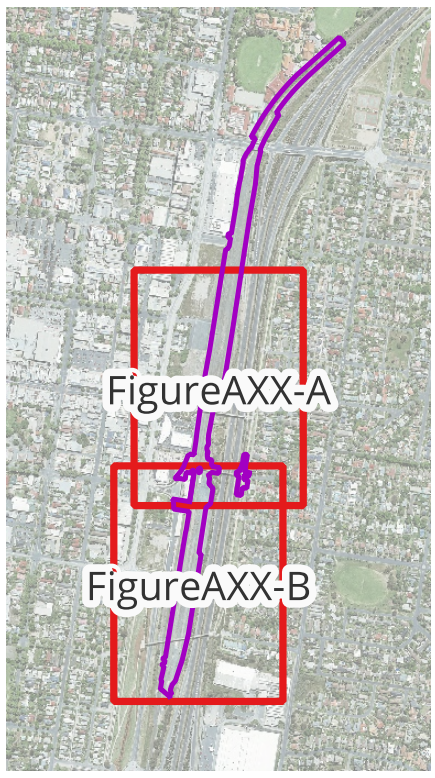
Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

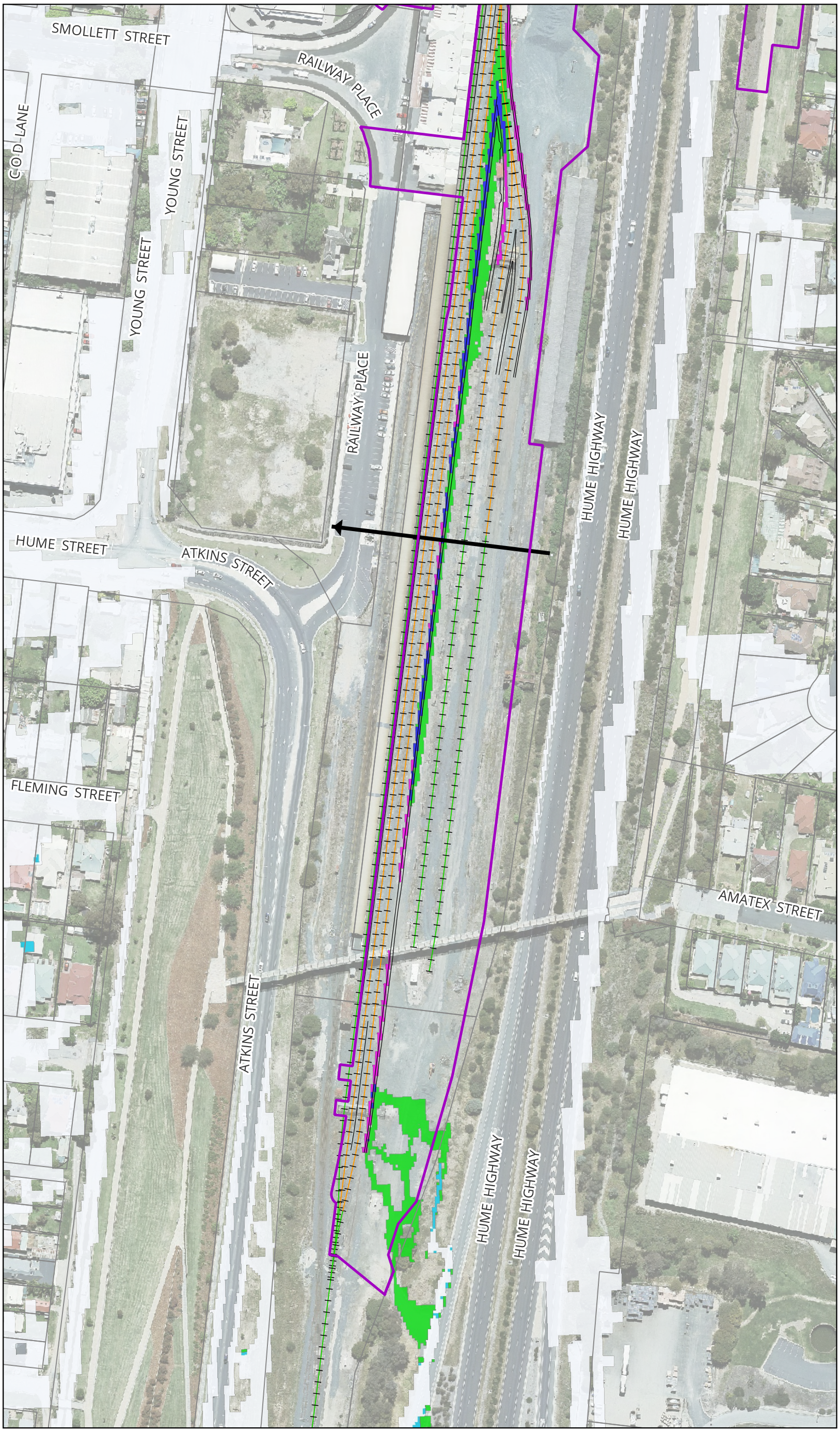
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A42-A: Changes in Peak Flood Levels for 1% AEP - Design Condition vs Existing Condition



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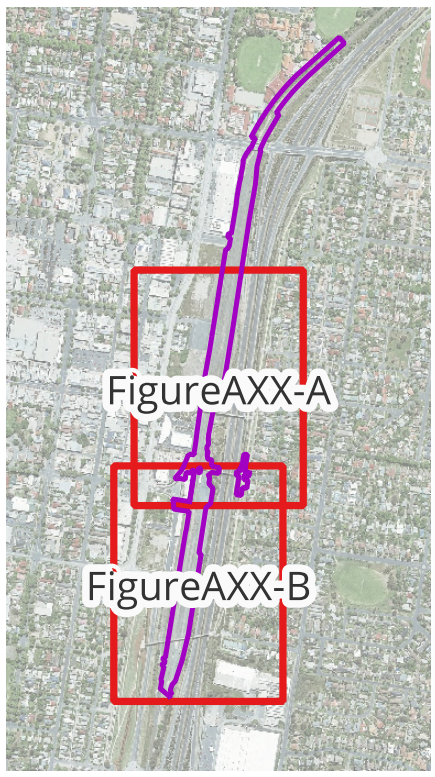
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

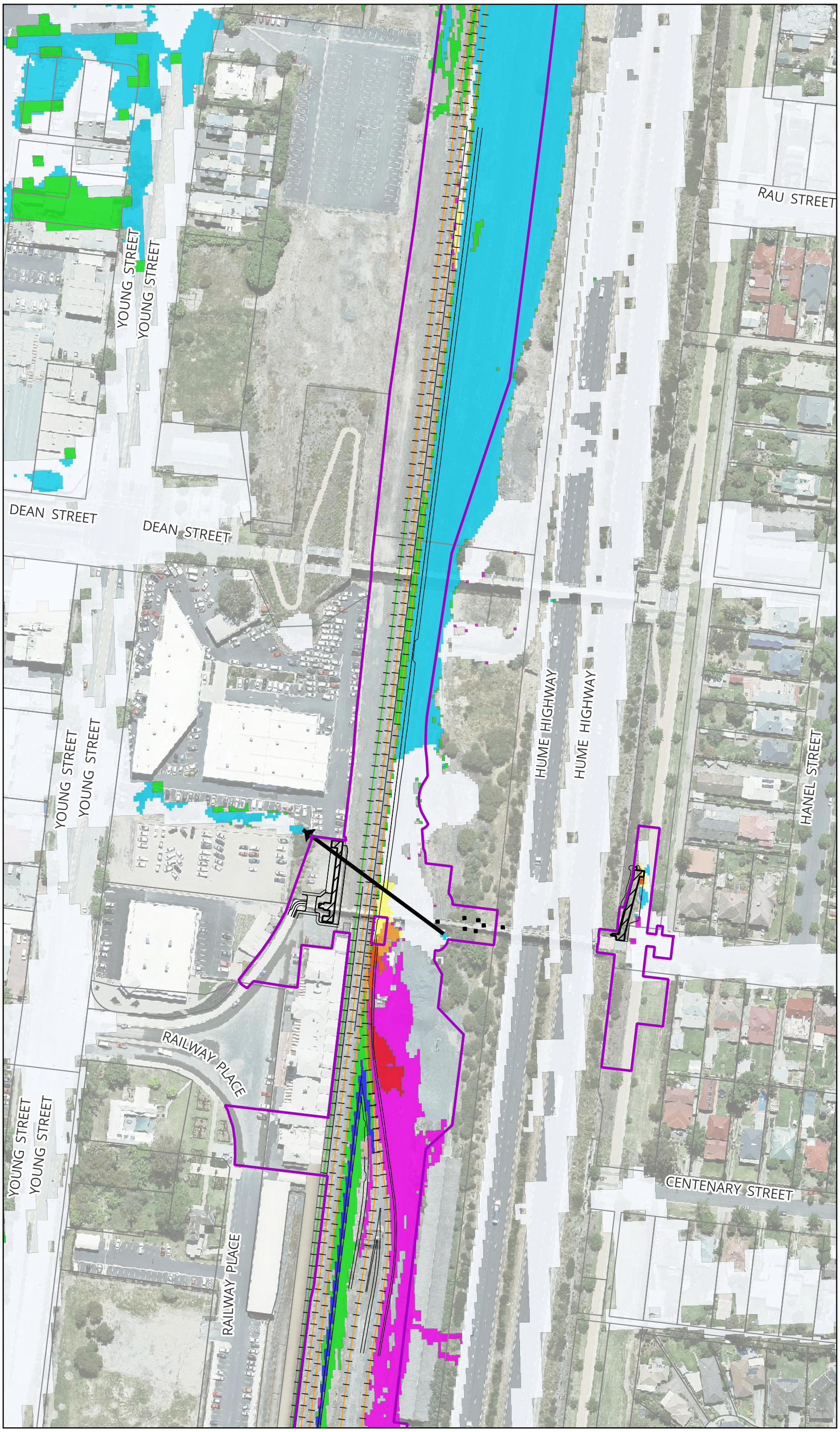
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A42-B: Changes in Peak Flood Levels for 1% AEP - Design Condition vs Existing Condition



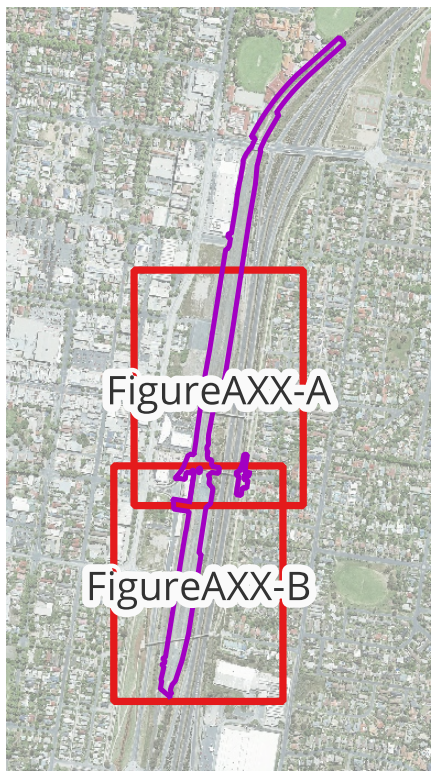
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- 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

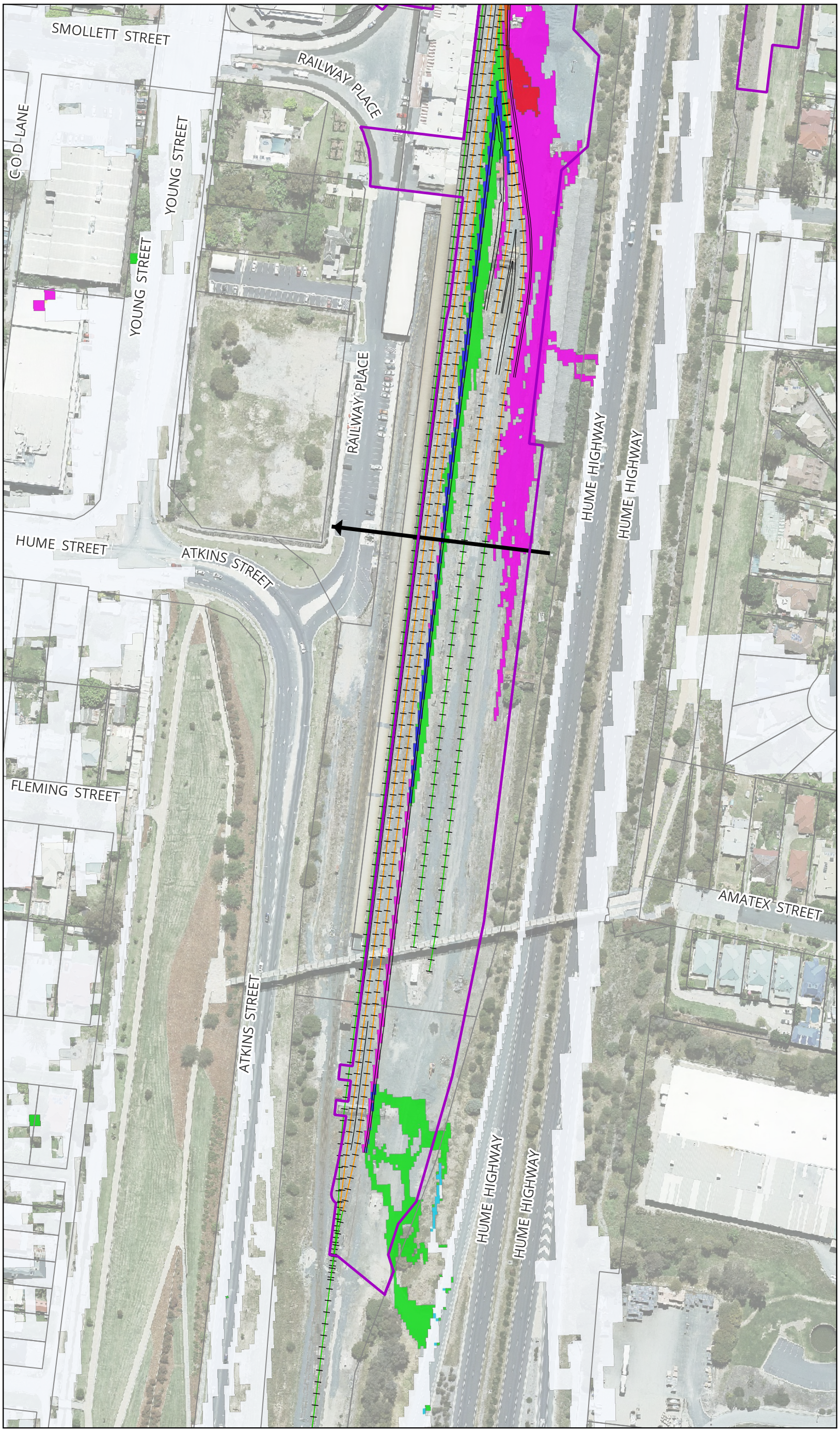
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A43-A: Changes in Peak Flood Levels for 1% AEP Climate Change - Design Condition vs Existing Condition



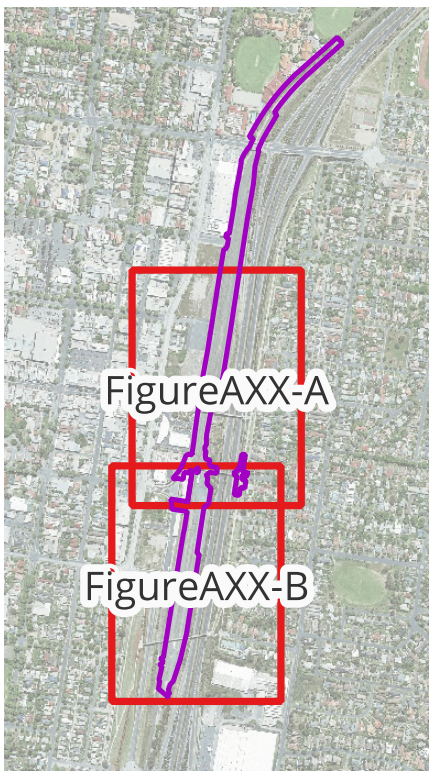
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- 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

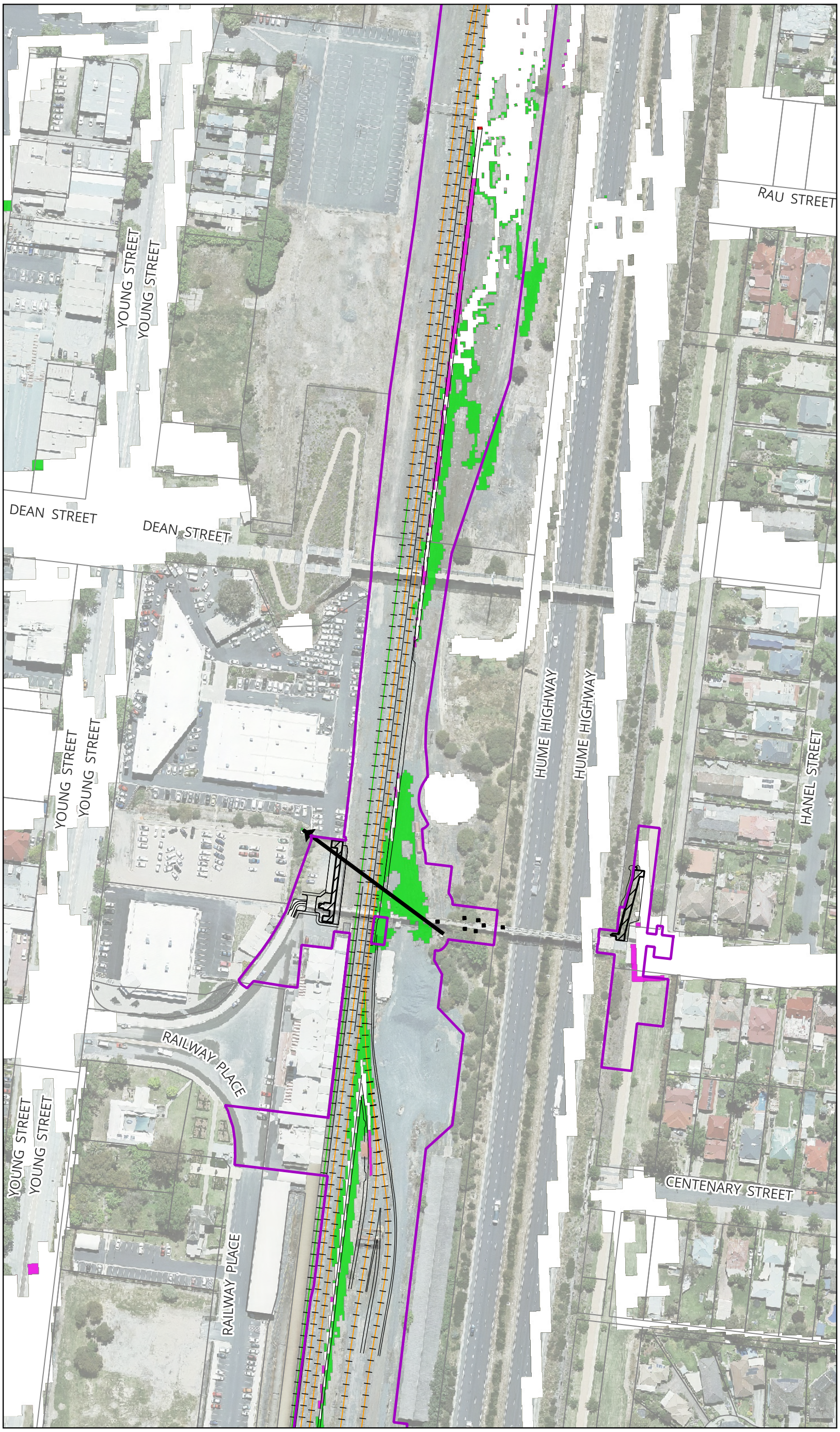
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A43-B: Changes in Peak Flood Levels for 1% AEP Climate Change - Design Condition vs Existing Condition



MARTINUS
aurecon
BG&E

Legend

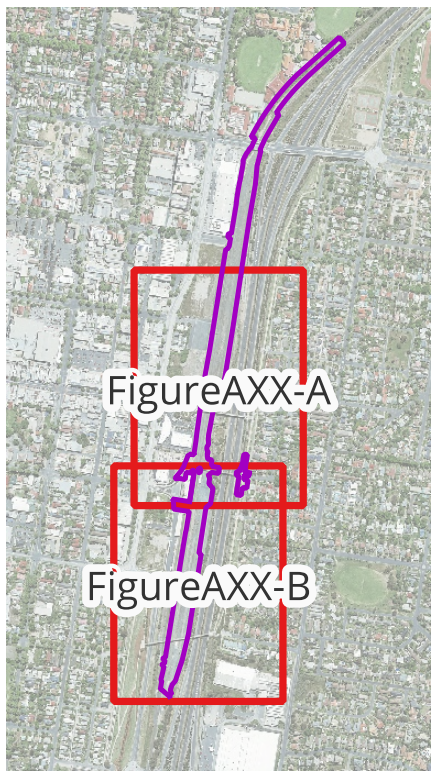
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

- <= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

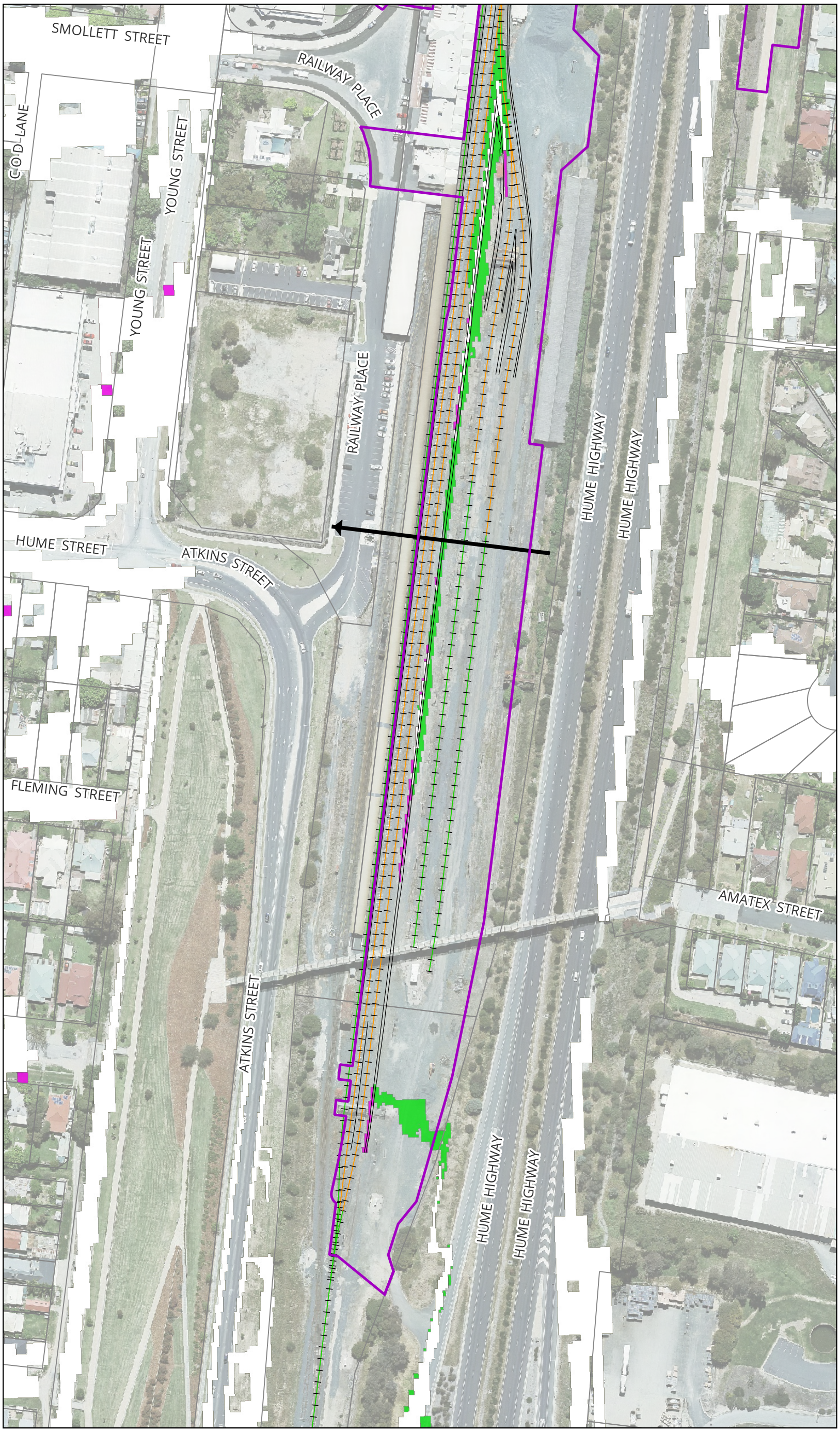
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



MARTINUS

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BG&E

Legend

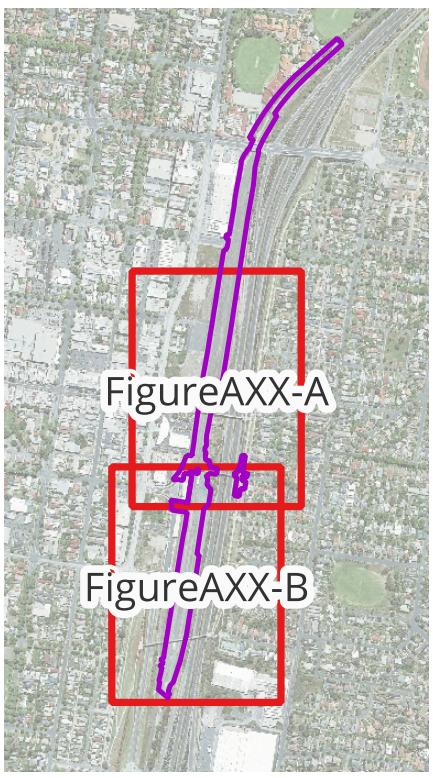
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

<= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

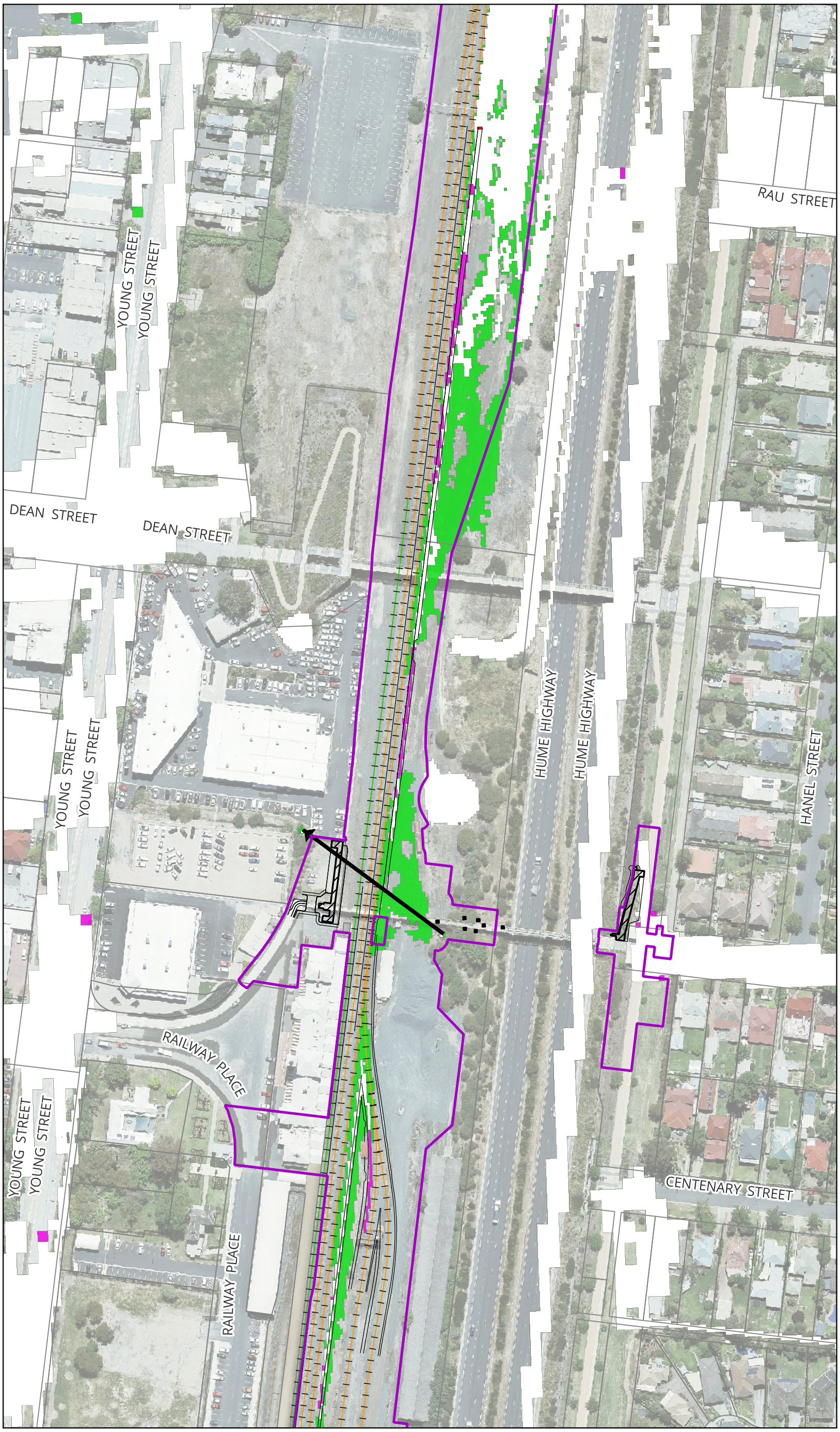
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



MARTINUS
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Legend

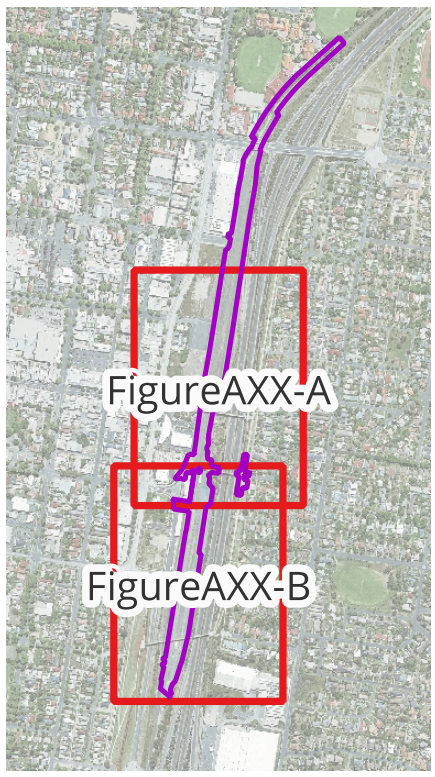
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

- <= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

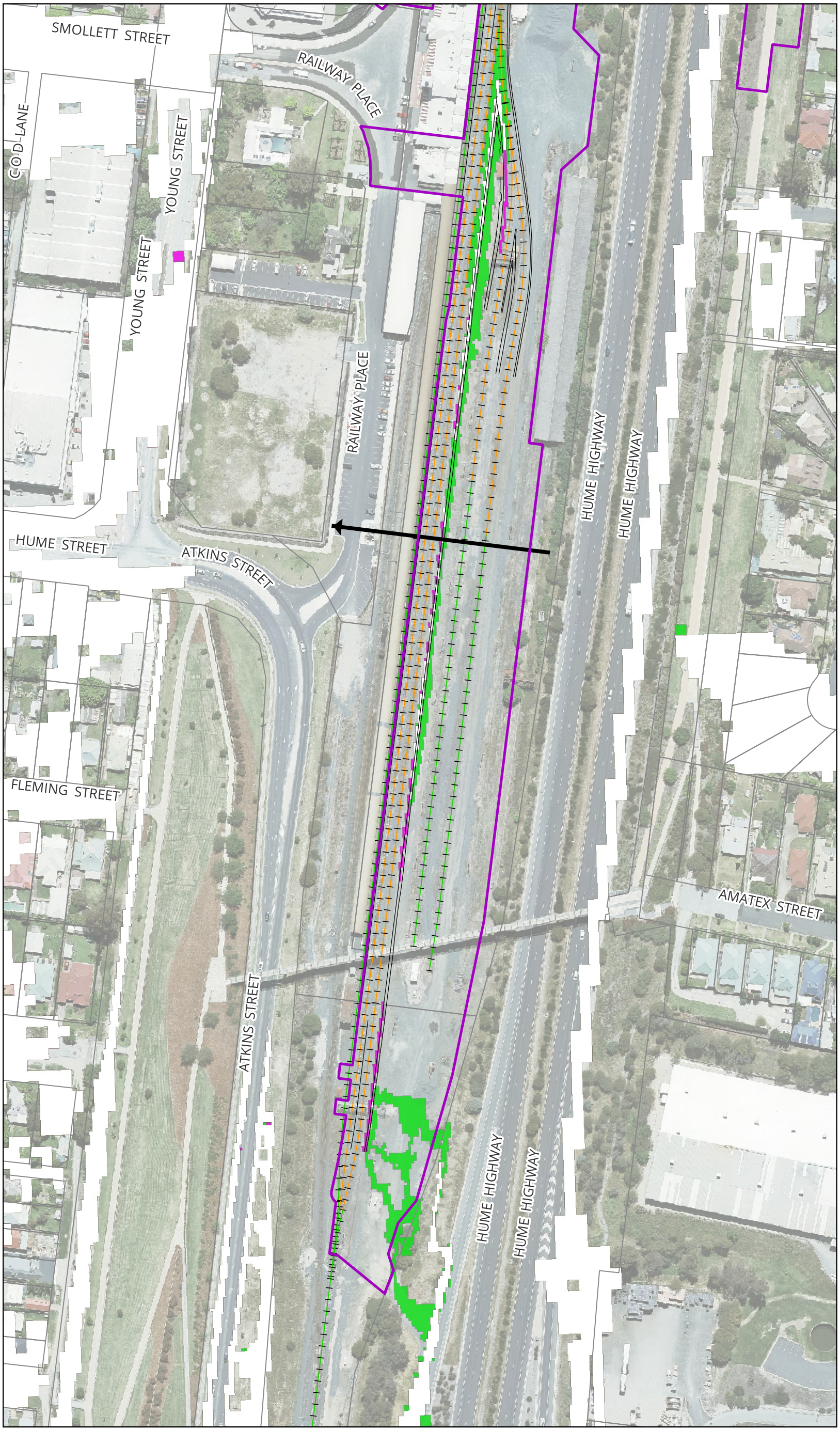
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



MARTINUS
aurecon
BG&E

Legend

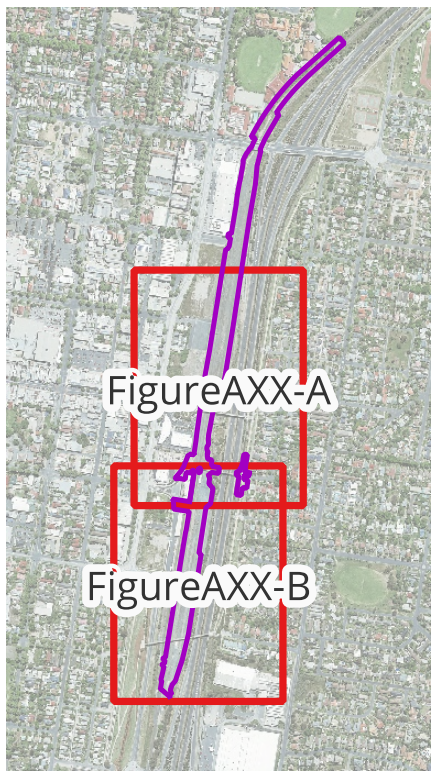
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

<= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

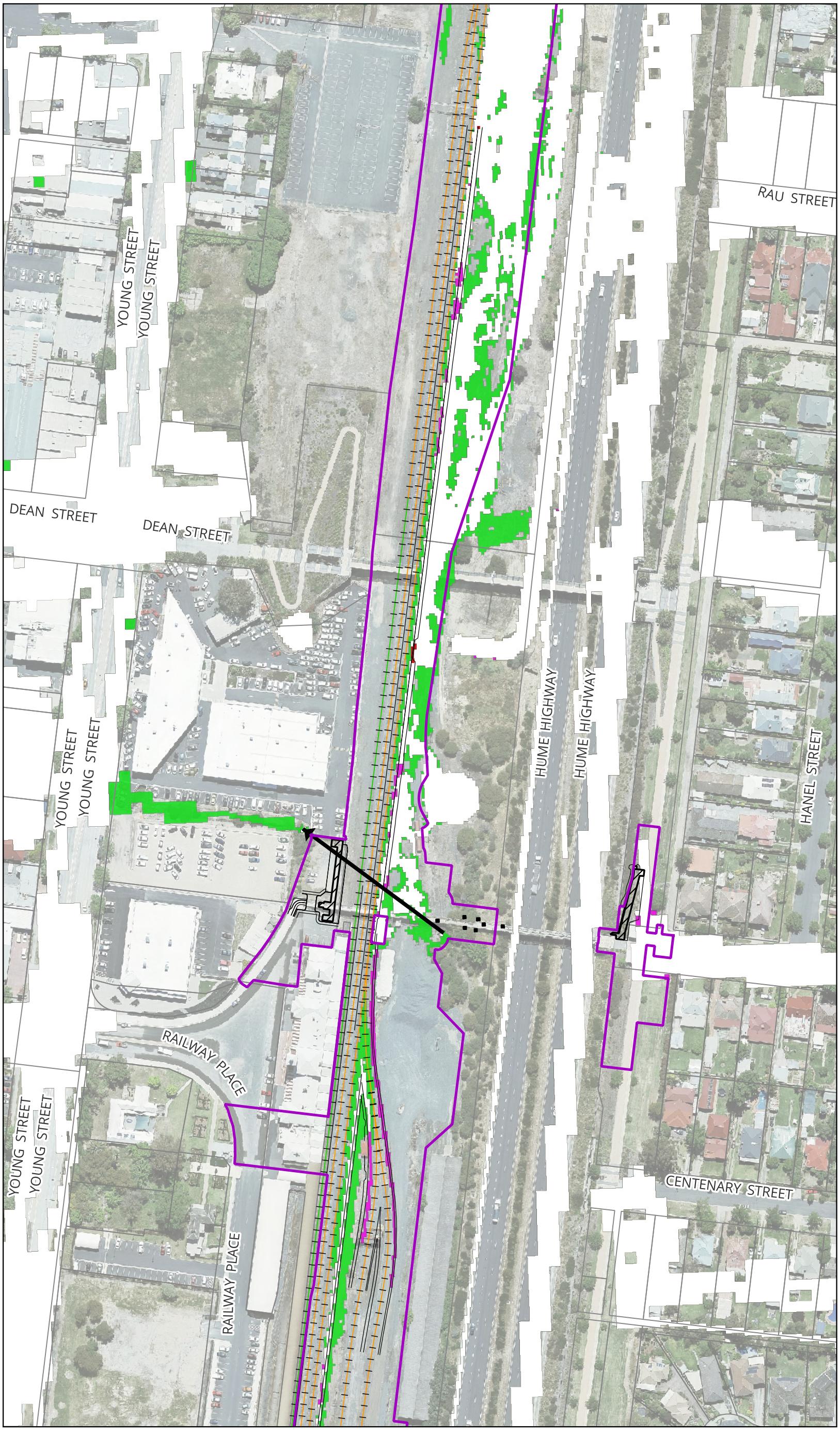
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



MARTINUS
aurecon
BG&E

Legend

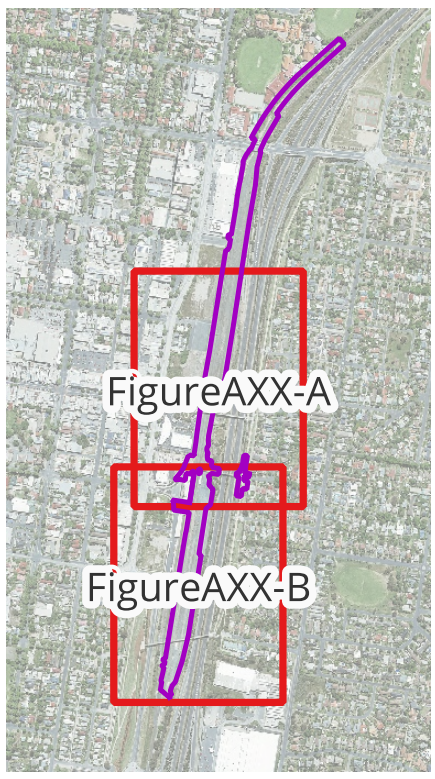
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

- <= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

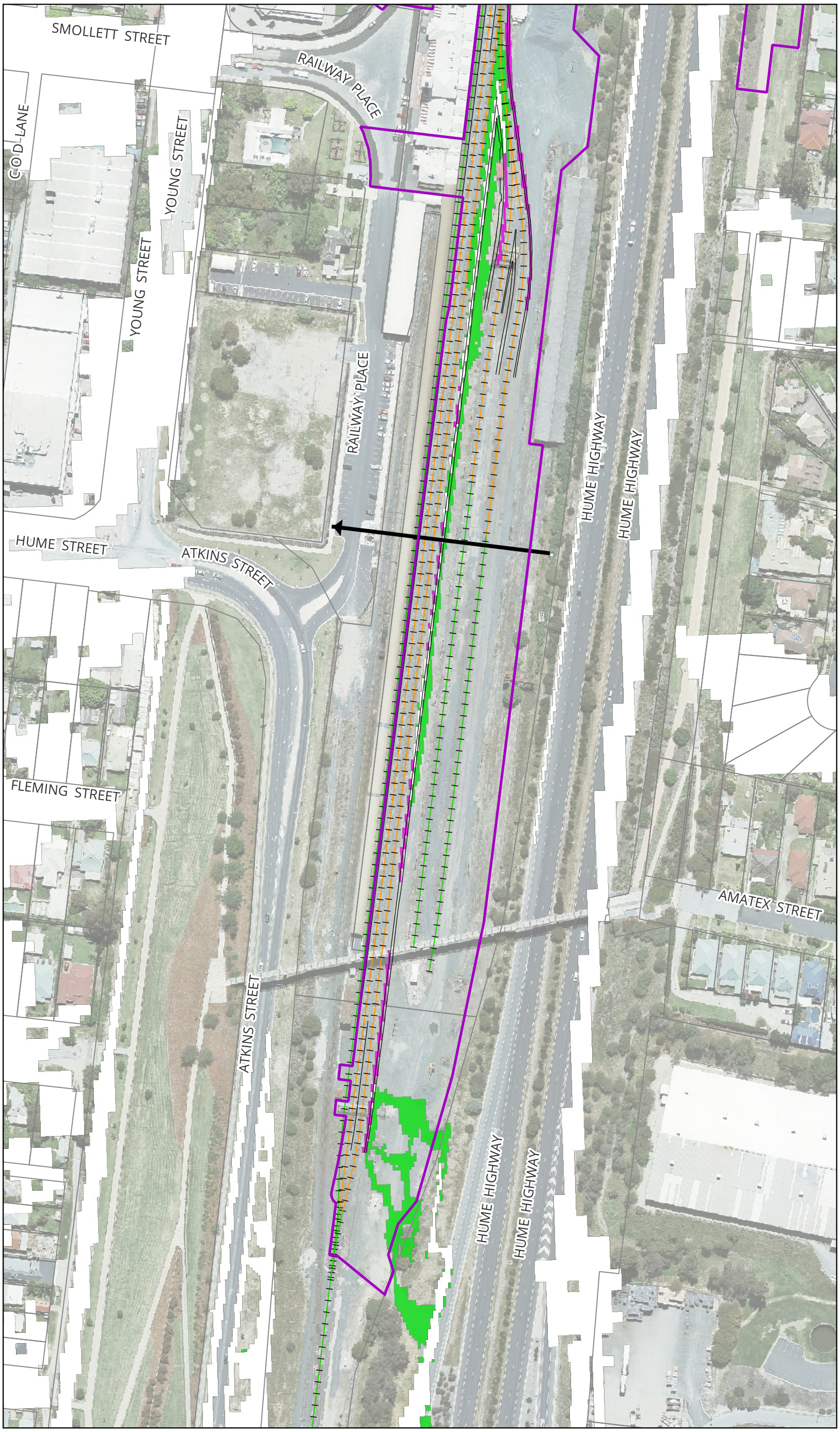
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



MARTINUS
aurecon
BG&E

Legend

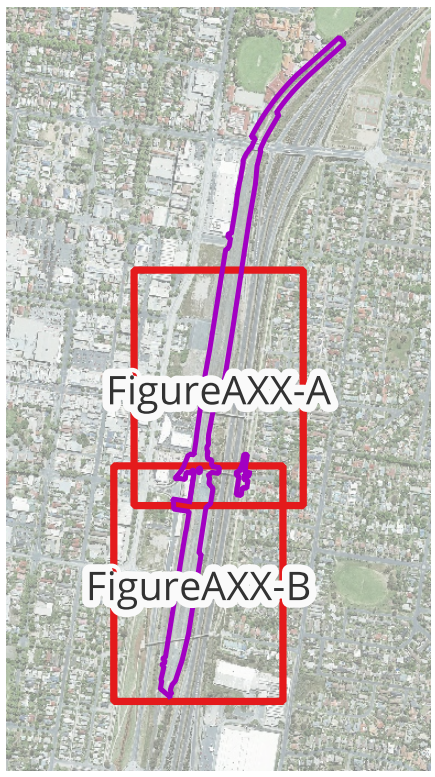
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

<= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

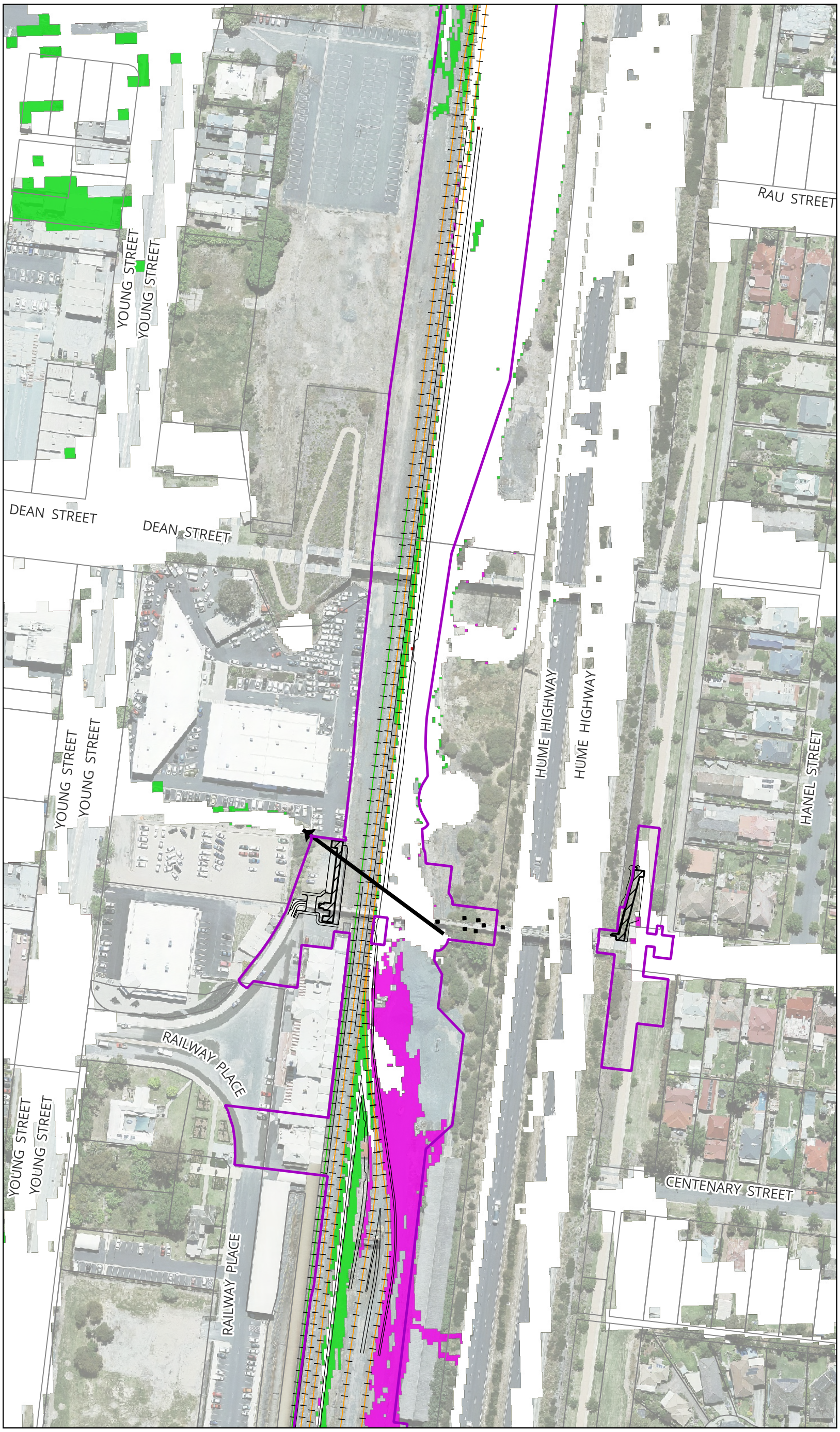
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

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



MARTINUS
aurecon
BG&E

Legend

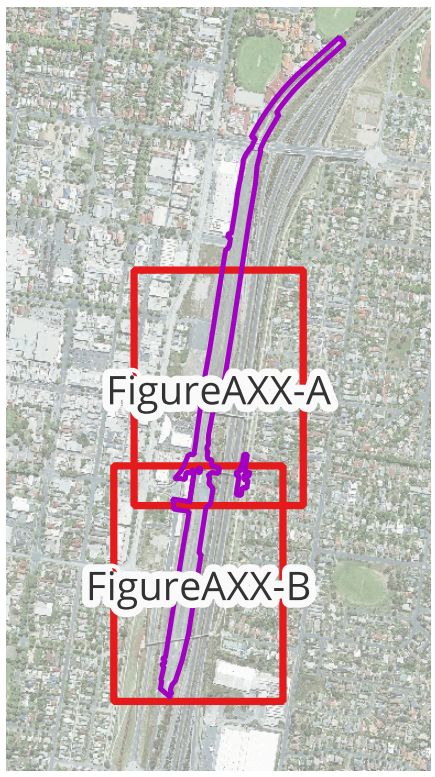
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

- <= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

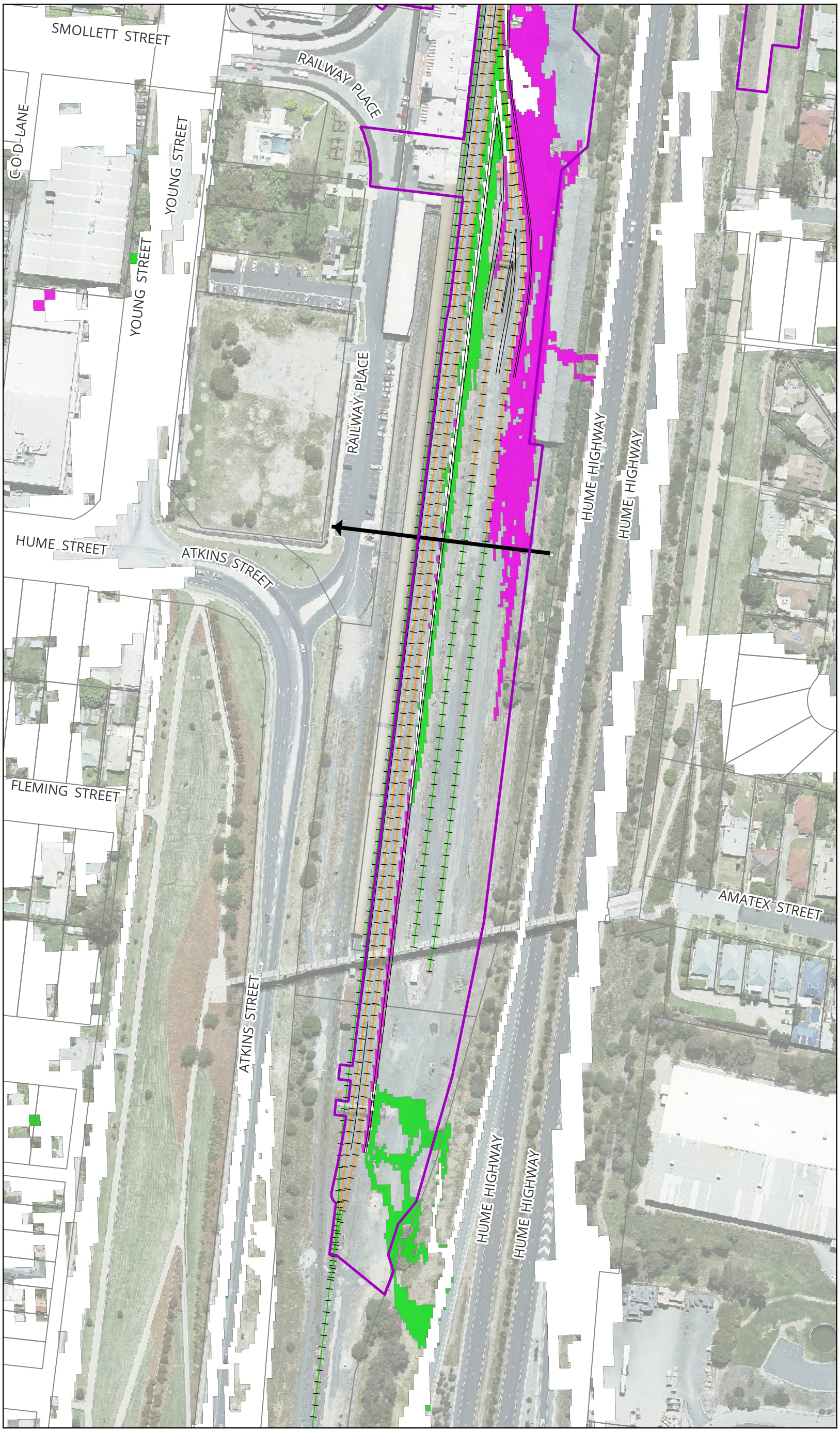
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A47-A: Changes in Peak Flood Velocity for 1% AEP Climate Change - Design Condition vs Existing Condition



MARTINUS
aurecon
BG&E

Legend

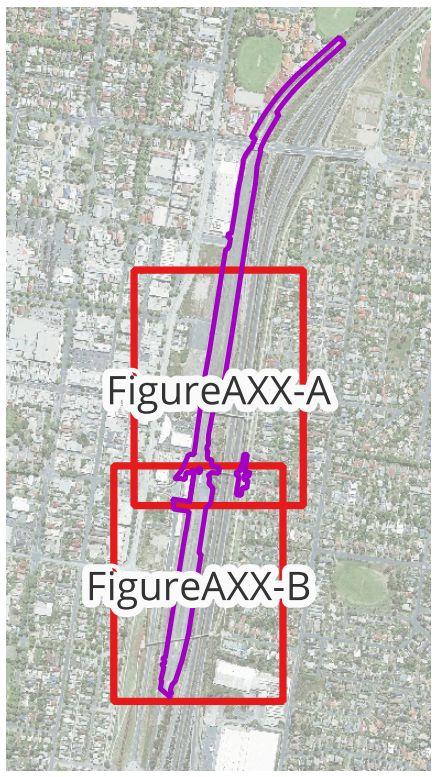
- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Velocity (m/s)

<= 0.5

Changes in Velocity (%)

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



Notes:

Map by: TT

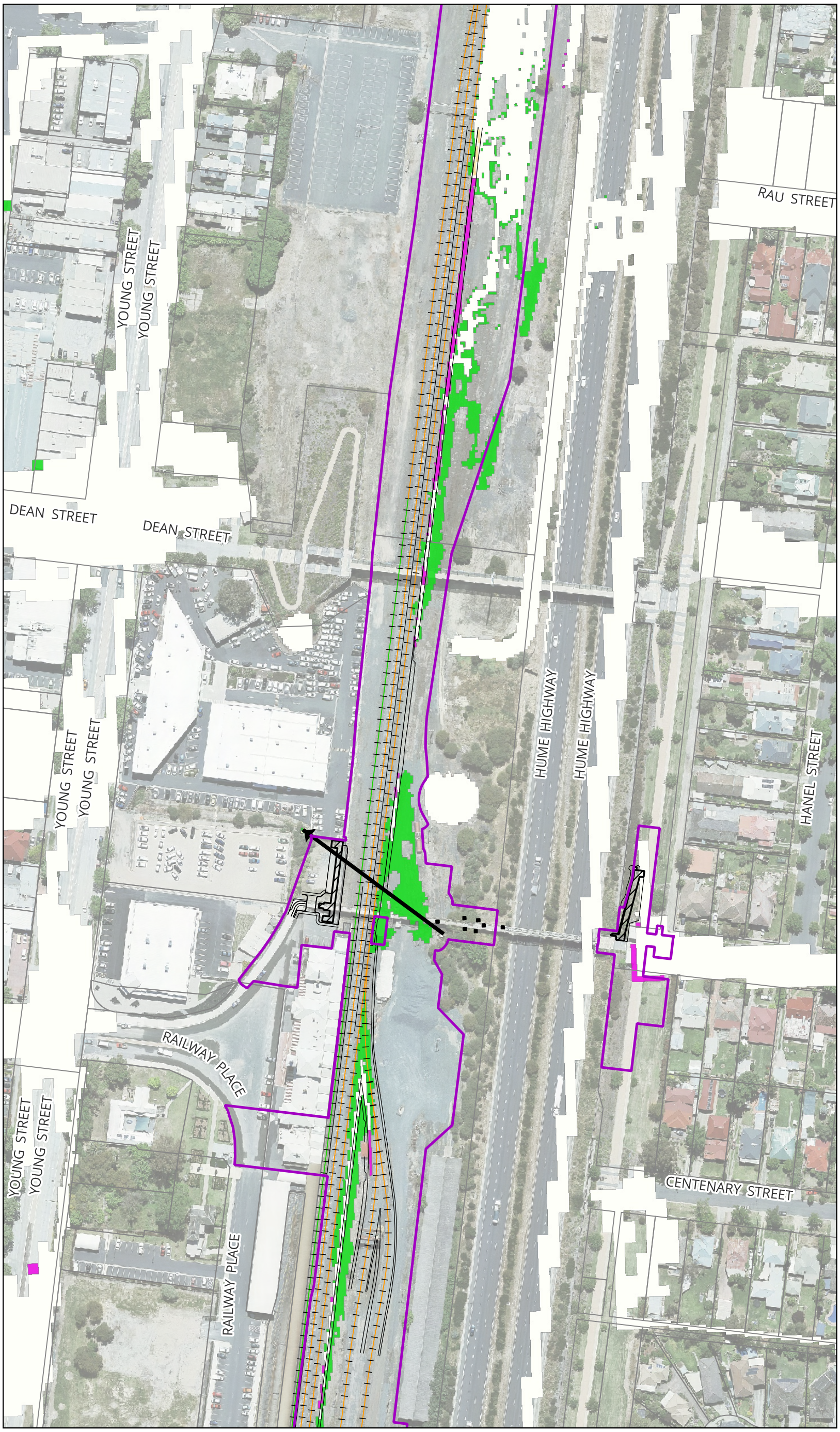
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A47-B: Changes in Peak Flood Velocity for 1% AEP Climate Change - Design Condition vs Existing Condition



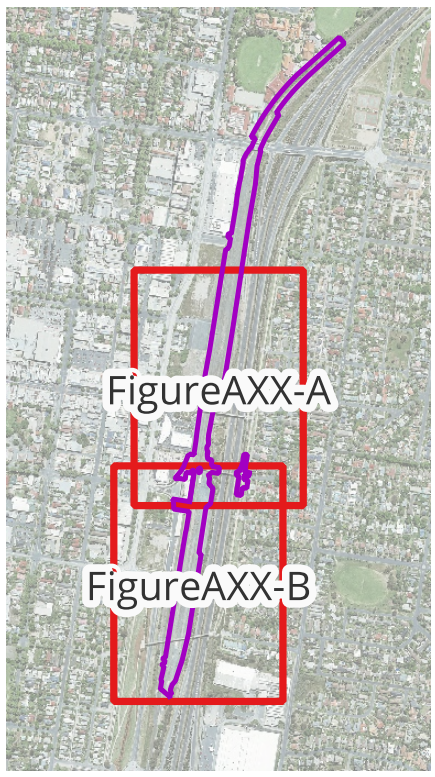
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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

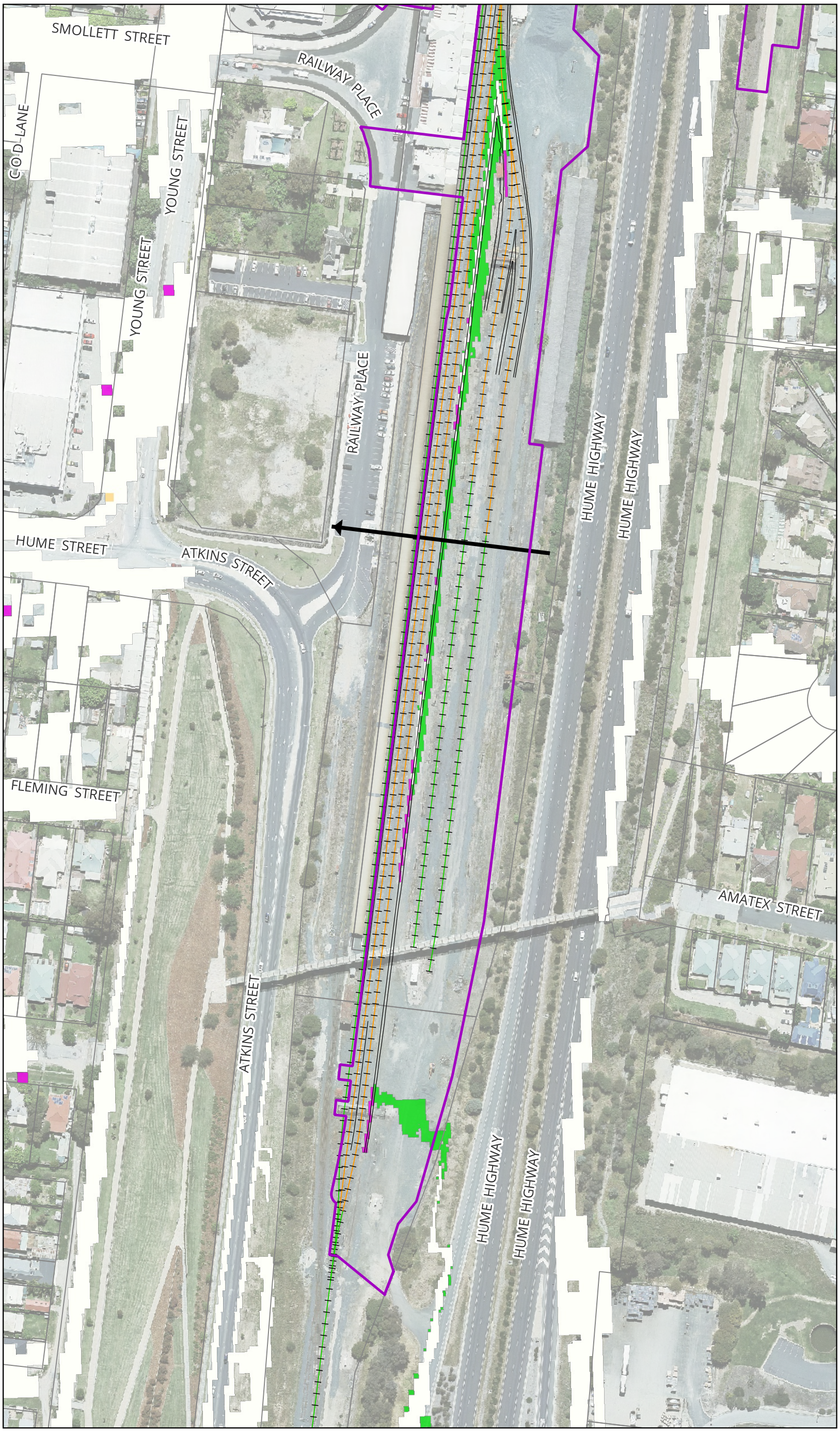
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A48-A: Changes in Peak Flood Hazard for 5% AEP - Design Condition vs Existing Condition



Map by: TT

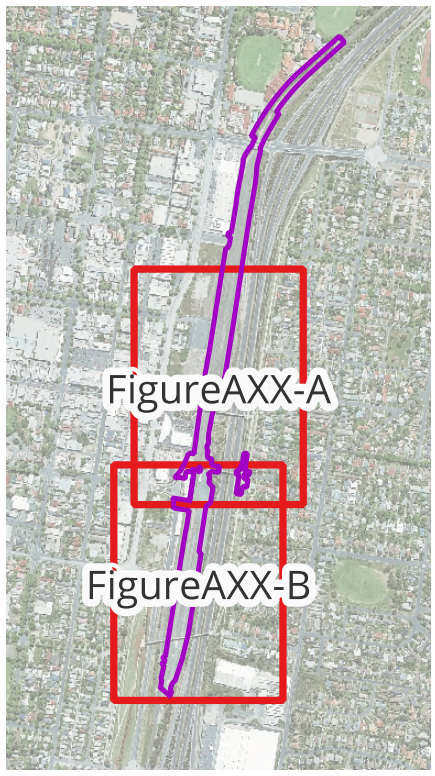
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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.

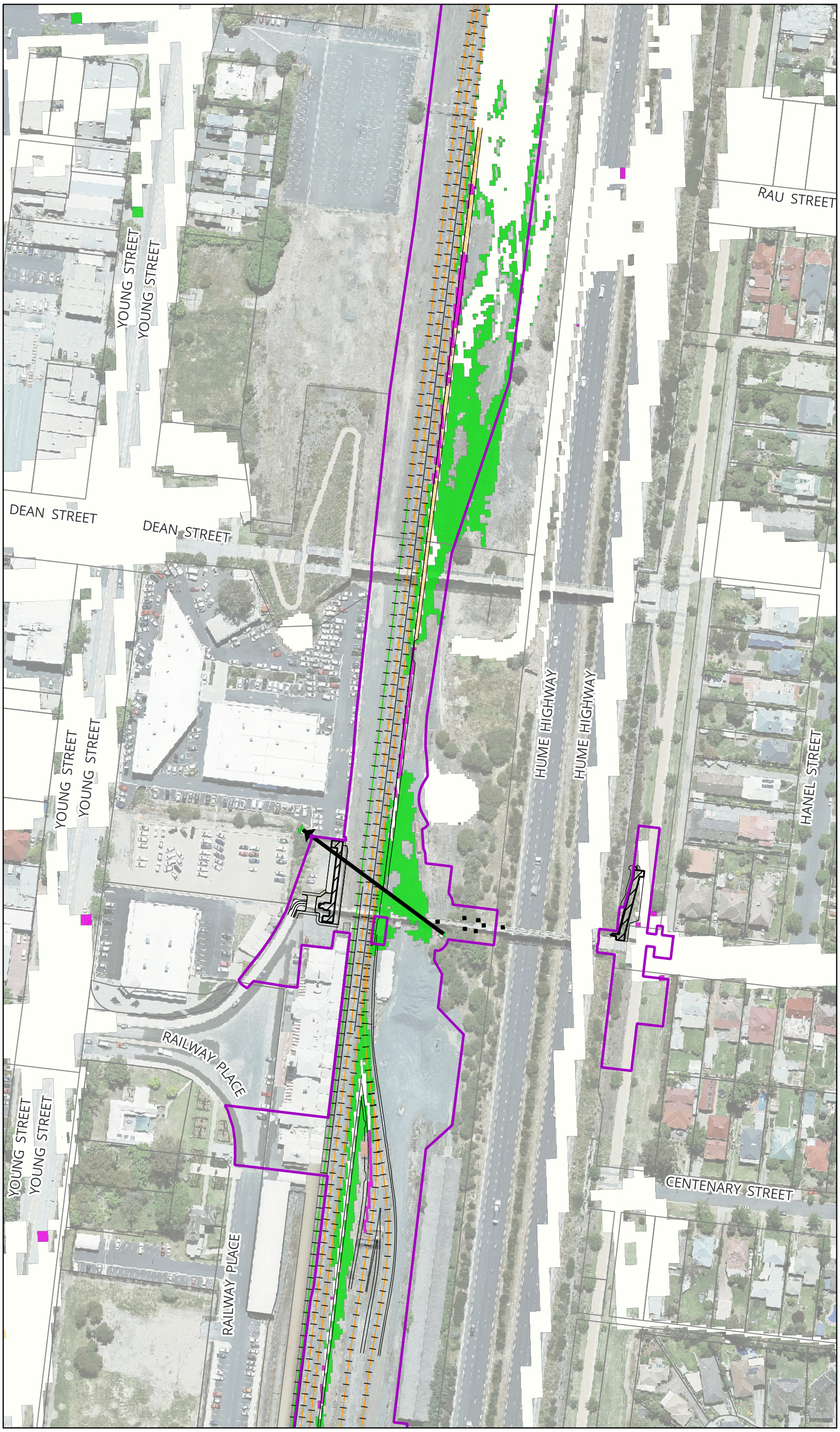
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A48-B: Changes in Peak Flood Hazard for 5% AEP - Design Condition vs Existing Condition



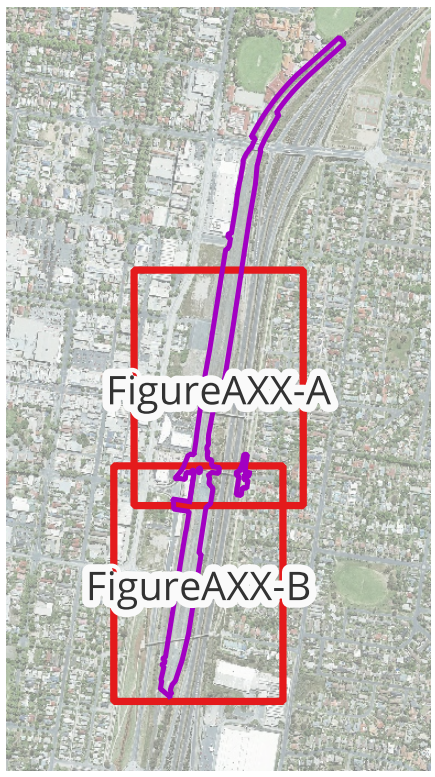
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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

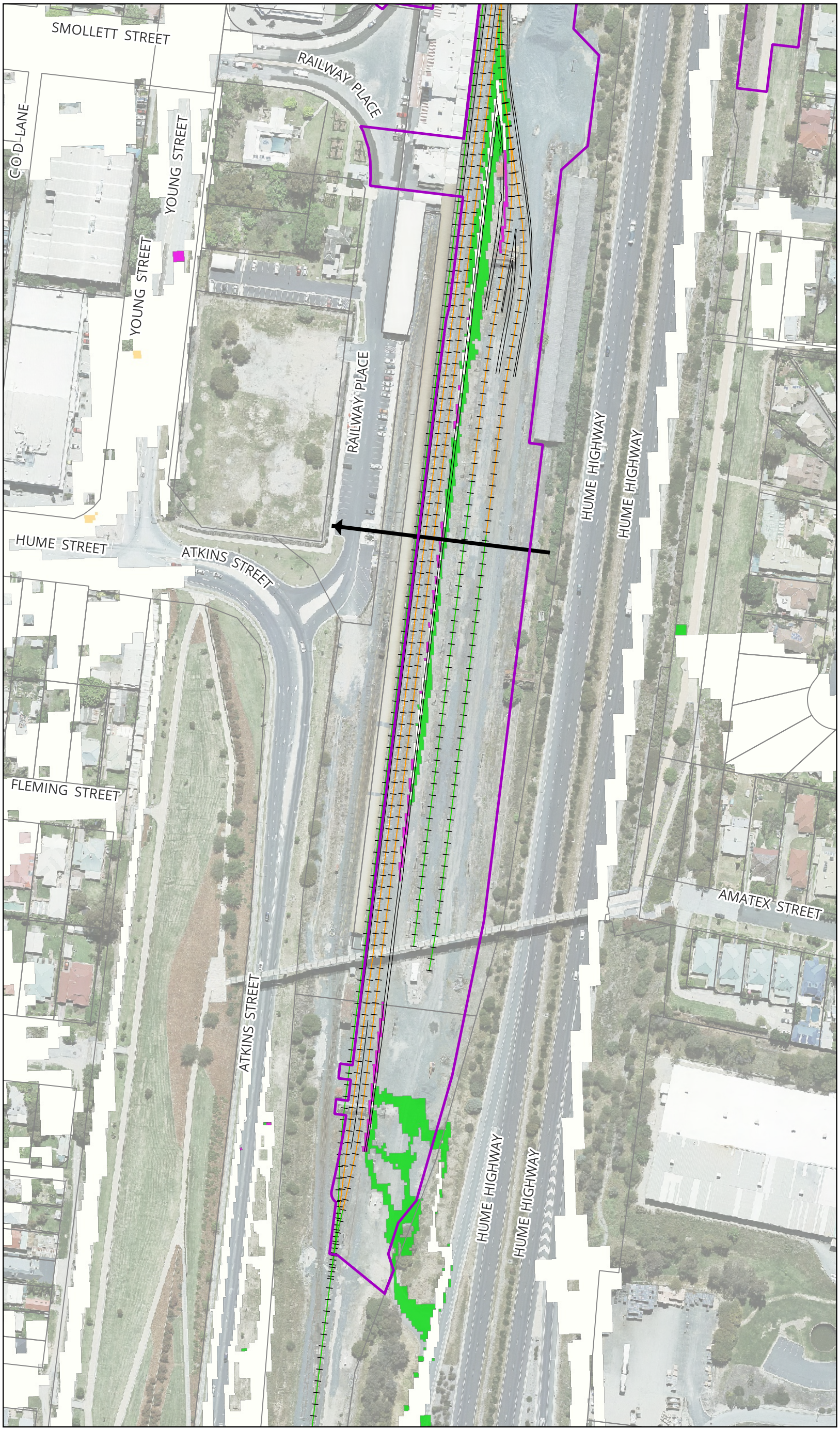
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A49-A: Changes in Peak Flood Hazard for 2% AEP - Design Condition vs Existing Condition



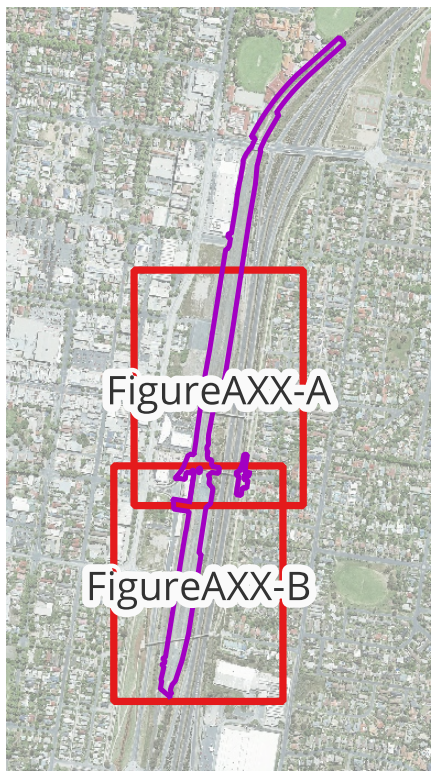
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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

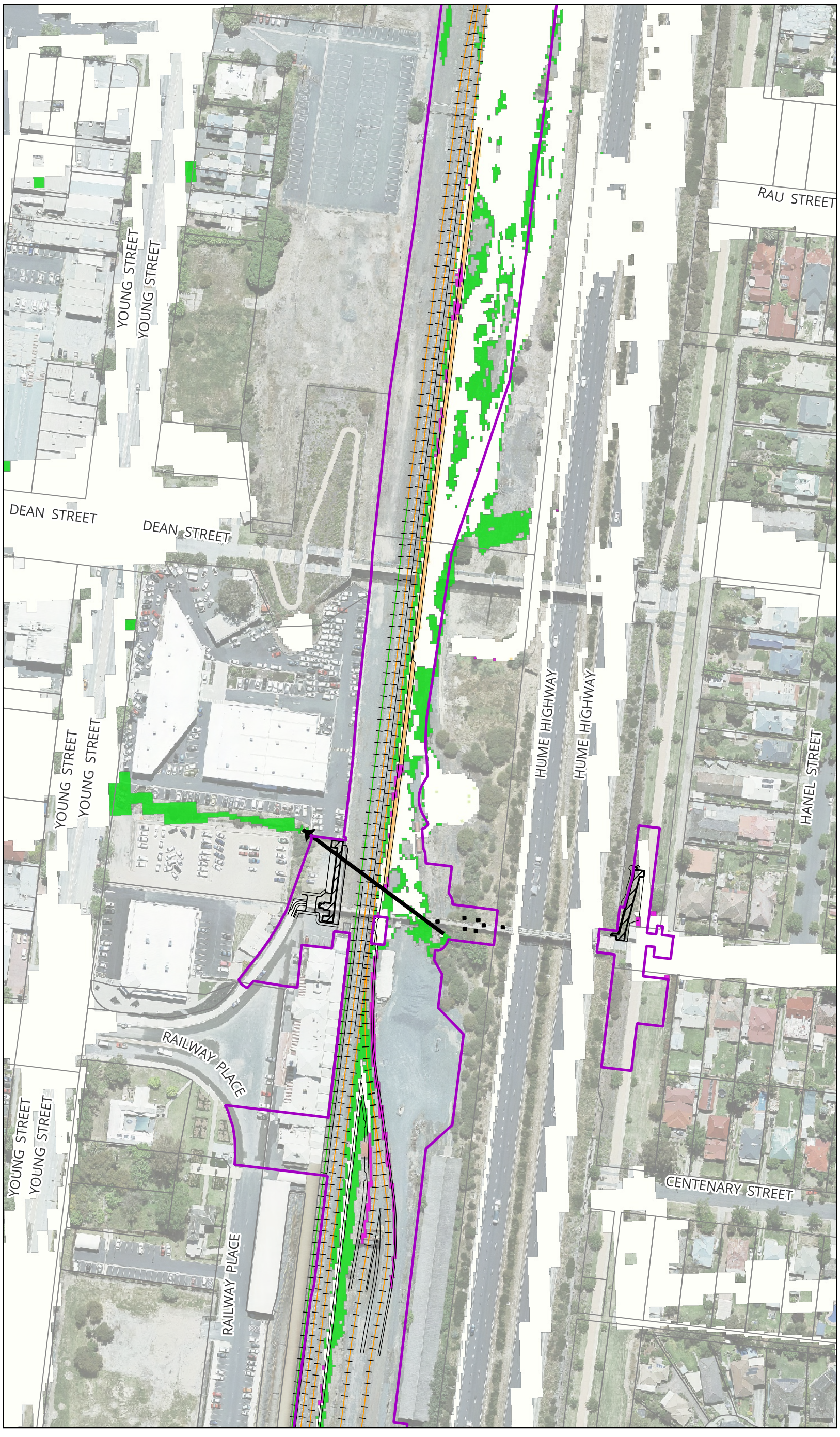
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A49-B: Changes in Peak Flood Hazard for 2% AEP - Design Condition vs Existing Condition



Map by: TT

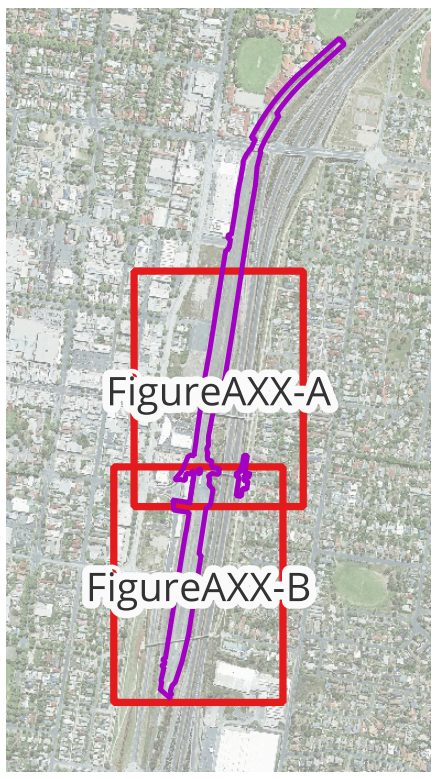
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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.

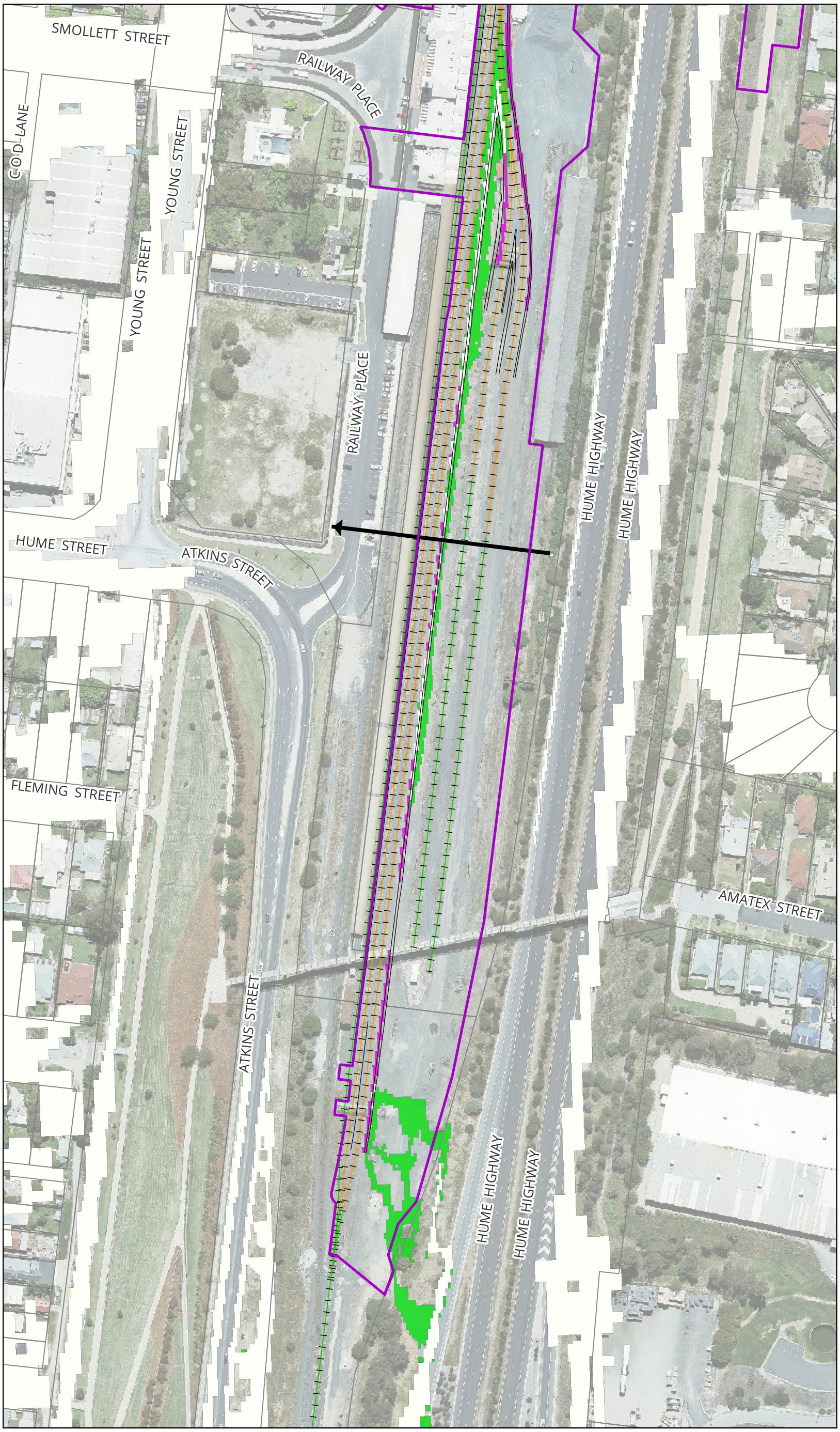
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A50-A: Changes in Peak Flood Hazard for 1% AEP - Design Condition vs Existing Condition



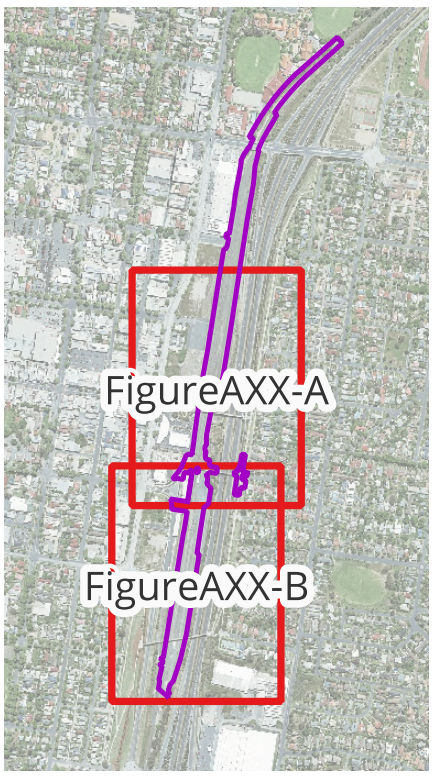
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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

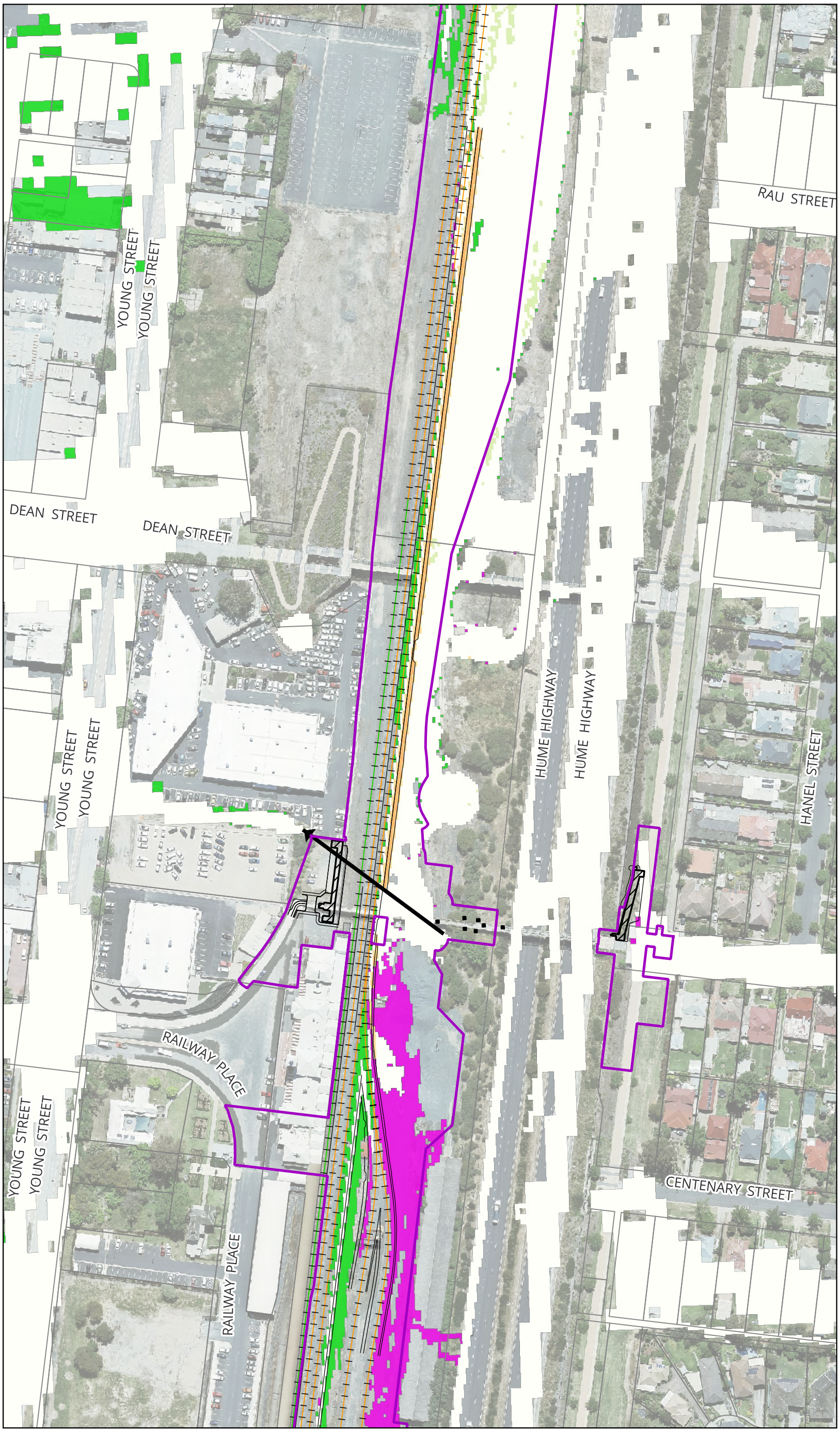
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A50-B: Changes in Peak Flood Hazard for 1% AEP - Design Condition vs Existing Condition



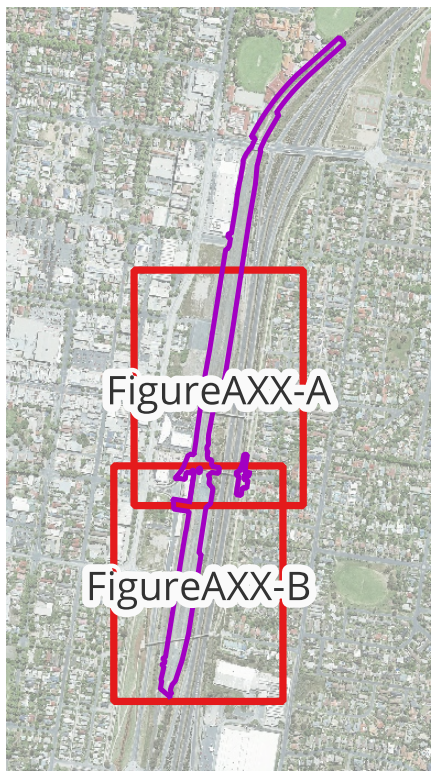
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Modelled Bridge Pier (Design)
- Modelled Design Ramp
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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:

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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

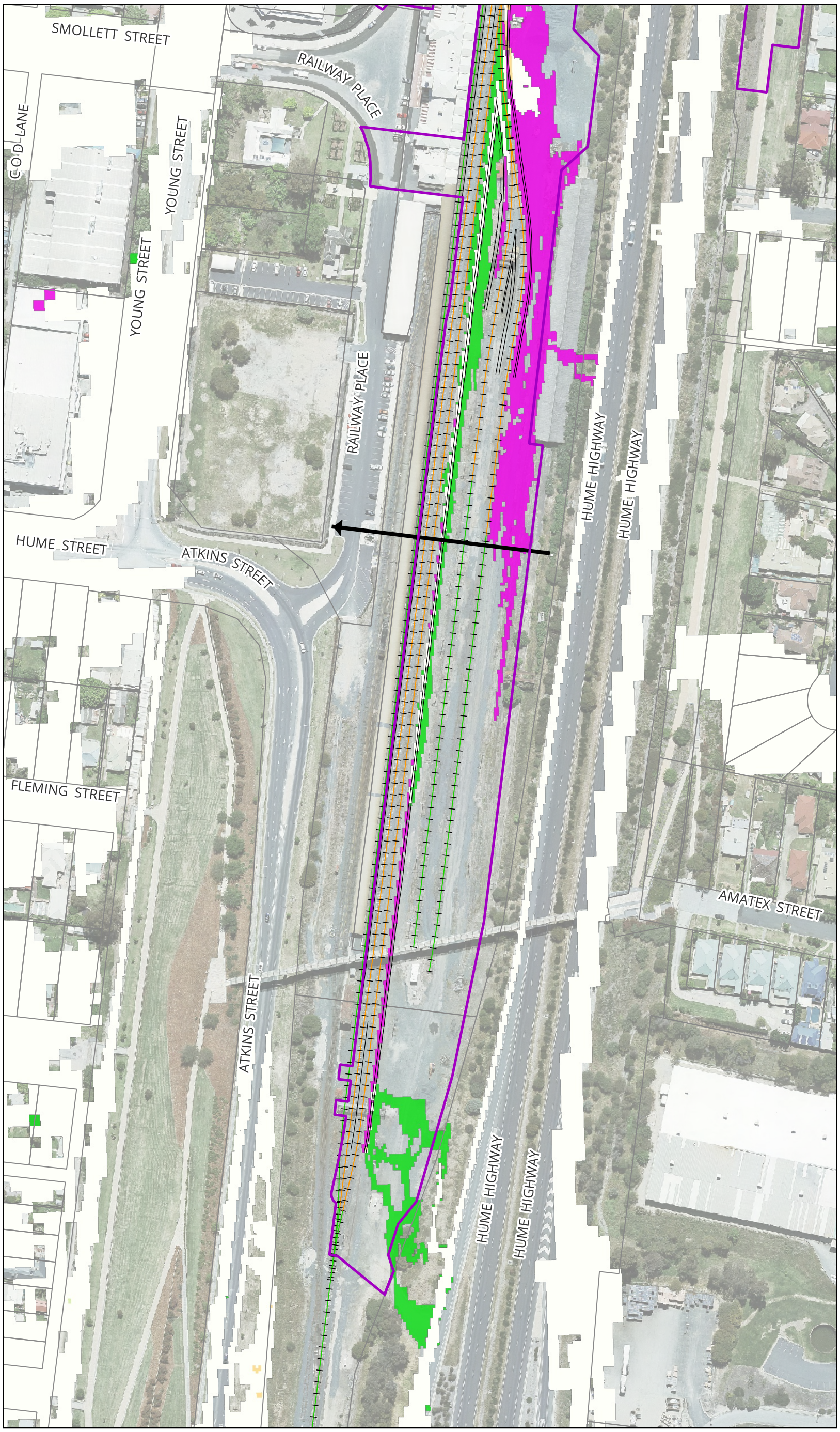
0 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A51-A: Changes in Peak Flood Hazard for 1% AEP Climate Change - Design Condition vs Existing Condition



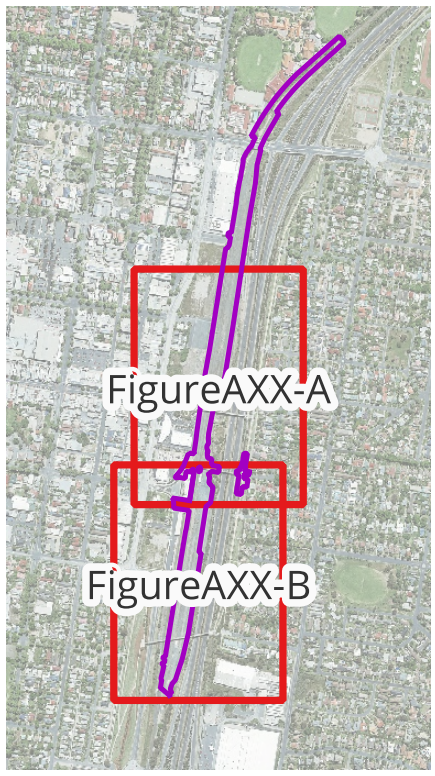
MARTINUS
aurecon
BG&E

Legend

- Project Boundary
- Proposed Civil Design
- Proposed Railway Track
- Existing Railway Track
- Existing Major Site Culvert
- Cadastre

Changes in Peak Flood 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 70 140 m

A3 Scale: 1:1,800

13/10/2025 GDA2020 MGA 55

Albury Yard and Footbridge - Inland Rail (A2P) - IFC Stage

Figure A51-B: Changes in Peak Flood Hazard for 1% AEP Climate Change - Design Condition vs Existing Condition

APPENDIX B

ARR2019 Information

Results - ARR Data Hub
[STARTTXT]

Input Data Information
[INPUTDATA]
Latitude,-36.046717
Longitude,146.927849
[END_INPUTDATA]

River Region
[RIVREG]
Division,Murray-Darling Basin
River Number,10
River Name,Murray Riverina
[RIVREG_META]
Time Accessed,30 May 2024 09:28PM
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,30 May 2024 09:28PM
Version,2016_v1
[END_LONGARF]

Storm Losses
[LOSSES]
ID,25723.0
Storm Initial Losses (mm),27.0
Storm Continuing Losses (mm/h),4.5
[LOSSES_META]

Time Accessed,30 May 2024 09:28PM
Version,2016_v1
[END_LOSSES]

Temporal Patterns
[TP]
code,MB
Label,Murray Basin
[TP_META]
Time Accessed,30 May 2024 09:28PM
Version,2016_v2
[END_TP]

Areal Temporal Patterns
[ATP]
code,MB
arealabel,Murray Basin
[ATP_META]
Time Accessed,30 May 2024 09:28PM
Version,2016_v2
[END_ATP]

Median Preburst Depths and Ratios
[PREBURST]
min (h)\AEP(%),50,20,10,5,2,1
60 (1.0),2.5 (0.126),1.9 (0.074),1.6 (0.051),1.2 (0.035),1.2 (0.028),1.1 (0.024)
90 (1.5),2.5 (0.113),2.1 (0.073),1.9 (0.055),1.7 (0.043),1.0 (0.022),0.5 (0.009)
120 (2.0),4.0 (0.169),3.4 (0.108),3.0 (0.082),2.7 (0.063),1.3 (0.026),0.2 (0.004)
180 (3.0),2.8 (0.104),2.9 (0.081),2.9 (0.071),3.0 (0.064),1.4 (0.026),0.2 (0.004)
360 (6.0),2.6 (0.080),2.1 (0.050),1.8 (0.036),1.5 (0.026),3.4 (0.052),4.8 (0.067)
720 (12.0),0.3 (0.008),1.0 (0.019),1.4 (0.023),1.8 (0.027),3.1 (0.038),4.0 (0.045)
1080 (18.0),0.0 (0.000),0.5 (0.009),0.9 (0.012),1.2 (0.015),1.9 (0.021),2.5 (0.025)
1440 (24.0),0.0 (0.000),0.1 (0.002),0.2 (0.003),0.3 (0.004),0.9 (0.009),1.3 (0.012)
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,30 May 2024 09:28PM
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,30 May 2024 09:28PM

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 (0.006),0.1 (0.003),0.0 (0.001),0.0 (0.000),0.0 (0.000),0.0 (0.000)

90 (1.5),0.1 (0.005),0.1 (0.002),0.0 (0.001),0.0 (0.000),0.0 (0.000),0.0 (0.000)

120 (2.0),0.1 (0.004),0.1 (0.002),0.0 (0.001),0.0 (0.000),0.0 (0.000),0.0 (0.000)

180 (3.0),0.0 (0.001),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,30 May 2024 09:28PM

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),17.2 (0.879),16.2 (0.615),15.5 (0.501),14.8 (0.418),14.8 (0.356),14.7 (0.319)
90 (1.5),16.8 (0.763),17.7 (0.601),18.3 (0.530),18.8 (0.477),14.8 (0.322),11.9 (0.232)
120 (2.0),16.5 (0.688),17.3 (0.545),17.8 (0.481),18.4 (0.433),15.6 (0.317),13.6 (0.248)
180 (3.0),14.6 (0.543),15.4 (0.435),15.9 (0.387),16.4 (0.351),14.1 (0.259),12.3 (0.205)
360 (6.0),12.5 (0.380),13.7 (0.322),14.6 (0.295),15.4 (0.275),18.0 (0.278),20.0 (0.279)
720 (12.0),5.4 (0.133),8.3 (0.158),10.2 (0.169),12.0 (0.176),15.7 (0.198),18.5 (0.210)
1080 (18.0),1.9 (0.042),6.1 (0.103),8.9 (0.130),11.5 (0.149),12.1 (0.133),12.5 (0.123)
1440 (24.0),1.5 (0.030),4.4 (0.067),6.3 (0.083),8.1 (0.095),9.6 (0.096),10.8 (0.096)
2160 (36.0),0.0 (0.000),0.9 (0.013),1.6 (0.018),2.2 (0.022),3.9 (0.034),5.3 (0.041)
2880 (48.0),0.0 (0.000),0.6 (0.007),1.0 (0.011),1.4 (0.013),2.0 (0.016),2.4 (0.017)
4320 (72.0),0.0 (0.000),0.1 (0.001),0.2 (0.002),0.3 (0.002),0.3 (0.002),0.4 (0.003)
[PREBURST75_META]
Time Accessed,30 May 2024 09:28PM
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),39.4 (2.013),34.2 (1.303),30.9 (0.997),27.6 (0.777),27.7 (0.667),27.9 (0.602)
90 (1.5),32.5 (1.475),37.1 (1.259),40.1 (1.161),42.9 (1.087),33.0 (0.716),25.5 (0.499)
120 (2.0),36.1 (1.509),39.1 (1.232),41.1 (1.108),43.1 (1.015),45.5 (0.923),47.3 (0.866)
180 (3.0),27.2 (1.012),32.9 (0.933),36.8 (0.894),40.5 (0.864),34.4 (0.633),29.8 (0.497)
360 (6.0),23.4 (0.715),26.5 (0.622),28.6 (0.579),30.5 (0.546),36.2 (0.559),40.4 (0.565)
720 (12.0),19.0 (0.468),22.7 (0.433),25.1 (0.416),27.5 (0.403),29.7 (0.374),31.4 (0.356)
1080 (18.0),13.1 (0.284),18.7 (0.315),22.4 (0.327),26.0 (0.335),25.8 (0.284),25.7 (0.253)
1440 (24.0),12.5 (0.249),18.4 (0.283),22.3 (0.297),26.1 (0.306),24.8 (0.247),23.8 (0.213)
2160 (36.0),4.8 (0.085),9.7 (0.131),12.8 (0.150),15.9 (0.163),19.1 (0.165),21.4 (0.166)
2880 (48.0),4.6 (0.075),7.3 (0.091),9.2 (0.098),10.9 (0.102),18.7 (0.148),24.6 (0.173)
4320 (72.0),1.4 (0.021),6.2 (0.069),9.3 (0.089),12.3 (0.103),13.7 (0.096),14.7 (0.092)
[PREBURST90_META]
Time Accessed,30 May 2024 09:28PM
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,30 May 2024 09:28PM

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),18.3,9.5,8.9,9.7,9.7,8.7

90 (1.5),18.6,10.2,9.1,9.2,9.2,8.8

120 (2.0),17.8,10.1,9.2,9.2,9.0,7.8

180 (3.0),19.0,11.6,10.1,10.2,9.7,9.2

360 (6.0),19.7,13.3,11.6,12.1,10.3,6.7

720 (12.0),22.1,15.8,14.4,14.5,12.6,8.0

1080 (18.0),23.7,17.7,16.4,16.1,14.8,10.9

1440 (24.0),24.2,18.4,17.6,17.8,16.8,12.2

2160 (36.0),26.2,21.2,21.1,22.0,20.1,14.0

2880 (48.0),26.5,22.1,22.4,22.8,22.0,14.2

4320 (72.0),27.3,22.6,23.6,24.1,23.6,19.0

[BURSTIL_META]

Time Accessed,30 May 2024 09:28PM

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),8.6,17.4,18.0,17.2,17.2,18.2

90 (1.5),8.3,16.7,17.8,17.7,17.7,18.1

120 (2.0),9.1,16.8,17.7,17.7,17.9,19.1

180 (3.0),7.9,15.3,16.8,16.7,17.2,17.7

360 (6.0),7.2,13.6,15.3,14.8,16.6,20.2

720 (12.0),4.8,11.1,12.5,12.4,14.3,18.9

1080 (18.0),3.2,9.2,10.5,10.8,12.1,16.0

1440 (24.0),2.7,8.5,9.3,9.1,10.1,14.7

2160 (36.0),0.7,5.7,5.8,4.9,6.8,12.9

2880 (48.0),0.4,4.8,4.5,4.1,4.9,12.7

4320 (72.0),0.0,4.3,3.3,2.8,3.3,7.9

[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

Rainfall Depth

Duration	50%	20%	10%	5%	2%	1%	1 in 200	1 in 500	1 in 1000	1 in 2000
1 min	1.92	2.59	3.06	3.52	4.13	4.61	5.06	5.72	6.24	6.78
2 min	3.25	4.38	5.16	5.9	6.81	7.5	8.35	9.54	10.5	11.5
3 min	4.42	5.95	7	8.02	9.28	10.2	11.3	12.9	14.2	15.5
4 min	5.43	7.32	8.61	9.87	11.5	12.7	14	15.9	17.4	19
5 min	6.32	8.52	10	11.5	13.4	14.9	16.4	18.6	20.3	22.1
10 min	9.55	12.9	15.3	17.6	20.7	23.1	25.3	28.5	31.1	33.7
15 min	11.7	15.8	18.7	21.6	25.5	28.5	31.2	35.2	38.4	41.6
20 min	13.3	18	21.2	24.5	28.9	32.4	35.5	40.1	43.7	47.4
25 min	14.5	19.7	23.2	26.8	31.6	35.3	38.8	43.9	47.9	52
30 min	15.5	21	24.8	28.6	33.7	37.7	41.4	46.9	51.2	55.7
45 min	17.9	24.1	28.4	32.7	38.4	42.8	47.1	53.4	58.4	63.6
1 hour	19.5	26.3	30.9	35.5	41.6	46.3	51	57.8	63.3	68.9
1.5 hour	22	29.4	34.5	39.5	46.1	51.1	56.3	63.8	69.8	76
2 hour	23.9	31.8	37.1	42.4	49.3	54.6	60.1	68	74.3	80.9
3 hour	26.8	35.3	41.1	46.8	54.3	60	65.8	74.3	81	88
4.5 hour	30.1	39.3	45.6	51.8	60	66.3	72.3	81.5	88.7	96
6 hour	32.8	42.6	49.3	55.9	64.7	71.6	77.9	87.6	95.2	103
9 hour	37.1	47.9	55.3	62.6	72.7	80.5	87.5	98.2	107	115
12 hour	40.5	52.3	60.3	68.2	79.5	88.2	95.9	108	117	126
18 hour	46	59.4	68.6	77.6	90.9	101	110	124	135	147
24 hour	50.3	65.1	75.3	85.4	100	112	123	139	152	165
30 hour	53.8	69.9	81	91.9	108	121	138	159	176	194
36 hour	56.8	74	85.9	97.6	115	129	149	174	194	216
48 hour	61.5	80.6	93.8	107	127	143	165	193	217	242
72 hour	68.1	89.7	105	119	142	161	183	213	238	264
96 hour	72.4	95.5	111	127	151	171	191	221	246	273
120 hour	75.3	99	115	131	156	177	196	226	250	276
144 hour	77.4	101	117	133	159	180	198	229	253	280
168 hour	78.8	102	117	133	159	180	200	231	256	283

APPENDIX D

ARTC Review

ARTC INLAND RAIL

Document Control Information			
	Contractor DC to update for re-submission	**Submitted Document No. or Transmittal No.:**	Martinus-PTRAN-001770
Project:	2100 - A2I	**Date Submission Received:**	1/09/2025
Comment Sheet Number_Revision:	5-0052-210-IHY-B0-CS-0001_C	**Comment Sheet Title:**	***External Comment Sheet - A2I | Flood Design Report - Albury Station Yard and Footbridge***
Revision Date:	20/10/2025	**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-B0-RP-0001_A.pdf	Page 2, 5-0052-210-IHY-B0-RP-0001_A, Page 1, Doc Control	DDR	Thinesh Thirumurugan - Water Engineer 'Prepared by', unable to verify EDPM Competency	Non-Compliant	Mick Parnell	16/07/2025	Zoe Cruice	Engineering Manager	31/08/2025	Thinesh now has civil designer RIW competency. Rev N register to be transmitted shortly, however, this should be visilbe on RIW platform		Mick Parnell	8/09/2025	CLOSED	
2	PSR, Ann F	5-0052-210-IHY-B0-RP-0001_A.pdf	Page 2, 5-0052-210-IHY-B0-RP-0001_A, Page 1, Doc Control	DDR	Yucen Lu - Senior Water Engineer 'Prepared by', unable to verify EDPM Competency	Non-Compliant	Mick Parnell	16/07/2025	Zoe Cruice	Engineering Manager	31/08/2025	Yucen now has civil design verifier / approver RIW competency. Rev N register to be transmitted shortly, however, this should be visilbe on RIW platform		Mick Parnell	8/09/2025	CLOSED	
3	PSR, Ann F	5-0052-210-IHY-B0-RP-0001_A.pdf	Page 2, 5-0052-210-IHY-B0-RP-0001_A, Page 1, Doc Control	DDR	Jasmine Lee - Associate Water Engineer 'Reviewed by', unable to verify EDPM Competency	Non-Compliant	Mick Parnell	16/07/2025	Zoe Cruice	Engineering Manager	31/08/2025	Jasmine now has civil design verifier / approver RIW competency. Rev N register to be transmitted shortly, however, this should be visilbe on RIW platform		Mick Parnell	8/09/2025	CLOSED	
4	*Opportunity*	5-0052-210-IHY-B0-RP-0001_A.pdf	Page 27, 5-0052-210-IHY-B0-RP-0001_A, Section 4.3.1.4	DDR	Reference error needs correction.	Opportunity	Ayub Ali	7/07/2025	Zoe Cruice	Martinus	10/08/2025	Noted. Cross-referencing will checked (and checked again!) to ensure error is removed before submission. Apologies. **4.3.1.5 Drainage Network** The drainage data based on detailed survey was incorporated into the updated DDR TUFLOW model (refer to Item 6 in Table 2). The Albury FRMSP TUFLOW model drainage data is used outside the site and updated in relation to the 2020 LiDAR.	5-0052-210-IHY-B0-RP-0001_A, Section 4.3.1.5	Ayub Ali	1/09/2025	CLOSED	This item is closed based on the screenshot of the updated report.

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 E

External Consultation Review

A2I Flood Design Report CONSULTATION - COMMENTS REGISTER - Albury Station Yard and Footbridge

5-0052-210-IHY-BO-CS-0002-TW_B

Comment Sheet Number_Revision:

Title: External Comment Sheet - A2I | Flood Design Report - Albury Station Yard and Footbridge - Transport for NSW (TfNSW)

Stakeholder Category	Stakeholder Name	Flood Design Report	Document reference (e.g. section, figure, table)	Date raised	Topic that comment relates to	Comments	Full Name	Company	Date	Response *(must be specific on how the comment has been addressed. Agreed approach for re-submission)*	Documentation Section # / Figure #
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	1.3 Site Description	24/06/2025	Flood impact context	To provide greater context to the site, please include classified roads on Figure 1 and/or include a text description of key classified roads in the impact area - in this case the Hume Highway and Riverina Highway, neither of which is visually shown as a classified road or discussed in the report for context.	Thinesh Thirum	DJV Flood Modeller	16/07/2025	Figure 1 updated with classified road around site areas. Text updated indicating key classified road near the site The site of Albury Station Yard and Albury Station Footbridge (hereby known as Albury Station Yard and Footbridge) forms part of the Albury to Illabo Section, with the proposed track slew works and footbridge replacement located between Chainage (CH) 645.350km to 646.630km and Chainage 646.000km respectively. The proposed footbridge solution will provide a pedestrian crossing over the railway tracks and will have a clearance of 7.1m over the Main, Loop and Platform Lines to allow the passage of double-stack rail traffic underneath the bridge. Young Street, Riverina Highway and Hume Highway are classified road which is located near the site (Refer to Figure 1). The site of Albury Station Yard and Albury Station Footbridge (hereby known as Albury Station Yard and Footbridge) forms part of the Albury to Illabo Section, with the proposed track slew works and footbridge replacement located between Chainage (CH) 645.350km to 646.630km and Chainage 646.000km respectively. The proposed footbridge solution will provide a pedestrian crossing over the railway tracks and will have a clearance of 7.1m over the Main, Loop and Platform Lines to allow the passage of double-stack rail traffic underneath the bridge. Young Street, Riverina Highway and Hume Highway are classified road which is located near the site (Refer to Figure 1).	5-0052-210-IHY-B0-RP-0001 figure 1 and Section 1.3.1
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	2.1 Project Scope and Requirements 4.3.1.5 Drainage Network	24/06/2025	Editorial	There is a broken cross-reference in Table 4 (Section 0) - please correct. There is a broken cross-reference in Section 4.3.1.5 - please correct.	Thinesh Thirum	DJV Flood Modeller	16/07/2025	Reference error was corrected and checked throughout the report Part 8: Hydraulic Design of Waterway Structures. | Footbridge scope. The Albury Footbridge is not a waterway bridge. 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. | A Climate Change assessment was carried out by running the 1% AEP + 2090 RCP 8.5 scenario and identifying potential flood behaviour. 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 | design conditions. **4.3.1.5 Drainage Network** The drainage data based on detailed survey was incorporated into the updated DDR TUFLOW model (refer to Item 6 in Table 2). The Albury FRMSP TUFLOW model drainage data is used outside the site and updated in relation to the 2020 LiDAR.	5-0052-210-IHY-B0-RP-0001 Table 4 and Section 4.3.1.5
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	2.2. Conditions of Approval - Flooding	24/06/2025	Editorial	In Table 5 for Condition of Approval E41 this should read "The Proponent's response to the requirements of Conditions E38 and E40..." - please correct.	Thinesh Thirum	DJV Flood Modeller	21/07/2025	The condition of criteria is corrected as "The Proponent's response to the requirements of Conditions E38 and E40.." BTS 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. | 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 will be undertaken through a formal review of this Flood Design Report. Consultation with other stakeholders will occur prior to finalisation of the report.	5-0052-210-IHY-B0-RP-0001 Table 5
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	4.2.1 ARR2019 Approach	10/07/2025	PMF hydrology	The PMP was based on 11 temporal patterns. It is assumed this refers to the patterns from Jordan et al. 2005. ARR2019 recommends the GSDM spatial patterns for short duration storm events - were the GSDM patterns considered?	Thinesh Thirum	DJV Flood Modeller	21/07/2025	The PMP calculation were based on the GSDM method and 11 Temporal patterns. This has been discussed in the report Study). Instead of DRAINS-ILSAX (ARR2019 recommended initial loss and continue losses cannot be used in DRAINS-ILSAX), Rainfall Excess was calculated to be applied to the urbanised catchment with the drainage network. The parameters for the two types of models were summarised in Table 8. The PMF Hydrology model was based on the ARR1987 guidelines. This was then updated as per ARR2019 guidelines incorporating an ensemble of 11 temporal patterns for GSDM PMF from 15 minutes to 180 minutes. **4.3.1.6 Design Events** The storm durations of 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 5%, 2%, 1% and 1% AEP with Climate Change. The critical duration and temporal patterns determined and elaborated are summarise in the table below with the information of the design events. **Table 10: Summary of Events and Critical Durations Run in TUFLOW – Albury Station Yard and Footbridge.** Design Events | Master Design Critical Duration and Temporal Pattern | Temporal Pattern 5% AEP | 30 minutes, 60 minutes, 120 minutes, 270 minutes | All 10 temporal patterns for each duration 2% AEP | 30 minutes, 60 minutes, 120 minutes, 270 minutes 1% AEP | 30 minutes, 90 minutes, 120 minutes, 270 minutes 1% AEP + Climate Change | 30 minutes, 90 minutes, 120 minutes 0.05% AEP | 30 minutes, 120 minutes PMF | 180 minutes | All 11 temporal patterns for each duration	5-0052-210-IHY-B0-RP-0001 Section 4.2.1 and Table 10

State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	6.1 Existing Condition	24/06/2025	Points of interest	It appears all nominated Points of Interest, Points 1 to 5, are within the project boundary (Figure 12). TfNSW would like to see Points of Interest nominated outside the project boundary as well, preferably one on each of the two State Roads in the impact area, at the most flood impacted location along each State Road.	Thinesh Thirum	DJV Flood Modeller	16/07/2025	The Points of Interest have been designated exclusively within the project boundary. For information regarding areas of interest outside the project boundary, including locations along the relevant State Roads, please refer to the provided flood maps.	5-0052-210-IHY-B0-RP-0001 Appendix A
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	6.4.1 Changes in Peak Flood Level	24/06/2025	Flood impacts	In the 5% AEP flood modelling indicates flood impacts over the Riverina Highway, being increases in flood level and new areas of flooding along Hume Street / Young Street (Figure A40-B). Table 27 indicates "Young Street experiences an afflux of less than 50mm, however this is within the CoA Afflux limit (CoA clause E42 (d)) for commercial land." Although these increase in flood level impacts may meet criteria listed in Condition of Approval E42(d), if land zoning is strictly applied, TfNSW does not agree with the interpretation of applying land zoning to road corridors, in particular for State Roads. Rather the use of the State Road should be considered. As such, these impacts on the State Road are not acceptable to TfNSW. TfNSW expects these impacts will be designed out to mitigate any increases in flood level and new areas of flooding along the State Road (Riverina Highway).	Thinesh Thirum	DJV Flood Modeller	16/07/2025	The QDL standards (based on the EIS report) state that the classified roads managed by TfNSW, allows up to 50mm of increased flood levels impacts. However, the COA clauses do not have a specific category to address the afflux limits in roads. Thus, DJV adopted CoA clause E42 (D), which allows up to a 50mm increase in flood levels outside the project boundary. The impact at Young Street is generally less than 25 mm. Therefore, DJV believes that the impacts are within acceptable limits.	
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	6.4.2 Changes in Peak Flood Velocity	24/06/2025	Flood impacts	"Points 1 to 4 experience less than 0.5m/s of velocity increase for events 5% AEP, 2% AEP and 1% AEP. The changes in flood velocity outside the project boundary comply with the PSR and CoA clause E42 (h) project requirements." This paragraph is confusing as Points 1 to 4 are inside the project boundary - consider rewording to clarify.	Thinesh Thirum	DJV Flood Modeller	16/07/2025	Text updated and reworded to avoid confusion. The initial text discussed velocity changes at the points of interest inside the project boundary, and the second sentence discussed velocity changes outside the project boundary. **6.4.2 Changes in Peak Flood Velocity** The table below provides details of changes in peak flood velocity for the design condition. **Table 29: Flood Velocity Impact Assessment** Design Events: 5% AEP, 2% AEP, 1% AEP Changes in Peak Flood Velocity: The changes in velocity outside the site are less than 0.5m/s. (Refer to Figure A44 to A46 in Appendix A). Points of interest from 1 to 5 inside the site, experiences less than 0.5m/s of velocity increase for events 5% AEP, 2% AEP and 1% AEP. As stated in Table 29, The changes in flood velocity outside the project boundary comply with the PSR and CoA clause E42 (h) project requirements.	5-0052-210-IHY-B0-RP-0001 Section 6.4.2
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	6.4.3 Changes in Flood Hazard	24/06/2025	Flood impacts	Table 30 states: "Generally, no increase in hazard outside the project boundary. (Refer to Figure A48 to A50 in Appendix A). Minor isolated increases can be observed at Young Street in 2% AEP and 5% AEP events, however the Hazard is still H2 or less which is generally safe and not significant." Although isolated, TfNSW still considers these increases constitute a non-compliance with Condition E42(g), particularly as Young Street is part of the Riverina Highway (State Road). TfNSW notes Table 5 reports "Compliant" with Condition E42(g) - please correct and/or provide further justification in Table 5, to justify reporting of compliant with this condition. These impacts on the State Road are not acceptable to TfNSW. TfNSW expects these impacts will be designed out to mitigate the non-compliances listed in this report. The flood modelling indicates flood impacts over the Riverina Highway, being increases in flood hazard categories and new areas of flooding along Hume Street / Young Street. There is also concerns that more frequent events than those modelled (e.g. the 10% AEP and the 20% AEP) may show even greater impacts in this area than the 5% AEP. These impacts on the State Road are not acceptable to TfNSW. TfNSW expects these impacts will be designed out to mitigate any increases in flood hazard categories and new areas of flooding along the State Road (Riverina Highway).	Thinesh Thirum	DJV Flood Modeller	16/07/2025	The Design condition hazard level (ZAEM1) is generally classified as H2 or lower, with only a few isolated pixels indicating it is not a significant issue. Analysing the hazard in terms of Depth and Velocity (Z0) shows that the state road experiences less than 0.2 m^2/s for the product of Depth and Velocity, with depths below 0.4 meters and velocities under 1.5 m/s for both the 2% and 5% Annual Exceedance Probability (AEP) events. Given that hazards with Depth x Velocity values below 0.4 m^2/s, (depths less than 0.5 meters, and velocities under 3 m/s) are classified as low hazard and safe (As per ARR). In addition, the changes in Z0 between the design condition and the existing condition are less than 0.05 m^2/s. These conditions suggest the area is generally safe. Therefore, the impact on the state road is considered not significant. A sensitivity analysis was performed for the 10% AEP event. The results indicated that changes in flood levels at the Young Street/Riverina Highway intersection are generally less than 10mm. Thus, during more frequent flood events, and any associated impacts are anticipated to be insignificant.	
State Government Agency	TfNSW	5-0052-210-IHY-B0-RP-0001	6.4.4 Changes in Duration of Inundation	24/06/2025	Flood impacts	TfNSW appreciates that two locations, one on each State Road in the impact area, has been selected for analysis of changes in duration of inundation. Please confirm if both these locations are within the trafficable portion of the State Road, as given the large size of the solid-fill location markers on Figure 15, this is difficult to interpret.	Thinesh Thirum	DJV Flood Modeller	16/07/2025	Only one Point was located at Young Street while the other point was located near the end of Kenilworth Street. However, an additional point located at the Hume Highway will be selected for reporting the change in inundation in the IFC design stage.	n/A

APPENDIX F

Independent Flood Consultant Review

Project: 2300 **Deliverable:** Albury Station Yard and Footbridge - IFC Submission - Hydrology & Hydraulics Comments

Comment Sheet Reference: 5-0052-210-IHY-B0-CS-0001-PE_E

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)	Compliance Reference	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-B0-RP-0001_A	TUFLOW files	Hatch	Dan Williams	Flood Assessment	29/07/2025	DDR	the model files provided for review couldn't be used to replicate the model results files produced for the Flood Design Report and provided for review. This appears to be an issue with the model files that were provided being incomplete and some of the xf files potentially being outdated. It is requested that this issue be resolved, and an up-to-date version of the model be provided at the IFC review stage so that the Proof Engineering simulations can confirm consistency with the results of the Flood Design Report.		Minor	Thinesh Thirumurugan	DJV Flood Modeller	8/08/2025	A review will be conducted on the submitted model files. In the IFC stage, up-to-date files and results will be provided for PE review.		Daniel Williams	Hatch	13/08/2025	CLOSED	Noted. Will confirm for close out at IFC.
2	5-0052-210-IHY-B0-RP-0001_A	TUFLOW files	Hatch	Dan Williams	Flood Assessment	22/10/2025	DDR	The updated model files have now been recieved and the results files are consistent with what is being modelled in the Proof Engineering process								Daniel Williams	Hatch	22/10/2025	CLOSED	
3	5-0052-210-IHY-B0-RP-0001_A	TUFLOW files & Report	Hatch	Dan Williams	Flood Assessment	27/10/2025	DDR	no further comments											CLOSED	
4	5-0052-210-IHY-B0-RP-0001_0	TUFLOW files & Report	Hatch	Darren Lyons	Flood Assessment	27/10/2025	IFC	no further comments											CLOSED	

MARTINUS

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