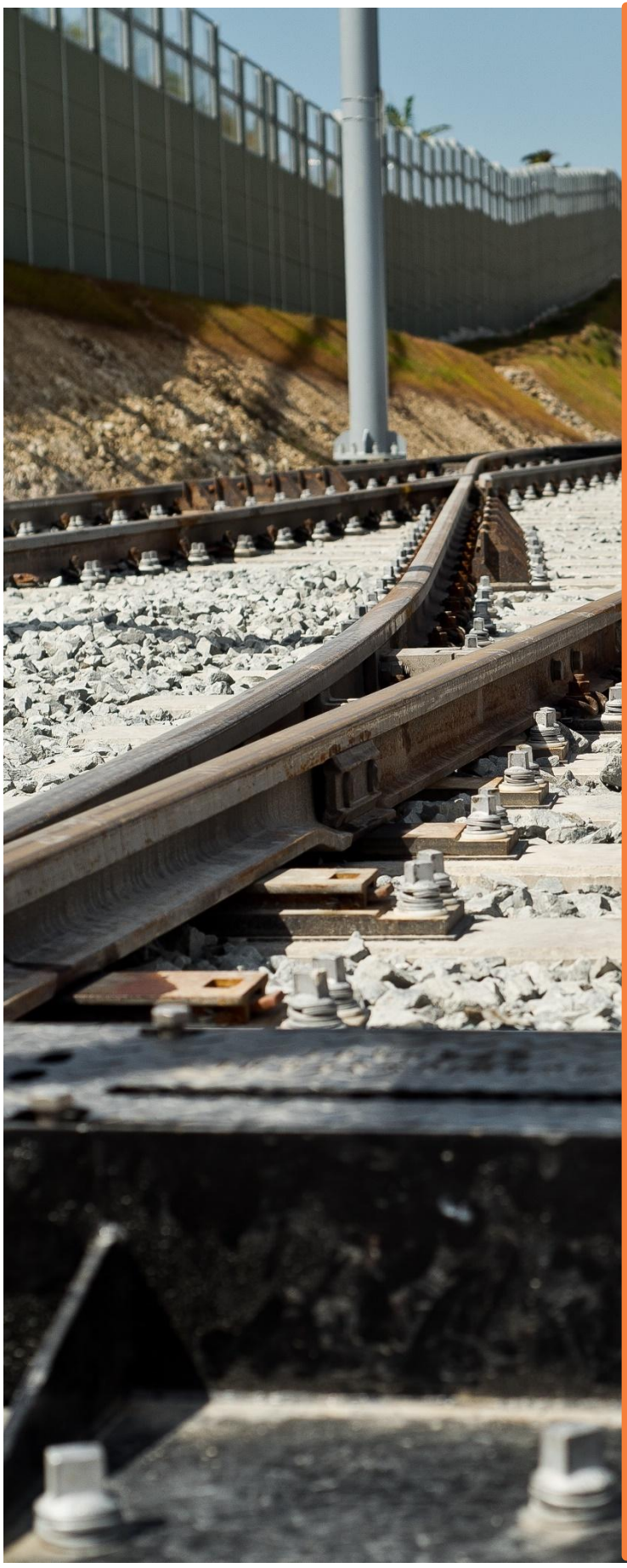
This document is uncontrolled when printed.

MARTINUS INLAND RAIL



CONSTRUCTION SOIL AND WATER MANAGEMENT PLAN – STAGE C

A2I | Albury to Illabo

CONTRACT NUMBER: 0052

PROJECT DOCUMENT NUMBER:
6-0052-210-PMA-00-PL-0027

Document Control

DOCUMENT TITLE:	Construction Soil and Water Management Plan – Stage C		
DOCUMENT OWNER:	Simon Fisher – Environmental Lead		
PREPARED BY:	Joshua O'Connell	**TITLE:**	Environmental Approvals
SIGNATURE:		**DATE:**	29/09/2026
REVIEWED BY:	Clint Dedden	**TITLE:**	Environment Approvals Advisor
SIGNATURE:	Clint Dedden	**DATE:**	29/09/2026

Approved by

NAME	TITLE	SIGNATURE	DATE
Andy Williams	Project Director		29/09/2026

Revision History

REVISION	REVISION DATE	AMENDMENT	DATE TO CLIENT
A	19/09/2025	Prepared to consider Stage C	19/09/2025
0	24/09/2025	Issued for Use and for ER approval	24/09/2025
0.1	11/05/2026	Periodic update for review	26/05/2026
1	29/09/2026	For use	29/09/2026

Disclaimer: This document has been prepared by Martinus. Use of this document shall be subject to the terms of the relevant contract with Martinus. The electronic file of this current revision is the controlled copy. This file is stored on Martinus' server located at Head Office, 3B, 33-35 Belmont St, Sutherland NSW 2232.

This document is the property of and contains proprietary information owned by Martinus. No permission is granted to publish, reproduce, transmit or disclose to another party, any information contained in this document, in whole or in part, without prior written permission from the issuing authority.

For the purpose of this document, Martinus refers to the Martinus Group of companies.

This document is uncontrolled when printed.

TABLE OF CONTENTS

GLOSSARY 5

1 INTRODUCTION 8
1.1 Project overview 8
1.2 Planning context 8
1.3 Statutory context and approval 8
1.4 Scope of this Stage C Plan 9
1.4.1 Staging 9
1.5 Interactions with other management plans and strategies 10
1.6 Consultation 11
1.6.1 Consultation for this Plan 11
1.6.2 Ongoing consultation during construction 12
1.7 Endorsement and approval 12

2 PURPOSE 13
2.1 Purpose 13
2.2 Objectives 13
2.3 Targets 13
2.4 Performance outcomes 13
2.5 SMART principles 14
2.6 Infrastructure Sustainability Council Requirements 14

3 ENVIRONMENTAL REQUIREMENTS 17
3.1 Legislation 17
3.2 Guidelines and standards 17
3.3 Minister's Conditions of Approval 17
3.4 Updated Management Measures 19
3.5 EPL No.21984 20
3.6 Water Access Licence 20

4 EXISTING ENVIRONMENT 21
4.1 Topography 21
4.1.1 Albury 21
4.1.2 Greater Hume–Lockhart 21
4.1.3 Wagga Wagga 21
4.1.4 Junee 21
4.2 Soil types 21
4.3 Saline soils 23
4.4 Acidity 25
4.4.1 Acid sulfate soils 25
4.4.2 Naturally acidic soils 25
4.5 Surface water 26
4.5.1 Local watercourses 26
4.5.2 Water quality 50
4.5.3 Sensitive receiving environments 51
4.6 Groundwater 52
4.6.1 Groundwater systems 52
4.6.2 Groundwater quality 52
4.6.3 Sensitive receivers 53

5 ASPECTS AND IMPACTS 64
5.1 Soil and erosion 64
5.1.1 Soil erosion 64
5.1.2 Acid soils and rock 64
5.1.3 Saline soils 65
5.2 Surface water 65
5.3 Groundwater 66
5.3.1 Enhancement sites with negligible or low risk of groundwater impact (EAD) 66
5.3.2 Enhancement sites with increased risk of impact (EAD) 76

6 MANAGEMENT AND MITIGATION 78
6.1 Erosion and sediment control 78
6.2 Stockpile management 78
6.3 Saline soils 79
6.4 Acid sulfate soils 79
6.4.1 Bill Hughes Bridge Site Specific ASS Management 79
6.5 Water use 80
6.6 Dewatering management 83
6.7 Spill prevention and response 83
6.8 Work in waterways 84
6.9 Groundwater 84
6.9.1 Detailed design and construction planning 84
6.9.2 Groundwater monitoring 84
6.9.3 Make good arrangements 85
6.9.4 Groundwater protocol 85
6.10 Management measures 87

7 COMPLIANCE MANAGEMENT 95
7.1 Training 95
7.2 Inspection and monitoring 95
7.2.1 Inspections 95
7.2.2 Monitoring 96
7.2.3 Auditing 96
7.2.4 Reporting and identified records 96

8 REVIEW AND IMPROVEMENT 97
8.1 Continuous improvement 97
8.2 Update and amendment 97

APPENDICES 98

APPENDIX A 99
Secondary CoAs and UMMs 99

APPENDIX B 109
Construction Surface Water Monitoring Program 109

APPENDIX C 110
Dam Dewatering Protocol 110

APPENDIX D 111
Spill Response Procedure 111

APPENDIX E 112
ISC Requirements 112

APPENDIX F 116
Water Demand Table 116

APPENDIX G 117
Overarching Erosion and Sediment Control Plan 117

LIST OF TABLES

Table 1: Consultation summary 11
Table 2: Performance outcomes (construction soil, water, salinity and groundwater) 13
Table 3: Receiving water quality specific sustainability targets 14
Table 4: Conservation of on-site resources specific sustainability targets 15
Table 5: Water use monitoring and reduction specific sustainability targets 16
Table 6: Replace potable water specific sustainability targets 16
Table 7: Primary CoA relevant to this plan 17
Table 8: Primary UMMs relevant to this plan 19

Table 9: EPL conditions 20
Table 10: Soil landscape types 21
Table 11: Summary of salinity for each precinct and enhancement site 23
Table 12: Initial salinity testing 24
Table 13: Relevant watercourses and other waterbodies 26
Table 14: Water quality monitoring data on the Murray River near Albury 50
Table 15: Water quality monitoring data on the Murrumbidgee River near Wagga Wagga 51
Table 16: Sensitive receiving environments 51
Table 17: Beneficial use categories adopted for assessment (DPIE 2019a, 2019b & 2019c) 53
Table 18: Summary of known groundwater conditions 54
Table 19: Preliminary groundwater results 61
Table 20: Assessment of Enhancement Sites that are not predicted to intersect the Regional Permanent Groundwater Table 67
Table 21: Assessment of Enhancement Sites that are anticipated to intercept the water table due to piling 73
Table 22: Potential construction water sources 80
Table 23: Additional construction water sources 81
Table 24: Water balance 82
Table 25: Water reuse criteria 83
Table 26: Water discharge criteria 83
Table 27: Groundwater monitoring parameters 85
Table 28: Construction soil and water management and mitigation measures 87
Table 29: Inspections relevant to soil and water 95

LIST OF FIGURES

Figure 1: Watercourses relative to Murray River Bridge enhancement site 29
Figure 2: Watercourses relative to Albury Station Yard enhancement site 30
Figure 3: Watercourses relative to Billy Hughes Bridge enhancement site 31
Figure 4: Watercourses relative to Table Top Yard enhancement site 32
Figure 5: Watercourses relative to Culcairn Station Yard enhancement site 33
Figure 6: Watercourses relative to Henty Yard enhancement site 34
Figure 7: Watercourses relative to Yerong Creek Yard enhancement site 35
Figure 8: Watercourses relative to The Rock Yard enhancement site 36
Figure 9: Watercourses relative to Uranquinty Yard enhancement site 37
Figure 10: Watercourses relative to Pearson Street Bridge enhancement site 38
Figure 11: Watercourses relative to Cassidy Parade Pedestrian Bridge, Edmonson Street Bridge and Wagga Wagga Station Yard enhancement sites 39
Figure 12: Watercourses relative to Docker Street (Wagga Wagga Station Yard enhancement site) 40
Figure 13: Watercourses relative to Bomen Yard Enhancement Site 41
Figure 14: Watercourses relative to Harefield Yard enhancement site 42
Figure 15: Watercourses relative to Kemp Street Bridge, Junee Station yard and Junee Yard Clearances enhancement sites 43
Figure 16: Watercourses relative to Olympic highway Underbridge enhancement site 44
Figure 17: Watercourses relative to Junee to Illabo clearances enhancement site (1 of 5) 45
Figure 18: Watercourses relative to Junee to Illabo Clearances enhancement site (2 of 5) 46
Figure 19: Watercourses relative to Junee to Illabo Clearances enhancement site (3 of 5) 47
Figure 20: Watercourses relative to Junee to Illabo Clearances enhancement site (4 of 5) 48
Figure 21: Watercourses relative to Junee to Illabo Clearances enhancement site (5 of 5) 49

GLOSSARY

TERM	DEFINITION
A2I	Albury to Illabo section of the Inland Rail project
AIP	NSW Aquifer Interference Policy
ARI	Average Recurrence Interval
ARTC	Australian Rail Track Corporation
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soils
BCS	Biodiversity, Conservation and Science Directorate of DCCEEW (former)
CBMP	Construction Biodiversity Management Plan
CCS	Community Communication Strategy
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CFBEMP	Construction Flood and Bushfire Emergency Management Plan
CGMP	Construction Groundwater Monitoring Program
CMP	Construction Monitoring Program
CPESC	Certified Professional in Erosion and Sediment Control
CPHR	Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Conservation, Programs, Heritage and Regulation
CoA	Conditions of Approval
Construction	Includes work required to construct the CSSI as defined in the Project Description described in the documents listed in Condition A1 including commissioning trials of equipment and temporary use of any part of the CSSI but excluding Low Impact Work which is carried out or completed prior to approval of the CEMP.
CSSI	Critical State Significant Infrastructure
CSWMP	Construction Soil and Water Management Plan – Stage C (this Plan)
CWCHMMP	Construction Waste, Contamination and Hazardous Materials Management Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
DPHI	Department of Planning, Housing and Infrastructure
EAD	Environmental Assessment Documentation that includes: • Inland Rail – Albury to Illabo Environmental Impact Statement (ARTC, August 2022); • Albury to Illabo Response to Submissions (ARTC, November 2023); • Albury to Illabo Preferred Infrastructure Report (ARTC, November 2023);

TERM	DEFINITION
	• Albury to Illabo Preferred Infrastructure Report Response to Submissions (ARTC, February 2024); • Inland Rail – Albury to Illabo (SSI-10055) Response to request for additional information – Air Quality Assessment (letter dated 1 May 2024); • Part 1 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024); • Part 2 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024); • Albury to Illabo Kemp Street Bridge Enhancement Site Modification (June 2025); • Albury to Illabo Kemp Street Bridge Enhancement Site Modification Clarification (July 2025); • Albury to Illabo Kemp Street Bridge Modification Noise and Vibration Impact Assessment (August 2025).
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority (NSW)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
EPL	Environment Protection Licence
Environmental Representative (ER)	The Environmental Representative(s) for the CSSI approved by the Planning Secretary
ESCP	Erosion and Sediment Control Plan
EWMS	Environmental Work Method Statement
GDEs	Groundwater Dependent Ecosystems
IRPL	Inland Rail Pty Ltd
ISC	Infrastructure Sustainability Council
km	Kilometre
LGA	Local Government Area
m	metre
mAHD	Metres Australian Height Datum
mBGL	Metres below ground level
ML	Megalitre
Modification Report	Documents that include: ▪ Albury to Illabo Kemp Street Bridge Enhancement Site Modification (June 2025); ▪ Albury to Illabo Kemp Street Bridge Enhancement Site Modification Clarification (July ▪ 2025); ▪ Albury to Illabo Kemp Street Bridge Modification Noise and Vibration Impact Assessment (August 2025).
MR	Martinus Rail
MR ESM	Martinus Rail Environment, Approvals and Sustainability Manager
NSW	New South Wales
OEH	Office of Environment and Heritage

TERM	DEFINITION
PASS	Potential Acid Sulfate Soils
Permanent stockpile sites	Permanent stockpile sites are generally required for ongoing maintenance of existing roads and have a longer life than temporary stockpiles.
PESCP	Progressive Erosion and Sediment Control Plan
pH	A figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acid and higher values more alkaline
Planning Secretary	Secretary of the NSW Department of Infrastructure, Housing and Infrastructure, or delegate
PIR	Preferred Infrastructure Report
Primary CoA/UMM	CoA and/or UMMs that are specific to the development of this Plan
POEO Act	*NSW Protection of Environment Operations Act 1997*
SEARs	Secretary's Environmental Assessment Requirements
SIMP	Social Impact Management Plan
SMART	Specific, Measurable, Achievable, Relevant and Timely
SSI	State Significant Infrastructure
SuMP	Sustainability Management Plan
Temporary stockpile sites	Temporary stockpile sites are generally project related, with their use limited to the duration of the project. These stockpile sites are established at the beginning and used throughout the project. Once the project is complete, the site is usually de-commissioned and the land restored to its original condition.
UMM	Updated Management Measures
Waterfront land	Defined in *Controlled activities – Guidelines for riparian corridors on waterfront land* (DPE 2022) as: Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary.

1 INTRODUCTION

1.1 Project overview

Inland Rail is an approximate 1,600 kilometres (km) freight rail network that will connect Melbourne and Brisbane via regional Victoria, New South Wales (NSW) and Queensland. The Inland Rail route would involve using approximately 1,000 km of existing track (with enhancements and upgrades where necessary) and 600 km of new track, passing through 30 local government areas (LGAs). Inland Rail will accommodate double-stacked freight trains up to 1,800 metres (m) long and 6.5 m high.

The Australian Government has confirmed that Inland Rail is an important project to meet Australia's growing freight task, improve road safety and help decarbonise the economy. Inland Rail will enhance our national freight and supply chain capabilities, connecting existing freight routes through rail, roads and ports, and supporting Australian's growth. Inland Rail is being delivered by Australian Rail Track Corporation (ARTC) and Inland Rail Pty Ltd (IRPL).

Comprising 12 sections, a staged approach is being undertaken to deliver Inland Rail. Each of these projects can be delivered and operated independently with tie-in points to the existing railway. Work south of Parkes has been prioritised, which will enable Inland Rail to initially connect to existing rail networks between Melbourne, Sydney, Perth and Adelaide via Parkes and Narromine. The Parkes to Narromine and Narrabri to North Star Phase 1 sections are complete.

The project will enable enhancement works to structures and sections of track along 185 km of the existing operational standard-gauge railway in the Albury to Illabo (A2I) section of the Inland Rail program. Enhancement works are required to provide the increased vertical and horizontal clearances required for double-stacked freight trains. Works would include track realignment, lowering and/or modification within the existing rail corridor, modification, removal or replacement of bridge structures (rail, road and/or pedestrian bridges), raising or replacing signal gantries, level-crossing modifications and other associated works.

A detailed project description is provided in Section 4 of the Construction Environmental Management Plan (CEMP).

1.2 Planning context

The Inland Rail – Albury to Illabo project (the project) is declared State significant infrastructure (SSI) and critical State significant infrastructure (CSSI) under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). The project (SSI-10055) is permissible without development consent and is subject to assessment and approval by the NSW Minister for Planning and Public Spaces.

An environmental impact statement (EIS) was prepared to support ARTC's application for approval of the project in accordance with the requirements of the EP&A Act and the environmental assessment requirements of the Secretary of the (then) NSW Department of Planning, Industry and Environment (the SEARs) (now the Department of Planning, Housing and Infrastructure (DPHI)).

The EIS was placed on public exhibition from 17 August 2022 to 28 September 2022. During the exhibition period, interested stakeholders and members of the community were able to review the EIS online, participate in consultation and engagement activities held by ARTC, and make a written submission to the DPE for consideration in its assessment of the project.

In accordance with section 5.17(6)(b) of the EP&A Act, on 13 April 2023 the Planning Secretary directed ARTC to submit a Preferred Infrastructure Report (PIR) that provides further assessment of traffic and transport, noise and vibration, and air quality impacts. The PIR was also prepared to consider changes to the exhibited project that have arisen as a consequence of these further assessments and related submissions.

A modification report (Kemp Street Bridge Enhancement Site Modification, Inland Rail June 2025) was prepared to revise the replacement road and pedestrian bridge arrangement over the railway line at the Kemp Street bridge enhancement site in Junee to now provide a combined, single structure.

1.3 Statutory context and approval

The Inland Rail – Albury to Illabo project was assessed as part of the following documents:

- Inland Rail – Albury to Illabo Environmental Impact Statement (ARTC, August 2022);
- Albury to Illabo Response to Submissions (ARTC, November 2023);
- Albury to Illabo Preferred Infrastructure Report (ARTC, November 2023);
- Albury to Illabo Preferred Infrastructure Report Response to Submissions (ARTC, February 2024);
- Inland Rail – Albury to Illabo (SSI-10055) Response to request for additional information – Air Quality Assessment (letter dated 1 May 2024);

- Part 1 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024);
- Part 2 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024);
- Kemp Street Bridge Enhancement Site Modification (June 2025);
- Albury to Illabo Kemp Street Bridge Enhancement Site Modification Clarification (July 2025);
- Albury to Illabo Kemp Street Bridge Modification Noise and Vibration Impact Assessment (August 2025).

Together these documents are referred to as the Environmental Assessment Documentation (EAD).

The original approval for the project under the EP&A Act was granted by the Minister for Planning on 8 October 2024. The Modification was approved by the delegate of the NSW Minister for Planning and Public Spaces on 13 August 2025.

1.4 Scope of this Stage C Plan

The scope of this Construction Soil and Water Management Plan (CSWMP or this Plan) is to describe how the project will manage potential soil, water, salinity and groundwater impacts during Stage C construction of the project (refer Section 1.4.1).

It is noted that the management of both salinity (CoA C6(h)) and groundwater (CoA C6(k)) are included in this Plan. This is in accordance with CoA C6 which states that nothing in this CoA prevents the project from combining any of the required CEMP Sub-plans.

This Plan addresses the requirements of the EAD including incorporating the relevant updated environmental management measures (UMMs), and CoAs. SMART (Specific, Measurable, Achievable, Realistic and Timely) principles have been considered and applied during the preparation of this Plan which will be implemented for the duration of Stage C construction.

All project staff and sub-contractors are required to comply with and operate fully under the requirements of this Plan and related environmental management plans, over the full duration of the Stage C construction program.

Operational soil and water management measures do not fall within the scope of this CSWMP and therefore are not included within the processes contained within this CSWMP.

1.4.1 Staging

The Staging Report describes how the construction and operation of the project will be staged in accordance with CoA A9, A10 and A11. A staged approach has been primarily adopted for the project to prioritise critical activities that are reliant upon infrequent and fixed rail possessions. It overall de-risks the construction program for the project, ensuring that the project is operational within the timeframe committed to by the NSW Government.

As required by CoA A14 and C16, a Construction Environmental Management Framework (CEMF) has been prepared to be consistent with the Staging Report. The CEMF has been prepared to facilitate the preparation and approval of CEMPs, Sub-plans, and construction monitoring plans (CMPs) during the construction phase of the project. It includes a guide to the general environmental, stakeholder and community management requirements which will be implemented during construction and provides a road map for environmental management documentation.

In accordance with CoA C16, the CEMF must be endorsed by the Environmental Representative (ER) and then submitted to the Planning Secretary (for approval) no later than one (1) month before the lodgement of any CEMP, CEMP Sub-plan, or Construction Monitoring Program.

This CEMP has been prepared to be consistent with the Staging Report and the CEMF, as required by CoA A11 and A12, as well as C16.

Stage C, as described in Section 2.1.5 of the Staging Report, will include demolition of the existing Edmondson Street bridge and construction of the new Edmondson Street bridge. Construction in Stage C will also comprise a continuation of activities started in Stage A, Stage B and/or Stage B2 and therefore works will be occurring at all enhancement sites during Stage C:

- Murray River Bridge;
- Albury Station pedestrian bridge;
- Albury Yard clearances;
- Riverina Highway bridge;
- Billy Hughes bridge;
- Table Top Yard clearances
- Culcairn pedestrian bridge;
- Culcairn Yard clearances;

- Henty Yard clearances
- Yerong Creek Yard clearances
- The Rock Yard clearances;
- Uranquinty Yard clearances;
- Pearson Street bridge;
- Cassidy Parade pedestrian bridge;
- Edmondson Street bridge;
- Wagga Wagga Station pedestrian bridge;
- Wagga Wagga Yard clearances;
- Bomen Yard clearances;
- Harefield Yard clearances;
- Kemp Street bridge;
- Junee pedestrian bridge;
- Junee Yard clearances;
- Olympic Highway underbridge;
- Junee to Illabo clearances.

This plan applies to the entirety of Stage C.

Staging is described further in Section 4.2 of the CEMP and in the CEMF and Staging Report.

Construction work during Stage C will generally include:

- Pre-construction activities that have not commenced before the approval of the CEMP;
- Utility works, including drainage;
- Site establishment and operation;
- Traffic management and access, including material haulage;
- Clearing, grubbing and topsoil strip;
- Earthworks including preparation of pads and stockpiling;
- Track work including realignment and lowering;
- Rail bridge works;
- Road and pedestrian bridge works, including demolition;
- Level crossing works;
- Gantry and signalling work
- Finishing works.

1.5 Interactions with other management plans and strategies

This Plan has the following interrelationships with other management plans and documents:

- The Construction Flood and Bushfire Emergency Management Sub-plan (CFBEMP) addresses how flood and bushfire emergencies will be managed during construction of the project;
- The Water Reuse Strategy identifies and evaluates options for water reuse during construction of the project;
- The Construction Waste, Contamination and Hazardous Materials Management Sub-plan (CWCHMMP) addresses the management of contaminated land, hazardous materials, and unexpected contaminated finds for the project;
- The Construction Biodiversity Management Sub-plan (CBMP) addresses the management of flora and fauna including aquatic and riparian habitats and vegetation rehabilitation during the construction of the project;
- The Social Impact Management Plan (SIMP) which addresses the socio-economic impacts associated with all stages of the project.
- The Sustainability Management Plan (SuMP) which outlines the required sustainability goals and deliverables of the project, and how the Contractor intends to achieve these outputs during design, delivery and operation of the project under the Infrastructure Sustainability Council (ISC) rating system.

Where a reference to another document is made, this is assumed to be the most recent version, unless otherwise stated.

1.6 Consultation

1.6.1 Consultation for this Plan

In accordance with CoA C6, this CSWMP will be prepared in consultation with Department of Climate Change, Energy, the Environment and Water (DCCEEW) – Conservation, Programs, Heritage and Regulation (CPHR), DCCEEW Water Group (groundwater aspects of this Plan only), the NSW Environment Protection Authority (EPA), and the following relevant councils:

- Wagga Wagga Council;
- Albury City Council;
- Greater Hume Council;
- Lockhart Shire Council;
- Junee Shire Council.

Consultation with these stakeholders was undertaken during the development of the Stage A CSWMP. All Councils and the NSW EPA had no comments on the Stage A CSWMP. BCS (now CPHR) had various comments including on Sloane's Froglets, fauna handling and fauna relocation. DCCEEW Water had various comments including on water supply, groundwater and waterfront lands.

Consultation was also undertaken during the development of the Stage B CSWMP. The consultation report prepared for the Stage B CSWMP in accordance with CoA A8 outlines the location in which stakeholder responses, where provided, have been addressed. A summary of consultation has been provided in Table 1.

No further consultation was undertaken during the development of the Stage C CSWMP as the demolition of the Edmondson Street bridge was originally included in the scope of the Stage B CSWMP when the plan was provided to stakeholders.

TABLE 1: CONSULTATION SUMMARY

Stakeholder	Dates	Feedback provided	How addressed
CPHR (former BCS)	9/05/2025	Various comments provided from CPHR, including: ▪ Adding or changing the names of watercourses and identifying features. ▪ Figures should show the names of watercourses and the exclusion zone at Billy Hughes bridge. ▪ Queries regarding monitoring periods, Sloane's Froglet management measures, ESCPs. ▪ A request to update the figures in the Monitoring Program. ▪ Comments on the Dam Dewatering Protocol about Sloane's Froglets.	The document was updated to address CPHR comments as follows: ▪ The watercourse and identifying feature names were added to the document. ▪ Watercourse names and the exclusion zone are now included in the figures. ▪ Clarification was provided in the text regarding monitoring periods, Sloane's Froglet measures and the ESCPs. ▪ The figures in the Monitoring Program were amended. ▪ The Dam Dewatering protocol was amended.
DCCEEW Water Group	15/05/2025	The CSWMP should be updated to: ▪ provide details on maximum annual groundwater take volumes from aquifer interference activities ▪ provide details on the Water Access Licence(s) required to account for groundwater take from affected water sources or	▪ Section 5.3.2 includes estimated groundwater take volumes that were identified in the EAD. The project is refining the groundwater take predictions. ▪ A new Section 3.6 has been included to confirm that following consultation with DCCEEW Water the Project is

Stakeholder	Dates	Feedback provided	How addressed
		identify where an exemption applies.	exempt under the Water Management (General) Regulation 2025.
	25/06/2025	Meeting between DCCEEW Water Group and Martinus Rail regarding potential licencing / exemption avenues.	▪ Update to Section 3.6 regarding the applicable water access licence exemption.
NSW EPA	1/05/2025	EPA response confirming no comments on the Plan.	N/A
Albury City Council	20/05/2025	Relating to flooding – please ensure all works maintain pre-development flows and have no impact on existing Council-maintained infrastructure.	Permanent impacts on flooding are addressed in the Flood Design Reports, which are presented to Council for review and comment. Construction planning (Section 6.2.2 of the Construction Flood and Bushfire Emergency Management Plan) also identifies how the layout of construction works sites and ancillary facilities would be carried out to minimise impacts on overland flow paths and flooding risks.
Greater Hume Council	23/04/2025	Council has no comments on the Plan.	N/A
Junee Shire Council	N/A	No response received	N/A
Lockhart Shire Council	17/04/2025	Response received from council stating they have no comments on the Plan	N/A
Wagga Wagga City Council	N/A	No response provided	N/A

1.6.2 Ongoing consultation during construction

Ongoing consultation between Martinus Rail, IRPL, other construction projects, stakeholders, the community and relevant agencies regarding the management of soil and water impacts on the environment will be undertaken during the construction of the project as required.

As required by CoA E172, prior to construction, Martinus Rail will consult with the landowner and/or relevant roads authority that is located immediately adjacent to the new or upgraded culvert to determine the potential for impacts on infrastructure, dwellings, property access, agricultural productivity, farm operations and farm dams (including changes in water supply yield, reliability of supply, flood flows and embankment stability) due to the introduction or alteration of flows.

Where potential adverse impacts are identified, Martinus Rail will consult with the affected landowner or relevant roads authority on the management measures that will be implemented to mitigate the impacts. The outcomes of this consultation will be documented. The process for consultation is described in the Community Communication Strategy (CCS).

1.7 Endorsement and approval

Construction will not commence until the relevant CEMP(s) and Sub-plans have been endorsed by the ER and approved by the Planning Secretary (as applicable and as identified in the CEMF approved under CoA C16), in accordance with CoA C15.

Additionally, the CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER, must be implemented for the duration of Stage C of construction.

2 PURPOSE

2.1 Purpose

The purpose of this Plan is to describe how potential construction soil and water will be managed during Stage C construction of the project. This includes the management of salinity and groundwater.

2.2 Objectives

The key objective of this Plan is to ensure that soil and water (including salinity and groundwater) to the environment associated with the project are minimised. To aid in achieving this objective, this Plan incorporates the relevant soil, water management measures from the following sources:

- The project EAD;
- Inland Rail – Albury to Illabo Infrastructure Approval CoA (SSI-10055);
- All relevant legislation and other requirements described in Section 3 of this Plan.

In addition to the above, a SIMP has been developed for the project. The SIMP identifies desired outcomes for the project, including 'amenity impacts are minimised through monitoring, engagement and continuous improvement initiatives'. The implementation of this CSWMP supports the desired outcome through the implementation of the identified management measures and monitoring activities.

2.3 Targets

Targets for the management of soil and water impacts during the project include:

- Achieve full compliance with relevant legislative requirements including CoAs and UMMs;
- Full compliance with any Environmental Protection License (EPL);
- Manage potential downstream water quality impacts during the construction of the project through the implementation of feasible and reasonable water quality management measures.

2.4 Performance outcomes

Performance outcomes identified in Chapter 27 of the EIS (Approach to mitigation and management), that are relevant to the management of soil, water, salinity, groundwater and air during construction of the project are identified in Table 2.

TABLE 2: PERFORMANCE OUTCOMES (CONSTRUCTION SOIL, WATER, SALINITY AND GROUNDWATER)

Performance outcomes	How performance outcome will be achieved
Minimises the use of water during construction, as much as practicable.	Implement this CSWMP, particularly the management measures in Section 6, which have been developed to consider the requirements in Section 3.2, Section 3.3 and Appendix A. Undertake training, inspections and monitoring as summarised in Section 6.2 and Section 6.5.
Minimises changes to water flows in watercourses, as far as practicable, due to design and construction considerations.	
Implements erosion and sediment controls during construction in accordance with the Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 4th Edition March 2004) and Volume 2D Main Roads Construction (DECC 2008) – commonly referred to as the 'Blue Book';	
Protects or contributes to achieving the water quality objectives, during construction and operation, by establishing discharge criteria that protect the environmental values of the receiving waters, as far as practicable	
Considers site-specific soil, subsoil and landform characteristics during detailed design and construction.	
Manages any contamination in accordance with relevant regulatory requirements.	
Assesses, classifies, manages and disposes of any soil waste in accordance with the Waste Classification Guidelines (NSW EPA, 2014b).	

2.5 SMART principles

This Plan has been developed with the consideration of SMART principles. This was achieved as follows:

- **Specific**: The measures listed this Plan are specific to soil and water management during construction. They include the development and implementation of plans and procedures tailored to address soil, water, groundwater and salinity impacts, identification, and management of specific issues;
- **Measurable**: This Plan provides specific measures, requirements, and references that enable the evaluation and measurement of the effectiveness of each control measure. Monitoring program and reporting requirements are outlined, allowing for the assessment of soil, water, groundwater and salinity impacts;
- **Achievable**: The control measures outlined in this Plan are practical and achievable within the construction context. They involve the implementation of plans, investigations, and management strategies that can be feasibly executed during the construction phase;
- **Relevant**: The measures are directly relevant to soil and water management during construction. They address potential impacts and these measures are designed to mitigate or prevent soil, water, groundwater and salinity impacts;
- **Time-bound**: This Plan specifies when each measure should be implemented, such as prior to and during construction. It also assigns responsibilities to specific roles, indicating the timeline and accountability associated with each measure.

2.6 Infrastructure Sustainability Council Requirements

Both Martinus Rail and Inland Rail are firmly committed to ensuring the projects are designed and constructed with high levels of sustainability integrated throughout the projects. Martinus Rail has developed and will implement a Sustainability Management Plan (SuMP) that is compliant with:

- Project Approvals
- *Inland Rail Sustainability Strategy* (0-0000-900-ESS-00-RP-0003)
- *Specification - Inland Rail Sustainability Requirements – Albury to Parkes* (3-0000-210-ESS-00-SP-0001)
- A2P Enhancement Projects Incentivised Target Cost Deed (ARTC Contract No. 2140-0001)

Martinus Rail will aim to achieve a certified minimum rating of “Excellent” under the Infrastructure Sustainability Council (ISC) Infrastructure Sustainability Technical Manual version 1.2. For further detail, please refer to the SuMP.

Detailed management of soil and water impact targets are outlined in Section 2.3. Table 3 to Table 6 below lists the relevant Infrastructure Sustainability credits and indicates where they are addressed in this plan or references external documents that fulfill the ISC credit criteria. See Appendix E - ISC Requirements for the detailed compliance tables.

TABLE 3: RECEIVING WATER QUALITY SPECIFIC SUSTAINABILITY TARGETS

ISC Reference	Commitment	Document reference
Dis-1	Measures to minimise adverse impacts to receiving water environmental values during construction and operation have been identified and implemented.	▪ Section 6.1 ▪ Construction Environmental Management Plan ▪ Environmental Work Method Statements ▪ Dam Dewatering Protocol ▪ Spill Response Procedure ▪ Environmental Impact Statement
Dis-1	Monitoring of water discharges and receiving waters is undertaken at appropriate intervals and at times of discharge during construction.	▪ Section 7.2 ▪ Appendix B, Construction Surface Water Monitoring Program ▪ Construction Biodiversity Management Sub-plan
Dis-1	Monitoring and modelling of water discharges and receiving waters demonstrates no adverse impact on local receiving water environmental values.	▪ Section 2.4 ▪ Appendix B, Construction Surface Water Monitoring Program

ISC Reference	Commitment	Document reference
		▪ Biodiversity Impact Assessments
Dis-1	The infrastructure does not increase peak stormwater flows for rainfall events of up to a 1.5 year ARI event discharge	▪ Flood Design Reports
Dis-1	Opportunities to improve local receiving water quality and/or provide environmental flows have been identified and implemented	▪ Specification Landscape Design ▪ Urban Design and Landscaping Plan
Dis-1	Monitoring and modelling demonstrates improvement of local receiving water environmental values	▪ Appendix B, Construction Surface Water Monitoring Program ▪ Construction Groundwater Monitoring Program ▪ Biodiversity Impact Assessments

TABLE 4: CONSERVATION OF ON-SITE RESOURCES SPECIFIC SUSTAINABILITY TARGETS

ISC Reference	Commitment	Document reference
Lan-2	Conservation of topsoil and subsoil has been considered.	▪ Section 6.2 ▪ Spoil Management Strategy ▪ Site Environmental Plans ▪ Erosion and Sediment Control Plans ▪ Inspection and Testing Plans
Lan-2	All subsoil and topsoil impacted by the project is separated and protected from degradation, erosion or mixing with fill or waste;	▪ Section 6.2 ▪ Section 7.2.1 ▪ Spoil Management Strategy ▪ Construction Waste, Contamination and Hazardous Materials Management Plan ▪ Daily site diaries and site inspection records ▪ Inspection and Testing Records
Lan-2	95% of all topsoil (by volume) retains its productivity and is beneficially re-used on or nearby to the project.	▪ Soil Tracking Register ▪ Daily site diaries and site inspection records ▪ Inspection and Testing Records
Lan-2	Opportunities to improve topsoil productivity of previously disturbed areas have been identified and incorporated into the project.	▪ Construction Waste, Contamination and Hazardous Materials Management Plan ▪ Spoil Management Strategy ▪ Inland Rail Landscape and Rehabilitation Framework ▪ Urban Design and Landscaping Plan

ISC Reference	Commitment	Document reference
		▪ Design Reports ▪ Inspection and Testing Records

TABLE 5: WATER USE MONITORING AND REDUCTION SPECIFIC SUSTAINABILITY TARGETS

ISC Reference	Commitment	Document reference
Wat-1	Monitoring and modelling (reasonable estimates or predictions) of water use, is undertaken	▪ Section 6.5 ▪ Section 6.10, Table 28 ▪ Appendix F, Water Demand Table ▪ Water Reuse Strategy
Wat-1	Monitoring and modelling demonstrates a reduction in water use compared to a base case footprint.	▪ A2I BAU Assumptions (Water Usage) ▪ Water Balance Calculations ▪ A2I Water Modelling

TABLE 6: REPLACE POTABLE WATER SPECIFIC SUSTAINABILITY TARGETS

ISC Reference	Commitment	Document reference
Wat-2	Monitoring and modelling demonstrates that some proportion of total water use is from non-potable sources (substituting for potable). Fractions of Levels may be achieved on a sliding scale up to 100% for Level 3.	▪ Section 6.5 ▪ Section 6.6 ▪ Section 6.10, Table 28 ▪ A2I BAU Assumptions (Water Usage) ▪ Appendix C, Dam Dewatering Protocol ▪ A2I Water Reuse Strategy ▪ Water Usage Monitoring Records ▪ Water Balance Calculations ▪ A2I Water Modelling

3 ENVIRONMENTAL REQUIREMENTS

3.1 Legislation

Legislation and regulations relevant to soil and water management includes:

- *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act);
- *Protection of the Environment Operations Act 1997* (NSW) (POEO Act);
- *Water Act 2007* (Cth);
- *Water Amendment Act 2008* (Cth);
- *Water Act 1912* (NSW);
- *Water Management Act 2000* (NSW).

A register of legal requirements for the project is contained in Appendix A1 of the CEMP.

3.2 Guidelines and standards

The main guidelines, specifications, and policy documents relevant to this Plan include:

- Environmental Management Plan Guideline – Guideline for Infrastructure Projects (DPHI, April 2020);
- Inland Rail Construction Environmental Management Framework (A2P CEMF) (0-0000-900-EEC-00-SP-0002_2) (ARTC, 2022);
- Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 4th Edition March 2004) and Volume 2D Main Roads Construction (DECC 2008) – commonly referred to as the 'Blue Book';
- Managing Urban Stormwater – Soils and Construction, Volumes 2A and 2C (NSW Department of Environment, Climate Change and Water 2008) – commonly referred to as the 'Blue Book';
- Policy and Guidelines for Fish Habitat Conservation and Management (DPI Fisheries, 2013);
- Guidelines for controlled activities on waterfront land (Department of Primary Industries (DPI), 2012b);
- Guidelines for developments adjoining land and water (OEH, 2013b);
- Murray–Darling Basin Plan 2012 (including water resource plans and water quality management plans) (Murray–Darling Basin Authority, 2012) (the Basin Plan 2012);
- National Water Quality Management Strategy (Australian and New Zealand Environment and Conservation Council (ANZECC), 2018);
- Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000a) (the ANZECC guidelines);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Governments, 2018) (the Water Quality Guidelines);
- NSW Water Quality and River Flow Objectives (Department of Environment, Climate Change and Water (DECCW), 2006) (the NSW Water Quality Objectives).
- Inland Rail Sustainability Strategy (0-0000-900-ESS-00-RP-0003)
- Inland Rail Sustainability Requirements – Albury to Parkes (3-0000-210-ESS-00-SP-0001)

3.3 Minister's Conditions of Approval

The requirements of the CoA relevant to the development of this Plan are shown in Table 7. These are defined as primary CoA and are specifically related to the development of this Plan. Secondary CoA have been listed in Appendix A. A cross reference is also included to indicate where the CoA is addressed in this Plan or other project management document.

TABLE 7: PRIMARY COA RELEVANT TO THIS PLAN

No.	Requirement	Where addressed
C5	CEMP(s) (and relevant CEMP sub-plans) not requiring the Planning Secretary's approval, but requiring ER endorsement, must be submitted to the ER no later than one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage. The CEMPs (and relevant CEMP sub-plans) must be endorsed by the ER as being consistent with the conditions of this approval and all undertakings made in the documents listed in Condition A1.	This CSWMP Section 1.7

No.	Requirement	Where addressed
C6	Except as provided by Condition C16 the following CEMP Sub-plans must be prepared in consultation with the relevant government agencies identified for each CEMP Sub-plan. Details of all information requested by an agency during consultation must be provided to the Planning Secretary as part of any submission of the relevant CEMP Sub-plan, including copies of all correspondence from those agencies as required by Condition A8. (b) Soil and water — BCS*, NSW EPA, and relevant councils (h) Salinity management plan — Relevant councils (k) Groundwater management plan — DCCEEW Water Group and relevant councils Note: 1. CEMP Sub-plan(s) may reflect the construction of the project through geographical activities, temporal activities or activity-based staging. Nothing in this condition prevents the Proponent from combining any of the above CEMP Sub-plans.	This CSWMP Section 1.6
C7	The CEMP Sub-plans must state how:	-
	(a) the environmental performance outcomes identified in the documents listed in Condition A1 will be achieved;	Section 1.3 Section 2.4
	(b) the mitigation measures identified in the documents listed in Condition A1 will be implemented;	Section 6
	(c) the relevant terms of this approval will be complied with; and	Section 3.3 Section 6 Section 7 Appendix A
	(d) issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.	Section 2.5 Section 6 Section 8 Appendix B
C13	The Soil and Water Management Sub-plan must include:	-
	a) Measures to avoid and minimise erosion and sedimentation impacts including to agricultural and forested land, and areas of high salinity and high erosion potential;	Section 6.3 Section 6.1 Section 6.10
	b) Information demonstrating that the required construction water resources are legally and physically available;	Section 6.5
	c) Procedures and protocols for the appropriate supply, transport and storage of water across the CSSI;	Section 6.5
	d) mitigation measures to address construction water resource shortages that arise;	Section 6.5 Water Reuse Strategy
	e) a Construction Groundwater Management Plan (CGMP) that includes a protocol for avoiding, minimising and mitigating impacts.	Section 4.6

No.	Requirement	Where addressed
		Section 5.3 Section 6.9 Table 28: CSW-28 to CSW-32
	f) a surface water monitoring framework;	Appendix B
	g) a dam dewatering protocol;	Appendix C
	h) a spill response procedure; and	Appendix D
C15	Construction must not commence until the relevant CEMP(s) and CEMP Sub-plans have been approved by the Planning Secretary or endorsed by the ER, (as applicable and as identified in the CEMF approved under Condition C16). The CEMP and CEMP Sub-plans, as approved by the Planning Secretary, including any minor amendments approved by the ER, must be implemented for the duration of construction. Where the CSSI is being staged, construction of that stage is not to commence until the relevant CEMP and sub-plans have been endorsed by the ER and approved by the Planning Secretary or ER.	Section 1.4
C16	Except as provided by **Condition C16** the following **Construction Monitoring Programs** must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in **Condition A1** or in the **CEMP**: **Required Construction Monitoring Programs** / **Relevant government agencies to be consulted for each Construction Monitoring Program** (d) Surface water — DCCEEW Water Group, and relevant councils	Appendix B

* BCS has changed names and is now CPHR

3.4 Updated Management Measures

There are two identified primary requirements of the UMMs related to the preparation of this CSWMP as listed in Table 8. Secondary UMMs have been listed in Appendix A. A cross reference is also included to indicate where the UMM is addressed in this Plan or other project management documents.

TABLE 8: PRIMARY UMMS RELEVANT TO THIS PLAN

No.	Requirement	Timing	Where addressed
HFWQ1	Construction-phase water supply options will continue to be explored during detailed design and would include ongoing consultation with water suppliers to access the local reticulated network, use of water tanks within construction compounds and/or use of farm dams. Alternative water supply options, including recycled water, would also be investigated. As part of the Soil and Water Management sub-plan, ARTC will: ▪ Confirm a draft water balance for the project ▪ Demonstrate that the required construction water sources are legally and physically viable ▪ Outline mitigation measures to address construction water resource shortages that arise. Appropriate approvals would be obtained as required if alternative constructive water sources beyond commercial water suppliers and local governments are required.	Construction	Section 6.5 Water Reuse Strategy

No.	Requirement	Timing	Where addressed
GW2	A groundwater monitoring program (level and quality), prepared by a suitably qualified person, will be implemented in accordance with the requirements outlined in this assessment prior to construction. This will identify ongoing monitoring requirements, following the completion of construction, according to the risks to groundwater levels and quality. Ongoing groundwater monitoring (level and quality) will be carried out at the sites for the duration specified in the groundwater monitoring program.	Pre-construction/Construction	Construction Groundwater Monitoring Program

3.5 EPL No.21984

The A2I project is subject to EPL 21984 as a Scheduled Activity for 'railway activities – railway infrastructure construction'. The EPL includes clauses requiring the licensee to minimise soil and water impacts from the project. The EPL sets out two conditions relating to soil and water, which are presented in Table 9.

TABLE 9: EPL CONDITIONS

Condition	Requirement	Where addressed
P1.1	No discharges to water are to occur without a Water Pollution Impact Assessment. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines.	Section 6.6
L1.1	Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.	Section 3.1

3.6 Water Access Licence

The Essential Infrastructure water access licence exemption, identified in Water Management (General) Regulation 2025, Schedule 4, Part 2, is applicable to the A2I project.

4 EXISTING ENVIRONMENT

The existing environment in relation to soil and water (including groundwater and salinity) from the construction of the project were assessed in the EAD, notably in:

- Chapter 18 of the EIS (Hydrology flooding and water quality);
- Chapter 19 of the EIS (Groundwater);
- Chapter 20 of the EIS (Soils and contamination);
- EIS Technical Paper 11 (Hydrology, Flooding and Water Quality);
- EIS Technical Paper 12 (Groundwater);
- EIS Technical Paper 13 (Contamination).

No references to hydrology, flooding, water quality, groundwater or contamination were included in the Kemp Street Bridge Enhancement Site Modification Report (June 2025).

4.1 Topography

4.1.1 Albury

The elevation of the enhancement sites in the Albury precinct range from about 150 metres (m) Australian Height Datum (mAHD) at the Murray River to 230 mAHD. The land generally slopes to the south towards the Murray River.

4.1.2 Greater Hume–Lockhart

The enhancement sites in Greater Hume–Lockhart precinct are located at about 210 to 220 mAHD. The topography generally slopes to the north, west to the Murrumbidgee River; however, there are localised high points along the Olympic Highway that drain to various tributaries of the Murrumbidgee River.

4.1.3 Wagga Wagga

The enhancement sites in the Wagga Wagga precinct are located at an elevation of about 190 to 200 mAHD at the south of the Murrumbidgee River. The topography generally slopes to the north to the Murrumbidgee River; however, there are localised high points along the Olympic Highway that drain to various tributaries of the Murrumbidgee River.

4.1.4 Junee

The topography generally slopes from the Harefield Yard clearances enhancement site, located at an elevation of about 250 mAHD, up towards Junee with the Junee yard clearances and Olympic Highway underbridge enhancement site at elevations of about 300 to 320 mAHD. For the Junee to Illabo clearances enhancement site, the elevation varied from 250 mAHD in the east to 360 mAHD in the west.

Junee Yard clearances enhancement sites are located in a topographic depression that extends towards the north–northwest, with neighbouring hills to the south, east and west peaking at approximately 360 mAHD.

4.2 Soil types

A review of the eSPADE 2.0 spatial viewer system (eSPADE) was conducted for the EAD and soil types along the project are summarised in Table 10.

TABLE 10: SOIL LANDSCAPE TYPES

Precinct and enhancement site	Landscape type	Characteristics
Albury Precinct		
Murray River bridge	▪ Wakool River landscape.	▪ Prone to water logging.
Albury Station pedestrian bridge, Albury Yard clearances and Riverina Highway bridge	▪ Wait A While landscape; ▪ Livingston landscape.	▪ Localised wind erosion, waterlogging and flooding, and salinity.
Table Top yard clearances	▪ Ettamogah landscape.	▪ High erosion hazard; ▪ Localised gully erosion has been observed along with widespread wind and sheet erosion.

Precinct and enhancement site	Landscape type	Characteristics
Billy Hughes bridge	▪ Ettamogah landscape.	▪ High erosion hazard; ▪ Localised gully erosion has been observed along with widespread wind and sheet erosion.
Greater Hume-Lockhart Precinct		
Culcairn pedestrian bridge and Culcairn Yard clearances	▪ Culcairn soil landscape.	▪ Prone to localised high gully erosion hazard, acidity, waterlogging, poor drainage, sodicity and foundation hazard where sodic.
Henty Yard clearances	▪ Henty soil landscape.	▪ Prone to moderate wind and gully erosion hazard; ▪ Prone to localised acidity, waterlogging, poor drainage, sodicity, foundation hazard where sodic, burial by wind-blown sand and complex terrain.
Yerong Creek Yard clearances	▪ Mangoplah soil landscape; ▪ O'Briens Creek soil landscape in the far south (in the vicinity of Sandy Creek).	▪ Prone to streambank erosion, acidity and localised water logging
The Rock Yard clearances	▪ Vincent Road soil landscape; ▪ Mangoplah soil landscape.	▪ Local soils are also prone to high erosion hazard, localised foundation hazard and strong acidity; ▪ Low-lying areas are also prone to localised waterlogging.
Wagga Wagga Precinct		
Uranquinty Yard clearances	▪ Pearson soil landscape in the south; ▪ O'briens Creek soil landscape; ▪ Belfrayden soil landscape in the north east.	▪ Strong acidity, local water logging and stream bank erosion; ▪ Erosion hazard is higher on the sodosols.
Pearson Street bridge	▪ Becks Lane soil landscape.	▪ High erosion hazard, acidity and localised foundation hazards
Cassidy Parade pedestrian bridge, Edmondson Street bridge, Wagga Wagga Station pedestrian bridge and Wagga Wagga Yard clearances	▪ Becks Lane soil landscape; ▪ Lloyd soil landscape to the eastern end of the site.	▪ High erosion hazard, steep slopes, localised foundation hazards and mass movement, stoney and strongly acid soils on ridges and upper slopes
Bomen Yard clearances	▪ Bomen soil landscape to the eastern end of the site; ▪ Currawama soil landscape to the western end of the site.	▪ Moderate erosion hazard and acidity; ▪ Locally shallow soil and localised foundation hazard.
Junee Precinct		
Harefield Yard clearances	▪ Currajong soil landscape in the south west; ▪ Houlaghans Creek soil landscape in the north east.	▪ Localised seasonal waterlogging, flood hazard, sheet and gully erosion hazard, poor drainage, strong acidity of topsoils, sodicity/dispersibility and low wet bearing strength of subsoil, and salinity.

Precinct and enhancement site	Landscape type	Characteristics
Kemp Street bridge, Junee Station pedestrian bridge and Junee Yard clearances, and Olympic Highway underbridge	▪ Currajong soil landscape	▪ Localised salinity, poor drainage, high run-on, sheet and gully erosion hazard, high erodibility of subsoils, acidity of topsoils, and sodicity/dispersibility of subsoil.
Junee to Illabo clearances	▪ Currajong soil landscape in the south; ▪ Malebo soil landscape in the south; ▪ Mimosa soil landscape centrally between Junee and Illabo; ▪ Eurongilly soil landscape in the north and beneath Illabo.	▪ Localised salinity, poor drainage, high run-on, sheet, wind and gully erosion hazard, high erodibility of subsoils, acidity of topsoils, and sodicity/dispersibility of subsoil, engineering hazard, low bearing strength and mass movement.

4.3 Saline soils

Desktop reviews for the EAD using eSPADE across the project sites indicates that several local soil types have potential salinity hazards associated with them.

A detailed summary of salinity at each enhancement site was provided in Appendix B of Technical Paper 13: Contamination of the EIS. The contamination assessment identified one area with very high potential salinity hazard at Culcairn Pedestrian bridge and Culcairn Yard clearances. Moderate salinity was mapped at several enhancement sites.

Table 11 replicates information presented in Appendix B of Technical Paper 13 of the EIS (Contamination).

TABLE 11: SUMMARY OF SALINITY FOR EACH PRECINCT AND ENHANCEMENT SITE

Precinct	Enhancement site	Salinity hazard
Albury Precinct	Murray River bridge	The salinity hazard of this landscape is mapped as “low risk”. The environment is also described as being part of the Murray Alluvium hydrogeological landscape with an overall “low” land salinity hazard.
	Albury Station pedestrian bridge, Albury Yard clearances and Riverina Highway bridge	The Wait A While landscape has localised salinity hazards identified and the land is also part of the Long Plain hydrogeological landscape which describes it as having “moderate” land salinity.
	Table Top Yard clearances	Whilst salinity is listed as “not observed” (not identified during assessment) for the Ettamogah landscape, the enhancement site is also shown on the Table Top hydrogeological landscape, in which is described as having a “moderate” land salinity hazard.
	Billy Hughes bridge	Whilst salinity is listed as “not observed” (not identified during assessment) for the Ettamogah landscape, the enhancement site is also shown on the Table Top hydrogeological landscape, in which is described as having a “moderate” land salinity hazard.
Wagga Wagga Precinct	Uranquinty Yard clearances	The local area is mapped as having “moderate” land salinity hazard in the south west and “low” salinity hazard beneath the township and extending to the north west.
	Pearson Street bridge	The local area is mapped as having “low” land salinity hazard in the south west and central portions, and “moderate” salinity hazard beneath the far north west portion.

Precinct	Enhancement site	Salinity hazard
	Cassidy Parade pedestrian bridge and Edmondson Street bridge, Wagga Wagga Station pedestrian bridge and Wagga Wagga Yard clearances	The local area is mapped as having “low” land salinity hazard.
	Bomen Yard clearances	The local area is mapped as having “moderate” land salinity hazard.
Greater Hume-Lockhart Precinct	Culcairn pedestrian bridge and Culcairn Yard clearances	The environment is described as being part of the Lower Billabong hydrogeological landscape. Though it has a “low” land salinity hazard, the groundwater and stream have a high salinity load making the overall salinity hazard “Very High”. Care will need to be taken not to cause groundwater flows to be impeded at this site as that could cause salts to be brought nearer the surface.
	Henty Yard clearances	The local area is mapped as having “moderate” land salinity hazard
	Yerong Creek Yard clearances	The local area is mapped as having “moderate” land salinity hazard.
	The Rock Yard clearances	The local area is mapped as having “moderate” land salinity hazard.

Initial testing of salinity (soil aggressivity) in accordance with UMM SC4 has been undertaken at the enhancement sites where excavation is required:

- Riverina Highway bridge
- Billy Hughes bridge
- Pearson Street bridge
- Kemp Street bridge.

A durability memo is prepared and included in the detailed design report for each relevant enhancement site. A summary of results described in the durability memos at these locations, and others is included in Table 12.

Exposure classifications for various project elements are identified, which then informs the type of mitigation required to be incorporated into the project design. For example, steel elements are considered to have a C3: medium exposure classification. To achieve the nominated design life and to accommodate the C3: medium exposure, the steel elements will be protected with a specific coating, in accordance with relevant standards.

TABLE 12: INITIAL SALINITY TESTING

Precinct	Enhancement site	Summary results
Albury Precinct	Riverina Highway bridge Detailed Design Report: 5-0052-210-PEN-B4-RP-0001	Sulfate (SO_4) and chloride (Cl) contents are considered low, with the soil measuring in the upper limit of 188 mg/kg and 339 mg/kg, respectively. For the groundwater testing, the SO_4 and Cl contents are considered low, with the groundwater data measuring in the upper limit of 57 mg/L and 396 mg/L, respectively. Exposure classifications include: B1 (Concrete), C3:Medium (Steel), B1 (Grout encapsulation) for various project elements.

Precinct	Enhancement site	Summary results
	Billy Hughes bridge Detailed Design Report: 5-0052-210-PEN-B5-RP-0001	SO_4 and Cl contents are considered low, with the soil measuring in the upper limit of 110 mg/kg and 330 mg/kg, respectively. Two boreholes measured pH values of 4.7 and 4.8. Exposure classifications include: A2 (Concrete), B1 (Concrete), C3:Medium (Steel) for various project elements.
Wagga Wagga Precinct	Pearson Street bridge Detailed Design Report: 5-00520210-PEN-W2-RP-0001	SO_4 and Cl contents are considered low, with the soil measuring in the upper limit of 290 mg/kg and 120 mg/kg, respectively. Exposure classifications include: B1 (Concrete), B1 (Grout encapsulation) for various project elements.
	Edmondson Street Bridge and Footbridge Detailed Design Report: 5-0052-210-PEN-W5-RP-0001	SO_4 and Cl contents are considered low, with the soil measuring in the upper limit of 190 mg/kg and 173 mg/kg, respectively. Exposure classifications include: B1 (Concrete), C3:Medium (Steel) for various project elements.
	Wagga Wagga Station (Mothers') Footbridge Detailed Design Report: 5-0052-210-PEN-W8-RP-0001	SO_4 and Cl contents are considered low, with the soil measuring in the upper limit of 330 mg/kg and 369 mg/kg, respectively. The exposure classification of B1 in accordance with AS5100.5:2017 has been nominated for the buried or in contact with the ground elements for this package. Exposure classifications include: B (Concrete), C3:Medium (Steel) for various project elements.
Junee Precinct	Kemp Street bridge Detailed Design Report: 5-0052-210-PEN-J2-RP-0001	SO_4 and Cl contents are considered low, with the soil measuring in the upper limits of 588 mg/kg and 568 mg/kg, respectively. The exposure classification has been assessed to be B1 in accordance with AS5100.5:2017 for 100-year design life concrete elements, and A2 in accordance with AS3600 for 50-year design life concrete elements, for which they are buried or in contact with ground. Exposure classifications include: A (Concrete), A2 (Concrete), B1 (Concrete), C3:Medium (Steel), Non-aggressive (Steel) for various project elements.
	Kemp Street footbridge Detailed Design Report: 5-0052-210-PEN-J3-RP-0001	SO_4 and Cl contents are considered low, with the soil measuring in the upper limits of 588 mg/kg and 568 mg/kg, respectively. The buried elements' exposure classification is B1. Exposure classifications include: A (Concrete), B1 (Concrete), C3:Medium (Steel) for various project elements.

4.4 Acidity

4.4.1 Acid sulfate soils

A review of the ASRIS Acid Sulfate Risk map identified that the project is located within areas described as low probability of acid sulfate soils (ASS). It is possible that some other areas of localised inland ASS may be present in dams or other inundated areas where sulfides may be laid down in sediments over time.

4.4.2 Naturally acidic soils

Naturally acidic soils may be acidic as a result of natural acidity inherent in the parent rock, due to organic acids being present in the soil or through agricultural practices (e.g. long-term fertiliser use).

A review of pH ranges from soils presented in eSPADE indicates that the upper 0.3 m of soils relevant to the project generally has a pH of between 5 and 6, which is considered strongly to moderately acidic in the context of soil chemistry.

This is particularly so in the valleys. Where the project is located within, or near, more elevated terrain such as near Billy Hughes bridge enhancement site, Table Top Yard clearances enhancement site, The Rock Yard clearances enhancement site, north of Uranquinty Yard clearances enhancement site and the Junee to Illabo clearances enhancement site, the acidity of this upper 0.3-m ranges from pH 4.5 to pH 5.5 and is considered very strongly acidic to strongly acidic.

For subsoil (0.3 m to 1 m), eSPADE indicates that the soil is generally less acidic, with a pH range between 5.5 to 6.5 (moderately acidic to slightly acidic) except where the project is located in more elevated terrain, as identified within this section. In these instances, the pH of the subsoil is between 4.5 to 6.0 (very strongly acidic to moderately acidic)

4.5 Surface water

4.5.1 Local watercourses

The project interacts with a range of watercourses, including rivers, creeks, piped and open channel urban drainage systems and overland flow paths, as well as other waterbodies such as farm dams and ponds. Table 13 describes the watercourses and other waterbodies crossed by or located near the enhancement sites. The watercourses and waterbodies adjacent to enhancement sites subject to construction works are shown in Figure 1 to Figure 20. The information in Table 13 is based primarily on information from the EAD, however, additional information from CPHR has been included in the table as well.

TABLE 13: RELEVANT WATERCOURSES AND OTHER WATERBODIES

Precinct	Catchment	Enhancement site	Watercourses and waterbodies
Albury Precinct	Murray	Murray River bridge	Murray River and Oddies Creek intersect the enhancement site. Within waterfront land.
	Murray	Albury Yard clearances, Albury Station pedestrian bridge, and Riverina Highway bridge	Mudges Canal (a concrete lined channel) runs from north to south through the site. This channel links to Browns Lagoon (or Waites Lagoon) that discharge to the Murray River. Browns Lagoon is located 450m to the south west of the enhancement site. Within waterfront land.
	Murray	Billy Hughes bridge	An unnamed tributary of Eight Mile Creek intersects the enhancement site. This drains to Eight Mile Creek to the east. Eight Mile Creek then flows South and discharges to the Murray River. Within waterfront land.
	Murray	Table Top Yard clearances	No watercourses intersect the enhancement site. Two farm dams. Lake Hume is located 3km to the east of the site. Within waterfront land.
Greater Hume-Lockhart Precinct	Murray	Culcairn Yard clearances and pedestrian bridge	No watercourses intersect the enhancement site. Billabong Creek is located 350m to the south and an unnamed tributary is located 80m to the north. The site is part of the Middle Billabong sub catchment of the Murray catchment.
	Murrumbidgee	Henty Yard clearances	No watercourses intersect the enhancement site. Buckargingah Creek is located 30m to the north of the enhancement site. The enhancement site is part of the Burkes/Bullenbung sub catchment of the Murrumbidgee catchment. Within waterfront land.

Precinct	Catchment	Enhancement site	Watercourses and waterbodies
	Murrumbidgee	Yerong Creek Yard clearances	Sandy Creek is located approximately 300m south of the enhancement site and Yerong Creek is located 400m to the north. Yerong Creek flows to the west and is part of the Burkes/Bullenbung sub catchment of the Murrumbidgee catchment. Several farm dams around the site.
	Murrumbidgee	The Rock Yard clearances	No watercourses intersect the enhancement site. Burkes Creek is located 380m north of the enhancement site. Burkes Creek flows to the west and eventually joins Bullenbung Creek. Three farm dams north of the site.
Wagga Wagga Precinct	Murrumbidgee	Uranquinty Yard clearances	Sandy Creek intersects the enhancement site. Sandy Creek flows towards north and joins the Murrumbidgee River. Within waterfront land.
	Murrumbidgee	Pearson Street bridge	Glenfield Drain, a tributary of Flowerdale Lagoon, intersects the enhancement site. Flowerdale Lagoon is located about 1.5km north of the enhancement site and discharges to the Murrumbidgee River. Within waterfront land.
	Murrumbidgee	Cassidy Parade pedestrian bridge, Edmondson Street bridge, Wagga Wagga Station pedestrian bridge and Wagga Wagga Yard clearances	No watercourses intersect the enhancement site (as such this site is not mapped). The Murrumbidgee River is located approximately 800m to the north. These sites are impacted by major overland flow paths with numerous culverts located under the rail to facilitate overland flows travelling from south to north through the urban areas of Wagga.
	Murrumbidgee	Bomen Yard clearances	No watercourses intersect the enhancement site. The Murrumbidgee River is located about 3.5km to the south of the site. Bomen Lagoon is located about 2km south of the site.
Junee Precinct	Murrumbidgee	Harefield Yard clearances	Reedy Creek intersects the enhancement site at two locations. The enhancement site is part of the Houlaghans sub catchment of the Murrumbidgee catchment. Four small farm dams surrounding the site. Within waterfront land.
	Murrumbidgee	Kemp Street bridge	Lower Butlers Gully, a tributary to Houlaghans Creek intersects the enhancement site and flows to the north. Within waterfront land.
	Murrumbidgee	Junee Yard clearances	Lower Butlers Gully intersects the enhancement site. The enhancement site is part of the Houlaghans sub catchment of the Murrumbidgee catchment. Within waterfront land.

Precinct	Catchment	Enhancement site	Watercourses and waterbodies
	Murrumbidgee	Junee Station pedestrian bridge	No watercourses intersect the enhancement site. The enhancement site is part of the Houlaghans sub catchment of the Murrumbidgee catchment.
	Murrumbidgee	Olympic Highway underbridge	A tributary to Houlaghans Creek intersects the enhancement site and flows to the north. Within waterfront land.
	Murrumbidgee	Junee to Illabo clearances	Jeralgambeth Creek and some other unnamed tributaries flow through the site. The enhancement site is part of the Billabong Creek sub catchment of the Murrumbidgee catchment. Several farm dams surrounding the site, the largest of which is adjacent to Illabo station, Illabo dam. Within waterfront land.



FIGURE 1: WATERCOURSES RELATIVE TO MURRAY RIVER BRIDGE ENHANCEMENT SITE



FIGURE 2: WATERCOURSES RELATIVE TO ALBURY STATION YARD ENHANCEMENT SITE

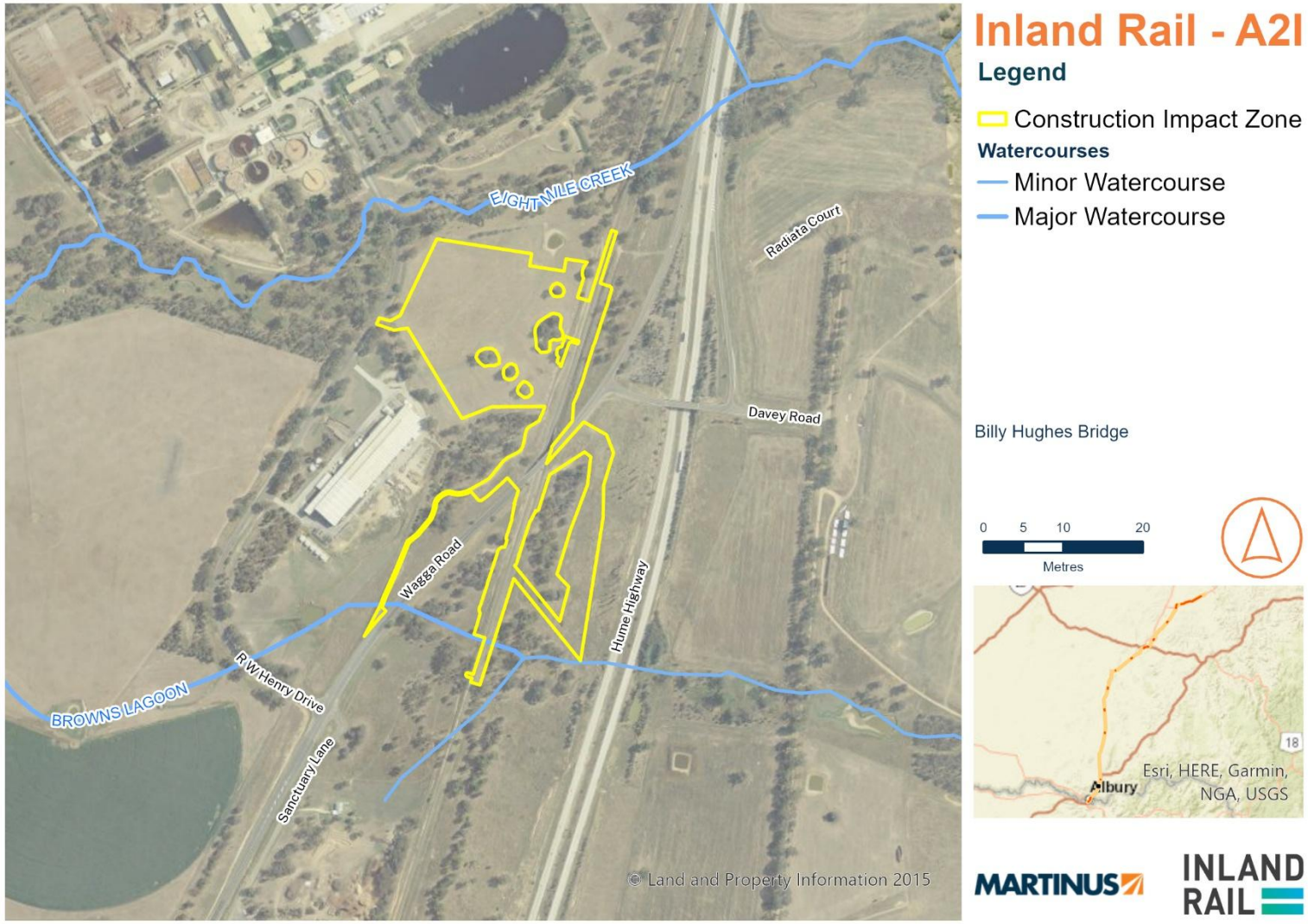


FIGURE 3: WATERCOURSES RELATIVE TO BILLY HUGHES BRIDGE ENHANCEMENT SITE

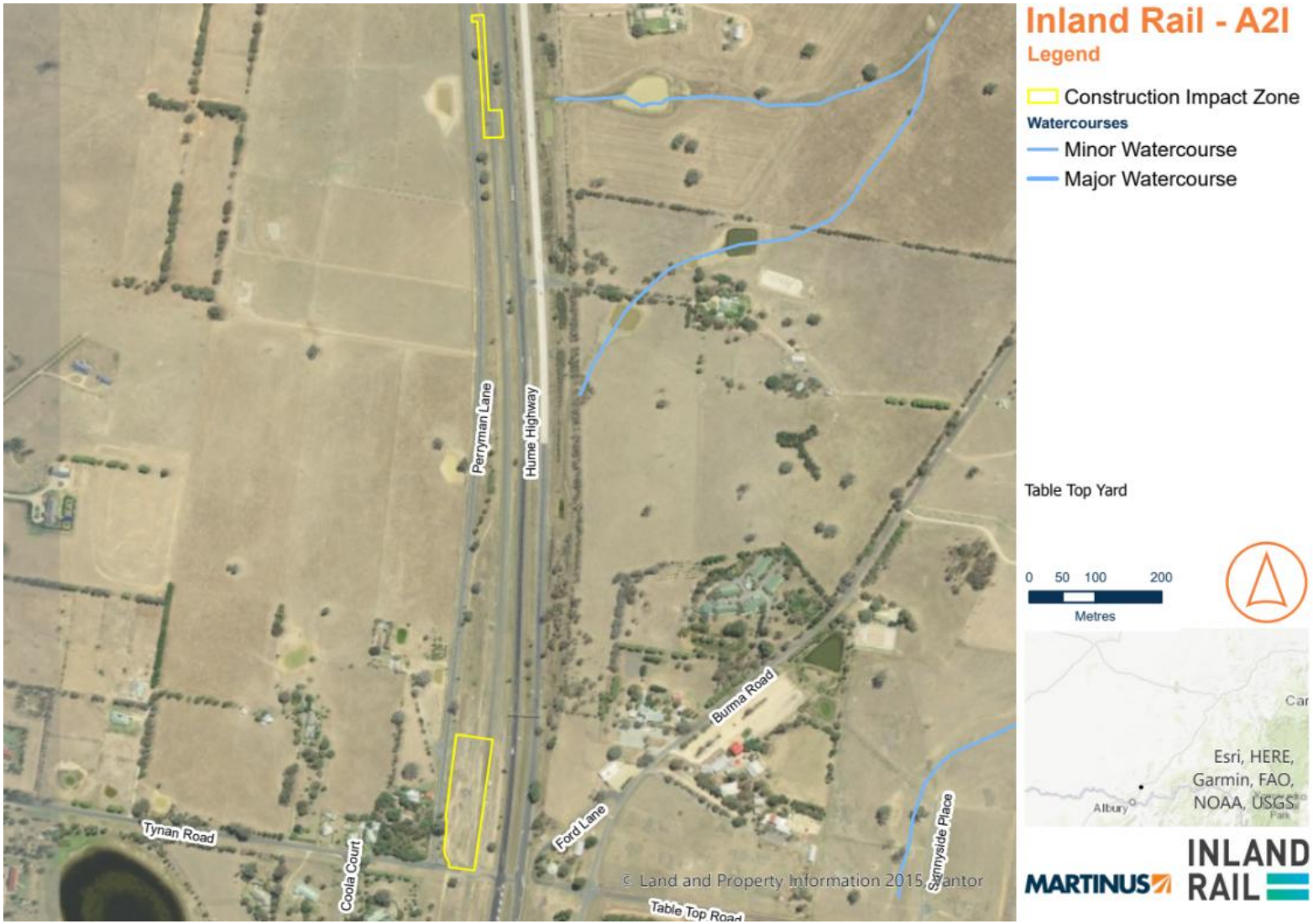
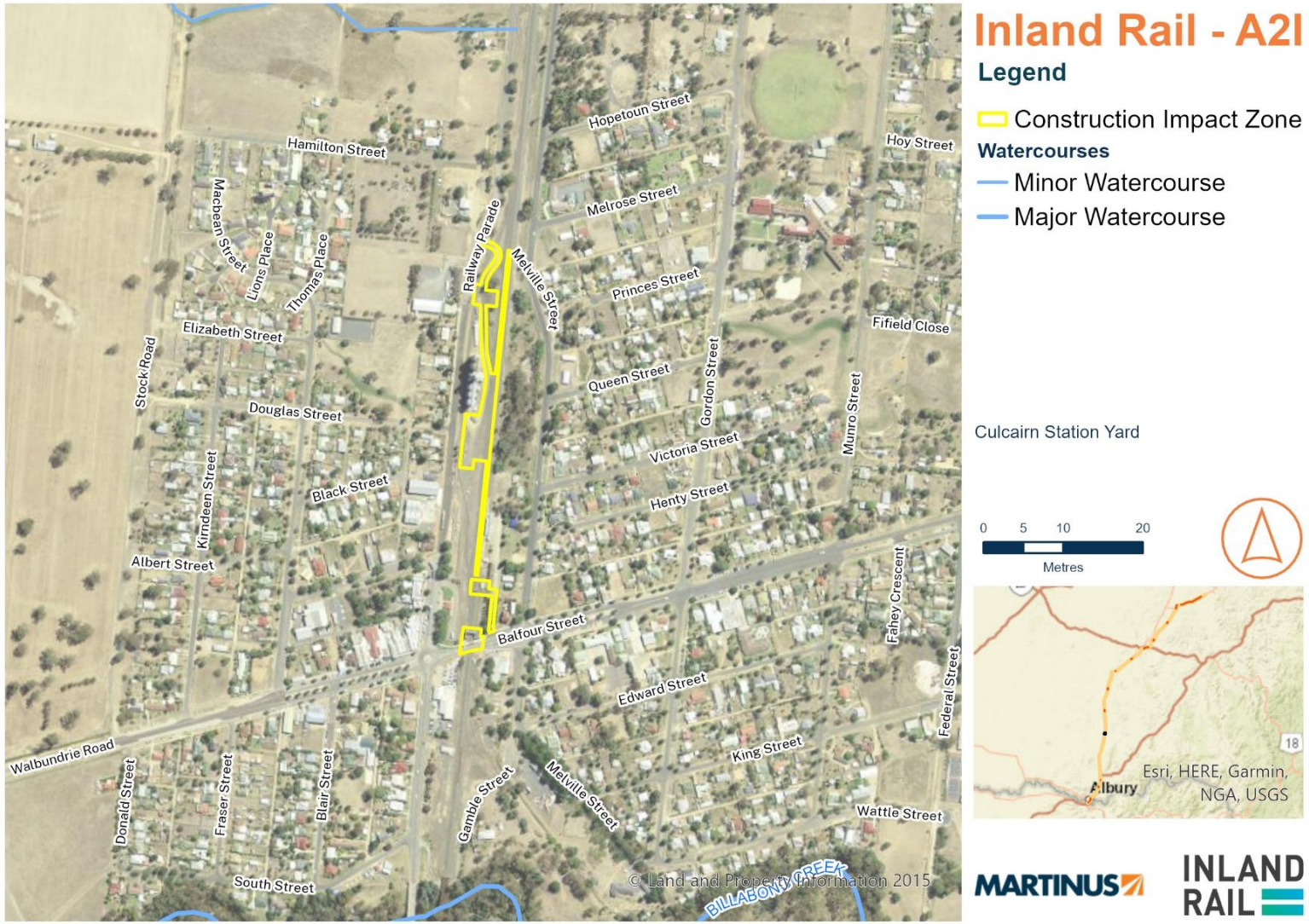


FIGURE 4: WATERCOURSES RELATIVE TO TABLE TOP YARD ENHANCEMENT SITE



Inland Rail - A2I

Legend

Construction Impact Zone

Watercourses

Minor Watercourse

Major Watercourse

Culcairn Station Yard

0 5 10 20

Metres

MARTINUS

INLAND RAIL

FIGURE 5: WATERCOURSES RELATIVE TO CULCAIRN STATION YARD ENHANCEMENT SITE

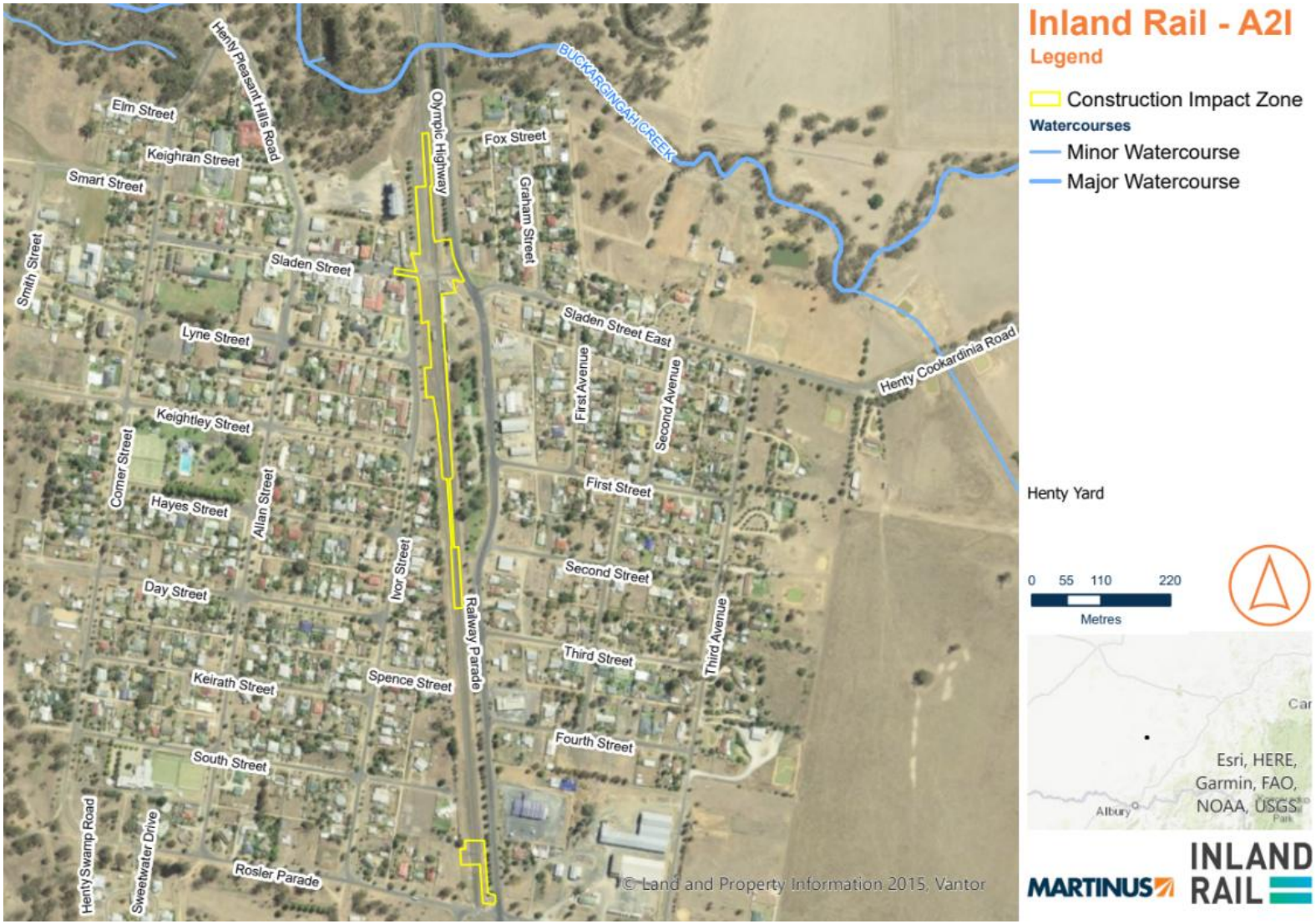


FIGURE 6: WATERCOURSES RELATIVE TO HENTY YARD ENHANCEMENT SITE

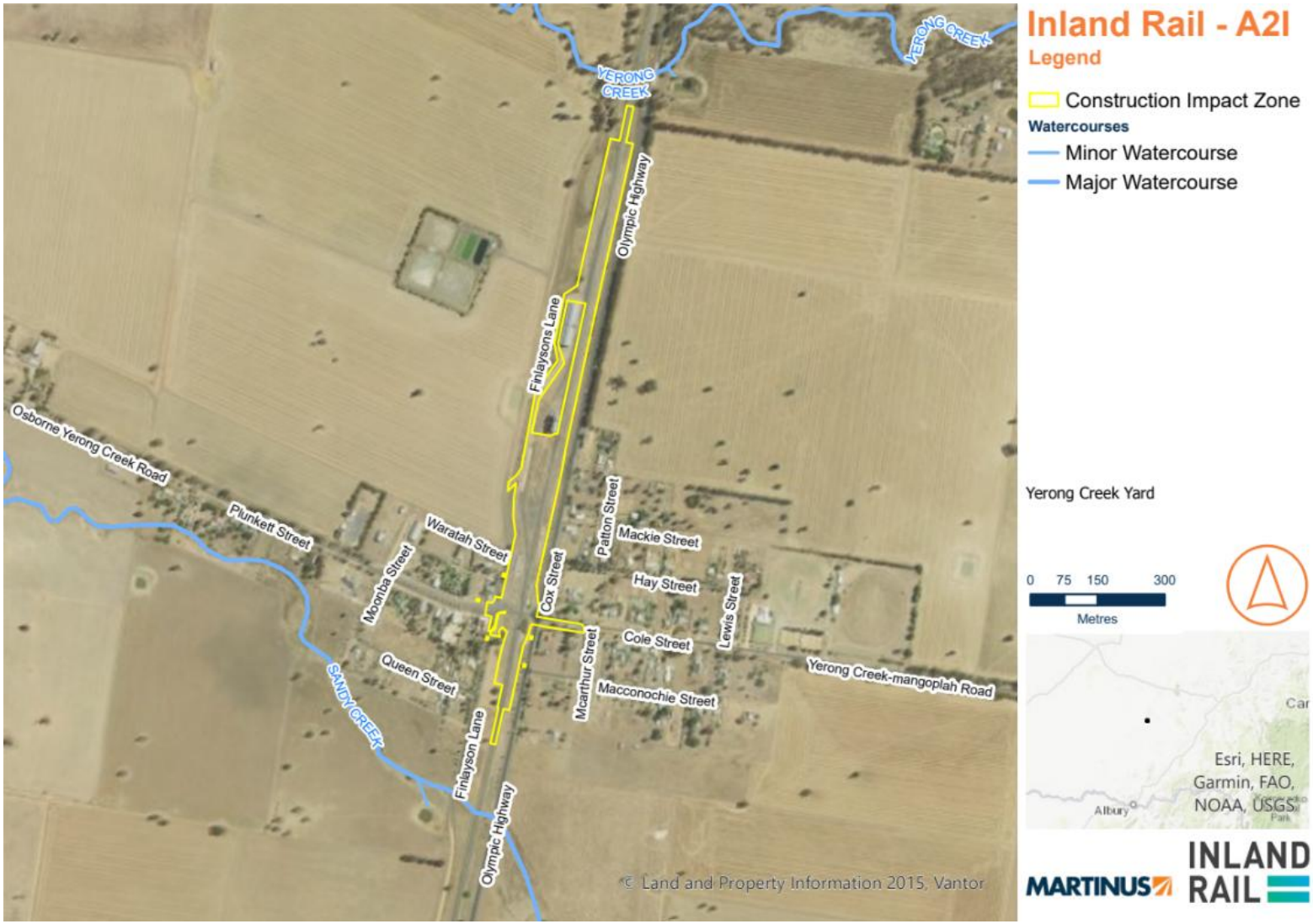


FIGURE 7: WATERCOURSES RELATIVE TO YERONG CREEK YARD ENHANCEMENT SITE



FIGURE 8: WATERCOURSES RELATIVE TO THE ROCK YARD ENHANCEMENT SITE

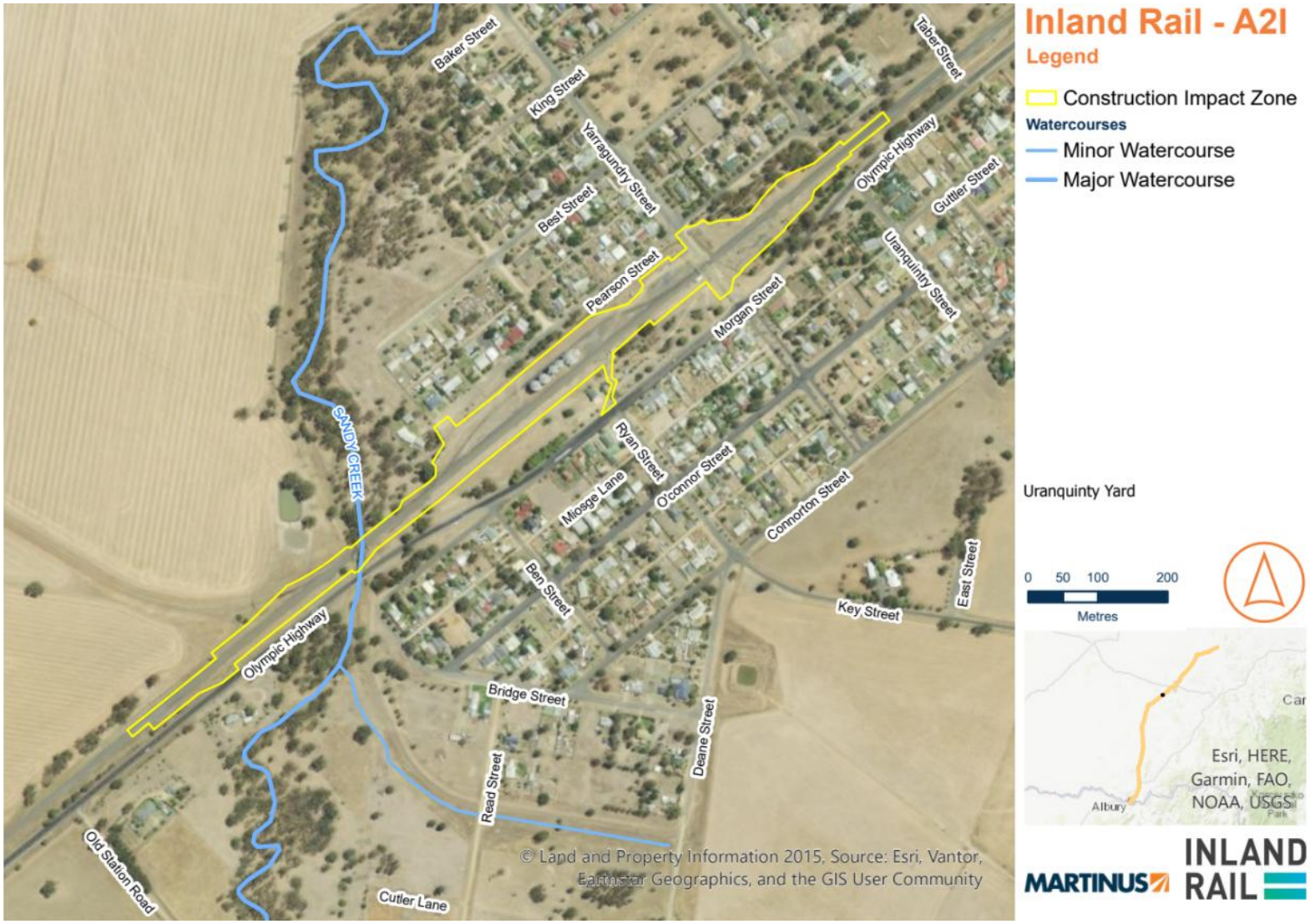


FIGURE 9: WATERCOURSES RELATIVE TO URANQUINTY YARD ENHANCEMENT SITE

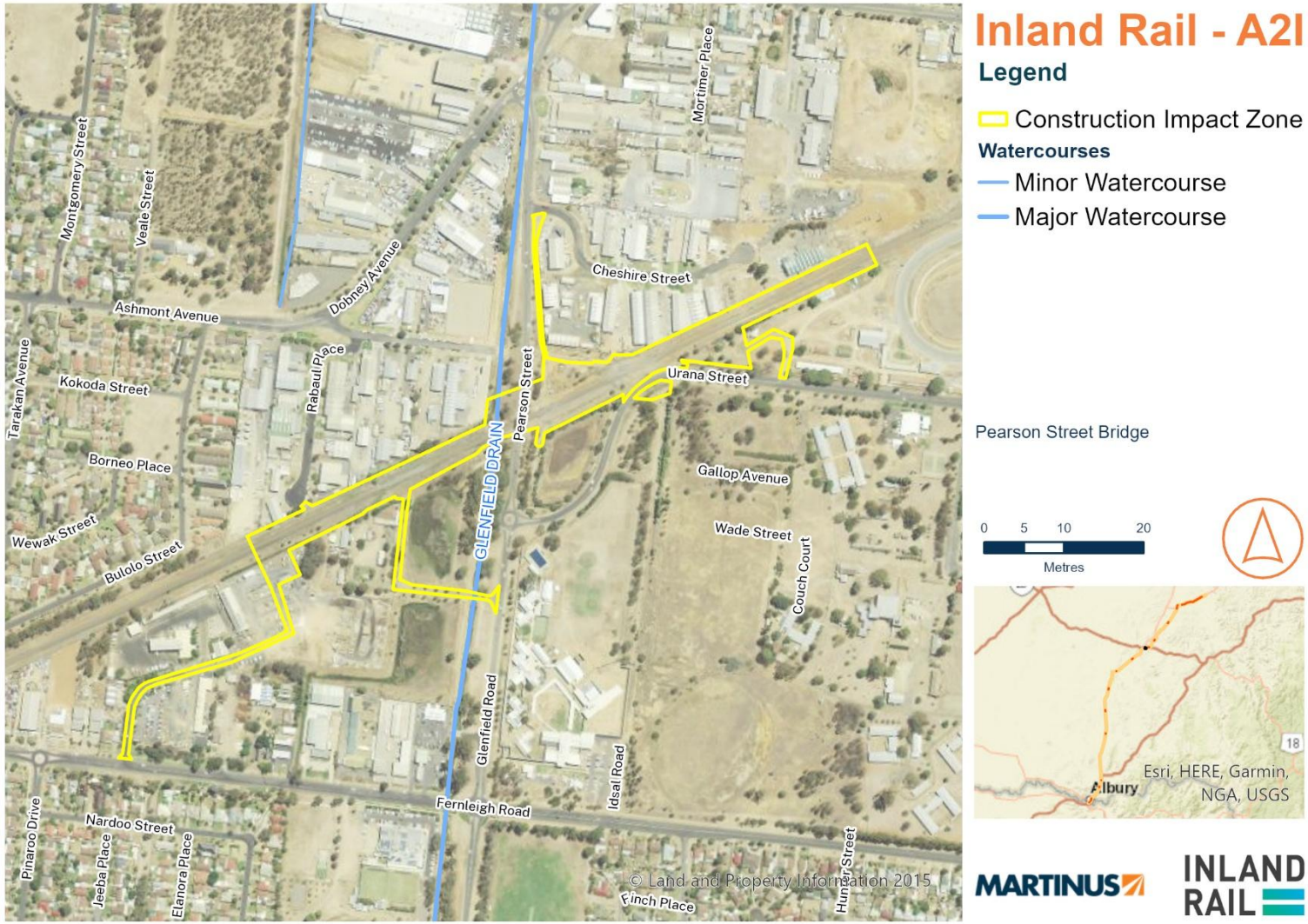


FIGURE 10: WATERCOURSES RELATIVE TO PEARSON STREET BRIDGE ENHANCEMENT SITE

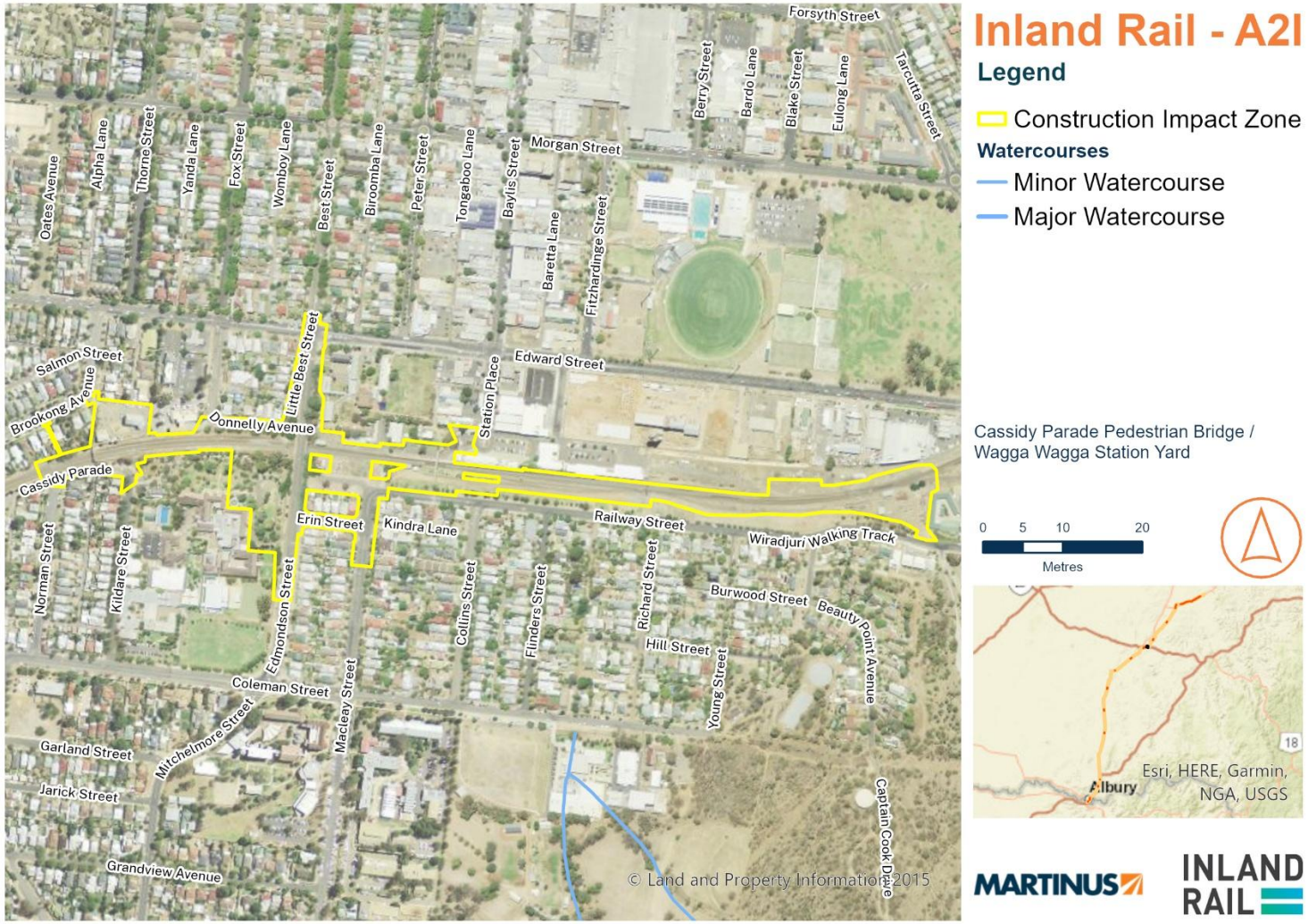


FIGURE 11: WATERCOURSES RELATIVE TO CASSIDY PARADE PEDESTRIAN BRIDGE, EDMONSON STREET BRIDGE AND WAGGA WAGGA STATION YARD ENHANCEMENT SITES



FIGURE 12: WATERCOURSES RELATIVE TO DOCKER STREET (WAGGA WAGGA STATION YARD ENHANCEMENT SITE)

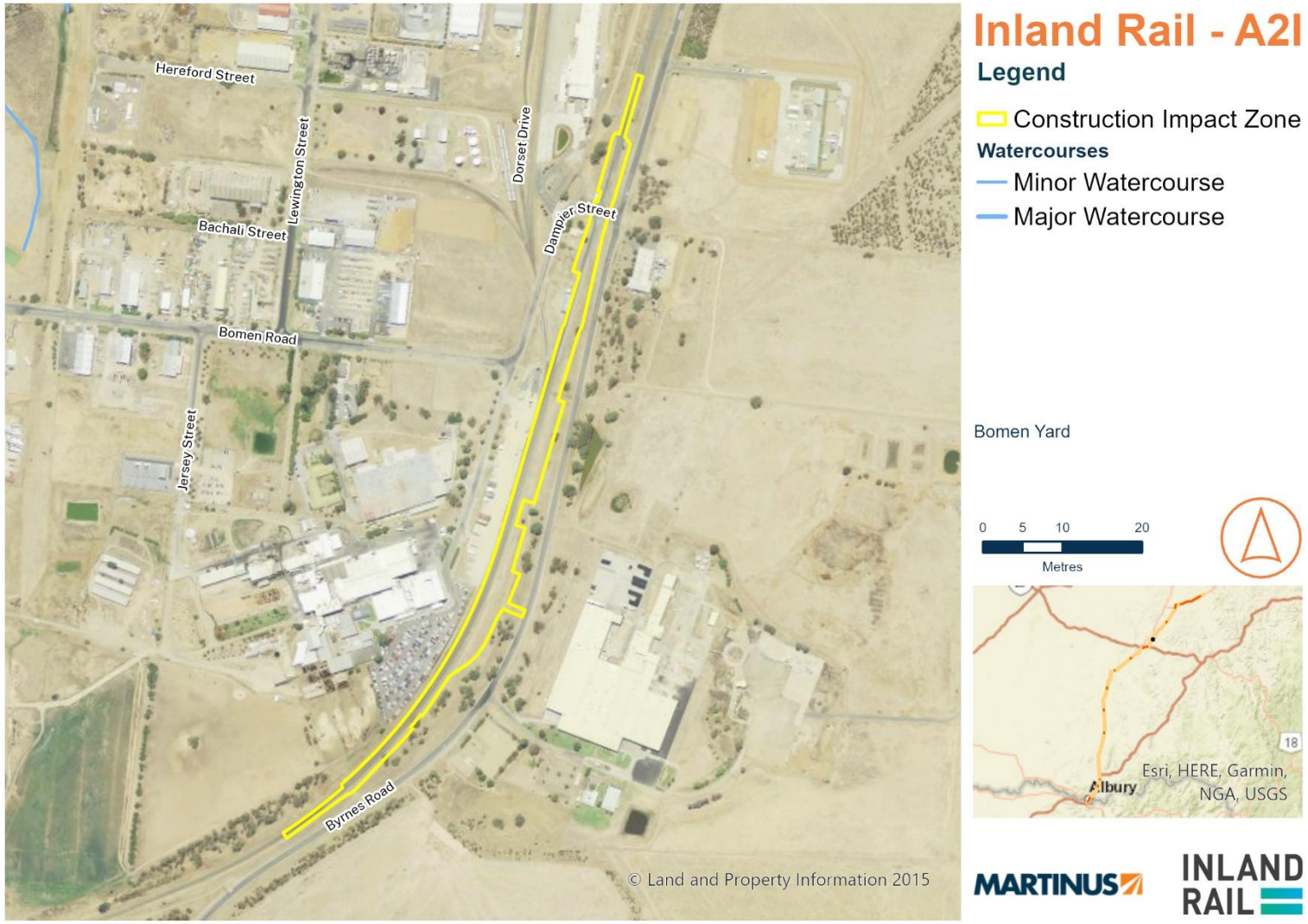


FIGURE 13: WATERCOURSES RELATIVE TO BOMEN YARD ENHANCEMENT SITE

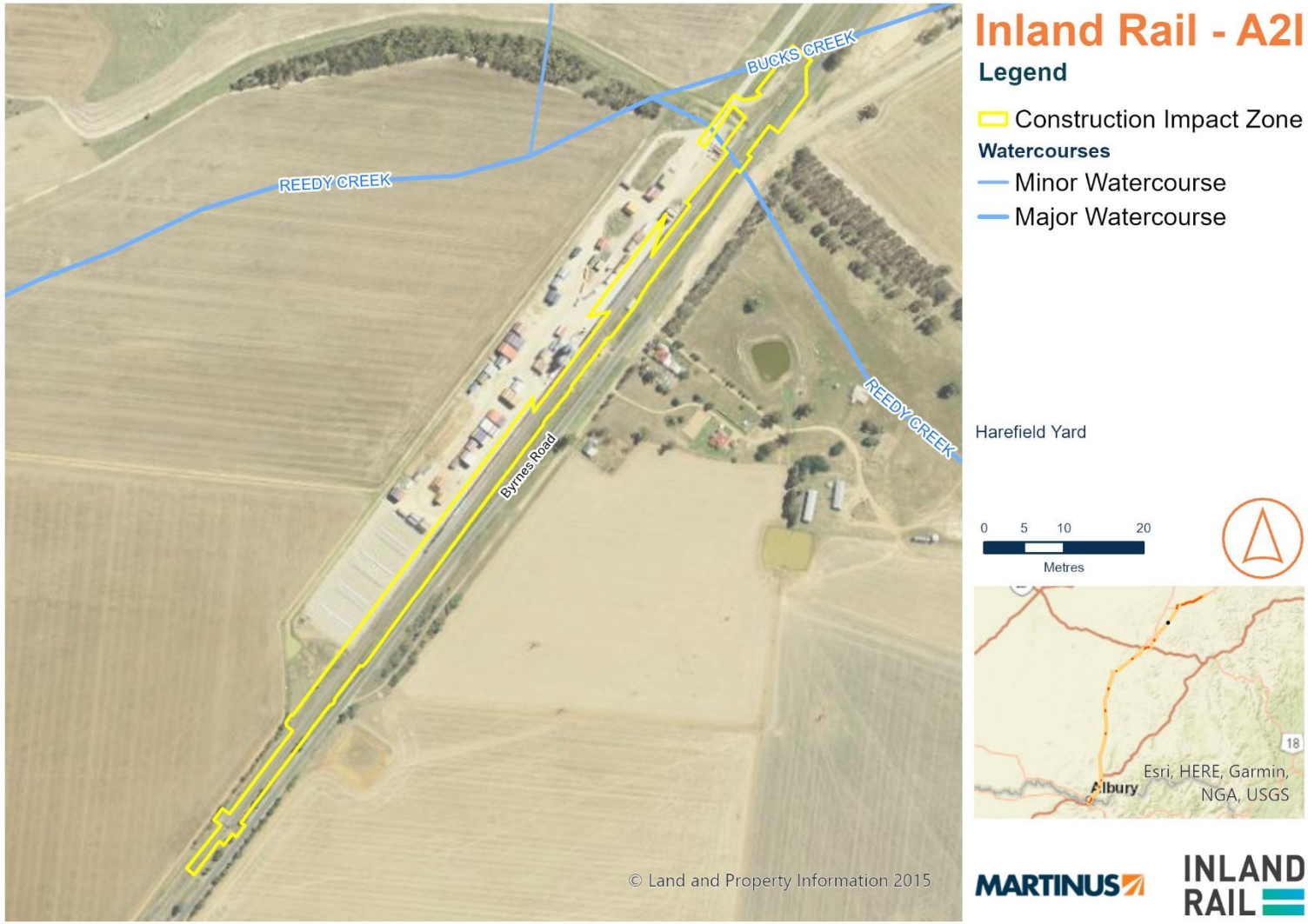


FIGURE 14: WATERCOURSES RELATIVE TO HAREFIELD YARD ENHANCEMENT SITE

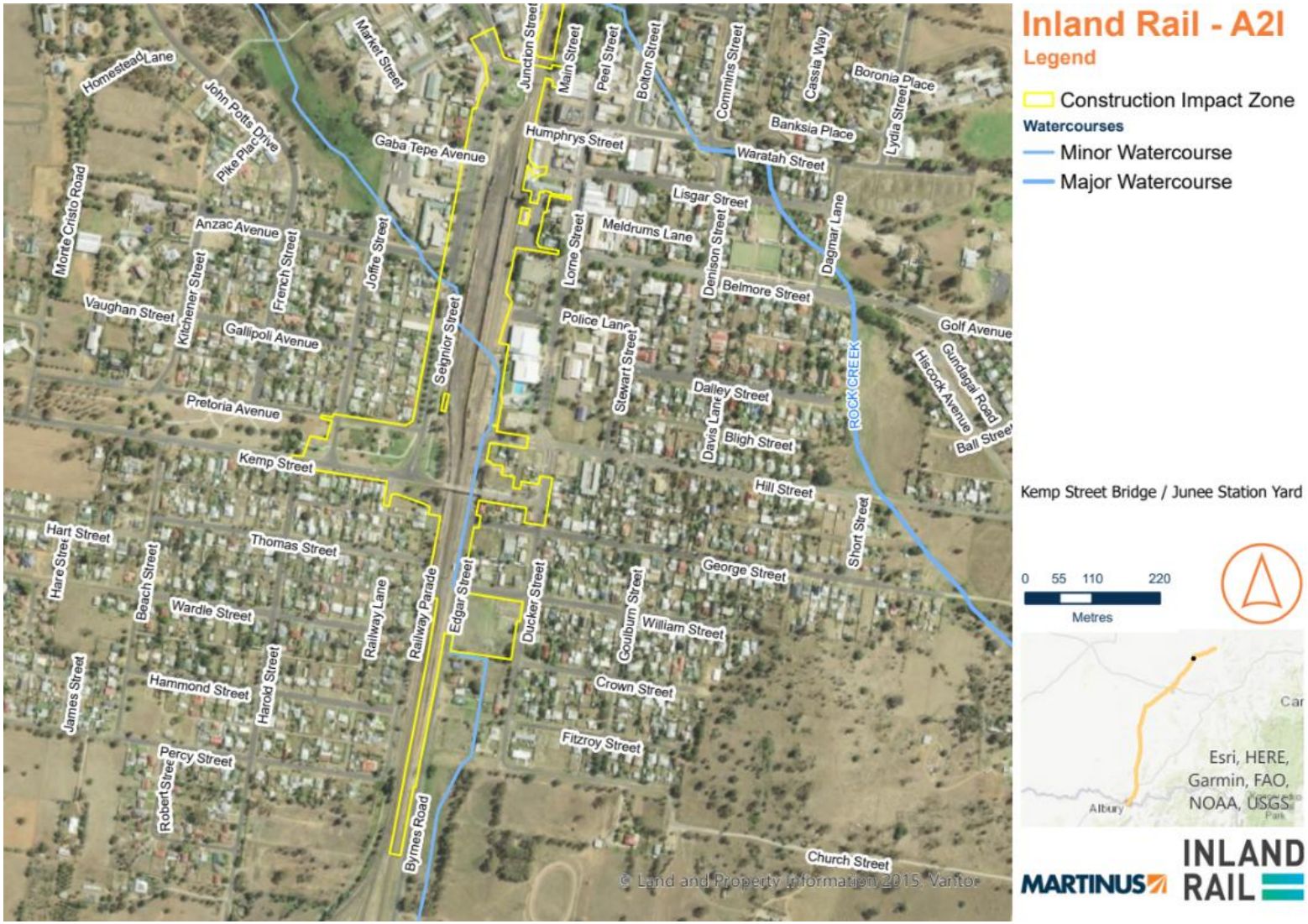


FIGURE 15: WATERCOURSES RELATIVE TO KEMP STREET BRIDGE, JUNEE STATION YARD AND JUNEE YARD CLEARANCES ENHANCEMENT SITES

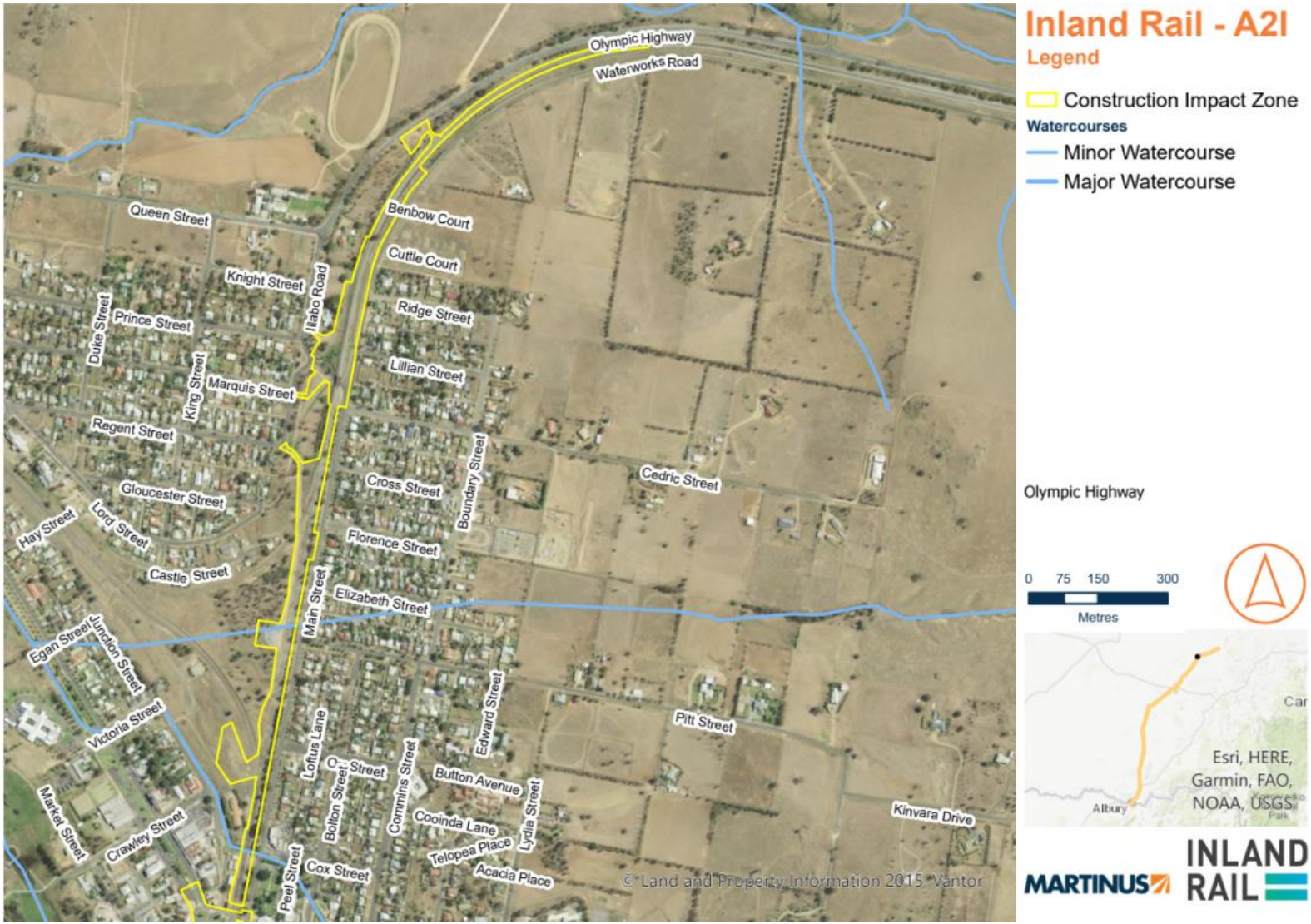


FIGURE 16: WATERCOURSES RELATIVE TO OLYMPIC HIGHWAY UNDERBRIDGE ENHANCEMENT SITE

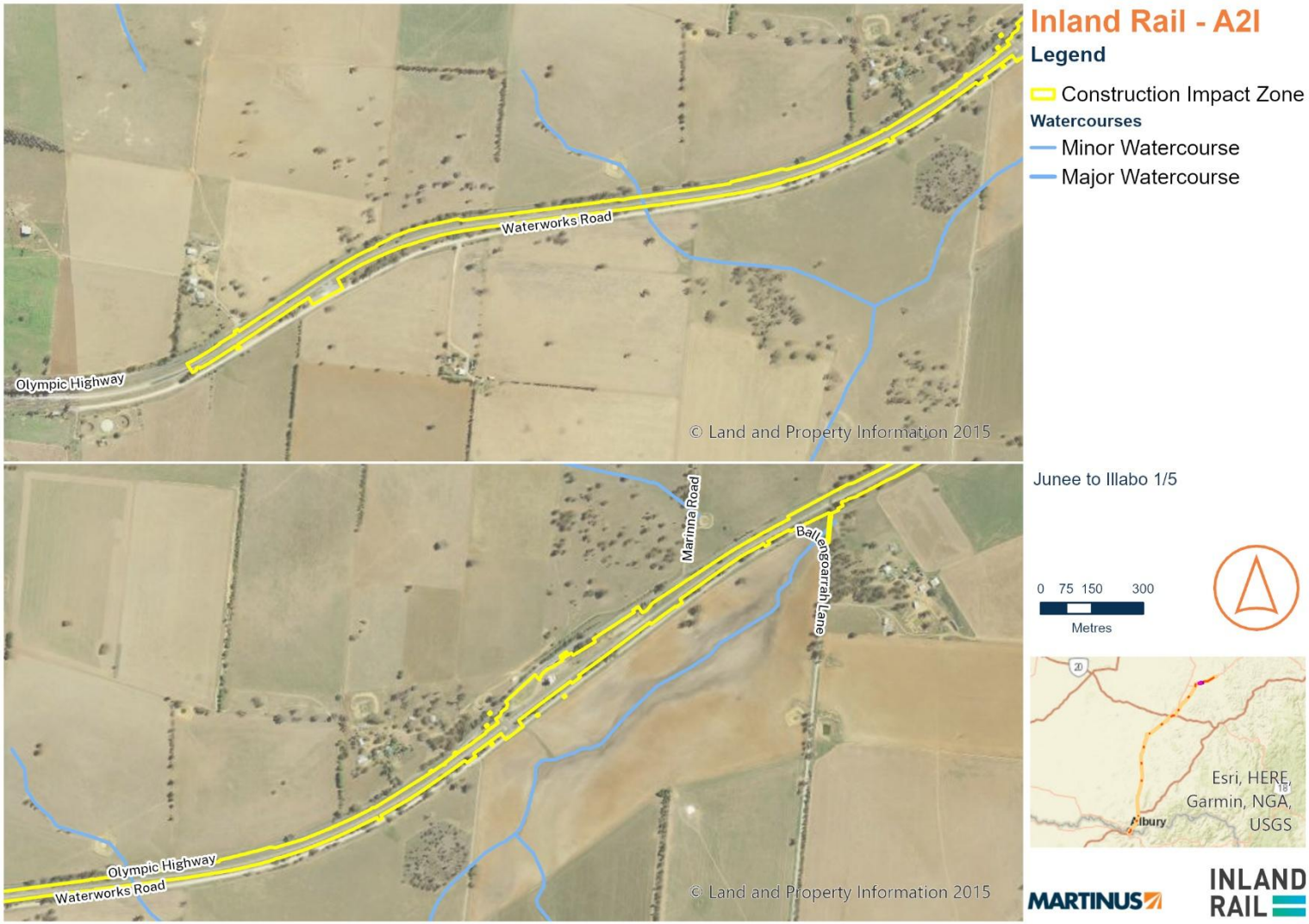


FIGURE 17: WATERCOURSES RELATIVE TO JUNEE TO ILLABO CLEARANCES ENHANCEMENT SITE (1 OF 5)

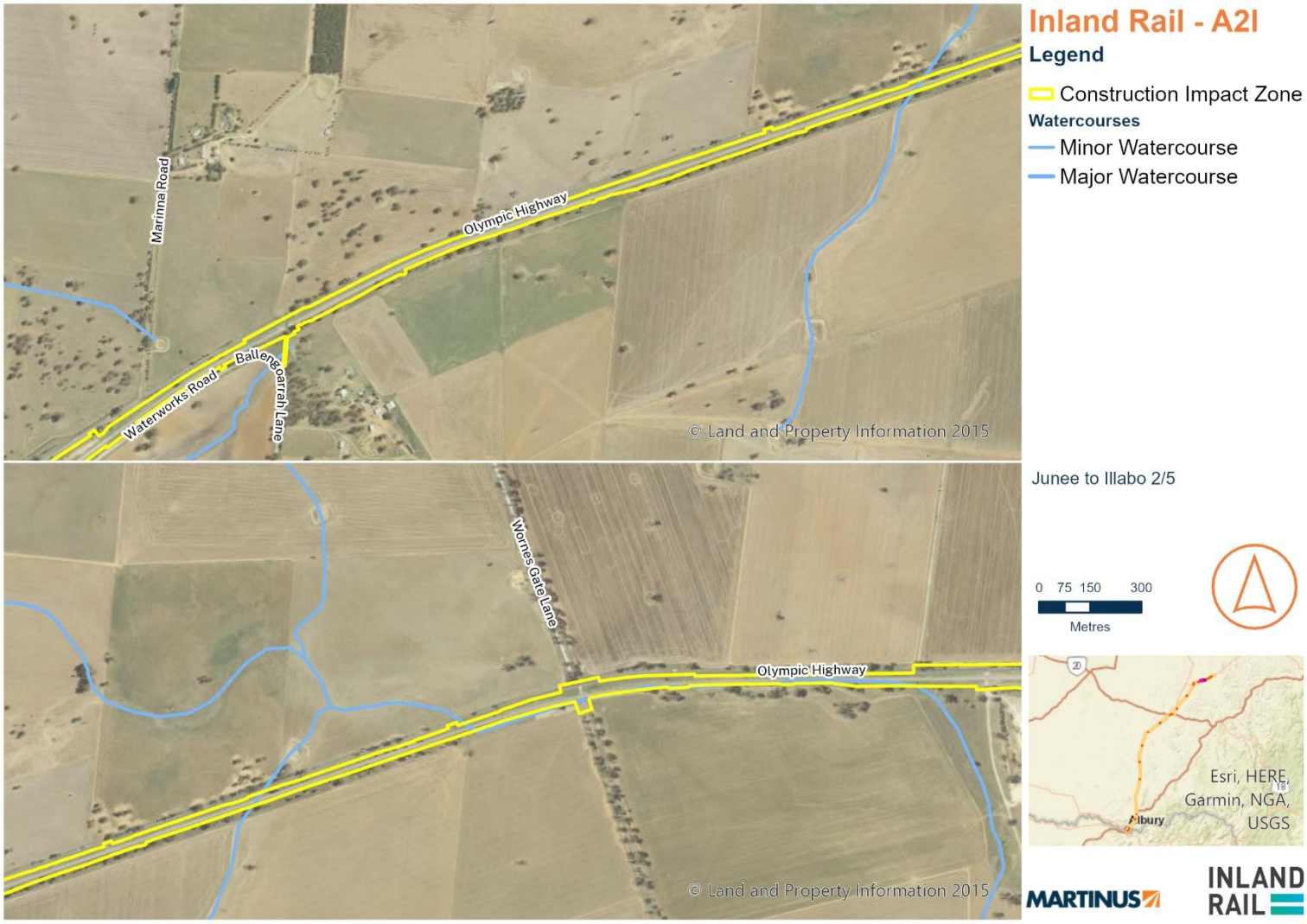


FIGURE 18: WATERCOURSES RELATIVE TO JUNEE TO ILLABO CLEARANCES ENHANCEMENT SITE (2 OF 5)

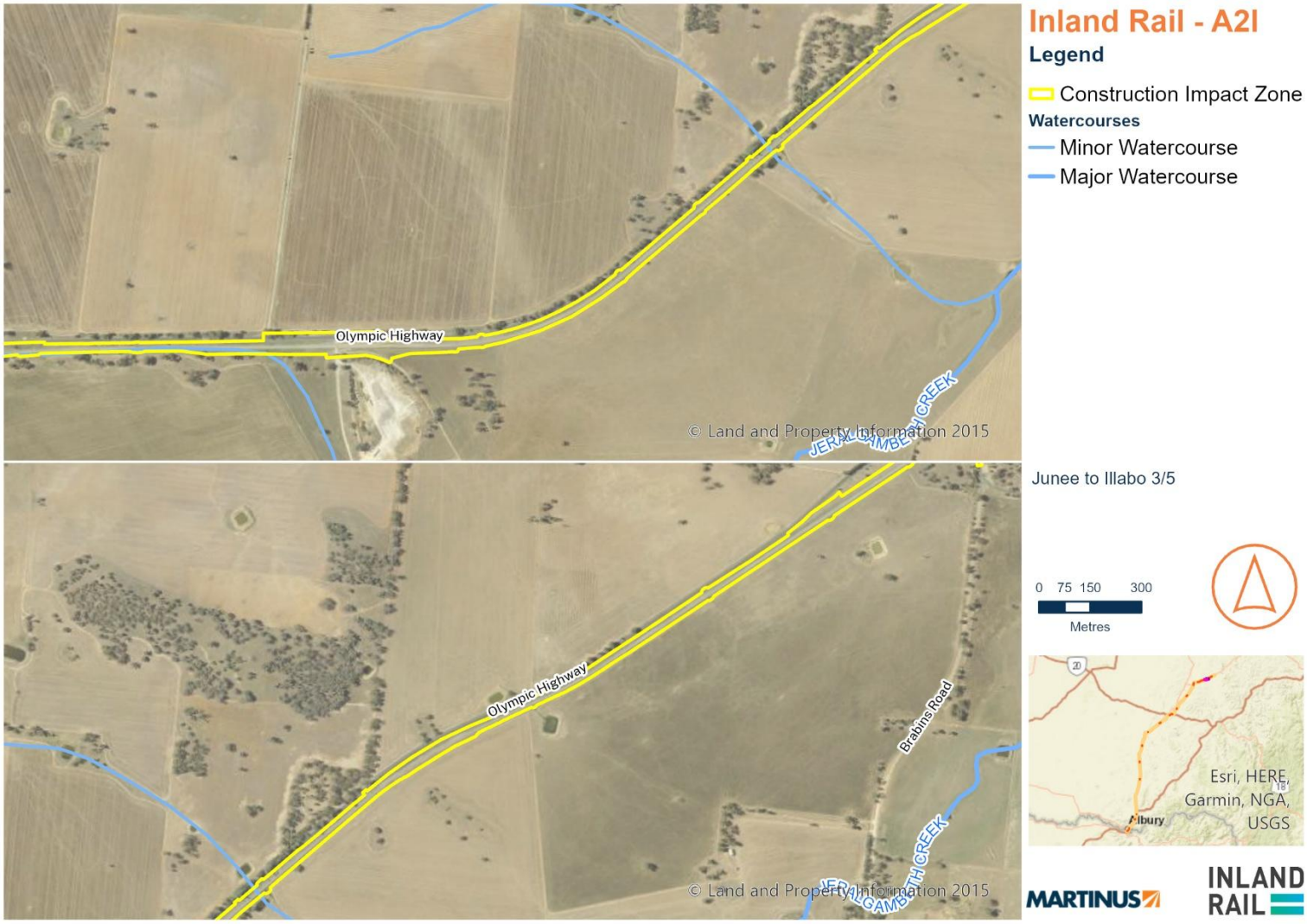


FIGURE 19: WATERCOURSES RELATIVE TO JUNEE TO ILLABO CLEARANCES ENHANCEMENT SITE (3 OF 5)

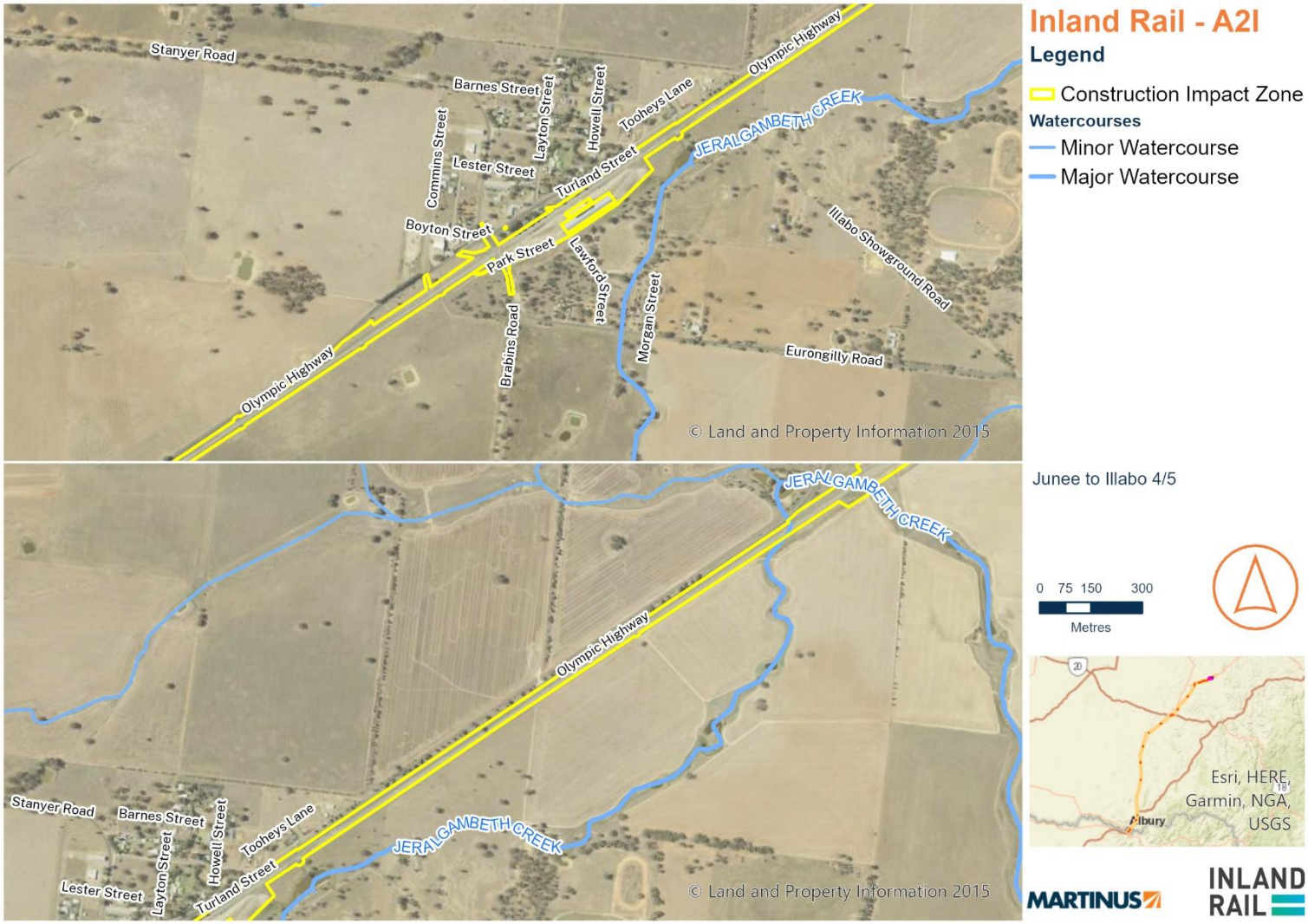


FIGURE 20: WATERCOURSES RELATIVE TO JUNEE TO ILLABO CLEARANCES ENHANCEMENT SITE (4 OF 5)

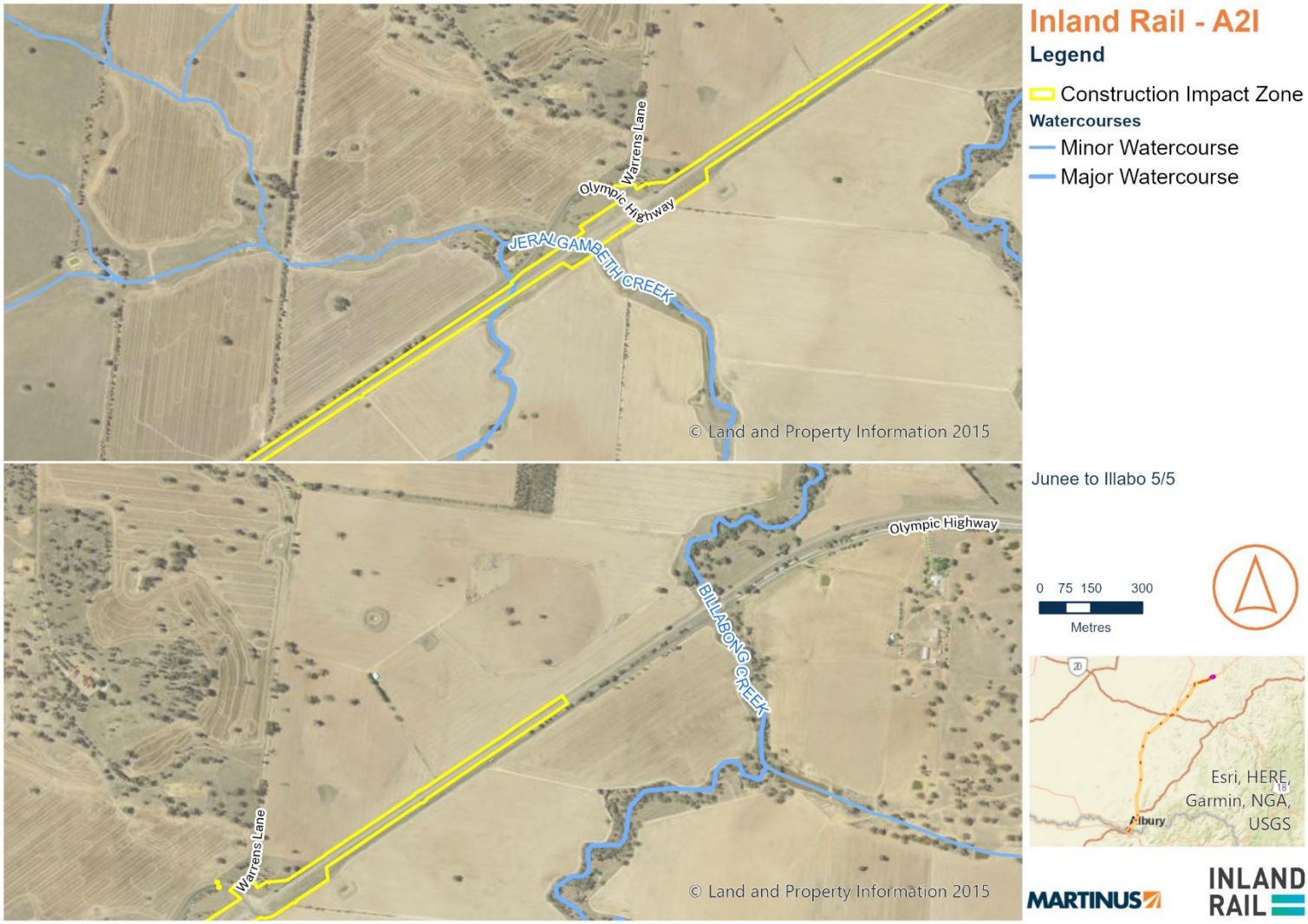


FIGURE 21: WATERCOURSES RELATIVE TO JUNEE TO ILLABO CLEARANCES ENHANCEMENT SITE (5 OF 5)

4.5.2 Water quality

Site-specific water quality data for the enhancement sites is not available. Existing water quality data from the broader catchment areas was reviewed as part of the EAD to understand the existing water quality of the catchments that would receive runoff from the enhancement sites. A review of publicly available information from NSW DCCEEW (formerly NSW DPI Water) was undertaken for water quality in the Murray and Murrumbidgee catchments and is summarised below.

Murray catchment

The condition of the Murray catchment within the study area is considered 'good' against the total phosphorus and total nitrogen key water quality indicators, indicating an acceptable nutrient load in the catchment's watercourses (NSW DPI, 2019a).

Water quality data collected by Water NSW from the Murray River at four (4) monitoring sites located downstream of the Murray River bridge enhancement site is shown in Table 14. Electrical conductivity is the only value that was monitored consistently at all sites. These values were taken on a monthly basis beginning in late 2001 up until 2021. pH and DO values at Albury Union Bridge were recorded between August 2013 and September 2014. pH, DO and turbidity were monitored daily from late March 2021 to early June 2021.

Water quality at the monitoring sites meets the target values for the catchment in the Basin Plan 2012 for pH and dissolved oxygen levels but is below target values for electrical conductivity (indicating salinity) and turbidity (Water NSW, 2021).

TABLE 14: WATER QUALITY MONITORING DATA ON THE MURRAY RIVER NEAR ALBURY

Analyte		Albury (Union Bridge) Site: 409001	Downstream Hume Dam (Heywoods) Site:409016	Doctors point Site: 409017	Howlong Site: 409037
pH Target: 6.5–7.5	Min	7.0	6.8	-	-
	Mean	7.3	6.9	-	-
	Max	7.7	7.1	-	-
EC Target peak (80percentile): 412 µS/cm	Min	21.0	34.1	18.0	31.5
	Mean	55.3	49.5	51.8	64.5
	Max	170.8	78.5	119.6	318.2
DO Target: >7.7 mg/L	Min	6.6	6.5	-	-
	Mean	9.2	8.3	-	-
	Max	11.4	10.4	-	-
Turbidity Target: 15 NTU	Min	-	2.6	-	-
	Mean	-	5.1	-	-
	Max	-	9.3	-	-

Murrumbidgee catchment

Water quality in the Murrumbidgee catchment nearest the study area is rated 'fair' to 'good' based on the total nitrogen and phosphorus, pH levels and dissolved oxygen key indicators. There is a general trend towards increasing turbidity concentration with distance down the catchment, due to the cumulative impacts of land use, soil disturbance and human activity. High flow from rainfall and runoff also results in higher turbidity, nutrients, possible pesticides and pathogens and lower in-stream salinity within the catchment (NSW DPI, 2019b).

Water quality data collected from the Murrumbidgee River and a number of tributaries at four (4) monitoring sites near Wagga Wagga by WaterNSW. Electrical conductivity is the only value that was monitored consistently at all sites beginning

in May 1993 (site 410001), December 2000 (site 410048) and February 2002 (site 410047) up until 2021. Turbidity was monitored intermittently at site 410001 at between June 1993 and February 2012. 12 samples of turbidity were available from site 410048 between December 2004 and June 2010.

The data is shown in Table 15 and indicate the following:

- Mean electrical conductivity (indicating salinity) values on the Murrumbidgee and at Tarcutta Creek were below or close to the target values given under the Basin Plan 2012;
- Mean electrical conductivity values at Kyeamba Creek and Billabong Creek were both two to three times the target electrical conductivity (EC) values;
- Turbidity data was only available at the Murrumbidgee River site and Kyeamba Creek site. The mean turbidity values for these sites were above the target values, which reflects the cumulative impacts of land use, soil disturbance and human activity on water quality within the catchment (WaterNSW, 2021).

TABLE 15: WATER QUALITY MONITORING DATA ON THE MURRUMBIDGEE RIVER NEAR WAGGA WAGGA

Analyte		Murrumbidgee River at Wagga Wagga Site: 410001	Tarcutta Creek at Old Borambola Site: 410047	Kyeamba Creek at Ladysmith Site: 410048	Billabong Creek Downstream Ten Mile & Mountain Creeks Site: 410186
EC Target peak (80percentile): 258 µS/cm	Min	30.0	35.9	20.8	2
	Mean	142.0	266.8	733.7	856.0
	Max	309.4	727.4	2109.2	2185.1
Turbidity Target: 35-50 NTU	Min	3.7	-	-1	-
	Mean	71.6	-	54.6	-
	Max	316.6	-	131.4	-

Summary

There is limited water quality data available for watercourses intersected by the project. Given the high proportion of land developed for urban and agricultural purposes within the project area, it is likely that runoff from these areas contributes to degradation of water quality, and some watercourses near the project would not achieve the water quality criteria as laid out in the ANZG 2018 and Murray Darling Basin Plan 2012, particularly for nutrients. The sources of the high nutrient levels are likely to be diffuse and related to current and historical agricultural activities within the study area.

Further information about existing water quality and baseline monitoring is detailed in the Construction Surface Water Monitoring Program (refer Appendix B).

4.5.3 Sensitive receiving environments

A sensitive receiving environment is one that has a high conservation value or supports human uses of water that are particularly sensitive to degraded water quality. Watercourses and other surface water features in the vicinity of the project site, which are considered to be sensitive receiving environments, are listed in Table 16.

TABLE 16: SENSITIVE RECEIVING ENVIRONMENTS

Sensitive receiving environment	Enhancement site	Reason for classification
Greater Hume-Lockhart Precinct		
Buckargingah Creek, Henty	In proximity to Henty Yard clearances	Key Fish Habitat Potential for threatened species Doodle Comer Swamp within 250 metres

Sensitive receiving environment	Enhancement site	Reason for classification
Yerong Creek	In proximity to Yerong Creek Yard clearances	Key Fish Habitat
Sandy Creek (Yerong Creek)	In proximity to Yerong Creek Yard clearances	Key Fish Habitat
Junee Precinct		
Jeralgambeth Creek	Within Junee to Illabo clearances	Key Fish Habitat
Albury Precinct		
Murray River	Within Murray River bridge	Key Fish Habitat Potential for threatened species
Oddies Creek	Within Murray River bridge	Key Fish Habitat
Eight Mile Creek	Within Billy Hughes Bridge	Potential for threatened species
Wagga Wagga Precinct		
Sandy Creek	Within Uranquinty Yard clearances	Key Fish Habitat Potential for threatened species

4.6 Groundwater

4.6.1 Groundwater systems

Four (4) groundwater systems were identified in the EAD that underlie the study area for the entire project (Stage A, Stage B and Stage C):

- Upper Murray (Alluvium)—Albury precinct;
- Billabong Creek (Alluvium)—Greater Hume, Lockhart precinct;
- Wagga Wagga alluvial—Wagga Wagga precinct;
- Lachlan fractured rock—all precincts.

These groundwater systems are delineated as per the groundwater sources listed within the water sharing plans.

4.6.2 Groundwater quality

Groundwater quality describes the condition of water within the groundwater source and its suitability for different purposes, such as whether it can be used for town water, stock and domestic supply or irrigation. One way of assessing groundwater quality is by the salinity of the water resource.

Beneficial use categories are general groupings of groundwater uses based on water quality; primarily based on salinity and the absence or presence of contamination but can include water quality indicators or sodium absorption ration, nutrients and pathogens. The overriding principle is that groundwater quality should be maintained within its beneficial use category. Beneficial use is the equivalent of environmental value (ANZECC, 2000). Beneficial use categories:

- Were adopted in the NSW Groundwater Quality Protection Policy (Department of Land and Water Conservation (DLWC), 1998);
- Have been adopted in the NSW Aquifer Interference Policy (AIP);
- Are used in the relevant WRPs.

Beneficial use categories for each enhancement site are included in Table 17 and are based on salinity for this assessment. Salinity levels are separated into classes A1 to D dependent on the total dissolved solids which determine the beneficial use category as outlined in Table 17.

TABLE 17: BENEFICIAL USE CATEGORIES ADOPTED FOR ASSESSMENT (DPIE 2019A, 2019B & 2019C)

Beneficial use	Salinity (TDS mg/L)						
	A1 (0-600)	A2 (600-900)	A3 (901-1,200)	B (1201-3000)	C1 (3001-6000)	C2 (6001-10,000)	D (>10,000)
Aquatic ecosystem protection	✓	✓	✓	✓	✓	✓	✓
Primary industries – Irrigation	✓	✓	✓	✓			
Primary industries – Stock drinking water	✓	✓	✓	✓	✓	✓	
Recreation and aesthetics	✓	✓	✓	✓	✓	✓	✓
Raw drinking water	✓	✓	✓				
Industrial water	✓	✓	✓	✓	✓	✓	✓
Cultural and spiritual	✓	✓	✓	✓	✓	✓	✓

Notes: 1. Conversion from mg/L to µs/cm (conversion factor of 0.67) is A1 = 0-896, A2 = 897-1,343, A3 = 1,344-1,791, B = 1,792-4,478, C1 = 4,479-8,955, C2 = 8,956-14,925 and D = >14,925

4.6.3 Sensitive receivers

Registered groundwater bores

A total of 469 registered groundwater bores are located within the EAD study area with only one located within an enhancement site - registered bore (GW402492). This registered bore is sited within the Olympic Highway underbridge enhancement site within the Junee precinct and has a purpose as a monitoring/test bore.

Most of registered bores are for monitoring or observation purposes (305) followed by water supply (including industry, aquaculture, commercial and household water supply) (91), unknown purpose (32), recreation (15), stock and domestic (11), drainage (11) and exploration (4).

Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) rely on a supply of groundwater to support the species composition, structure and function of the ecosystem. A GDE may be either entirely dependent on groundwater for survival or may use groundwater opportunistically or as a supplementary source of water. Groundwater discharge can be important in maintaining baseflow in rivers and streams, and ecosystems associated with these discharge areas may have a high dependency on groundwater for their water requirements.

A total of 31 ecosystems (16 aquatic and 15 terrestrial) that potentially rely on the surface expression of groundwater have been identified across all groundwater study areas assessed in the EAD. The location of these GDEs in respect to the enhancement sites is detailed in Table 18.

TABLE 18: SUMMARY OF KNOWN GROUNDWATER CONDITIONS

Enhancement site	Groundwater source/details	Groundwater levels	Groundwater quality/hydraulic conductivity	Nearby sensitive receivers
Albury Precinct				
Murray River bridge	▪ Upper Murray (Alluvium) groundwater system ▪ Groundwater recharge is likely dominated by the Murray River, which shares a hydraulic connection to the alluvial aquifer.	Groundwater would be of a similar elevation to the water level of the Murray River.	▪ Strongly influenced by the SWL, flow and quality of the Murray River	▪ GDEs, including Murray River (aquatic) and River Red Gums (terrestrial)
Albury Yard clearances and Albury Station pedestrian bridge	▪ Upper Murray (Alluvium) groundwater system ▪ Groundwater recharge is likely dominated by the Murray River, which shares a hydraulic connection to the alluvial aquifer.	Between 8.1 - 8.5m below ground level (mBGL)	▪ Quality: marginal to brackish ▪ Salinity category: A3 to B ▪ Hydraulic conductivity: 0.88 – 0.97 m/day	▪ Registered bores situated close to the Murray River ▪ GDEs, including Murray River (aquatic) and River Red Gums (terrestrial)
Riverina Highway bridge	▪ Upper Murray (alluvium) groundwater system ▪ Groundwater recharge is likely dominated by the Murray River, which shares a hydraulic connection to the alluvial aquifer. ▪ Groundwater flow towards the Albury Yard clearances is plausible based on limited information regarding groundwater level differences between Albury Yard clearances and Riverina Highway bridge.	Between 7.3 – 7.7 mBGL	▪ Quality: marginal to brackish ▪ Salinity category: A3 ▪ Hydraulic conductivity: 0.8m/day	▪ Registered bores for water supply purposes. ▪ GDEs situated closer to the Murray River or its tributaries.
Billy Hughes bridge	▪ Lachlan fractured rock groundwater system ▪ Recharge would primarily be from surface water infiltration and localised flows from neighbouring topographic highs. ▪ Perched water may exist, groundwater flow would generally follow local topography, which regionally dips towards the south.	Below observable groundwater investigation depths of 7.2 mBGL (211.7 mAHD).	▪ No information regarding groundwater quality is available	▪ Anticipated to be at depth within the weathered fractured rock and be unsuitable for a resource due to predicted low yields. ▪ GDEs within the groundwater study area and enhancement site.

Enhancement site	Groundwater source/details	Groundwater levels	Groundwater quality/hydraulic conductivity	Nearby sensitive receivers
Table Top Yard clearances	▪ Lachlan fractured rock groundwater system; ▪ Due to the proposed works (gantry signal works) requiring minimal excavation, no site investigations were conducted.	No groundwater level information is available, but groundwater is not anticipated within 0.5 m of the surface within the enhancement site.	▪ No groundwater quality information is available; ▪ Groundwater yields of 0.1 litres per second (L/s) from current bore.	▪ One registered bore (GW505149); ▪ Nearest GDEs approximately 350 m and 850 m from the enhancement site.
Lockhart-Greater Hume Precinct				
Culcairn Yard clearances	▪ Billabong Creek (alluvium) groundwater system; ▪ Recharge would occur through rainfall infiltration overlying alluvium soils and discharge from Billabong Creek; ▪ Groundwater flow is predicted to generally flow east to west due to connection with Billabong Creek.	Recorded groundwater levels of 4.0 – 34.0 mBGL. Median groundwater level calculated from nine bores was 13.7m.	Groundwater quality is anticipated to be fresh to brackish (WaterNSW, 2021).	GDEs clustered around the riparian corridor of Billabong Creek.
Henty Yard clearances	▪ Lachlan fractured rock groundwater system; ▪ Recharge from rainfall infiltration is considered the dominant recharge mechanism; ▪ Urbanisation around the project site may impact localised responses to rainfall events; ▪ Groundwater flow is anticipated to follow topography, east to west.	The shallow permanent groundwater system is predicted to be greater than 2.2 m within the enhancement site	No groundwater quality information is available.	GDE populations of the topographically low-lying Doodle Corner Swamp, a highpotential GDE located approximately 1.6 km west of the enhancement site.
Yerong Creek Yard clearances	▪ Lachlan fractured rock groundwater system; ▪ Recharge from rainfall infiltration is anticipated to be the dominant recharge mechanism; ▪ Groundwater flow is anticipated to generally follow topography, generally south-east to north-west	Below observable groundwater depths of 2.2 mBGL.	No groundwater quality information is available.	Yerong Creek is the only mapped GDE within the groundwater study area for this site

Enhancement site	Groundwater source/details	Groundwater levels	Groundwater quality/hydraulic conductivity	Nearby sensitive receivers
The Rock Yard clearances	▪ Lachlan fractured rock groundwater system; ▪ Recharge from discharge from Burkes River during high flow and flooding conditions and infiltration from rainfall are anticipated to be the dominant recharge mechanisms; ▪ Groundwater flow most likely follows regional river topography towards the north west.	Below observable groundwater depths of 5.4 mBGL.	No groundwater quality information is available.	Burke River is the only mapped GDE within the groundwater study area.
Wagga Wagga Precinct				
Uranquinty Yard clearances	▪ Wagga Wagga Alluvium groundwater system.	▪ Likely deeper than the observable groundwater depth (8.5 mBGL) recorded during site investigations ▪ A deeper aquifer is likely in excess of 30m.	▪ No information available	▪ GDEs associated with Sandy Creek ▪ One bore approximately 1.7km north-east of the enhancement site.

Enhancement site	Groundwater source/details	Groundwater levels	Groundwater quality/hydraulic conductivity	Nearby sensitive receivers
Pearson Street bridge	▪ Lachlan fractured rock groundwater system; ▪ Wagga Wagga Alluvial groundwater system; ▪ Recharged by direct rainfall, or rainfall in areas of topographic highs to the south east; ▪ Groundwater flow would be controlled by localised topography, towards the north–north west.	▪ Monitored groundwater ranged from 184–185.2 mAHD; ▪ Groundwater levels (based on long term data) show strong correlation to climatic conditions, with a strong variability close to the enhancement site.	▪ Quality: fresh; ▪ Salinity category: A1 (see Table 19-4 for beneficial uses); ▪ Hydraulic conductivity: 0.10 m/day; ▪ Groundwater quality may be influenced by dewatering to manage localised groundwater salinity issues within its vicinity.	Nearest GDE is located around 300 m to the north of the enhancement site.
Cassidy Parade pedestrian bridge, Edmondson Street bridge, Wagga Wagga Yard clearances	▪ Lachlan fractured rock groundwater system; ▪ Recharged by direct rainfall, or rainfall in areas of topographic highs to the south; ▪ Groundwater flow would be controlled by localised topography, and flow towards the north.	▪ BH210: between 10.9–11.1 mBGL at BH210; ▪ Wagga Wagga Council monitoring bore 20: ranged from 4.5 mBGL to greater than 14.9 mBGL.	▪ BH210 quality: fresh; ▪ BH210 salinity category: A1 (see Table 19-4 for beneficial uses); ▪ Monitoring bore 20 salinity: B to C2 (see Table 19-4 for beneficial uses); ▪ Groundwater quality may be influenced by dewatering to manage localised groundwater salinity issues within its vicinity	None identified.

Enhancement site	Groundwater source/details	Groundwater levels	Groundwater quality/hydraulic conductivity	Nearby sensitive receivers
Bomen Yard clearances	▪ Lachlan fractured rock groundwater system; ▪ Recharge from rainfall infiltration is considered the dominant recharge mechanism; ▪ Groundwater flow likely to follow topography, towards the west to north west.	▪ Between 12-15 mBGL ▪ Perched water may exist at soils and weathered rock interface ▪ Shallow permanent groundwater table is predicted to be greater than 2.1 mBGL.	No information available	▪ Bore GW402633 ▪ Low potential GDEs of Blakely's Red Gum and Yellow Box grasses.
Junee Precinct				
Harefield Yard clearances	▪ Lachlan fractured rock groundwater system; ▪ Recharge from rainfall infiltration is considered the dominant recharge mechanism; ▪ Additional recharge likely provided through hydraulic connection with Reedy Creek during high-flow conditions; ▪ Groundwater flow is predicted to follow topography, towards the north-west.	▪ Recorded groundwater levels between 15.0–25.0 mBGL; ▪ The shallow permanent groundwater table is predicted to be greater than 2.0 mBGL under non-flooding or highflow creek conditions.	Qualitative statement of 'very good' in the records for bored GW019704 (WaterNSW, 2021).	▪ Three registered water supply bores within groundwater study area; ▪ Low potential GDEs of yellow box are located adjacent to the southern end of the enhancement site.
Kemp Street bridge	▪ Localised depression filled with minor alluvial and colluvial sediments from the surrounding Lachlan fractured rock groundwater system; ▪ Recharge would primarily be through infiltration from rainfall from overlying sediments and the surrounding topographic	▪ No site investigations were completed; ▪ Conditions predicted to be similar to conditions at Kemp Street bridge and Olympic	▪ No information available ▪ Groundwater quality and hydraulic conductivity likely to be similar to Olympic Highway underbridge	▪ One bore within 20m (GW064614) ▪ Limited connectivity with GDEs.

Enhancement site	Groundwater source/details	Groundwater levels	Groundwater quality/hydraulic conductivity	Nearby sensitive receivers
	highs located to the east and west, which would influence the groundwater quality and likely to similar to the groundwater quality monitored at Olympic Highway underbridge, Junee (brackish, beneficial use category B); ▪ Indication of a non-permanent groundwater sourced (perched system) dominated by evaporation, or a limited hydraulic conductivity and yields exists above Lachlan fractured rock groundwater system; ▪ Groundwater flow would follow topography and flow towards the north to north-west.	Highway underbridge enhancement sites.		
Junee Yard clearances	▪ Localised depression filled with colluvial sediments from the surrounding Lachlan fractured rock groundwater system; ▪ Recharge would primarily be through infiltration from rainfall from overlying sediments and the surrounding topographic highs; ▪ Groundwater flow is anticipated to follow topography, generally towards the north-west.	▪ No site investigations were completed; ▪ Conditions predicted to be similar to conditions at Kemp Street bridge and Olympic Highway underbridge enhancement sites.	▪ No information available; ▪ Groundwater quality and hydraulic conductivity likely to be similar to Olympic Highway underbridge.	Limited connectivity with GDEs.
Olympic Highway underbridge	▪ Localised depression that overlies colluvial and residual deposits of the Lachlan fractured rock groundwater system; ▪ Recharge would primarily be through infiltration from rainfall from overlying sediments and the surrounding topographic highs; ▪ Groundwater flow is predicted to follow topography, flow towards the south along the enhancement sites then towards the west.	▪ BH215 between 9.5–10 mBGL; ▪ Perched, temporary water may be present at fill, soil and shallow rock interfaces; ▪ Groundwater is predicted to be greater than 9.5mBGL.	▪ Quality: brackish; ▪ Salinity: B (see Table 17 for beneficial uses) ▪ Hydraulic conductivity: 0.11 m/day.	Limited connectivity with GDEs.

Enhancement site	Groundwater source/details	Groundwater levels	Groundwater quality/hydraulic conductivity	Nearby sensitive receivers
Junee to Illabo clearances	▪ Lachlan fractured rock groundwater system; ▪ Recharge would primarily be through infiltration from rainfall from overlying sediments and the surrounding topographic highs; ▪ Groundwater flow is predicted to follow topography, flow to the northeast.	▪ Limited registered bores drilled into the Lachlan fractured rock deep groundwater system; ▪ No reviewed records contained groundwater level information, one bore (GW401369) identified water bearing zones starting from 19 mBGL; ▪ Groundwater is predicted to be greater than 2.0 mBGL.	Quality: brackish.	One bore (GW401369)

Multiple geotechnical investigations and laboratory test data has been completed during various phases of the project and are summarised in the Detailed Design Reports for each package. A summary of the groundwater findings is included in Table 19.

TABLE 19: PRELIMINARY GROUNDWATER RESULTS

Enhancement site / Detailed Design Report	Summary
ALBURY PRECINCT	
Murray River bridge 5-0052-210-PEN-B1-RP-0001	No geotechnical scope for this design package.
Albury Yard clearances and Albury Station pedestrian bridge Albury Station Yard 5-0052-210-PEN-B2-RP-0001	Groundwater strike levels have been observed at some of the borehole investigation locations; shallow groundwater levels within less than 1m depth below ground surface were observed in the test pit investigations due to rain events prior to the test date. Groundwater was encountered between 2 and 7.2 mBGL (158.73 – 151.99 m AHD) during other monitoring events in the area.
Riverina Highway bridge 5-0052-210-PEN-B4-RP-0001	Groundwater was not encountered during auger drilling of the borehole depths ranging from 1.95 m (161.05 m AHD) to 16.25 m (144.822 m AHD) below existing ground surface level. Drilling fluid was utilized during coring of rock below this depth, which prevented observation of groundwater. A groundwater standpipe in the area was recorded to have a standing water level (SWL) between 7.48 – 11.5 mBGL l (153.91 – 149.7m AHD)
Billy Hughes bridge 5-0052-210-PEN-B5-RP-0001	Groundwater was not encountered during auger drilling of the boreholes in which the depths ranging from 1.95 m (184.25 m AHD) to 19.7 m (201.88 m AHD). Drilling fluid was utilized during coring of rock below this depth, which prevented observation of groundwater. A HOBO datalogger has been installed in the standpipe at 210-05-TP5501. The datalogger was dry between installation on 11 April 2024 until at least 3 October 2024.
Table Top Yard clearances 5-0052-210-PEN-B6-RP-0001	No geotechnical scope for this design package.
LOCKHART-GREATER HUME PRECINCT	
Culcairn Yard clearances 5-0052-210-PEN-G1-RP-0001	Groundwater levels were not observed and recorded in the geotechnical investigation.
Henty Yard clearances 5-0052-210-PEN-G2-RP-0001	For the purpose of the current track slew geotechnical assessment, the groundwater level is conservatively assumed at the bottom of Unit 2-fill layer, i.e. top of the natural subgrade.
Yerong Creek Yard clearances 5-0052-210-PEN-G3-RP-0001	For the purpose of the current track slew geotechnical assessment, the groundwater level is conservatively assumed at the bottom of Unit 2-fill layer, i.e. top of the natural subgrade.

Enhancement site / Detailed Design Report	Summary
The Rock Yard clearances 5-0052-210-PEN-G4-RP-0001_0	No geotechnical scope for this design package.
WAGGA WAGGA PRECINCT	
Uranquinty Yard clearances 5-0052-210-PEN-W1-RP-0001	For the purpose of the current track slew geotechnical assessment, the groundwater level is conservatively assumed at the bottom of Unit 2-fill layer, i.e. top of the natural subgrade.
Pearson Street bridge 5-00520210-PEN-W2-RP-0001	Groundwater measurements varied from 1.41 – 9.7 mBGL (184.79 – 178.27m AHD).
Cassidy Parade pedestrian bridge, Edmondson Street bridge, Wagga Wagga Yard clearances Wagga Wagga Yard 5-0052-210-PEN-W7-RP-0001	For the purpose of the current track slew geotechnical assessment, the groundwater level is conservatively assumed at the bottom of Unit 2-fill layer, i.e. top of the natural subgrade.
Wagga Wagga Station (Mothers') Footbridge 5-0052-210-PEN-W8-RP-0001	Groundwater was observed at a depth of 9.7 mBGL (174.433m AHD)
Cassidy Parade footbridge 5-0052-210-PEN-W4-RP-0001	Groundwater strikes were observed during borehole drilling between 0.3 – 2.00 mBGL (186.548 – 184.978m AHD). For the purpose of this design, the design groundwater is adopted at the existing surface ground level.
Edmondson Street Bridge and Footbridge 5-0052-210-PEN-W5-RP-0001	Shallow groundwater was not encountered at the site. Groundwater was observed during borehole drilling between 5.5 – 12.2 mBGL (178.1 – 171.413m AHD)
Bomen Yard clearances 5-0052-210-PEN-W9-RP-0001	For the purpose of the current track slew geotechnical assessment, the groundwater level is conservatively assumed at the bottom of Unit 2-fill layer, i.e. top of the natural subgrade.
JUNEE PRECINCT	
Harefield Yard clearances 5-0052-210-PEN-J1-RP-0001	Inferred groundwater strikes between 0.5 – 0.68 mBGL (259.20 – 252.66m AHD); water retained below ballast from previous rainfall event
Kemp Street bridge 5-0052-210-PEN-J2-RP-0001	Groundwater was observed between 1.41m – 6.1 mBGL (298.15 – 294.50m AHD)

Enhancement site / Detailed Design Report	Summary
Junee Yard clearances 5-0052-210-PEN-J4-RP-0001	Groundwater levels were not observed and recorded in the geotechnical investigation.
Olympic Highway underbridge 5-0052-210-PEN-J6-RP-0001	For the purpose of the current track slew geotechnical assessment, the groundwater level is conservatively assumed at the bottom of Unit 2-fill layer, i.e. top of the natural subgrade.
Junee to Illabo clearances 5-0052-210-PEN-J7-RP-0001	For the purpose of the current track slew geotechnical assessment, the groundwater level is conservatively assumed at the bottom of Unit 2-fill layer, i.e. top of the natural subgrade.

5 ASPECTS AND IMPACTS

5.1 Soil and erosion

Excavation and ground disturbance activities would expose and disturb soils. If not adequately managed, this could result in:

- Erosion of exposed soil and stockpiled materials;
- Dust generation;
- An increase in sediment loads entering the stormwater system and/or local runoff, and, therefore, nearby receiving waterways;
- Increase in salinity levels in soil;
- Acid Sulfate Soil (ASS)/Potential Acid Sulfate Soil (PASS) conditions;
- Mobilisation of contaminated sediments, with resultant potential for environmental and human health impacts.

5.1.1 Soil erosion

Construction during Stage C would temporarily expose the natural ground surface and sub-surface through the removal of vegetation, overlying structures (such as existing roads) and excavation. The exposure of soil to runoff and wind can increase soil erosion potential; particularly, where construction activities are undertaken in soil landscapes characterised by dispersive soils, given their susceptibility to erosion.

5.1.2 Acid soils and rock

Acid sulfate soils

The exposure of ASS to oxygen during disturbance can lead to the generation of sulfuric acid. The subsequent acidic leachate can then lead to mobilisation of heavy metals such as aluminium and iron into water bodies. Drainage from ASS may affect water quality and can impact aquatic organisms.

The project sites are located within areas described as having a low probability of ASS, with the exception of the Murray River bridge enhancement site, where there are sediments that have a 'high probability' of occurrence of ASS..The potential impacts associated with ASS at the Murray River bridge enhancement site would be minimal, as the proposed works comprise mainly structural bridge work and grading of an access track with very limited excavation. In addition to this, the proposed works are not located in areas where ASS is likely to be present and, therefore, the risk of encountering ASS is considered to be low.

Environments are classed as having a low probability of occurrence where they are generally not suitable for ASS formation, or ASS are highly localised or sporadic. Because ASS are not expected to occur widely in these environments, land management is generally not affected by these soil materials. However, this does negate the fact that interactions with ASS can still occur in low probability areas as is the case for the works within the Billy Hughes Bridge enhancement site. Following indicative datasets within the EAD, the Project team undertook further investigation to verify the existence of ASS within the construction area. The results determined exceedance values above ASSMAC guidelines in multiple locations triggering the Unexpected Finds Protocol and the creation and implementation of an independent Acid Sulfate Soil Management Plan (6-0052-210-EAP-B5-PL-0001). Details of the treatment strategy can be found in Section 6.4.1

Naturally acidic soil

Soil conditions are considered very strongly acidic to strongly acidic within, or near, more elevated terrain, such as near Ettamogah and Table Top, The Rock and northeast of Junee to Illabo. The following enhancement sites during Stage C could be impacted by naturally acidic soils:

- Table Top Yard clearances;
- The Rock Yard clearances;
- Uranquinty Yard clearances;
- Junee to Illabo clearances.

During design development, the selection of construction materials and subsurface construction would consider the aggressivity of the soil at these enhancement sites.

5.1.3 Saline soils

Salinity is a concern as it can lead to corrosion of structures and land degradation, including salinisation of land so that it no longer can be stabilised by vegetation – leading to increased erosion risk. Where not managed it can also result in increased salt loads in local creeks.

Moderate salinity was mapped at several enhancement sites as presented in Table 11. The highest risk is associated with enhancement sites that have high or moderate potential for salinity and more significant excavation comprising:

- Riverina Highway bridge enhancement site where excavation for track lowering;
- Billy Hughes bridge enhancement site where excavation for track lowering;
- Pearson Street bridge enhancement site where excavation for track lowering.

The most likely scenarios leading to an increase in salinity presence at the surface will be excavation of salt affected soil from deeper horizons and placing it at the surface, and disruption of existing aboveground and sub-surface drainage patterns allowing salts to be brought to the surface in seeps or to accumulate in zones of evaporation.

Soil disruption associated with excavations or cuttings into the landscape for the proposed rail line, footings, construction compounds, bridges or levelling purposes are potential activities that could lead to increased salinity risk.

Management of salinity hazards will require a site specific understanding of the salt distribution in the soil profile, and interaction with the groundwater and surface water regime to identify where measures will be required. Excavation associated with the project is generally limited to discrete sites, within areas subject to extensive prior disturbance from historical development of the rail corridor. As such, the risks relating to impacts occurring from salinity to the project are considered to be manageable.

5.2 Surface water

Construction presents a risk to downstream water quality if management measures are not implemented, monitored and maintained throughout the construction period. The following construction activities have the potential to impact water quality in downstream watercourses as a result of erosion and sedimentation:

- Stripping topsoils for site preparation;
- Vegetation removal;
- Construction of site access roads, crane pads, construction compounds and other site infrastructure;
- Cut, fill and piling;
- Ground disturbance for removal of rail infrastructure;
- Track realignment including removal, treatment and fill of formation;
- Stockpiling and transport of materials and soils;
- Works in watercourses to construct temporary bridges and culverts;
- Concreting works.

If inadequately managed, construction activities could potentially impact water quality if they disturb soil or watercourses, result in the uncontrolled discharges of substances to watercourses, or generate contamination. Potential sources of water quality impacts include:

- Increased sediment loads from exposed soil transported offsite to downstream watercourses during rainfall events and from discharge of sediment-laden wastewater;
- Exposure of ASS or PASS, which may generate acidic runoff;
- Increased levels of nutrients, metals and other pollutants, transported in sediments to downstream watercourses or via discharge of wastewater to watercourses;
- Increased alkalinity of pH of downstream watercourses and groundwater sources due to runoff from concrete pumps and agitators (concrete dust, slurry or washout water);
- Chemicals, oils, grease and petroleum hydrocarbon spills from construction machinery directly polluting downstream watercourses;
- Litter from construction activities polluting downstream watercourses;
- Contamination of watercourses due to runoff from contaminated land.

5.3 Groundwater

The EAD assess the potential groundwater impacts as a result of the project. The key issue identified is the risk associated with excavations that could intersect aquifers (such as track lowering or bridge works). Dewatering of excavations (or cuts), whether temporary or permanent, have the potential to lower groundwater levels, reducing the availability of groundwater to nearby sensitive receptors such as GDEs or nearby users of groundwater. Where bridge piling or the construction of soil retaining walls are to occur, impedance to groundwater flow can also occur. This can result in changes to groundwater levels and quality.

5.3.1 Enhancement sites with negligible or low risk of groundwater impact (EAD)

The risk assessment and impacts for enhancement sites with negligible or low risk of groundwater impact from the EAD (EIS Technical Paper 12 – Groundwater) are replicated in Table 20 and Table 21

TABLE 20: ASSESSMENT OF ENHANCEMENT SITES THAT ARE NOT PREDICTED TO INTERSECT THE REGIONAL PERMANENT GROUNDWATER TABLE

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
Albury	Murray River bridge	▪ Upgrading infrastructure without excavation or earthworks relating to existing foundations ▪ Minimal earthworks for site access, pad preparation and laydown areas for plant equipment and construction materials (such as stripping of topsoil and grading).	▪ Maximum excavation depths of 0.5mBGL which is above the interred groundwater depth (anticipated to be close to Murray River surface water level) ▪ Changes to the landscape impacting recharge would be minimal given construction activities (laydown areas, construction pads) will be minimal in extent and utilise existing rail corridor ▪ Inferred strong hydraulic connection to the Murray River would provide a dominant source of water supply to neighbouring GDEs, further limiting potential impacts from changes to recharge.	Negligible
	Albury Yard clearances	▪ Replacing existing track slews and gantry replacement ▪ Stripping of topsoil and grading ▪ Treatment of foundation material.	▪ Maximum bulk excavation depth of 1.1mBGL ▪ Groundwater depth recorded ranged from 8.11 to 8.49mBGL. This is below the maximum bulk excavation depth ▪ Identified registered water supply bores are located approximately 400m or greater from the enhancement site ▪ No change in the current landform that would significantly alter recharge.	Low

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
	Table Top Yard	▪ Removal of existing gantry structure, if structure can't be removed by de-bolting, minimal earthworks for stripping of surface material to expose existing footing will be required ▪ Preparation of access tracks ▪ Installation of new post mounted signal	▪ maximum excavation depths of 0.5mBGL which is above the predicted groundwater depth ▪ no registered water supply bores located within the groundwater study area ▪ distance to nearest GDEs are approximately 350m (low potential GDE) and 850m (high potential GDE) ▪ no change in the current landform that would significantly alter recharge.	Negligible
Greater-Hume Lockhart	Culcairn Yard	▪ Installation of connecting trap loop ▪ Gantry modification ▪ Stripping of topsoil ▪ Treatment of foundation material (for track loop)	▪ Maximum bulk excavation depth of 1.0mBGL to treat foundation material ▪ Groundwater is anticipated to be at depths greater than 4.0mBGL, which is deeper than the proposed bulk excavations ▪ Identified registered water supply bores are located approximately 140m or greater from the enhancement site ▪ Registered water supply bores contain deeper groundwater levels than bulk excavation depths and are inferred to take from the deep Lachlan fractured rock HSU ▪ No change in the current landform that would significantly alter recharge.	Low
	Yerong Creek Yard	▪ Adjustment of the mainline track horizontally and vertically (track slew)	▪ maximum excavation depths of 1.0mBGL which is above the predicted groundwater depth	Low

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
		▪ Removal of existing platform and hut ▪ Stripping of topsoil ▪ Treatment of foundation material.	▪ identified registered water supply bores are located approximately 180m or greater from the enhancement site ▪ registered water supply bores are inferred to take from the deep Lachlan fractured rock HSU ▪ distance to identified GDEs, with Yerong Creek (moderate potential GDE) the only mapped GDE in the groundwater study area and is located approximately 400m to the north ▪ no change in the current landform that would significantly alter recharge.	
	The Rock Yard	▪ Modification of existing over-track gantry structure via de-bolting or cutting ▪ Stripping of topsoil for access tracks, if required.	▪ maximum excavation depths of 0.5mBGL which is above the predicted groundwater depth ▪ identified registered water supply bores are located approximately 630m or greater from the enhancement site ▪ registered water supply bores are inferred to take from the deep Lachlan fractured rock HSU ▪ distance to identified GDEs, with Burkes River (high potential GDE) the only mapped GDE in the groundwater study area and is located approximately 330m to the north ▪ no change in the current landform that would significantly alter recharge.	Negligible
Wagga Wagga	Uranquinty Yard	▪ adjustment of mainline track horizontally and vertically (track slew) ▪ strengthening of Sandy Creek Bridge structure	▪ Maximum excavation depths of 0.5mBGL ▪ Groundwater is expected to be deeper than 8.5mBGL within alluvial soils of the shallow Lachlan fractured rock HSU and deeper than 30mBGL in the underlying deep Lachlan fractured rock HSU	Negligible

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
		▪ stripping of topsoil and grading for access tracks ▪ service relocation, if necessary ▪ treatment of foundation.	▪ Identified registered water supply bore is located approximately one kilometre from the enhancement site ▪ Registered water supply bore is inferred to take from the deep Lachlan fractured rock HSU ▪ No change in the current landform that would significantly alter recharge.	
	Wagga Wagga Yard	▪ Adjustment of mainline track horizontally and vertically (track slew) ▪ Treatment of foundation, if necessary.	▪ Maximum bulk excavation depth of 0.5mBGL ▪ Groundwater depth recorded ranged from 10.94-11.14mBGL. This is below the maximum bulk excavation depth ▪ Identified registered water supply bores are located approximately 550m or greater from the enhancement site ▪ Registered water supply bores are inferred to take from a different HSU (Wagga Wagga Alluvial instead of the shallow Lachlan fractured rock) ▪ No change in the current landform that would significantly alter recharge.	Negligible
	Bomen Yard	▪ Adjustment of mainline track and loop horizontally and vertically (track slew) ▪ Stripping of topsoil and grading for access tracks ▪ Service relocation, if necessary ▪ Treatment of foundation.	▪ Maximum excavation depths of 1.05mBGL which is above the predicted groundwater depth ▪ Nearby registered bores are for monitoring purposes, not water supply ▪ Identified registered water supply bores are located approximately 1.5 kilometre or greater from the enhancement site ▪ No change in the current landform that would significantly alter recharge.	Negligible

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
Junee	Harefield Yard	▪ Adjustment of mainline track horizontally and vertically (track slew) ▪ Replacement of gantry structure ▪ Adjustment of signals and existing bridge to facility track slews ▪ Stripping of topsoil for access tracks ▪ Treatment of foundations.	▪ maximum excavation depths of 1.3mBGL which is above the predicted groundwater depth ▪ identified registered water supply bores are located approximately 850m or greater from the enhancement site ▪ registered water supply bores are inferred to take from the deep Lachlan fractured rock HSU ▪ no change in the current landform that would significantly alter recharge.	Low
	Junee Yard Clearances	▪ Adjustment of mainline track horizontally and vertically (track slew)	▪ identified registered water supply bores are located approximately 450m or greater from the enhancement site ▪ nearest GDE is located approximately 970m from the enhancement site ▪ no change in the current landform that would significantly alter recharge.	Low
	Junee Station pedestrian bridge	▪ Removal of an existing footbridge ▪ Existing bridge foundations to be cut and capped.	▪ Minimal earthworks and excavations are required for the removal of the existing footbridge as the foundations are to be cut and capped.	Negligible
	Olympic Highway Underbridge	▪ Adjustment of mainline track horizontally and vertically (track slew) ▪ Excavation for service relocation, if required ▪ Stripping of soil for access tracks, if required ▪ Treatment of foundation material.	▪ maximum excavation depths of 1.3mBGL which is above groundwater depths recorded between 9.53–9.99mBGL ▪ identified registered water supply bores are located approximately 430m or greater from the enhancement site ▪ nearest GDE is located approximately one kilometre from the enhancement site ▪ no change in the current landform that would significantly alter recharge	Low

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
			▪ one registered bore for monitoring purposes (GW402492) exists within the enhancement site. As groundwater take is not anticipated and the bore is not registered for use as water supply, the risk and impact to the registered bore being unable to continue with its purpose is low. Should the bore be accidently damaged during construction activities, make good provisions would apply.	
	Junee to Illabo	▪ Adjustment of mainline track horizontally and vertically (track slew) ▪ Full reconstruction of 4.3 kilometres of track ▪ Stripping of topsoil for access ▪ Service relocation, if required ▪ Treatment of foundation material.	▪ maximum excavation depths of 1.0mBGL which is above the predicted groundwater depth ▪ identified registered water supply bores are located approximately 350m or greater from the enhancement site. ▪ no change in the current landform that would significantly alter recharge.	Low

TABLE 21: ASSESSMENT OF ENHANCEMENT SITES THAT ARE ANTICIPATED TO INTERCEPT THE WATER TABLE DUE TO PILING

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
Albury	Albury Station pedestrian bridge	▪ Replacing existing bridge ▪ Existing bridge foundations to be cut and capped ▪ Piling for new bridge foundations.	▪ Anticipated piling depth of up to 20.0mBGL ▪ Groundwater depth recorded ranged from 8.11 to 8.49mBGL. This is below the maximum bulk excavation depth ▪ Identified registered water supply bores are located approximately 400m or greater from the enhancement site ▪ No change in the current landform that would significantly alter recharge.	Low
	Billy Hughes bridge	▪ Track lowering by up to 1.4m, including horizontal realignment of the track (by approximately 5m) ▪ Installation of soil retaining walls and drainage network ▪ Stripping of topsoil and removal of material to design level ▪ Treatment of foundation material ▪ Piling to support soil retaining walls.	▪ Maximum bulk excavation depth of 2.5mBGL to treat foundation material ▪ Anticipated piling depth of up to 15.0mBGL ▪ Groundwater is anticipated to be at depths greater than 7.2mBGL, which is deeper than the proposed bulk excavations ▪ Identified registered water supply bores are located approximately 220m or greater from the enhancement site ▪ Registered water supply bores are inferred to take from the deep Lachlan fractured rock HSU ▪ No change in the current landform that would significantly alter recharge.	Low

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
Greater Hume-Lockhart	Culcairn pedestrian bridge	▪ Removal and relocation of an existing footbridge	▪ Anticipated piling depth of up to 10.0mBGL ▪ Groundwater is anticipated to be at depths greater than 4.0mBGL, which is deeper than the proposed bulk excavations ▪ Identified registered water supply bores are located approximately 140m or greater from the enhancement site ▪ Registered water supply bores contain deeper groundwater levels than bulk excavation depths and are inferred to take from the deep Lachlan fractured rock HSU ▪ No change in the current landform that would significantly alter recharge	Low
	Henty Yard	▪ Adjustment of the mainline track by 53.4cm horizontally and 4.9cm vertically (track slew) ▪ Removal of an existing track loop ▪ Modification of gantry sign ▪ Stripping of topsoil ▪ Installation of appropriate drainage measures ▪ Relocation of services, if required ▪ Treatment of foundation material.	▪ maximum bulk excavation depth of 1.0mBGL to treat foundation material ▪ anticipated piling depth of up to 10.0mBGL ▪ groundwater is anticipated to be at depths greater than 1.0mBGL, which is deeper than the proposed bulk excavations ▪ identified registered water supply bores are located approximately 200m or greater from the enhancement site ▪ registered water supply bores inferred to take from the deep Lachlan fractured rock HSU ▪ no change in the current landform that would significantly alter recharge.	Low

Precinct	Enhancement Site	Proposed construction activities	EAD assessment considerations	Potential impact
Wagga Wagga	Cassidy Parade pedestrian bridge and Wagga Wagga Station pedestrian bridge	▪ Adjustment of mainline track by 54.7cm horizontally and 13.2cm vertically (track slew) ▪ Replacement of gantry structure with ground signals ▪ Stripping of topsoil and grading for access tracks ▪ Service relocation, if necessary ▪ Treatment of foundation. ▪	▪ maximum bulk excavation depth of 0.7mBGL ▪ anticipated piling depth of up to 30.0mBGL. ▪ groundwater depth recorded ranged from 10.94–11.14mBGL and is below the maximum bulk excavation depth. ▪ identified registered water supply bores are located approximately 550m or greater from the enhancement site ▪ registered water supply bores are inferred to take from a different HSU (Wagga Wagga Alluvial instead of the shallow Lachlan fractured rock) ▪ no change in the current landform that would significantly alter recharge.	Low
	Edmondson St Bridge	▪ Removal of existing bridge ▪ Construction of new bridge including bulk excavation for piling benches ▪ Adjustment of mainline track by 54.7cm horizontally and 13.2cm vertically (track slew) ▪ Installation of drainage ▪ Replacement of gantry structure with ground signals ▪ Stripping of topsoil and grading for access tracks	▪ maximum bulk excavation depth of 178.00 mAHD (up to 7.00 mBGL. ▪ anticipated piling depth of up to 30.0mBGL. ▪ groundwater depth recorded ranged from 172.53–173.38mAHD (10.94–11.14mBGL) and is below the maximum bulk excavation depth. ▪ identified registered water supply bores are located approximately 550m or greater from the enhancement site ▪ registered water supply bores are inferred to take from a different HSU (Wagga Wagga Alluvial instead of the shallow Lachlan fractured rock) ▪ no change in the current landform that would significantly alter recharge.	Low

5.3.2 Enhancement sites with increased risk of impact (EAD)

Riverina Highway bridge, Pearson Street bridge and Kemp Street bridge enhancement sites were identified in the EAD to contain potential risks greater than low against one or more of the identified risks.

Riverina Highway bridge enhancement site

The proposed works at the Riverina Highway bridge enhancement site involve the lowering of the track by up to one metre, installation of soil retaining walls and an underground storage tank. Groundwater is not anticipated to be intersected for the typical bulk excavation depths of up to 2.1mBGL required for track lowering, foundation material improvement and installation of soil retention walls. However, the installation of the underground storage tank to a base excavation level approximately 8.9mBGL is below the monitored maximum groundwater level (7.33-7.7mBGL). This would result in approximately up to 1.8m of dewatering during construction for its installation. The proposed construction impacts of the Riverina Highway bridge identified in the EAD include:

- 0.7ML estimated to be dewatered with a radius of influence of up to 5.8 metres based on dewatering for 21 days;
- Localised groundwater flow paths and levels would be impacted from dewatering. Changes to groundwater flow paths and levels may disturb and migrate potential existing contamination or saline groundwater.

Given the radius of influence (5.8m), the distance to GDEs (over 700m) and registered bores (around 100m), and the minimal time dewatering is required, the risk of groundwater take impacting these GDEs and registered bores is predicted to be negligible to low.

As dewatering is temporary (21 days) with a limited range of influence, no significant changes to soil moisture content are predicted and, therefore, the risk of settlement and deflection induced by dewatering on adjacent infrastructure is assessed as low. Likewise, due to the small surface area of 64m² for the underground storage tank, it is not predicted to impact the recharge of the groundwater system through changes in infiltration or act as a barrier to groundwater flows.

Pearson Street bridge enhancement site

The proposed works at the Pearson Street bridge enhancement site have a potential moderate risk of intersecting the water table during construction. This is due to long-term historical groundwater monitoring undertaken by Wagga Wagga City Council, indicating that groundwater levels have a strong correlation to climatic conditions and groundwater level responses can vary significantly depending on location, with up to a 3.4m fluctuation observed over 28 years at one nearby Wagga Wagga City Council monitoring bore. The works at this location include:

- Track lowering by up to 1.5m and installation of soil retaining walls
- The total depth of excavations is expected to be up to 2.8mBGL
- Piling works are also expected to extend to a maximum depth of 15mBGL
- The work is proposed to take around 30 days to complete
- Groundwater depth at the enhancement site is around 1.3-2.5mBGL with groundwater of high quality suitable for raw drinking water.

The hydrogeological conceptual model indicates that the groundwater level at the enhancement site likely has a strong correlation to climatic conditions and monitored groundwater levels could be influenced from nearby pumping. As such, there is a risk that groundwater levels could be elevated during construction if wetter climatic conditions occur or there are changes to pumping (if influenced). Under the above conditions there is an increased risk that potential elevated groundwater levels may be intersected during bulk excavations resulting in groundwater intersection and take.

Given the anticipated groundwater levels under current monitoring conditions, bulk excavations are not anticipated to intercept the water table. As no groundwater take is anticipated, and the existing land use would not significantly alter during construction to impact groundwater recharge from infiltration, the risk and resulting impacts from dewatering, settlement, contamination and recharge would be low, including any impacts to GDEs or registered users.

There is, however, a low-to-moderate risk that groundwater levels could be elevated at the time of construction due to future climatic conditions. This could result in potential groundwater take; however, the short timeframe required for the excavation works would limit potential impacts. GDEs located down-gradient from Pearson Street bridge are likely to be supported by its local groundwater environment's hydraulic connection to surface water features, such as the Murrumbidgee River and its associated lagoons and oxbows.

Retaining walls, supported by piling methods such as secant piling, have the potential to act as groundwater flow barriers, altering groundwater flows and impacting local groundwater levels. Groundwater mounding, resulting in increased groundwater levels may occur up-gradient of the barrier (south to south-eastern section of the proposal) and shadowing, resulting in decreased groundwater levels down gradient. While the retaining walls would be perpendicular to the inferred groundwater flow path, they are limited in extent to the area underlying and proximal to Pearson Street bridge. This limited extent would result in a minor impediment to the regional groundwater flow and is unlikely to cause any perceivable impacts to GDEs or registered bores; therefore, the resulting risk and impact to changes in water quality from salinity would be low.

Kemp Street enhancement site

The proposed works at Kemp Street bridge enhancement site involves a bridge replacement and installation of supporting walls. Earthworks would be required, and excavations would predominately involve stripping of soil to allow for capping of the existing foundations, installation of supporting walls and treatment of foundation material. Total depth of bulk excavations is anticipated to be up to 5.0mBGL. Piling would be required to support the new bridge and is anticipated to extend up to 30mBGL. Excavation earthworks are anticipated to take approximately 25 days.

Given the current design depths required for construction, it is anticipated up to approximately 1.8m of groundwater in the shallow Lachlan fractured rock groundwater system would be intersected and require dewatering. Groundwater is predicted to be intersected during excavation required for the treatment of soil foundations and construction of the soil retaining wall. Piling is anticipated to also intersect the shallow Lachlan fractured rock groundwater system aquifer and potentially the deeper aquifer system if water bearing zones are present at depth; however, using appropriate piling techniques, no dewatering resulting from piling is predicted to occur.

The proposed construction impacts of the Kemp Street bridge enhancement site identified in the EAD include:

- 11.4ML estimated to be dewatered with a radius of influence of up to 5.1m based on dewatering for 25 days
- Localised groundwater flow paths and levels would be impacted. The changes to groundwater flow paths and levels may disturb and migrate potential existing contamination or saline groundwater
- There is a moderate risk of dewatering impacting a neighbouring water supply bore (GW064614) that is located approximately 7.5m of the dewatering activity.

Given the calculated radius of influence (5.1m) and the distance to GDEs (around 500m), the risk of dewatering impacting GDEs is low. Additionally, these GDEs are situated within different localised topographic terrains from the point of dewatering, further reducing the risk of impact due to reduced groundwater connectivity within the enhancement site. Given dewatering is temporary and for a relatively short duration, the groundwater is predicted to recover with no long-term impact. In the event that bore GW064614 was significantly impacted (unlikely), make-good provisions would apply.

As dewatering is temporary, no significant changes to soil moisture content are anticipated outside natural conditions and, therefore, the risk of settlement and deflection induced by construction dewatering on adjacent infrastructure is anticipated to be low. Likewise, given the proposal is not altering the existing land use (rail) during construction, the impact to groundwater recharge is assessed as low. This is due to the site already being modified to accommodate rail, including altering drainage patterns, piling for bridge foundations and soil retaining walls.

6 MANAGEMENT AND MITIGATION

6.1 Erosion and sediment control

Temporary erosion and sediment control measures will be installed to protect water quality on the project. Controls and management measures will be designed (stability, location, type and size), constructed, operated and maintained in accordance with Managing Urban Stormwater: Soils and Construction (Landcom, 2004) (the Blue Book) and Managing Urban Stormwater – Soils and Construction, Volume 2D, Main road construction (DECC, 2008).

A Certified Professional in Erosion and Sediment Control (CPESC) will be engaged for the duration of the works. An overarching erosion and sediment control plan (ESCP) has been prepared and is included in Appendix G. The CPESC will prepare an initial Erosion and Sedimentation Control Plan (ESCP) to detail the erosion control measures to be utilised across a range of different receiving environments and landforms for each enhancement site, prior to the commencement of construction at the relevant site. In these initial ESCPs the CPESC will identify any high risk areas.

As required by the Blue Book, the following background information will be included in the ESCPs:

- location of site boundaries and adjoining roads;
- approximate grades and indications of direction(s) of fall;
- approximate location of trees and other vegetation, showing items for removal or retention;
- location of site access, proposed roads and other impervious areas (e.g. parking areas and site facilities);
- existing and proposed drainage patterns with stormwater discharge points; and
- north point and scale.

Environmental staff will then use the ESCP as a basis to develop Progressive Erosion and Sediment Control Plans (PESCP) in consultation with Martinus Rail Project Engineers, Superintendents and Supervisors. For high risk environments as identified by the CPESC, such as works near major watercourses, floodplains, and in steep or highly erodible terrain, the PESCPs will be certified by the CPESC. This will ensure that erosion and sediment control management is incorporated into the planning stage of construction activities and is coordinated in its approach. PESCPs will be updated as required as sites and associated erosion and sediment control requirements change as the works progress. These changes would typically be in repose to the following in accordance with the Blue Book:

- Where changes occur in slope gradients and drainage paths, with their exact form frequently unpredictable before works start;
- Where works continue over an extended period, with revisions being required at the beginning of the second year of operations and further revisions at 2-yearly intervals after that; and
- Where the desired outcome (e.g. protection of receiving waters) is not being achieved.

The Martinus Rail Environment, Approvals and Sustainability Manager (ESM) will approve PESCPs in the first instance and provide the approved PESCP to IRPL as soon as practicable after approval. Minor changes thereafter will be approved by environment staff in consultation with the Environmental Manager and CPESC for high risk environments, as required. PESCPs are designed for use as a practical guide and may be produced in conjunction with Environmental Work Method Statements (EWMS).

Noting that the Sloanes Froglet is sensitive to sedimentation impacts, a Sloane's Froglet Management Plan is being developed and will be implemented in accordance with CoA E26.

6.2 Stockpile management

The project will utilise temporary stockpiles to store excess topsoil and subsoil material from topsoil stripping and earthworks activities. The definition and management of temporary stockpiles will be agreed to with IRPL in writing prior to works for the stockpile commencing. The following techniques will be applied to the management of stockpiles:

- The location of stockpiles will be planned in advance of topsoil stripping and bulk earthworks. Stockpile locations will be selected such that they are -
    - Where practicable, located on slopes less than 10 percent;
    - Positioned such that erosion of the stockpile and the surrounding area is minimised;
    - Constructed on the contour at least 2 (preferably 5) metres from hazard areas particularly likely areas of concentrated water flows
    - Located at least 40-metres from any Riparian zone, unless assessed and approved by the CPESC
- Stripped topsoil will be stockpiled separately from woody material and vegetation and subsoil layers;
- As required by the PESCP, clean water diversions will be installed upslope of stockpiles and sediment controls will be installed downslope;

- Stockpiles will be appropriately stabilised if they are to be in place for more than 10 days to minimise the risk of erosion.
- All topsoil stockpiles must not exceed 2m in height
- Where maintaining seed viability is desirable, ensure stockpiles of topsoil and leaf litter from remnant native bushland areas are no greater than 2 metres deep and kept weed-free.
- The preferred method includes stripping topsoil to the subsoil profile. If all topsoil cannot be removed, geofabric and appropriate material (e.g. crushed rock) can be installed on top or an alternative acceptable solution to minimise risk of soil inversion;
- Stockpiles would be provided with a protective cover that reduces the C-factor on bare surface area to 0.1 after 10 working days of inactivity and 0.15 or less after 20 workings days of inactivity

The PESCP will detail requirements in relation to stabilisation based on the size (including anticipated height) of the stockpile, the duration that the stockpile will remain in place, and its proximity to watercourses and other sensitive environments.

The above management of stockpiles is only applicable to those stockpiles created as a result of project works.

6.3 Saline soils

Construction within areas of high-risk saline soils (as noted in Table 11) will include the following key mitigation measures:

- Initial groundwater monitoring of salinity, continued as required by the Groundwater Monitoring Program;
- Progressive stabilisation and revegetation of exposed areas following disturbance as soon as is practicable;
- Testing to confirm the presence of saline soils in areas of high salinity potential prior to disturbance.

Soil salinity management will also be carried out in accordance with the NSW Department of Primary Industries (2014) Salinity Training Handbook.

Management of salinity hazards will require a site-specific understanding of the salt distribution in the soil profile, and interaction with the groundwater and surface water regime to identify where measures will be required. Excavation associated with the project is generally limited to discrete sites, within areas subject to extensive prior disturbance from historical development of the rail corridor. As such, the risks relating to impacts occurring from salinity to the project are considered to be manageable. However, mitigation and management measures will be implemented to identify and manage these soil types where they are encountered.

Salinity testing described in the durability memos associated with each Detailed Design Report, identified the exposure categories for various project elements. The exposure categories inform the type of mitigation required to be included in the project design. The results of these tests indicate that salinity could be managed through design elements.

6.4 Acid sulfate soils

A review of the ASRIS Acid Sulfate Risk map identified that the project sites are located within areas described as low probability of ASS, with the exception of the Murray River bridge. Construction within Murray River sediment has a high probability of encountering acid sulfate soils.

Any unexpected Acid Sulfate Soils (ASS) finds will be managed in accordance with the project's Unexpected Finds Procedure for Contamination and the Acid Sulfate Soil Manual (1998). The manual includes procedures for the investigation, handling, treatment and management of such soils. Management strategies will include:

- Avoid land where PASS occurs;
- Avoid disturbing PASS if present on land;
- Undertake shallow soil disturbance so as not to disturb PASS at depth;
- Cover PASS with clean fill material;
- Set aside or do not disturb PASS material.

The disposal of ASS would be managed in line with the project Construction Waste, Contamination and Hazardous Materials Management Plan.

6.4.1 Bill Hughes Bridge Site Specific ASS Management

To manage and treat the ASS found within the Billy Hughes Enhancement site the Project team followed the Unexpected Finds procedure which included implementing a site-specific ASS Management Plan (Doc No. 5-0052-214-PIM-00-RG-0001). The report outlines;

- The extent of the investigation and assessment of the enhancement site.

- The determination of a neutralising material and application rates (between 3-5kg/t of agricultural lime),
- Excavation and treatment process including the creation of a treatment pad and mitigations to minimise the impact to the surrounding environment.
- Site runoff management and dewatering processes.
- The ongoing verification procedure where samples of the excavated materials were lab tested to either confirm the neutrality of the material or direct the team to undertake re-treatment.

The management strategy was implemented successfully with the excavated material being neutralised and stockpiled for future use.

6.5 Water use

Water is required during construction for a range of activities, including:

- Earthworks and formation preparation and material conditioning;
- Dust suppression;
- Concrete production;
- Vehicle and equipment wash down;
- Site services at compounds;
- Landscaping and rehabilitation.

It is estimated that about 86.6 megalitres (ML) of water would be required over the course of construction. See Appendix F for the A2I expected water demand for the project.

A series of indicative water supply points have been identified in the EIS as suitable connection points for the supply of either potable or non-potable water for the project. During construction, water is expected to be sourced from multiple sources. The EIS identified the following (subject to approval):

- For works in the Albury precinct: Albury City Council and quarry sources. Alternative sources include seeking groundwater extraction licences and bores if other sources do not prove viable;
- For works in the Greater Hume-Lockhart precinct: Water may be sourced from the Riverina Water and quarry sources;
- For works in the Junee precinct: Water may be sourced from the Junee Council Recycled Water, Goldenfields Water, Riverina Water and quarry sources.

Additional potential water sources have been identified in Table 22. The Riverina Water and Albury City Council locations are confirmed as legally and physically available. The availability of the Junee Council water source is being confirmed. Additional water sources will continue to be investigated to ensure that sufficient volumes of construction water to meet the needs of the Stage C works are legally and physically available.

All sourced water will have flow meters, and the source/usage data will be made available to IRPL, where requested.

TABLE 22: POTENTIAL CONSTRUCTION WATER SOURCES

Enhancement site	Closest standpipe	Distance (km)	Supplier
Murray River bridge	West Albury	6.7	Albury City Council
Albury Yard	West Albury	4.3	Albury City Council
Riverina Highway bridge	East Albury	4	Albury City Council
Billy Hughes bridge	Ettamogah (raw water)	1	Albury City Council
Table Top Yard clearance	Ettamogah (raw water)	6	Albury City Council
Culcairn Yard clearances	Ravlona	19.4	Riverina Water
Henty Yard clearances	Henty	1	Riverina Water

Enhancement site	Closest standpipe	Distance (km)	Supplier
Yerong Creek Yard clearances	Yerong Creek	1	Riverina Water
The Rock Yard clearances	The Rock	1	Riverina Water
Uranquinty Yard clearances	Glenfield	11.2	Riverina Water
Pearson Street bridge	Glenfield	4	Riverina Water
Cassidy Parade pedestrian bridge	Glenfield	7	Riverina Water
Edmondson Street bridge	Glenfield	7	Riverina Water
Wagga Wagga Yard	Glenfield	7.5	Riverina Water
Bomen Yard clearances	Bomen	4	Riverina Water
Harefield Yard clearances	Bomen	19	Riverina Water
Kemp Street bridge	Joffre Street	2	Junee Council
Junee Yard clearances	Joffre Street	2	Junee Council
Olympic Highway underbridge	Joffre Street	2	Junee Council
Junee to Illabo clearances	Joffre Street	6-22	Junee Council
Junee to Illabo clearances	Boyton Street	0.150	Junee Council

Two additional sources have been identified and may support multiple enhancement sites as required. These are identified in Table 23.

TABLE 23: ADDITIONAL CONSTRUCTION WATER SOURCES

Location	Type	Supplier
Lake Albert, Plumpton Road (Wagga Wagga)	Bulk filling station	Riverina Water
Sunnyside Road, Junee	Metered standpipe	Goldenfields Water

Water may also be purchased under licensing agreements with the various water suppliers/landholders as required. These agreements are part of ongoing discussions and final locations will be determined during final negotiations. Additional water supply points may also be identified as the detailed design stage is progressed in order to reduce the distance to, and the number of vehicle movements associated with water supply.

Currently no dam water is proposed to be utilised for the Project. If additional water is required and dam water is identified as an ideal source, water would only be taken after an agreement is sought and finalised with the landowner. All dam dewatering would be undertaken in accordance with the Dam Dewatering Procedure attached as Appendix C.

Visual assessment will be undertaken to assess the access and existing water supply infrastructure for each water supply points. Any subsequent minor adjustment works required to ensure compatibility and enable the required flow rates will be determined during detailed design and enacted in line with the EIS and Infrastructure Approval.

Where additional water supply points are required, prior to the use of each additional water supply point, the project would implement the following water supply procedure:

- Assess potential water sources, considering parameters such as availability, supply capacity, distance from site, approved vehicle routes, etc.
- Reach agreement with the water supplier regarding the use of the water supply point for the project

- Retain any appropriate records, including licences or agreements
- Carry out any additional assessments which may be required.

Where new water supply points are identified during construction, this CSWMP will be updated to demonstrate the resources are legally and physically available for use in accordance with CoA C13(b).

Transport of water to the work sites would be via water cart in accordance with the Construction Traffic, Transport and Access Plan (CTTAMP). Once the water supply points have been identified in consultation with the supplier, the access and transport routes would be reviewed in accordance with the CTTAMP and updated as required. Vehicle drivers, including those transporting water to site, will be required to read and acknowledge the Driver Code of Conduct established for the project, which includes procedures to ensure that drivers implement safe driving practices. All drivers must comply with legal obligations while operating vehicles.

At the time of writing this plan, additional water storage locations or vessels have not been identified to be required. In the event that water storage is identified during the project, this plan will be updated with the relevant details.

A draft water balance has been calculated based on expected construction water use, which is included in Table 24.

TABLE 24: WATER BALANCE

Water use	Potable (ML)	Non-potable (ML)	Total (eligible for substitution with non-potable water) (ML)	Total (ML)
Maintenance activities: Dust Suppression, Haul roads	57.61	5.00	62.61	62.61
Construction activities	16.37	6.94	13.31	23.31
Site Amenities	0.45	0.27	0.27	0.72
Total construction phase use (ML)	**74.43**	**12.21**	**76.19**	**86.64**
Total construction phase use (%)	**86%**	**14%**	**88%**	**100%**

A predicted estimate of water capture on site has been calculated based on the monthly rainfall and surface areas for the enhancement sites. It is estimated that between 2.5% and 5% of the rainfall on site may be captured, leading to a total of 14.835 to 29.66 ML during the Stage C works. The feasibility of this capture approach is being reviewed.

Captured rainwater may be used to satisfy the non-potable requirements and substitute for potable requirements, where available and practical.

In general, water collected on site would reduce the amount of water required to be obtained from external sources. Based on the estimate above, 71.77 ML (86.6ML – 14.83 ML) to 56.94 ML (86.6 ML – 29.66 ML) would need to be sourced externally. The exact volumes would be based on a range of variables, including the availability of rainfall at a specific time and/or location, the type of water required (e.g. potable vs non-potable water), etc.

Wherever possible water will be reused on site. By reusing collected runoff for dust suppression, stormwater runoff will remain on site and discharge is unlikely. Where water is proposed to be reused for dust suppression or discharge is required, it will carried out in accordance with Section 6.6.

Water resource shortage

The project will monitor the status of the current water restriction levels in each catchment area. Consultation will be undertaken with relevant Council(s) and the EPA to identify appropriate mitigation measures to be implemented.

In the event that construction water resource shortages arise, opportunities to minimise water consumption would be identified and implemented where practical. The Water Reuse Strategy identifies a number of initiatives to reduce water consumption, including the use of chemical additives or soil binders, stockpile coverage and drought tolerant vegetation to reduce the consumption of water during construction.

Alternative/additional water sources would also be investigated, including from water supply authorities, private bore/licence holders and recycled water sources.

6.6 Dewatering management

Dewatering is any activity that involves the removal of ponded stormwater or infiltrated groundwater from any location within the project (including from dams) and the subsequent reuse or discharge of that water. Onsite reuse may include applications such as dust suppression, earthworks compaction, vegetation establishment/ rehabilitation, and plant/vehicle wash-down.

Martinus Rail will plan to reuse all water captured on site and avoid discharges as much as practicable. The criteria in Table 25 would apply to water reused on site.

TABLE 25: WATER REUSE CRITERIA

Approach	Criteria
Reuse onsite Use for dust suppression, earthworks compaction, vegetation establishment / rehabilitation, and plant / vehicle wash-down and ensure no runoff to waterways	Reuse on site shall only occur if: • There is no visible oil or grease • The pH levels are between 6.5 – 8.5 • No erosion is caused from the discharge • Any runoff generated by the reuse is controlled entirely within the site boundary; and • Appropriate sediment controls are installed and maintained in accordance with the Blue Book. • If all criteria above are met then the water may be authorised for reuse by the ESM.

As required under CoA C13(g) the project has prepared a Dam Dewatering Procedure (Appendix C).

In line with CoA E175 if construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment (WPIA) will be required to inform licensing consistent with section 45 of the POEO Act.

The project has consulted with the EPA regarding discharge of water. The discharge criteria accepted by the EPA are identified in Table 26.

TABLE 26: WATER DISCHARGE CRITERIA

Pollutant	Units of measurements	100 percentile concentration limit
Oil and grease	Visible	Not visible
pH	pH	6.5-8.5
Turbidity	nephelometric 50 turbidity units	6.5-8.5

A dewatering permit will be required prior to any discharge being released. The dewatering permit system will include water quality requirements and a register of all the permits will be maintained (either Procore or similar tool). A new permit will be required after each rainfall event, or if the pump is moved to a new location. All water will be pumped into water dissipation devices.

6.7 Spill prevention and response

In accordance with CoA C13(h), Appendix D of this CSWMP details the Spill Response Procedure. Spill clean-up kits will be maintained on-site in agreed locations that are accessible and known to all site workers. Adequate quantities of suitable material to counteract spillage will be readily available. All personnel to participate in induction about use of spill kits prior to commencing works on site. Any activity which may result in spillage of a chemical, fuel or lubricant which drains directly

to waters or environmentally sensitive area, will not be undertaken unless appropriate temporary impervious bunding is provided.

General measures to be implemented to manage material storage include:

- Chemicals will be stored and handled in accordance with relevant Australian standards such as:
  - Storage and Handling of Dangerous Goods Code of Practice (WorkCover NSW, 2005) and the Hazardous and Offensive Development Application Guidelines: Applying SEPP 33 (Department of Planning, 2011)
  - The Environment Protection Manual for Authorised Officers: Bunding and Spill Management technical bulletin (EPA, 1997)
  - AS 1940-2004 The storage and handling of flammable and combustible liquids
  - AS/NZS 4452:1997 The storage and handling of toxic substances
  - AS/NZS 5026:2012 The storage and handling of Class 4 dangerous goods
  - AS/NZS 1547:2012 On-site domestic wastewater management
- Liquid chemicals and fuels will be stored in appropriate containers in bunded areas. Bunded areas will have the capacity to hold 110% of the liquid waste volume for bulk storage or 120% of the volume of the largest container for smaller packaged storage.
- Where practicable, storage areas will not be located within 50 metres of natural surface drainage areas, storm drainage systems, poorly drained or flood prone areas or any area with a slope steeper than 10%.
- All drums and decanted containers must be labelled and stored within bunded areas whenever they are not in use. Whenever practical, all unattended drums/containers must be returned to the bunded storage area.
- All refuelling activities with be undertaken in either a bunded area or with a drip tray

If a pollution incident occurs, the Pollution Incident Response Management Plan (PIRMP) will be implemented.

6.8 Work in waterways

Where work is required within waterways, an EWMS for the work(s) will be prepared. The EWMS for work in waterways will detail the control measures to avoid or minimise erosion and any adverse impact on water quality and riparian fauna and flora, and include provision to:

- Plan work to avoid, where practicable, any activities in aquatic habitats, riparian zones and any areas identified in the Sloane's Froglet Management Plan;
- Properly protect and signpost as environmentally sensitive areas all waterways in or adjacent to the site which are excluded from the work areas;
- Minimise riparian vegetation removal where practicable, and restrict access to the waterways to the minimum amount of bank length required for the activity;
- Retain stumps in riparian zones and aquatic habitats, where practicable, to reduce the potential for bank erosion;
- Carry out any refuelling of plant and equipment, chemical storage and decanting at least 50 m away from aquatic habitats.

In the instance that any materials are dropped into the water way during works, this will be managed as an environmental incident and is to be reported in accordance with Section 7.2.4 of the CSWMP.

The EWMS for any works over water will be shared with IRPL during a risk assessment workshop.

6.9 Groundwater

6.9.1 Detailed design and construction planning

During detailed design and construction planning, opportunities to use piling methodologies for bridge foundations that minimise groundwater take, such as the use of a tremie system, pile casings, bentonite plugs and onsite treatment options will be investigated and implemented where practicable.

6.9.2 Groundwater monitoring

As noted in Table 19, preliminary groundwater monitoring is being undertaken at all enhancement sites requiring excavations greater than 0.5mBGL to inform detailed design and confirm the potential interaction with groundwater at these enhancement sites. Preliminary investigations completed to date have not identified any additional groundwater interactions beyond those considered by the EAD. No changes to detailed design have been made as a result of these investigations. In the event that the presence of groundwater is identified during any further investigations then this will be considered further by detailed design.

Groundwater monitoring (level and quality) would be undertaken in accordance with the Groundwater Monitoring Program (GWMP), which will be maintained separately to this CSWMP. Initial monitoring will be undertaken at eight enhancement

sites, where the EAD identified a greater than low risk rating potential to intersect, or where significant excavation was proposed as part of the project scope:

- Kemp Street Bridge
- Wagga Wagga Station Footbridge
- Cassidy Street Bridge
- Edmondson Street Overbridge
- Pearson Street Bridge
- Billy Hughes Highway
- Riverina Highway Bridge
- Albury Station Footbridge.

Groundwater monitoring will be undertaken at a monthly frequency at least until works with the potential to impact groundwater are complete. Groundwater levels will be monitored via manual gauging and sampling. Groundwater quality may be undertaken via representative groundwater samples (e.g. use of hydrasleeves) to be analysed in an appropriate laboratory, or via calibrated field water quality meters.

Table 27 details the analytes that will be monitored during the construction phase groundwater monitoring. The parameters will indicate if the project has potentially caused impact to groundwater quality as a result of construction activities.

TABLE 27: GROUNDWATER MONITORING PARAMETERS

Category	Parameters
Physio-chemical parameters (field)	▪ Temperature ▪ Electrical conductivity ▪ Total dissolved solids ▪ pH ▪ Reduction-oxidation potential
Major anions and cations	▪ Calcium ▪ Magnesium ▪ Sodium ▪ Potassium ▪ Bicarbonate ▪ Chloride ▪ Sulfate

Groundwater monitoring will enable comparison between on-site observations against the anticipated impacts. Where observed impacts from project construction differ from anticipated impacts, the monitoring program and existing mitigation measures will be reviewed. If required, consideration for the implementation of additional mitigation measures will also be made. If additional mitigation measures are required, this CSWMP will be updated to identify those additional mitigation measures.

6.9.3 Make good arrangements

As per UMM GW5 registered bore GW402492 at the Olympic Highway underbridge enhancement site will be avoided during construction. If this registered bore is accidently damaged during construction and cannot be used for its intended purpose (monitoring), make good arrangements will apply (such as replacement), subject to discussion with the registered owner.

As per UMMGW6, a site inspection will be carried out to confirm the current viability of registered bore GW064614 (water supply) at Kemp Street bridge enhancement site. In the event that the bore is viable, and the AIP minimal impact considerations are temporarily or permanently exceeded, make-good provisions will apply.

6.9.4 Groundwater protocol

To avoid and minimise impacts to groundwater, the measures identified in this CSWMP should be implemented, including but not limited to:

- Storage and handling of hazardous substances (Section 6.7);
- Availability and maintenance of spill clean-up kits (Section 6.7);
- Refuelling restrictions (Table 28, CSW-17);
- Concrete washout restrictions (Table 28, CSW-23)

- Implementation of Spill Response Procedure (Appendix D);
- Relevant training (Section 7.1);
- Regular inspections (Section 7.2.1).

6.10 Management measures

A range of environmental requirements and management measures are identified in the EAD and CoA. Specific measures and requirements to address soil, water, salinity and groundwater impacts are outlined in Table 28. The following mitigation measures have been developed with consideration of SMART (specific, measurable, achievable, relevant and time-based) principles.

TABLE 28: CONSTRUCTION SOIL AND WATER MANAGEMENT AND MITIGATION MEASURES

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
General						
CSW-01	Training will be provided to all project personnel, including relevant subcontractors on soil, water and contamination management and the requirements from this plan through inductions, toolboxes talks and targeted training.	All	Pre-construction	MR ESM	Good Practice	Toolbox talks Project Induction Training Records
CSW-02	The project must be designed, constructed and operated so as to maintain the NSW Water Quality Objectives where they are being achieved as at the date of approval, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the project contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with.	All	Pre-construction, Construction	MR ESM	CoA E168	Monitoring records
CSW-03	Before undertaking any work and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with Managing Urban Stormwater: Soils and Construction Vol 1 4th ed. by Landcom, 2004 (The Blue Book).	All	Pre-construction, Construction	MR ESM	CoA E174 UMM HFWQ7	PESCP ESCP

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
CSW-04	Ensure that any recycled wastewater (including recycled and treated water) proposed for use by the project, considers risks to human health or the receiving environment and meets the relevant standards.	All	Construction	MR ESM	CoA E170	Water Reuse Strategy
CSW-05	Unless an EPL is in force in respect to the project and that licence specifies alternative criteria, discharges from construction water treatment plants to surface waters must not exceed: a) the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG 2018) default guideline values for toxicants at the 95 per cent species protection level; b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000; and c) for bioaccumulative and persistent toxicants, the ANZG 2018 values at a minimum of 99 per cent species protection level." Where the ANZG 2018 does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG 2018 for deriving guideline values, using interim guideline values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used.	All	Pre-construction, Construction	MR ESM	CoA E171	No construction water treatment plants are proposed.
CSW-06	If construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment will be required. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk.	All	Pre-construction, Construction	MR ESM	CoA E175	WPIA

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
Erosion and sediment control						
CSW-07	Construction materials and spoil will be appropriately stored on site and within the construction site compounds with the aim to minimise erosion, dust generation and sediment-related impacts in adjacent areas.	All	Construction	MR ESM	Good Practice	PESCP ESCP Inspection Records
CSW-08	Regular maintenance of erosion and sediment controls is to be completed pre and post wet weather events.	All	Construction	MR ESM	Table 3, A2P CEMF Specification Soil and Water	Inspection Records
CSW-09	Spotters and excavator operators to monitor the loading of spoil trucks to make sure they are not being overloaded	All	Construction	MR ESM	Table 3, A2P CEMF Specification Soil and Water	Inspection Records
Working near waterways						
CSW-10	The construction of the project must protect the integrity of riparian corridors in accordance with the Controlled activities – Guidelines for riparian corridors on waterfront land (DPE 2022) when carrying out Work within 40 metres of a watercourse.	All	Construction	MR ESM	CoA E173	PESCP ESCP Inspection Records
CSW-11	All activities on waterfront lands will be guided by the principles from the Guidelines for Controlled Activities on Waterfront Land (2012), Why do Fish Need to Cross the Road? Fish Passage Requirements for Waterway Crossings (NSW Fisheries 2003) and the Policy and Guidelines for Fish Habitat and Conservation and	All	Pre-construction, Construction	MR ESM	Good Practice	PESCP ESCP Inspection Records EWMS

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
	Management (NSW Fisheries, 2013) unless DPE Water agrees otherwise. Measures to control and manage erosion and minimise sedimentation on waterfront lands will be documented for specific areas and activities in the initial ESCP and PESCPs will be developed prior to the works commencing in waterfront areas.					
CSW-12	Instream works at Jeralgambeth Creek (Junee to Illabo clearances) will be undertaken in dry conditions as far as practicable. Where works cannot be conducted in the dry, appropriate erosion and sediment control would be installed (i.e. a silt curtain or sediment boom around the work area and attached to the same side of the bank to maintain fish passage). Appropriate erosion and sediment control will be installed and maintained. Aquatic habitat will be returned to pre-works condition (or better) in accordance with the rehabilitation strategy.	Junee to Illabo clearances	Construction	MR ESM	UMM BD12	EWMS ESCPs Inspection Records
Saline soils						
CSW-13	Where identified, salinity will be managed in accordance with this CSWMP.	All	Construction	MR ESM	UMM SC4	Inspection Records CSWMP
Acid Sulfate Soils (ASS)						
CSW-14	If ASS are encountered, they will be managed in accordance with the Acid Sulfate Soils Manual (Acid Sulfate Soils Management Advisory Committee (ASSMAC), 1998b) and the Waste Classification Guidelines – Part 4: Acid Sulfate Soils (NSW EPA, 2014b).	All	Construction	MR ESM	UMM SC1	Inspection Records EWMS

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
CSW-15	The aggressivity of the soil pH to construction materials will be assessed to confirm impacts from acidity.	All	Construction	MR ESM	UMM SC2	EWMS
CSW-16	Where excavation into sulfidic rock is confirmed during detailed design, a suitably qualified geologist or geotechnical engineer will advise on the risk and mitigation required to ensure the suitability of construction materials. If sulfidic rock is identified, environmental advice will be sought for waste management and environmental protection.	All	Pre-construction	MR ESM	UMM SC3	EWMS
Chemicals, fuels or other hazardous substances						
CSW-17	Refuelling will be conducted outside of waterfront land, 50m or more from a watercourse. Spill kits will be kept with maintenance vehicles and or machinery within 100 m of a watercourse.	All	Construction	MR ESM	UMM BD15 Junee Shire Council consultation	Inspection Records
CSW-18	Construction materials such as fuels, chemicals, vehicles and equipment will be appropriately stored to minimise the introduction of contaminants to the existing soil, groundwater and surface water runoff.	All	Construction	MR ESM	Good Practice	Inspection Records
CSW-19	All chemicals, fuels or other hazardous substances will be stored in accordance with the supplier's instructions, any relevant legislations or Australian Standards or the applicable guidelines.	All	Construction	MR ESM	UMM H3	Inspection Records
CSW-20	All chemicals, fuels or other hazardous substances will be stored in a bunded area, with the bunding sized at 130 per cent of the largest chemical volume contained within the bunded area. The location of the bunded enclosure/s will be shown on relevant PESCPs.	All	Construction	MR ESM	Good Practice	Inspection Records

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
CSW-21	In the event of a spill incident of chemicals, fuels or other hazardous substances, the Spill Response Procedure provided in Appendix D will be followed.	All	Construction	MR ESM	CoA C13(h)	Spill Response Procedure
CSW-22	Appropriate spill containment equipment (i.e. spill kits) will be provided and placed at strategic and accessible locations within the site, such as adjacent to chemical storage areas, relevant work areas and refuelling areas.	All	Construction	MR ESM	Good Practice	PESCP ESCP
CSW-23	Concrete washouts will be located at least 100m from watercourses and drainage paths, unless otherwise approved by a suitably qualified person. Concrete washouts must be maintained to ensure there is sufficient capacity.	All	Construction	MR ESM	Good Practice	PESCP ESCP
Water supply						
CSW-24	Construction-phase water supply options will continue to be explored and would include ongoing consultation with water suppliers to access the local reticulated network, use of water tanks within construction compounds and/or use of farm dams. Alternative water supply options, including recycled water, would be investigated. Appropriate approvals would be obtained as required if alternative constructive water sources beyond commercial water suppliers and local governments are required.	All	Construction	MR ESM	UMM HFWQ1	Water supply approvals Consultation records
CSW-25	Opportunities to reduce the need for water would be further explored during detailed design and construction planning. Such options include: ▪ Use of additives;	All	Construction	MR ESM	UMM HFWQ2 CoA E169	Water Reuse strategy

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
	▪ Alternative construction techniques; ▪ Reduced dust suppression regime where there is minimal potential for impacts.					
Dewatering						
CSW-26	Discharge to surface water will be undertaken in accordance with the EPL for construction of the project and would consider the hydrological attributes of the receiving waterbody.	All	Construction	MR ESM	UMM HFWQ8	Dewatering permit Dam Dewatering Procedure – Appendix C
CSW-27	A dam dewatering protocol (refer Appendix C) will be implemented where dewatering of farm dams is required.	All	Construction	MR ESM	CoA C13(g)	Dam Dewatering Procedure – Appendix C
Groundwater						
CSW-28	Opportunities to use piling construction methodologies for bridge foundations that minimise groundwater take, such as the use of a tremie system, pile casings and bentonite plugs will be investigated during detailed design and implemented where practicable.	All	Pre-construction	MR ESM	UMM GW3	Work Method Statements
CSW-29	The quality of groundwater taken during excavation works at Riverina Highway bridge enhancement sites will be assessed for the suitability for re-use during construction (or by others) or disposed of accordingly.	All	Pre-construction	MR ESM	UMM GW4	Groundwater Quality Monitoring
CSW-30	Registered bore GW402492 at the Olympic Highway underbridge enhancement site will be avoided during construction. If this registered bore is accidently damaged during construction and cannot be used for its intended purpose (monitoring), make good arrangements will apply	Olympic Highway underbridge	Construction	MR ESM	UMM GW5	Inspection Records PESCP ESCP

ID	Management measure	Location	When to implement	Responsibility for implementation	Reference or source	Evidence of implementation
	(such as replacement), subject to discussion with the registered owner					
CSW-31	Site inspection will be carried out to confirm the current viability of registered bore GW064614 (water supply) at Kemp Street bridge enhancement site. In the event that the bore is viable and the AIP minimal impact considerations are temporarily or permanently exceeded, make good provisions will apply.	Kemp Street bridge	Construction	MR ESM	UMM GW6	Inspection Records
CSW-32	A groundwater monitoring program (level and quality), prepared by a suitably qualified person, will be implemented in accordance with the requirements outlined in this assessment prior to construction. This work will identify ongoing monitoring requirements following the completion of construction according to the risks to groundwater levels and quality. Ongoing groundwater monitoring (level and quality) will be carried out at the sites for the duration specified in the groundwater monitoring program.	All	Pre-construction	MR ESM	UMM GW2	Construction Groundwater Monitoring Program
Surface water monitoring						
CSW-33	Surface water monitoring would be undertaken in accordance with the Construction Surface Water (Appendix B).	All	Construction	MR ESM	CoA C25	Surface Water Monitoring Program – Appendix B

7 COMPLIANCE MANAGEMENT

7.1 Training

To ensure that this Plan is effectively implemented, all site personnel (including sub-contractors) will undergo site induction training that includes construction soil and water management issues prior to construction commencing. The induction training will address element related to soil and water management including:

- Relevant legislation;
- The environmental management system;
- Complying with the CoA and UMMs;
- The CEMP;
- Spill response; and
- The purpose and general content of PESCPs.

Targeted training in the form of toolbox talks or specific training will also be delivered to personnel with a key role in soil, water and contamination management. Examples of training topics may include:

- Specific erosion and sediment controls, including installation methods, maintenance requirements and the requirements of site-specific PESCPs;
- No-go zones;
- Unexpected finds procedure for contamination finds; and
- The dam dewatering protocol.

Daily pre-start meetings conducted by the Martinus Rail Foreman/Site Supervisor will inform the site workforce of any environmental issues relevant to soil and water management that could potentially be impacted by, or impact on, the day's activities.

Further details regarding staff induction and training are outlined in Section 6 of the CEMP.

7.2 Inspection and monitoring

7.2.1 Inspections

Regular inspections of sensitive areas and activities will occur for the duration of the project. Martinus Rail will carry out weekly site inspections. The inspections will check the implementation and effectiveness of the management measures identified in Section 6 and the environmental performance of the project relevant to soil and water management.

Weekly and other routine inspections by the ER will occur throughout construction. Detail on the nature and frequency of these inspections are documented in the CEMP.

A summary of inspection requirements relevant to soil and water are summarised in Table 29.

TABLE 29: INSPECTIONS RELEVANT TO SOIL AND WATER

Item	Scope	Frequency	Responsibility	Records/reporting
Weekly inspections	Inspection of the site erosion and sediment controls, spill response equipment, stockpiles and the site access point(s).	Weekly Daily monitoring when adverse weather is predicted.	MR ESM or delegate	Environmental Inspection Checklist
CPESC inspections	Inspection of the site erosion and sediment controls	Monthly at active enhancement sites	CPESC	Environmental Inspection Checklist
Acid sulfate soil	On-site field testing to determine the presence of ASS/PASS soils.	Prior to ground disturbance in areas of ASS/PASS soil occurrence	MR Environmental Advisor	Test results
Saline soil inspection	Visual inspection of work areas for indicators of saline soil prior to ground disturbances.	Prior to ground disturbances	MR ESM or delegate	Report by exception in daily diary

Item	Scope	Frequency	Responsibility	Records/reporting
Pre-rainfall inspection	Inspection of the environmental controls to assess site preparedness for potential forecast rainfall events. Inspection to be undertaken on working days, if safe to do so. Issue actions to repair/maintain any damaged controls, or install additional controls if necessary.	Prior to predicted rainfall greater than 15 mm at 80% chance of occurring	MR ESM or delegate	Pre rainfall inspection checklist (Internal document number MR-EF-017)
Post-rainfall inspection	Post rainfall inspections to evaluate the effectiveness of erosion and sediment controls measures and issue appropriate actions to repair or maintain any controls and/or install additional controls where required. Post rainfall inspections will occur after a rainfall event. For the purpose of this inspection, a rainfall event occurs when more than 10mm of rain has been received.	Within the next working day, if safe to do.	MR ESM or delegate	Post rainfall inspection checklist (Internal document number MR-EF-005)

7.2.2 Monitoring

Monitoring requirements are outlined in the Surface Water Monitoring Program detailed in Appendix B.

7.2.3 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of soil and water management measures, compliance with this Plan, conditions of approval and other relevant approvals, licenses and guidelines. Audit requirements are detailed in Section 9 of the CEMP.

7.2.4 Reporting and identified records

Reporting requirements and responsibilities are documented in Section 10 of the CEMP. Additionally, in the event of an incident or non-compliance, the Planning Secretary will be notified in writing of the findings of the review conducted by the project relating to the incident or non-compliance.

The project will maintain accurate records substantiating all construction activities associated with the project or relevant to the conditions of approval, including measures taken to implement this Plan. Records will be made available to the Planning Secretary upon request, within the timeframe nominated in the request.

8 REVIEW AND IMPROVEMENT

8.1 Continuous improvement

Continuous improvement of this Plan will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement.

Issues requiring management during construction (including cumulative impacts), as identified through ongoing environmental risk analysis, will be managed through SMART principles.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance;
- Identify environmental risks not already included in the risk register;
- Determine the cause or causes of non-conformances and deficiencies;
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies;
- Verify the effectiveness of the corrective and preventative actions;
- Document any changes in procedures resulting from process improvement;
- Make comparisons with objectives and targets.

Martinus Rail will be responsible for ensuring that project environmental risks are identified and included in the risk register and appropriate mitigation measures implemented throughout the construction of the project, as part of the continuous improvement process.

This continuous risk analysis approach will ensure prompt identification of new risks and ensure efficient mitigation through implementation of appropriate management measures, as outlined in Section 6.

8.2 Update and amendment

The processes described in Section 10 of the CEMP may result in the need to update or revise this Plan.

Any revisions to this Plan will be in accordance with the process outlined in Section 10 of the CEMP. A copy of the updated Plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure.

APPENDICES

APPENDIX A

Secondary CoAs and UMMs

TABLE A1-A: SECONDARY COA RELEVANT TO THIS PLAN

No.	Requirement	Where addressed
E26	In all locations where the Sloane's Froglet is recorded, a site-specific Sloane's Froglet Management Plan(s) must be prepared and implemented in consultation with DCCEEW and landowners to manage work within and adjacent to Sloane's Froglet habitat. The Sloane's Froglet Management Plan must include: (a) details of proposed detention basins to manage stormwater consistent with the *Sloane's Froglet Stormwater Wetland Design Guidelines (Spire, 2017)*; (b) measures to prevent Sloane's Froglet habitat from being impacted by sediment; and (c) regular monitoring	Unexpected Threatened Species Finds Procedure (Appendix A of the Construction Biodiversity Management Plan) Sloane's Froglet Management Plan
E168	The CSSI must be designed, constructed and operated so as to maintain the NSW Water Quality Objectives where they are being achieved as at the date of this approval, and contribute towards achievement of the NSW Water Quality Objectives over time where they are not being achieved as at the date of this approval, unless an EPL in force in respect of the CSSI contains different requirements in relation to the NSW Water Quality Objectives, in which case those requirements must be complied with.	Table 28– MM CSW-02
E169	The CSSI must aim to reduce the need for water during construction including exploring, options to use additives, alternative construction techniques and reduce dust suppression regime where there is minimal potential for impacts.	Section 6.5 Water Reuse Strategy Table 28– MM CSW-25
E170	The CSSI must be designed, constructed, and operated to: (a) ensure all drainage feature crossings (permanent and temporary watercourse crossings and stream diversions) new or modified surface water drainage (including cess drains), depressions are designed and constructed in accordance with *Controlled activities – Guidelines for riparian corridors on waterfront land* (DPE 2022) and Policy and Guidelines for *Fish Habitat Conservation and Management* (Department of Primary Industries, 2013); (b) locate all scour protection work associated with replacement culverts or the construction of new culverts within the rail corridor, or as agreed to by the relevant landowner; (c) ensure that there is no permanent extraction of groundwater; (d) ensure all discharges from new or modified surface drainage (including cess drains and pumping stations) adjacent to the new and upgraded track are released at a controlled rate to prevent scour; and	(a) Compliance for permanent crossings, drainage, and/or depressions are a design requirement. Any temporary crossings, and/or depressions would be designed in consultation with the CPESC. (b) This is a design team concern. All scour protection work would be designed in consultation with the CPESC. (c) No permanent extraction of groundwater is anticipated, as outlined in Section 5.3 and 6.9. Groundwater monitoring will be undertaken in accordance with the Construction Groundwater Monitoring Program (d) Compliance for permanent surface drainage is a design team concern. Temporary surface drainage would be designed

No.	Requirement	Where addressed
	(e) ensure that any recycled wastewater (including recycled and treated water) proposed for use by the CSSI, considers risks to human health or the receiving environment and meets the relevant standards.	in consultation with the Project CPESC for high-risk areas and managed in line with PESCPs. (e) – Table 28– MM CSW-04 and Section 6.6
E171	Unless an EPL is in force in respect to the CSSI and that licence specifies alternative criteria, discharges from construction water treatment plants to surface waters must not exceed: a) the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018 (ANZG 2018) default guideline values for toxicants at the 95 per cent species protection level; b) for physical and chemical stressors, the guideline values set out in Tables 3.3.2 and 3.3.3 of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000; and c) for bioaccumulative and persistent toxicants, the ANZG 2018 values at a minimum of 99 per cent species protection level. Where the ANZG 2018 does not provide a default guideline value for a particular pollutant, the approaches set out in the ANZG 2018 for deriving guideline values, using interim guideline values and/or using other lines of evidence such as international scientific literature or water quality guidelines from other countries, must be used.	Table 28– MM CSW-05
E173	The construction of the CSSI must protect the integrity of riparian corridors in accordance with the Controlled activities – Guidelines for riparian corridors on waterfront land (DPE 2022) when carrying out Work within 40 metres of a watercourse.	Table 28– MM CSW-10
E174	Before undertaking any work and during maintenance or construction activities, erosion and sediment controls must be implemented and maintained to prevent water pollution consistent with Managing Urban Stormwater: Soils and Construction Vol 1 4th ed. by Landcom, 2004 (The Blue Book).	Table 28– MM CSW-03 Section 6.1 Section 6.2
E175	If construction stage stormwater discharges are proposed, a Water Pollution Impact Assessment will be required. Any such assessment must be prepared in consultation with the EPA and be consistent with the National Water Quality Guidelines, with a level of detail commensurate with the potential water pollution risk. Note: If an EPL is required the Water Pollution Impact Assessment will be required to inform licensing consistent with section 45 of the POEO Act.	Table 28 – MM CSW-06 Section 6.6

TABLE A1-B: SECONDARY UMMS RELEVANT TO THIS PLAN

No.	Requirement	Where addressed
HFWQ1	Construction-phase water supply options will continue to be explored during detailed design and would include ongoing consultation with water suppliers to access the local reticulated network, use of water tanks within construction compounds and/or use of farm dams. Alternative water supply options, including recycled water, would also be investigated. As part of the Soil and Water Management sub-plan, ARTC will: - Confirm a draft water balance for the project - Demonstrate that the required construction water sources are legally and physically viable - Outline mitigation measures to address construction water resource shortages that arise. Appropriate approvals would be obtained as required if alternative constructive water sources beyond commercial water suppliers and local governments are required.	Table 28 - MM CSW-24 Section 6.5
HFWQ2	Opportunities to reduce the need for water would be further explored during detailed design and construction planning. Such options include: - use of additives - alternative construction techniques - reduced dust suppression regime where there is minimal potential for impacts.	Table 28- MM CSW-25
HFWQ7	Sediment and erosion control devices will be installed in accordance with Managing Urban Stormwater: Soils and Construction, Volume 1 (Landcom, 2004).	Table 28 – MM CSW-03 Section 6.1 Section 6.2
HFWQ8	Discharge to surface water will be undertaken in accordance with the EPL for construction of the project and would consider the hydrological attributes of the receiving waterbody.	Table 28 – MM 7 Section 6.6
GW3	Opportunities to use appropriate piling construction methodologies for bridge foundations that minimises groundwater take, such as the use of a tremie system, will be investigated during detailed design and implemented where practicable.	Table 28 - MM CSW-28

No.	Requirement	Where addressed
GW4	The quality of groundwater taken during excavation works at Riverina Highway bridge and Kemp Street bridge enhancement sites will be assessed for the suitability for re-use during construction (or by others) or disposed of accordingly	Table 28 - MM CSW-29
GW5	Registered bore GW402492 at the Olympic Highway underbridge enhancement site will be avoided during construction. If this registered bore is accidently damaged during construction and cannot be used for its intended purpose (monitoring), make good arrangements will apply (such as replacement), subject to discussion with the registered owner.	Table 28 - MM CSW-30 Section 6.9
GW6	Site inspection will be carried out to confirm the current viability of registered bore GW064614 (water supply) at Kemp Street bridge enhancement site. In the event that the bore is viable, and the AIP minimal impact considerations are temporarily or permanently exceeded, make-good provisions will apply.	Table 28 – MM CSW-31
SC1	In the event of any ground disturbance below the water table in areas mapped as containing potential acid sulfate soils (ASS) at the Murray River bridge enhancement site, testing will be carried out to confirm the presence of actual and/or potential ASS and liming rates required to mitigate the risk. If ASS are encountered, they will be managed in accordance with the Acid Sulfate Soils Manual (Acid Sulfate Soils Management Advisory Committee (ASSMAC), 1998b) and the Waste Classification Guidelines – Part 4: Acid Sulfate Soils (NSW EPA, 2014b).	Table 28 - MM CSW-14
SC2	The aggressivity of the soil pH to construction materials will be assessed to confirm impacts from acidity.	Table 28 - MM CSW-15
SC3	Where excavation into sulfidic rock is confirmed during detailed design, a suitably qualified geologist or geotechnical engineer will advise on the risk and mitigation required to ensure the suitability of construction materials. If sulfidic rock is identified, environmental advice will be sought for waste management and environmental protection.	Table 28 – MM CSW-16
SC4	Further assessment of salinity will be completed at enhancement sites where excavation is required, including: - Riverina Highway bridge enhancement site - Billy Hughes bridge enhancement site - Pearson Street bridge enhancement site	Section 4.3 Table 28 – MM CSW-13

No.	Requirement	Where addressed
	- Kemp Street bridge enhancement site. The assessment of salinity will include drilling of representative boreholes to test the depth profile of salts and consideration of how the works will affect surface and subsurface water flows. Where identified, salinity will be managed in accordance with the salinity management plan. Relevant aggressivity will be considered in the design of subsurface structures.	
BD12	Instream works at Sandy Creek (Uranquinty Yard clearances) and Jeralgambeth Creek (Junee to Illabo clearances) will be undertaken in dry conditions as far as practicable. Where works cannot be conducted in the dry, appropriate erosion and sediment control would be installed (i.e. a silt curtain or sediment boom around the work area and attached to the same side of the bank to maintain fish passage). Appropriate erosion and sediment control will be installed and maintained. Aquatic habitat will be returned to pre-works condition (or better) in accordance with the rehabilitation strategy	Table 28 - MM CSW-14
BD15	Refuelling will be conducted outside of waterfront land, so far as it practicable, with appropriate measures in place to avoid impacts to waterways, aquatic habitats and groundwater. This includes spill kits always kept with maintenance vehicles and or machinery within 100 m of a watercourse.	Table 28 - MM CSW-17 Section 6.7
H3	Dangerous goods and hazardous materials will be stored in accordance with supplier's instructions and relevant legislation, Australian Standards, and applicable guidelines; and may include bulk storage tanks, chemical storage cabinets/containers or impervious bunds.	Table 28 - MM CSW-19 Section 6.7

PSR and CEMF requirements are internal requirements beyond the Infrastructure Approval. These have been included for internal quality control purposes and do not form part of the management plan.

TABLE A1-C: INTERNAL PSR AND CEMF REQUIREMENTS APPLICABLE TO THIS PLAN.

No.	Requirement	Where addressed
PSR Appendix C Section 6.1.3 (a)	The key environmental risks areas which the Contractor shall consider in development of the Construction Environmental Management Plan include, but are not limited to: (a) erosion and sediment control	This Plan
PSR Appendix C Section 6.1.3 (h)	The key environmental risks areas which the Contractor shall consider in development of the Construction Environmental Management Plan include, but are not limited to:	This Plan

No.	Requirement	Where addressed
	(h) water quality	
PSR Appendix C Section 8.10.1	The Contractor shall perform all dewatering activities as needed to construct the Works and in accordance with the environmental management requirements in PSR Annexure F, section 6.1.1	Section 6.6 Appendix C
PSR Appendix C Section 11.1.3	The Contractor shall develop and implement groundwater control measures to mitigate against adverse impacts on groundwater. The design of these mitigation measures, management and the monitoring shall be based on a Hydrogeological Interpretive Report prepared in accordance with the requirements of Annexure F.	The Detailed Design Reports indicate that no groundwater control measures are required.
Table 3, A2P CEMF Specification Soil and Water	The CPESC shall be engaged by the Contractor and available to the Contractor at all times during the Contractor's Activities	Section 6.1
Table 3, A2P CEMF Specification Soil and Water	ESCP is to be prepared and approved by a CPESC prior to construction and updated regularly (timeframe to be agreed with ARTC) for the life of project and provided to ARTC	Section 6.1
Table 3, A2P CEMF Specification Soil and Water	ESCP to be implemented and maintained on Site as per approved plans	Section 6.1
Table 3, A2P CEMF Specification Soil and Water	Site is to be left stable at the end of each day	ESCP
Table 3, A2P CEMF Specification Soil and Water	When working around waterways and installing temporary crossings site specific ESCP shall be required	Section 6.1
Table 3, A2P CEMF Specification Soil and Water	Clean rock is to be utilised	ESCP
Table 3, A2P CEMF Specification Soil and Water	Silt curtains will be available and deployed where required for permanent water courses	ESCP

No.	Requirement	Where addressed
Table 3, A2P CEMF Specification Soil and Water	Water quality monitoring upstream and downstream undertaken daily during works and records maintained	Water quality monitoring will be undertaken at a monthly frequency during construction at the locations specified in Appendix B – Construction Surface Water Quality Monitoring Program
Table 3, A2P CEMF Specification Soil and Water	Wet weather preparedness and response plan to be completed and provided to ARTC in August of each year unless an alternative timeframe is agreed with ARTC	This CSWMP
Table 3, A2P CEMF Specification Soil and Water	All equipment, personnel and materials shall be sufficient and available on site to respond to wet weather events and regular maintenance of erosion and sediment controls is to be completed pre and post wet weather events	Table 28 MM CSW-08
Table 3, A2P CEMF Specification Soil and Water	Dewatering procedure to be developed and in place at all times and included in the CEMP	Appendix C – Dam Dewatering Protocol
Table 3, A2P CEMF Specification Soil and Water	Dewatering permit system including water quality requirements and a register maintained of all permits. A new permit will be required after each rainfall event, or if the pump is moved to a new location	Section 6.6
Table 3, A2P CEMF Specification Soil and Water	The dewatering permit is to be stored by the pump when actively dewatering	Dewatering permits will be maintained in Procore and will be available to access prior to commencement of dewatering activities.
Table 3, A2P CEMF Specification Soil and Water	No water to be discharged off site outside of the agreed water quality parameters	Section 6.6
Table 3, A2P CEMF Specification Soil and Water	All water to be pumped into water dissipation devices	Section 6.6
Table 3, A2P CEMF Specification Soil and Water	All sourced water will have flow meters and source/usage data provided to ARTC	Section 6.5
Table 3, A2P CEMF Specification Soil and Water	Topsoil is to be kept separate from subsoil at all times	Section 6.2

No.	Requirement	Where addressed
Table 3, A2P CEMF Specification Soil and Water	All topsoil stockpiles must not exceed 2m in height	Section 6.2
Table 3, A2P CEMF Specification Soil and Water	Subsoil and topsoils shall be segregated (see Landscape and Rehabilitation Framework (0-0000-900-ELE-00-GU-0001). A minimum of 300mm of topsoil must be stripped, or to the subsoil profile. If all topsoil cannot be removed, geofabric and appropriate material (e.g. crushed rock) can be installed on top or an alternative acceptable solution to minimise risk of soil inversion	Section 6.2
Table 3, A2P CEMF Specification Soil and Water	Any works over water will undergo an individual construction risk assessment workshop which includes ARTC	Section 6.8
Table 3, A2P CEMF Specification Soil and Water	Definition and management of temporary stockpiles are to be agreed with ARTC in writing prior to works for the stockpile commencing	Section 6.2
Table 3, A2P CEMF Specification Soil and Water	Implement wash down bays, rumble grids or other devices to remove soil and other debris prior to departing site when in wet/muddy environments	ESCP
Table 3, A2P CEMF Specification Soil and Water	Spotters and excavator operators to monitor the loading of spoil trucks to make sure they are not being overloaded	Table 23 MM CSW-09
Table 3, A2P CEMF Specification Soil and Water	Aquatic ecologist to advise of fauna relocation/management requirements if instream dewatering is to occur. Any relocation/salvage of aquatic fauna needs to be undertaken by a suitably qualified person and undertaken in accordance with any relevant guidelines	Appendix C – Dam Dewatering Protocol
Table 3, A2P CEMF Specification Soil and Water	Reinstatement completed to ensure stable landform	The Stage C Construction Biodiversity Management Sub-plan addresses the management of flora and fauna including aquatic and riparian habitats and vegetation rehabilitation during the construction of Stage C of the project
Table 3, A2P CEMF Specification Soil and Water	Concrete washouts to be at least 100m from watercourses and drainage paths unless otherwise approved by a suitably qualified person	ESCP

No.	Requirement	Where addressed
Table 3, A2P CEMF Specification Soil and Water	Any materials dropped into the water way will be managed as an Environmental Event. All tools/materials to be secured at all times	Section 6.8
Table 3, A2P CEMF Specification Soil and Water	Where possible, prioritise precast structures over in situ concrete pours for structures within or over waterways	To be incorporated into the relevant design.
Table 3, A2P CEMF Specification Soil and Water	All slurry to be captured and prevented from entry into waterways	ESCP
Table 3 ARTC CEMF Specification	All fuel trucks will have an appropriately sized spill kit, cut off valves installed on all high flow pumps	Section 6.7 MM CSW-17 Appendix D
Table 3 ARTC CEMF Specification	All work fronts to have a spill kit and marine spill kit for works around water	CSW-17 Section 6.7
Table 3 ARTC CEMF Specification	Refuelling will occur >50m from a waterway, ephemeral watercourse or wetland	Section 6.8
Table 3 ARTC CEMF Specification	All refuelling activities will be undertaken in either a bunded area or with a drip tray	Section 6.7

APPENDIX B

Construction Surface Water Monitoring Program

This document is uncontrolled
when printed.

MARTINUS INLAND RAIL



CONSTRUCTION SURFACE WATER QUALITY MONITORING PROGRAM – STAGE C

A2I | Albury to Illabo

CONTRACT NUMBER: 0052

PROJECT DOCUMENT NUMBER:
6-0052-210-PES-00-PJ-0009

Document Control

DOCUMENT TITLE:	Construction Surface Water Quality Monitoring Program – Stage C		
DOCUMENT OWNER:	Simon Fisher – Environmental Lead		
PREPARED BY:	Joshua O'Connell	**TITLE:**	Environmental Advisor
SIGNATURE:		**DATE:**	29/09/2026
REVIEWED BY:	Clint Dedden	**TITLE:**	Environmental Approvals Advisor
SIGNATURE:		**DATE:**	29/09/2026

Approved by

NAME	TITLE	SIGNATURE	DATE
Andy Williams	Project Director		29/09/2026

Revision History

REVISION	REVISION DATE	AMENDMENT	DATE TO CLIENT
A	19/09/2025	Prepared to consider Stage C	19/09/2025
0	24/09/2025	For ER approval	24/09/2025
1	29/09/2026	Minor update. (Maps)	29/09/2026

Disclaimer: This document has been prepared by Martinus. Use of this document shall be subject to the terms of the relevant contract with Martinus. The electronic file of this current revision is the controlled copy. This file is stored on Martinus' server located at Head Office, Unit 1, 23-27 Waratah St, Kirrawee, NSW.

This document is the property of and contains proprietary information owned by Martinus. No permission is granted to publish, reproduce, transmit or disclose to another party, any information contained in this document, in whole or in part, without prior written permission from the issuing authority.

For the purpose of this document, Martinus refers to the Martinus Group of companies.

This document is uncontrolled when printed.

TABLE OF CONTENTS

GLOSSARY **4**

1 INTRODUCTION **6**
1.1 Project overview 6
1.1.1 Planning context 6
1.1.2 Statutory context and approval 6
1.2 Scope of this Stage C Monitoring Program 7
1.3 Approval 7
1.4 Consultation 7
1.5 Responsibilities 7
1.6 Environmental requirements 7
1.6.1 Guidelines and standards 7
1.6.2 Minister's Conditions of Approval 8
1.6.3 Updated Management Measures 9
1.6.4 EPL No.21984 9

2 BASELINE DATA **10**
2.1 Desktop review 10
2.1.1 Water quality data for the Murray River 10
2.1.2 Water quality data for the Murrumbidgee River 11

3 SURFACE WATER QUALITY CONSTRUCTION MONITORING **12**
3.1 Overview 12
3.2 Sampling location and frequency 12
3.3 Sampling parameters 23
3.4 Performance criteria 23

4 MONITORING METHODOLOGY / SAMPLING PROTOCOL **25**
4.1 Sampling collection 25
4.2 Field measures 25
4.3 Recording of field results 25
4.4 Decontamination 25
4.5 Quality assurance 25

5 COMPLIANCE MANAGEMENT **26**
5.1 Roles, responsibility and training 26
5.2 Monitoring and inspection 26
5.3 Data analysis and management response 26
5.4 Auditing 26
5.5 Reporting 26

6 REVIEW AND IMPROVEMENT **28**
6.1 Continuous improvement 28
6.2 Update and amendment 28

LIST OF TABLES

Table 1: CoA relevant to this Monitoring Program 8
Table 2: Water quality monitoring data on the Murray River near Albury 10
Table 3: Water quality monitoring data on the Murrumbidgee River near Wagga Wagga 11
Table 4: Surface water monitoring locations 13
Table 5: Surface water quality monitoring parameters 23
Table 6: Water quality monitoring criteria (Aquatic ecosystems) 23
Table 7: Reporting requirements 26

LIST OF FIGURES

Figure 1: Sampling locations SW01 – Murray River 14
Figure 2: Sampling locations SW02 – Eight Mile Creek 15
Figure 3: Sampling locations SW03 – Billabong Creek 16
Figure 4: Sampling locations SW04 – Buckargingah Creek 17
Figure 5: Sampling locations SW05 – Yerong Creek 18
Figure 6: Sampling locations SW06 – Sandy Creek 19
Figure 7: Sampling locations SW07 – Pearson Street Drain 20
Figure 8: Sampling locations SW08 – Reedy Creek 21
Figure 9: Sampling locations SW09 – Jeralgambeth Creek 22

GLOSSARY

TERM	DEFINITION
ARTC	Australian Rail Track Corporation
BOM	Bureau of Meteorology
CEMF	Construction Environmental Management Framework
CEMP	Construction Environmental Management Plan
CSWMP	Construction Soil and Water Management Plan
CSWQMP	Construction Surface Water Quality Monitoring Program
CoA	Conditions of Approval
Construction	Includes work required to construct the CSSI as defined in the Project Description described in the documents listed in CoA A1 including commissioning trials of equipment and temporary use of any part of the CSSI but excluding Low Impact Work which is carried out or completed prior to approval of the CEMP.
CSSI	Critical State Significant Infrastructure
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DIPNR	Department of Infrastructure, Planning and Natural Resources
DO	Dissolved Oxygen
DPE	NSW Department of Planning and Environment
DPI	Department of Primary Industries
DPHI	Department of Planning, Housing and Infrastructure
EAD	The Inland Rail – Albury to Illabo project was assessed as part of the following documents: ▪ Inland Rail – Albury to Illabo Environmental Impact Statement (ARTC, August 2022); ▪ Albury to Illabo Response to Submissions (ARTC, November 2023); ▪ Albury to Illabo Preferred Infrastructure Report (ARTC, November 2023); ▪ Albury to Illabo Preferred Infrastructure Report Response to Submissions (ARTC, February 2024); ▪ Inland Rail – Albury to Illabo (SSI-10055) Response to request for additional information – Air Quality Assessment (letter dated 1 May 2024); ▪ Part 1 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024); ▪ Part 2 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024) ▪ Albury to Illabo Kemp Street Bridge Enhancement Site Modification Report (June 2025); ▪ Albury to Illabo Kemp Street Bridge Enhancement Site Modification Clarification (July 2025); ▪ Albury to Illabo Kemp Street Bridge Modification Noise and Vibration Impact Assessment (August 2025).
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EPA	Environmental Protection Authority (NSW)
EP&A Act	*Environmental Planning and Assessment Act 1979 (NSW)*

TERM	DEFINITION
EPL	Environment Protection Licence
Environmental Representative (ER)	The Environmental Representative(s) for the CSSI approved by the Planning Secretary
IRPL	Inland Rail Pty Ltd
km	Kilometre
mm	Millimetre
NATA	National Association of Testing Authorities Australia
NSW	New South Wales
pH	A figure expressing the acidity or alkalinity of a solution on a logarithmic scale on which 7 is neutral, lower values are more acid and higher values more alkaline.
Planning Secretary	Secretary of the NSW Department of Infrastructure, Housing and Infrastructure, or delegate
PIR	Preferred Infrastructure Report
Primary CoA/UMM	CoA and/or UMMs that are specific to the development of this Monitoring Program
POEO Act	*NSW Protection of Environment Operations Act 1997*
TDS	Total Dissolved Solids
UMM	Environmental Management Measure, as amended in the Albury to Illabo Kemp Street Bridge Enhancement Site Modification (June 2025)
WPIA	Water Pollution Impact Assessment

1 INTRODUCTION

1.1 Project overview

Inland Rail is an approximate 1,600 kilometres (km) freight rail network that will connect Melbourne and Brisbane via regional Victoria, New South Wales (NSW) and Queensland. The Inland Rail route would involve using approximately 1,000 km of existing track (with enhancements and upgrades where necessary) and 600 km of new track, passing through 30 local government areas (LGAs). Inland Rail will accommodate double-stacked freight trains up to 1,800 metres (m) long and 6.5 m high.

The Australian Government has confirmed that Inland Rail is an important project to meet Australia's growing freight task, improve road safety and help decarbonise the economy. Inland Rail will enhance our national freight and supply chain capabilities, connecting existing freight routes through rail, roads and ports, and supporting Australian's growth. Inland Rail is being delivered by Australian Rail Track Corporation (ARTC) and Inland Rail Pty Ltd (IRPL).

Comprising 12 sections, a staged approach is being undertaken to deliver Inland Rail. Each of these projects can be delivered and operated independently with tie-in points to the existing railway. Work south of Parkes has been prioritised, which will enable Inland Rail to initially connect to existing rail networks between Melbourne, Sydney, Perth and Adelaide via Parkes and Narromine. The Parkes to Narromine (P2N) and Narrabri to North Star Phase 1 (N2NS P1) sections are complete.

The project will enable enhancement works to structures and sections of track along 185 km of the existing operational standard-gauge railway in the Albury to Illabo (A2I) section of the Inland Rail program. Enhancement works are required to provide the increased vertical and horizontal clearances required for double-stacked freight trains. Works would include track realignment, lowering and/or modification within the existing rail corridor, modification, removal or replacement of bridge structures (rail, road and/or pedestrian bridges), raising or replacing signal gantries, level-crossing modifications and other associated works.

A detailed project description is provided in Section 4 of the Construction Environmental Management Plan (CEMP).

1.1.1 Planning context

The Inland Rail – Albury to Illabo project (the project) is declared State significant infrastructure (SSI) and critical State significant infrastructure (CSSI) under Division 5.2 of the *Environmental Planning and Assessment Act 1979* (NSW) (EP&A Act). The project is permissible without development consent and is subject to assessment and approval by the NSW Minister for Planning and Public Spaces.

An environmental impact statement (EIS) was prepared to support ARTC's application for approval of the proposal in accordance with the requirements of the EP&A Act and the environmental assessment requirements of the Secretary of the (then) NSW Department of Planning, Industry and Environment (the SEARs) (now the Department of Planning, Housing and Infrastructure (DPHI)).

The EIS was placed on public exhibition from 17 August 2022 to 28 September 2022. During the exhibition period, interested stakeholders and members of the community were able to review the EIS online, participate in consultation and engagement activities held by ARTC, and make a written submission to the DPE for consideration in its assessment of the proposal.

In accordance with section 5.17(6)(b) of the EP&A Act, on 13 April 2023 the Planning Secretary directed ARTC to submit a Preferred Infrastructure Report (PIR) that provides further assessment of traffic and transport, noise and vibration, and air quality impacts. The PIR was also prepared to consider changes to the exhibited proposal that have arisen as a consequence of these further assessments and related submissions.

A modification report (Kemp Street Bridge Enhancement Site Modification, Inland Rail June 2025) was prepared to revise the replacement road and pedestrian bridge arrangement over the railway line at the Kemp Street bridge enhancement site in Junee to now provide a combined, single structure.

1.1.2 Statutory context and approval

The project was assessed as part of the following documents:

- Inland Rail – Albury to Illabo Environmental Impact Statement (ARTC, August 2022);
- Albury to Illabo Response to Submissions (ARTC, November 2023);
- Albury to Illabo Preferred Infrastructure Report (ARTC, November 2023);
- Albury to Illabo Preferred Infrastructure Report Response to Submissions (ARTC, February 2024);

- Inland Rail – Albury to Illabo (SSI-10055) Response to request for additional information – Air Quality Assessment (letter dated 1 May 2024);
- Part 1 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024);
- Part 2 - Revised Technical Paper 8: Biodiversity Development Assessment Report (WSP, February 2024);
- Albury to Illabo Kemp Street Bridge Enhancement Site Modification Report (June 2025);
- Albury to Illabo Kemp Street Bridge Enhancement Site Modification Clarification (July 2025);
- Albury to Illabo Kemp Street Bridge Modification Noise and Vibration Impact Assessment (August 2025).

Together these documents are referred to as the Environmental Approvals Documentation (EAD).

The original approval for the Inland Rail – Albury to Illabo project under the EP&A Act was granted by the Minister for Planning on 08 October 2024. The Modification was approved by the delegate of the NSW Minister for Planning and Public Spaces on 13 August 2025.

1.2 Scope of this Stage C Monitoring Program

The scope of this Construction Surface Water Monitoring Program (this Monitoring Program) is to describe how the project will monitor potential surface water impacts during Stage C construction (refer to Section 7 of the Construction Soil and Water Management Plan (CSWMP)).

This Program is an appendix of the CSWMP.

SMART (Specific, Measurable, Achievable, Realistic and Timely) principles are to be considered and applied during the preparation and ongoing implementation of this Monitoring Program.

This Monitoring Program Plan is applicable to all activities during construction of the project, including all areas where physical works will occur or areas that may otherwise be impacted by the construction works, and are under the control of Martinus Rail. All Martinus Rail staff and sub-contractors are required to comply with the requirements of this Monitoring Program and related environmental management plans, over the full duration of the construction program.

1.3 Approval

In accordance with CoA A22(d), this Monitoring Program will be submitted to the Environmental Representative (ER) for endorsement prior to submission to the Planning Secretary for approval.

Construction will not commence until the relevant CEMP(s) and Sub-plans have been endorsed by the ER and/or approved by the Planning Secretary (as applicable and as identified in the CEMF approved under CoA C16), in accordance with CoA C15.

This Monitoring Program will be implemented throughout construction.

1.4 Consultation

In accordance with CoA C25, this Monitoring Program will be prepared in consultation with Department of Climate Change, Energy, the Environment and Water (DCCEEW) - Water Group and the following relevant councils:

- Albury City Council;
- Great Hume Shire Council;
- Wagga Wagga City Council;
- Lockhart Shire Council;
- Junee Shire Council.

The consultation report prepared for the CSWMP will outline the location in which stakeholders' responses have been addressed.

1.5 Responsibilities

Martinus Rail's Construction Manager/Area Manager and the Environment, Approvals and Sustainability Manager (MR ESM) are responsible for ensuring that all legal and other requirements described in this Monitoring Program are met.

1.6 Environmental requirements

1.6.1 Guidelines and standards

The main guidelines, specifications, and policy documents relevant to this Monitoring Program include:

- National Water Quality Management Strategy (Australian and New Zealand Environment and Conservation Council (ANZECC), 2018);
- Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARMCANZ, 2000a) (the ANZECC guidelines);
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Australian and New Zealand Governments, 2018) (the Water Quality Guidelines);
- NSW Water Quality and River Flow Objectives (Department of Environment, Climate Change and Water (DECCW), 2006) (the NSW Water Quality Objectives).

1.6.2 Minister's Conditions of Approval

The requirements of the CoA relevant to the development of this Monitoring Program are shown in Table 1. A cross reference is also included to indicate where the CoA is addressed in this Monitoring Program or other project management document, as relevant.

TABLE 1: COA RELEVANT TO THIS MONITORING PROGRAM

No.	Requirement	Where addressed
C25	Except as provided by Condition C16 the following Construction Monitoring Programs must be prepared in consultation with the relevant government agencies identified for each to compare actual performance of construction of the CSSI against the performance predicted in the documents listed in Condition A1 or in the CEMP: b) Surface Water – DCCEEW Water Group, and relevant councils	Section 1.3
C26	Each Construction Monitoring Program (CMP) must have consideration of SMART principles and provide: a) details of baseline data available;	Section 1.2 Section 2
	b) details of baseline data to be obtained and when;	Section 2
	c) details of all monitoring of the project to be undertaken;	Section 3
	d) the parameters of the project to be monitored;	Section 3.3
	e) the frequency of monitoring to be undertaken;	Section 3
	f) the location and justification of monitoring locations;	Section 3.2
	g) the reporting of monitoring results and analysis results against relevant criteria;	Section 5.5
	h) details of the methods that will be used to analyse the monitoring data;	Section 4
	i) procedures to identify and implement additional mitigation measures where the results of the monitoring indicate unacceptable project impacts; and	Section 6
	j) any consultation to be undertaken in relation to the monitoring programs.	Section 1.4
C28	CMP(s) must be submitted to the Planning Secretary for approval except those permitted to be endorsed by others pursuant to a CEMF approved by the Planning Secretary under Condition C16.	Section 1.3
C29	Where a CMP requires Planning Secretary's approval, the CMP must be endorsed by the ER and then submitted to the Planning Secretary for approval no later than one (1) month before the commencement of construction, or where construction is staged, no later than one (1) month before the commencement of each stage.	Section 1.3

No.	Requirement	Where addressed
C30	CMP(s) not requiring the Planning Secretary's approval, but requiring ER endorsement, must be submitted to the ER no later than one (1) month before the commencement of construction or where construction is staged no later than one (1) month before the commencement of that stage. The CMP(s) must be endorsed by the ER as being consistent with the conditions of this approval and all undertakings made in the documents listed in Condition A1.	Section 1.3
C31	Construction must not commence until the relevant CMP(s) have been approved by the Planning Secretary or endorsed by the ER, (as applicable and as identified in the CEMF approved under Condition C16), and all relevant baseline data for the specific construction activity has been collected.	Section 1.3
C32	The CMP(s), as approved or endorsed (as relevant), including any minor amendments approved by the ER, must be implemented for the duration of construction and for any longer period set out in the monitoring program or specified by the Planning Secretary, whichever is the greater.	Section 1.3
C33	The results of the CMP(s) must be submitted to the Planning Secretary, and relevant regulatory agencies, for information in the form of a Construction Monitoring Report at the frequency identified in the relevant CMP. Note: Where a relevant CEMP Sub-plan exists, the relevant Construction Monitoring Program may be incorporated into that CEMP Sub-plan.	Section 6

1.6.3 Updated Management Measures

No primary or secondary UMMs presented in the EAD are considered relevant to the development of this Monitoring Program.

1.6.4 EPL No.21984

The A2I project is subject to EPL 21984 as a Scheduled Activity for 'railway activities – railway infrastructure construction'. The EPL includes clauses requiring the licensee to minimise soil and water impacts from the project. No conditions set out in the EPL are relevant to surface water monitoring.

2 BASELINE DATA

2.1 Desktop review

A desktop review was carried out during the preparation of the EAD to establish the existing water quality condition in the area. As site-specific water quality data was not available, existing water quality data from the broader catchment areas was reviewed to assess the general water quality of the downstream catchments that ultimately receive runoff from the proposal site. The following reports and data were reviewed:

- NSW State of the Environment, 2018 (NSW EPA, 2018);
- NSW Murray And Lower Darling Water Quality Management Plan (NSW DPI, 2019a);
- Murrumbidgee Water Quality Management Plan (NSW DPI, 2019b);
- Real-time Data network (WaterNSW, 2021).

These reports generally use pH, dissolved oxygen (DO), total suspended solids (TSS), total nitrogen (TN), total phosphorus (TP) and salinity as key indicators of water quality.

The reports reviewed to inform the EAD all noted that water quality can vary significantly within the studied catchments. These reports are informed by the real-time monitoring stations that exist within the catchments. A summary of the data collected at these WaterNSW monitoring sites is summarised below. No additional information regarding water quality was included in the Albury to Illabo Kemp Street Enhancement Site Modification (June 2025).

Baseline data monitoring is currently in progress and will be added to subsequent versions of this monitoring program.

2.1.1 Water quality data for the Murray River

The Real-time Data website maintained by WaterNSW provides access to data from monitoring stations on rivers, streams, dams and bores in NSW. Data was extracted for four (4) sites upstream and downstream of the Murray River bridge enhancement site on the Murray River as shown in Table 2. Monitoring stations 409001 at Albury (Union Bridge) and 409037 at Howlong are located downstream and sites 409016 downstream of the Hume Dam (Heywoods) and 409017 at Doctors Point are located upstream of the Murray River bridge at Albury.

Table 2 shows the minimum, mean and maximum values for pH, DO, EC and turbidity for the available monitoring periods at these monitoring sites. Electrical conductivity is the only value that was monitored consistently at all sites. These values were taken on a monthly basis beginning in late 2001 up until 2021. pH and DO values were recorded at site 409001 at Albury Union Bridge and 409016 Downstream of the Hume Dam. The pH and DO values at Albury Union Bridge were recorded between August 2013 and September 2014. pH, DO and turbidity were monitored daily at site 409016 downstream of the Hume Dam from late March 2021 to early June 2021.

TABLE 2: WATER QUALITY MONITORING DATA ON THE MURRAY RIVER NEAR ALBURY

Analyte		Albury (Union Bridge) Site: 409001	Downstream Hume Dam (Heywoods) Site:409016	Doctors point Site: 409017	Howlong Site: 409037
pH Target: 6.5–7.5	Min	7.0	6.8	-	-
	Mean	7.3	6.9	-	-
	Max	7.7	7.1	-	-
EC Target peak (80percentile): 412 µS/cm	Min	21.0	34.1	18.0	31.5
	Mean	55.3	49.5	51.8	64.5
	Max	170.8	78.5	119.6	318.2
DO Target: >7.7 mg/L	Min	6.6	6.5	-	-
	Mean	9.2	8.3	-	-
	Max	11.4	10.4	-	-

Analyte		Albury (Union Bridge) Site: 409001	Downstream Hume Dam (Heywoods) Site:409016	Doctors point Site: 409017	Howlong Site: 409037
Turbidity Target: 15 NTU	Min	-	2.6	-	-
	Mean	-	5.1	-	-
	Max	-	9.3	-	-

The monitoring data shows that the mean EC values at all sites were below the target values given under the Murray Darling Basin Plan. The mean pH values taken at each site were within the target range under the Murray Darling Basin Plan. While the minimum values for DO were below the targets, the mean DO values at the relevant monitoring sites were both greater than the target DO values for the catchments and therefore satisfied the catchment target. Turbidity data was only available at the Hume Dam (Heywoods) site. The turbidity value for this site was below the target values given under the Murray Darling Basin Plan.

2.1.2 Water quality data for the Murrumbidgee River

Data from four (4) sites near Wagga Wagga on the Murrumbidgee River, Tarcutta and Billabong Creek were also extracted from the Real-time Data website (WaterNSW, 2021) as shown in Table 3. Monitoring stations 410001 at Wagga Wagga on the Murrumbidgee, 410017 at Old Borambola on Tarcutta Creek and 410048 at Ladysmith at Kyeamba Creek are located upstream of the proposal at Wagga Wagga. Site 410186 at Billabong Creek downstream of Ten Mile & Mountain Creeks is located upstream of the project works at Culcairn.

Table 3 shows the minimum, mean and maximum values for EC and turbidity for the available monitoring periods at these monitoring sites. Electrical conductivity is the only value that was monitored consistently at all sites. These values were taken on a monthly basis beginning in May 1993 (site 410001), December 2000 (site 410048) and February 2002 (site 410047) up until 2021. It is noted that data sets were not complete for the time periods monitored. Turbidity was monitored intermittently at site 410001 at Wagga Wagga on the Murrumbidgee between June 1993 and February 2012. 12 samples of turbidity were available from site 410048 at Ladysmith at Kyeamba Creek between December 2004 and June 2010.

The monitoring data shows that the mean EC values on the Murrumbidgee and at Tarcutta Creek were below or close to the target values given under the Murray Darling Basin Plan. The mean EC values at Kyeamba Creek and Billabong Creek were both two to three times the target EC values. Turbidity data was only available at the Murrumbidgee River site and Kyeamba Creek site. The mean turbidity values for these sites were above the target values but represent smaller average exceedances than exceedances recorded in EC values.

TABLE 3: WATER QUALITY MONITORING DATA ON THE MURRUMBIDGEE RIVER NEAR WAGGA WAGGA

Analyte		Murrumbidgee River at Wagga Wagga SITE: 410001	Tarcutta Creek at Old Borambola SITE: 410047	Kyeamba Creek at Ladysmith SITE: 410048	Billabong Creek Downstream Ten Mile & Mountain Creeks SITE: 410186
EC Target peak (80percentile): 258 µS/cm	Min	30.0	35.9	20.8	2
	Mean	142.0	266.8	733.7	856.0
	Max	309.4	727.4	2109.2	2185.1
Turbidity Target: 35-50 NTU	Min	3.7	-	-1	-
	Mean	71.6	-	54.6	-
	Max	316.6	-	131.4	-

3 SURFACE WATER QUALITY CONSTRUCTION MONITORING

3.1 Overview

Based on the risks presented by construction activities adjacent to the subject areas, the potential sources of water quality impacts include:

- Increased sediment loads from exposed soil transported offsite to downstream watercourses during rainfall events;
- Exposure of actual or potential acid sulfate soils (ASS);
- Increased levels of nutrients, metals and other pollutants, transported in sediments to downstream watercourses;
- Increased alkalinity of pH of downstream watercourses and groundwater sources;
- Chemicals, oils, grease and petroleum hydrocarbon spills from construction machinery;
- Litter from construction activities;
- Contamination of watercourses from contaminated land.

Table 5 contains the parameters to be tested as part of this Monitoring Program. Water Quality criteria are identified in Table 6 and will be used to assess potential impacts on sensitive receiving environments.

Variation in physio-chemical parameters provides an indication of a change to overall water quality triggering the assigned performance criteria and further impact assessment.

The Environment Protection Licence (EPL) may authorise discharge of water from specific locations or premises and establish criteria that differ from those given in this Program. In such circumstances the EPL, and any conditions and criteria of that EPL, take precedence over this Monitoring Program.

The project is currently in discussions with the EPA regarding a Water Pollution Impact Assessment (WPIA) and discharge criteria. This monitoring program will be updated once the WPIA and discharge criteria have been agreed upon with the EPA.

3.2 Sampling location and frequency

As no site-specific monitoring was undertaken as part of the EAD, surface water monitoring will be undertaken during construction. This allows for the assessment of trends in water quality, including natural variations, and will allow sufficient data to enable assessment of any potential impacts measured during Stage B or Stage C construction.

Surface water quality monitoring will be undertaken at nine (9) sites along the project alignment prior to and throughout construction.

Surface water quality monitoring will continue to be undertaken at these nine (9) sites along the project alignment during Stage B and Stage C works. Water quality sampling will be undertaken at a monthly frequency during the construction phase at the locations indication in Table 4 and Figure 1 to Figure 9, using a multiprobe water quality meter. Upstream (US) and Downstream (DS) monitoring locations are shown in Figure 1 to Figure 9. A note has been made in Table 4 to explain what the purpose of the monitoring is.

Where safe to do so, wet weather monitoring will be conducted at a frequency of at least once a quarter (once every 3 months) when a continuous rainfall event of more than 25 mm is received in the local catchment during a 24-hour period as recorded via the Bureau of Meteorology (BOM) weather station. Sampling will be completed when flows are reasonably constant and safe.

TABLE 4: SURFACE WATER MONITORING LOCATIONS

Sample ID	Sample Location	Purpose	Analysis suite	Sampling frequency
SW01	Murray River	Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW02	Eight Mile Creek	Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW03	Billabong Creek	Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW04	Buckargingah Creek	Monitoring for Stage A construction Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW05	Yerong Creek	Monitoring for Stage A construction Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW06	Sandy Creek	Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW07	Pearson St Drain	Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW08	Reedy Creek	Monitoring for Stage A construction Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)
SW09	Jeralgambeth Creek	Monitoring for Stage A construction Monitoring for baseline Stage B Monitoring for Stage B and Stage C construction	Physio-chemical parameters Laboratory analysis	Monthly Wet weather (Physio-chemical parameters only)

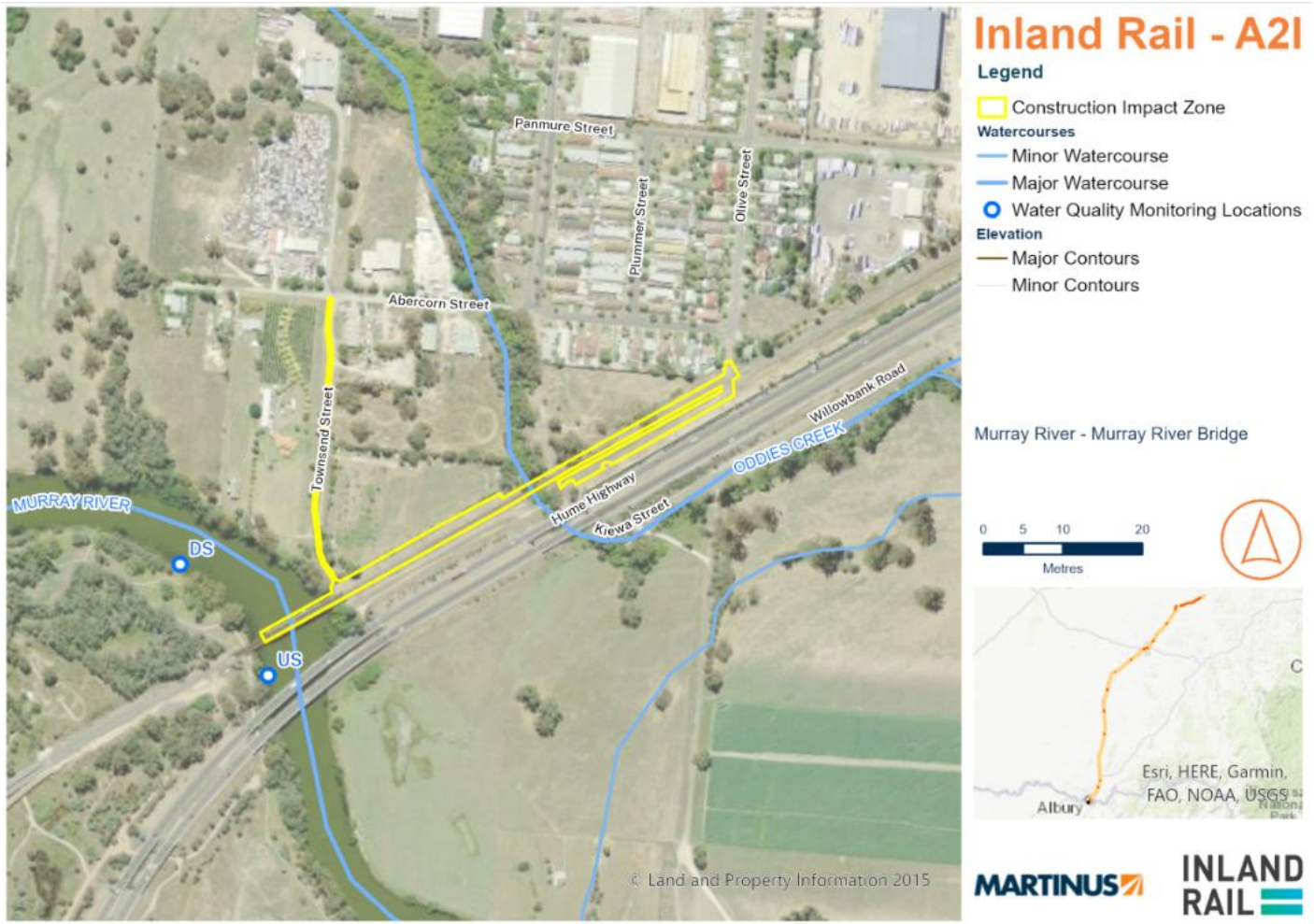


FIGURE 1: SAMPLING LOCATIONS SW01 – MURRAY RIVER

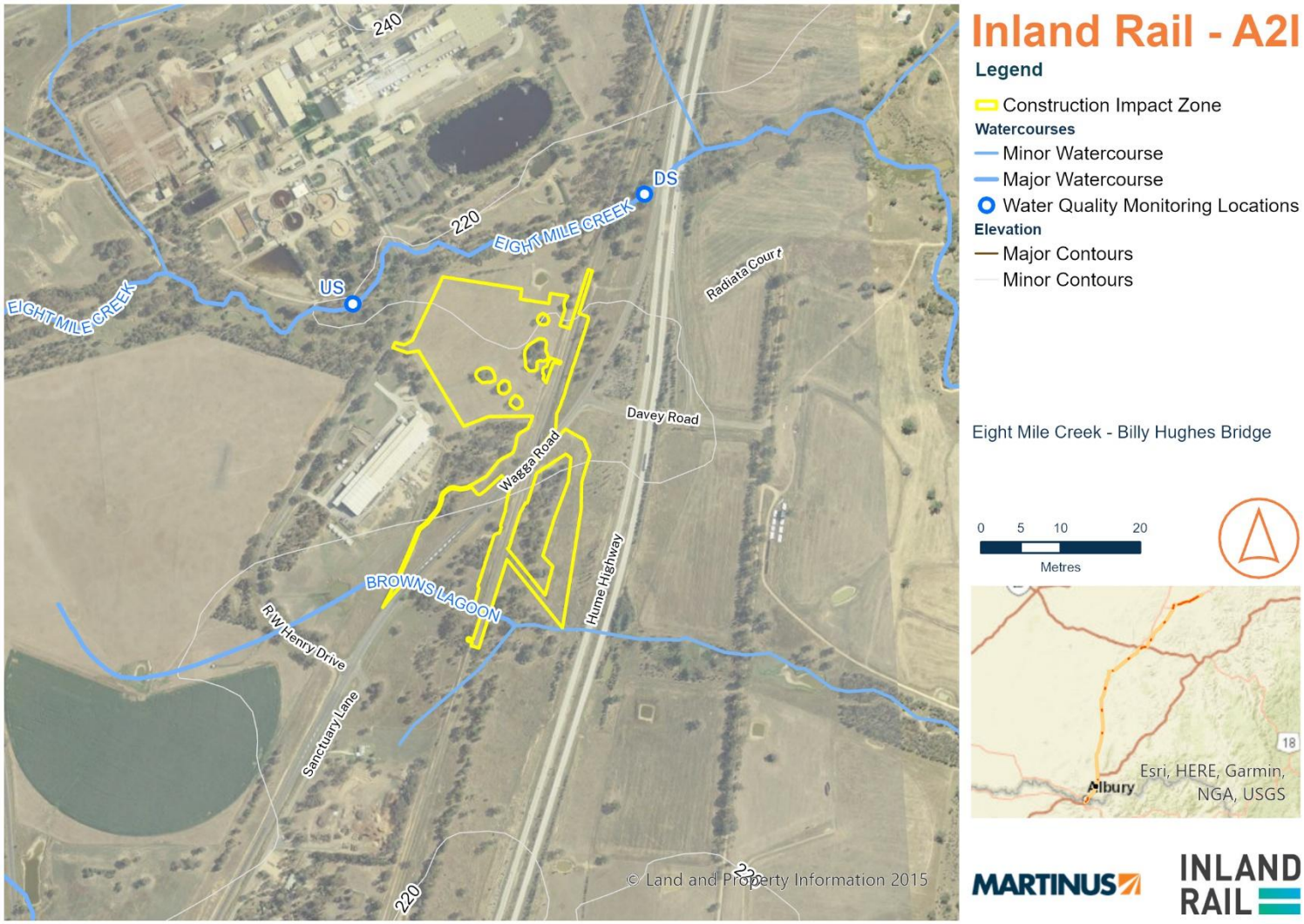


FIGURE 2: SAMPLING LOCATIONS SW02 – EIGHT MILE CREEK



FIGURE 3: SAMPLING LOCATIONS SW03 – BILLABONG CREEK

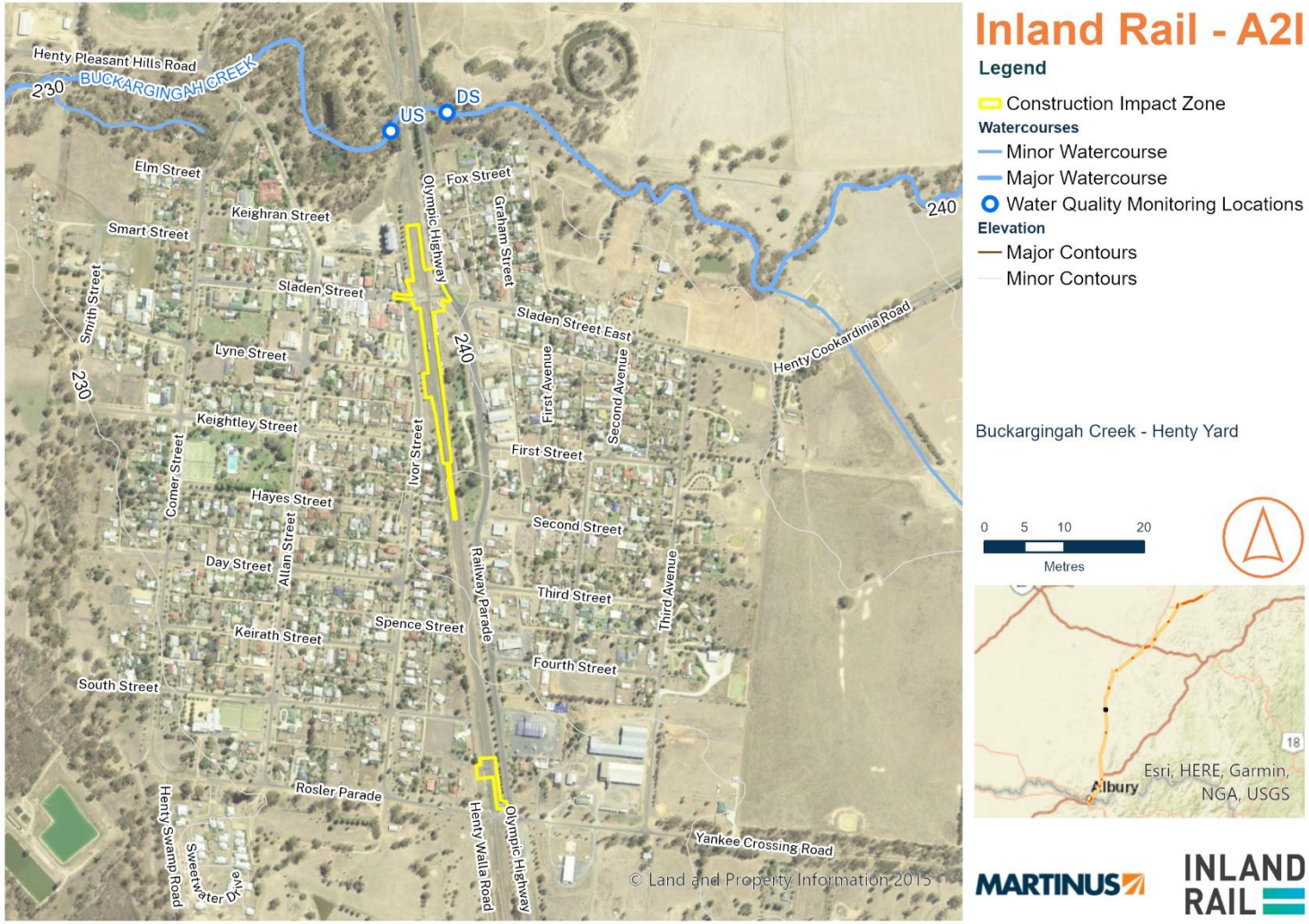


FIGURE 4: SAMPLING LOCATIONS SW04 – BUCKARGINGAH CREEK



FIGURE 5: SAMPLING LOCATIONS SW05 – YERONG CREEK

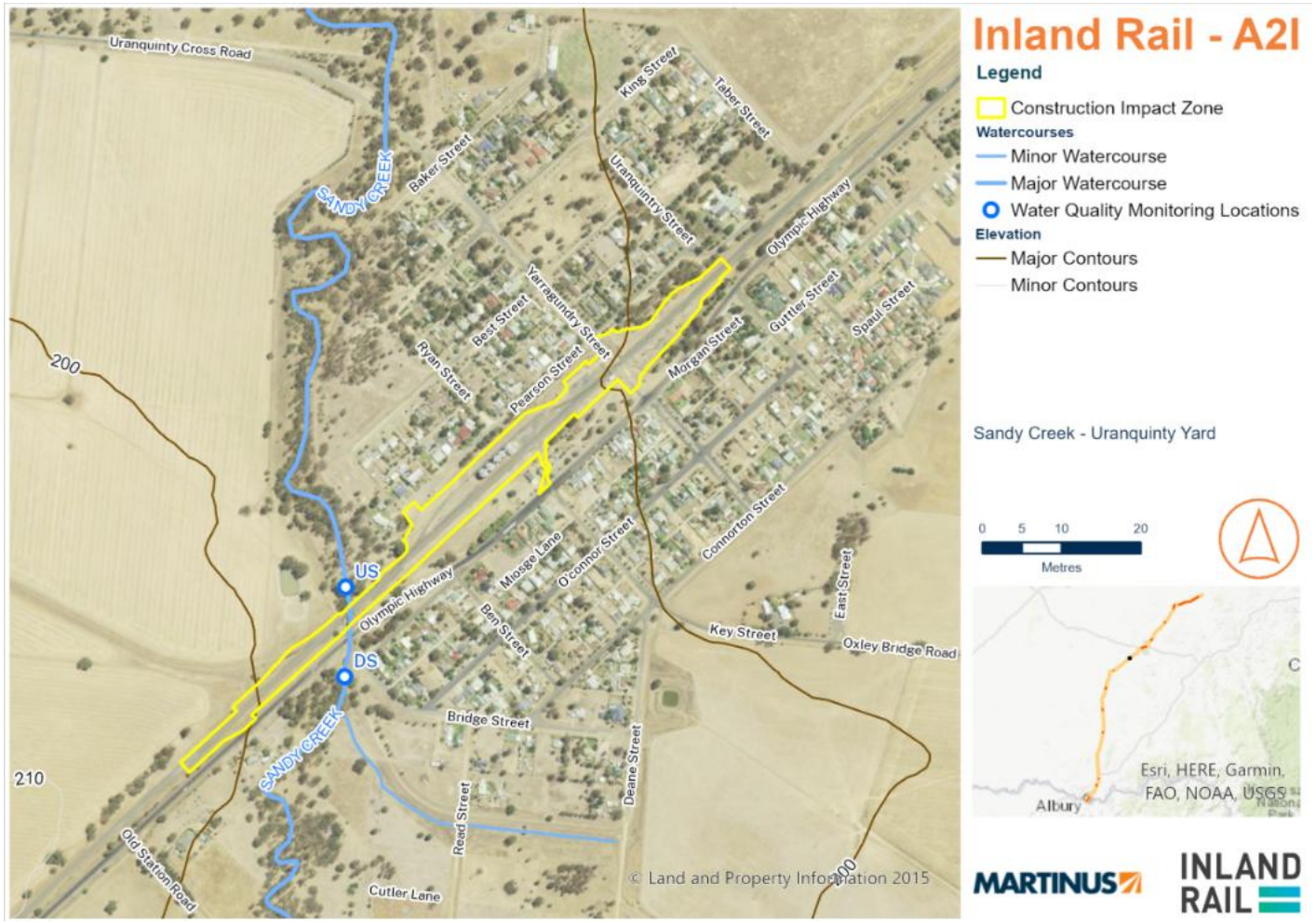


FIGURE 6: SAMPLING LOCATIONS SW06 – SANDY CREEK

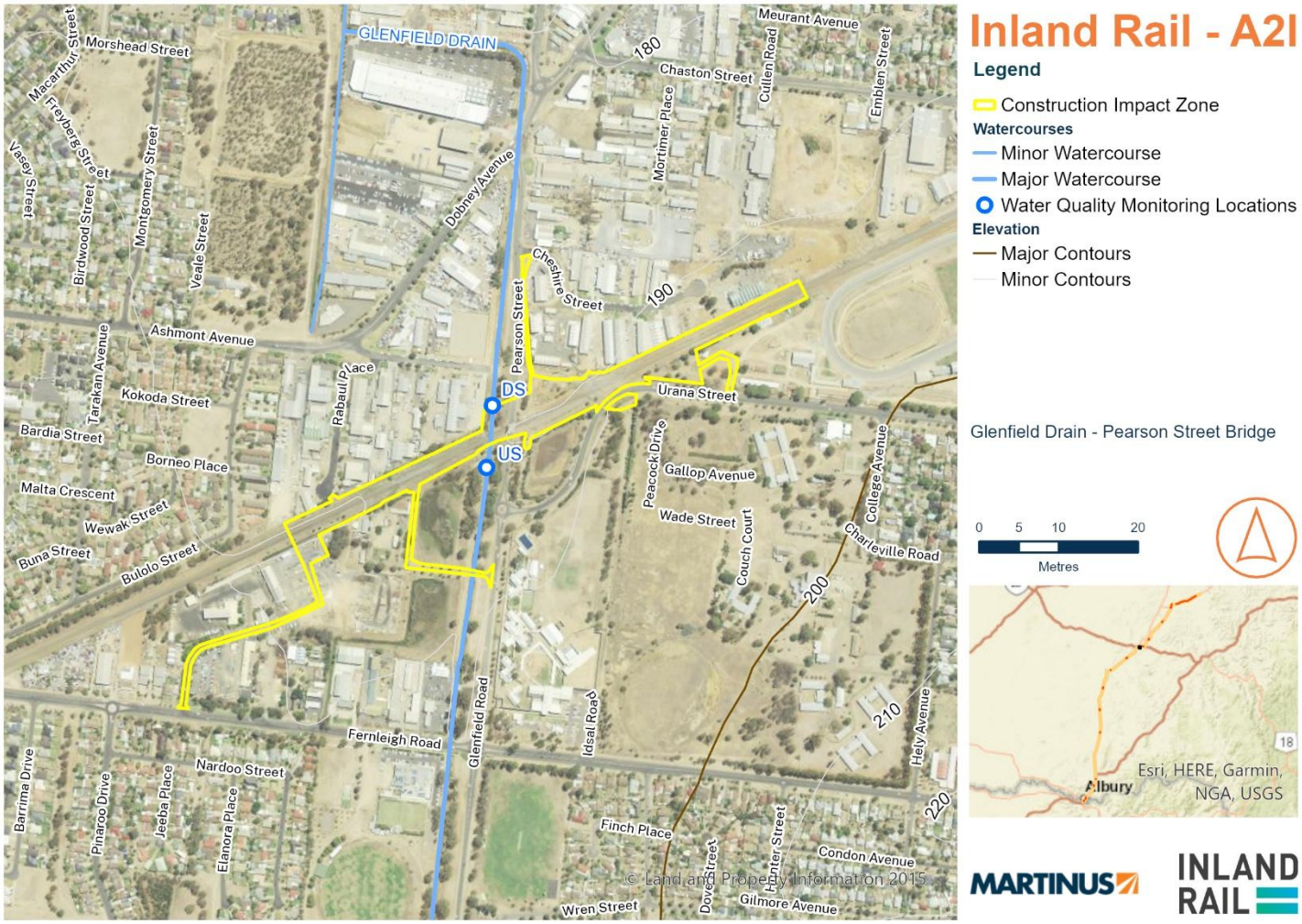


FIGURE 7: SAMPLING LOCATIONS SW07 – PEARSON STREET DRAIN

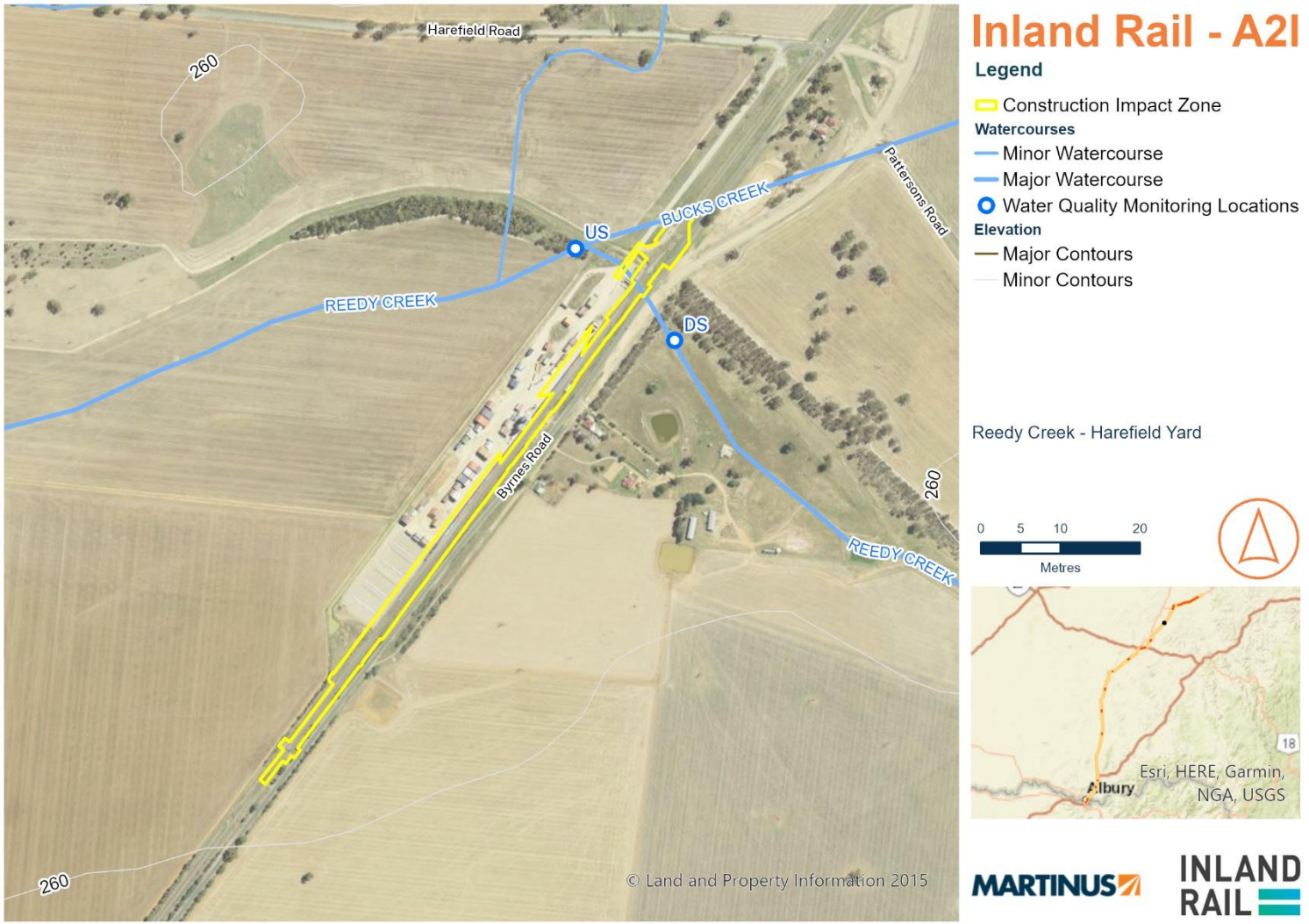


FIGURE 8: SAMPLING LOCATIONS SW08 – REEDY CREEK

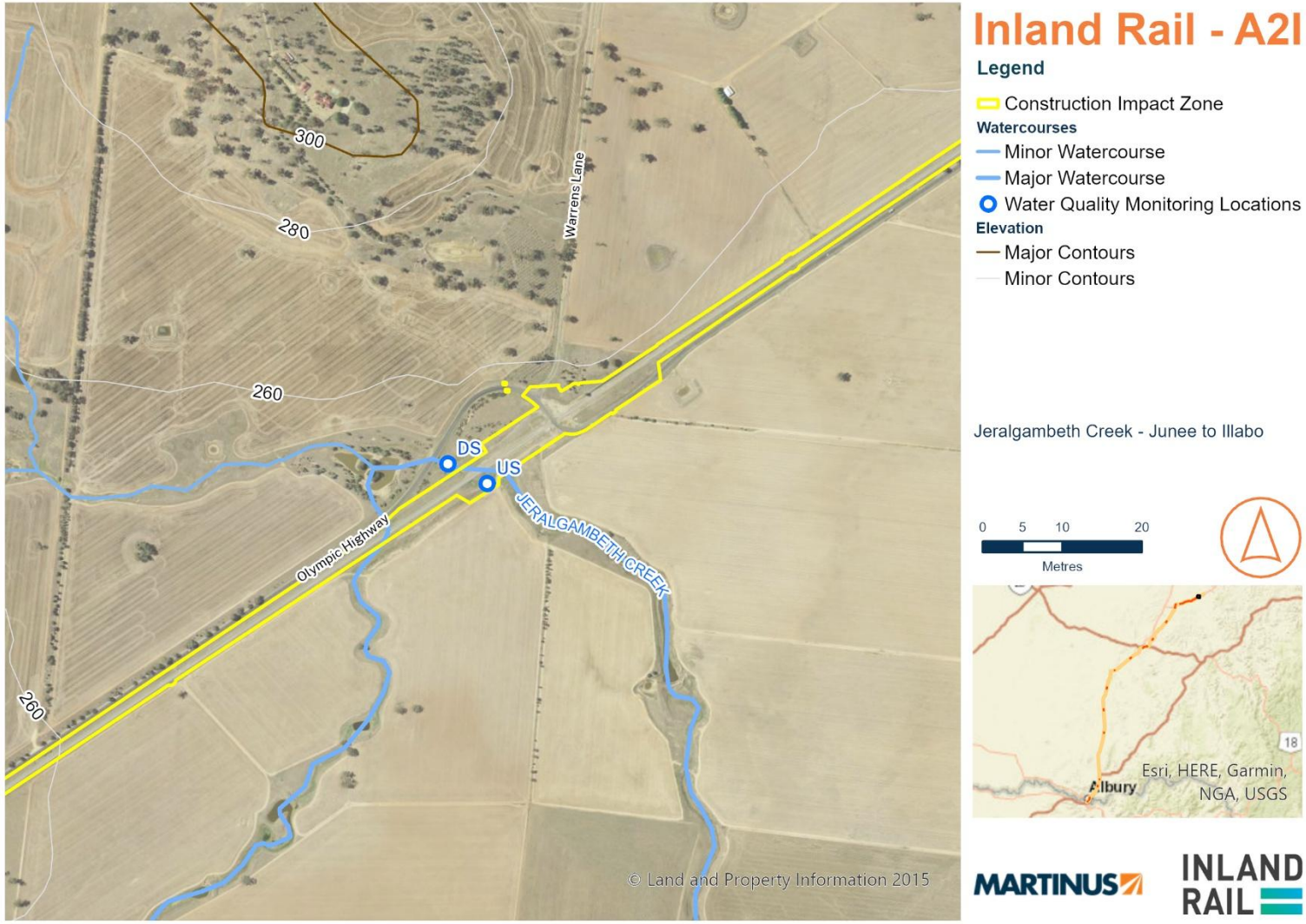


FIGURE 9: SAMPLING LOCATIONS SW09 – JERALGAMBETH CREEK

3.3 Sampling parameters

Table 5 details the analytes that will be monitored during the construction phase surface water monitoring. The parameters are suitable to indicate if the project has potentially caused impact to surface water quality as a result of construction activities.

TABLE 5: SURFACE WATER QUALITY MONITORING PARAMETERS

Category	Parameters
Physio-chemical parameters (field)	▪ Turbidity (TDS); ▪ pH; ▪ Dissolved oxygen (DO); ▪ Salinity/ Electrical Conductivity (EC); ▪ Temperature.
Laboratory analysis	▪ Chlorophyll-a; ▪ Nutrients (total phosphorus and total nitrogen); ▪ Total suspended solids; ▪ Total metals (Aluminium, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel and zinc); ▪ TKN (total Kjeldahl nitrogen); ▪ Nitrogen NOx (oxidised nitrogen); ▪ Organic compounds (BTEX, naphthalene, and TRH); ▪ Total Recoverable Hydrocarbons (vTRH C6-C9, TRH C10-C36); ▪ Chemical Oxygen Demand; ▪ Biochemical Oxygen Demand.

Surface water quality analysis results will be assessed and compared to baseline conditions, rainfall records, upstream monitoring results, and the performance criteria described below.

3.4 Performance criteria

The baseline data shows that some surface water quality parameters exceed the default ANZECC (2000a) water quality trigger values for Aquatic ecosystems.

This is not unexpected given the significant disturbance agricultural enterprise can cause to receiving waterways surrounding the project. Location specific performance criteria have not been established for each monitoring location as such the water quality objectives and criteria identified in the EAD have been adopted.

Table 6 summarises the water quality monitoring criteria for the project as identified in the EAD and ANZECC 2000 Guidelines. An EPL may authorise discharge of water from specific locations or premises and establish criteria that differ from those given in this Program. In such circumstances the EPL, and any conditions and criteria of that EPL, take precedence over this Monitoring Program.

TABLE 6: WATER QUALITY MONITORING CRITERIA (AQUATIC ECOSYSTEMS)

Water quality objective	Indicator	Trigger value or criteria
Maintaining or improving the ecological condition of waterbodies and their riparian zones over the long term	Total phosphorous	Upland rivers: 20µg/L Lowland rivers: 50µg/L for rivers in the Murray Darling Basin
	Total nitrogen	Upland rivers 250µg/L Lowland rivers: 500µg/L for rivers in the Murray Darling Basin
	Chlorophyll-a	Upland rivers: Not applicable Lowland rivers: 5µg/L

Water quality objective	Indicator	Trigger value or criteria
	Turbidity	Upland rivers: 2–25 NTU Lowland rivers: 6-50 NTU
	Salinity (electrical conductivity)	Upland rivers: 30–350µS/cm Lowland rivers: 125–2200µS/cm
	Dissolved oxygen	Upland rivers: 90–110% Lowland rivers: 85–110%
	pH	Upland rivers: 6.5–8.0 Lowland rivers: 6.5–8.5
	Temperature	15-35°C
	Chemical contaminants or toxicants (95% species protection):	
	Aluminium	55 ugL^{-1}
	Arsenic (AsIII/ AsV)	24 ugL^{-1} /13 ugL^{-1}
	Cadmium	0.2 ugL^{-1}
	Chromium (CrVI)	1 ugL^{-1}
	Copper	1.4 ugL^{-1}
	Lead	3.4 ugL^{-1}
	Manganese	1900[c] ugL^{-1}
	Mercury (inorganic)	0.6 ugL^{-1}
	Nickel	11 ugL^{-1}
	Zinc	8.0 [c] ugL^{-1}

The criteria provide an easily identifiable indication of a potential change in water quality. A management response would be initiated if any of the following occurs:

- A parameter exceeds the criteria outlined in Table 6 for any single monitoring event
- A parameter downstream exceeds the corresponding parameter upstream for any single monitoring event by more than 20 per cent;
- A parameter exceeds the criteria for two consecutive monthly monitoring events;
- A parameter exceeds the criteria for half of the sampling events in a twelve-month period.

In the event that any of the above triggers are observed, a review will be initiated immediately to determine the significance of the exceedance(s) and possible causes.

The review will assess the baseline data for the relevant waterway, recent rainfall records, other activities within the catchment and recent activities or recorded erosion/sediment control incidents occurring in the catchment. If the exceedance is determined to be attributable to project works, the event will be treated as an environmental incident and managed in accordance with the requirements of Section 8 of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

4 MONITORING METHODOLOGY / SAMPLING PROTOCOL

4.1 Sampling collection

Grab samples will be collected manually from the sampling locations identified in Table 4, and Figure 1 to Figure 9 The volume of sample collected will be sufficient for the required physio-chemical (field) parameter analysis using a multi-probe water quality meter(s).

4.2 Field measures

Field physico-chemical parameters including EC, pH, DO, TDS, temperature, and turbidity will be measured at each sampling location using a fully calibrated multi-probe water quality meter(s) or provided for laboratory analysis. Other observations including odour and colour may also be recorded.

The multi-probe field water quality meter(s) will be calibrated against known standards, as supplied by the manufacturer, at the start and completion of each day of water quality sampling.

A grab sample will be collected at each site and sent to the laboratory for analysis using the relevant vessels provided by the laboratory.

4.3 Recording of field results

Results for each monitoring location will be recorded on appropriate field sheets (hard copy or digital) using unique sampling identification nomenclature consisting of the sample date, location, and sampler details.

4.4 Decontamination

Sampling equipment will be cleaned (decontaminated) between each sample. Where a sample site shows evidence of contamination (i.e. there is an algal bloom, or the site smells strongly of hydrocarbons, sewage or something else) equipment will need to be cleaned thoroughly. In addition, equipment will need to be cleaned periodically to prevent a build-up of dirt.

The following method will be followed:

- Rinse the equipment in tap water;
- Clean with De-Con 90 (a phosphate free detergent), or equivalent;
- Rinse again with tap water;
- Rinse three times with de-ionised water;
- Allow to dry.

De-ionised and tap water will be available for washing equipment in the field, if required.

4.5 Quality assurance

Any sample to be sent to a laboratory will be subject to quality assurance protocols. Quality assurance and control protocols during sampling and recording of physio-chemical (field) parameters will be undertaken monthly (each sampling event) in accordance with ANZECC/ARMCANZ (2000b) to ensure the integrity of the dataset. As part of sampling the following will be undertaken:

- Rinsate blanks (one per sampling event only);
- Blind duplicates (at a rate not less than 20 per cent of total samples);
- Split duplicates (at a rate not less than 20 per cent of total samples).

Samples are to be transported to a National Association of Testing Authorities (NATA)-accredited laboratory under documented chain-of custody protocols. Field results will be checked for accuracy before leaving the site and errors or discrepancies will be cross-checked, and further investigation initiated if required. Monitoring and calibration records will be maintained in accordance with the appropriate standard.

5 COMPLIANCE MANAGEMENT

5.1 Roles, responsibility and training

The project's organisational structure and overall roles and responsibilities are outlined in Section 6.2 of the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in the CSWMP.

All employees, contractors and utility staff working on site will undergo site induction and targeted training relating to surface water management issues, detailed in the CSWMP. Further details regarding staff induction and training are outlined in Section 6 of the CEMP.

5.2 Monitoring and inspection

This Program details the monitoring requirements for surface water. Additional soil and surface water inspection requirements (including weekly site inspections) are detailed in the CSWMP.

In accordance with Section 7.2 of the CEMP, the Martinus Rail Environmental and Sustainability Manager will be responsible for ensuring monitoring activities are undertaken.

Additional requirements and responsibilities in relation to inspections are documented in Section 7.1 of the CEMP.

5.3 Data analysis and management response

Results from the construction monitoring program will be compared with the criteria and with previous results.

Monthly monitoring results for surface water quality will be compared against criteria (refer Table 6) and reported in the construction compliance monitoring reports. If a trigger is observed, a review will be initiated to determine the significance of the exceedance(s) and possible causes. The review will assess available surface water data, baseline data for the relevant waterway, recent rainfall records, and recent activities or recorded erosion/sediment control incidents occurring in the catchment.

If the exceedance is determined to be attributable to project works, the event will be treated as an environmental incident and managed in accordance with Section 8 of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

5.4 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this Monitoring Program, CoA, and other relevant approvals, licenses and guidelines.

Audit requirements are detailed in Section 9.1 and 9.2 of the CEMP.

5.5 Reporting

During construction, surface water quality data will be collected, tabulated and assessed against baseline conditions and performance criteria. Reporting requirements associated with the Monitoring Program for the construction phase of the project are presented in Table 7.

Additional monitoring requirements to the EPA will be undertaken in accordance with the project's EPL.

In the event that any exceedances are observed, a review will be initiated immediately to determine the significance of the exceedance(s) and possible causes. The review will assess the baseline data for the relevant waterway, recent rainfall records, other activities within the catchment and recent activities or recorded erosion/sediment control incidents occurring in the catchment. If the exceedance is determined to be attributable to project works, the event will be treated as an environmental incident and managed in accordance with the requirements of Section 8 of the CEMP.

TABLE 7: REPORTING REQUIREMENTS

Schedule	Requirements	Recipient (relevant authority)
Monthly Environmental Report (every month)	Monitoring program performance will be documented in the Monthly Environmental Report. Any incidents and key environmental issues will be documented. The Monthly Environmental Reports will be submitted within five business days prior to the end of each month, or as otherwise agreed to with IRPL	IRPL

Schedule	Requirements	Recipient (relevant authority)
Water Monitoring Reports (quarterly)	Data summary reports presenting tabulated surface water monitoring data collected during the reporting period. Water quality results will be presented and performance criteria exceedances will be highlighted. Applicable management responses will be documented. The Water Monitoring Reports will be submitted for information 60 days after the reporting period ends.	IRPL, ER, Planning Secretary

6 REVIEW AND IMPROVEMENT

6.1 Continuous improvement

Monitoring data will be reviewed throughout the construction period to provide potential requirements to increase, or decrease, the number of sampling locations and/or the analytical suites. The criteria will be reviewed for appropriateness following 12 months of construction monitoring. Alterations to criteria, monitoring locations, analytical suites, or frequencies will be reported in the Water Monitoring Reports.

Continuous improvement of this Program will be achieved by the ongoing evaluation of environmental management performance against environmental policies, objectives and targets, and the project performance outcomes of the EAD for the purpose of identifying opportunities for improvement.

The continuous improvement process will be designed to:

- Identify areas of opportunity for improvement of environmental management and performance;
- Determine the cause or causes of non-conformances and deficiencies;
- Develop and implement a plan of corrective and preventative action to address any non-conformances and deficiencies;
- Verify the effectiveness of the corrective and preventative actions;
- Document any changes in procedures resulting from process improvement;
- Make comparisons with objectives and targets.

6.2 Update and amendment

The processes described in Section 10.4 of the CEMP may result in the need to update or revise this Monitoring Program.

Revisions of this Monitoring Program will be in accordance with the process outlined in Section 10.4 of the CEMP.

This Monitoring Program, including any amendments, will be implemented throughout Stage C construction.



MARTINUS

Head Office | 1/23-27 Waratah Street | KIRRAWEE NSW 2232

APPENDIX C

Dam Dewatering Protocol

This document is uncontrolled when printed.



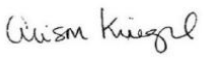
DAM DEWATERING PROTOCOL

A2I | Albury to Illabo

CONTRACT NUMBER: 0052

PROJECT DOCUMENT NUMBER:
6-0052-210-PES-00-PR-0006

Document Control

DOCUMENT TITLE:	Dam Dewatering Protocol			
DOCUMENT OWNER:	Chris Standing – Environment, Approvals and Sustainability Manager			
PREPARED BY:	Ellen Fowler	**TITLE:**	Environmental Approvals Support	
SIGNATURE:			**DATE:**	19/09/2025
REVIEWED BY:	Alison Kriegel	**TITLE:**	Environmental Approvals Lead	
SIGNATURE:			**DATE:**	19/09/2025

Approved by

NAME	TITLE	SIGNATURE	DATE
Andy Williams	Project Director		19/09/2025

Revision History

REVISION	REVISION DATE	AMENDMENT	DATE TO CLIENT
0	11/02/2025	Approved by DPHI as part of Stage A CSWMP	11/02/2025
1	19/05/2025	Update to refer to Stage B	19/05/2025
2	19/09/2025	Update to refer to Stage C	19/09/2025

Disclaimer: This document has been prepared by Martinus. Use of this document shall be subject to the terms of the relevant contract with Martinus. The electronic file of this current revision is the controlled copy. This file is stored on Martinus' server located at Head Office, Unit 1, 23-27 Waratah St, Kirrawee, NSW.

This document is the property of and contains proprietary information owned by Martinus. No permission is granted to publish, reproduce, transmit or disclose to another party, any information contained in this document, in whole or in part, without prior written permission from the issuing authority.

For the purpose of this document, Martinus refers to the Martinus Group of companies.

This document is uncontrolled when printed.

1 INTRODUCTION

1.1 Scope and purpose

This Dam Dewatering Protocol (this Protocol) forms part of the Stage C Construction Soil and Water Management Plan for Inland Rail – Albury to Illabo project (the project).

The purpose of this Protocol is to address Condition of Approval (CoA) C13(g), as well as to provide guidance to ensure that site dewatering activities are completed in a manner that does not cause harm to any aquatic fauna.

This Protocol is applicable to all activities conducted by site personnel (including sub-contractors) that have the potential to require transfer, movement or dewatering on-site during Stage C construction of the project.

1.2 Objective

The objectives of this Protocol include:

- Ensure compliance with environmental requirements of the project;
- Ensure invasive species are not translocated and are humanely disposed of;
- Provide a clear methodology for the protection and relocation of aquatic fauna for the duration of dam dewatering activities.

1.3 Responsibilities, inductions and training

The Martinus Rail Environment, Approvals and Sustainability Manager (MR ESM) is responsible for ensuring this Protocol is effectively implemented, and all site personnel are aware of the requirements of this Protocol, as relevant to their activities.

An Environmental Work Method Statement (EWMS) will be prepared in accordance with this Protocol to manage and control dewatering activities in a manner that does not cause harm to the environment. Training will include inductions, toolbox talks, pre-starts and targeted training as required.

1.4 Environmental requirements

This Protocol has been developed with consideration of the following key legislation and guidelines:

- *Protection of the Environment Operations Act 1997* (POEO Act);
- *Fisheries Management Act 1994* (FM Act);
- *Biodiversity Conservation Act 2016* (BC Act);
- *Biodiversity Conservation Regulation 2017*.

This Protocol has also been developed to meet the requirements of the Inland Rail Construction Environmental Management Framework (A2P CEMF) (0-0000-900-EEC-00-SP-0002_2) (ARTC, 2022), as well as to meet the CoA identified in Table 1. There are no Updated Management Measures (UMMs) identified within the PIR RtS for dam dewatering.

TABLE 1: APPLICABLE COA TO THIS PROTOCOL

CoA	Requirement	Where addressed
C13	The Soil and Water Management Sub-plan must include: g) a dam dewatering protocol;	This Protocol

2 PROTOCOL

2.1 Environmental Work Method Statement

Martinus Rail will develop an EWMS to manage and control dewatering activities in a manner that does not cause harm to the environment in cases where dams require partial or full dewatering.

The EWMS will be prepared by the MR ESM (or delegate).

EWMS incorporate appropriate mitigation measures and controls, including those identified in the CSWMP. They also identify key activity specific procedures to be used concurrently with the EWMS. EWMS are specifically designed to communicate requirements, actions, processes and controls to construction personnel using plans, diagrams and simple written instructions.

2.2 Dam dewatering

In addition to the discharge requirements outlined in the CSWMP for the discharge of water, the dewatering of waters from dams will require:

- Preparing the dam for dewatering;
- Aquatic fauna capture;
- Relocation of captured aquatic fauna;
- Management of pest species and pathogens.

2.2.1 Preparing the dam for dewatering

Prior to dewatering of the dam, the following steps will be undertaken:

- Where possible, consultation with the landowner to establish if any fish have been stocked in the dam and/or if they are aware of any fish present in the dam;
- Identification of suitable habitats near the dam for translocation of native fauna by the project ecologist;
- Installation of measures to minimise aquatic fauna being injured. This may include sediment controls to direct aquatic fauna towards suitable alternative habitat during the dewatering process;
- Obtaining and setting up pumping screens to ensure native aquatic fauna are not harmed during the pumping process or pest species are not transferred during the pumping operations;
- To allow rapid fauna rescue, the pump inlet will be large enough to allow sediment to pass but would include the use of an appropriate mesh (no greater than five millimetres in diameter) to cover the pump but prevent macroinvertebrates, fish, tadpoles and frogs from being pumped out.

2.2.2 Aquatic fauna capture

The method for translocating as many native fauna living in the dam as possible will be directed by the project ecologist and subject to the specific conditions of any licences or permits. This includes a Section 37 Permit under *the Fisheries Management Act*, where required. All fauna handling must be in accordance with the Fauna Handling and Rescue Procedure (Appendix B of the A2I Construction Biodiversity Management Plan) and the Sloane's Froglet Management Plan.

A work method statement will be submitted by the project ecologist prior to dewatering activities for review and approval as part of the dewatering EWMS.

The general methodology used for aquatic capture will include but not be limited to:

- Trapping of native fauna. The use of floating traps to remove native turtles from the dams prior to dewatering, deployed by suitably experienced and licensed ecologist;
- For the surrounding vegetation, manual searching of suitable cover such as hollows, fallen timber, burrows, discarded tins etc.;
- Dewatering over several days to allow native fauna to relocate. Measures to direct aquatic fauna away from dangerous areas (i.e. roads) and towards suitable alternative locations will be included;
- Manually entering (where safe to do so) the partially dewatered dam and searching manually for remaining fauna;
- The dewatering schedule will allow time for fauna rescue, especially during the final 0.3– 0.5 metre water depth (to be advised by Project Ecologist). Fauna will be captured in one day, so pumps need to be of an adequate size and placed in an area free from mud and debris (e.g. inside excavator bucket or screened sump pit);

- Fauna will be collected by hand nets during the final day of dewatering. This is most effective when the water is less than 0.3 metres deep. Larger fauna will be targeted first due to the rapid decrease of dissolved oxygen concentration as the water volume decreases;
- Native fauna will be transferred to aerated holding containers (fish) or where possible transferred directly to the release area (reptiles/amphibians). It is preferable if frogs are released at night to disadvantage predators, however if this is not feasible, they should be released into dense pool/pond side vegetation. Sloane's Froglets should be managed in accordance with the Sloane's Froglet Management Plan. The holding tanks will be kept shaded to prevent harmful increases in temperature. Care will be taken as to not overcrowd water containers to limit the spread of diseases and predation. Frogs will be captured in aerated plastic bags (used as a glove) and kept as one per bag for release. Reptiles will be captured using gloves and placed in a plastic tub for transport;
- As the water level drops, the dam wall will be partially and progressively removed and stabilised to prevent refilling. A ramp will be graded as the wall is removed to allow any fauna in the bottom sediment to escape. This ramp will be left in place for two nights.

In accordance with the A2P CEMF, any relocation/salvage of aquatic fauna needs to be undertaken by a suitably qualified person and undertaken in accordance with any relevant guidelines. The details of all relocated/salvaged aquatic fauna must be recorded in accordance with the Incident Reporting Protocol outlined in the Fauna Handling and Rescue Procedure (Appendix B of the A2I Construction Biodiversity Management Plan).

2.2.3 Relocation of captured fauna

The project ecologist will nominate a suitable release site based on species and quantity of captured aquatic fauna.

Native fish are to be transported in aerated containers of dam water and gradually mixed with stream water to allow acclimatisation of fauna to the new environment. The host location will be large enough to accommodate additional fish, especially predatory eels.

Water from the receiving waterbody will be mixed slowly over 5 – 10 minutes with the tank water to allow fish to acclimatise to the new water quality. Frogs will be released into dense aquatic and pond side vegetation to provide shelter against predators. Release will also preferably be undertaken after sunset.

All details of aquatic fauna captured and relocated will be recorded in a report after dam dewatering has occurred. Consent of the landholder will be required prior to the relocation into a dam or waterway outside of the construction boundary, if that location is on private property.

2.2.4 Methods to prevent injury to fauna

Methods to prevent injury to fauna include:

- The use of gloves to limit the spread of disease, new gloves will be used for each site;
- Working slowly and methodically through the waterway to limit trampling of aquatic fauna;
- Limit holding time in aerated containers to half an hour;
- One frog per bag to minimise disease spread and possible toxin impact of one species on another;
- Continually monitor holding tanks for sign of deterioration of health of aquatic fauna;
- Shading of holding containers;
- By having a release point nearby to minimise transportation time and stress to aquatic fauna;
- The water will be released slowly and a mesh (no greater than five millimetres in diameter) guard at the pump intake will limit intake of aquatic fauna.

Where a fish kill occurs in the vicinity of the works, DPI Fisheries and the EPA will be notified immediately. In such cases, all works other than emergency response procedures will cease until the issue is rectified and approval given by DPI Fisheries and/or the EPA for the works to proceed.

2.2.5 Management of pest species and pathogens

Exotic aquatic life may inhabit the dams. Any pest non-native species will be euthanized, by the Aquatic Ecologist, who has been trained in humane methods for all aquatic non-native species.

To minimise the potential spread of pathogens, all personnel undertaking in-water work will ensure that decontamination processes are followed in accordance with relevant guidelines. Equipment that comes in contact with dam water or potentially contaminated sediments, such as boots and vehicle tyres, will be cleaned with an appropriate cleaning solution and/or disinfectant. Disposable gloves will be worn when handling aquatic flora and fauna.

2.2.6 Reuse and discharge of dam water

Water quality discharge criteria for reuse, for discharge to land and discharge to water are outlined in Appendix D of the CSWMP. The reuse of dam water onsite or discharge of dam water to land or to water must be authorised by the MR ESM who will confirm that the water quality criteria outlined in the Appendix D of the CSWMP are met prior to reusing or discharging.

3 RECORDS

3.1 Pre-dewatering report

The project ecologist or suitably qualified delegate will report the findings of the pre-dewatering survey within a pre-dewatering report. The report will include:

- Consultation with landowners to identify any fish species that may be present;
- Presence of any fauna habitats near the dam and their species;
- Identify suitable translocation sites for each species;
- Identify suitable methods of transport for each species.

3.2 Post-dewatering report

A record will be maintained for each dam to be dewatered that will include:

- Date and time of fauna capture;
- Species captured;
- Location of release for each species;
- Date and time of release;
- Details of personnel carrying out fauna capture and release and their qualifications and licenses to carry out the work.

This information will be contained within a post-dewatering report.

The pre- and post-dewatering reports may also be consolidated into a single report.



MARTINUS

Head Office | 1/23-27 Waratah Street | KIRRAWEE NSW 2232

APPENDIX D

Spill Response Procedure

This document is uncontrolled when printed.



SPILL RESPONSE PROCEDURE

A2I | Albury to Illabo

CONTRACT NUMBER: 0052

PROJECT DOCUMENT NUMBER:

6-0052-210-PES-00-PR-0002

Document Control

DOCUMENT TITLE:	Spill Response Procedure			
DOCUMENT OWNER:	Chris Standing – Environment, Approvals and Sustainability Manager (A2P)			
PREPARED BY:	Aidann Stathis	**TITLE:**	Environmental Approvals Support – A2I	
SIGNATURE:			**DATE:**	19/09/2025
REVIEWED BY:	Simon Fisher	**TITLE:**	Environmental Approvals Lead – A2I	
SIGNATURE:			**DATE:**	19/09/2025

Approved by

NAME	TITLE	SIGNATURE	DATE
Chris Standing	Environment, Approvals and Sustainability Manager		19/09/2025

Revision History

REVISION	REVISION DATE	AMENDMENT	DATE TO CLIENT
0	14/01/2025	Issued for Information. Approved by DPHI as part of Stage A CSWMP	14/01/2025
1	19/05/2025	Update to refer to Stage B	19/05/2025
2	19/09/2025	Update to refer to Stage C	19/09/2025

Disclaimer: This document has been prepared by Martinus. Use of this document shall be subject to the terms of the relevant contract with Martinus. The electronic file of this current revision is the controlled copy. This file is stored on Martinus' server located at Head Office, Unit 1, 23-27 Waratah St, Kirrawee, NSW.

This document is the property of and contains proprietary information owned by Martinus. No permission is granted to publish, reproduce, transmit or disclose to another party, any information contained in this document, in whole or in part, without prior written permission from the issuing authority.

For the purpose of this document, Martinus refers to the Martinus Group of companies.

This document is uncontrolled when printed.

TABLE OF CONTENTS

1 INTRODUCTION 3
1.1 Scope and Purpose 3
1.2 Responsibilities, Inductions and Training 3
1.3 Environmental Requirements 3

2 PROCEDURE 4
2.1 Preventative Spill Measures 4
2.2 Reactive Spill Measures 4
2.3 Spill Containment 6
2.4 Incident management 6

LIST OF TABLES

Table 1: Applicable CoA to this Procedure 3
Table 2: Applicable UMMs to this Procedure 3
Table 3: Spill containment materials 6

LIST OF FIGURES

Figure 1: Spill response procedure flow chart 5

1 INTRODUCTION

1.1 Scope and Purpose

This Spill Response Procedure (this Procedure) forms part of the Stage C Construction Soil and Water Management Plan for the Inland Rail – Albury to Illabo project (the project).

The purpose of this Procedure is to address Condition of Approval (CoA) C13(h), as well as to describe the emergency spill response approach that will be employed by all project site personnel and sub-contractors during construction of the project.

This Procedure is to be applied in the event of a chemical, fuel or oil spill that arises due to the project activities.

1.2 Responsibilities, Inductions and Training

The Martinus Rail Environment, Approvals and Sustainability Manager (MR ESM) is responsible for ensuring this Procedure is effectively implemented, and all site personnel are aware of the requirements of this Procedure.

All site personnel (including sub-contractors) will undertake an induction which will include details relating to this procedure.

Training will also occur through toolbox talks, pre-starts and targeted training, as required, and following any spills that occur on the project.

1.3 Environmental Requirements

This Procedure has been developed to meet the CoA identified in Table 1.

TABLE 1: APPLICABLE COA TO THIS PROCEDURE

CoA	Requirement	Where addressed
C13	The Soil and Water Management Sub-plan must include: h) a spill response procedure;	This Procedure

There applicable Updated Management Measures (UMMs) identified within the PIR RtS specific for spill response management are provided in Table 2.

TABLE 2: APPLICABLE UMMS TO THIS PROCEDURE

No.	Requirement	Where addressed
BD15	Refuelling will be conducted outside of waterfront land, so far as it practicable, with appropriate measures in place to avoid impacts to waterways, aquatic habitats and groundwater. This includes spill kits always kept with maintenance vehicles and or machinery within 100 m of a watercourse.	Section 2.1 Section 2.3

2 PROCEDURE

2.1 Preventative Spill Measures

In order to minimise the potential for environmental impacts to water and soil from spills the following will be undertaken:

- Training in use of spill containment materials, their locations and spill response will be undertaken proactively as required particularly for personnel who are working within or near to aquatic environments and are involved in regularly handling and using potentially contaminating substances (e.g. personnel who are carrying out refuelling activities);
- Unless unavoidable, washing and maintenance of vehicles and mechanical plant will occur at least 50 m from waterbodies;
- Refuelling will be conducted outside of waterfront land, so far as it practicable, with appropriate measures in place to avoid impacts to waterways, aquatic habitats and groundwater. This includes spill kits always kept with maintenance vehicles and or machinery within 100 m of a watercourse;
- Plant and equipment will undergo regular checks and subsequent repair for potential leakages or worn hydraulic hoses;
- All chemicals including fuels and oils will be stored when not in use in bunded areas;
- All chemicals and hydrocarbons will be stored and handled as per manufacturer's instructions.

Regular inspection of chemical storage areas will be undertaken to assess compliance of the above measures.

2.2 Reactive Spill Measures

All spills are to be managed in accordance with the steps detailed in Figure 1. This includes the following steps:

1) Assess the situation;
2) Cease work and if safe to do so, control the spill;
3) Report the incident;
4) Clean up the spill;
5) Dispose of contaminated materials;
6) Investigation and reporting.

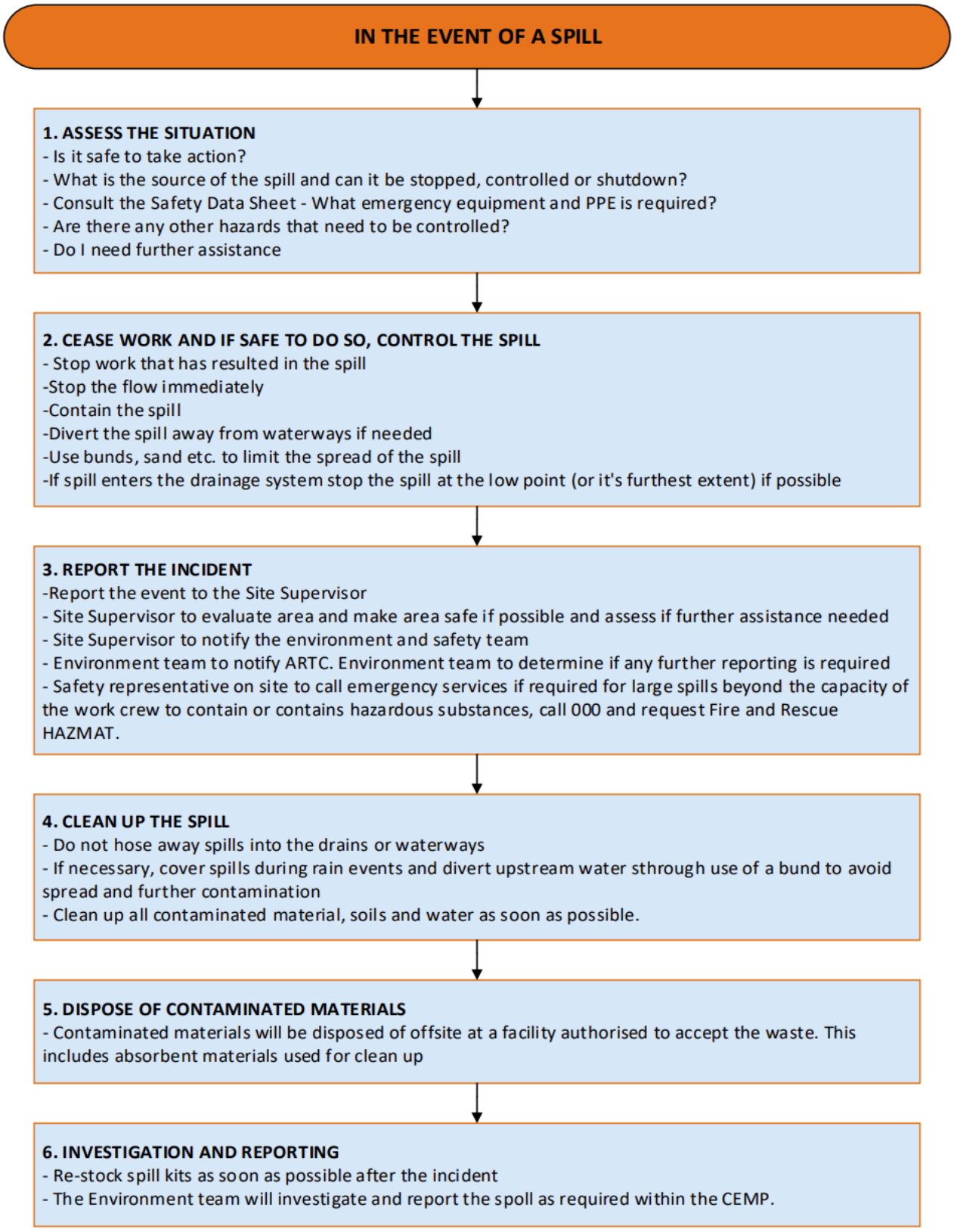


FIGURE 1: SPILL RESPONSE PROCEDURE FLOW CHART

2.3 Spill Containment

Spill containment materials such as those listed in Table 3 referred to as 'spill kits' will be kept and stocked on site at any location where there is significant risk/potential impact of a spill. Examples of potential locations include refuelling areas, chemical storage or where works are within the vicinity of waterways. Spill kits could be stored in a fixed location or be mobile. Spill kits will be placed in dedicated, visible and accessible locations.

Spill kits will always be kept with maintenance vehicles and or machinery within 100 m of a watercourse.

The spill kits will be appropriately sized according to the volume of chemicals and fuels being stored or used and the activities which are being undertaken. All staff would be made aware of the location of the spill kit and trained in its use. Spill kits would be restocked as soon as possible after each use, with used material replaced.

Table 3 provides examples of appropriate application of material types. Spill kit inspections are to be undertaken on regular intervals such as during the weekly environmental site inspections detailed within the Construction Environmental Management Plan. The inspections would check that spill kits are present at the required locations, are accessible and appropriately stocked.

TABLE 3: SPILL CONTAINMENT MATERIALS

Product	Description/Application
Pads, pillows and socks	▪ Used to clean-up (absorb) small to medium liquid spills on land rather than containing; ▪ Thin absorbent mats placed over spills; ▪ Cushion shaped products containing absorbent fibres, used directly under a leak or drip; ▪ Absorbent socks placed at the low point of a spill; ▪ Consider the need to have a spill kit containing these at the source of the activity and extras in-stock on site; ▪ If these materials are not enough to clean-up the spill, consider using absorbent granular materials or equivalent.
Sorbents	▪ Used during clean-up, sorbents are materials that soak up the spill such as saw dust, granules or peat mixture; ▪ Spread the sorbent over the contaminant after control materials have been applied; ▪ Recover the contaminant/sorbent mixture using shovels/excavator bucket or similar; ▪ Sorbents can be used from small to large spills.
Drip trays and washout bunds	▪ Used to contain incidental leaks during plant and equipment maintenance; ▪ Containers should be maintained, and liquids/sludge collected; ▪ Consider if these containers are not sufficient to contain leaks/washout then construction of permanent bunding may be suitable.
Manual recovery	▪ Used to physically remove the contaminant either by excavating the contaminant and adjacent soil on land or pump / vacuum truck removal for contaminant and adjacent liquid/sludge in waterbodies; ▪ Control materials should be installed prior to manual recovery to prevent spread during recovery task.

2.4 Incident management

Environmental incidents will be managed (including notifications and investigations) in accordance with the Construction Environment Management Plan.



MARTINUS

Head Office | 1/23-27 Waratah Street | KIRRAWEE NSW 2232

APPENDIX E

ISC Requirements

TABLE A5-A: ISC DIS-1, LAN-2, DIS-4, WAT-1 & WAT-2 COMPLIANCE TABLE

BENCHMARK or MUST STATEMENT	ISC Credit	Where addressed
Receiving Water Quality (Dis-1)		
Level 1		
Benchmark	Measures to minimise adverse impacts to receiving water environmental values during construction and operation have been identified and implemented.	▪ Section 6.1 ▪ Construction Environmental Management Plan ▪ Environmental Work Method Statements ▪ Dam Dewatering Protocol ▪ Spill Response Procedure ▪ Environmental Impact Statement
Benchmark	Monitoring of water discharges and receiving waters is undertaken at appropriate intervals and at times of discharge during construction.	▪ Section 7.2 ▪ Appendix B, Construction Surface Water Monitoring Program ▪ Construction Biodiversity Management Sub-plan
Must Statement from v1.2 ISC Technical Manual	Set water quality objectives that must be met to maintain the environmental values.	▪ Section 2.3 ▪ Appendix B, Construction Surface Water Monitoring Program ▪ Environmental Impact Statement
Level 2		
Benchmark	Monitoring and modelling of water discharges and receiving waters demonstrates no adverse impact on local receiving water environmental values.	▪ Section 2.4 ▪ Appendix B, Construction Surface Water Monitoring Program ▪ Biodiversity Impact Assessments
Benchmark	The infrastructure does not increase peak stormwater flows for rainfall events of up to a 1.5 year ARI event discharge	▪ Flood Design Reports
Level 3		
Benchmark	Opportunities to improve local receiving water quality and/or provide environmental flows have been identified and implemented	▪ Specification Landscape Design ▪ Urban Design and Landscaping Plan
Benchmark	Monitoring and modelling demonstrates improvement of local receiving water environmental values	▪ Appendix B, Construction Surface Water Monitoring Program ▪ Biodiversity Impact Assessments
Must Statement from v1.2 ISC Technical Manual	A long-term trend would need to be demonstrated on a rolling 12 month average basis.	▪ Appendix B, Construction Surface Water Monitoring Program ▪ ▪ Biodiversity Impact Assessments
Conservation of on-site resources (Lan-2)		
Level 1		
Benchmark	Conservation of topsoil and subsoil has been considered.	▪ Section 6.2 ▪ Spoil Management Strategy

BENCHMARK or MUST STATEMENT	ISC Credit	Where addressed
		▪ Site Environmental Plans ▪ Erosion and Sediment Control Plans ▪ Inspection and Testing Plans
Level 2		
Benchmark	All subsoil and topsoil impacted by the project is separated and protected from degradation, erosion or mixing with fill or waste;	▪ Section 6.2 ▪ Section 7.2.1 ▪ Spoil Management Strategy ▪ Construction Waste, Contamination and Hazardous Materials Management Plan ▪ Daily site diaries and site inspection records ▪ Inspection and Testing Records
Benchmark	95% of all topsoil (by volume) retains its productivity and is beneficially re-used on or nearby to the project.	▪ Soil Tracking Register ▪ Daily site diaries and site inspection records ▪ Inspection and Testing Records
Must Statement from v1.2 ISC Technical Manual	Correct separation, handling and storage of topsoil and subsoil must be demonstrated.	▪ Section 7.2.1 ▪ Soil Tracking Register ▪ Daily site diaries and site inspection records ▪ Inspection and Testing Records
Must Statement from v1.2 ISC Technical Manual	It must be demonstrated that the integrity of the site's topsoil was not compromised during construction works and that at least 95% of it remains productive at completion of construction.	▪ Section 7.2.1 ▪ Soil Tracking Register ▪ Daily site diaries and site inspection records ▪ Inspection and Testing Records
Must Statement from v1.2 ISC Technical Manual	To remain productive, the topsoil must not be covered by permanent hard surfaces.	▪ Section 6.2 ▪ Section 7.2.1 ▪ Site inspection records ▪ Inspection and Testing Records
Must Statement from v1.2 ISC Technical Manual	Beneficial re-use includes leaving the soil where it is and moving it to another location where it is used for landscaping. What represents 'nearby' must be judged in the context of the project and its location.	▪ Construction Waste, Contamination and Hazardous Materials Management Plan ▪ Spoil Management Strategy
Level 3		
Benchmark	Opportunities to improve topsoil productivity of previously disturbed areas have been identified and incorporated into the project.	▪ Construction Waste, Contamination and Hazardous Materials Management Plan ▪ Spoil Management Strategy ▪ Inland Rail Landscape and Rehabilitation Framework ▪ Urban Design and Landscaping Plan ▪ Design Reports ▪ Inspection and Testing Records

BENCHMARK or MUST STATEMENT	ISC Credit	Where addressed
Water use monitoring and reduction (Wat-1)		
Level 1		
Benchmark	Monitoring and modelling (reasonable estimates or predictions) of water use, is undertaken	▪ Section 6.5 ▪ Section 6.10, Table 28 ▪ Appendix F, Water Demand Table ▪ Water Reuse Strategy
Must Statement from v1.2 ISC Technical Manual	For the As-Built rating, monitoring of water use must be undertaken during construction, and modelling of water use must be undertaken for the operation phase based on the as-built infrastructure to give a total footprint across the infrastructure lifecycle.	▪ Section 7.2.1 ▪ Water Usage Monitoring Records ▪ Material Movement Records
Level 1 to 3		
Benchmark	Monitoring and modelling demonstrate a reduction in water use compared to a base case footprint. For every reduction up to 20% for Level 3, fractions of Levels may be achieved on a sliding scale.	▪ A2I BAU Assumptions (Water Usage) ▪ Water Balance Calculations ▪ A2I Water Modelling
Replace Potable Water (Wat-2)		
Level 0 to 3		
Benchmark	Monitoring and modelling demonstrates that some proportion of total water use is from non-potable sources (substituting for potable). Fractions of Levels may be achieved on a sliding scale up to 100% for Level 3.	▪ Section 6.5 ▪ Section 6.6 ▪ Section 6.10, Table 28 ▪ A2I BAU Assumptions (Water Usage) ▪ Section Appendix C, Dam Dewatering Protocol ▪ Water Reuse Strategy ▪ Water Usage Monitoring Records ▪ Water Balance Calculations ▪ A2I Water Modelling
Must Statement from v1.2 ISC Technical Manual	Suitable justification and evidence must be provided to demonstrate that there are no negative impacts (environmental, social or economic) associated with the use of groundwater as an alternative water source.	▪ Section 4.6.2 ▪ Section 5.3, Table 20; Table 21 ▪ Section 6.9 ▪ Section 6.10 ▪ Section 7.2.1 ▪ Water Reuse Strategy ▪ Appendix B, Construction Surface Water Monitoring Program ▪ Water Usage Monitoring Records

APPENDIX F

Water Demand Table

Project:- A2P Enhancement Project

Description:- A2I - Construction Water - Estimate Demand - Based off A2I baseline program - 24-5-24

Date:- 19/08/2024

			2025												2026												2027									
Site ID	Site Description	Data Est	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
1	Murray River	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Albury Yard	TOTAL	0.0	0.0	0.0	0.4	0.4	0.7	0.7	0.4	0.7	0.5	0.8	0.7	0.7	0.8	0.8	0.5	0.5	0.5	0.5	0.5	0.7	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.3	0.0	0.0	0.0	0.0	0.0
3	Riverina Highway	TOTAL	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.7	0.4	0.4	0.4	0.4	0.8	0.7	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Billy Hughes	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.7	0.7	0.4	0.6	0.4	0.4	0.4	0.4	0.8	1.1	0.4	0.4	0.4	0.4	0.8	1.1	0.4	0.4	0.4	0.2	0.0	0.0	0.0
5	Table Top	TOTAL	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	Culcairn Yard	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	Henty Yard	TOTAL	0.0	0.0	0.0	0.1	0.3	0.1	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	Yerong Creek	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	The Rock Yard	TOTAL	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	Uranquinty Yard	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.6	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	Pearson St	TOTAL	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	Cassidy St	TOTAL	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.4	0.4	0.2	0.2	0.2	0.6	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0
13	Edmondson St	TOTAL	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.4	0.4	0.4	0.2	0.1	0.1	0.2	0.4	0.4	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.3	0.3	0.4	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0
14	Wagga Yard &	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1	0.1	0.1	0.1	0.3	0.3	0.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	Bomen Yard	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	Harefield Yard	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	Kemp St Bridge	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.3	0.2	0.2	0.3	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
18	Junee Yard	TOTAL	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.4	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	Olympic Hwy	TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	J2I	TOTAL	0.0	0.1	0.6	0.5	1.1	0.8	0.8	1.1	1.3	1.1	1.1	0.8	0.8	0.8	1.3	0.8	0.8	0.8	0.8	0.8	1.3	0.8	0.8	0.8	0.6	0.8	0.8	0.6	0.4	0.0	0.0	0.0	0.0	0.0
	SUMMARY TOTAL EST		**0.0**	**0.1**	**0.6**	**1.1**	**2.1**	**3.0**	**3.1**	**3.0**	**5.2**	**3.9**	**4.0**	**3.3**	**3.4**	**4.1**	**6.2**	**4.1**	**3.9**	**3.8**	**3.2**	**3.3**	**5.0**	**3.1**	**2.5**	**2.3**	**2.0**	**3.1**	**3.6**	**2.0**	**1.2**	**0.4**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**

APPENDIX G

Overarching Erosion and Sediment Control Plan

A2I ENHANCEMENT WORKS
OVERARCHING SEDIMENT AND EROSION CONTROL



DRAWING LIST:

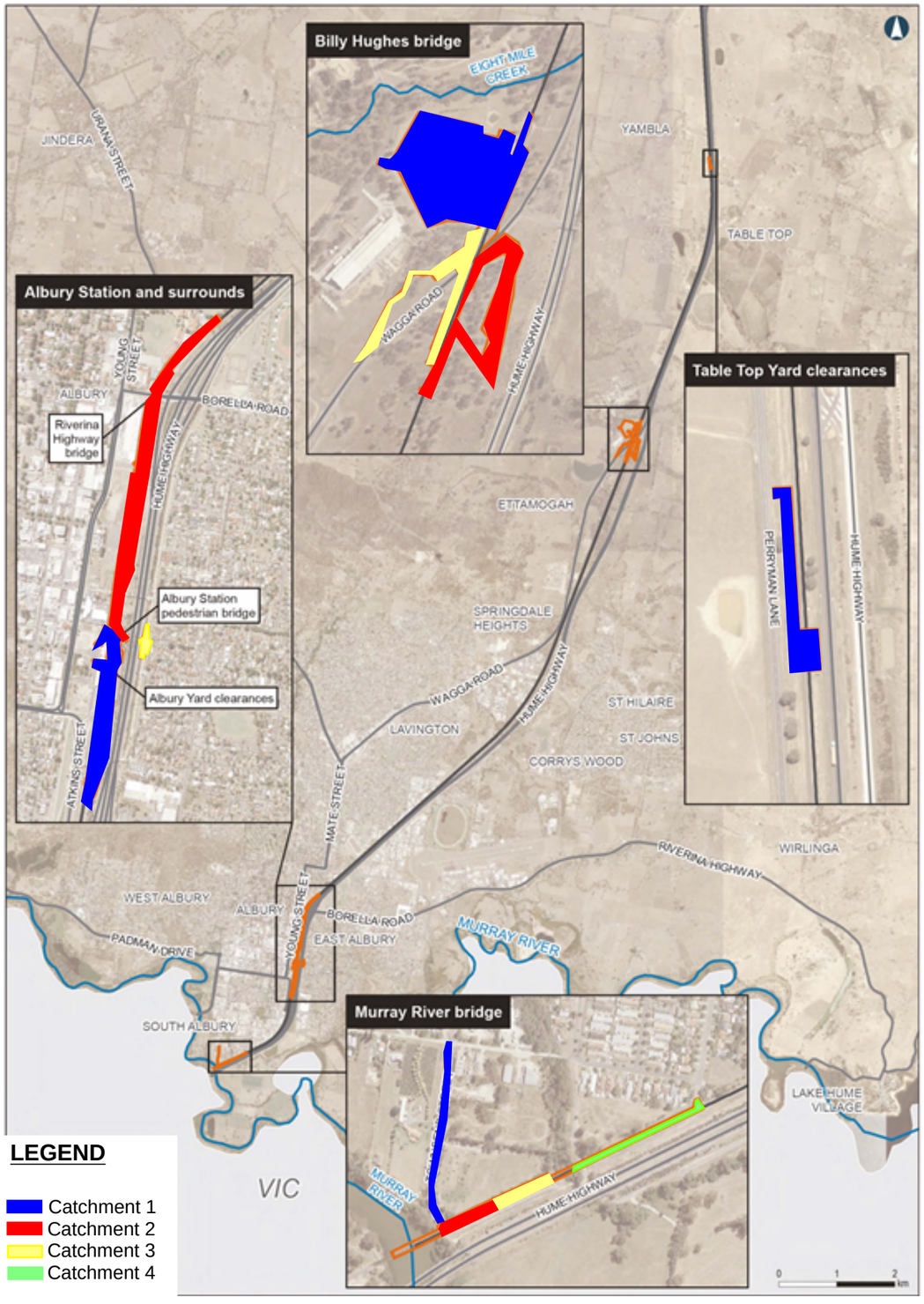
A2I-OESCP-001 - PROJECT AREA AND ENHANCEMENT SITES
A2I-OESCP-002 to 003: CATCHMENT AREAS
A2I-OESCP-004: RUSLE EROSION RISK ASSESSMENT & CALCULATIONS
A2I-OESCP-005 to 007: STANDARD DRAWINGS

REVISION	DESCRIPTION	APPROVED	DATE
A	ORIGINAL ISSUE	SS	19/01/2025

MARTINUS
TREESTONE ENVIRONMENTAL

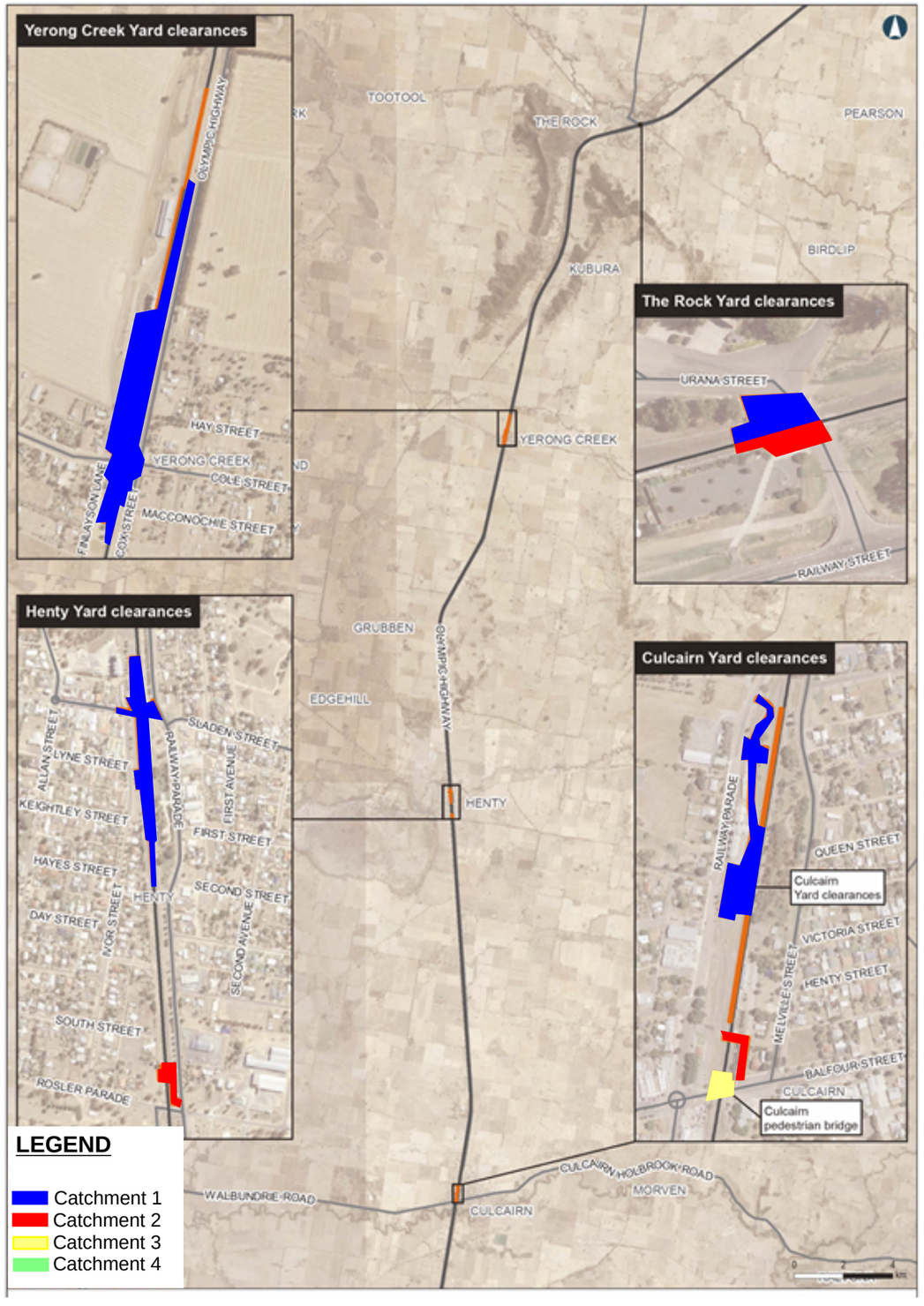
CLIENT	MARTINUS		
DRAWN	SS	DESIGNED SS	DATE 19/01/25
CPESC CERTIFICATION	APPROVED Sarah Steel CPESC 7317		
PROJECT	A2I - ENHANCEMENT WORKS		
DRAWING TITLE	PROJECT AREA AND ENHANCEMENT SITES		
PROJECT No	0052	DRAWING No A2I-OESCP-001	REV A

CATCHMENT AREAS



LEGEND

- Catchment 1
- Catchment 2
- Catchment 3
- Catchment 4



LEGEND

- Catchment 1
- Catchment 2
- Catchment 3
- Catchment 4

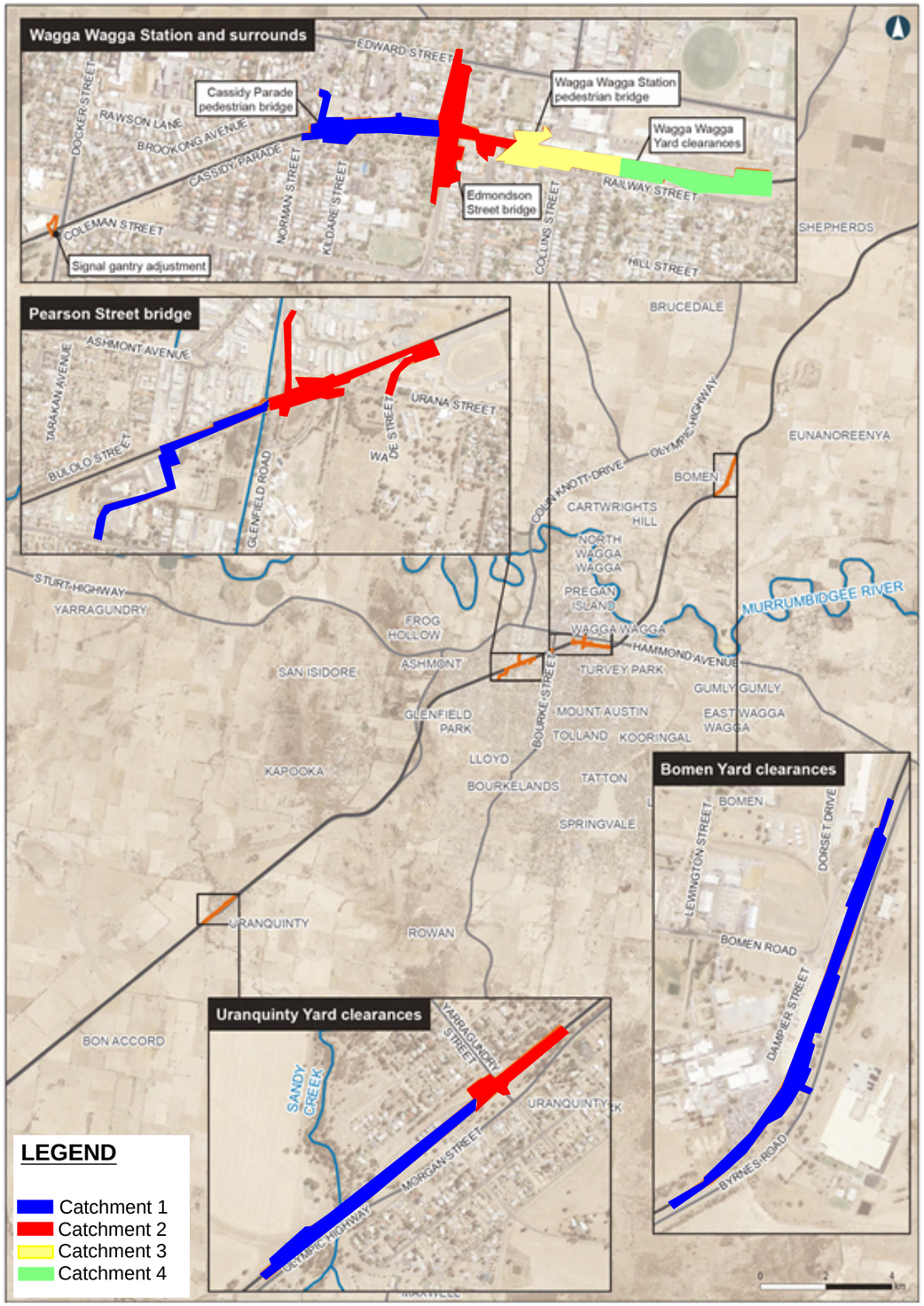
REVISION	DESCRIPTION	APPROVED	DATE
A	ORIGINAL ISSUE	SS	22/01/2025

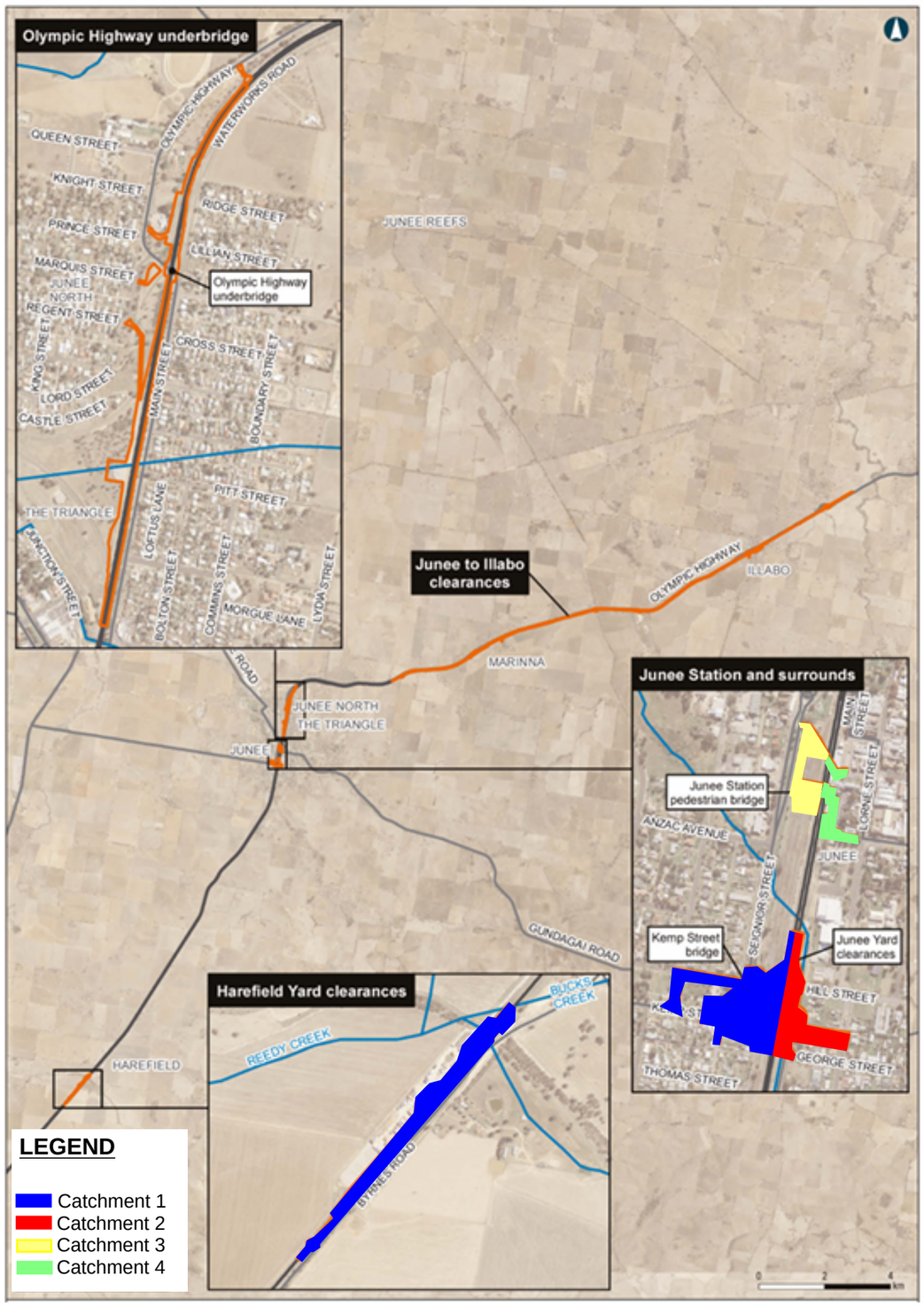
MARTINUS
TREESTONE ENVIRONMENTAL

CLIENT: MARTINUS
DRAWN: SS | DESIGNED: SS | DATE: 22/01/2025
CPESC CERTIFICATION: APPROVED, Sarah Steel, CPESC 7317

PROJECT: A2I ENHANCEMENT WORKS
DRAWING TITLE: CATCHMENT AREAS
PROJECT No:
DRAWING No: A2I-OESCP-001
REV: A

CATCHMENT AREAS





REVISION	DESCRIPTION	APPROVED	DATE
A	ORIGINAL ISSUE	SS	22/01/2025

MARTINUS
TREESTONE ENVIRONMENTAL

CLIENT: MARTINUS
DRAWN: SS | DESIGNED: SS | DATE: 22/01/2025
CPESC CERTIFICATION
APPROVED
Sarah Steel
CPESC 7317

PROJECT: A2I ENHANCEMENT WORKS
DRAWING TITLE: CATCHMENT AREAS
PROJECT No:
DRAWING No: A2I-OESCP-001
REV: A

EROSION RISK ASSESSMENT AND DRAINAGE CALCULATIONS

RUSLE - EROSION RISK ASSESSMENT

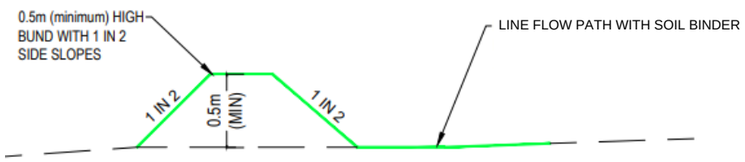
Catchment ID	Area (ha)	R	K	Slope Length (m)	Slope (%)	LS	P	C	A(t/ha/yr)	Control
Murray River Bridge										
Catchment 1	0.2	1046	0.05	80	3	0.65	1.3	1	44	TYPE 3
Catchment 2	0.12	1046	0.05	80	3	0.65	1.3	1	44	TYPE 3
Catchment 3	0.15	1046	0.05	80	3	0.65	1.3	1	44	TYPE 3
Catchment 4	0.11	1046	0.05	80	2	0.41	1.3	0.5	14	TYPE 3
Albury Station and Surrounds										
Catchment 1	3.86	1046	0.05	100	2	0.44	1.3	0.5	15	TYPE 3
Catchment 2	2.55	1046	0.05	100	2	0.44	1.3	0.5	15	TYPE 3
Catchment 3	0.17	1046	0.05	80	2	0.41	1.3	0.5	14	TYPE 3
Billy Hughes Bridge										
Catchment 1	5.39	1046	0.05	80	2	0.41	1.3	1	28	TYPE 3
Catchment 2	1.18	1046	0.05	80	2	0.41	1.3	1	28	TYPE 3
Catchment 3	2.15	1046	0.05	80	2	0.41	1.3	1	28	TYPE 3
Table Top Yard Clearances										
Catchment 1	0.22	1046	0.05	80	2	0.41	1.3	1	28	TYPE 3
Culcairn Yard Clearances										
Catchment 1	0.55	1046	0.05	50	2	0.34	1.3	1	23	TYPE 3
Catchment 2	0.05	1046	0.05	30	2	0.28	1.3	1	19	TYPE 3
Catchment 3	0.1	1046	0.05	20	2	0.24	1.3	1	16	TYPE 3
Henty Yard Clearances										
Catchment 1	0.18	1046	0.05	60	2	0.36	1.3	0.5	12	TYPE 3
Catchment 2	1.17	1046	0.05	80	2	0.41	1.3	0.5	14	TYPE 3
Yerong Creek Yard Clearances										
Catchment 1	3.94	1046	0.05	80	2	0.41	1.3	0.5	14	TYPE 3
The Rock Yard Clearances										
Catchment 1	0.04	1046	0.05	20	2	0.24	1.3	0.5	8	TYPE 3
Catchment 2	0.02	1046	0.05	20	2	0.24	1.3	0.5	8	TYPE 3
Uranquinty Yard Clearances										
Catchment 1	2.2	1091	0.05	100	2	0.44	1.3	0.5	16	TYPE 3
Catchment 2	1.7	1091	0.05	100	2	0.44	1.3	0.5	16	TYPE 3
Pearson Street Bridge										
Catchment 1	1.21	1091	0.05	80	2	0.41	1.3	0.5	15	TYPE 3
Catchment 2	1.84	1091	0.05	80	2	0.41	1.3	0.5	15	TYPE 3
Cassidy Parade Pedestrian Bridge										
Catchment 1	1.48	1091	0.05	100	2	0.44	1.3	0.5	16	TYPE 3
Edmonson Street Bridge										
Catchment 1	2.13	1091	0.05	80	2	0.41	1.3	0.5	15	TYPE 3
Wagga Wagga Station Pedestrian Bridge										
Catchment 1	1.32	1091	0.05	80	2	0.41	1.3	0.5	15	TYPE 3
Wagga Wagga Yard Clearances										
Catchment 1	1.43	1091	0.05	80	2	0.41	1.3	0.5	15	TYPE 3
Bomen Yard Clearances										
Catchment 1	2.25	1091	0.05	100	2	0.44	1.3	0.5	16	TYPE 3
Harefield Yard Clearances										
Catchment 1	2.32	1091	0.05	100	2	0.44	1.3	0.5	16	TYPE 3
Kemp Street Bridge										
Catchment 1	3.39	1091	0.05	100	2	0.44	1.3	0.5	16	TYPE 3
Junee Station Pedestrian Bridge										
Catchment 1	0.05	1091	0.05	20	2	0.24	1.3	0.5	9	TYPE 3
Junee Yard Clearances										
Catchment 1	0.81	1091	0.05	40	2	0.31	1.3	0.5	11	TYPE 3
Olympic Highway Underbridge										
Catchment 1	4.56	1091	0.05	100	2	0.44	1.3	0.5	16	TYPE 3
Junee to Illabo Clearances										
Catchment 1	4.38	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 3
Catchment 2	1.98	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 4
Catchment 3	4,23	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 5
Catchment 4	9.65	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 6
Catchment 5	4.23	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 7
Catchment 6	5.04	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 8
Catchment 7	1.4	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 9
Catchment 8	1.03	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 10
Catchment 9	2.8	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 11
Catchment 10	4.79	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 12
Catchment 11	2.9	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 13
Catchment 12	0.79	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 14
Catchment 13	2.67	1091	0.05	80	3	0.65	1.3	0.8	37	TYPE 15

DRAIN AND BUND SIZING

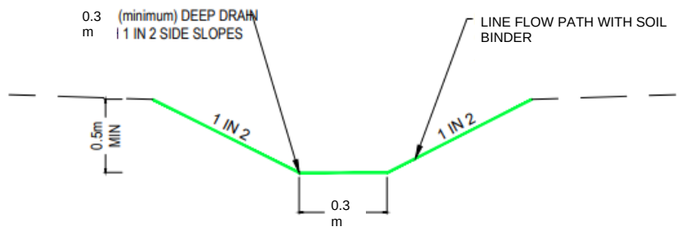
DRAIN/BUND ID	AREA (HA)	ARI	C_{ARI}	TIME OF CONC (mins)	I_{ARI}	FLOW - Q (m^3/s)	LONG. SLOPE (m/m)	BASE WIDTH	SIDE SLOPE 1 (1 in x)	SIDE SLOPE 2 (1 in x)	LINING	MANNING ROUGH COEFF	MAX PERM VEL (m/s)	DESIGN VEL (m/s)	DEPTH OF FLOW (m)	DEPTH WITH F/BOARD (m)	DRAIN TOP WIDTH (m)	OK / NOT OK
Bund <1HA <1% Slope	1	10	0.48	10	39.9	0.05	0.01	0	2	20	Soil Binder	0.02	1.5	0.8	0.08	0.23	5.01	OK
Bund <1HA <3% Slope	1	10	0.48	10	39.9	0.05	0.03	0	2	20	Soil Binder	0.02	1.5	0.93	0.07	0.22	4.89	OK
Bund <1HA <5% Slope	1	10	0.48	10	39.9	0.05	0.05	0	2	20	Soil Binder	0.02	1.5	1.12	0.07	0.22	4.74	OK
Bund <2HA <1% Slope	2	10	0.48	10	39.9	0.11	0.01	0	2	20	Soil Binder	0.02	1.5	0.96	0.10	0.25	5.51	OK
Bund <2HA <3% Slope	2	10	0.48	10	39.9	0.11	0.03	0	2	20	Soil Binder	0.02	1.5	1.12	0.09	0.24	5.35	OK
Bund <2HA <5% Slope	2	10	0.48	10	39.9	0.11	0.05	0	2	20	Soil Binder	0.02	1.5	1.35	0.08	0.23	5.16	OK
Bund <3HA <1% Slope	3	10	0.48	10	39.9	0.16	0.01	0	2	20	Soil Binder	0.02	1.5	1.06	0.12	0.27	5.88	OK
Bund <3HA <3% Slope	3	10	0.48	10	39.9	0.16	0.03	0	2	20	Soil Binder	0.02	1.5	1.23	0.11	0.26	5.69	OK
Bund <3HA <5% Slope	3	10	0.48	10	39.9	0.16	0.05	0	2	20	Soil Binder	0.02	1.5	1.49	0.10	0.25	5.47	OK
Drain <1HA <1% Slope	1	10	0.48	10	39.9	0.05	0.01	0.60	2	2	Soil Binder	0.02	1.5	1.03	0.07	0.22	1.48	OK
Drain <1HA <3% Slope	1	10	0.48	10	39.9	0.05	0.03	0.60	2	2	Soil Binder	0.02	1.5	1.18	0.06	0.21	1.45	OK
Drain <1HA <5% Slope	1	10	0.48	10	39.9	0.05	0.05	0.60	2	2	Soil Binder	0.02	1.5	1.40	0.05	0.20	1.41	OK
Drain <2HA <1% Slope	2	10	0.48	10	39.9	0.11	0.01	0.60	2	2	Soil Binder	0.02	1.5	1.29	0.10	0.25	1.61	OK
Drain <2HA <3% Slope	2	10	0.48	10	39.9	0.11	0.03	0.60	2	2	Soil Binder	0.02	1.5	1.49	0.09	0.24	1.57	OK
Drain <2HA <5% Slope	2	10	0.48	10	39.9	0.11	0.05	0.60	2	2	Soil Binder	0.02	2.5	1.77	0.08	0.23	1.52	OK
Bund <3HA <1% Slope	3	10	0.48	10	39.9	0.16	0.01	0.60	2	2	Soil Binder	0.02	1.5	1.46	0.13	0.28	1.71	OK
Bund <3HA <3% Slope	3	10	0.48	10	39.9	0.16	0.03	0.60	2	2	Soil Binder	0.02	2.5	1.68	0.11	0.26	1.66	OK
Bund <3HA <5% Slope	3	10	0.48	10	39.9	0.16	0.05	0.60	2	2	Soil Binder	0.02	2.5	2.01	0.10	0.25	1.60	OK

STANDARD DRAINAGE TYPES

Drain/Bund Type	Description
Bund <1HA	<5% Grade: 0.5m High - Vital HR @ L/m2
Bund <2HA	
Bund <3HA	
Drain <1HA	<5% Grade: 0.6m base width, 0.3m deep - Vital HR @ L/m2
Drain <2HA	
Drain <3HA	



DIVERSION BERM - TYPICAL DETAIL



DIVERSION DRAIN - TYPICAL DETAIL

REVISION	DESCRIPTION	APPROVED	DATE
A	ORIGINAL ISSUE	SS	22/01/2025

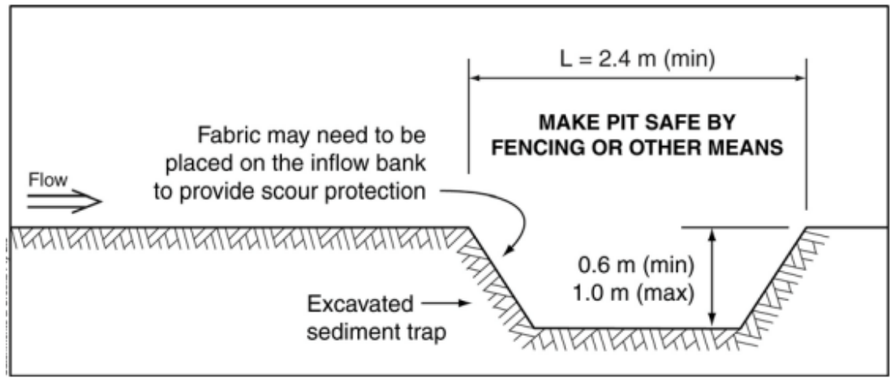
MARTINUS
TREESTONE ENVIRONMENTAL

CLIENT: MARTINUS
DRAWN: SS | DESIGNED: SS | DATE: 22/01/2025
CPESC CERTIFICATION: APPROVED, Sarah Steel, CPESC 7317

PROJECT: A2I ENHANCEMENT WORKS
DRAWING TITLE: EROSION RISK ASSESSMENT AND CALCULATIONS
PROJECT No:
DRAWING No: A2I-OESCP-004
REV: A

STANDARD DRAWINGS

TYPE 2 CONTROL SIZING		
TYPE 2 CONTROL	CATCHMENT (HA)	REQUIRED PONDING AREA (m^2)
RFD	1	1.4
RFD	2	2.8
RFD	3	4

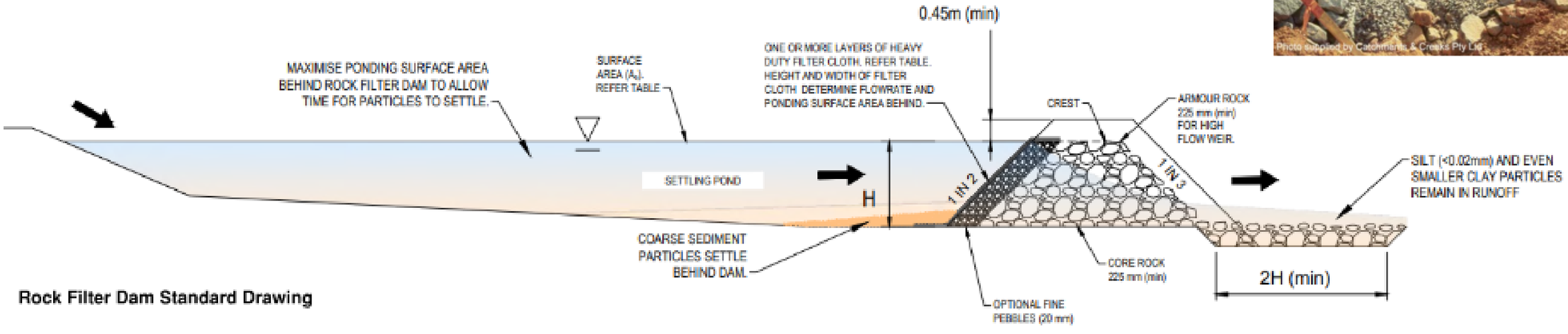


Excavated Sediment Trap Standard Drawing


Photo supplied by Catchments & Creeks Pty Ltd

Rock Filter Dam Notes

1. Design surface area based on critical sediment size for 0.05mm for Type 2
2. Design flow of 0.5 x Q1 critical storm
3. Includes allowance for turbulent inflow (20%)
4. Surface area must be able to pond run-off and can include that available behind bunds or within temporary storages



Rock Filter Dam Standard Drawing

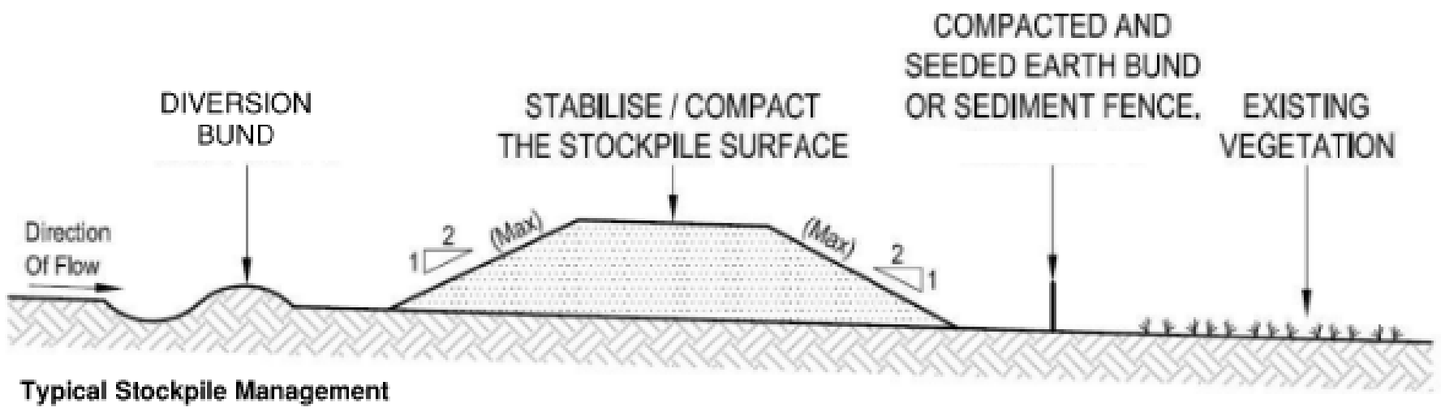
REVISION	DESCRIPTION	APPROVED	DATE
A	ORIGINAL ISSUE	SS	22/01/2025

MARTINUS
TREESTONE ENVIRONMENTAL

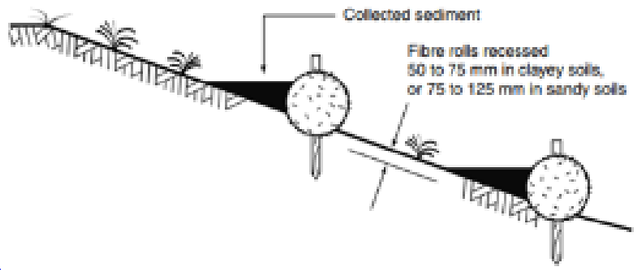
CLIENT: MARTINUS
DRAWN: SS | DESIGNED: SS | DATE: 22/01/2025
CPESC CERTIFICATION: APPROVED, Sarah Steel, CPESC 7317

PROJECT: A2I ENHANCEMENT WORKS
DRAWING TITLE: STANDARD DRAWINGS
PROJECT No:
DRAWING No: A2I-OESCP-005
REV: A

STANDARD DRAWINGS



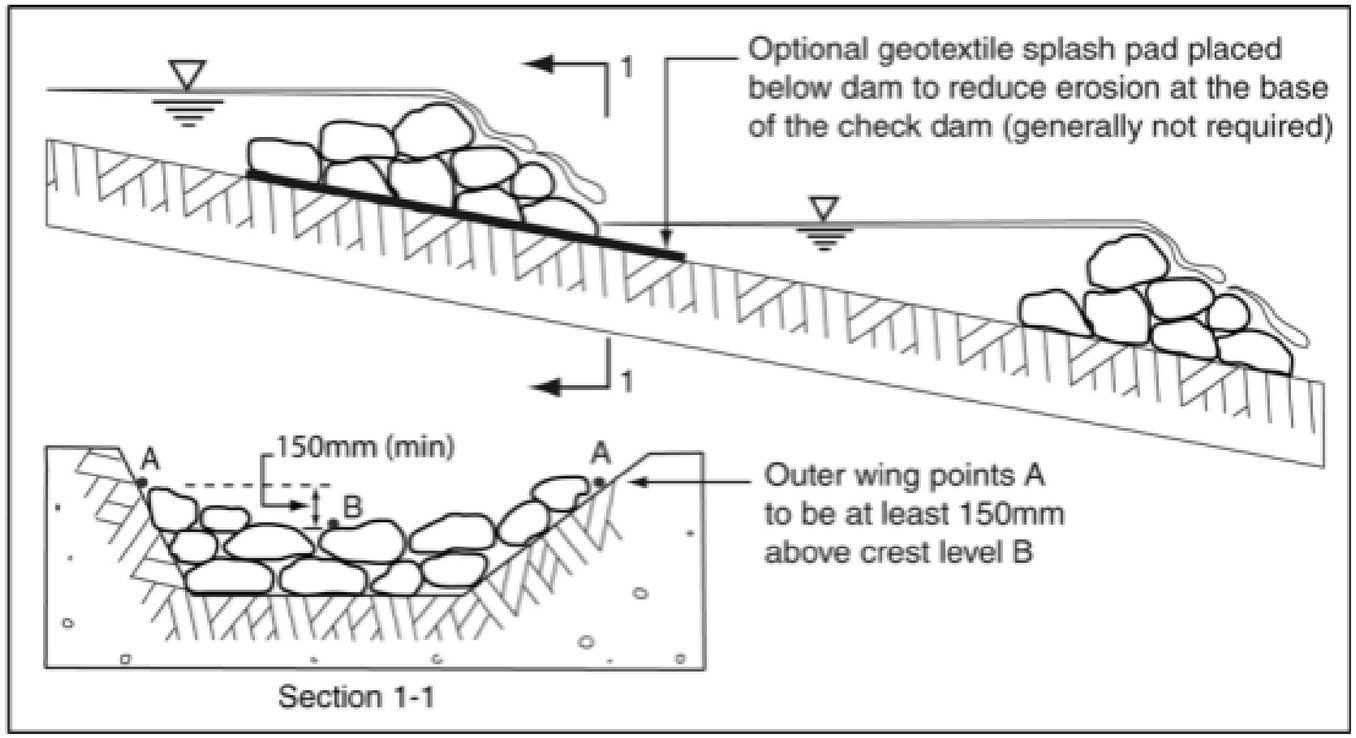
Typical Stockpile Management



Typical installation of coir logs



Coir log sediment trap and coir log velocity control in drainage lines



Check Dam Sediment Trap

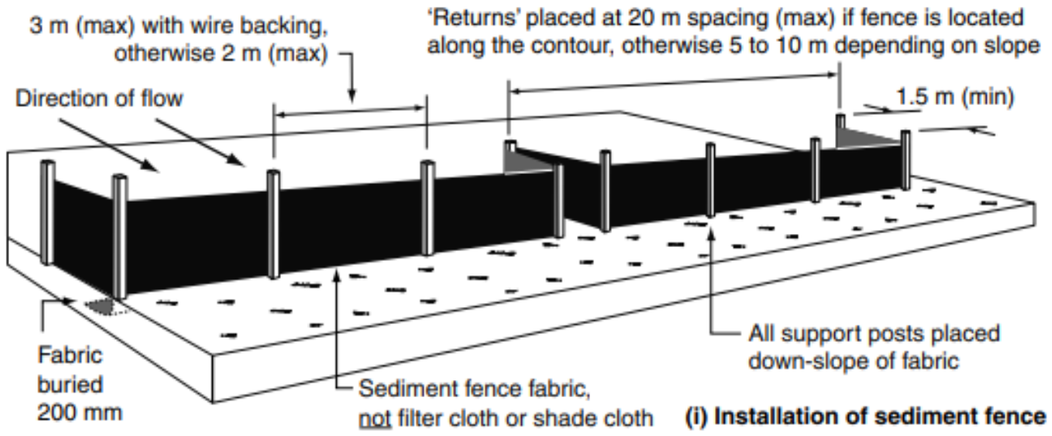
REVISION	DESCRIPTION	APPROVED	DATE
A	ORIGINAL ISSUE	SS	22/01/2025

MARTINUS
TREESTONE ENVIRONMENTAL

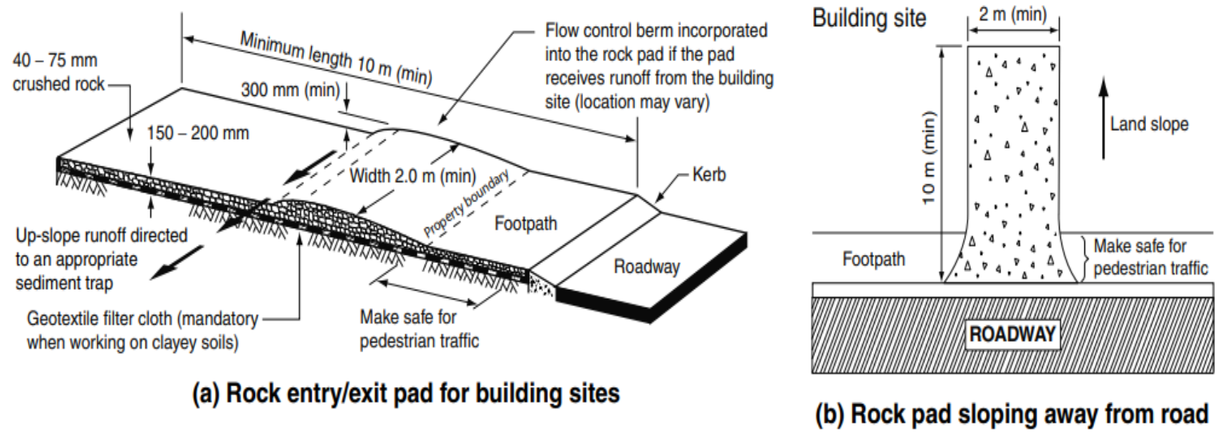
CLIENT: MARTINUS
DRAWN: SS | DESIGNED: SS | DATE: 22/01/2025
CPESC CERTIFICATION: APPROVED, Sarah Steel, CPESC 7317

PROJECT: A2I ENHANCEMENT WORKS
DRAWING TITLE: STANDARD DRAWINGS
PROJECT No:
DRAWING No: A2I-OESCP-006
REV: A

STANDARD DRAWINGS

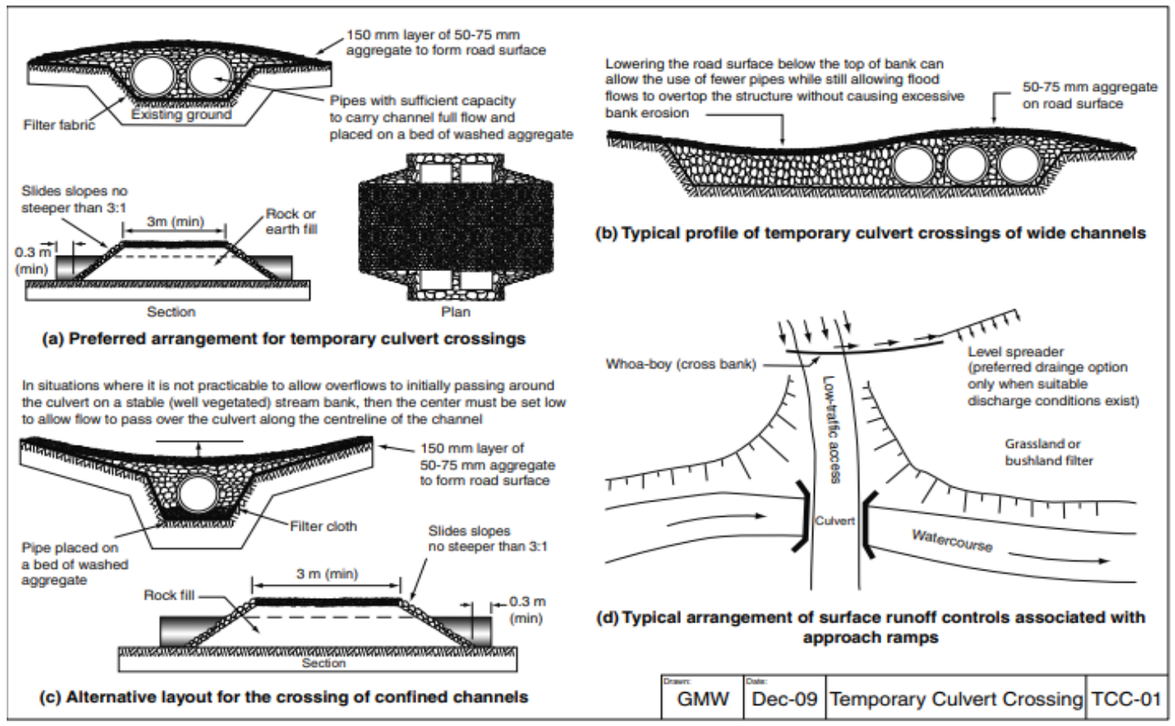


Sediment Fence Installation Standard Detail



Stabilised Entry/Exit Standard Detail

Application of Surface Roughening on slope



REVISION	DESCRIPTION	APPROVED	DATE
A	ORIGINAL ISSUE	SS	22/01/2025

MARTINUS
TREESTONE ENVIRONMENTAL

CLIENT: MARTINUS
DRAWN: SS | DESIGNED: SS | DATE: 22/01/2025
CPESC CERTIFICATION: APPROVED, Sarah Steel, CPESC 7317

PROJECT: A2I ENHANCEMENT WORKS
DRAWING TITLE: STANDARD DRAWINGS
PROJECT No:
DRAWING No: A2I-OESCP-007
REV: A



MARTINUS

Head Office | 3B, 33-35 Belmont Street | SUTHERLAND NSW 2232