

Construction Biodiversity Management Sub-Plan

Narrabri to North Star (N2NS)

2600-0018 N2NS SP1
SUBMISSION BY TRANS4M RAIL

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Document Control

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Revision History

REVISION	DATE ISSUED	DESCRIPTION
A	08/10/2020	Issued for Internal Review
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C	18/01/2021	Amended to address comments
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1	20/08/2021	Updated to include mitigation measures for the Five-clawed Worm Skink
2	23/12/2021	Updated to include Five-clawed Worm-skink protocol, description of mitigation measures and reporting requirements (Section 5, Section 6 and Appendix I)
3	06/01/2022	Updated to address comments from Biodiversity, Conservation and Science Directorate, Department of Planning, Industry and Environment and the Department of Agriculture, Water and Environment regarding changes made in Rev 2
4	21/09/2022	Updated to include the requirements of the document titled "INLAND RAIL – NARRABRI TO NORTH STAR PHASE 1: FIVE-CLAWED WORM SKINK (<i>Anomalopus mackayi</i>) CONSTRUCTION SPECIES MANAGEMENT PLAN", specifically Sections 3.0, 5.2 and 7.0.
5	28/02/2023	Updated to facilitate changes made to the document titled "INLAND RAIL – NARRABRI TO NORTH STAR PHASE 1: FIVE-CLAWED WORM SKINK (<i>Anomalopus mackayi</i>) CONSTRUCTION SPECIES MANAGEMENT PLAN" Rev. 2 (dated 23/12/2022).

6	16/06/2023	Reviewed, with minor changes made.
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Compliance Matrix

Table 1: EPBC Conditions of Approval

CONDITION REFERENCE	REQUIREMENTS	WHERE ADDRESSED
PART A CONDITIONS SPECIFIC TO THE ACTION		
1(a)	Implement conditions C4 and C9 of Part C, Schedule 2 of the State Infrastructure approval, of where they relate to monitoring, managing, avoiding, mitigating, offsetting, recording or reporting on, impacts to protected matters, with the exception of C9(a)	CEMP
1(b)	Ensure that the Weed Management Plan included in the Biodiversity Sub plan required under condition C9 of Part C, Schedule 2 of the State Infrastructure approval, includes appropriate weed control measures to prevent the introduction and/or spread of weeds from construction areas to any retained area of Belsons Panic (<i>Homopholis belsonii</i>), Natural Grassland on Basalt and Fine Textured Alluvial Plains of Northern New South Wales and Southern Queensland, Brigalow (<i>Acacia harpophylla</i> dominant and co dominant) and Weeping Myall Woodlands ecological communities.	BMP - Appendix A
1(c)	Implement biodiversity conditions E17-E21 and E23-E26 of Part E Schedule 2 of the State Infrastructure approval, where they relate to monitoring, managing, minimising, reducing, avoiding, mitigating, offsetting, recording, or reporting on, impacts to protected matters.	CEMP and BMP
1(d)	For any aspect of the action, for the period of which the approval has effect, the approval holder must not exceed the maximum impacts to protected matters specified under the State Infrastructure approval.	CEMP
PART B- STANDARD ADMINISTRATIVE CONDITIONS		
2	The approval holder must notify the Department in writing of the date of commencement of the action within 10 business days after the date of commencement of the action	CEMP
4	The approval holder must maintain accurate and complete compliance records.	CEMP - Section 8
5	If the Department makes a request in writing, the approval holder must provide electronic copies of compliance records to the Department within the timeframe specified in the request.	CEMP - Section 8
Annual Compliance Reporting		
6	The approval holder must prepare a compliance report for each 12 month period following the date of commencement of the action, or otherwise in accordance with the annual date that has been agreed with in writing by the Minister. The approval holder must: <ul style="list-style-type: none"> a) Publish each compliance report on the website within 60 business days following the relevant 12 month period; b) Notify the Department by email that a compliance report has been published on the website and provide the weblink for the compliance report within five business days of the date of publication; and c) Keep all compliance reports publicly available on the website until this approval expires. 	CEMP - Section 8
Reporting non-compliance		
7	The approval holder must notify the Department in writing of any: incident, non-compliance with the conditions of this approval; or non-compliance with the commitments made in any element of the Construction Environmental Management Plan, (required under	CEMP - Section 9

CONDITION REFERENCE	REQUIREMENTS	WHERE ADDRESSED
	<p>Part C- State Infrastructure approval) referred to in condition 1. The notification must be given as soon as practicable, and not later than two business days after becoming aware of the incident or non-compliance. The notification must specify:</p> <ul style="list-style-type: none"> a) Any condition which is or may be in breach; b) A short description of the incident and/or non-compliance; and c) The location (including co-ordinates), date and time of the incident and/or non-compliance. In the event the exact information cannot be provided, provide the best information available. 	
8	<p>The approval holder must notify the Department in writing of any: incident, non-compliance with the conditions of this approval; or non-compliance with the commitments made in any element of the Construction Environmental Management Plan, (required under Part C- State Infrastructure approval) referred to in condition 1. The notification must be given as soon as practicable, and not later than two business days after becoming aware of the incident or non-compliance specifying:</p> <p>Any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future</p> <p>The potential impacts of the incident or non-compliance; and</p> <p>The method and timing of any remedial action that will be undertaken by the approval holder.</p>	CEMP - Section 9

Table 2: Minister's Conditions of Approval

REQUIREMENT REFERENCE	DETAILS	WHERE ADDRESSED
A1	<p>The CSSI may only be carried out in accordance with the terms of this approval and generally in accordance with the description of the CSSI in the Inland Rail – Narrabri to North Star Environmental Impact Statement, Volumes 1-7 (prepared by GHD and dated November 2017), the Inland Rail – Narrabri to North Star Submissions Preferred Infrastructure Report (ARTC, dated December 2019) and (updated BDAR, RtS on the SPIR and RFI responses).</p>	CEMP - Section 1
A2	<p>The CSSI must be carried out in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the documents listed in Condition A1 unless otherwise specified in, or required under, this approval.</p>	CEMP - Section 5
A3	<p>In the event of an inconsistency between the documents listed in Condition A1 or any other document required under this approval, and a term of this approval, the term of this approval prevails to the extent of the inconsistency.</p> <p>Note: For the purpose of this condition, there will be an inconsistency between a term of this approval and any document if it is not possible to comply with both the term and the document.</p>	CEMP - Section 5
A4	<p>The Proponent must comply with the written requirements or directions of the Planning Secretary, including in relation to:</p> <ul style="list-style-type: none"> a) the environmental performance of the CSSI; b) any document or correspondence under the terms of this approval in relation to the CSSI (including the provision of such documentation or correspondence); c) any independent appointment or dismissal made in relation to the CSSI; d) any notification given to the Planning Secretary under the terms of this approval; e) any audit of the construction or operation of the CSSI; 	CEMP - Section 5

	<ul style="list-style-type: none"> f) the terms of this approval and compliance with the terms of this approval (including anything required to be done under this approval); g) the carrying out of any additional monitoring or mitigation measures; and h) in respect of ongoing monitoring and management obligations, compliance with an updated or revised version of a guideline, protocol, Australian Standard or policy required to be complied with under this approval. 							
A5	<p>Where the terms of this approval require a document or monitoring program to be prepared or a review to be undertaken in consultation with identified parties, evidence of the consultation undertaken must be submitted to the Planning Secretary with the document. The evidence must include:</p> <ul style="list-style-type: none"> -documentation of the engagement with the party identified in the condition of approval that has occurred before submitting the document for approval -a log of the dates of engagement or attempted engagement with the identified party and a summary of the issues raised by them -documentation of the follow-up with the identified party where engagement has not occurred to confirm that they do not wish to engage or have not attempted to engage after repeated invitations -outline of the issues raised by the identified party and how they have been addressed -a description of the outstanding issues raised by the identified party and the reasons why they have not been addressed. 	CEMP - Section 8						
A6	<p>Any document that must be submitted, or approval that must be obtained, within a timeframe specified in or under the conditions of this approval may be submitted within a later timeframe agreed with the Planning Secretary. This condition does not apply to the immediate written notification required in respect of an incident under Condition A41. The Proponent must provide supporting evidence so that the Secretary can consider the need, environmental impacts and consistency of any request.</p> <p>Note: Inaction and/or expedience will not be supported as justifications for need unless it can be demonstrated that there are beneficial environmental impacts associated with the request.</p>	CEMP - Section 8						
A16	<p>Ancillary facilities that are not identified by description and location in the EIS; can only be established and used in each case if:</p> <ul style="list-style-type: none"> (c) they have no impacts on heritage items (including areas of archaeological sensitivity), threatened species, populations or ecological communities beyond the impacts approved under the terms of this approval. 	CEMP						
A21	<p>Facilities including lunch sheds, office sheds, material lay down sites, stockpile areas, areas used to assemble infrastructure, and portable toilet facilities can be established and operated where they satisfy the following criteria:</p> <ul style="list-style-type: none"> iii) no impacts on biodiversity, soil and water, and heritage items beyond those already approved under other terms of this approval. 	CEMP						
C4	<p>The following CEMP Sub-plans must be prepared in consultation with the relevant government agencies and relevant Councils identified for each CEMP Sub-plan and be consistent with the CEMP referred to in the EIS.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;"></th> <th style="width: 40%;">REQUIRED CEMP SUB-PLAN</th> <th style="width: 50%;">RELEVANT GOVERNMENT AUTHORITIES TO BE CONSULTED FOR EACH CEMP SUB-PLAN</th> </tr> </thead> <tbody> <tr> <td>(c)</td> <td>Biodiversity</td> <td>EES, DAWE and relevant councils</td> </tr> </tbody> </table>		REQUIRED CEMP SUB-PLAN	RELEVANT GOVERNMENT AUTHORITIES TO BE CONSULTED FOR EACH CEMP SUB-PLAN	(c)	Biodiversity	EES, DAWE and relevant councils	This BMP
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(c)	Biodiversity	EES, DAWE and relevant councils						
C5	<p>The CEMP Sub-plans Listed in Condition C4 must state how:</p> <ul style="list-style-type: none"> a) the environmental performance outcomes identified in the documents listed in Condition A1, as modified by these conditions, will be achieved; b) the mitigation measures identified in the documents listed in Condition A1, as modified by these conditions will be implemented; c) the relevant terms of this approval will be complied with; and 	This BMP						

	d) issues requiring management during construction (including coordination of concurrent activities of other projects as well as concurrent activities in this CSSI), as identified through ongoing environmental risk analysis, will be managed.													
C6	The CEMP Sub-plans must be developed in consultation with relevant parties identified in Condition C4 . Details of all information requested by an agency to be included in a CEMP Sub-plan as a result of consultation, including copies of all correspondence from those agencies, must be provided with the relevant CEMP Sub-plan .	Section 4 of the CEMP												
C7	Any of the CEMP Sub-plans may be submitted to the Secretary along with, or subsequent to, the submission of the CEMP , but in any event, no later than one (1) month prior to construction.	Noted												
C9	The Biodiversity Management Sub-plan must include: <ul style="list-style-type: none"> a) a weed management plan, including appropriate weed control to manage introduction and/or spread of weeds from construction areas to any retained Weeping Myall Woodlands TEC, and appropriate protocols to demonstrate compliance with the requirements of the <i>Biosecurity Act 2015</i> and <i>Biosecurity Regulation 2017</i>; b) procedures for pre-clearing surveys for threatened species to be undertaken by a suitably qualified and experienced ecologist, including survey and relocation methodologies and management/offset measures; c) measures to control cane toads, as relevant to the construction phase areas and scope in accordance with the Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (relevant to works adjacent to retained Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant) TEC and Weeping Myall Woodlands TEC); and d) measures to protect <i>EPBC Act</i> listed threatened species, in particular the koala, and threatened ecological communities. 	Appendix A, (Pest and Weed Management Plan) and Section 5												
C13	Construction must not commence until the CEMP and all CEMP Sub-plans have been approved by the Secretary. The CEMP and CEMP Sub-plans, as approved by the 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 Secretary.	CEMP-Section 2												
E17	The Proponent must minimise impacts to plant community types and not exceed the total areas impacted as identified in Table E1. Table E1: Native Vegetation Impacted <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">VEGETATION ZONE AND PLANT COMMUNITY TYPE (PCT) ID AND NAME</th> <th style="text-align: left;">TEC UNDER THE EPBC ACT (HA)</th> <th style="text-align: left;">TOTAL AREA IMPACTED (HA)</th> </tr> </thead> <tbody> <tr> <td>Zone 1 - PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion</td> <td><i>Weeping Myall Woodlands</i> – 9.16</td> <td>17.94</td> </tr> <tr> <td>Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion</td> <td><i>Brigalow (Acacia harpophylla dominant and codominant)</i> – 16.13</td> <td>17.31</td> </tr> <tr> <td>Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion</td> <td><i>Coolabah - Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions</i> – 1.74</td> <td>1.74</td> </tr> </tbody> </table>	VEGETATION ZONE AND PLANT COMMUNITY TYPE (PCT) ID AND NAME	TEC UNDER THE EPBC ACT (HA)	TOTAL AREA IMPACTED (HA)	Zone 1 - PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	<i>Weeping Myall Woodlands</i> – 9.16	17.94	Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	<i>Brigalow (Acacia harpophylla dominant and codominant)</i> – 16.13	17.31	Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	<i>Coolabah - Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions</i> – 1.74	1.74	Sections 4 and 5
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	Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	<i>Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern NSW and Southern Qld – 432.07</i>	432.07	
	Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Not listed	143.95	
	Zone 6 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Derived - Native Grasslands)	Not listed	249.85	
	Zone 7 - PCT71 (BR127, NA126) Carbeen – White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and aeolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion	Not listed	0.51	
	Zone 8 - PCT 78 River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Not listed	11.82	
	Zone 9 - PCT 135 Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Not listed	9.50	
	Zone 10 - PCT 413 Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	Not listed	5.72	
	Total Area Impacted	459.10	890.41	
E22	Prior to vegetation clearing, the Proponent must consult with community and landcare groups and government agencies to determine if retained timber and root balls can be reused in habitat enhancement and rehabilitation work, before pursuing other disposal options. The retained timber and root balls may be used on or off the CSSI site.			Section 2 CEMP – Appendix F Biodiversity, Flora and Fauna ECM

Table 3: RMMs

REQUIREMENT REFERENCE	DETAILS	WHERE ADDRESSED
BIODIVERSITY		
C3.1 General Biodiversity Impacts	<p>A biodiversity management sub-plan would be prepared and implemented as part of the CEMP. It would include measures to minimise the potential for biodiversity impacts. The sub-plan would address, as outlined below:</p> <ul style="list-style-type: none"> ▶ a pre-clearing survey and tree-felling procedure ▶ procedures to manage micro-bats ▶ avoiding impacts on surrounding vegetation (item C3.2) ▶ weed management (item C3.3) ▶ dewatering of standing pools in watercourses 	This BMP

	▶ measure to minimise impacts on aquatic ecology.	
C3.2 Avoidance of impacts – terrestrial and aquatic biodiversity	Areas of biodiversity value outside the preferred infrastructure site would be fenced or signposted, where appropriate, to prevent the unnecessary disturbance during the construction phase.	Section 5
C3.3 Weed Management	Priority weeds would be managed in accordance with the Biosecurity Act 2015. Weeds of national environmental significance would be managed in accordance with the Weeds of National Significance Weed Management Guide. Any herbicides would be applied such that impacts on surrounding agricultural properties are avoided.	Appendix A Pest and Weed Management Plan Appendix E TARP
C3.4 Rehabilitation	Rehabilitation of disturbed areas would be undertaken progressively and in accordance with the rehabilitation strategy	SWMP

Table 4: SEARs Environmental Performance Outcomes

REQUIREMENT REFERENCE	DETAILS	WHERE ADDRESSED
6 Biodiversity	Offsets and/or supplementary measures are assured which are equivalent to any remaining impacts of project construction and operation.	Noted; (managed by ARTC)

Glossary

ACRONYM / ABBREVIATION	DEFINITION
AMS	Activity Method Statement
ARTC	Australian Rail Track Corporation
BMP	Biodiversity Management Plan
BOS	Biodiversity Offset Strategy
CAD	Computer-Aided Design
CEMP	Construction Environmental Management Plan
CIZ¹	Construction Impact Zone
CoA	Conditions of Approval
CSEMP	Community and Stakeholder Engagement Management Plan
CSSI	Critical State Significant Infrastructure
DBH	Diameter at Breast Height
DPIE	Department of Planning Industry and Environment
ECM	Environmental Control Map
ECP	Environmental Control Plan
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	Environmental Protection Authority
EPBC	Environmental Protection and Biodiversity Conservation Act
EPL	Environment Protection Licence
EPO	Environmental Performance Objective
EP&A	Environmental Planning and Assessment Act (1979)
ER	Environment Representative
ESCP	Progressive Erosion and Sediment Control Plan
FCWS	Five-clawed Worm Skink
GIS	Geographic Information System
GMR	Global Mandatory Requirement
HSEQS	Health, Safety, Environment, Quality and Sustainability
IMS	Integrated Management System
IR	Inland Rail
ISCA	Infrastructure Sustainability Council of Australia
N2NS	Narrabri to North Star (Separable Portion 1)
PWMP	Pest and Weed Management Plan
REMM	Revised Environmental Management Measure
RTS	Response to Submissions
SEARs	Secretary's Environmental Assessment Requirements
SEMP	Site Establishment Management Plan
SEP	Site Environmental Plan
SPIR	Submissions Preferred Infrastructure Report
SuMP	Sustainability Management Plan

ACRONYM / ABBREVIATION	DEFINITION
TEC	Threatened Ecological Community
TARP	Trigger Action Response Plan
TPZ	Tree Protection Zone
TRA	Task Risk Assessment
TfNSW	Transport for NSW
WIRES	Wildlife Rescue 1300 094 737 info@wires.org.au
WRA	Workplace Risk Assessment

NOTE:

1. For the purposes of this sub-plan; the project area, proposal site, study area, development footprint or construction footprint are general terms to refer to the area or site assessed and approved via the Project EIS and SPIR. Throughout the detailed design and construction phase, this footprint is referred to as the Construction Impact Zone (CIZ) which will undergo refinements and changes in accordance with Section 3.3 of this BMP.

1 Introduction

1.1 Purpose and Scope

This Construction Biodiversity Management Plan (BMP) forms part of the Construction Environmental Management Plan (CEMP) for the Narrabri to North Star (Separable Portion 1) (N2NS) Project and details the key management and mitigation measures that will be implemented by Trans4m Rail in order to minimise and manage the potential construction impacts on flora and fauna during the N2NS project. Construction of N2NS will have impacts on flora and fauna listed under both Commonwealth and NSW legislation.

This BMP addresses the relevant requirements of the Project Approval and all applicable guidelines and standards specific to biodiversity during the Project. It has been developed based on the findings of the Environmental Impact Statement (EIS) and the Submissions Preferred Infrastructure Report (SPIR) and describes how construction impacts on flora and fauna can be avoided, minimised and managed.

The BMP is consistent with the ARTC Inland Rail Environment and Sustainability Policy, ARTC Environmental Policy and Trans4m Rail's Environment Policy (Appendix B in the CEMP). In accordance with Condition of Approval (CoA) C9 (a), the pest and weed management plan for the project can be found in Appendix A.

Construction will not commence until the CEMP and sub-plans and the Construction Monitoring Programs are endorsed by the Environmental Representative (ER) and approved by the Secretary of the Department of Planning, Industry and Environment (DPIE). The CEMP and Construction Monitoring Programs will be submitted to the Secretary for approval no later than one month prior to the commencement of construction as required by CoAs C7 and C17.

The key objective of this BMP is to ensure that all CoAs, Revised Environmental Management Mitigation Measures (RMMs) and licence/permit requirements relevant to flora and fauna are adhered to, thus protecting biodiversity environmental values.

1.2 Objectives and Targets

The key objective of this BMP is to ensure that all legislative and licence/permit requirements (i.e. EPBC Act, CoA's, SPIR, RMMs and Project EIS) relevant to biodiversity are adhered to, thus protecting biodiversity values of the site and surrounds. Biodiversity management objectives and targets are outlined in Table 1.

Environmental objectives and targets for construction of the N2NS have been established as a means of guiding environmental management of the project and assessing environmental performance. These objectives and targets have been developed with consideration of key biodiversity issues identified through the environmental assessment and risk assessment process as well as the CoAs and RMMs.

The objectives and targets are consistent with Trans4m Rail's Environment Policy and will assist in monitoring whether the commitments of the policy are being met. The performance of the Project will be monitored against the objectives and targets. Project performance monitoring will be documented in the Project construction compliance reports and at least on a quarterly basis as part of the management review.

Table 5: Objectives and Targets

OBJECTIVE	TARGET
Full compliance with and no breaches of the legislative requirements (i.e. EPBC Act, CoA's, SPIR, RMMs and Project EIS) relevant to the	Full implementation and 100% compliance with this Biodiversity Management Plan including the Appendix A Pest and Weed Management Plan.

OBJECTIVE	TARGET
construction phase of the Project.	
Impacts to plant community types will not exceed those identified in CoA E17 (Table E1).	<p>No clearing / disturbance of native vegetation will occur outside of the approved CIZ without prior approval as part of the consistency assessment process.</p> <p>A clearing tracking register will be established and updated throughout the project to include all native vegetation clearing impacts for the project to measure compliance with relevant CoAs.</p> <p>A reduction of the vegetation clearing requirements (i.e. total area impacted as detailed Table E1 of the CoA) will be reduced by at least 5% for the Project. The clearing tracking register will be utilised to manage this target.</p>
Prevent impacts to sensitive biodiversity areas associated with the project site	<p>Develop a site Environmental Control Map for 100% of sites showing sensitive biodiversity areas (threatened species habitat/ TECs, weed infestations) and clearly identifying construction boundaries and No-Go Zones.</p> <p>Sensitive biodiversity areas (threatened species habitat/ TECs) occurring in proximity to the approved CIZ will be fenced and identified with appropriate signage to prevent inadvertent access/ impacts.</p>
Prevent terrestrial fauna mortality during the project	<p>Prior to clearing commencing project ecologists (or suitably trained environmental personnel) will complete pre-clearing surveys to identify/ relocate fauna within 100% of sites to be cleared. Relocation will be completed in accordance with the Fauna Handling Procedure (Appendix H).</p> <p>Prior to and during clearing capture / relocation of fauna will be undertaken within all areas of clearing by a suitably qualified and licensed fauna spotter catcher in accordance with the Fauna Handling Procedure (Appendix H).</p> <p>All (100%) hollow-bearing trees within the clearing boundary will be identified, marked and subject to a two-stage clearing process under the supervision of a qualified and licensed fauna spotter catcher to capture/ relocate native fauna present (refer to Appendix H Fauna Handling Procedure).</p> <p>All structures (culverts/ bridges) to be impacted by the project will be checked for microbats prior to demolition with ecologist guided management including capture/ relocation to be undertaken.</p> <p>Measures within trenches/ excavations will be implemented to avoid fauna entrapment.</p>
No fish kill events within waterways associated with the project site	<p>All pools in watercourses that would be impacted by the project will be subject to a dewatering procedure including capture/ relocation of native aquatic native fauna to be undertaken by a suitably qualified and experienced ecologist.</p> <p>Erosion/ sediment control measures will be implemented and maintained in accordance with the Progressive Erosion Sediment Control Plan (ESCP) to avoid sediment entering waterways.</p>
No increase in the abundance or distribution of pests or weeds currently existing within the project area as a result of construction activities.	<p>Undertake weekly environmental inspections to monitor the presence, abundance and types of pests and weed species present and record any new weed infestations or pest populations.</p> <p>Implement the weed hygiene protocol detailed in the Construction Pest and Weed Management Plan (Appendix A) including vehicle wash-down and weed hygiene declarations for all plant/ vehicles entering/ leaving the site.</p> <p>Any weed infestations recorded during the project will be controlled using herbicide application or manual removal.</p> <p>When working within or near an EEC, 100% of all workers will be inducted (including biodiversity risks) and attend a pre-start that details biodiversity risks.</p>

The implementation of mitigation measures will ensure the performance targets are achieved. This will be managed through project inductions, specialised training, toolbox talks, inspections, and environmental monitoring and auditing. Project inductions will inform Trans4m Rail personnel (including subcontractors) of the management measures, while toolbox talks, and specialised training will ensure they are reinforced throughout the construction program.

1.3 Environment Policy

Trans4m Rail believes that respect for the Project location, its surroundings and the communities in which it operates is essential for project success, as well as compliance with all environmental, heritage, sustainability and community requirements. This commitment is described in Trans4m Rail's Environment Policy which can be found in Appendix A of the CEMP.

1.4 Project Description

The N2NS Project is one of 13 projects that make up the Inland Rail Project. The route is within the Narrabri, Moree Plains and Gwydir Local Government Areas (LGAs) in north west NSW. N2NS extends approximately 171km from north of Narrabri Junction, terminating at North Star and the project is generally within the existing rail corridor. Works over the Gwydir Floodplain are excluded from the N2NS Project. This construct only contract will be delivered by Trans4m Rail (an unincorporated Joint Venture between SEE Civil Pty Ltd and John Holland Pty Ltd). Further detail on the project, including construction scope of works and construction schedule can be found in Section 2 of the CEMP.

2 Community and Stakeholder Engagement

Trans4m Rail's Community and Stakeholder Engagement Management Plan (CSEMP) provides a clear framework for active communication and stakeholder engagement management. The Plan outlines how Trans4m Rail will meet best practice community and project outcomes by keeping the community and other stakeholders informed, minimising potential impacts and responding to the needs and requirements of stakeholders. The CSEMP contains procedures and strategies to manage community and stakeholder engagement activities as they align to the Project delivery program. To the extent practicable, Trans4m Rail will provide stakeholders with open and transparent consultation. CoA A5 and C4 require that the BMP be prepared in consultation with:

- ▶ The Department of Planning, Infrastructure and Environment's (DPIE) Environment, Energy and Science (EES) group;
- ▶ Federal Department of Climate Change, Energy, Environment and Water (DCCEEW);
- ▶ Narrabri Shire Council;
- ▶ Moree Plains Shire Council; and
- ▶ Gwydir Shire Council.

As required by CoA C6, details of all information requested by an agency to be included in a CEMP Sub-plan as a result of consultation can be found in Appendix B. Appendix B also provides an assessment of where comments have been addressed in the BMP.

Comments have been received from DPE (EES), DCCEEW, Moree Plains Shire Council, Narrabri Shire Council and Gwydir Shire Council, refer to Appendix B for details.

As required under CoA E22, prior to clearing works commencing, Trans4m Rail will consult with community and landcare groups and government agencies to determine if retained timber and root balls can be reused in habitat enhancement and rehabilitation work, before pursuing other disposal options.

3 Legal and Compliance Requirements

This section details the relevant legal and compliance requirements for the N2NS project including the Minister's CoAs, RMMs and the Secretary's Environmental Assessment Requirements (SEARs) environmental performance outcomes (EPOs).

3.1 Legislation

Legislation relevant to biodiversity outcomes and management associated with construction of the project include the:

- ▶ *(Federal) Environment Protection and Biodiversity Conservation Act (1999);*
- ▶ *(State) Biodiversity Conservation Act (2016);*
- ▶ *(State) Fisheries Management Act (1994);*
- ▶ *(State) Biosecurity Act (2015);*
- ▶ *(State) Biosecurity Regulation (2017); and*
- ▶ *(State) Environmental Planning and Assessment Act 1979.*

Guidelines and standards relating to biodiversity management associated with construction of the project include:

- ▶ NSW – Legislation, Guidelines and Policies – Flora and Fauna Management Sub-plans (Australian Rail and Track Corporation Limited, 2020)
- ▶ Biodiversity Guidelines – Protecting and Managing Biodiversity on RTA Projects (Roads and Traffic Authority, 2011)
- ▶ Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (Department of the Environment, 2013)
- ▶ Guidelines for vegetation management plans on waterfront land (NSW Office of Water, 2012)
- ▶ Guidelines for controlled activities on waterfront land – riparian corridors (Department of Primary Industries, 2018)
- ▶ Why do Fish Need to Cross The Road? Fish Passage Requirements for Waterway Crossings. Fairfull and Witheridge (2003)
- ▶ Factsheet: Vehicle Biosecurity Kit – Plant Industries (Department of Primary Industries, 2012)
- ▶ Fauna Management Work Instruction (0-0000-900-EEC-00-WI-0004) (Inland Rail, 2019)
- ▶ Landscape and Rehabilitation Framework (0-0000-900-ELE-00-GU-0001) (Inland Rail, 2018)
- ▶ INLAND RAIL – NARRABRI TO NORTH STAR PHASE 1: FIVE-CLAWED WORM SKINK (*Anomalopus mackayi*) CONSTRUCTION SPECIES MANAGEMENT PLAN.

3.2 Conditions of Approval, Mitigation Measures and Performance Outcomes

As discussed in Section 4 of the CEMP, the N2NS project is a Controlled Action under the EPBC Act (1999) and a CSSI under the EP&A Act (1979). Under Section 45 of the EPBC Act (i.e. the bilateral agreement between the NSW and Federal Governments), the Project has been assessed by DPIE for both State and Federal approvals. The Project has been approved with conditions by both the NSW Minister for Planning and Public Spaces and the Federal Minister for Agriculture, Water and Environment. These conditions of approval relevant to the construction phase and where they have been addressed in this BMP can be found in the Compliance Matrix at the beginning of this document.

Biodiversity management and mitigation measures were identified in the EIS. Following consideration of the issues raised in the stakeholder and community submissions on the EIS and additional assessments undertaken, mitigation measures were updated and included in the SPIR. RMMs

relevant to biodiversity and where they have been addressed in this BMP can also be found in the Compliance Matrix at the beginning of this document.

The SEARs identified a number of desired environmental performance outcomes (EPOs) for the N2NS project. Based on the outcomes of the EIS and the implementation of the RMMs, EPOs have been established for the proposal. EPOs relevant to biodiversity and where they have been addressed in this BMP can also be found in the Compliance Matrix at the beginning of this document.

3.3 General Changes to the Project

As required by CoA A2, *“The CSSI must be carried out in accordance with all procedures, commitments, preventative actions, performance criteria and mitigation measures set out in the documents listed in Condition A1 unless otherwise specified in, or required under, this approval.”* Refinements to the Project may occur during detailed design or changed circumstances throughout construction. Design changes or changes in scope will be communicated to the Trans4m Rail Environment Manager either through formal change processes or via informal written communications. Proposed changes are to be assessed by Inland Rail for consistency against the approved Project.

For design/activity/work changes proposed by Trans4m Rail, the Environment Manager will undertake an assessment of the proposed changes for potential impacts and compare them to the proposed impacts for the assessed and approved Project. These changes would be managed through ARTC’s Consistency Assessment Work Instruction (Consistency Assessment Work Instruction - 0-0000-900-EEC-00-WI-0013). Any consistency assessment and associated report required by Trans4m Rail will include:

- ▶ A description of the approved development / activity / works
- ▶ A description of the proposed development / activity / works
- ▶ Justification for the proposed development / activity / works
- ▶ A description of the existing surrounding environment
- ▶ An assessment of the environmental impacts of the construction works, including, but not necessarily limited to traffic, noise and vibration, air quality, soil and water, ecology and heritage
- ▶ Any additional vegetation clearing requirements and specifically Project compliance with the vegetation clearing quantities detailed in Table E1 of the CoA
- ▶ Details of mitigation measures and monitoring specific to the proposed development / activity / works that would be implemented to minimise environmental impacts
- ▶ Identification of the timing for completion of the proposed development / activity / works and how the site/s would be reinstated
- ▶ Assessment of each component of the proposed development / activity / works to determine its’ consistency with the approved project; and
- ▶ Assessment of any other approvals that may be required for the proposed development / activity / works.

If the proposed design/activity/works are consistent with the approved project, the assessment would be submitted to the Environmental Representative (in accordance with CoA A29) and ARTC for determination. Written approval would be obtained prior to commencing the subject works.

If the proposed development/activity/works are inconsistent with the approved project, the proposed development/activity/works will be either:

- ▶ Modified to be consistent with the approved project; or
- ▶ The subject of a Planning Approval Modification process.

As N2NS is a CSSI project, changes that are not consistent with the Approval will require modification under Section 5.25 of the Environmental Planning & Assessment Act 1979 (EP&A Act) and

determination by the Minister for Planning. If required, the CEMP and management plans will be updated to incorporate any additional potential environmental impacts or management measures that resulted from the proposed change.

4 Environmental Risk Assessment

4.1 Existing Biological Environment

A summary of the key findings from the EIS and SPIR are outlined below. Further detail can be found in the N2NS EIS and associated Technical Report 2 (Biodiversity Assessment Report). Mapping of vegetation communities undertaken during the EIS process can be found in Appendix D. Appendix D also contains mapping of koala habitat within the Construction Impact Zone.

- ▶ The majority of the study area has been heavily modified by past and ongoing disturbances associated with the active rail corridor and surrounding rural and agricultural activities. Clearance and maintenance of the rail corridor has resulted in fragmentation, a high level of disturbance and degradation of vegetation communities within the rail corridor. The majority of the proposal site (69 per cent) is cleared or consists of non-native vegetation. Patches of native vegetation exist sporadically within and near the proposal site, and are typically associated with travelling stock reserves, road reserves, or farm woodland remnants.
- ▶ The project occurs in a landscape that is dominated by crop land and introduced pastures and contains only a small proportion of woodland and scattered tree cover. Patches of native woodland habitat exists sporadically and are typically associated with road verges or small woodland patches on farmland. As such, native fauna habitats within the project are minimal. No critical habitat listed under the *Biodiversity Conservation Act 2016* (BC Act) occurs within the project area.
- ▶ 890.41 ha of native plant community types (including 175.25 ha of Koala habitat) listed under the BC Act and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) will be impacted. ARTC will offset this impact with the retirement of ecosystems and species credits through biodiversity stewardship agreements.
- ▶ Four of the vegetation communities in the project area conform to threatened ecological communities (TECs) listed under the BC Act:
 - ✓ Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregions;
 - ✓ Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions;
 - ✓ Coolibah - Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions; and
 - ✓ Carbeen Open Forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions.
- ▶ Seven threatened fauna species were recorded in the project area during field surveys:
 - ✓ Grey-crowned Babbler (*Pomatostomus temporalis temporalis*);
 - ✓ Varied Sittella (*Daphoenositta chrysoptera*);
 - ✓ Koala (*Phascolarctos cinereus*);
 - ✓ Grey-headed flying-fox (*Pteropus poliocephalus*);
 - ✓ Eastern Bentwing-bat (*Miniopterus schreibersii oceanensis*);
 - ✓ Little Pied Bat (*Chalinolobus picatus*); and
 - ✓ Yellow-bellied sheath-tail-bat (*Saccolaimus flaviventris*).
- ▶ Three threatened flora species were recorded in the project area during field surveys:
 - ✓ Belson's Panic (*Homopholis belsonii*);
 - ✓ Creeping Tick-trefoil (*Desmodium campylocaulon*); and
 - ✓ Finger Panic Grass (*Digitaria porrecta*).
- ▶ No protected areas, defined as areas/reserves managed by DPIE and/or DPI NSW Fisheries under the National Parks and Wildlife Act 1974 (NPW Act), are located near the project.
- ▶ The proposal is located within the major water catchments of the Namoi River Basin, Gwydir River Basin and the Macintyre River Basin. Whereas minor river catchments (i.e. those less

than 1,000 square kilometres) along the existing rail corridor include; Bobbiwa Creek; Ten Mile Creek; Boggy Creek; Gehan Creek; Waterloo Creek; Little Bumble Creek; Gurley Creek; Halls Creek; Mehi River; Gil Gil Creek; Croppa Creek; Yallaroi Creek and Mungle Creek.

- ▶ The main impacts on aquatic ecological systems would be as a result of the removal and construction of new watercourse crossing structures along the proposal site and access over watercourses for movement of construction equipment and personnel. An assessment of significance of impact of the Project on aquatic communities identified that the Project is unlikely to have an adverse residual impact on threatened species and endangered populations. There are no State significant or important wetlands within the Project Boundary.
- ▶ The EIS lists 21 areas of key fish habitat (this includes areas found in the Separable Portion 2 works). These are areas classified as class 3 (minimal key fish habitat) or above, in accordance with the Policy and guidelines for fish habitat conservation and management (Department of Primary Industries, 2013).

4.2 Risk Assessment and Management

The N2NS Risk Management Plan includes full details on the risk assessment process utilised by Trans4m Rail. A risk assessment has been completed utilising the risk matrix included within Appendix A of the N2NS Risk Management Plan to assess the risks of the project not achieving full compliance with legislative requirements (i.e. EPBC Act, CoA's, SPIR, RMMs and Project EIS) in relation to biodiversity. This risk assessment is included as Appendix C of this plan.

Section 26.3 of the N2NS EIS provides a summary of the potential residual impacts for the project with a description of how these potential residual impacts would be managed. The identified residual impact is that construction will involve the permanent removal of native vegetation and fauna habitat, including removal of threatened ecological communities and habitats for threatened species. Recommended potential mitigation measures are:

- ▶ implementation of a biodiversity offset strategy to offset permanent removal of native vegetation (managed by ARTC)
- ▶ detailed design and construction planning would minimise the construction footprint and avoid impacts to native vegetation as far as practicable
- ▶ Implementation of area clearing environmental control plan, detailing clear delineation of clearing limits and No-Go Zones
- ▶ implementation of the flora and fauna management sub-plan (as part of the CEMP), including weed control, fauna habitat management and monitoring
- ▶ pre-clearance surveys would be undertaken, and a tree felling procedure would be implemented to avoid injury and mortality of native fauna during construction
- ▶ native vegetation temporarily disturbed during construction would be rehabilitated.

These mitigation measures are incorporated in Trans4m Rail's management and mitigation measures detailed in Section 6 - Environmental Management Measures.

4.3 Concurrent Project Risk Management

Trans4m Rail and ARTC will liaise with TfNSW and relevant Councils on a monthly basis with the aim of developing and implementing measures designed to manage concurrent projects in the region, including environmental management, impact and compliance. Concurrent projects may include simultaneous construction of Inland Rail (incl. other packages of the Inland Rail program), Newell Highway upgrade works co-ordinated by TfNSW and any significant Council improvement and / or development works.

5 Trans4m Rail Environmental Management System

Trans4m Rail will be utilising an Environmental Management System (EMS) (which is certified to ISO AS/NZS14001) to enhance its' environmental performance. This is discussed in detail in Section 7.1 of the CEMP.

5.1 Roles and Responsibilities

Section 7.4 of Trans4M Rail's CEMP details roles and responsibilities for environmental management (including Biodiversity). Trans4m Rail's Environment Manager has overall responsibility for the implementation of environmental matters on the Project and the Site Supervisor is responsible for field implementation of environmental requirements and control measures (including Biodiversity requirements and control measures). It is important to note that all personnel are responsible for ensuring biodiversity values are protected.

In addition, Trans4m Rail have engaged ecologists to:

- ▶ Provide advice on appropriately minimising vegetation clearing;
- ▶ Provide advice on management of species fauna species such the Koala and micro bats; and
- ▶ Undertake pre-clearance surveys.

ARTC is responsible for managing the implementation of the Project's Biodiversity Offset Strategy (BOS). The reporting undertaken by Trans4m Rail during implementation of the BMP (refer to Section 5.7) will assist ARTC track actual clearing impacts and offset requirements, and compliance with the BOS.

5.2 Competence, Training and Awareness

All personnel performing environmental management activities for and on behalf of Trans4m Rail will be trained, qualified and competent. Personnel performing specified assigned tasks shall be qualified on the basis of appropriate education, training, skills and/or experience, as appropriate. Section 6.5 of the CEMP details competence, training and awareness and includes:

- ▶ Inductions;
- ▶ Tool box talks;
- ▶ Daily pre-start meetings;
- ▶ Resource planning; and
- ▶ Trans4m Rail's Environment Training Program.

5.3 Hold Points

Hold Points will be implemented on this Project for the purpose of minimising the likelihood of an incident when undertaking specific construction activities that have a greater environmental risk. Further discussion of the hold-point process for the project is included in Section 8.6 of the CEMP. Hold Points specific to biodiversity management are detailed in Table 6 below.

Table 6: Hold points

HOLD POINT	RELEASING AUTHORITY
If the CIZ is to be amended after it has been approved, the amended CIZ must be submitted to the ER and ARTC for approval and will constitute a Hold Point. The amendment would be assessed via a consistency assessment (refer to Section 3.3).	ER and ARTC
A Clearing Permit is required prior to any clearing of native vegetation, including GPS locations of extent of Clearing applicable to Permit.	Trans4m Rail Environment Manager (or delegate)

HOLD POINT	RELEASING AUTHORITY
<p>NOTE: The Clearing Permit is typically prepared by the Trans4m Rail Engineer or Site Supervisor and approved by the Trans4m Rail Environment Manager (or delegate).</p> <p>The Clearing Permit will include the following information: time, date and location of the clearing activities, Environmental Sensitive Area plan (ESA Plan) showing all environmental constraints within (or adjacent) to the site, the plant community types (PCT) and area to be cleared, any notable environmental features (i.e. threatened flora species, structures, hollow-bearing trees, suitable habitat, etc) and pre-clearance (or other) requirements.</p>	
Develop a site Environmental Control Map highlighting sensitive areas and clearly identifying construction boundaries and No-Go Zones	Trans4m Rail Environment Manager (or delegate)
Excavation works cannot commence / recommence until an Erosion and Sediment Control Plan (ESCP) is developed/ reviewed and implemented.	Trans4m Rail Environment Manager (or delegate)
<p>Water Discharge Permit is required prior to any water discharge from the site, to confirm water is suitable for discharge.</p> <p>NOTE: The Water Discharge Permit is typically prepared by the Trans4m Rail Engineer or Site Supervisor and approved by the Trans4m Rail Environment Manager (or delegate). The Water Discharge Permit will include the following information: time, date and location of discharge activities, the volume and quality of the water to be discharged and the receiving water quality.</p>	Trans4m Rail Environment Manager (or delegate)
Prior to water reuse on the site, contact the Environment Manager to confirm water quality criteria has been met.	Trans4m Rail Environment Manager (or delegate)

5.4 Environmental and Sustainability Inspections

Section 7.8 of Trans4m Rail's CEMP details environmental and sustainability inspections, including inspections related to the BMP. Table 7 lists the details of each type of environmental and sustainability inspection to be undertaken on the Project.

Table 7: Inspection Schedule

ACTIVITY	FREQUENCY	RESPONSIBILITY	RECORD
Site inspection	Daily	Supervisor/s	Site Diary
Environmental and Sustainability	Weekly	Environment Coordinator/s	Weekly Environmental Management Inspection Checklist (Soteria)
Pre and Post Rainfall Events	Prior to forecasted rain. Following a rainfall event generating runoff.	Environment Coordinator/s	ESC Inspection Checklist (Soteria)
Pre Flood / Significant Rainfall Inspection	Following a BOM Weather Warning being issued (Severe Weather OR Flood Warning). NOTE: Nominated waterways only.	Environment Coordinator/s	Site Specific Flood Preparation Plan (Checklist)
High Risk Activity Inspections	As required	Construction Manager (or Delegate)	High Risk activity inspection checklist (Soteria)

NOTE: In the final stages of construction and post construction, the weekly Environmental and Sustainability Inspections will predominantly focus on demobilisation and rehabilitation requirements to ensure the sites are left in a clean, stable, and non-polluting state. These inspections will continue until the EPL has been relinquished. All work groups will be subject to the above-listed inspections, regardless of whether they are T4MR personnel or subcontractors.

5.5 General Environmental Compliance Monitoring and Reporting

The Trans4m Rail Environment Team will undertake environmental inspections, audits and reporting to develop and evaluate the effectiveness of environmental controls. This will include:

- ▶ General observations for the daily management of flora and fauna controls shall be documented in site dairies (daily) by the Site Supervisor;
- ▶ Weekly inspections of flora, fauna and weed management controls shall be undertaken by the Environmental Coordinator and Site Supervisor using the Weekly Environmental Management Inspection Checklist and uploaded to Soteria;
- ▶ Effectiveness of the flora, fauna and weed management controls shall be reviewed weekly by the Environmental Coordinator for adequacy having regard for changing circumstances;
- ▶ Monthly reporting to Inland Rail on biodiversity management will be recorded through Project Monthly Reports;
- ▶ Six monthly Independent Environmental Audits (external) by a suitably qualified professional (RPS) reviewing BMP compliance;
- ▶ ER monitoring of the implementation of the documents listed in the CoA; and
- ▶ The broader EMP auditing process is discussed further in Section 6.10 of Trans4m Rail's CEMP.

5.6 Biodiversity Specific Monitoring and Reporting

A Construction Monitoring Program for biodiversity on the project (including pests and weeds) is detailed below in Table 8. The program aims to capture high quality baseline data for the project during ecologist pre-clearing surveys in relation to biodiversity including the presence of weeds, pests and pathogens. This information would be shown on Environmental Control Maps (ECMs) and use as the primary tool to inform Trans4m Rail's approach to management of biodiversity during construction.

Table 8: Construction Monitoring Program

ACTIVITY	TIMING	RESPONSIBILITY	REPORTING
WEEDS, PEST AND PATHOGEN MONITORING			
Pre-construction <ul style="list-style-type: none"> ▶ As part of ecologist pre-clearing surveys of the project site, weed infestations would be recorded and mapped on ECMs for the project to inform management during construction. ▶ If pathogens are identified on the site, mapping of affected areas would be undertaken immediately to inform works. ▶ If pests are identified on the site, mapping of affected areas would be undertaken immediately to inform control measures. ▶ Clearing Permit (T4MR-FRM-ENV-001-02) 	Prior to construction commencing	Environment Manager Ecologist	Pre-clearing survey report. ECM Clearing Permit
Construction <ul style="list-style-type: none"> ▶ Weekly inspections of the site to be undertaken to record any weed infestations or signs of pests and pathogens using the Weekly Environmental Management Inspection Checklist with results uploaded to Project Pack Web. Control of weeds, pest and pathogens will be undertaken in accordance with actions within the Trigger Control Plan (Appendix E) and requirements of the Pest and Weed 	Weekly	Environment Coordinator	Weekly Environmental Management Inspection Checklist

ACTIVITY	TIMING	RESPONSIBILITY	REPORTING
Management Plan (refer to Section 6 and the full PWMP included as Appendix A).			
<ul style="list-style-type: none"> All works personnel will be trained on the identification of potentially occurring weeds, pests and pathogens and encouraged to report occurrences/ infestations to the Environmental Manager. Such occurrences would be confirmed by the environmental team with control to be undertaken in accordance with actions within the Trigger Action Response Plan (Appendix E) and the Pest and Weed Management Plan (refer to Section 6 and the full PWMP included as Appendix A). 	When reported	Environmental Manager Environment Coordinator	Induction and toolbox records. Site diaries/ Weekly Environmental Management Inspection Checklist.
<ul style="list-style-type: none"> Where control of pests, pathogens and weeds is undertaken follow-up monitoring (monthly or otherwise recommended by the pre-clearing survey) would be undertaken to determine the effectiveness of management and any follow-up management required. 	One month after weed, pest, pathogen control is undertaken.	Environment Coordinator	Weekly Environmental Management Inspection Checklist /Project monthly reports
<p>Post-construction</p> <ul style="list-style-type: none"> Post construction, the weekly Environmental and Sustainability Inspections will predominantly focus on demobilisation and rehabilitation requirements (incl. pest and weed) to ensure the sites are left in a clean, stable, and non-polluting state. These inspections will continue until the EPL has been relinquished 	Weekly	Environment Coordinator	Weekly Environmental Management Inspection Checklist
ENVIRONMENTALLY SENSITIVE ENVIRONMENTS (THREATENED SPECIES HABITAT/TEC)			
<p>Pre-construction</p> <ul style="list-style-type: none"> As part of ecologist pre-clearing surveys, sensitive biodiversity areas (threatened species habitat/ TECs) occurring in proximity to the clearing boundary would be identified on ECMs and fenced with appropriate signage to prevent inadvertent access/ impacts. Clearing Permit (T4MR-FRM-ENV-001-02) 	Prior to construction commencing	Environment Manager Ecologist	Pre-clearing survey report. Clearing Management Inspection Checklist. ECM. Clearing Permit.
<p>Construction</p> <ul style="list-style-type: none"> Weekly inspections of the site to ensure sensitive areas shown in ECMs are appropriately fenced off/ protected using the Weekly Environmental Management Inspection Checklist with results uploaded to Project Pack Web. Any remediation of fencing will be actioned as required. Any unexpected finds would be undertaken in accordance with actions within the Trigger Action Response Plan (Appendix E). 	Weekly	Environment Coordinator	Clearing Management Inspection Checklist. Weekly Environmental Management Inspection Checklist
<p>Post-construction</p> <ul style="list-style-type: none"> Post construction, the weekly Environmental and Sustainability Inspections will predominantly focus on 	Weekly	Environment Coordinator	Weekly Environmental Management Inspection Checklist

ACTIVITY	TIMING	RESPONSIBILITY	REPORTING
<p>demobilisation and rehabilitation requirements (incl. ground cover, weed species / abundance, erosion, etc) to ensure the sites are left in a clean, stable, and non-polluting state. These inspections will continue until the EPL has been relinquished.</p>			
FAUNA			
<p>Pre-construction</p> <ul style="list-style-type: none"> ▶ Completion of ecologist pre-clearing survey prior to works commencing ▶ All project personnel will be made aware of project fauna requirements via the project induction ▶ One (1) month prior to works commencing on a structure (i.e. bridges, culverts, etc), a suitably trained and qualified Ecologist will inspect the structure for presence of or signs of occupation by microbats. The structure will be monitored (inspected weekly, by the T4MR environment team) in the month leading up to works commencing and the results recorded. The findings of this monitoring will determine if exclusion works are required (to be carried out by the Ecologist) and inform any additional management measures during construction. ▶ Any unexpected finds would be undertaken in accordance with actions within the Trigger Action Response Plan (Appendix E). ▶ Following exclusion works occurring (if required) and prior to works commencing on the structure, regular inspections (weekly, or as otherwise recommended by the Ecologist) would be undertaken by the Ecologist to ensure microbats have been excluded from the structure. <p>NOTE: Partial exclusion of microbats from structures is not expected. In the event that partial exclusion is required, and populations of microbats will remain in situ whilst structure works is occurring, then weekly monitoring of the population numbers will occur by the project Ecologist throughout the construction stage.</p>	<p>Prior to construction commencing</p>	<p>Environment Manager Ecologist</p>	<p>Pre-clearing survey report. Microbat inspection report. ECM. Induction records</p>
<p>Construction (Clearing / Structures / etc)</p> <ul style="list-style-type: none"> ▶ Biodiversity/Flora and Fauna ECM (T4MR-FRM-ENV-001-06) ▶ Daily monitoring would be undertaken by the fauna spotter catcher during clearing as follows: <ul style="list-style-type: none"> ✓ Habitat trees and other fauna habitats prior to and during removal ✓ Clearing limit fencing ✓ Presence of any threatened fauna species (e.g. Koalas) ✓ Fauna injuries/ mortalities 	<p>Daily during clearing</p>	<p>Fauna spotter catcher Environmental Co-ordinator</p>	<p>ECM Clearing Management Inspection Checklist.</p>

ACTIVITY	TIMING	RESPONSIBILITY	REPORTING
<ul style="list-style-type: none"> Daily (pre-start) monitoring would be undertaken by the construction team for presence of microbats in structures undergoing demolition, replacement, or refurbishment. If partial exclusion is required whilst works are occurring on a structure, the Construction Team will monitor the microbat populations for daytime “flyout” and consult the Ecologist in the event of flyout. 			
<p>Construction (general)</p> <ul style="list-style-type: none"> All project personnel would report any injured / dead fauna on the project site. Weekly environmental inspections would monitor/ record any such occurrences. Any fauna injuries/ mortalities would be recorded within a project fauna register. 	Weekly	All personnel Environmental Coordinator	Weekly Environmental Management Inspection Checklist
Five clawed Worm Skink – Site Survey*	Daily and at completion of construction activities that seek to disturb and remove known and potential FCWS habitat	Project Ecologist	Daily pre-clearing checklist and post clearing report

*Source: INLAND RAIL – NARRABRI TO NORTH STAR PHASE 1: FIVE-CLAWED WORM SKINK (*Anomalopus mackayi*) CONSTRUCTION SPECIES MANAGEMENT PLAN

The Construction Monitoring Program implementation will be the responsibility of the Environmental Manager and will include the following aspects:

- Sufficient training of personnel;
- Arranging specialist consultants when required;
- Coordination of monitoring equipment and materials;
- Coordination of sample collection, documentation and delivery;
- Ensuring frequency and methodology is in accordance with all licences, permits, approvals, Australian Standards and any industry standards;
- Data management and representation of results; and
- Reporting non-compliances or incidents related to monitoring and implementing corrective actions.

5.7 Reporting and Communication

Reporting will include monthly internal project reports and Construction Monthly Environmental Reports to ARTC. Compliance monitoring and reporting are discussed in further detail in Section 8 of Trans4m Rail’s CEMP.

A Clearing Tracking Register would be included in the Monthly Environmental Reports provided to ARTC to inform the clearing undertaken and the actual vegetation types and quantities to be offset under the BOS.

5.8 Pre-clearing Surveys

Prior to construction commencing, pre-clearing surveys will be undertaken by a suitably qualified ecologist to:

- ▶ Identify and demarcate habitat trees;
- ▶ Identify other fauna habitat features including fallen timber/hollow logs and burrows;
- ▶ Identify habitat features that are suitable for translocation or salvage;
- ▶ Undertake updated mapping of weed infestations for the project site;
- ▶ Identify culverts / bridges to be demolished which represent habitat for microbats;
- ▶ Identify any threatened flora species within the project site not assessed as part of the EIS; and
- ▶ Identify and demarcate any threatened flora to be retained occurring in proximity to the CIZ.

The results of the pre-clearing surveys would inform the production of Environmental Control Maps for the project.

5.9 Unexpected Finds Procedure

During pre-clearing surveys, it is possible that previously unidentified threatened species (not considered within the EIS) may be identified. Unexpected finds will be documented by the ecologist with no works to be undertaken within such areas until further assessment is undertaken including:

- ▶ Assessment and advice by a suitably trained and experienced ecologist (NOTE: this may include additional mitigation measures which will be included in the sites ECP, ECMF and this sub-plan as updated from time to time);
- ▶ Referral of the find to ARTC in accordance with the Incident and Event Management Procedure; and
- ▶ Works may proceed when an approval to proceed is received from the client.

NOTE: Unexpected finds of threatened flora, threatened fauna or EEC will be managed in accordance with Appendix G - Unexpected Threatened Species / Endangered Ecological Community Find Procedure and Appendix E – Trigger Action Response Plan, where relevant.

Any additional impacts to TEC's, koala habitat, threatened flora and / or fauna will be formally referred to ARTC via Aconex to ensure that the appropriate offsets are secured.

5.10 Fauna Spotter / Catcher

A suitably qualified fauna spotter catcher would be present during clearing activities to:

- ▶ Undertake searches prior to (pre-clearing surveys) and during clearing for any fauna and undertake relocation where possible;
- ▶ Supervise the felling of habitat trees which would be felled as gently as possible utilising a two stage clearing process;
- ▶ Uninjured animals would be released on the day of capture into nearby suitable secure habitat and would not be held for extended periods of time; and
- ▶ Injured animals would be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment.

Where a Koala is located within a clearing area, clearing activities would stop and a 50m buffer established around the animal with no clearing within this area to resume until the fauna spotter/catcher confirms the animal has left the area of its own volition. The Project Team will ensure the koala has a means of egress to move away from construction so the animal is not isolated with no route to escape.

Notification to the Trans4m Rail Environment Manager of Koala sightings within the works area, confirmation ceased of clearing activities and reporting of when works commenced for recording in the Project Fauna register. The Trigger Action Response Plan (Appendix E) provides further information regarding the management of Koala, Microbat and other threatened species finds.

All fauna will be handled in accordance with the fauna handling procedure included as Appendix H.

5.11 Five-clawed Worm-Skink

To reduce the impacts on the FCWS population, a Species Management Plan has been prepared. The SMP formalises the agreed management actions so that impacts can be minimised during the planning, construction and operation of the Project. The SMP can be found in **Appendix J**.

5.11.1 Five-clawed Worm-skink Encounter Protocol

A protocol to be enacted when a Five-clawed Worm-skink is encountered on the project within identified habitat areas (all Stage 1 and Stage 3: Chainage 735.000 to 754.250) is presented in **Appendix I**, which replaces **Appendix G** in this instance.

In the event of a Five-clawed Worm-skink find, the fauna handling procedure (**Appendix H**) would be applicable with the following exceptions; data collection and record (i.e. fauna register), treatment of injured and deceased individuals and reporting requirements (refer **Appendix I**).

In an unexpected finds instance outside the above chainages, the management strategies outlined in this plan will be adopted for up to 500m on either side of the capture site and include:

- ▶ Additional pre-clearing and topsoil stripped surveys as deemed appropriate by the Project Ecologist;
- ▶ Relocation of individuals using the framework developed in this plan;
- ▶ Data capture of the individual and habitat data outlined in this plan;
- ▶ Updating of relocation sites, FCWS register, construction drawings and environmental control plans; and
- ▶ A periodic examination and review of the adequacy of the proposed mitigation measures proposed in consultation with DPE and DCCEEW.

5.11.2 Additional Mitigation measures

Additional mitigation measures to be implemented in Stage 1 and Stage 3: Chainage 735.000 to 754.250 are set out in more detail below.

Habitat enhancement and refuge placement

Two phases of habitat enhancement / refuge placement are proposed, with Phase 1 comprising works to be undertaken during clearing and grubbing activities, and Phase 2 comprising works to be undertaken during landscaping activities.

Key objectives of Phase 1: Clearing and grubbing; are the enhancement of retained habitats to improve population viability and the provision of refuge for relocated Five-clawed Worm-skinks. The key objective of Phase 2: Post landscaping; is to encourage re-colonisation of the site post landscaping works to improve population viability.

Phase 1 temporary habitat enhancement would include the placement of hay bales at 100 m intervals on freehold and / or private land within the construction boundary.

More permanent habitat enhancement in Phase 2 will include the placement of coarse woody debris (e.g. logs, sleepers, or mulched woody vegetation piles) within the construction boundary. Where available, woody debris will be placed in a manner that is reflective of the pre-construction landscape. As an example, at Yallaroi Creek (CH740.59), woody debris were placed at an average rate of one piece per 10m², whereas in open areas where no vegetation was removed, no woody debris will be placed.

Pre-soil disturbance mitigating activities

The following activities are to be implemented prior to soil disturbance, including:

- ▶ An ecologist would perform a pre clearing inspection to determine the suitability of the site for pre-clearing surveys before slashing commences. A pre-clearing survey involving active searches under logs and shelter sites would only be undertaken where these attributes occur. No pre-clearing survey involving active search would be undertaken in areas that comprise only dense tall grasses given there is little opportunity for the surveyor to actively search and locate FCWS. The same approach would occur where the area is inundated. Skinks captured during this stage would need to be retained until such a time the slashing has been completed adjacent to the relocation site. In most cases, this should not last for more than a few hours and accord with the Ecologists Animal Care and Ethics Approval Permit.
- ▶ An ecologist or spotter-catcher to perform clearing supervision when the slasher is mowing vegetation. The slasher should be set at a cutting height that is near to the ground (<100 mm) in order to reduce the suitability of the retained habitat. The ecologist/spotter-catcher would turn suitable materials such as logs, disused sleepers, refuse whilst looking for dispersing skinks. Skinks captured during this stage would need to be retained until such a time the slashing has been completed adjacent to the relocation site noting that a series of measurements and habitat information is to be recorded.
- ▶ Slashed vegetation should be windrowed to the edge of the CIZ to provide temporal refuge sites. This should be performed in a way so as to reduce the suitability of the habitat for FCWS within the CIZ. Ideally, slashing should seek to windrow the slashing material with each up and down pass so that it concentrates the windrowed material to enable more efficient FCWS checks prior to soil disturbance works.
- ▶ Relocation sites should be established based on the capture sites. Silt fence is proposed to assist in delineating these areas and to reduce habitat permeability between the relocation site and the CIZ.
- ▶ Once the above works are completed within a given area, a waiting period of at least 2 days/nights and up to 5 days/nights is proposed before topsoil stripping can commence. This should enable sufficient time for uncaptured FCWS to move of their own accord. NOTE: The adopted waiting period must be determined in consultation with Project Ecologist. The Project Ecologist should consider site-specific conditions at the time of clearing including the outcomes of any pre-clearing surveys, soil conditions (presence of moisture / cracking / baking), daytime temperatures and other factors that in the opinion of the Project Ecologist may or may not contribute to hostile ground conditions for the FCWS.

Soil disturbance mitigating activities

The following measures are to be implemented during soil disturbance activities, including:

Once the adopted waiting period has elapsed within a slashed area, the ecologist/spotter-catcher will implement the following measures during soil disturbance activities (e.g. topsoil stripping):

- A site assessment by a senior ecologist to determine the site suitability for FCWS. This survey is to determine if the area contains suitable habitat as opposed to unsuitable habitat which could include inundated or saturated areas or simply non-black cracking soils or highly trafficked areas such as driveways and road verges. Area still deemed as suitable habitat for FCWS would have the following procedures:
 - A daytime pre-stripping survey for FCWS focusing on the most likely micro habitat components in the CIZ. This survey would occur within 2 days of the topsoil stripping

with the completed survey area being clearly demarcated by either plastic bollards, witches hats or pennant flagging to ensure no topsoil stripping occurs in areas not yet surveyed.

- Topsoil stripping surveys to a depth of 100 mm would then be performed to capture and relocate displaced FCWS. At least one ecologist or spotter catcher will be assigned per machine (i.e. excavator, dozer, grader or scraper). Should a scraper be used, an ecologist or spotter catcher will be present to inspect the material at the recipient site.
- Salvaged FCWS would be assessed for signs of injury, measurements recorded and habitat data collected.

5.11.3 Five-clawed Worm-skink Environmental Management Measures

Environmental management measures for the identified Five-clawed Worm-skink habitat areas (Stage 1 and Stage 3: Chainage 735.000 to 754.250) are outlined below and included in **Section 6, Table 9** (B43-B46).

Five-clawed Worm-skink Induction

All Project personnel would be subject to a Five-clawed Worm-skink induction that includes:

- ▶ A general description of the Five-clawed Worm-skink (including photos and key identification features).
- ▶ Locations where Five-clawed Worm-skink surveys are required on the project site i.e. Stage 1 and Stage 3 CH735.000 to CH754.250.
- ▶ Provision of Section 5 of this Biodiversity Management Plan.

Records of induction / toolbox training would be retained.

Visitors and delivery personnel are to be accompanied by a fully inducted person at all times in accordance with the CEMP (Trans4Rail 2021). Signage is also provided at the various site offices.

Targeted Five-clawed Worm-skink surveys

Targeted Five-clawed Worm-skink surveys outlined in **Section 5.11.2** above would be undertaken by the Project Ecologist and/or Spotter-Catcher Team prior to and during slashing, clearing of woody vegetation and topsoil stripping activities within the Five-clawed Worm-skink habitat areas.

The surveys would include active searches of microhabitats, including, carefully turning woody debris, rocks and artificial debris, raking the soil surface or leaf litter beneath trees and looking beneath peeling bark for reptiles or their sloughs; searching for animals during topsoil stripping (working closely with the grader operator).

Targeted pre-clearing surveys would comprise a minimum of 1.5 person hours per hectare for habitats of average complexity per targeted species (scaled up or down depending on site complexity).

No pre-clearing survey involving active search would be undertaken in areas that comprise only dense tall grasses (or inundation) given there is little opportunity for the Ecologist to actively search and locate FCWS.

Skinks captured during this stage would need to be retained until such a time the slashing has been completed adjacent to the relocation site. In most cases, this should not last for more than a few hours and accord with the Ecologists Animal Care and Ethics Approval Permit.

Relocation Sites

i. Site Identification

Relocation sites will be identified based on the captures from pre clearing and clearing supervision surveys. This will ensure FCWS are moved a minimal distance from their capture site and still potentially within their home range. In some cases, FCWS relocation sites may be identified based on suitable habitat along the alignment and before the commencement of construction works so as to assist in the scheduling of construction resources. When this occurs, a relocation site will be selected using the following criteria:

- ▶ The area is adjacent to or comprises native grassland or woodland on public land;
- ▶ A relocation site must be as close as possible to the capture site;
- ▶ Sites must support suitable microhabitat of loose friable soil, with areas of leaf litter, mulch or dense vegetative groundcover which provides cover and foraging resources at least 100m² in area, and
- ▶ Relocation sites will be mapped and a GIS layer developed.

ii. Site Establishment

Establishing a FCWS relocation site will involve:

- ▶ Creating a minimum 100 m² relocation area at 200 m intervals (where possible)'
- ▶ Installing hay bales (minimum one per 25m²) with each bale measuring approximately 1m x 0.4 x .46. Slashed vegetation and/or woody debris should also be used as an alternative.
- ▶ Erection of an exclusion fence (silt fence) along the CIZ boundary at the hub plus 10 m either side of the relocation hub where practicable. If this is not possible, it must be documented within the FCWS capture register.
- ▶ Appropriate signage and a high visibility boundary at every relocation site, where practicable.
- ▶ Relocation of up to 10 adults and 5 sub adult skinks per 100m².
- ▶ Sites that receive captured/relocated FCWS will be GPS and a register created as part of an environmental sensitive zone for ARTC operations.

Fauna Register Details

Any Five-clawed Worm-Skinks captured during the works would have the following data collected:

- ▶ Stage of Project and Chainage;
- ▶ Capture date and time;
- ▶ Condition (Good, Injured, Deceased);
- ▶ Microhabitat at capture site;
- ▶ Soil at capture site;
- ▶ Activity undertaken at time of find;
- ▶ Detection method (e.g. survey);
- ▶ GPS Coordinates for capture and relocation site;
- ▶ Details of the person/s who made the discovery;
- ▶ Description of vegetation/PCT;
- ▶ Where practicable, validation photos from on top, side, below and close-up photos of forelimbs and hindlimbs; and
- ▶ Series of measurements including; snout-vent length, tail length and total length.

Photographs of the site (general location, vegetation, habitat features where the individual/s was discovered) shall be captured each day for each work area.

In addition to the above, the following microhabitat features should be recorded for each find where practicable:

- ▶ Soil crack density and size range (depth if possible)
- ▶ % litter cover
- ▶ % bare ground
- ▶ % grass cover and/or tussock spacing
- ▶ 3 most abundant groundcover species
- ▶ Soil type, soil structure (blocky, small peds, massive) and pH if possible
- ▶ Large surface debris abundance
- ▶ Ground moisture levels (including recent rainfall amount if known/relevant).

Following the completion of habitat removal, the Ecologist will prepare a Post Clearing Summary Report.

The Project Ecologist or the Environmental Manager for Trans4M Rail will manage this register. The register will be provided with each incident notification and live FCWS find report, and it will be made available to regulatory agencies.

5.11.4 Regulator Notification and Reporting Requirements for the Five-clawed Worm-skink

Regular Updates – EES and DCCEEW

Regular updates will be provided to DPE Environment, Energy and Science (EES) and the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) within 48 hours of ARTC becoming aware of a Five-clawed Worm-skink encounter, or as otherwise agreed at the time with the respective departments.

Information to be provided should include:

- ▶ Capture date and time,
- ▶ GPS Coordinates for capture and relocation site;
- ▶ Condition (Good, Injured, Deceased);
- ▶ Microhabitat at capture site;
- ▶ Soil at capture site;
- ▶ Activity undertaken at time of find; and
- ▶ Detection method (e.g. survey).

Stage 3 Summary Report – EES, DCCEEW and DPE

A final report is to be prepared at the conclusion of Stage 3 construction works detailing all Five-clawed Worm-skink finds from Stage 3. The report should include:

- ▶ A copy of the fauna register, including information outlined in **Section 5.11.3 Fauna Register Details** above.
- ▶ a detailed description of all survey methods and mitigation measures and subsequent outcomes.
- ▶ a description of all relocation sites and the number of skinks relocated into each site.
- ▶ any other relevant information collected or activities/procedures undertaken, including adaptive management.

Notification Requirements - DPE

In the event of a Five-clawed Worm Skink mortality or injury or if unauthorised disturbance of habitat occurs, T4MR will immediately notify the nominated ARTC Representative/s who will arrange DPE notification/s in accordance with the relevant Ministers Condition of Approval.

5.12 Environmental Control Maps / Site Environmental Plans

Trans4m Rail will use Environmental Control Maps (ECMs) and Site Environmental Plans (SEP) to aid in the identification, communication and protection of significant biodiversity features associated with the project. The ECM / SEPs will include:

- ▶ Specific measures relevant to the work site to protect and prevent adverse impacts to environmentally sensitive areas or items;
- ▶ Significant environmental features of the site (i.e. Threatened Ecological Communities, populations of threatened flora, weed presence, hollow bearing trees, items or areas of cultural heritage, contaminated sites, etc); and
- ▶ Locations of 'known' and 'likely to occur' FCWS habitat areas, those being Stage 1 (Chainage 603.000 to 625.000) and those areas defined within Figure 4-1 FCWS distribution map (FCWS SMP, Appendix J).

Additionally, ECPs will be updated periodically to include 'Known' FCWS habitat as determined from FCWS finds during the construction of the N2NS Inland Rail Project. Known FCWS habitat identified in this way will include a 100m buffer around any FCWS record.

ECMs are further discussed in Section 8 of the CEMP.

5.13 Environmental Management Procedures, Forms and Other Documents

The Project's EMS procedures, project specific procedures, forms and other documents provide instructions and records related to both environmental and non-environmental activities throughout the Project. These are discussed in detail in Section 8 of the CEMP.

5.14 Communication and Complaints Management

Trans4m Rail's Community and Stakeholder Engagement Management Plan (CSEMP) and Section 8 of the CEMP details communication and complaints management processes and procedures. The CSEMP identifies key stakeholder groups that will be consulted and engaged with during the Project and outlines the communication tools that will be used to consult and engage with these groups. During construction, any comments, feedback or complaints relating to biodiversity issues will be addressed through the Complaints Management System. The Complaints Management System includes a complaint register within the stakeholder database Consultation Manager. The complaints register will be developed in accordance with AS 4269: Complaints Handling.

5.15 Incidents, Emergencies and Non-Conformity

In the event of an environmental, social performance, sustainability heritage or other incident, an Incident and Emergency Response Plan will be implemented. Environmental incidents are managed in accordance with Trans4m Incident and Event Management procedure (T4MR-MPR-SQE-010), ARTC's Project Environmental Incident and Reporting Procedure (5-9020-0000-EEC-PR0001) and project approvals or licences. Incidents, emergencies, response plans and non-conformities are discussed in detail in Section 9 of the CEMP.

Any FCWS environmental incidents involving unplanned habitat disturbance, relocation failure or accidental death, the event will be investigated and reported to ARTC.

5.16 BMP Review and Revision Process

This BMP is a 'live' and 'working' document. As required by Trans4m Rail's EMS requirements, the Environment Manager will conduct regular reviews of the BMP at intervals of not less than six months and ensure that the BMP is formally reviewed and updated at least annually, or earlier as change requirements dictate. The CEMP and sub-plans review, and revision process is discussed in detail in Section 10 of the CEMP.

6 Environmental Management Measures

Table 9 details the mitigation measures that will be implemented by the Project to manage construction risks to biodiversity.

Table 9: Biodiversity Mitigation Measures

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY															
PRE-CONSTRUCTION																			
B1	Impacts to plant community types will be minimised and will not exceed those identified in CoA E17 (Table E1 below). Table E1: Native Vegetation Impacted	CoA Clearing Management Procedure (T4MR-MPR-ENV-004) Clearing register	Entire project	Project Director Environment Manager Site Engineer															
	<table border="1"> <thead> <tr> <th>VEGETATION ZONE AND PLANT COMMUNITY TYPE (PCT) ID AND NAME</th> <th>TEC UNDER THE EPBC ACT (HA)</th> <th>TOTAL AREA IMPACTED (HA)</th> </tr> </thead> <tbody> <tr> <td>Zone 1 - PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion</td> <td><i>Weeping Myall Woodlands</i> – 9.16</td> <td>17.94</td> </tr> <tr> <td>Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion</td> <td><i>Brigalow (Acacia harpophylla dominant and codominant)</i> – 16.13</td> <td>17.31</td> </tr> <tr> <td>Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion</td> <td><i>Coolabah - Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions</i> – 1.74</td> <td>1.74</td> </tr> <tr> <td>Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion</td> <td><i>Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern NSW and Southern Qld</i> – 432.07</td> <td>432.07</td> </tr> </tbody> </table>				VEGETATION ZONE AND PLANT COMMUNITY TYPE (PCT) ID AND NAME	TEC UNDER THE EPBC ACT (HA)	TOTAL AREA IMPACTED (HA)	Zone 1 - PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	<i>Weeping Myall Woodlands</i> – 9.16	17.94	Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	<i>Brigalow (Acacia harpophylla dominant and codominant)</i> – 16.13	17.31	Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	<i>Coolabah - Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions</i> – 1.74	1.74	Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	<i>Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern NSW and Southern Qld</i> – 432.07	432.07
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ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Not listed	143.95	
	Zone 6 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Derived - Native Grasslands)	Not listed	249.85	
	Zone 7 - PCT71 (BR127, NA126) Carbeen – White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and aeolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion	Not listed	0.51	
	Zone 8 - PCT 78 River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Not listed	11.82	
	Zone 9 - PCT 135 Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Not listed	9.50	
	Zone 10 - PCT 413 Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	Not listed	5.72	
	Total Area Impacted	459.10	890.41	
B2	If the establishment of a Construction Ancillary Facility (under CoA A16) is required outside of those areas previously assessed as part of the biodiversity assessment for the EIS and SPIR, additional field survey and analysis through a Consistency Assessment will be undertaken (refer to Section 3.3 of this plan).	CEMP, BMP	Prior to construction Construction	Project Director Environment Manager Site Engineer

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY										
B3	<p>Clearing of Koala habitat, as identified by the CoA E23 (Table E4 below), will be reduced by at least 25%, or as otherwise agreed by the Planning Secretary. Prior to construction commencing, key construction and environmental personnel will assess the Construction Impact Zone (CIZ) issued by ARTC and identify areas where Koala Habitat (and other mapped vegetation) can be retained.</p> <p>As required by CoA 24, ARTC will submit a report to the Planning Secretary, EES and DAWE for information on the final construction footprint demonstrating how impacts to Koala Habitat shown in Table E4 have been reduced to at least <u>131.43 ha</u> within six months after the commencement of construction. This process will be achieved via a workshop (or series of workshops) with representation from the Environment, Construction, Engineering and GIS / Survey Teams.</p> <p>Table E4: Vegetation Zones/ Plant Community Types Identified as Koala Habitat</p> <table border="1"> <thead> <tr> <th>VEGETATION ZONE AND PLANT COMMUNITY TYPE (PCT) ID AND NAME</th> <th>TOTAL AREA IMPACTED (HA)</th> </tr> </thead> <tbody> <tr> <td>Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion</td> <td>17.31 (12.98)</td> </tr> <tr> <td>Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion</td> <td>1.74 (1.31)</td> </tr> <tr> <td>Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion</td> <td>0.08 (scattered trees) (0.06)</td> </tr> <tr> <td>Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW</td> <td>143.95 (107.95)</td> </tr> </tbody> </table>	VEGETATION ZONE AND PLANT COMMUNITY TYPE (PCT) ID AND NAME	TOTAL AREA IMPACTED (HA)	Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	17.31 (12.98)	Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	1.74 (1.31)	Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	0.08 (scattered trees) (0.06)	Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	143.95 (107.95)	Construction methodology and site layout drawings.	Prior to construction	Construction Manager Environment Manager Engineer
VEGETATION ZONE AND PLANT COMMUNITY TYPE (PCT) ID AND NAME	TOTAL AREA IMPACTED (HA)													
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ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	<p>Zone 6 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Derived - Native Grasslands) 0.35 (scattered trees) (0.26)</p> <p>Zone 8 - PCT 78 River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion 11.82 (8.87)</p> <p>Total area impacted as per EIS 175.25</p> <p>Revised total area of impact (allowing for reduction by 25%) 131.43</p> <p>NOTE: Figures shown in brackets detail the clearing quantities (by PCT) with the 25% reduction applied.</p>			
B4	Prior to construction commencing Environmental Control Maps (ECMs) will be prepared which clearly show all areas of sensitive biodiversity (including threatened flora/ fauna habitat, TECs and weed infestations) clearing boundaries and no-go areas associated with the site. Plans will be made readily available to construction personnel.	Ecologist pre-clearing survey report, Clearing Permit (T4MR-FRM-ENV-001-02) Project induction	Prior to construction	Environment Manager
B5	The CEMP, construction plans and ECMs will clearly document the location and full extent of clearing required.	CEMP, construction methodology, site layout drawings, Clearing Management Procedure (T4MR-MPR-ENV-004) and ECMs.	Prior to construction	Construction Manager Environment Manager
B6	All key actions of this BMP and ECMs (e.g. clearing demarcation, erosion control measures and clearing permit requirements) will be incorporated in relevant project HSEQ risk management documentation (AMS, ITPs, TRA/SWMS and ECMs) and included in the Supervisor's Workpack for the site.	BMP, ECM	Prior to construction	Project Director Environment Manager
B7	Prior to clearing commencing, demarcation of the approved clearing boundary (CIZ) will be undertaken and the extent of any areas of clearing defined with roped flagging or similar.	Clearing Management Procedure (T4MR-MPR-ENV-004) Site layout drawings and ECMs.	Prior to construction	Environment Manager Survey Manager Construction Superintendent

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
B8	Prior to clearing, sensitive biodiversity areas (threatened species habitat/ TECs) occurring outside but in proximity to the clearing boundary will be fenced with appropriate signage to prevent inadvertent access/ impacts.	Clearing Management Procedure (T4MR-MPR-ENV-004) Clearing Permit (T4MR-FRM-ENV-001-02) ECMs	Prior to construction	Environment Manager
B9	Prior to clearing commencing a clearing tracking register will be established to accurately track 'as-built' vegetation clearing impacts for the project to demonstrate compliance with relevant CoAs. The register will be maintained (monthly) throughout the project.	Clearing tracking register	Entire project	Environment Manager
B10	Prior to construction pre-clearing surveys of impacted bridges / culverts would be undertaken by a suitably qualified ecologist to identify roosting habitat and presence of microbats.	Ecologist pre-clearing survey report Clearing Management Procedure (T4MR-MPR-ENV-004) Clearing Permit (T4MR-FRM-ENV-001-02) ECMs Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure	Prior to construction commencing	Environment Manager Ecologist
B11	In the event that unidentified threatened species (not considered within the EIS) are identified on the site the Unexpected Finds Procedure (refer to Appendix G) will be initiated with no works to be undertaken within such areas until further assessment is undertaken including: <ul style="list-style-type: none"> ▶ Assessment by ecologist ▶ Referral of finding to client and regulatory authorities. ▶ Approval to proceed works is received from the client. 	Incident and Event Management procedure (T4MR-MPR-SQE-010) Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure	Upon locating an unexpected threatened species.	Environment Manager Ecologist
B12	Prior to construction commencing appropriate local vets or rescue organisation/wildlife carers/facilities will be identified and contacted to seek permission to assist with any injured/ orphaned fauna. Contact details for these companies/ organisations will be included on ECMs.	Community Stakeholder and Engagement Management Plan (CSEMP)	Prior to construction	Environment Manager

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
		Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)		
B13	Prior to clearing commencing the community, Landcare groups and government agencies will be consulted to determine if retained timber and root balls can be reused in habitat and rehabilitation work.	Biodiversity, Flora and Fauna ECM (7632-T4MR-PL-PES-010)	Prior to clearing commencing	Environment Manager Community and Stakeholder Engagement Manager
CLEARING				
B15	<p>Prior to clearing commencing pre-clearance surveys will be undertaken by suitably qualified and experienced ecologists within areas of woody native vegetation within the CIZ including:</p> <ul style="list-style-type: none"> ▶ Identification and demarcation of all habitat tree (which are defined as trees containing hollows, cracks or fissures and spouts, active nests, dreys or other signs of recent fauna usage). ▶ Identification of other fauna habitat features including fallen timber/hollow logs and burrows. ▶ Identification of habitat features that are suitable for translocation or salvage. ▶ Identification and demarcation of any threatened flora to be retained occurring in proximity to the CIZ. ▶ Updated mapping of weed infestations for the project site. 	<p>Ecologist pre-clearing survey report</p> <p>Clearing Management Procedure (T4MR-MPR-ENV-004)</p> <p>Clearing Permit (T4MR-FRM-ENV-001-02)</p> <p>Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure</p>	Prior to clearing commencing	Environment Manager Ecologist
B16	<p>A suitably qualified and licensed fauna spotter catcher will be present during the following clearing activities:</p> <ul style="list-style-type: none"> ▶ Clearing of any native, mature trees (>3 metres) in height. ▶ Removal of habitat trees, stags and nests. ▶ The fauna spotter catcher will: <ul style="list-style-type: none"> ✓ Undertake searches during clearing for any fauna and undertake relocation in accordance with the Fauna Handling Procedure (refer to Appendix H). ✓ Uninjured animals will be released on the day of capture into nearby suitable secure habitat and would not be held for extended periods of time. 	<p>Ecologist pre-clearing survey report</p> <p>Clearing Management Procedure (T4MR-MPR-ENV-004)</p> <p>Clearing Permit (T4MR-FRM-ENV-001-02)</p> <p>Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure</p>	During clearing	Environment Manager Fauna spotter/ catcher

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	<ul style="list-style-type: none"> ✓ Injured animals will be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment prior to being released into nearby suitable secure habitat. 			
B17	A pre-clearance survey will to be undertaken by a qualified and licensed fauna spotter catcher immediately prior to the commencement of any vegetation clearing (on each day of clearing) to identify and relocate fauna within clearing areas.	Qualified fauna spotters on site during clearing activities Clearing Management Procedure (T4MR-MPR-ENV-004) Clearing Permit (T4MR-FRM-ENV-001-02)	During clearing	Environment Manager Fauna spotter/ catcher
B18	<ul style="list-style-type: none"> ▶ Where a Koala is located within a clearing (or works) area, clearing or work activities will stop and a 50m buffer will be established around the animal with no clearing within this area to resume until the fauna spotter/ catcher confirms the animal has left the area of its own volition. The Project Team will ensure the Koala has a means of egress to more away from construction so the animal is not isolated with no route to escape. ▶ Any Koala record within the site will be reported to Trans4m Rail's Environment Manager. Details of the record including cessation and recommencement dates/ times of clearing activities will be recorded in the project fauna register. 	Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06) Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure	During clearing	Entire project Fauna spotter/ catcher Environment Manager
B19	<ul style="list-style-type: none"> ▶ All habitat trees (as defined in B15) will be subject to a two-stage clearing process involving: <ul style="list-style-type: none"> ✓ Initial clearing of non-habitat trees around habitat trees within the immediate vicinity of habitat tree. ✓ Allowing habitat trees to stand for at least 48 hours after initial clearing to allow fauna the opportunity to self-relocate. ▶ Felling of habitat trees will be supervised by the attending fauna spotter catcher. ▶ The use of a harvester head will be used to carefully lower habitat trees to the ground where possible. ▶ All habitat trees are to be lowered gently to the ground where possible. Additional steps such as bumping the habitat tree three times over a 5-minute period will be undertaken to encourage fauna 	Clearing Management Procedure (T4MR-MPR-ENV-004) Clearing Permit (T4MR-FRM-ENV-001-02) Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06) Qualified fauna spotters on site during clearing activities	During clearing	Environment Manager Fauna spotter/ catcher

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	<p>to vacate prior to felling would be adopted where the potential to lower the tree gently is low.</p> <ul style="list-style-type: none"> ▶ The fauna spotter catcher will search all habitat trees immediately after felling to identify and capture any fauna present. ▶ Uninjured animals would be released on the day of capture into nearby suitable secure habitat and would not be held for extended periods of time. ▶ Injured animals will be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment. ▶ Hollow branches will be salvaged for re-use as hollow logs in adjacent retained vegetation where appropriate. 			
B20	<p>Any death of a State or Commonwealth listed threatened fauna species will be reported to ARTC with 24 hours and further notification provided as per;</p> <ul style="list-style-type: none"> ▶ Environment Protection and Biodiversity Conservation Act 1999, Conditions of Approval (EPBC 2016/7729) and; ▶ Critical State Significant Infrastructure Conditions of Approval (CSSI SSI7474) 	<p>CEMP Incident and Event Management procedure (T4MR-MPR-SQE-010)</p>	Entire project	<p>Environment Manager Ecologist Fauna spotter/ catcher Construction personnel</p>
B21	<p>A fauna register will be maintained throughout construction to include the following information:</p> <ul style="list-style-type: none"> ▶ All details of fauna captures, relocations and releases. ▶ All fauna mortalities. ▶ Any fauna taken into care and outcomes. 	<p>Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06) Fauna register</p>	During clearing	<p>Environment Manager Ecologist Fauna spotter/ catcher</p>
B22	<p>A post-clearing report will be completed at the completion of clearing activities documenting all data collected in the fauna register.</p>	<p>Clearing Management Procedure (T4MR-MPR-ENV-004)</p>	At the completion of clearing	<p>Environment Manager Ecologist</p>
GENERAL CONSTRUCTION				
B23	<p>Employee education and training including inductions for staff, contractors and visitors to the site will include biodiversity issues at the site to ensure all personnel understand responsibilities in relation to the protection and/or minimisation of impacts to native biodiversity.</p> <p>Site inductions will include:</p> <ul style="list-style-type: none"> ▶ Legislative responsibilities including General Environmental Duty and Duty to Notify. 	<p>Site Induction Procedure (T4MR-MPR-SQU-001) CEMP ECM's</p>	<p>Site inductions Pre-Start and Toolbox talks</p>	<p>Project Director Environment Manager</p>

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	<ul style="list-style-type: none"> ▶ Clearing requirements and penalties (including fines) for over-clearing. ▶ Construction exclusion zones. ▶ Protected area requirements. ▶ Project identified sensitive flora and fauna locations and responsibilities in relation to these. ▶ Pest and weed awareness and reporting requirements. ▶ Fauna interaction rules. 			
B24	<p>The management of trees in the vicinity of the construction zone will be undertaken in accordance with the AS 4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)).</p> <p>Tree protection zones (TPZs) will be demarcated by para webbing or similar.</p>	<p>Clearing Management Procedure (T4MR-MPR-ENV-004)</p> <p>Clearing Permit (T4MR-FRM-ENV-001-02)</p> <p>AS 4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)).</p>	Entire project	<p>Environment Manager</p> <p>Project arborist</p> <p>Construction personnel</p>
DEMOLITION OF BRIDGES/ CULVERTS (MICROBAT HABITAT)				
B25	<p>For any structures identified as potential microbat habitat an additional pre-clearance surveys would be undertaken by a suitably qualified ecologist prior to these structures being demolished to determine if microbats are present.</p>	<p>Ecologist pre-clearing survey report</p> <p>Clearing Management Procedure (T4MR-MPR-ENV-004)</p> <p>Clearing Permit (T4MR-FRM-ENV-001-02)</p>	Prior to construction	<p>Environment Manager</p> <p>Ecologist</p> <p>Fauna spotter/ catcher</p>
B26	<p>If small numbers (<10) of non-breeding bats are present (in surveys undertaken for B25) an ecologist would either:</p> <ul style="list-style-type: none"> ▶ Install exclusion after the bats have vacated the site at night. ▶ Capture and relocate the bats that evening. 	<p>Ecologist preclearing survey</p> <p>Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)</p>	Prior to demolition of structure	<p>Environment Manager</p> <p>Ecologist</p>

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
B27	Where larger numbers or breeding microbats are identified a specific plan will be developed and implemented by an ecologist with microbat experience in consultation with ARTC / DPIE. <i>It is noted that ecological management for such instances will vary depending on factors including species, breeding status and seasonality therefore flexibility is required.</i>	Ecologist preclearing survey Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)	Prior to demolition of structure	Environment Manager Ecologist
B28	Only suitably qualified ecologists with up to date bat Lyssavirus vaccinations will handle microbats.	Safety Management Plan Provision of ecologist license and vaccination records	Entire project	Environment Manager Safety Manager Ecologist
B29	Unless necessary from an Engineering, Quality or Construction perspective, any gaps, joins, lifting points and other void spaces in bridge elements and culverts will not be filled or enclosed to provide microbat roosting habitat.	IFC Design	Prior to installation / replacement of structure	Environment Manager Engineer & Supervisor
WORKS NEAR/ IN CREEKS AND TEMPORARY WATERWAY CROSSINGS				
B30	Works within the riparian zone will maximise the preservation of any existing vegetation and minimise disturbance.	Sediment and Erosion Plan Water quality, Sediment and Erosion ECM (T4MR-FRM-ENV-001-11)	Entire project	Environment Manager Environment Coordinator Site Supervisor
B31	Any instream large woody debris in the development footprint will be relocated upstream or downstream in consultation with the ecologist.	Ecologist preclearing survey Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)	Entire project	Environment Manager Environment Coordinator Site Supervisor
B32	Designs for works within or near watercourses will provide for the retention of natural functions and maintenance of fish passage in accordance with Why do fish need to cross the road? Fish passage requirements for waterway crossings (<i>Fairfull and Witheridge, 2003</i>).	Design documents	Entire project	ARTC Project Engineer Environment Manager
B33	Works within watercourses will be avoided during / within 24 hours prior to periods of high rainfall or high flow events. Where works are required to continue, these will be risk assessed with a member of the Environmental Team.	ESCP Water quality, Sediment and Erosion ECM	Entire project	Construction Manager Environment Manager

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
		(T4MR-FRM-ENV-001-11)		
B34	Any pools in watercourses that would be impacted by construction would be dewatered according to the Dewatering Procedure included in the Fauna Handling Procedure – Appendix H. As part of the dewatering procedure native aquatic fauna will be captured/ relocated with euthanasia of exotic species undertaken by a suitably qualified ecologist (refer to Fauna Handling Procedure – Appendix H). NOTE: Euthanasia is not to be undertaken by Project personnel unless under the approval of the Project Ecologist or T4MR Environment Manager.	Qualified ecologist ESCP Water quality, Sediment and Erosion ECM (T4MR-FRM-ENV-001-11) Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)	Entire project	Environment Manager Construction Personnel
TRENCHES / DEEP EXCAVATIONS				
B35	Where possible trenches / deep excavation will not to be left open overnight.	Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)	Entire project	Environment Coordinator Site Supervisor
B36	For trenches / excavation left open overnight, a fauna escape ramp / ladder (plastic garden mesh/ timber plank) will be provided.	Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)	Entire project	Environment Coordinator Site Supervisor
B37	Trenches/ excavations left overnight will be inspected for fauna prior to works commencing the next day with any fauna present to be captured/ relocated by a suitably qualified fauna spotter / catcher.	Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06)	Entire project	Environment Manager Environment Coordinator Site Supervisor
FAUNA MORTALITY				
B38	If the cause of a listed fauna fatality is from a road strike within the CIZ, a review of avoidance measures will be undertaken and adaptively managed to prevent further deaths.	Toolbox Talks Prestarts	Entire project	Environment Manager Environment Coordinator Safety Manager
B39	If the cause of a listed fauna fatality is from a road strike on a public road adjacent to the project, a review will be undertaken to ensure project activities are not forcing fauna onto the road. Additional mitigation and / or avoidance measures will be undertaken and adaptively managed to prevent further deaths.	Toolbox Talks Prestarts	Entire Project	Environment Manager Environment Coordinator Safety Manager
MANAGEMENT OF CANE TOADS				

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
B40	<p>Employee education and training inductions for staff, contractors and visitors to the site will include the following project requirements in relation to Cane Toads:</p> <ul style="list-style-type: none"> ▶ Awareness training ▶ Any potential siting is to be immediately reported to the Environment Manager ▶ The project ecologist is to investigate any potential Cane Toad observations including undertaking targeted surveys within the vicinity of the record ▶ If confirmed on site relevant regulatory authorities would be notified within 24 hours with notification to include a management response to be prepared in consultation with a Cane Toad expert including monitoring and control actions to be implemented on the site to eradicate all toads within the CIZ. <p><i>Advice from Cane Toad expert, Dr Matthew Greenlees: Cane toads have nor do not currently occur in the greater New England region - including in the area between Moree and Narrabri. The current known distribution of toads in New South Wales is essentially east of the Great Diving Range - a considerable distance from the area. In addition, current models predict that the climate in the region is unlikely to be suitable for toads becoming established (Kearney et al. 2008; Kolbe et al. 2010). There have been few historical records of individuals that have been translocated (accidentally) to the region, though never in numbers or to specific areas that have threatened them becoming established (see ALA 2021). If cane toads are detected in the area, expert advice should be sought immediately in initiating control and eradication measures. These will include manual removal of adults and if necessary, ethggs, tadpoles and metamorph (juvenile) toads. Such measures have been demonstrated to be effective for local eradication of small established populations (Greenlees et al. 2018).</i></p>	PWMP	Entire project	Environment Manager Ecologist Cane Toad expert All works personnel
REHABILITATION & REVEGETATION				
B41	<p>All rehabilitation and revegetation works will be undertaken in accordance with the mitigation measures detailed in the Project's CSWMP.</p> <p>Habitat features, such as woody debris will be scattered throughout rehabilitated areas within the rail corridor in consultation with the ARTC Project Manager / Project Director.</p>	CSWMP	Construction	Environment Manager Construction Manager
FIVE-CLAWED WORM-SKINK (ANOMALOPUS MACKAYI) – SPECIES SPECIFIC MITIGATION MEASURES				

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
B42	<p>All Project personnel would be subject to a Five-clawed Worm-skink induction that includes:</p> <ul style="list-style-type: none"> ▶ A general description of the Five-clawed Worm-skink (including photos and key identification features). ▶ Locations where Five-clawed Worm-skink surveys are required on the project site i.e. Stage 1 and Stage 3 CH735.000 to CH754.250. ▶ Provision of the project's unexpected finds procedure for when works are to occur outside of anticipated Five-clawed Worm-skink habitat areas. ▶ Reference to Section 5 of the BMP <p>NOTE: Records of induction / toolbox training would be retained.</p>	<p>Induction Toolbox Talk</p>	<p>Construction</p>	<p>Environment Manager</p>
B43	<p>Targeted Five-clawed Worm-skink surveys would be undertaken by the Project Ecologist and/or Spotter-Catcher Team prior to and during slashing, clearing of woody vegetation and topsoil stripping activities within the following chainages:</p> <ul style="list-style-type: none"> ▶ All Stage 1; and ▶ Stage 3: Chainage 735.000 to 754.250. <p>The surveys would include active searches of microhabitats, including, carefully turning woody debris, rocks and artificial debris, raking the soil surface or leaf litter beneath trees and looking beneath peeling bark for reptiles or their sloughs; searching for animals during topsoil stripping (working closely with the operator).</p> <p>Targeted pre-clearing surveys would comprise of 1.5 person hours per hectare for habitats of average complexity per targeted species (scaled up or down depending on site complexity).</p>		<p>Construction</p>	<p>Environment Manager Project's Ecologists Project's Spotter - Catchers</p>
B44	<p>Proposed release sites for a works area would be selected prior to works commencing in that area. The following criteria would be considered when selecting specific relocation points:</p> <ul style="list-style-type: none"> ▶ The area is adjacent to or comprises native grassland or woodland on public land; ▶ A relocation site must be as close as possible to the capture site; ▶ Sites must support suitable microhabitat of loose friable soil, with areas of leaf litter, mulch or dense vegetative groundcover which provides cover and foraging resources at least 100m² in area, and ▶ Relocation sites will be mapped and a GIS layer developed. 		<p>Construction</p>	<p>Environment Manager Project's Ecologists</p>

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	Establishment of relocation sites would include: <ul style="list-style-type: none"> ▶ Creating a minimum 100 m2 relocation area at 200 m intervals (where possible); ▶ Installing hay bales (minimum one per 25m2) with each bale measuring approximately 1m x 0.4 x .46. Slashed vegetation and/or woody debris should also be used as an alternative; ▶ Erection of an exclusion fence (silt fence) along the CIZ boundary at the hub plus 10 m either side of the relocation hub where practicable. If this is not possible, it must be documented within the FCWS capture register. ▶ Appropriate signage and a high visibility boundary at every relocation site, where practicable. ▶ Relocation of up to 10 adults and 5 sub adult skinks per 100m2. ▶ Sites that receive captured/relocated FCWS will be GPS and a register created as part of an environmental sensitive zone for ARTC operations. 			
B45	Any Five-clawed Worm-Skinks captured during the works would have the following data collected in a Fauna Register: <ul style="list-style-type: none"> ▶ Project Stage and Chainage ▶ Capture date and time; ▶ Condition (Good, Injured, Deceased); ▶ Microhabitat at capture site; ▶ Soil at capture site; ▶ Activity undertaken at time of find; ▶ Detection method (e.g. survey); ▶ GPS Coordinates for capture and relocation site; ▶ Details of the person/s who made the discovery; ▶ Description of microhabitat at capture site; ▶ Description of vegetation/PCT; ▶ Where, practicable, validation photos from on top, side, below and close-up photos of forelimbs and hindlimbs; and ▶ Series of measurements including; snout-vent length, tail length and total length. 		Construction	Environment Manager

ID	MEASURE/ REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	<p>Photographs of the site (general location, vegetation, habitat features where the individual/s was discovered) shall be captured each day for each work area.</p> <p>Deceased or euthanised individuals will be forwarded to the <i>Australian Museum</i> for research purposes.</p> <p>In addition to the above, the following microhabitat features should be recorded for each find where practicable:</p> <ul style="list-style-type: none"> ▶ Soil crack density and size range (depth if possible) ▶ % litter cover ▶ % bare ground ▶ % grass cover and/or tussock spacing ▶ 3 most abundant groundcover species ▶ Soil type, soil structure (blocky, small peds, massive) and pH if possible ▶ Large surface debris abundance ▶ Ground moisture levels (including recent rainfall amount if known/relevant). <p>The Project Ecologist or the Environmental Manager for Trans4M Rail will manage this register. The register will be provided with each incident notification and live FCWS find report, and it will be made available to regulatory agencies.</p>			

WEED, PEST AND PATHOGEN MANAGEMENT				
ID	Measure / Requirement	Resources	When to Implement	Responsibility
PW1	During the project Priority Weeds (LLS North-West Region) will be managed in accordance with requirements of the Biosecurity Act 2015 and <i>Biosecurity Regulation 2017</i> , and Weeds of National Significance (WoNS) will be managed in accordance with the Weeds of National Significance Weed Management Guide.	CEMP PWMP WPM ECP (T4MR-FRM-ENV-001-12)	Throughout project	Environment Manager Construction Managers
PW2	If identified on site pest species and pathogens would be managed in accordance with relevant best practice guidelines.	Industry best practice	Throughout project	Environment Manager Environmental Coordinators

WEED, PEST AND PATHOGEN MANAGEMENT				
	A qualified specialist will be engaged to prepare a specific management procedure in consultation with the client and relevant stakeholders for any pest/ pathogen identified on the site.			Site Supervisor
PW3	Should pest population control be required, a qualified specialist will be engaged to undertake this work and provide detailed advice. Where pest control has been undertaken, a record will be made and maintained. Monitoring of the effectiveness of the pest control measures as well as notification or neighbouring landholders will be undertaken as advised by the qualified pest specialist.	Subcontractor	Throughout project	Environment Manager Environmental Coordinators Site Supervisor
PRE-CONSTRUCTION				
PW4	Prior to construction as part of pre-clearing ecologist surveys of the project site, weed infestations will be recorded and mapped on Environmental Control Maps (ECMs) for the project to inform weed management during construction.	Preclearing survey ECM, WPM ECP (T4MR-FRM-ENV-001-12)	Prior to clearing commencing	Environment Manager Ecologist
PW5	Site personnel will be trained during project inductions on target weed species and weed infestations shown on ECMs. Training will include: <ul style="list-style-type: none"> ▶ Identification of weed and pest species known to be present on the site; ▶ Ecological impacts associated with invasive weeds and pests; ▶ Mitigation and hygiene measures for controlling weeds and pests; ▶ Awareness of human vectors in the introduction of weeds and pests. 	Project induction	Throughout project	Environment Manager
PATHOGEN MANAGEMENT				
PW6	If pathogens are identified on the site a Pathogen Management Procedure will be developed and implemented. This will include but is not limited to: <ul style="list-style-type: none"> ▶ Exclusion zones using fencing and signage; ▶ Hygiene washdowns for plant, light vehicles and personnel; and ▶ Additional toolbox training in relation to locations of pathogen and requirements for personnel. 		Throughout project	Environment Manager, Engineer, Site supervisor
MOVEMENT OF PLANT/ MACHINERY				

WEED, PEST AND PATHOGEN MANAGEMENT				
PW7	Mobile plant and vehicles must be clean of any mud or organic material, prior to arriving or departing from site to prevent the spread of weeds and disease.	ECM, WPM, ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager, Environmental Coordinators Site supervisor
PW8	Further washdown of vehicles, plant and equipment will be conducted as required. For example, where plant or vehicles have left sealed roads and driven through a known or potentially weed infested area then immediate washing will be required.	ECM, WPM, ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager, Environmental Coordinators Site supervisor
PW9	Further washdown of vehicles, plant and equipment will be conducted when transferring between landholdings within the project area.	ECM	Project Delivery	Engineer Site supervisor
PW10	Washing of vehicles, plant and equipment will be undertaken in an appropriately bunded wash down area.	ECM, WPM, ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager, Environmental Coordinators All site personnel
PW11	Weed hygiene declarations will be obtained for all vehicles, plant and equipment on the site.	Weed hygiene declaration		Environment Manager Site supervisor
PW12	Vendors supplying materials with the potential to contain weeds or pests (e.g soil/fill, mulch etc.) will be required to provide written assurance that all supplied materials are free from any weeds or pests.	Weed hygiene declaration or similar	Project Delivery	Environment Manager Engineer
PW13	All mobile plant and vehicles, including deliveries, must use designated travel routes, site access tracks and lay-down areas.	Vehicle movement plan	Project Delivery	Environment Manager Construction Manager
VEGETATION CLEARING				
PW14	Weed control of identified areas of noxious weeds will be undertaken prior to/ during clearing and grubbing involving the following methods: <ul style="list-style-type: none"> ▶ Spraying with herbicides; and/or ▶ Mechanical removal. 	ECM, WPM ECP (T4MR-FRM-ENV-001-12) Weed control contractor	Prior to/ during clearing	Environment Manager Environment Coordinator Site Supervisor
PW15	Where practicable, areas known to be infested with weeds will be cleared separately to non-infested areas to prevent cross contamination and reduce vehicle/plant/equipment cleaning requirements.	ECM	During clearing	Environment Manager Environment Coordinator Site Supervisor

WEED, PEST AND PATHOGEN MANAGEMENT				
PW16	Erosion and sediment control techniques will be undertaken to assist with the management of removed vegetation and subsequent exposed soils and to prevent further weed outbreaks.	Progressive erosion sediment control plan (PESCP)	Immediately after clearing	Environment Manager Environment Coordinator Site Supervisor
PW17	Any vegetation stockpiled after clearing will be managed to prevent the spread of weeds.	ECM	Immediately after clearing	Environment Manager Superintendent
USE OF HERBICIDE				
PW18	Herbicide application will only be undertaken by suitably qualified personnel in strict accordance with the requirements of the Pesticides Act 1999 so as not pose a threat to site personnel or nearby sensitive receivers.	Weed control contractor	Project Delivery	Environment Manager
PW19	Herbicide application will be undertaken during optimal seasonal conditions and in accordance with manufactures guidelines on application rates, intervals etc.	Weed control contractor	Project Delivery	Environment Manager
PW20	All chemical applications will be communicated and coordinated with relevant land holders.	WPM ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager Community consultation manager
PW21	Application of herbicide will only be applied such that impacts on surrounding properties (including agricultural land/ sensitive environments) are avoided.	ECM	Project Delivery	Environment Manager Community Engagement Manager
TOPSOIL STRIPPING				
PW22	Topsoil stripped from areas containing high densities of weeds will be treated and / or disposed of according to jurisdictional requirements. This may include on site burial or removal to an appropriately licensed waste management facility.	ECM	During topsoil stripping	Environment Coordinator Site Supervisor
GENERAL CONSTRUCTION				
PW23	Weekly inspections for weed and pest infestations will be undertaken to assess the need for control measures during construction. Inspections for weeds and pests will be undertaken by person(s) appropriately trained in the identification of weeds and pests of significance in NSW and Nationally.	Weekly inspections	Project Delivery	Environment Manager Environment Coordinator Site Supervisor
PW24	Any weed infestations recorded during the project will be controlled using the following methods:	Weekly inspections	Project Delivery	Environment Manager Environment Coordinator

WEED, PEST AND PATHOGEN MANAGEMENT				
	<ul style="list-style-type: none"> ▶ Spraying with herbicides; and/or ▶ Mechanical removal. 			Site Supervisor
PW25	Construction sites will be managed to avoid the creation of habitat that favours pest species i.e. avoiding poor housekeeping, stockpiles of large woody debris and / or poor waste management.	Weekly Inspections	Project Delivery	Environment Coordinator Site Supervisor
DOCUMENTATION				
PW26	Documentation (including disposal receipts) will be maintained for all pest animal and weed control activities and will include records regarding application of herbicide.		Project Delivery	Environment Manager

7 Sustainability

The N2NS Project will pursue an Infrastructure Sustainability Council of Australia (ISCA) rating under the IS Rating Scheme V1.2.

The IS Rating Scheme (IS) is a comprehensive rating system for evaluating sustainability across the planning, design, construction and operational phases of infrastructure programs, projects, networks and assets. IS evaluates the sustainability performance of the quadruple bottom line (Governance, Economic, Environmental and Social) of infrastructure development.

This plan relates to Eco-1 Ecological Value and Eco-2 Habitat Connectivity. Eco-1 is measured on a sliding scale and Trans4m Rail will be aiming for an increase in ecological value of 5% and Level 1 for Eco-2. ISCA benchmarks are shown in Table 10 below.

The above targets will be achieved via the implementation of the mitigation measures detailed in Table 10 below.

Table 10: ISCA Scorecard Biodiversity Benchmarks

	LEVEL 1	LEVEL 2	LEVEL 3
BENCHMARK	ECO-1 ECOLOGICAL VALUE (LEVEL 1 TO 3 ON A SLIDING SCALE)		
	The ecological value of the infrastructure site is maintained.	The ecological value of infrastructure site is enhanced by 0 to 20%.	Fractions of Levels may be achieved on a sliding scale up to 20% for Level 3.
	ECO-2 HABITAT CONNECTIVITY		
	The existing degree of habitat connectivity is maintained.	NA	NA

8 Declaration of Accuracy

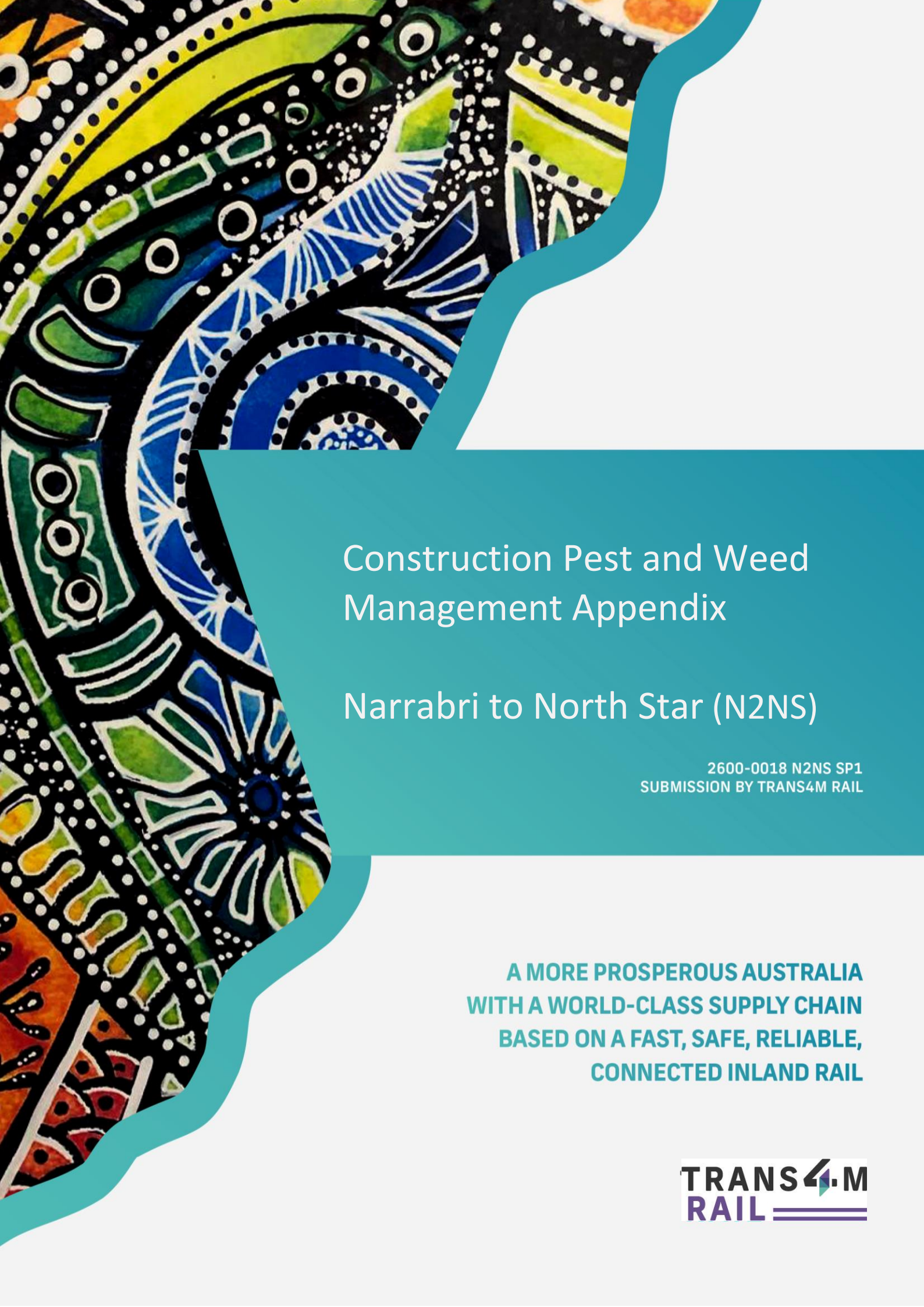
I declare that to the best of my knowledge, all the information contained in, or accompanying, this document is complete, current and correct. In making this declaration, I am aware that section 491 of the Environment Protection and Biodiversity Act 1999 (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the Environment Protection and Biodiversity Conservation Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration, and I have no knowledge of that authorisation being revoked at the time of making this declaration.”

Authorised Signatory (Trans4m Rail):

Date:

16/06/2023

Appendix A Construction Pest and Weed Management Plan



Construction Pest and Weed Management Appendix

Narrabri to North Star (N2NS)

2600-0018 N2NS SP1
SUBMISSION BY TRANS4M RAIL

**A MORE PROSPEROUS AUSTRALIA
WITH A WORLD-CLASS SUPPLY CHAIN
BASED ON A FAST, SAFE, RELIABLE,
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Document Control

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Name	Michael Matthews	Jon Holmes
Title	Environment Manager	Project Director
Signature	Refer Aconex Workflow	Refer Aconex Workflow
Date		

Revision History

REVISION	DATE ISSUED	DESCRIPTION
A	08/10/2020	Issued for Internal Review
B	30/10/2020	Issued for External Review
C	13/01/2021	Amended to address stakeholder comments
D	25/02/2021	Amended to address stakeholder comments
E	08/03/2021	Amended to address stakeholder comments
F	26/03/2021	Amended to address stakeholder comments
0	08/04/2021	Issued for Use
1	20/08/2021	Updated to include weed management measures as recommended by the Project Ecologist

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1 Introduction

1.1 Purpose

This Construction Pest and Weed Management Plan (PWMP) forms part of the Biodiversity Management Sub-Plan (BMP) for the Narrabri to North Star (Separable Portion 1) (N2NS) Project and details the key mitigation measures that will be implemented by Trans4m Rail in order to minimise and manage the N2NS project impacts on the environment and community. This PWMP outlines the potential impacts associated with pests and weeds and corresponding mitigation measures likely during the construction phase of the N2NS project which will be undertaken by Trans4M Rail. Construction of N2NS will result in activities that have the potential to be impacted by pests and weeds listed under Commonwealth, NSW and Local Government regulations.

1.2 Scope

The PWMP builds on the biodiversity assessment undertaken for the Environmental Impact Statement (EIS) and Submissions Preferred Infrastructure Report (SPIR) which assessed impacts of pests and weeds during construction. Trans4m Rail and our expert ecologists GeoLINK identified a suite of reasonable and feasible pest and weed management and mitigation measures to be implemented during construction of N2NS. The PWMP outlines these management and mitigation measures.

1.3 Objectives and Targets

Pest and Weed objectives and targets are outlined in Table 1 and have been established as a means of guiding environmental management of the project and assessing environmental performance. These objectives and targets have been developed with consideration of key pest and weed issues identified through the environmental assessment and risk assessment process as well as the CoAs and RMMs.

The objectives and targets are consistent with Trans4m Rail's Environment Policy and will assist in monitoring whether the commitments of the policy are being met. The performance of the Project will be monitored against the objectives and targets. Project performance monitoring will be documented in the Project construction compliance reports and at least on a quarterly basis as part of the management review.

A key objective of this PWMP is to ensure that the project will:

- ▶ *Prevent the introduction and / or spread of weeds from construction areas to any retained areas of Belson's Panic, Natural Grasslands, Brigalow and Weeping Myall Woodlands ecological communities as required under EPBC CoA 1(b).*

Given the inability of the project to access areas outside of the approved Construction Impact Zone (CIZ) associated with retained areas containing MNES this plan focuses on measures to detect and control weeds within the CIZ and avoid transportation of weeds offsite through implementation of weed hygiene protocols. Associated mitigation measures are considered to be sufficient to achieve this and other objectives included in Table 1.

Table 1: Objectives and Targets

OBJECTIVE	TARGET
Prevent the introduction and/ or spread of weeds from construction areas to any retained areas of Belson's Panic, Natural Grasslands, Brigalow and Weeping Myall Woodlands ecological communities.	Suppression and control of all weed infestations within the Construction Impact Zone (CIZ) in accordance with this Pest and Weed Management Plan throughout the entire project.
	Implement the weed hygiene protocol including vehicle wash-down and weed hygiene declarations for all plant / vehicles entering/ leaving the site.

OBJECTIVE	TARGET
No new pests or weeds (listed under Commonwealth, NSW and Local Government Regulations) introduced to the project area as a result of construction activities.	Trans4m Rail personnel (including sub-contractors, etc.) will complete an environmental induction (including requirements in relation to weed reporting / management and weed hygiene protocols) prior to commencing works on-site.
	Two environmental communications will be undertaken each month of the project (i.e. toolbox talks, site meetings, etc.) where pest and weed issues will be specifically addressed.
	Weekly environmental inspections will be undertaken to monitor the presence, abundance and types of pests and/ or weeds present and record any new weed infestations or pest populations.
	Implement the weed hygiene protocol including vehicle wash-down and weed hygiene declarations for all plant/ vehicles entering/ leaving the site.
	Commence control of newly identified pest or weed infestations (WONS or Priority Weeds) within 2 weeks of identification.
No increase in the abundance or distribution of pests or weeds currently existing within the project area as a result of construction activities.	Undertake weekly environmental inspections to monitor the presence, abundance and types of pests and weed species present and record any new weed infestations or pest populations.
	Implement the weed hygiene protocol including vehicle wash-down and weed hygiene declarations for all plant/ vehicles entering/ leaving the site.
	Any weed infestations recorded during the project will be controlled using herbicide application or manual removal.
Maintain positive and cooperative relationships with local communities and Avoid detrimental pest or weed impacts on adjacent landholdings.	Stakeholder complaints will be addressed in a timely and appropriate manner.
	Non-conformances and corrective actions will be managed in accordance with Section 8 of the CEMP.
	Full compliance with and no breaches of the legislative requirements (i.e. EPBC Act, CoA's, SPIR, RMMs and Project EIS) relevant to the construction phase of the Project.
	Full implementation and compliance with mitigation measures within this Pest and Weed Management Plan.

The implementation of the mitigation measures will ensure the performance targets are achieved. This will be managed through project inductions, specialised training, toolbox talks, inspections, and environmental monitoring and auditing. Project inductions will inform Trans4m Rail personnel (including subcontractors) of the management measures, while toolbox talks, and specialised training will ensure they are reinforced throughout the construction program.

1.4 Legislation

Legislation considered during the development of the PWMP includes:

- ▶ *Biosecurity Act (Commonwealth), 2015*
- ▶ *Biosecurity Act (NSW), 2015*
- ▶ *Biosecurity Regulation (NSW), 2017*
- ▶ *Agricultural and Veterinary Chemicals (NSW) Act, 1994*
- ▶ *Pesticides Act, 1999*
- ▶ *Local Land Services Act, 2013*
- ▶ *Game and Feral Animal Control Act, 2002*

1.5 Guidelines

Guidelines and standards relating to the management of pests and weeds include:

- ▶ NSW Weed Control Handbook, DPI 2018
- ▶ Factsheet: Vehicle Biosecurity Kit – Plant Industries, Department of Primary Industries, 2012
- ▶ Noxious and Environmental Weed Control Handbook, 6th Edition, DPI 2014
- ▶ Bringing Feed and Fodder into NSW: High Risk Weeds, DPI 2018
- ▶ Weeds of National Significance Weed Management Guide (Commonwealth)
- ▶ North West Regional Strategic Weed Management Plan 2017 – 2022, Local Land Services 2017
- ▶ Weed Management and Disposal Guide, Transport for NSW 2016.

2 Pest and Weed Species Recorded on the Site

A summary of the key findings from the EIS and SPIR are outlined below. Further detail can be found in the N2NS EIS and associated Technical Report 2 (Biodiversity Assessment Report).

The majority of the biodiversity assessment area is cleared or contains non-native vegetation. Table 2 lists the weed and pest species as identified N2NS EIS and associated Technical Report 2 (Biodiversity Assessment Report).

Table 2: Pest and Weed Species List

WEEDS OF NATIONAL SIGNIFICANCE (LISTED AS PRIORITY WEEDS BY THE NSW DPI)	RELATIVE ABUNDANCE
<ul style="list-style-type: none"> ▶ African Boxthorn (<i>Lycium ferocissimum</i>) 	<p>Located in 22 of the 54 plot / transect locations undertaken during the Project EIS. This WONS was located within the following Plant Community Types:</p> <ul style="list-style-type: none"> - Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion - Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion - Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion - Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and aeolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion - River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion - Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion - Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion
<ul style="list-style-type: none"> ▶ Tiger Pear (<i>Opuntia aurantiaca</i>) 	<p>Located in 10 of the 54 plot / transect locations undertaken during the Project EIS. This WONS was located within the following Plant Community Types:</p> <ul style="list-style-type: none"> - River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion - Cleared/non-native vegetation
<ul style="list-style-type: none"> ▶ Common Prickly Pear (<i>Opuntia stricta</i>) 	<p>Located in 20 of the 54 plot / transect locations undertaken during the Project EIS. This WONS was located within the following Plant Community Types:</p> <ul style="list-style-type: none"> - Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion - Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion - Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

	<p>- River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion</p> <p>- Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion</p> <p>- Cleared/non-native vegetation</p>
OTHER WEEDS	
<ul style="list-style-type: none"> ▶ Maynes Pest (<i>Glandularia aristigera</i>) ▶ Bathurst Burr (<i>Xanthium spinosum</i>) ▶ Rhodes Grass (<i>Chloris gayana</i>) ▶ Black-berry Nightshade (<i>Solanum nigrum</i>) ▶ Lippia (<i>Phyla canescens</i>) ▶ Bishops Weed (<i>Ammi majus</i>) ▶ Curled Dock (<i>Rumex crispus</i>) ▶ Flaxleaf Fleabane (<i>Conyza bonariensis</i>) ▶ Spiked Malvastrum (<i>Malvastrum americanum</i>) ▶ Sida spinosa ▶ Cat-head (<i>Tribulus terrestris</i>) ▶ Sorghum (<i>Sorghum bicolor</i>) ▶ Cobblers Pegs (<i>Bidens pilosa</i>) ▶ Bearded Oats (<i>Avena barbata</i>) ▶ Gomphrena Weed (<i>Gomphrena celosioides</i>) ▶ Turnip Weed (<i>Rapistrum rugosum</i>) ▶ Panic Veldtgrass (<i>Ehrharta erecta</i>) ▶ Urochloa Grass (<i>Urochloa panicoides</i>) ▶ Slender Panic (<i>Paspalidium gracile</i>) 	<p>Identified in 21 of the 54 plot / transect locations.</p> <p>Identified in 5 of the 54 plot / transect locations.</p> <p>Identified in 10 of the 54 plot / transect locations.</p> <p>Identified in 15 of the 54 plot / transect locations.</p> <p>Identified in 1 of the 54 plot / transect locations.</p> <p>Identified in 2 of the 54 plot / transect locations.</p> <p>Identified in 5 of the 54 plot / transect locations.</p> <p>Identified in 28 of the 54 plot / transect locations.</p> <p>Identified in 19 of the 54 plot / transect locations.</p> <p>Identified in 18 of the 54 plot / transect locations.</p> <p>Identified in 15 of the 54 plot / transect locations.</p> <p>Identified in 8 of the 54 plot / transect locations.</p> <p>Identified in 21 of the 54 plot / transect locations.</p> <p>Identified in 3 of the 54 plot / transect locations.</p> <p>Identified in 10 of the 54 plot / transect locations.</p> <p>Identified in 14 of the 54 plot / transect locations.</p> <p>Identified in 10 of the 54 plot / transect locations.</p> <p>Identified in 17 of the 54 plot / transect locations.</p> <p>Identified in 17 of the 54 plot / transect locations.</p>
PEST SPECIES	
<ul style="list-style-type: none"> ▶ Pig (<i>Sus scrofa</i>) ▶ Red fox (<i>Vulpes vulpes</i>) ▶ Cat (<i>Felis catus</i>) ▶ Brown hare (<i>Lepus capensis</i>) ▶ House mouse (<i>Mus musculus</i>) ▶ Sheep (<i>Ovis aries</i>) 	<p>Unknown</p> <p>Unknown</p> <p>Unknown</p> <p>Unknown</p> <p>Unknown</p> <p>Unknown</p>

3 Potential Impacts

Technical Report 2 (Biodiversity Assessment Report) of the EIS identified the following risks associated with weeds on the project:

- ▶ Potential infestations from weeds being brought onto the site with imported materials; and
- ▶ Increases in weeds associated with vegetation clearing.

The increased presence of weeds within the Development Site has the potential to decrease the value of retained vegetation to native species, particularly threatened species.

Other identified indirect impacts associated with pests and weeds from the EIS include:

- ▶ Dispersal of weed propagules (seeds, stems and pollen) into areas of native vegetation through erosion (wind and water) and the movement of workers and vehicles;
- ▶ Potential spread of soil-borne pathogens of native plants (for example, *Phytophthora* (*Phytophthora cinnamomi*) spread on machinery;
- ▶ Potential spread of Chytrid fungus into local native frog populations, through soil and water on machinery and through human contact; and
- ▶ The potential for weeds and disease to be transferred from one property to another via construction vehicles or machinery, or construction crew clothing and footwear; and attraction of pest animals to construction rubbish bins.

4 Mitigation and Management Measures

4.1 EIS

The following management measures were recommended in the Technical Report 2 (Biodiversity Assessment Report) of the EIS to minimise the potential impacts and spread of weeds during the construction of the proposal:

- ▶ Any vehicles or equipment being brought onto the Development Site to be involved in ground disturbance activities and/or travelling around the site must be inspected and cleaned prior to commencing work to limit the spread of seeds and plant material between sites;
- ▶ Regular inspections will be undertaken in the Development Site to monitor the spread of weed species;
- ▶ Training of environmental personnel on the identification of target weed species; and
- ▶ Any outbreak of priority weeds will be controlled and eradicated as required under the Biosecurity Act, 2015, and as required by the Local Land Services and other relevant authorities. Weed control and eradication techniques may include:
 - ✓ spraying with herbicides
 - ✓ physical removal e.g. chipping, and/or
 - ✓ minimisation of area available for weed infestation, through prompt revegetation of bare areas.

These measures have been incorporated into this PWMP.

4.2 Pest and Pathogen Management

Should pest or pathogen infestations be identified at the site, a qualified specialist will be engaged to prepare a specific management procedure in consultation with the client and relevant stakeholders.

Mitigation and management measures are included in Table 4 to avoid an increase in distribution and abundance of pest species as a result of construction activities.

4.3 Weed Management

Initial identification of weeds on the project site would be undertaken during ecologist pre-clearing surveys prior to vegetation clearing commencing with locations of priority weed infestation to be shown in project Environmental Control Maps (ECMs). Initial weed control would then be undertaken prior to/ during clearing by:

- ▶ Spraying of herbicides; and
- ▶ Mechanical removal.

Ongoing management of weeds would be undertaken throughout the project facilitated by the identification of weed infestations during weekly environmental inspections.

Any use of herbicides will be strictly in accordance with the *Pesticides Act 1999* and product label. Where approved herbicides are required to be used to control weed species near water, i.e. creeks, drainage depressions and stormwater drains, extra care is to be taken to limit overspray. All herbicides will only be used during suitable weather conditions. Herbicides will not be used without the prior approval of the Environment Manager or delegate. If a non-glyphosate herbicide is to be used, approval from the Safety Manager and the Environmental Manager is required.

4.4 Weed Hygiene Protocol

A weed hygiene protocol will be implemented on the project to prevent the spread of weed propagules to/ from the site. This would include:

- ▶ All mobile plant and vehicles will be clean of mud or organic material prior to arriving and departing from the site.

- ▶ Wash-down of vehicles / plant will be undertaken at designated bunded wash-down areas in the following instances:
 - ✓ Vehicles / plant arrive at site with mud / organic materials.
 - ✓ All vehicles / plant leaving the site
 - ✓ Where vehicles / plant have moved through areas mapped as containing weed infestations as shown on ECMs.
- ▶ Weed hygiene declarations will be obtained for all vehicles, plant and equipment when entering / leaving the site.

5 Risk Management

Section 7 of Trans4m Rail's CEMP contains a project wide risk assessment, which includes an assessment of construction phase pest and weed risk. Table 3 below summarises (and expands on) those risks from the CEMP, whilst assessing and scoring the pre and post mitigation risk in accordance with the matrices below. Indicative mitigation measures and documents have been identified in Table 3, whilst a full and comprehensive list of mitigation measures is provided in Table 4. In the event of an inconsistency between Table 3 and 4, the mitigation measure/s shown in Table 4 take precedence for the extent of the inconsistency.

Likelihood Rating

PROBABILITY OR CHANCE	QUALITATIVE ASSESSMENT	RECURRENCE TIMEFRAME	CONSEQUENCE						
			RATING	1	2	3	4	5	
≥ 90%	Almost certain to occur during the project / contract life	Less than "Monthly"	LIKELIHOOD	ALMOST CERTAIN	D	C	B	A	A
51% to 89%	Considered likely to occur during the project / contract life	"Monthly" to "Yearly"		LIKELY	D	D	C	B	A
30% to 50%	Considered a possible occurrence during the project / contract life	Between 2 and 5 years		POSSIBLE	E	D	C	C	B
5% to 29%	Considered unlikely to occur during the project / contract life	Between 5 and 20 years		UNLIKELY	E	E	D	C	B
< 5%	Considered a rare occurrence to happen during the project / contract life	Greater than every 20 years		RARE / REMOTE	E	E	D	D	C

Risk / Opportunity Rating Table

Opportunity Consequence Rating

RATING	CONSEQUENCE - RISK				
	1	2	3	4	5
Workplace Health and Safety	* First aid injury, and/or * Minor safe working issues	* Medical treatment, and/or * Moderate safe working breach likely to impact on operations	* Serious medical / hospital treatment resulting in need alternate working or resulting in lost time injury, and/or * Significant safe working breach with actual impact on operations	* Serious or permanent Injury, and/or * Significant safe working breach with immediate impact on operations on one or more worksites	* 1 or more fatalities, and/or * Major breach of safe working with immediate and extensive impact on one or more worksites
Budget (\$AUD)	< \$6,307,026 (<1%) under project budget	\$6,307,026 to \$31,535,130 (1% to 3%) under project budget	\$31,535,130 to \$31,535,130 (3% to 5%) under project budget	\$31,535,130 to \$63,070,261 (5% to 10%) under project budget	>\$63,070,261 (>10%) under project budget
Time Schedule (Target Program)	< 10 days (<1% of program) under the critical path program	10 to 21 days (1% to 2% of program) under the critical path program	21 to 32 days (2% to 3% of program) under the critical path program	32 to 54 days (3% to 5% of program) under the critical path program	>54 days (>5% program) under the critical path program
Environment & Natural Resources	* Low severity environmental impact(s) or impact on natural resources availability that are promptly reversible and affected area is within the site boundary	* Nuisance or low severity environmental impact(s) or impact on natural resources availability that are promptly reversible and affected area is outside the site boundary	* Moderate severity environmental impact(s) or impact on natural resources availability where the affected area is within the site boundary	Moderate severity environmental impact(s) or impact on natural resources availability where the affected area is outside the site boundary	High severity environmental impact(s) or impact on natural resources availability at local scale significance

Table 3: Pest and Weed Species Risk Management

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
Entire project	Introduction and/ or spread of weeds from construction areas to any retained areas of Belson's Panic,	B	▶ Throughout the project priority weeds will be managed in accordance with requirements of the <i>Biosecurity Act 2015</i> and <i>Biosecurity Regulation 2017</i> , and Weeds of National Significance (WoNS)	E	▶ Weeds of National Significance Weed Management Guide. ▶ NSW Weed Control Handbook.

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
	Natural Grasslands, Brigalow and Weeping Myall Woodlands ecological communities.		<p>will be managed in accordance with the <i>Weeds of National Significance Weed Management Guide</i>.</p> <ul style="list-style-type: none"> ▶ If identified on site pest species and pathogens will be managed in accordance with relevant best practice guidelines. ▶ Should pest population control be required, a qualified specialist will be engaged to undertake this work and provide detailed advice. Where pest control has been undertaken, a record will be made and maintained. Monitoring of the effectiveness of the pest control measures as well as notification or neighbouring landholders would be undertaken as advised by the qualified pest specialist. 		<ul style="list-style-type: none"> ▶ Noxious and Environmental Weed Control Handbook. ▶ Weed Management and Disposal Guide. ▶ Weed & Pest Management ECP (T4MR-FRM-ENV-001-12)
Pre-construction	Potential spread of weeds, pest species and pathogens.	B	<ul style="list-style-type: none"> ▶ As part of ecologist pre-clearing surveys of the project site, weed infestations would be recorded and mapped on Environmental Control Maps for the project to inform management during construction. ▶ Site personnel will be trained on the locations and target weed species during project inductions which would include the following specific components for weed and pest management: <ul style="list-style-type: none"> ✓ Identification of weed and pest 	E	<ul style="list-style-type: none"> ▶ Environmental Control Maps ▶ Project induction ▶ Weed & Pest Management ECP (T4MR-FRM-ENV-001-12)

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<p>species known to be present on the site,</p> <ul style="list-style-type: none"> ✓ Ecological impacts associated with invasive weeds and pests, ✓ Mitigation and hygiene measures for controlling weeds and pests, ✓ Awareness of human vectors in the introduction of weeds and pests. <p>▶ If pathogens are identified on the site a Pathogen Management Procedure will be developed and implemented. This will include but is not limited to:</p> <ul style="list-style-type: none"> ✓ Exclusion zones using fencing and signage, ✓ Hygiene washdowns for plant, light vehicles and personnel, and ✓ Additional toolbox training in relation to location of pathogen and requirements for personnel. 		
Movement of plant/ machinery	Spread or introduction of weed propagules to/ from the site from movements of vehicles/ plant.	B	<p>▶ All vehicles or equipment being brought onto the site must be inspected and cleaned (i.e. must be clean of any mud or organic material) prior to commencing work to limit the spread of weed seeds and plant material between sites. All plant/ equipment demobilising from site</p>	E	<ul style="list-style-type: none"> ▶ Vehicle/ plant hygiene declarations ▶ Project induction ▶ Factsheet: Vehicle Biosecurity Kit – Plant Industries ▶ Weed & Pest Management ECP (T4MR-

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<p>must be inspected and cleaned prior to leaving.</p> <ul style="list-style-type: none"> ▶ Washing of vehicles, plant and equipment will be undertaken in an appropriately bunded wash down area. ▶ Weed hygiene declarations or the like will be obtained for all vehicles, plant and equipment entering/ leaving the site. ▶ All mobile plant and vehicles, including deliveries, must use designated travel routes, site access tracks and lay-down areas. 		FRM-ENV-001-12)
Vegetation clearing	Proliferation and spread of weeds on the project site and surrounds as a result of ground disturbance.	B	<ul style="list-style-type: none"> ▶ Weed control of identified areas of priority weeds would be undertaken prior to/ during clearing and grubbing involving the following methods: <ul style="list-style-type: none"> ✓ Spraying with herbicides. ✓ Mechanical removal. ▶ Where practicable, areas known to be infested with weeds will be cleared separately to non-infested areas to prevent cross contamination and reduce vehicle/plant/equipment cleaning requirements. ▶ Erosion and sediment control techniques will be undertaken to assist with the management of removed vegetation and subsequent exposed soils and to 	E	<ul style="list-style-type: none"> ▶ Environmental Control Maps ▶ Soil and Water Management Plan ▶ Weed & Pest Management ECP (T4MR-FRM-ENV-001-12)

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<p>prevent further weed outbreaks.</p> <ul style="list-style-type: none"> ▶ Any vegetation stockpiled after clearing will be managed to prevent the spread of weeds. 		
Use of herbicide	Adverse impacts to the environment and adjoining lands from herbicide.	C	<ul style="list-style-type: none"> ▶ Herbicide application will only be undertaken by suitably qualified personnel in strict accordance with the requirements of the <i>Pesticides Act 1999</i> so as not pose a threat to site personnel or nearby sensitive receivers. ▶ Herbicide application will be undertaken during optimal seasonal conditions and in accordance with manufactures guidelines on application rates, intervals etc. ▶ Application of herbicide will only be applied such that unwanted impacts on surrounding properties (including agricultural land) are avoided. ▶ All chemical applications will be communicated and coordinated with relevant land holders. 	E	<ul style="list-style-type: none"> ▶ Weed & Pest Management ECP (T4MR-FRM-ENV-001-12)
Topsoil stripping	Proliferation and spread of weeds on the project site and surrounds as a result of topsoil stripping.	B	<ul style="list-style-type: none"> ▶ Topsoil stripped from areas containing high densities of weed will be treated and disposed of according to jurisdictional requirements. This may include on site burial or removal to an appropriately licensed waste management facility. 	E	<ul style="list-style-type: none"> ▶ Weed & Pest Management ECP (T4MR-FRM-ENV-001-12)
General construction	Proliferation and spread of weeds on	B	<ul style="list-style-type: none"> ▶ Weekly inspections for weed and pest infestations will be 	E	<ul style="list-style-type: none"> ▶ Weed & Pest Management ECP (T4MR-

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
	the project site and surrounds.		<p>undertaken to assess the need for control measures during construction. Inspections for weeds and pests will be undertaken by person(s) appropriately trained in the identification of weeds and pests of significance in NSW and Nationally.</p> <ul style="list-style-type: none"> ▶ Any weed infestations recorded during the project would be controlled using the following methods: <ul style="list-style-type: none"> ✓ Spraying with herbicides. ✓ Mechanical removal. 		FRM-ENV-001-12)
Documentation	Non-Compliance with regulatory requirements	B	<ul style="list-style-type: none"> ▶ Documentation (including disposal receipts) will be maintained for all pest animal and weed control activities and will include records regarding application of herbicide. 	E	▶ Weed & Pest Management ECP (T4MR-FRM-ENV-001-12)

Section 26.3 of the N2NS EIS provides a summary of the potential residual impacts for the project with a description of how these potential residual impacts would be managed. No residual construction pest or weed impacts have been identified.

Table 4 details the mitigation measures that will be implemented by Trans4m Rail to manage weed, pest and pathogen risks on the project.

Table 4: Pest and Weed Mitigation Measures

ID	MEASURE / REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
PW1	During the project priority weeds will be managed in accordance with requirements of the Biosecurity Act 2015 and Weeds of National Significance (WoNS) will be managed in accordance with the Weeds of National Significance Weed Management Guide.	CEMP PWMP WPM ECP (T4MR-FRM-ENV-001-12)	Throughout project	Environment Manager Construction Managers
PW2	If identified on site pest species and pathogens would be managed in accordance with relevant best practice guidelines. A qualified specialist will be engaged to prepare a specific management procedure in consultation with the client and relevant stakeholders for any pest/ pathogen identified on the site.	Industry best practice	Throughout project	Environment Manager Environmental Coordinators Site Supervisor
PW3	Should pest population control be required, a qualified specialist will be engaged to undertake this work and provide detailed advice. Where pest control has been undertaken, a record will be made and maintained. Monitoring of the effectiveness of the pest control measures as well as notification or neighbouring landholders will be undertaken as advised by the qualified pest specialist.	Subcontractor	Throughout project	Environment Manager Environmental Coordinators Site Supervisor
PRE-CONSTRUCTION				
PW4	Prior to construction as part of pre-clearing ecologist surveys of the project site, weed infestations will be recorded and mapped on Environmental Control Maps (ECMs) for the project to inform weed management during construction.	Preclearing survey ECM, WPM ECP (T4MR-FRM-ENV-001-12)	Prior to clearing commencing	Environment Manager Ecologist
PW5	Site personnel will be trained during project inductions on target weed species and weed infestations shown on ECMs. Training will include: <ul style="list-style-type: none"> ▶ Identification of weed and pest species known to be present on the site; ▶ Ecological impacts associated with invasive weeds and pests; ▶ Mitigation and hygiene measures for controlling weeds and pests; ▶ Awareness of human vectors in the introduction of weeds and pests. 	Project induction	Throughout project	Environment Manager
PATHOGEN MANAGEMENT				
PW6	If pathogens are identified on the site a Pathogen Management Procedure will be developed and implemented. This will include but is not limited to: <ul style="list-style-type: none"> ▶ Exclusion zones using fencing and signage; ▶ Hygiene washdowns for plant, light vehicles and personnel; and 		Throughout project	Environment Manager, Engineer, Site supervisor

ID	MEASURE / REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	<ul style="list-style-type: none"> Additional toolbox training in relation to locations of pathogen and requirements for personnel. 			
MOVEMENT OF PLANT/ MACHINERY				
PW7	Mobile plant and vehicles must be clean of any mud or organic material, prior to arriving or departing from site to prevent the spread of weeds and disease.	ECM, WPM, ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager, Environmental Coordinators Site supervisor
PW8	Further washdown of vehicles, plant and equipment will be conducted as required. For example, where plant or vehicles have left sealed roads and driven through a known or potentially weed infested area then immediate washing will be required.	ECM, WPM, ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager, Environmental Coordinators Site supervisor
PW9	Further washdown of vehicles, plant and equipment will be conducted when transferring between sensitive landholdings within the project area.	ECM	Project Delivery	Engineer Site supervisor
PW10	Washing of vehicles, plant and equipment will be undertaken in an appropriately bunded wash down area.	ECM, WPM, ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager, Environmental Coordinators All site personnel
PW11	Weed hygiene declarations will be obtained for all vehicles, plant and equipment on the site.	Weed hygiene declaration		Environment Manager Site supervisor
PW12	Vendors supplying materials with the potential to contain weeds or pests (e.g soil/fill, mulch etc.) will be required to provide written assurance that all supplied materials are free from any weeds or pests.	Weed hygiene declaration or similar	Project Delivery	Environment Manager Engineer
PW13	All mobile plant and vehicles, including deliveries, must use designated travel routes, site access tracks and lay-down areas.	Vehicle movement plan	Project Delivery	Environment Manager Construction Manager
VEGETATION CLEARING				
PW14	<p>Weed control of identified areas of priority weeds will be undertaken prior to/ during clearing and grubbing involving the following methods:</p> <ul style="list-style-type: none"> Spraying with herbicides; and/or Mechanical removal. <p>NOTE: The Project's Ecologist has recommended careful excavation and deep burial (<1m below ground level) for the WONS identified (<i>Opuntia spp.</i>) on the project. If the African Boxthorn is not in seed, then it may be slashed / cleared in conjunction with surrounding vegetation. Otherwise, if the African Boxthorn is in seed, then deep burial is the recommended management option.</p>	ECM, WPM, ECP (T4MR-FRM-ENV-001-12) Weed control contractor	Prior to/ during clearing	Environment Manager Environment Coordinator Site Supervisor
PW15	Where practicable, areas known to be infested with weeds will be cleared separately to non-	ECM	During clearing	Environment Manager

ID	MEASURE / REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	infested areas to prevent cross contamination and reduce vehicle/plant/equipment cleaning requirements.			Environment Coordinator Site Supervisor
PW16	Erosion and sediment control techniques will be undertaken to assist with the management of removed vegetation and subsequent exposed soils and to prevent further weed outbreaks.	Progressive erosion sediment control plan (PESCP)	Immediately after clearing	Environment Manager Environment Coordinator Site Supervisor
PW17	Any vegetation stockpiled after clearing will be managed to prevent the spread of weeds.	ECM	Immediately after clearing	Environment Manager Superintendent
USE OF HERBICIDE				
PW18	Herbicide application will only be undertaken by suitably qualified personnel in strict accordance with the requirements of the Pesticides Act 1999 so as not pose a threat to site personnel or nearby sensitive receivers.	Weed control contractor	Project Delivery	Environment Manager
PW19	Herbicide application will be undertaken during optimal seasonal conditions and in accordance with manufactures guidelines on application rates, intervals etc.	Weed control contractor	Project Delivery	Environment Manager
PW20	All chemical applications will be communicated and coordinated with relevant land holders.	ECM, WPM, ECP (T4MR-FRM-ENV-001-12)	Project Delivery	Environment Manager Community consultation manager
PW21	Application of herbicide will only be applied such that impacts on surrounding properties (including agricultural land/ sensitive environments) are avoided.	ECM	Project Delivery	Environment Manager Community Engagement Manager
TOPSOIL STRIPPING				
PW22	Topsoil stripped from areas containing high densities of weeds will be treated and / or disposed of according to jurisdictional requirements. This may include on site burial or removal to an appropriately licensed waste management facility.	ECM	During topsoil stripping	Environment Coordinator Site Supervisor
GENERAL CONSTRUCTION				
PW23	Weekly inspections for weed and pest infestations will be undertaken to assess the need for control measures during construction. Inspections for weeds and pests will be undertaken by person(s) appropriately trained in the identification of weeds and pests of significance in NSW and Nationally.	Weekly inspections	Project Delivery	Environment Manager Environment Coordinator Site Supervisor
PW24	Any weed infestations recorded during the project will be controlled using the following methods: <ul style="list-style-type: none"> ▶ Spraying with herbicides; and/or ▶ Mechanical removal. NOTE: The Project's Ecologist has recommended careful excavation and	Weekly inspections	Project Delivery	Environment Manager Environment Coordinator Site Supervisor

ID	MEASURE / REQUIREMENT	RESOURCES	WHEN TO IMPLEMENT	RESPONSIBILITY
	deep burial (<1m below ground level) for the WONS identified (<i>Opuntia spp.</i>) on the project. If the African Boxthorn is not in seed, then it may be slashed / cleared in conjunction with surrounding vegetation. Otherwise, if the African Boxthorn is in seed, then deep burial is the recommended management option.			
PW25	Construction sites will be managed to avoid the creation of habitat that favours pest species i.e. avoiding poor housekeeping, stockpiles of large woody debris and / or poor waste management.	Weekly Inspections	Project Delivery	Environment Coordinator Site Supervisor
PW26	Following completion of construction, weed monitoring (and subsequent management) will occur whilst Tran4m Rail has site possession and the EPL remains in place.	Monthly inspections	Rehabilitation and Revegetation	Environmental Coordinator
DOCUMENTATION				
PW27	Documentation (including disposal receipts) will be maintained for all pest animal and weed control activities and will include records regarding application of herbicide.	Disposal receipts	Project Delivery	Environment Manager



ABOUT THE ARTIST:
ANN JOHNSON

I am Ann Johnson, I am a Gamilaroi woman. I am the Eldest of ten children and the mother of four. A grandmother too.

I have always loved art. When I left school I did a Ticket writing traineeship in Newcastle and worked a David Jones. Soon after that I got married and had a family. We moved back to Moree in the early 1980s.

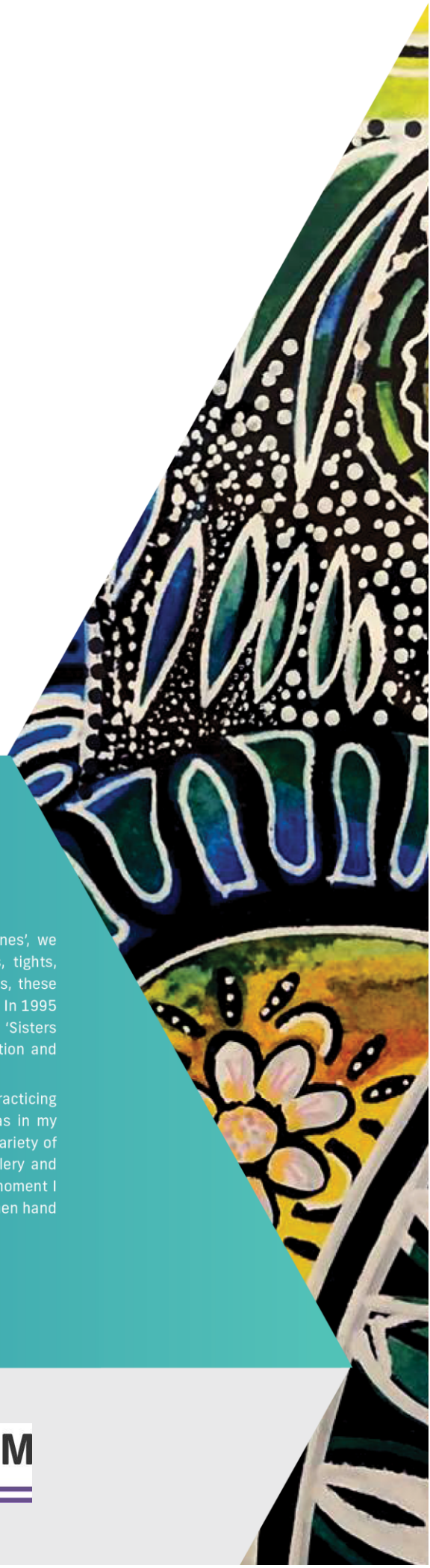
In the early 1990s I did an art course at Moree, which lead to a group of us setting up the Yurundiali Aboriginal Corporation. Janelle Boyd played a pivotal role in the setting up of Yurundiali, which designed and printed fabrics with Aboriginal designs.

In 1993 Janelle and I started 'Spirit Lines', we designed and printed them on t-shirts, tights, towels, ironing boards, and cooking mits, these were sold through Amnesty International. In 1995 we had a big exhibition in Moree called 'Sisters under the Skins', we also had an exhibition and fashion parade with Ken Done in Moree.

I produce art most days and if I am not practicing my art I am tossing around design ideas in my head. I like all types of art; I produce a variety of designs, do screen printing, make jewellery and sculpture amongst other things. At the moment I am exploring digitising my designs and then hand painting them using mixed media.



BEYOND THE TRACK: FOR OUR COVER ARTWORK, TRANS4M RAIL IS SUPPORTING AND FEATURING LOCAL MOREE ARTISTS



Appendix B Stakeholder Comments

DPIE -Biodiversity, Conservation and Science - Date 02/12/2020				
No	Comment	Page No	Recommendation	Response
1	<p>BCS has reviewed the draft document and notes that repetition exists throughout the BMP, particularly between Table 5 (biodiversity risk assessment), Table 9 (construction monitoring program), and Table 10 (biodiversity mitigation measures). Consideration should be given to whether some of these items could be combined to minimise repetition. Alternatively, where one item is amended as recommended within our response in Attachment A, all other relevant references to that matter must be</p>			<p>Table 5 (Biodiversity Risk Assessment) moved to Appendix C to avoid repetition within the document. Various changes made throughout remainder of document to remove and avoid repetition.</p>

	updated throughout the BMP.			
2	BCS notes that in numerous parts of the BMP it is stated that construction will only occur outside of the approved construction impact zone (CIZ) following the approval of a Consistency Assessment. Condition E17 of the Infrastructure Approval states that impacts to plant community types must not exceed those listed in Table E1 of the approval. BCS would welcome clarification on how impacts outside of those assessed through the Environmental Impact Statement can be approved via a Consistency Assessment rather			Section 3.4 added to include clarification of consistency assessment and modification.

	than a project modification.			
3	All criteria in the BMP including performance targets and monitoring actions should adhere to the SMART principles (specific, measurable, achievable, repeatable, time-bound). A Trigger Action Response Plan based on the plan’s objectives, performance measures and monitoring actions should be developed and inserted into the BMP.			Section 1.2 and Table 9 amended to provide a more comprehensive list of targets, following the SMART principles. A TARP has been prepared and included as an Appendix.
4	Section 1.2 Objectives and targets are outlined in section 1.2. The four performance targets that are listed are not comprehensive, and consideration should be given to		Increase the number of performance targets in section 1.2 so they cover the full scope and objectives of the BMP. All targets should adhere to	Section 1.2 amended to provide a more comprehensive list of targets, following the SMART principles.

	increasing the targets so they cover the full scope and objectives of the BMP. All performance targets should adhere to the SMART principles (specific, measurable, achievable, repeatable, time-bound).		the SMART principles.	
5	Section 3.1		Add the Environmental Planning and Assessment Act 1979.	Section 3.1 Updated to include the EP&A Act.
6	Section 4.1		Make the following edit in the third dot point – “...with the purchase retirement of ecosystems and species credits...”.	Section 4.1 Updated to reflect comment.
			4. Change the reference in dot point 7 from OEH to DPIE.	Section 4.1 Updated to reflect comment.

			5. Include a summary in section 4.1 of the creeks and rivers that the rail alignment crosses.	Section 4.1 Updated to include minor and major waterways along the alignment.
7	In Table 5 (and other sections and tables in the BMP) there is an explanation of the pre-clearing surveys that will be undertaken. If a pre-clearing checklist or proforma exists it would be beneficial to include a copy as an appendix to the BMP.		Include a copy of any pre-clearing survey checklist or proforma as an appendix to the BMP.	Appendix D DRAFT Pre-Clearance Checklist included. This Checklist is Draft and has been provided for information purposes. This Checklist will be further refined and finalised during the site establishment and mobilisation period.
8	Table 5 Clearing – Unexpected threatened species finds In Table 5 and section 4.11 of the BMP it is stated that unexpected threatened species finds will be documented by an ecologist and		Further information should be included in Table 5 and/or section 4.11 regarding the unexpected threatened species finds protocol that is proposed.	Appendix G added to provide additional detail regarding unexpected finds of threatened species and EEC's.

	<p>referred to the client and regulatory authorities. Further information should be provided regarding the individual steps in the protocol. The protocol used in the Inland Rail Parkes to Narromine Flora and Fauna Management Plan could potentially be used as an example.</p>			
<p>9</p>	<p>Table 5 Clearing – Felling of habitat trees BCS supports the salvage of habitat elements for re-use. The last dot point in Table 5 (Clearing – felling of habitat trees) states that hollow branches would be reused as hollow logs in adjacent retained vegetation where appropriate. Clarification is required regarding</p>		<p>Clarify in Table 5 Clearing (felling of habitat trees) whether salvaged habitat elements will be placed in the rail corridor or elsewhere. Detail the nature of discussions with landholders where private land will be the recipient site.</p>	<p>Table 5 updated. Hollow branches would be salvaged for re-use as hollow logs in adjacent retained vegetation within the CIZ, where appropriate</p>

	<p>whether this would be within the rail corridor, or in adjacent private property, or elsewhere. Where it will be outside the rail corridor, an overview of the agreements/discussions that have occurred with landholders should be provided.</p>			
10	<p>Table 5 Works in proximity to CIZ boundary Reference is made to the AS 4970-2009 Protection of trees on development sites. It is not clear what this document is or what its applicability is to this project. No clearing beyond</p>		<p>An explanation should be provided in Table 5 regarding the relevance of the AS 4970-2009 Protection of trees on development sites document and how it has been applied to this project.</p>	<p>Table 5 updated. -Trees that occur within the CIZ boundary that will be retained will be protected in accordance with AS 4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)). -Indirect impacts to any vegetation beyond the CIZ boundary will be managed in general accordance with AS 4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)).</p>

	the approved footprint, or construction impact zone (CIZ), should occur without approval. The BMP should clarify what procedure will be enacted if this does occur. Does it constitute an “incident” as per section 4.15?		10. Clarification in the BMP is required regarding what procedure will be enacted if clearing beyond the construction impact zone occurs.	Table 5 Updated. NOTE: No clearing of vegetation or disturbance to groundcover is permitted beyond the CIZ. Should clearing occur beyond the CIZ this will be considered an environmental incident and managed in accordance with Trans4m Incident and Event Management procedure (T4MR-MPR-SQE-010), ARTC’s Project Environmental Incident and Reporting Procedure (5-9020-0000-EEC-PR0001) and notification will occur in accordance with project approvals or licences. Incidents, emergencies, response plans and non-conformities are discussed in detail in Section 9 of the CEMP.
11	Table 5 Demolition of bridges/culverts (microbat habitat) It is proposed that a specified plan would be developed where large numbers of breeding microbats are identified (fourth dot point). This plan should be developed in consultation with BCS.		Update Table 5 Demolitions of bridges/culverts (microbat habitat) to state that any specific plan developed to manage large numbers or breeding microbats with regards to bridge or culvert demolition should include consultation with BCS.	Table 5 updated to include consultation with DPIE (BCS).
12	Table 7 states that a clearing permit is required prior to any clearing of		Provide further detail on the second item in Table 7 regarding	Table 7 updated to include additional detail regarding the Clearing Permit

	native vegetation. Further information is required regarding who prepares and approves this permit, and what information it will contain.		the clearing permit, including who prepares and approves it.	
13	Table 7; A Water Discharge Permit is required prior to any water being discharged from the site. Further information is required regarding who prepares and approves this permit, and what information it will contain.		Provide further detail on the fifth item in Table 7 regarding the Water Discharge Permit, including who prepares and approves it.	Table 7 updated to include additional detail regarding the Water Discharge Permit.
14	Section 4.7 Dot points two and three state that regular inspections and reviews will be undertaken on flora, fauna and weed management controls. The frequency of "regular" inspections and		Update section 4.7 to quantify how often "regular" inspections and reviews of flora, fauna and weed management controls will occur.	Section 4.7 updated. Inspections (and reviews of controls) will be undertaken weekly.

	reviews should be clearly stated.			
15	Table 9 Fauna		Add details to Table 9 regarding the monitoring to be undertaken for microbats.	Table 9 updated to include micrbat monitoring measures.
16	Section 4.12		Review the text in section 4.12 in the second dot point after “The ECMs will include” and update/edit accordingly.	Section 4.12 corrected.
17	Table 10			
	Item B3 states that clearing of koala habitat will be minimised where possible. Condition E23 of the infrastructure approval states that the area of impact to koala habitat must be reduced by 25%. This explicit requirement should be stated in the table.		Update item B3 in Table 10 to state that the clearing of koala habitat will be reduced by 25%.	Table 10 amended to read; Clearing of Koala habitat, as identified by Table E4 (CoA), will be reduced by at least 25%, or as otherwise agreed by the Planning Secretary. Prior to construction commencing, key construction and environmental personnel will assess the Construction Impact Zone (CIZ) issued by ARTC and identify areas where Koala Habitat (and other mapped vegetation) can be retained.

	<p>Item B11 states that pre-clearing surveys of culverts and bridges will identify microbat roosting habitat – this should be expanded to include identifying the presence of microbats.</p>		<p>Update item B11 in Table 10 to state that roosting habitat “and the presence of” microbats will be determined in pre-clearing surveys.</p>	<p>Table 10 amended to read; Presence or absence of microbats will also be determined during the pre-clearing surveys.</p>
	<p>Items B29-B33 discuss mitigation measures relevant to works in creeks and temporary waterway crossings. An additional mitigation measure that should be added is that all spoil and stockpiles will be located in the CIZ and will be located an appropriate distance away from riparian areas. The BMP should specify distances, including justification for the distances selected.</p>		<p>Add a mitigation measure to Table 10 “works near/in creeks and temporary waterway crossings” that states spoil and stockpiles will be located in the CIZ but away from riparian areas.</p>	<p>Mitigation Measure B45 added.</p>

	An additional mitigation measure that could be implemented to minimise impacts to native fauna could be avoiding working hours at dawn and dusk (when fauna are more active). Any night work should avoid excessive use of artificial lighting. An out-of-hours work protocol should be established.		Consider the addition of a mitigation measure to Table 10 to avoid working hours at dawn and dusk. Night work should avoid excessive use of artificial lighting, and an out-of-hours work protocol should be established.	Table 10 amended to read; Where possible, construction works will be avoided at dawn and dusk when some fauna are most active. All night works must be assessed and approved by the Project’s Environmental personnel via the Project’s Out-Of-Hours Protocol and should avoid the excessive use of artificial lighting.
18	Section 6 Table 11 refers to the IS Rating Scheme V1.2. An explanation of this rating scheme is required, including what actions will contribute to the achievement of a Level 1 benchmark for Eco-2 habitat connectivity		Describe the IS Rating Scheme V1.2 in section 6, including what actions will contribute to achieving the Level 1 benchmark for habitat connectivity.	Table 11 updated. The IS Rating Scheme (IS) is a comprehensive rating system for evaluating sustainability across the planning, design, construction and operational phases of infrastructure programs, projects, networks and assets. IS evaluates the sustainability performance of the quadruple bottom line (Governance, Economic, Environmental and Social) of infrastructure development.
19	The BMP does not contain a Trigger Action Response Plan (TARP). A TARP		Develop a Trigger Action Response Plan for the BMP.	TARP prepared and included in Appendix.

	allows for the development of a threshold or trigger point for each item being monitored and action being implemented, detailing relevant actions that need to occur when thresholds have been exceeded or not met.			
20	The BMP discusses the pre-clearing surveys that will be undertaken to detect roosting habitat for microbats, how microbats will be excluded from structures or captured and relocated, and the trigger for developing a		Consider including a microbat procedure in the BMP like that developed for the Parkes to Narromine Flora and Fauna Management Plan.	Microbat Monitoring and Management requirements included in the relevant sections of the BMP i.e. Microbat monitoring requirements detailed in Section 5.6, Microbat Management requirements detailed in Section 6 and Triggers and Actions specific Microbats included in the TARP (Appendix).

<p>specific plan where more than 10 microbats are detected. Consideration should be given to including a specific microbat procedure in the BMP, like that developed for the Parkes to Narromine Flora and Fauna Management Plan. Given the potential for the existing rail structures to provide microbat habitat (culverts, bridges, and other drainage structures), consideration should be given to installing habitat structures in the new bridges and structures like microbat habitat boxes.</p>		<p>Consider including microbat habitat boxes on new drainage and bridge structures.</p>	<p>Microbat nest boxes will be considered and discussed with the Project Ecologist depending on the following:</p> <ul style="list-style-type: none"> - The quantity (if any) and types of microbats found (or signs of occupation) during pre-clearance surveys. - The amount of microbat habitat lost through the retrofit, upgrade or replacement of bridge and culvert structures. - The amount of habitat created by the retrofit, upgrade or replacement of bridge and culvert structures. NOTE: A mitigation measure (B30) has been added not to fill in or enclose any joints, gaps, lifting points or other void spaces in culverts or structures. This is to be confirmed with the Construction and Engineering Team.
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Pest and Weed Management Appendix

22	<p>Table 1 The performance targets listed in Table 1 should be reviewed to ensure that they conform to SMART principles. For example, rather than undertaking “regular” compliance reviews the performance target should state a quantifiable frequency. Consideration should be given to expanding the performance targets to adequately address the objectives of the Pest and Weed Management Appendix. For example, infestations of newly identified weeds will be contained within a specific time period.</p>		<p>The performance targets in Table 1 should be reviewed to ensure they conform to the SMART principles.</p> <p>Consideration should be given to expanding the performance targets to comprehensively address the objectives of the Pest and Weed Management Appendix.</p>	<p>The Targets detailed in Table 1 have been amended to comply with the SMART principles.</p> <p>The Targets detailed in Table 1 have been amended to address the objectives of the Pest and Weed Management Appendix.</p>
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23	Table 2;		Update Table 2 to describe the relative abundance and geographic distribution of the weed species along the alignment.	Table 2 updated to include relative abundance of WONS and other weeds identified during the Project EIS.
24	No details are provided in the appendix regarding the pest animals that have been recorded in the project boundary, their relative abundance, what the performance targets are, and what control activities will be undertaken.		Update the Pest and Weed Management Appendix to include information on the pest animals that have been recorded in the project boundary, including the proposed control activities to be undertaken.	Table 2 updated to include the pest fauna species identified during the Project EIS (NOTE: Information describing the relative abundance of the pest fauna species was not provided in the Project EIS). Section 1.2 updated to include objectives and targets and Section 5 updated to include mitigation measures.
Narrabri Shire Council (05/02/2021)				
1	There is a lack of discussion of rehabilitation of the project site once construction is complete. Requirement C3.4 REMM (Revised Environmental Management	9	Yes addressed	The mitigation measures for site rehabilitation and revegetation have been detailed in Section 6 of the CSWMP. Table 3 of the BMP updated accordingly.

	Measure) from the SPIR (Submissions Preferred Infrastructure Report) refers to the 'rehabilitation strategy' which should be addressed in Section 5 of the BMP.			
2	The Weeping Myall Woodland, nor any other Threatened Ecological Community (TEC) is not specifically discussed or addressed. It is also unclear is how long the permit holder is responsible for weed and pest management post construction.	18	Yes addressed	TECs are explained in Section 4 - Existing Environment with mitigation measures to protect TECs are provided in Section 6 of the document. Mitigation measures added to the PWMP include: Following completion of construction, weed monitoring (and subsequent management) will occur whilst Tran4m Rail has site possession and the EPL remains in place.
3	a)A Construction Environmental Management Plan (CEMP) must be prepared in accordance with the Department's Environmental Management Plan Guideline for	N/A	Noted	These references have been externally verified by the Project ER and DPIE via the review process.

	<p>Infrastructure Projects (DPIE, 2020) to detail how the performance outcomes, commitments and mitigation measures will be implemented and achieved during all stages of construction. The BMP is a required CEMP Sub-Plan. The complete CEMP was unavailable at the time of this review, therefore there are many references within the BMP which could not be verified.</p>			
4	<p>b)Requirement C3.4 refers to the 'rehabilitation strategy' which should be addressed in Section 5 of the BMP. There is no detail about rehabilitation in Section 5, instead it refers to the Erosion and Sediment Control Plan. The</p>	9	Addressed	<p>NOTE: Rehabilitation and revegetation requirements detailed in the SWMP. Table 3 amended accordingly.</p>

	rehabilitation strategy needs to be further clarified.			
5	c) Within the glossary on page 10: ·the definition for ECM is incorrect. ·an ECP, EPO and TEC definition need to be included. ·the ESCP definition is out of alphabetical order which makes it hard to find. ·ESCP definition in the glossary is inconsistent with the report – is it the Project Erosions and Sediment Control Plan, or the Progressive Erosion and Sediment Control Plan?	10	Yes	Comments addressed in Glossary.
6	d)There is inconsistent use of Construction Impact Zone/ project area/ proposal site/ study area/ Project/ project/ development footprint/	11	Yes	Clarity of the terms provided.

	construction footprint. Define which term/s are relevant and be consistent with use.			
7	e)There are no Plant Community Type (PCT) descriptions within the body of the BMP, nor discussion of which PCT's are associated with which Threatened Ecological Community (TEC). There could also be more discussion about threatened species recorded in the 'project area' including which species are relevant, mapped or offset. There is also no discussion of reducing impact to koala habitat by 25 percent as per CoA E23. The impact area stated in this section of the report (see snip below) is not	17	Yes	Section 4.1 expanded to clearly explain the existing environment including the threatened flora and fauna and TEC's impact by the works. Mitigation Measure B1 describes the PCTs and the anticipated impact to each. Mitigation measures B3 updated to describe the process to reduce vegetation (and Koala Habitat) clearing. Reference (impact area) updated to 890.41Ha and 175.25Ha for Koala habitat.

	<p>consistent with the 890.41 hectares listed in the Compliance matrix – please explain the difference.</p> <p>CoA states impact to koala habitat is 175.25 hectares which is also different to the amount listed below.</p> <p><i>932 ha of native plant community types (including 174 ha of Koala habitat) listed under the BC Act and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) will be impacted. ARTC will offset this impact with the retirement of ecosystems and species credits through biodiversity</i></p>			
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	stewardship agreements.			
8	f) The area of impact to native vegetation is constantly changing as the project evolves and progresses, this should be explained in the BMP.	Section 3.3	Yes	Section 3.3 added, General Changes to the Project. This clearly defines the Consistency Assessment process. Bullet point 6 defines changes to vegetation clearing.
9	g) Key Fish Habitat (KFH) is touched upon at the end of Section 4.1 but there is no further discussion about impact to KFH. Explanation is required about mitigation of impact to KFH.	App C and Table 8	Yes	Appendix C updated to include direct and indirect impacts to KFH. Table 8 includes mitigation measures to address those risks identified.
10	h) There are many references to the Environmental Control Maps (ECM) which will clearly show sensitive areas, weeds etc but there is no explanation of who is responsible for creation of these maps and when will	CEMP App G BMP Section 5.11	Yes	NOTE: The Environmental Control Plans are included in App G of the CEMP. These are draft. The Environmental Control Maps will be progressively developed by the Environmental Coordinators as works are initiated.

	they be issued and where are they available. One ECM is referred to in particular; Biodiversity/ Flora and Fauna ECM (T4MR-MR-ENV-001-06) but it was unable to be located, and for this review it was assumed to be a part of the CEMP.			
11	i) Table 5 refers to future approved consistency assessments. What is a Consistency Assessment? This is not clearly explained.	Section 3.3	Yes	Section 3.3 added, General Changes to the Project. This clearly defines the Consistency Assessment process.
12	j) Regarding Clearing risk assessment (Table 5) where a koala is located, it should include 'allow koala a means of egress to more away from construction so the animal is not isolated with no route to escape'.	App C and various other Sections	Yes	Addressed, (text included) in Appendix C (Biodiversity Risk Assessment) and various other Sections.

13	k) Regarding inspections and monitoring, what is the duration of requirements post construction?	20 Table 7	Yes	Section 5.4 amended to detail post-construction inspection requirements.
14	l) With regards to the vegetation maps in Appendix C: · The legend should only show features that are visible on that particular map · Maps are not in a clear order – would be better if they visually connected to the next map (they appear to be in reverse order) · Threatened species should be labelled or colour co-ordinated to you can tell which species is where · Location of TEC's should be clearly marked · Some design lines are not PCT mapped · The red and pink hashed areas are	App D	Yes	New map suite appended, noting: - Legend showing all attributes. - Maps in order, based on Chainage. - Threatened species and TEC's identified. - All PCT's mapped. - Colours legible.

	difficult to differentiate.			
15	PWMP - The Weeping Myall Woodland, nor any other Threatened Ecological Community (TEC) is not specifically discussed or addressed in this plan, some extra detail and clarification may be required.	Section 1.3 Table 1 Table 3	Yes	The impacts to the Weeping Myall Woodland (and other TEC) is added to various sections of the PWMP. The mitigation measures to address these risks have been included in Section 5.
15	PWMP - It is also unclear is how long the permit holder is responsible for weed and pest management post construction.	19	Yes	PW26 added to Table 4.
17	PWMP - Further consideration is required to ensure that the reference from 'noxious' weeds is changed to 'priority' weeds throughout the document in line with current legislation.	Throughout	Yes	Addressed throughout

Gwydir Shire Council				
1	"No comment" received from GSC on the 25th February 2021.			
Moree Plains Shire Council				
1	"No comment" received from MPSC on the 24th November 2020.			
DAWE				
Condition / Requirement	DAWE Review	Proposed Trans4m Rail Response	DAWE Response	Trans4m Rail Response (Rev E)
General comments	<p>Plan not fit for purpose As is detailed below, the plan does not commit to either actions or outcomes. It cannot be considered fit for purpose until such time as the plan makes binding, measurable, auditable, and enforceable commitments regarding both the actions that will be taken, and the outcomes that will be achieved. These commitments must be specific, fully-defined, timebound, and drafted in unambiguous language so that an independent auditor could determine,</p>	Responses detailed below	BMP Rev C received 17 Feb 2021, addresses DPIE's comments, DAWE comments from 1 st February yet to be incorporated into BMP revision.	BMP and PWMP revised to address comments (see below)

	<p>objectively and without any lack of certainty, whether the commitments had been met.</p> <p>The plan also regularly just refers to further sub-plans (which have not been provided to the Department) instead of stating in the plan itself what will be done to manage various risks, impacts, and uncertainties. This is not acceptable. The plan must be capable of operating as a standalone document with all necessary information contained within it.</p> <p>There are also numerous typographical errors, which unacceptably undermine the plan's accuracy and enforceability. For example, as discussed below, Table 1 has numerous errors in condition numbering. These typographical errors must be fixed</p>			
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	before the plan is suitable for approval.			
Relevant EPBC Approval Conditions				
1. The approval holder must:	Not Met. See Comments below.	Responses detailed below	BMP Rev C claims this is addressed in CEMP	Refer below
a. Implement conditions C4 and C9 of Part C, Schedule 2 of the State Infrastructure approval, where they relate to monitoring, managing, avoiding, mitigating, offsetting, recording, or reporting on, impacts to protected matters, with the exception of C9(a).				
b. Ensure that the Weed Management Plan included in the Biodiversity Management	Not Met.		We note the inclusion of the Construction Pest and Weed Management Appendix to Rev C.	Mitigation measures for weeds, pests and pathogens have been duplicated in the BMP.

<p>Subplan required under condition C9 of Part C, Schedule 2 of the State Infrastructure approval, includes appropriate weed control measures to prevent the introduction and/or spread of weeds from construction areas to any retained area of Belson's Panic (<i>Homopholis belsonii</i>), Natural Grassland on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland, Brigalow (<i>Acacia harpophylla</i> dominant and codominant) and Weeping Myall Woodlands ecological communities.</p>	<p>Table 5 states that "A separate Pest and Weed Management (PWMP) Sub-plan has been prepared for the project." That is contrary to the EPBC Act approval conditions. The weed management measures must be included in the BMP. They must be set out in full, with binding commitments made, enforceable timeframes for implementation established, and justifications provided for why those measures are expected to succeed in preventing weed incursion into Weeping Myall Woodlands, Brigalow TEC, and Belson's Panic Natural Grassland. Also, from a governance perspective, such an approach would create three separate layers of plans, without clarity as to which override in</p>		<p>Objectives and Targets should reflect the conditions ie include prevention of introduction and/or spread of weeds from construction areas to any retained area of Belson's Panic, Natural Grassland, Brigalow and Weeping Myall Woodlands ecological communities.</p>	
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	<p>which situations, should there be inconsistencies, and without clarity as to which, if any, are enforceable. That is not appropriate.</p>			
	<p>Despite the plan’s statement noted above, Appendix A is titled “Construction Pest and Weed Management Appendix”. However, it does not provide adequate measures to control and prevent the spread of weeds from construction areas to retained areas of MNES. Table 1 of that Appendix sets out a series of objectives and targets for the Appendix. As with the objectives and targets for the main plan itself, the Appendix objectives are not written in binding language, are non-specific, are undefined, and</p>	<p>Mitigation measures for weeds and pests will be duplicated in the BMP.</p>	<p>Section 5.6 Table 7 contains detail of construction monitoring program including weekly inspections by environment coordinator to record weeds, pest and pathogens where observed. Control of weeds to be actioned as required – can this be altered to point to Appendix E trigger action response plan – this then closes the loop on what actions will be taken when an observation is made. What process would allow ad-hoc</p>	<p>Objectives in the PWMP and BMP have been redrafted to use more enforceable language and accord with SMART principles</p>

	<p>therefore are not capable of either enforcement or independent, objective auditing and compliance verification. The objectives and targets need to be redrafted to adhere to SMART principles (specific, measurable, achievable, repeatable, time-bound).</p>		<p>reporting of weeds, pest and pathogen from construction crew/outside the weekly environmental inspection? Will the weekly inspection include the placement and securement of roping/flagging/fencing of CIZ and sensitive MNES areas, to ensure disturbance of the soil and hence increased risk of weeds being spread outside CIZ is assessed?</p>	
			<p>An explanation of why the measures proposed are considered appropriate to prevent the spread to the MNES is required.</p>	

		<p>All weed management measures are aimed at managing/controlling weeds on site thereby avoiding impacts to offsite areas including these containing MNES. We have no ability to access offsite areas to undertake weed monitoring/management therefore our efforts to control weeds need to be confined to site.</p>	<p>The language at section 4.4 of Weed Management Appendix should be tightened to ensure enforcement.</p>	<p>Objectives and targets within the PWMP have been updated to include specific mention of avoiding introduction/ spread of weeds to nearby areas containing MNES.</p>

		Could DAWE please advise how mitigation measures for weeds in the PWMP are insufficient?		Section 5.6 (Table 7) has been updated to reference the trigger action control plan.
		Objectives in the PWMP will be redrafted to use more enforceable language.		Additional item included in Section 5.6 (Table 7) to capture ad-hoc reporting of weeds, pests and pathogens by construction personnel.
				The installation of clearing boundary flagging/ signage would not be undertaken as part of the weekly inspections rather this would be a routine activity to be undertaken within all clearing areas prior to commencing works.
				Additional wording has been provided in Section 1.3 of the PWMP explaining specifically why the measures proposed are appropriate to manage adjacent areas of MNES.
				Section 4.4 of PWMP reworded to be more clear and accommodate SMART principles.
Relevant State infrastructure Approval Conditions				
C5 The CEMP Sub-plans listed in Condition C4 must state how:	Not Met.	Objectives and targets for the BMP will be redrafted to use more enforceable language.	Rev C Table 8 Environmental Management Measures for preconstruction. We look forward to seeing the next version where our comments will be addressed.	Objectives and targets for the BMP have been redrafted to be more specific, use more enforceable language and differentiate between targets and objectives.

<p>(a) the environmental performance outcomes identified in the documents listed in Condition A1, as modified by these conditions, will be achieved;</p>	<p>The BMP’s objectives are listed at Section 1.2. Section 1.2 is not sufficiently specific. For example, it states that one objective is to “minimise disturbance to fauna and flora; including habitation, reproductive cycles, and availability of selective food sources”. DAWE is not clear what a “selective food source” would refer to. More broadly, the objective is not framed in binding, measurable, nor enforceable language. The objective needs to commit to maximum permitted disturbances/impacts on each relevant protected matter. Section 1.2 also sets out ‘targets’ for the plan. It is not clear what distinguishes an objective from a target. Again, targets are not written in binding, measurable, nor enforceable</p>		<p>Append D/G? Unexpected Threatened Species Procedure – Table 8 typo.</p>	<p>Mitigation measures within the BMP have been updated to include the maximum permitted impact on each vegetation community, TEC and Koala habitat. Maximum permitted clearing areas for threatened species habitat are not provided as these are captured by maximum permitted plant community areas and are not separated out in CoA.</p>
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	<p>language. For example, one target is “minimise fauna fatalities resulting from construction activities”. That target is not meaningful, because it:</p> <ul style="list-style-type: none"> • does not state the maximum acceptable number of fatalities, • does not state whether there are particular species where markedly lower levels of fatalities may still be unacceptable, and • does not explain how it will be determined whether impacts have been minimised. On one interpretation, minimisation might mean no fatalities at all are permitted, and whatever mitigations are needed to achieve that goal must be implemented. Alternatively, this might mean that there should be no fatalities 	<p>Table 8 B13 What is addressed in the Biodiversity/Flora and Fauna ECM (T4MR -MR-ENV-001-06)?</p>	<p>As discussed matters relating to biodiversity credits would be managed by ARTC and therefore are not part of the remit of the BMP.</p>
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	<p>save those that occur through normal construction</p> <p>– that is, any amount of fatalities that occur through ‘normal’ construction methods will be acceptable. “[M]inimised” is therefore too ambiguous and undefined a term, and is not a fit basis for objections or targets. At Section 4.1, the plan notes that 932 ha of native plant communities will be impacted, but does not commit to impacting no more than 932 ha. Committing to a maximum permitted impact is essential. While the plan identifies the vegetation types to be impacted that are listed TECs under the BC Act, it does not identify which EPBC Act-listed TECs will be impacted. The plan also does not state</p>			<p>Table 8 typo corrected re Appendix G – Threatened Species Procedure.</p> <p>The Biodiversity/Flora and Fauna Environmental Constraints Maps (ECMs) (T4MR -MR-ENV-001-06) shows all biodiversity constraints associated with the project including sensitive environmental areas, weed infestations, clearing boundaries etc. This is detailed in mitigation measure B4 and Section 5.11 of the BMP.</p>
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	<p>the maximum permitted impact on each TEC. Identifying the maximum permitted impact on each TEC is essential as it may radically alter the offsetting obligations that apply. Similarly, the plan does not state the maximum permitted impact on habitat for listed threatened fauna and flora species. Once the maximum permitted impacts are stated, the plan will also need to state the number of credits required to offset those impacts for each protected matter, and commit to retiring the required credits, and commit to doing so in compliance with the amended like-for-like rules that apply for projects subject to EPBC Act approvals.</p>			
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Section 4.1 is providing context to the plan as such doesn't need include a break-down of vegetation community clearing impacts. However, the relevant mitigation measure in Section 6 (Table 8) will be updated to include the maximum permitted impact on each community as well as TECs and threatened species habitat.

		Biodiversity credits will be offset by ARTC and therefore cannot be included as a commitment in Trans4m Rails CEMP.	Have requested information from ARTC on their offset strategy.	
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	<p>and below in this table: measures are not defined, are not written in binding language, and could not be independently and objectively audited to determine compliance. For example, measure B3 states: "Clearing of Koala habitat will be minimised by reducing the construction footprint where possible." This table has explored the problems with the word "minimised" and the phrase "where possible" elsewhere, and those comments apply equally here. Those issues consistently afflict all measures suggested in Table 10.</p>			
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		<p>The language of mitigation measures can be tweaked where possible to make the language more enforceable.</p> <p>Mitigation measure B3 has been updated to specifically state that clearing of Koala habitat will be reduced by 25%.</p>	<p>Can you specify the new target area for koala habitat clearing?</p>	<p>Setting a maximum number of acceptable fatalities for fauna is not possible given that fauna abundance/ distribution varies greatly between areas and has a major bearing on the number of fauna mortalities recorded on a project. The only meaningful objective in relation to fauna mortalities is to 'minimise' injuries/ mortalities.</p> <p>New target area for Koala habitat has been included.</p> <p>Mitigation measures have been edited to use more enforceable language (where possible...).</p>
<p>(c) the relevant terms of this approval will be complied with; and</p>	<p>Not Met.</p>	<p>We have checked the numbering for CoA in the current plan and this appears correct.</p>	<p>No response proposed, comment has been addressed.</p>	<p>No response required</p>

	<p>Table 1 shows the EPBC conditions of approval listed with incorrect numbering. The condition reference for EPBC conditions must be consistent with the numbering in the EPBC approval notice. Similarly, the numbering in the plan for the NSW Approval Conditions is incorrect, and must be amended.</p>	<p>It is noted the plan has been updated to incorporate comments received from BCS.</p>		
<p>(d) issues requiring management during construction (including coordination of concurrent activities of other projects as well as concurrent activities in this CSSI), as identified</p>	<p>Not Met.</p> <p>See comments below on the need for a full</p>	<p>Responses detailed below</p>	<p>-</p>	<p>-</p>

<p>through ongoing environmental risk analysis, will be managed.</p>	<p>rewrite of the plan's risk analysis.</p>			
<p>C6 The CEMP Sub-plans must be developed in consultation with relevant parties identified in Condition 0. Details of all information requested by an agency to be included in a CEMP Sub-plan as a result of consultation, including copies of all correspondence from those agencies, must be provided with the relevant CEMP Sub-plan.</p>	<p>Further consultation needed.</p>	<p>We disagree that a wholesale re-write of the plan is necessary. The plan has been reviewed following overlapping comments received from BCS. The plan has also been reviewed by the project Environment Representative who has endorsed the plan. Whilst some comments provided by DAWE require tweaks to mitigation measures most comments relate to editorial/</p>	<p>Plan has been revised following BCS comments. DAWE will need to see the revised plan before confirming plan is fit for purpose.</p>	<p>Noted</p>

	<p>DAWE considers that the plan has major deficits that will likely require a wholesale rewrite of the plan to address. As such, DAWE requests that a revised BMP be submitted for further consultation once DAWE's comments have been addressed.</p>	<p>structural changes to the document which BCS have not identified.</p>		
<p>C9 The Biodiversity Management Sub-plan must include</p>	<p>Not Met.</p>	<p>Refer to response at EPBC Condition 1(b).</p>	<p>-</p>	<p>-</p>

<p>(a) a weed management plan, including appropriate weed control to manage introduction and/or spread of weeds from construction areas to any retained Weeping Myall Woodlands TEC, and appropriate protocols to demonstrate compliance with the requirements of the <i>Biosecurity Act 2015</i> and <i>Biosecurity Regulation 2017</i>;</p>	<p>See comments at EPBC Condition 1(b).</p>			
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<p>(b) procedures for pre-clearing surveys for threatened species to be undertaken by a suitably qualified and experienced ecologist, including survey and relocation methodologies and management/off set measures;</p>	<p>Not Met.</p>	<p>The pre-clearing mitigation measures are standard for large infrastructure projects and sufficiently detailed. A fauna handling procedure will be included to provide additional detail on ecologist fauna capture/relocation methods. It is noted that ecologists/fauna spotter catchers are to be suitably qualified and experienced to undertake this work and as such would be bound by industry best practice.</p>	<p>Appendix F is Clearing Management Inspection Checklist.</p>	<p>Fauna handling procedure included as Appendix H.</p>
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	<p>The plan does not detail or define the procedures for pre-clearing surveys. Survey and relocation methodologies are not provided. Please provide the relevant government authorities with a copy of the Clearing Management Procedure (T4MR - MPR-ENV-004). If there is a pre-clearing checklist or proforma, please include a copy as an appendix to the BMP. The procedure needs to be provided in sufficient detail to constitute an enforceable commitment. That will also require framing the commitments regarding pre-clearing surveys in enforceable language (e.g.: not using “should”, “may”, “where possible”, or “where appropriate”). Those commitments also must include commitments regarding timeframes</p>			
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	and survey extent/effort.			
		A Clearing Management Checklist has been included in the latest draft.		Further refining of mitigation measures related to pre-clearing surveys/ fauna spotter catcher requirements has been undertaken to accord further with SMART principles.
(c) measures to control cane toads, as relevant to the construction phase areas and scope in accordance with the Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads (relevant to works adjacent to retained Brigalow (<i>Acacia</i>	Not Met.	A statement will be included by one of Australia’s leading Cane Toad researchers to support the statement that the current distribution of Cane Toads does not occur anywhere near the site.	Suggest a trigger flow chart be developed similar to the unexpected threatened species trigger at Appendix G, to demonstrate the approach proposed.	Additional detail provided in Table 8 (B39) including advice from Cane Toad expert and actions to be undertaken in the event of a Cane Toad being recorded.

<p><i>harpophylla</i> dominant and co-dominant) TEC and Weeping Myall Woodlands TEC); and</p>	<p>Tables 5 and 10 note that cane toads are not yet thought to be present at the site, and therefore propose only that any observation of a Cane Toad on the site be reported to the relevant regulatory authority and advice on management actions is to be provided by a Cane Toad expert. That is potentially a reasonable starting point, but it is not sufficient, and cannot be said to constitute “measures to control cane toads”. DAWE will also need to see evidence supporting that statement. DAWE would require the following additional information:</p>	<p>Additional measures will be included in the plan in relation to Cane Toads including:</p>		<p>Trigger action response plan updated to include a separate line item relating to Cane Toad response. As such, the flow chart is not considered necessary.</p>
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	<ul style="list-style-type: none"> • What is the evidence (a survey report or published ecological survey from within the last two years will suffice) that Cane Toads are not currently present on the site? • Will staff be trained to recognise Cane Toads and signs of their presence? • Will there be a formal regular monitoring program actively seeking to determine whether Cane Toads are present, or does the approval holder propose to rely on passive, incidental observation? 	<p>*Staff training awareness and reporting requirements to be included in induction.</p> <p>*A number of additional mitigation measures that would be triggered if a Cane Toad is detected on the site.</p>		<p>Given the fact that Cane Toads are highly unlikely to occur at the site no formal monitoring is warranted.</p>
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	<ul style="list-style-type: none"> • If a formal, regular monitoring program will take place, what will that program consist of? How regularly will it occur? What methods will be used? • What control measures will be implemented if Cane Toads are detected? DAWE is not able to accept proposals to leave key details (such as the actual control measures to be implemented) to be determined at a later date. Once that information is provided, DAWE will be able to advise whether we consider the proposed measures fit for purpose. 	<p>Given the fact that Cane Toads are highly unlikely to occur at the site no formal monitoring is warranted.</p>		
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General expectations for producing quality Management Plans

<p>Plans must effectively assess, management, and account for, risks that may cause those plans not to achieve their outcomes. This must include:</p>	<p>The plan presents a brief summary of a risk assessment from another plan at Table 5 (in Section 4.2). This is not sufficient, for several reasons.</p>	<p>It is noted that changes suggested to the risk assessment are largely editorial/ structural and will not affect mitigation measures and on-ground outcomes. The risk assessment used in the plans is based on John Hollands compliant environmental system. In addition, ongoing risk assessment is built into the environmental management systems to be used on the project.</p>	<p>It would be beneficial to add a table indicating how the risk ratings were derived. The EPBC Act EMP Policy states that EMPs should clearly present how conclusions about risk are reached. Please add the risks related to the yellow highlighted section in our comments.</p>	<p>Risk assessment matrices have been included in the BMP and PWMP reflecting the overall risk assessment process used by Trans4m Rail outlined in full in the N2NS Risk Management Plan. The risk assessments in the BMP and PWMP has been revised to align with this risk assessment approach.</p>
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<ul style="list-style-type: none"> Identifying the limits of available information and its utility; Identifying any matter on which there is significant lack of information or significant uncertainty; 	<p>Firstly, the plan states final risk ratings, but does not explain how those risk ratings were derived. The risk analysis needs to state both the likelihood of the risk eventuating and the consequence should that risk eventuate. The interaction of likelihood and consequence should be assessed in accordance with a table such as below.</p>	<p>The risk assessment process forms part of the JHG SQE risk management system, also forming part of our EMS accredited system.</p>	
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- Implementing strategies to manage uncertainty;

- Discussing all risks that may cause the plan not to achieve its outcomes, including *force majeure* risks; and

The risk	
RISK MATRIX	
Qualitative measure of likelihood (how likely is it that this event/circumstance will occur after management activities are implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	

Mitigation	
Minor	Minor incident of environmental damage that can be reversed <i>(e.g. short-term delays to achieving plan objectives, implementing low-cost, well-characterised corrective actions)</i>
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts <i>(e.g. short term delays to achieving plan objectives, implementing well-characterised, high-cost/effort corrective actions)</i>
High	Substantial instances of environmental damage that could be reversed with intensive efforts <i>(e.g. medium-long term delays to achieving objectives, implementing uncertain, high-cost/effort corrective actions)</i>
Major	Major loss of environmental amenity and real danger of continuing <i>(e.g. plan objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies)</i>
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage <i>(e.g. plan objectives are unable to be achieved, with no evidenced mitigation strategies)</i>

		Consequence				
		Minor	Moderate	High	Major	Critical
Likelihood	Highly Likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

<ul style="list-style-type: none"> Clearly explaining how conclusions about risks have been reached. <p>Please note: the risk analysis is about the risk that the plan will not achieve its outcomes, not just the risk that environmental impacts may occur.</p>	<p>Secondly, the partial risk assessment does not commit to any mitigation measures. Instead, all mitigation measures are said to be merely “indicative”. Such a framing removes any enforceability, and means DAWE cannot have confidence that risks will be managed, let alone managed effectively.</p> <p>Those mitigations are then also not sufficiently specific. For example, one proposed mitigation is “Clearing of Koala habitat will be minimised by reducing the construction footprint where possible.” As discussed elsewhere in these comments, “minimised” is not a term capable of enforcement because it is undefined. That lack of enforceability is then exacerbated by the phrase “where possible”, which again would appear to</p>	<p>As the project breakdowns into activities, further risk assessments are completed, which are more detailed, and task focused.</p> <p>Given the short timeframes involved with project commencement, the project team would like to focus on mitigation measures and tangible outcomes of the plan. As such we question if a rewrite of the risk assessment is warranted?</p>		
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	<p>absolve the approval holder of any obligation to undertake minimisations, even should minimisation be adequately defined.</p> <p>Thirdly, Table 5 does not address corrective actions should the identified risks eventuate. The risk analysis must state: the monitoring method that will detect when a risk has occurred or is likely to occur; the objectively and independently measurable trigger or threshold at which corrective actions will be taken in response</p>			
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<p>to the risk occurring or becoming likely; and the corrective actions that will be taken in response to those triggers having been reached. Corrective actions are distinct from general mitigations. Mitigations are pre-emptive measures that are taken to reduce the likelihood of a risk eventuating, and to reduce the severity of a risk should it occur. Mitigations will be implemented at all relevant times – they will not be triggered by particular events. By contrast, corrective actions are additional measures that will be enacted should they become necessary due to particular events or circumstances emerging.</p>		
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	<p>There are also no timeframes for the implementation of any measures listed in the incomplete risk assessment.</p> <p>Finally, the risk assessment appears to be assessing the wrong risks. The risk assessment appears to be assessing the sources of potential impacts to the environment, rather than the risk that the plan will not achieve its objectives. Each risk must be assessed in terms of how it will affect the approval holder's ability to achieve the plan's objectives (which must in turn be defined and</p>	<p>In relation to comments over page, the term indicative will be removed and the mitigation measures will be aligned with those in Section 6 (Table 8) of the BMP and Table 4 of the PWMP.</p>		
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	<p>measurable, so that successful achievement can be objectively verified). Mitigations must speak to how the impacts on the approval holder's ability to achieve the plan's objectives will be managed.</p>	<p>As mentioned earlier where possible mitigation measures will be revised to use more enforceable language.</p>		
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<p>Plans must demonstrate that all proposed measures are efficient, effective, timely, transparent, scientifically-robust, and reasonable. References to unpublished data are not acceptable. The Department is also not able to accept assertions based solely on a consultant’s experience in environmental management.</p>	<p>Again, a severe lack of detail and definition means the plan cannot demonstrate that its measures are adequate. For example, one of the proposed control measures (see Section 4.5) is a series of “Hold Points”. However, the plan does not state what a Hold Point means in this context, nor what the consequences of a Hold Point will be at such time as it is reached. As such, it is impossible to assess whether the Hold Points are likely to be efficient, effective, timely, transparent, scientifically- robust, or reasonable.</p>	<p>Additional explanation of the hold-point process is provided in the CEMP. This will not be brought over into the BMP to avoid repetition.</p>	<p>Please ensure any cross referencing to the CEMP and other procedures are clear, complete and specify the document version and date – this should include a reference to where the definition of ‘hold point’ is described.</p>	<p>Cross referencing to the relevant section of the CEMP included within ‘Section 5.3 Hold Points’ of the BMP. A number of additional CEMP references updated in BMP.</p>
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<p>Support from published scientific and environmental literature is required.</p>	<p>Section 4.8 and Table 9 provides somewhat more detail on measures associated with the monitoring program. Unfortunately, this serves to highlight the lack of detail in the plan. For example, under “Pre-construction”, the plan states that, if certain things are identified on site (weeds, pathogens, pest fauna), then monitoring will follow, and that monitoring will inform further control measures. The plan does not state what the monitoring program will be that might detect the relevant triggers (method, frequency, and percentage of site covered are all not provided). The plan then also does not state the monitoring program that will follow from the trigger having been detected (again, method, frequency,</p>		<p>The maps do not identify which threatened species are present.</p>	
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	<p>and percentage of site covered need to be stated). Finally, there is no explanation of how the monitoring results will inform further control measures. There is no list of control measures given that monitoring will help select from. There is no discussion of the situations in which any particular control measures would be appropriate. There is also no commitment actually to implement any control measures, nor is any timeframe for implementation provided.</p>			
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	<p>DAWE cannot currently have confidence that any control measures would in fact be implemented at any point.</p>	<p>Monitoring comprises detailed ecologist pre-construction surveys and weekly inspections of the site to be undertaken during construction. Additionally, surface water monitoring and dust monitoring is undertaken at the site. This monitoring is considered adequate to identify any changes on site and is in line with additional.</p>	<p>Please provide a checklist of what the Weekly Environmental Management Inspection Checklist would contain as a minimum, acknowledging it would be added to over time.</p>	<p>Maps have been updated to show threatened species names.</p>
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	<p>The plan also frequently refers to secondary documents that have not been provided, instead of making commitments to specific actions. For example, the Unexpected Finds Procedure (Section 4.11) states that any previously unidentified threatened species will trigger a notification process contained in the Incident and Event Management Procedure. "Incidents, Emergencies and Non-Conformity" is Section 4.15 of the plan .The section says only that incidents will be managed under Trans4m's Incident and Event Management procedure and ARTC's Project Environmental Incident and Reporting Procedure, both of which are wholly separate documents from the plan under review.</p>			
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	<p>That is not acceptable. Any procedure or process that will govern actions taken under the plan needs to be explained in the plan itself. Otherwise, DAWE cannot know what the relevant processes are, nor be confident that those processes are appropriate.</p> <p>The maps in Appendix C show dots representing 'threatened species' but do not say which species they represent. Please label or define what these species are.</p>	<p>A Trigger Response Plan (Appendix E) has been provided in response to BCS comments which provides detail on additional management responses and when they would be triggered.</p>		<p>A copy of the Weekly Environmental Management Checklist is included separately for information. This has not been included in the BMP as it is still being finalised.</p>
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		<p>Unexpected finds procedure has been included in latest revision. The Incident and Reporting Procedure is included in the CEMP and will not be included in the BMP to avoid duplication.</p> <p>The legend will be updated to incorporate species names.</p>		
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<p>Plans must have transparent governance arrangements, including being able to be readily measured, monitored, audited, and enforced. This means:</p> <ul style="list-style-type: none"> • The person taking the action must have full, enforceable responsibility for both the implementation and the success of the measures proposed; 	<p>Throughout the plan, the language is non-binding, relying on undefined terms (such as “minimised”) that are subject to such varied interpretation that measurement, enforcement, or auditing would be impossible.</p> <p>The plan has no definitions of success or failure that could be independently measured or audited.</p>	<p>The relevant mitigation measure in Section 6 (Table 8) will be updated to include the maximum permitted impact on each community as well as TECs and threatened species habitat.</p>	<p>Based on conversation at teleconference 10 Feb 2021, credits are proposed to be written in Credit Retirement Report within 6 months post clearance. The consultant writing the BMP said this was ARTC’s commitment – ARTC said there was no specific requirement to use Biodiversity Offset Scheme. Have requested information from ARTC on proposed offset strategy.</p>	<p>Mitigation measures of the BMP have been updated to include the maximum permitted impact on each vegetation community, TEC and Koala habitat. Maximum permitted clearing areas for threatened species habitat are not provided as these are captured by maximum permitted plant community areas and are not separated out in CoA.</p>
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- All commitments must be specific and auditable with measurable outcomes and clear timeframes;

At Section 4.1, the plan notes that 932 ha of native plant communities will be impacted, but does not commit to impacting no more than 932 ha. Committing to a maximum permitted impact is essential. While the plan identifies the vegetation types to be impacted that are listed TECs under the BC Act, it does not identify which EPBC Act-listed TECs will be impacted. The plan also does not state the maximum permitted impact on each TEC. Identifying the maximum permitted impact on each TEC is essential as it may radically alter the offsetting obligations that apply. Similarly, the plan does not state the maximum permitted impact on habitat for listed threatened fauna and flora species. Once the

Biodiversity credits will be offset by ARTC and therefore cannot be included as a commitment in Trans4m Rails CEMP.

As discussed matters relating to biodiversity credits would be managed by ARTC and therefore are not part of the remit of the BMP.

•
All commitments
must be written
clearly and

maximum permitted impacts are stated, the plan will also need to state the number of credits required to offset those impacts for each protected matter, and commit to retiring the required credits, and commit to doing so in compliance with the amended like-for-like rules that apply for projects subject to EPBC Act approvals. That said, Section 3.3 provides an extensive list of source documents for relevant standards and regulations, with sufficient detail for those documents to be located by regulators and/or members of the public efficiently and easily.

<p>unambiguously, using the terms “will” and “must” rather than “should” or “may”, and without phrases like “if possible”, “if appropriate”, “may consider” or similar caveats; and</p> <ul style="list-style-type: none">• Any and all technical terms or acronyms must be clearly and fully defined and explained, and any source documents for external standards must be identified and, at a minimum, hyperlinks to those source documents must be provided.				
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<p>The plan must include the following declaration:</p> <p>“Declaration of accuracy</p>	<p>No such declaration has been included.</p>	<p>Declaration of accuracy will be included.</p>	<p>No response proposed, comment addressed – to check in next revision of</p>	<p>Declaration of accuracy included</p>
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<p>I declare that to the best of my knowledge, all the information contained in, or accompanying, this document is complete, current and correct. In making this declaration, I am aware that section 491 of the <i>Environment Protection and Biodiversity Act 1999</i> (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the <i>Environment Protection and Biodiversity Conservation</i></p>		<p>BMP/CEMP received.</p>	
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Regulations 2000 (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration, and I have no knowledge of that authorisation being revoked at the time of making this declaration.”

The declaration must then be signed by an

authorised person.				
DAWE - Additional Comments (12/03/2021) – Amended in Rev F				
1	If cause of listed fauna fatality is from road strike within CIZ, a review of avoidance measures should be undertaken and adaptively managed to prevent further deaths.	Yes	37	Mitigation measure B39 added to address this.
2	If cause of listed fauna fatality on a public road, a review should be undertaken to ensure project activities are not forcing fauna onto the road, and then avoidance and mitigation measures reviewed and adaptively managed.	Yes	38	Mitigation measure B40 added to address this.
3	Add to Appendix E TARP for fauna species that any injured fauna, not just threatened	Yes	135	App E updated to address comments.

	<p>species would be taken to a vet. Update actions taken to include the timelines for notifying DAWE/NSW authorities of death of a threatened species (I believe it was 24 hours – please put reference to this procedure in BMP). Include in action taken, to review work practices to minimise any further injury or death ie create adaptive management loop.</p>			
4	<p>Appendix H Fauna Handling Procedure, Procedure 5a “If time permits call ecologist or fauna rescue for advice”. This conflicts with procedure 2 “Contact project ecologist to obtain positive identification of the</p>	Yes	140	Appendix H amended as per comments.

	subject species". Recommend remove procedure 5a, and add to procedure 2 'obtain advice for action to be taken from project ecologist'.			
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Appendix C Biodiversity Risk Assessment

The N2NS Risk Management Plan includes full details on the risk assessment process utilised by Trans4m Rail. A risk assessment has been completed utilising the risk matrix included within Appendix A of the N2NS Risk Management Plan (refer below) to assess the risks of the project not achieving full compliance with legislative requirements (i.e. EPBC Act, CoA's, SPIR, RMMs and Project EIS) in relation to biodiversity. This risk assessment is included below.

Likelihood Rating

Risk / Opportunity Rating Table

PROBABILITY OR CHANCE	QUALITATIVE ASSESSMENT	RECURRENCE TIMEFRAME	LIKELIHOOD	CONSEQUENCE					
				RATING	1	2	3	4	5
≥ 90%	Almost certain to occur during the project / contract life	Less than "Monthly"	LIKELIHOOD	ALMOST CERTAIN	D	C	B	A	A
51% to 89%	Considered likely to occur during the project / contract life	"Monthly" to "Yearly"		LIKELY	D	D	C	B	A
30% to 50%	Considered a possible occurrence during the project / contract life	Between 2 and 5 years		POSSIBLE	E	D	C	C	B
5% to 29%	Considered unlikely to occur during the project / contract life	Between 5 and 20 years		UNLIKELY	E	E	D	C	B
< 5%	Considered a rare occurrence to happen during the project / contract life	Greater than every 20 years		RARE / REMOTE	E	E	D	D	C

Opportunity Consequence Rating

RATING	CONSEQUENCE - RISK				
	1	2	3	4	5
Workplace Health and Safety	* First aid injury, and/or * Minor safe working issues	* Medical treatment, and/or * Moderate safe working breach likely to impact on operations	* Serious medical / hospital treatment resulting in need alternate working or resulting in lost time injury, and/or * Significant safe working breach with actual impact on operations	* Serious or permanent injury, and/or * Significant safe working breach with immediate impact on operations on one or more worksites	* 1 or more fatalities, and/or * Major breach of safe working with immediate and extensive impact on one or more worksites
Budget (\$AUD)	< \$6,307,026 (<1%) under project budget	\$6,307,026 to \$31,535,130 (1% to 3%) under project budget	\$31,535,130 to \$31,535,130 (3% to 5%) under project budget	\$31,535,130 to \$63,070,261 (5% to 10%) under project budget	>\$63,070,261 (>10%) under project budget
Time Schedule (Target Program)	< 10 days (<1% of program) under the critical path program	10 to 21 days (1% to 2% of program) under the critical path program	21 to 32 days (2% to 3% of program) under the critical path program	32 to 54 days (3% to 5% of program) under the critical path program	>54 days (>5% program) under the critical path program
Environment & Natural Resources	* Low severity environmental impact(s) or impact on natural resources availability that are promptly reversible and affected area is within the site boundary	* Nuisance or low severity environmental impact(s) or impact on natural resources availability that are promptly reversible and affected area is outside the site boundary	* Moderate severity environmental impact(s) or impact on natural resources availability where the affected area is within the site boundary	Moderate severity environmental impact(s) or impact on natural resources availability where the affected area is outside the site boundary	High severity environmental impact(s) or impact on natural resources availability at local scale significance

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
Pre-construction	Clearing outside approved CIZ and clearing areas exceeding approval requirements.	B	<ul style="list-style-type: none"> ▶ Impacts to plant community types will not exceed those identified in the CoA (Table E1) and any future approved Consistency Assessments. ▶ If Construction is required outside of those areas previously assessed as part of the biodiversity assessment for the EIS and SPIR, additional field survey and analysis through a Consistency Assessment is required. ▶ Clearing of Koala habitat will be minimised by reducing the construction footprint where possible. ▶ The CEMP and construction plans will clearly document the location and full extent of clearing required. ▶ Prior to construction, demarcation of the clearing boundary (CIZ) is to be undertaken. The extent of any areas of clearing are to be defined with roped flagging or similar. ▶ Sensitive Area Plans are to be prepared which clearly show all areas of sensitive biodiversity associated with the site. Plans are to be included on Environmental Control Maps (ECM). ▶ Sensitive biodiversity areas (threatened species habitat/ TECs) occurring in proximity to the clearing boundary would be fenced with appropriate signage to prevent inadvertent access/ impacts. ▶ A clearing tracking register will be established and maintained throughout the project to accurately track 'as-built' vegetation clearing 	D	Approved CIZ Clearing tracking register Approved design Minister's Conditions of Approval Environmental Control Map Clearing Management Procedure T4MR -MPR- ENV-004

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			impacts for the project to demonstrate compliance with relevant CoAs.		
Clearing Pre-clearing surveys	Fauna mortality	B	<ul style="list-style-type: none"> ▶ Pre-clearance surveys will be undertaken by suitably qualified and experienced ecologists within areas of woody native vegetation that are to be cleared and would involve: <ul style="list-style-type: none"> ✓ Identification and demarcation of habitat trees which are defined as trees containing hollows, cracks or fissures and spouts, active nests, dreys or other signs of recent fauna usage. ✓ Identification of other fauna habitat features including fallen timber/hollow logs and burrows. ✓ Identification of habitat features that are suitable for translocation or salvage. ✓ Identification and demarcation of any threatened flora to be retained occurring in proximity to the CIZ. ▶ Pre-clearing surveys would also be undertaken of any culverts/ bridges/ built structures that are to be removed to identify roosting habitat for microbats (refer to microbat mitigation measures). 	C	Clearing Management Procedure T4MR -MPR-ENV-004 EWMS-Clearing and Grubbing NSW Legislation, Guidelines and Policies – Flora and Fauna Management Sub-plans Guideline
Clearing Unexpected Threatened Species Finds		C	<ul style="list-style-type: none"> ▶ During pre-clearing surveys, it is possible that previously unidentified threatened species (not considered within the EIS) may be identified. Unexpected finds will be documented by the ecologist with no works to be undertaken within such areas until further assessment is undertaken including: <ul style="list-style-type: none"> ✓ Assessment by ecologist 	E	Clearing Management Procedure T4MR -MPR-ENV-004 Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<ul style="list-style-type: none"> ✓ Referral of finding to ARTC and regulatory authorities. ✓ Approval to proceed works is received from ARTC. <p>NOTE: Unexpected finds of threatened flora, threatened fauna or EEC will be managed in accordance with Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure.</p>		NSW Legislation, Guidelines and Policies – Flora and Fauna Management Sub-plans Guideline
Clearing Clearing supervision (Fauna spotter/catcher)	Fauna mortality	B	<ul style="list-style-type: none"> ▶ Identify appropriate local vet or rescue organisation/wildlife carers/facilities. Contact details for this person/company must be available in the relevant ECM. ▶ A suitably qualified fauna spotter catcher is to be present during the following clearing activities: <ul style="list-style-type: none"> ✓ Clearing of any native, mature trees (>3 metres) in height. ✓ Removal of habitat trees, stags and nests. ▶ The fauna spotter catcher would undertake searches during clearing for any fauna and undertake relocation where possible. ▶ Uninjured animals would be released on the day of capture into nearby suitable secure habitat and would not be held for extended periods of time. ▶ Injured animals would be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment. ▶ As part of clearing supervision, a pre-clearance survey is to be undertaken immediately prior to the commencement of any vegetation clearing to identify and 	C	Clearing Management Procedure T4MR -MPR-ENV-004 Appendix D - Unexpected Threatened Species / Endangered Ecological Community Finds Procedure NSW Legislation, Guidelines and Policies – Flora and Fauna Management Sub-plans Guideline

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<p>relocate if possible, any fauna within clearing areas.</p> <ul style="list-style-type: none"> ▶ Where a Koala is located within a clearing area, clearing activities would stop and a 50m buffer would be established around the animal with no clearing within this area to resume until the fauna spotter/ catcher confirms the animal has left the area of its own volition. The Project Team will ensure the koala has a means of egress to more away from construction so the animal is not isolated with no route to escape. ▶ Unexpected finds of threatened flora and fauna or EEC would be managed in accordance with Appendix D - Unexpected Threatened Species / Endangered Ecological Community Finds Procedure. 		
Clearing Felling of habitat trees	Fauna mortality	B	<ul style="list-style-type: none"> ▶ Habitat trees would be subject to a two-stage clearing process involving: <ul style="list-style-type: none"> ✓ Initial clearing of non-habitat trees around habitat trees within the immediate vicinity of habitat tree. ✓ Allowing habitat trees to stand for at least 48 hours after initial clearing to allow fauna the opportunity to self-relocate. ✓ Felling of habitat trees would be supervised by the attending fauna spotter catcher. ✓ The use of a harvester head would be used to carefully lower habitat trees to the ground where possible. ✓ All habitat trees are to be lowered gently to the ground where possible. Additional steps such as bumping the habitat tree three times over a 5 minute period would be undertaken to encourage fauna to vacate 	C	Clearing Management Procedure T4MR -MPR-ENV-004 EWMS Clearing and Grubbing Clearing Permit T4MR -FRM-ENV-001-02 Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure NSW Legislation, Guidelines and Policies – Flora and Fauna Management Sub-plans Guideline

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<p>prior to felling where the potential to lower the tree gently is low.</p> <ul style="list-style-type: none"> ✓ The fauna spotter catcher would search all habitat trees immediately after felling to identify and capture any fauna present. ✓ Uninjured animals would be released on the day of capture into nearby suitable secure habitat and would not be held for extended periods of time. ✓ Injured animals would be taken to the nearest veterinary clinic or wildlife carer as soon as possible for assessment and treatment. ✓ Hollow branches would be salvaged for re-use as hollow logs in adjacent retained vegetation within the ClZ, where appropriate. ✓ Unexpected finds of threatened flora, threatened fauna or EEC will be managed in accordance with Appendix D - Unexpected Threatened Species / Endangered Ecological Community Find Procedure. 		
Clearing Re-use of timber		E	<ul style="list-style-type: none"> ▶ The community, Landcare groups and government agencies will be consulted to determine if retained timber and root balls can be reused in habitat and rehabilitation work. 	E	Minister's Conditions of Approval
Clearing Documentation	Not demonstrating project compliance	D	<ul style="list-style-type: none"> ▶ Any death of a State or Commonwealth listed threatened fauna species would be reported to ARTC and the applicable government department. ▶ A fauna register will be maintained during clearing by the ecologist/ fauna spotter catcher of: <ul style="list-style-type: none"> ✓ All habitat trees recorded/ cleared. 	E	Incident & Event Management Procedure T4MR -MPR-SQU-010 Clearing Permit T4MR - FRM-ENV-001-02 Appendix D - Unexpected Threatened Species / Endangered Ecological

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<ul style="list-style-type: none"> ✓ All details of fauna captures/ relocation. ✓ All fauna mortalities. ✓ Any fauna taken into care and outcomes. <p>▶ A post-clearing report would be completed at the completion of clearing activities documenting all data collected in the relevant work area.</p>		Community Find Procedure
General construction	Poor understanding of project biodiversity obligations	A	<p>▶ Employee education and training including inductions for staff, contractors and visitors to the site would include the biodiversity issues present at the site to ensure all personnel understand responsibilities in relation to the protection and/or minimisation of impacts to native biodiversity.</p>	B	Project induction Site induction procedure T4MR-MPR-SQE-001
Works in proximity to CIZ boundary	Damage to trees adjacent to the CIZ	B	<p>▶ Trees that occur within the CIZ boundary that will be retained will be protected in accordance with AS 4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)).</p> <p>▶ Indirect impacts to any vegetation beyond the CIZ boundary will be managed in general accordance with AS 4970-2009 Protection of trees on development sites (incorporating Amendment No. 1 (March 2010)).</p> <p>NOTE: No clearing of vegetation or disturbance to groundcover is permitted beyond the CIZ. Should clearing occur beyond the CIZ this will be considered an environmental incident and managed in accordance with Trans4m Incident and Event Management procedure (T4MR-MPR-SQE-010), ARTC's Project Environmental Incident and Reporting Procedure (5-9020-0000-EEC-PR0001)</p>	C	Approved CIZ AS 4970-2009 Clearing Permit T4MR - FRM-ENV-001-02

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			and notification will occur in accordance with project approvals or licences. Incidents, emergencies, response plans and non-conformities are discussed in detail in Section 9 of the CEMP.		
Demolition of bridges/ culverts (microbat habitat)	Microbat mortality	B	<ul style="list-style-type: none"> ▶ Pre-clearing surveys would be undertaken of any culverts/ bridges that are to be removed to identify roosting habitat for microbats. ▶ For any structures identified as potential microbat habitat an additional pre-clearance survey would be undertaken by a suitably qualified ecologist on the day prior to the disturbance of these structures to determine if microbats are present. ▶ If small numbers (<10) of non-breeding bats are present an ecologist would either: <ul style="list-style-type: none"> ✓ Install exclusion after the bats have vacated the site at night. ✓ Capture and relocate the bats that evening. ▶ Where larger numbers or breeding microbats are identified a specific plan would be developed and implemented by an ecologist with microbat experience in consultation with ARTC and DPIE (BCS). ▶ Only suitably qualified ecologists with up to date bat Lyssavirus vaccinations are to handle microbats. 	C	Clearing Permit T4MR - FRM-ENV-001-02
Works near / in creeks, piling pads and temporary crossings	Impacts to waterway Impacts (complete or partial blockages) to fish passage.	B	<ul style="list-style-type: none"> ▶ Works within the riparian zone would maximise, where practicable, the preservation of any existing vegetation and minimise disturbance. 	E	Waterway Crossing EWMS Why do fish need to cross the road? Fish passage requirements for

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
	Indirect and direct impacts to key fish habitat i.e. instream structures, sediment laden runoff, noise and vibration, etc.		<ul style="list-style-type: none"> ▶ Any instream large woody debris in the development footprint would be relocated upstream or downstream. ▶ Designs for works within or near watercourses would provide for the retention of natural functions and maintenance of fish passage in accordance with Why do fish need to cross the road? Fish passage requirements for waterway crossings (Fairfull and Witheridge, 2003). ▶ Works within watercourses will not commence during periods of rain or high flow events. 		waterway crossings (Fairfull and Witheridge, 2003). Clearing Permit T4MR - FRM-ENV-001-02
	Aquatic fauna mortality	B	<ul style="list-style-type: none"> ▶ Any pools in watercourses that would be impacted by construction would be dewatered according to a dewatering procedure to be prepared. ▶ The dewatering procedure is to include methods for collection and relocation of native aquatic fauna (defishing) in offsite habitat and euthanasia of exotic species. 	C	Water Discharge permit T4MR -FRM-ENV-001-01
Trenches/ deep excavation	Fauna mortality	C	<ul style="list-style-type: none"> ▶ Where possible trenches/ deep excavation are not to be left open overnight. ▶ Where possible for trenches/ excavation left open overnight, a fauna escape ramp/ ladder (plastic garden mesh/ timber plank) is to be provided. ▶ Trenches/ excavations left overnight are to be inspected prior to works commencing for fauna with any fauna present to <u>only</u> be captured/ relocated by a suitably qualified fauna spotter/ catcher. 	D	Clearing Permit T4MR - FRM-ENV-001-02 Flora & Fauna ECM- T4MR -FRM-ENV-001-06

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
Management of cane toads	Lethal toxic ingestion, caused by cane toads to local fauna.	C	<ul style="list-style-type: none"> Cane toads have nor do not currently occur in the greater New England region - including in the area between Moree and Narrabri. The current known distribution of toads in New South Wales is essentially east of the Great Diving Range - a considerable distance from the area. In addition, current models predict that the climate in the region is unlikely to be suitable for toads becoming established (Kearney et al. 2008; Kolbe et al. 2010). There have been few historical records of individuals that have been translocated (accidentally) to the region, though never in numbers or to specific areas that have threatened them becoming established (see ALA 2021). If cane toads are detected in the area, expert advice should be sought immediately in initiating control and eradication measures. These will include manual removal of adults and if necessary, eggs, tadpoles and metamorph (juvenile) toads. Such measures have been demonstrated to be effective for local eradication of small established populations (Greenlees et al. 2018). 	E	Pest and Weed Management Appendix
Weed, pest and pathogen management	Proliferation and spread of weeds, pest species and pathogens.	B	<ul style="list-style-type: none"> A separate Pest and Weed Management (PWMP) Sub-plan has been prepared for the project. All measures within this plan would be implemented. 	E	Pest and Weed Management Appendix
Earthworks	Reduced water quality as a result of released sediments.	B	<ul style="list-style-type: none"> All erosion sediment control measures detailed within the Progressive Erosion Sediment Control Plan (ESCP) would be implemented. 	E	Erosion and Sediment control procedure T4MR-MPR-ENV-005

CONSTRUCTION ACTIVITY/ ASPECT	POTENTIAL IMPACT	RISK LEVEL PRIOR TO MITIGATION	INDICATIVE MITIGATION MEASURES	RISK LEVEL FOLLOWING MITIGATION	DOCUMENTS / PROCEDURES / TRAINING REQUIRED
			<ul style="list-style-type: none"> ▶ Rehabilitation of disturbed areas would be undertaken progressively and in accordance with the rehabilitation strategy. 		Progressive Erosion Sediment Control Plan

Appendix D Vegetation Communities and Koala Habitat Mapping

Legend

Development Site	Meandering Transects - September 2014	Stream Order:
550m Buffer Area	Meandering Transects - October 2014	1st Order
IBRA Regions and Subregion Areas	Meandering Transects - January 2016	2nd Order
Local Government Area	Meandering Transects - May 2016	3rd Order
Mitchell Landscape Area	Plot/Transect	4th Order
Native Vegetation Area	Rapid Assessment	5th Order
	Fauna Survey Location	6th Order

Threatened Species:

Eastern Bentwing-Bat (ecosystem and species credit)	Black-striped Wallaby (species credit)
Grey-crowned Babbler (ecosystem credit)	Brown Treecreaper (ecosystem credit)
Grey-headed Flying-fox (ecosystem and species credit)	Five-clawed Worm-Skink (species credit)
Koala (species credit)	Glossy Black-cockatoo (ecosystem credit)
Little Pied Bat (ecosystem credit)	Square-tailed Kit (ecosystem credit)
Varied Sittella (ecosystem credit)	<i>Desmodium campylocaulon</i> (species credit)
Yellow-bellied Sheath-tail Bat (ecosystem credit)	<i>Digitaria parviflora</i> (species credit)
Little Eagle (ecosystem credit)	<i>Homaphalis belsonii</i> (species credit)
Magpie Goose (ecosystem credit)	<i>Dichanthium setosum</i> (species credit)
Pale-headed Snake (species credit)	<i>Swainsona murrayana</i> (species credit)
Turquoise Parrot (ecosystem credit)	

Vegetation:

Cleared/Non-native Vegetation
Zone 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion-Moderate - Good
Zone 2 - PCT-35 BVT-BR120, NA117-Brigalow - Belah open forest / woodland on alluvial often gilgaided clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion-Moderate - Good
Zone 3 - PCT-39 BVT-BR130, NA129-Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion-Moderate - Good
Zone 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion-Native Grassland
Zone 5 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW-Moderate - Good
Zone 6 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW-Derived Native Grasslands
Zone 7 - PCT-71 BVT-BR127, NA126-Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and aeolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion-Moderate - Good
Zone 8 - PCT-78 BVT-BR196, NA193-River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion-Moderate - Good
Zone 9 - PCT-135 BVT-BR284, NA271-Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion-Moderate - Good
Zone 10 - PCT-413 BVT-BR346, NA348-Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion-Moderate - Good



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - IBRA Regions and Subregion Areas
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A1
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

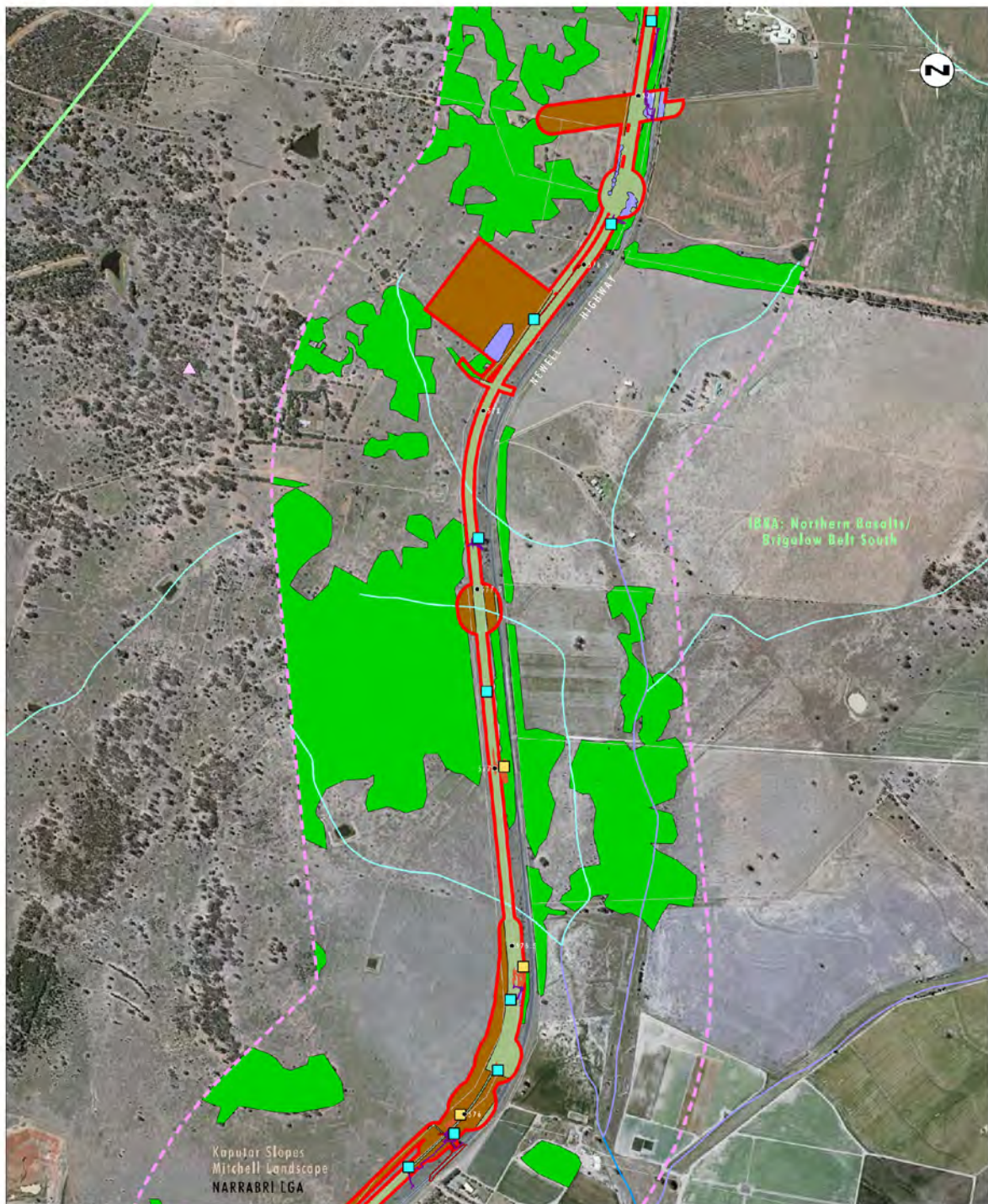


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - IBRA Regions and Subregion Areas
 - Rail Line Chainage

FIGURE A2
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

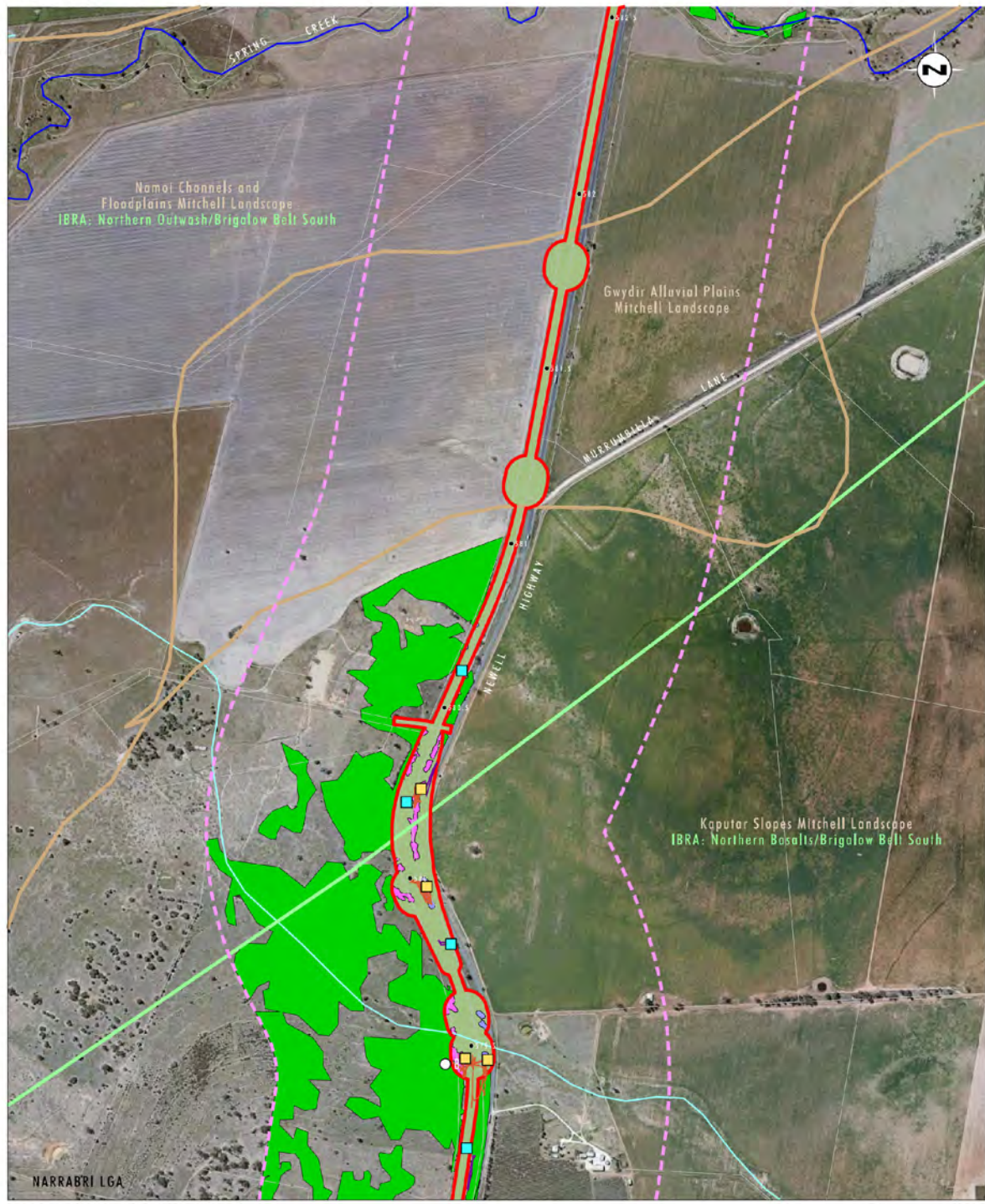


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - IBRA Regions and Subregion Areas
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A3
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

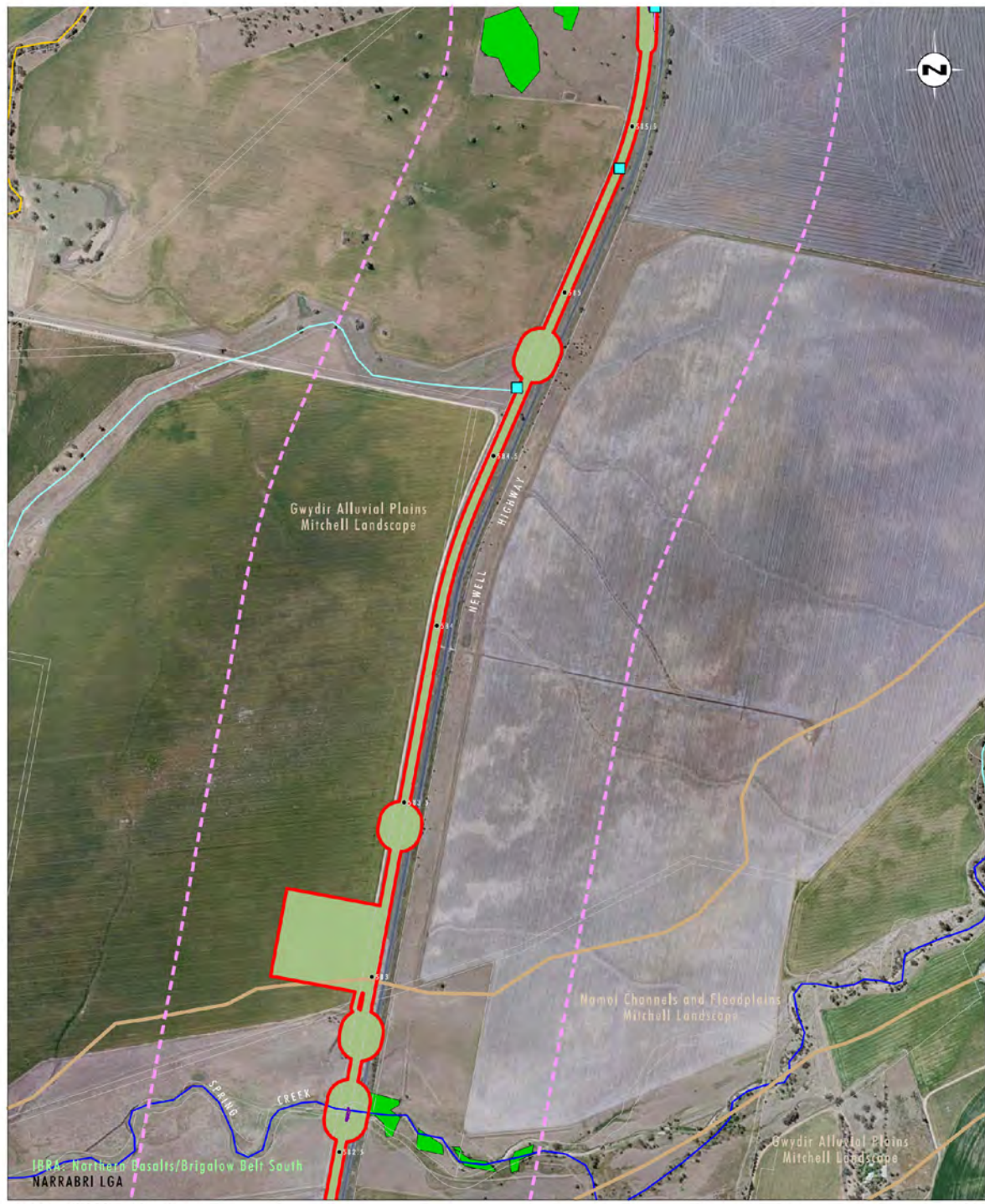


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A4
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

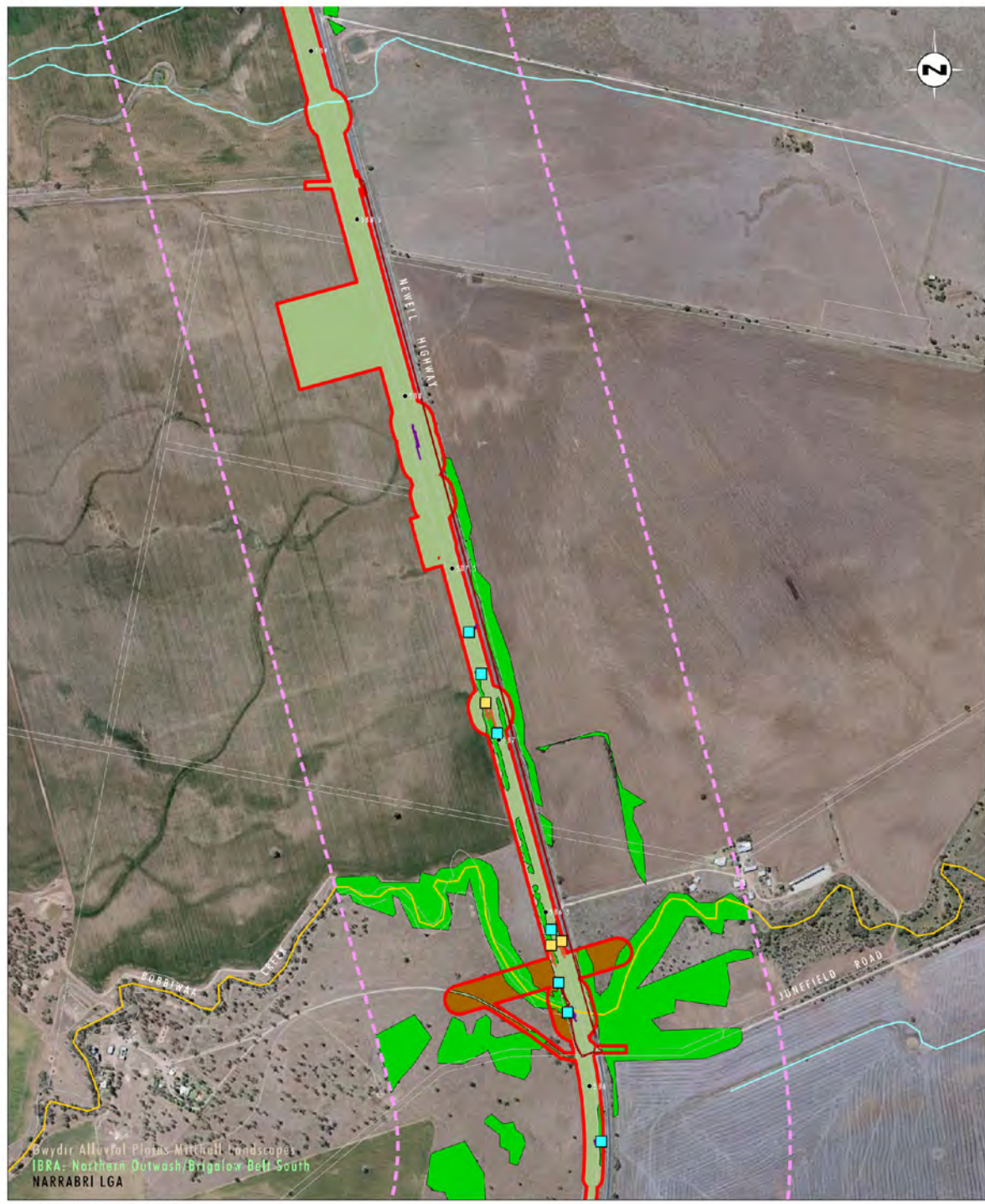
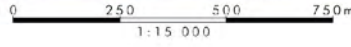
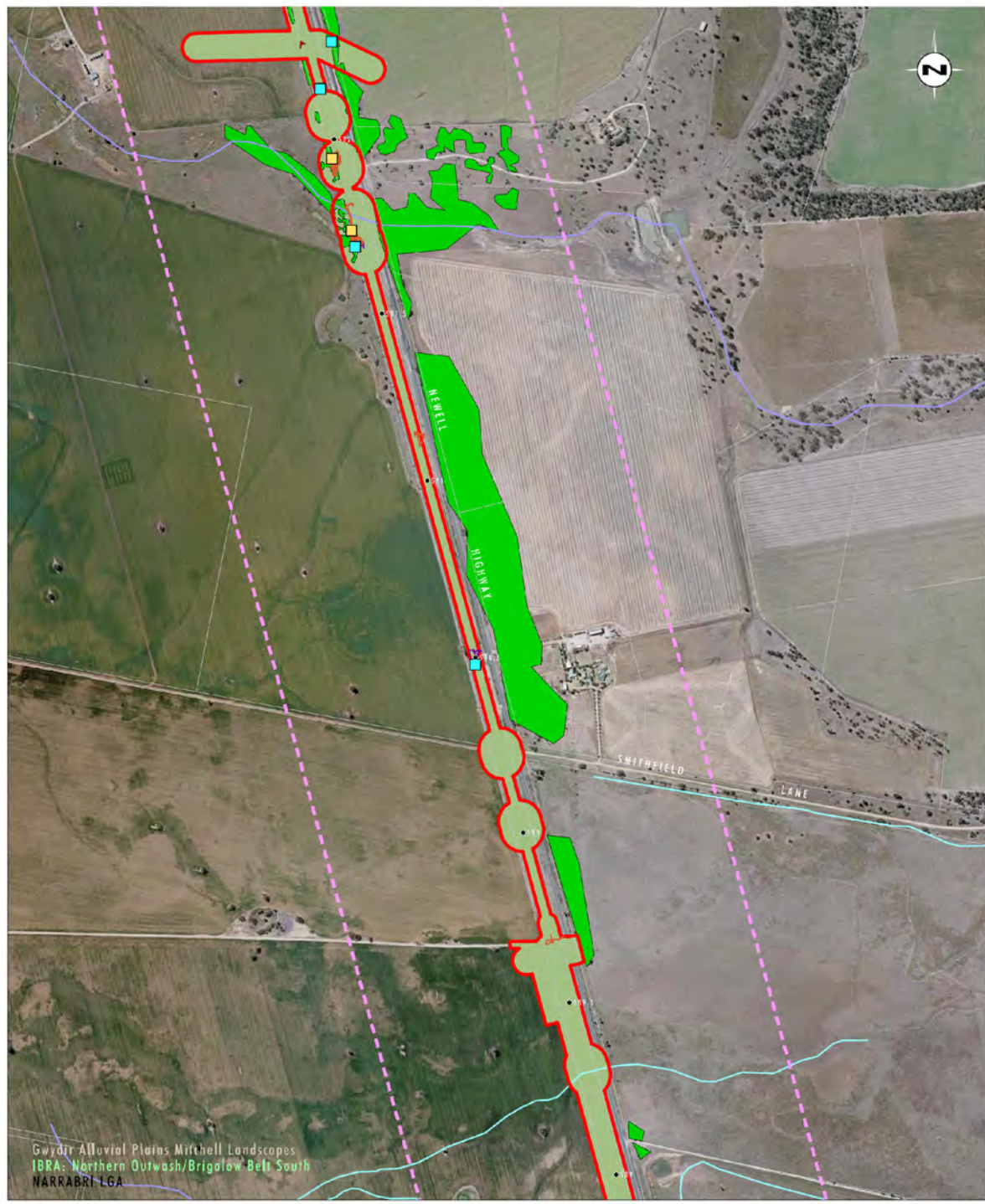


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
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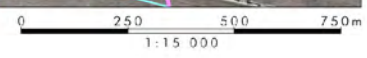
- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A5
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Gwydir Alluvial Plains Mitchell Landscapes
 IBRA: Northern Outwash/Brigalow Belt South
 NARRABRI LGA

Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page



- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A6
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A7
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

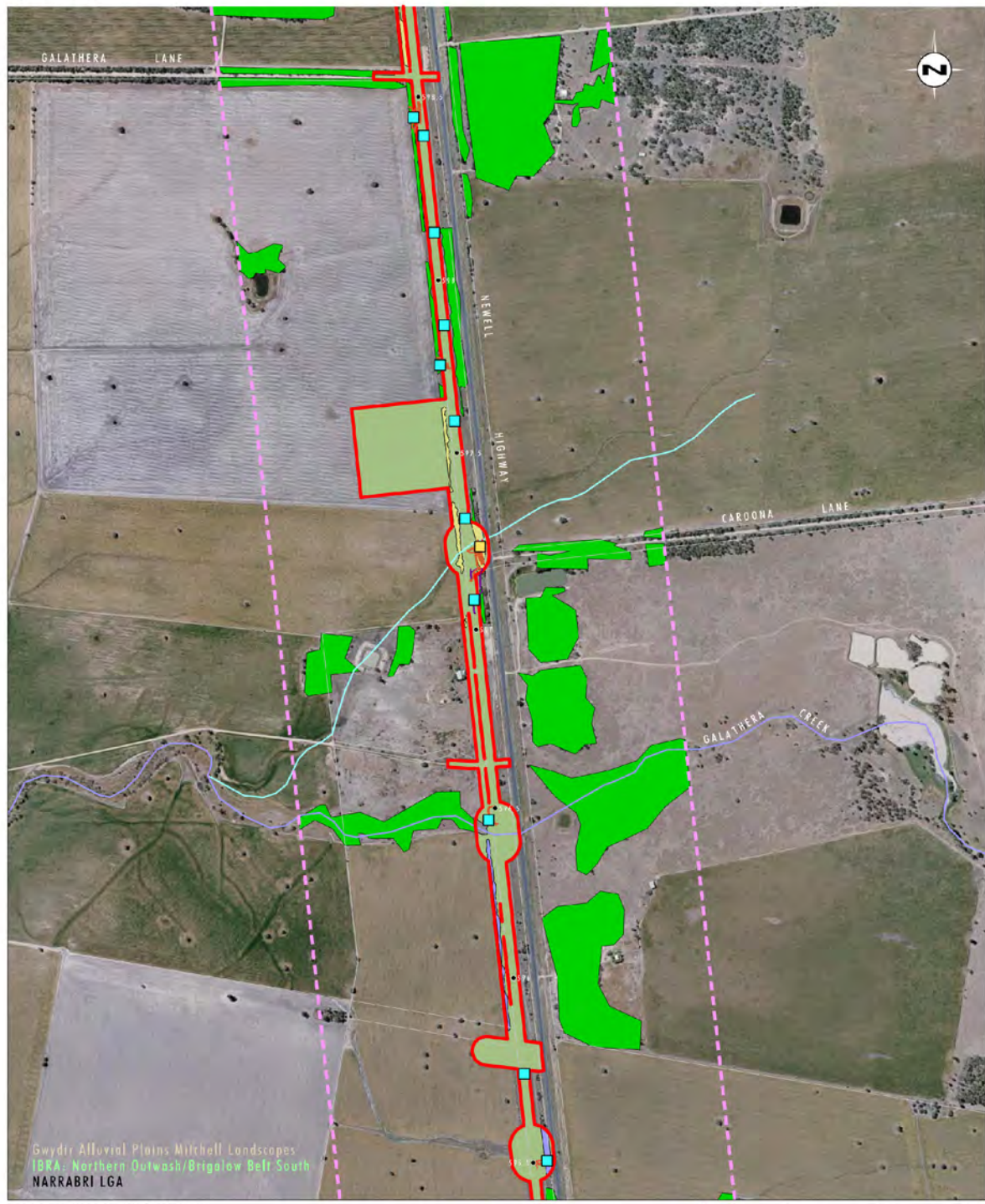


Image Source: ARTC (2016)
Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
Note: For full legend, refer to legend page

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- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A8
Survey Effort, Vegetation Map,
Threatened Species Locations
and Landscape Assessment

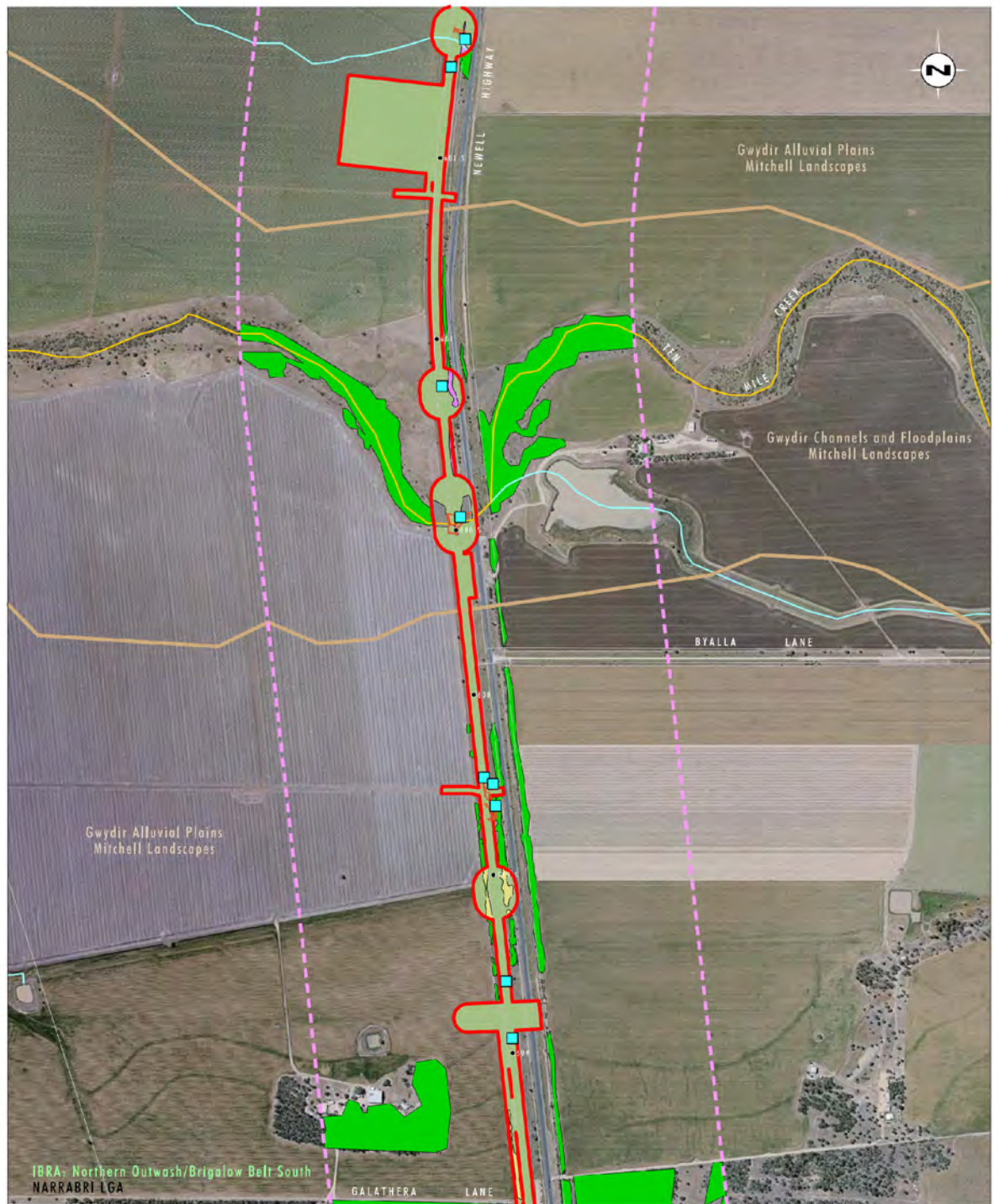


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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Legend

- Development Site
- 550m Buffer Area
- Mitchell Landscape Area
- Rail Line Chainage

FIGURE A9

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
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- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A10
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

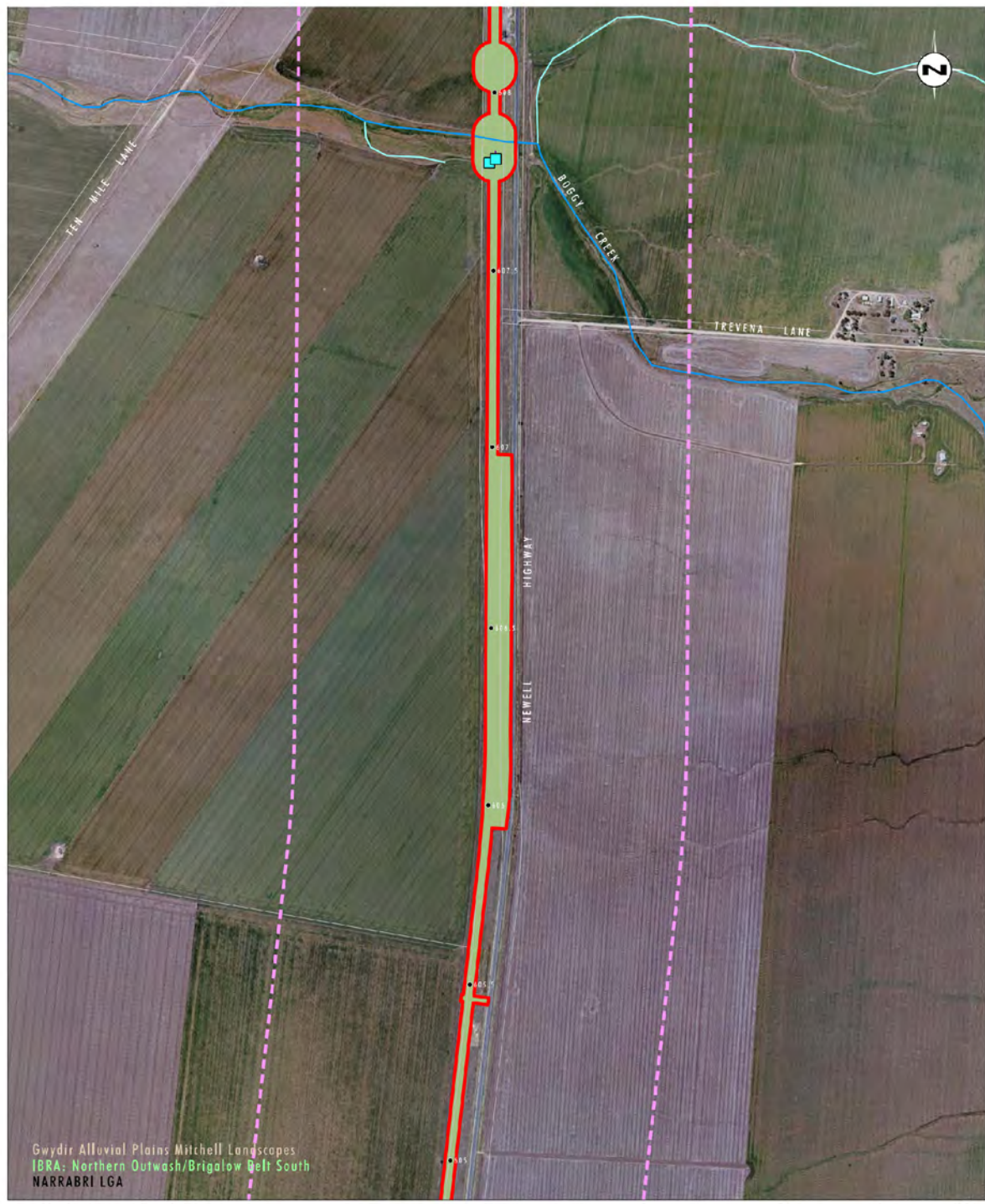


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page



- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A11
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

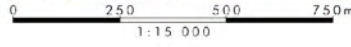


- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A12
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page



- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A13
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

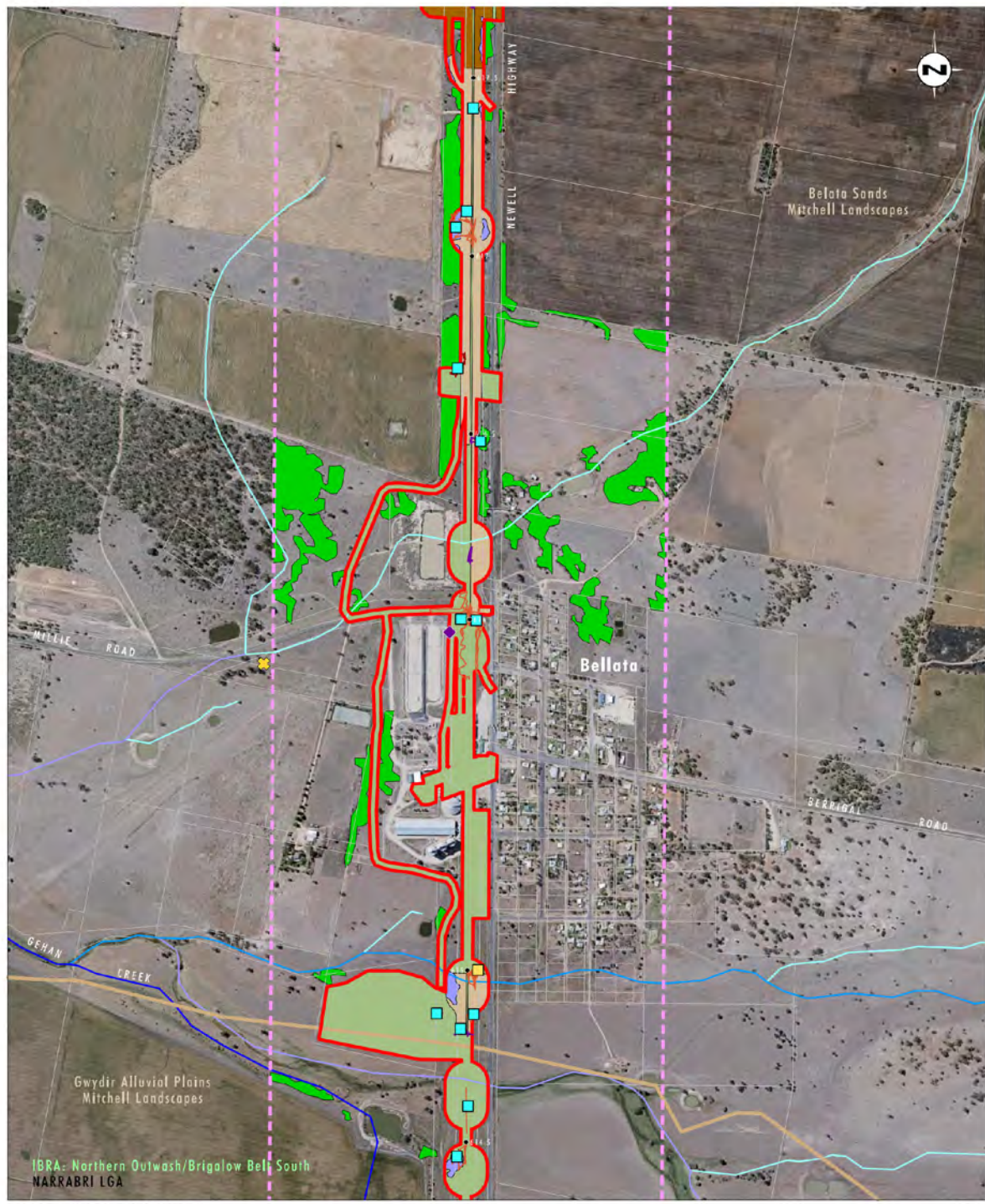


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A14
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

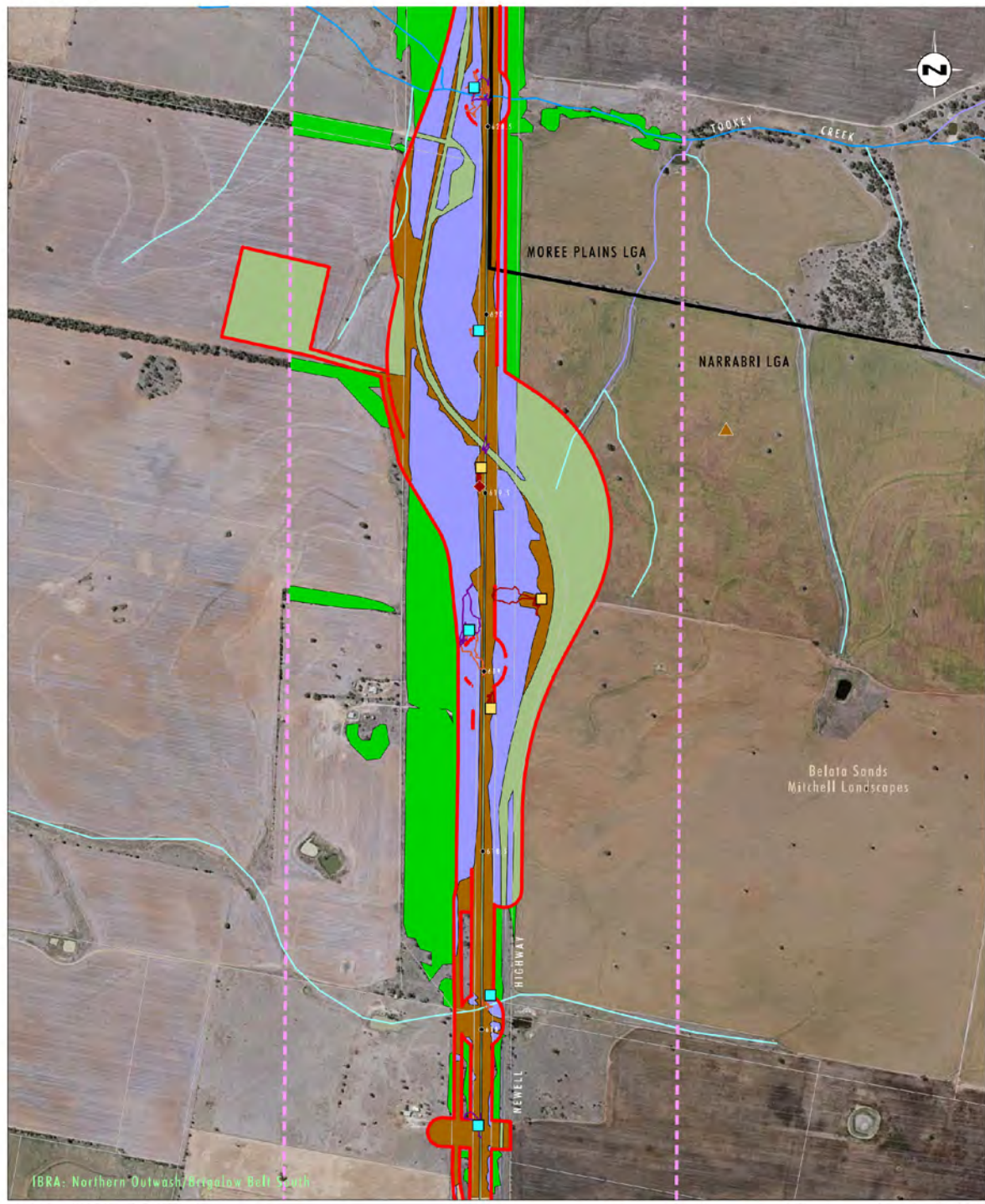


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 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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- Legend**
- Development Site
 - 550m Buffer Area
 - Local Government Area
 - Rail Line Chainage

FIGURE A15
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

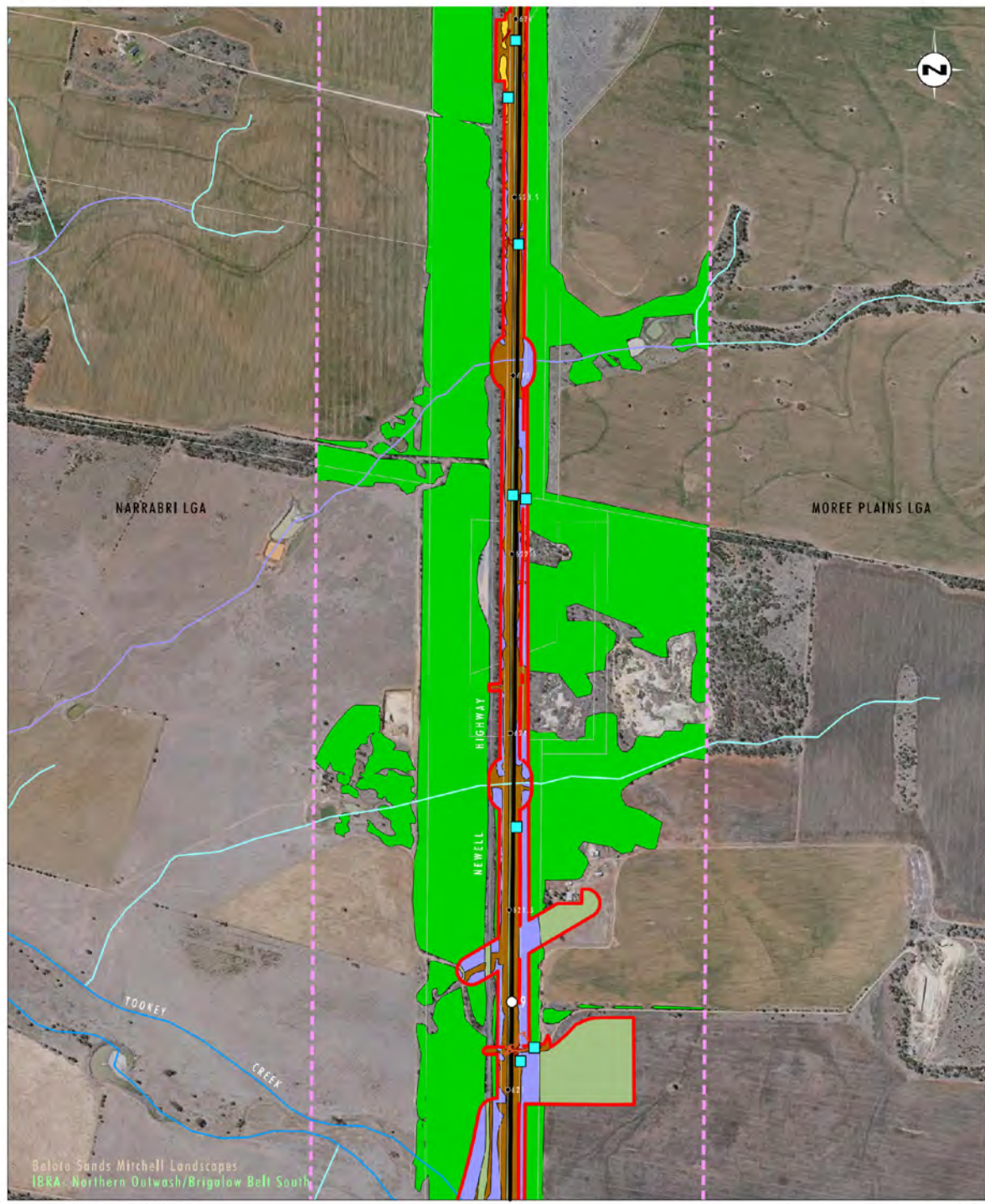


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 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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- Legend**
- Development Site
 - 550m Buffer Area
 - Local Government Area
 - Rail Line Chainage

FIGURE A16
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

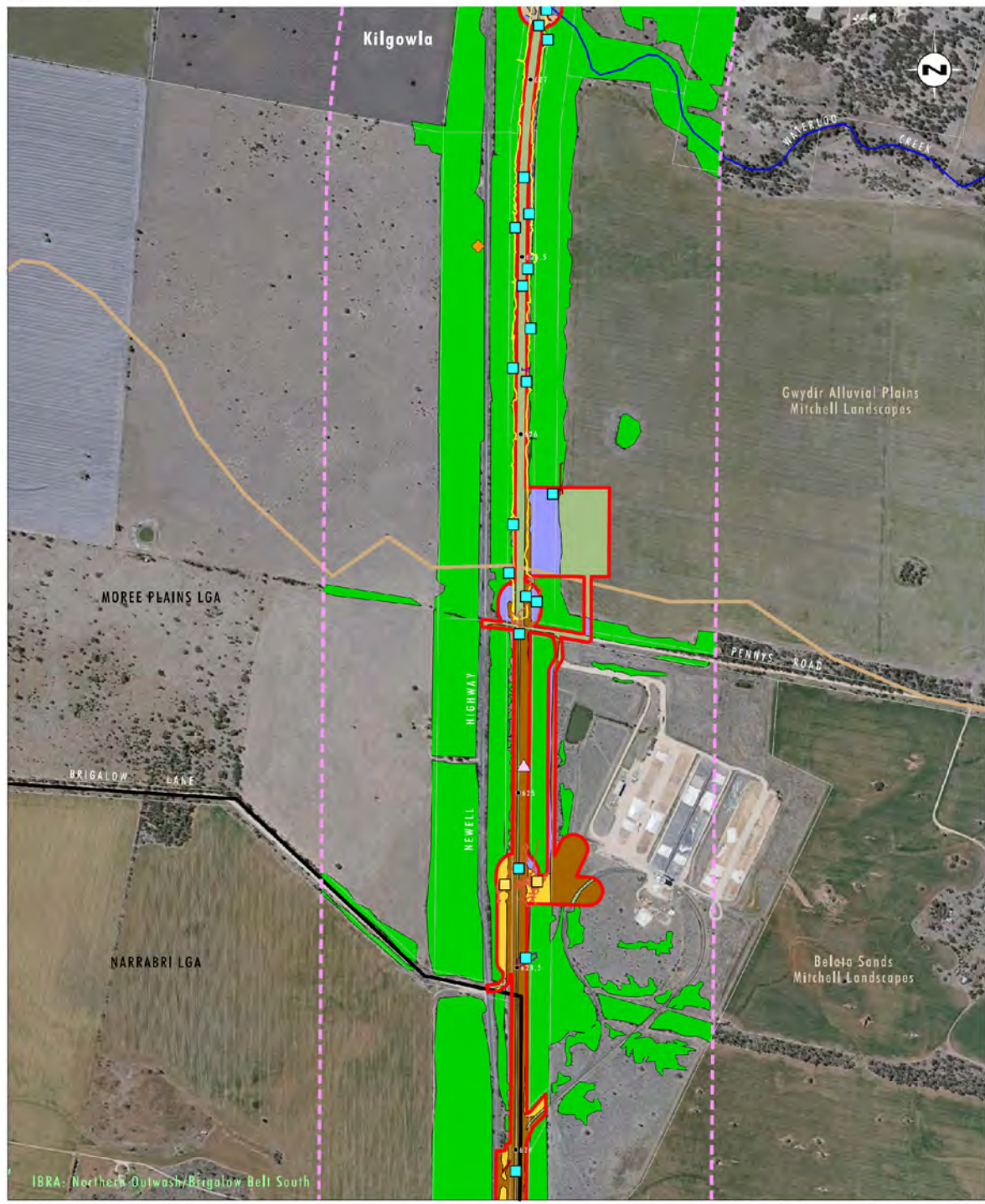


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Local Government Area
 - Rail Line Chainage

FIGURE A17
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

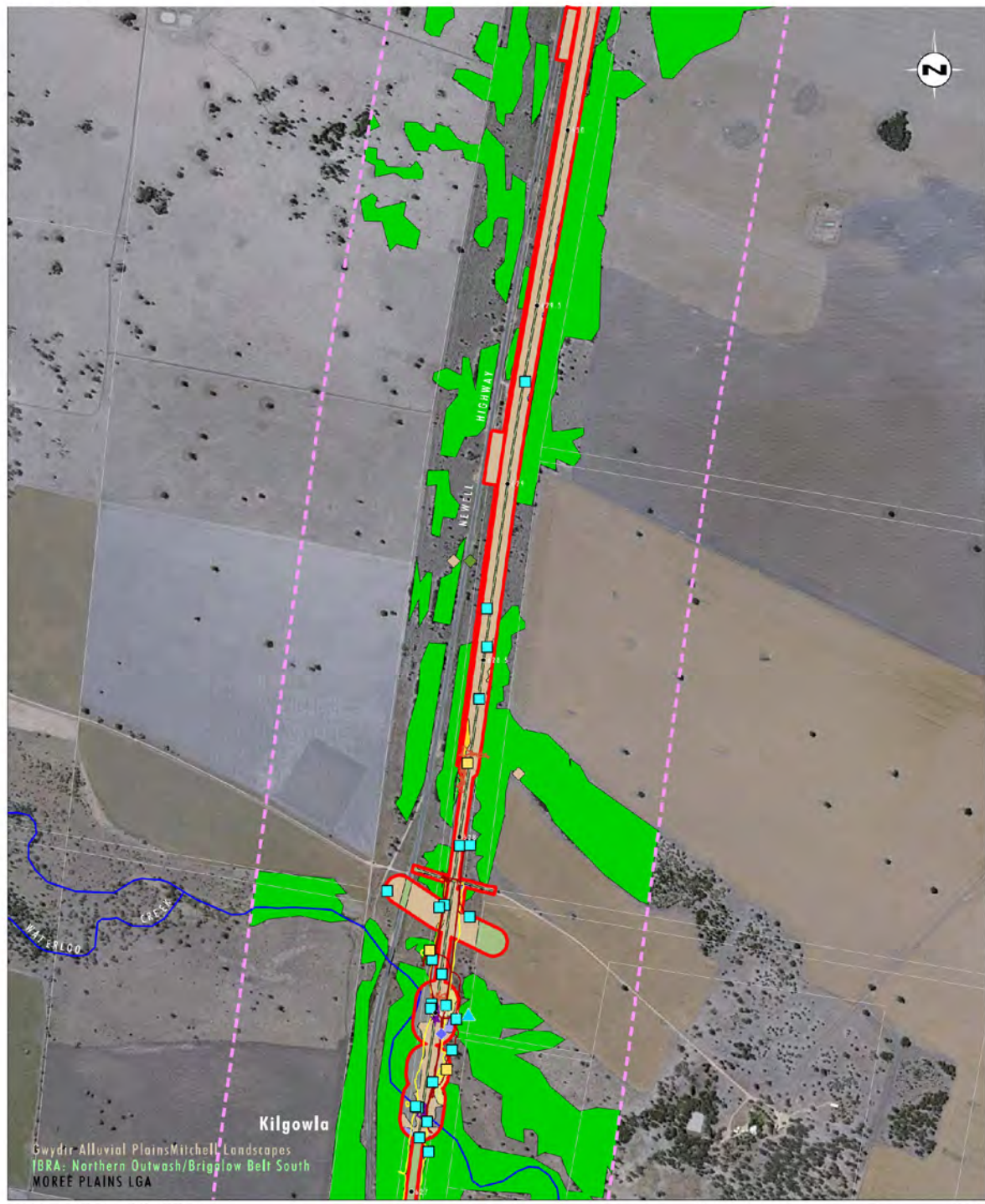


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A18
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

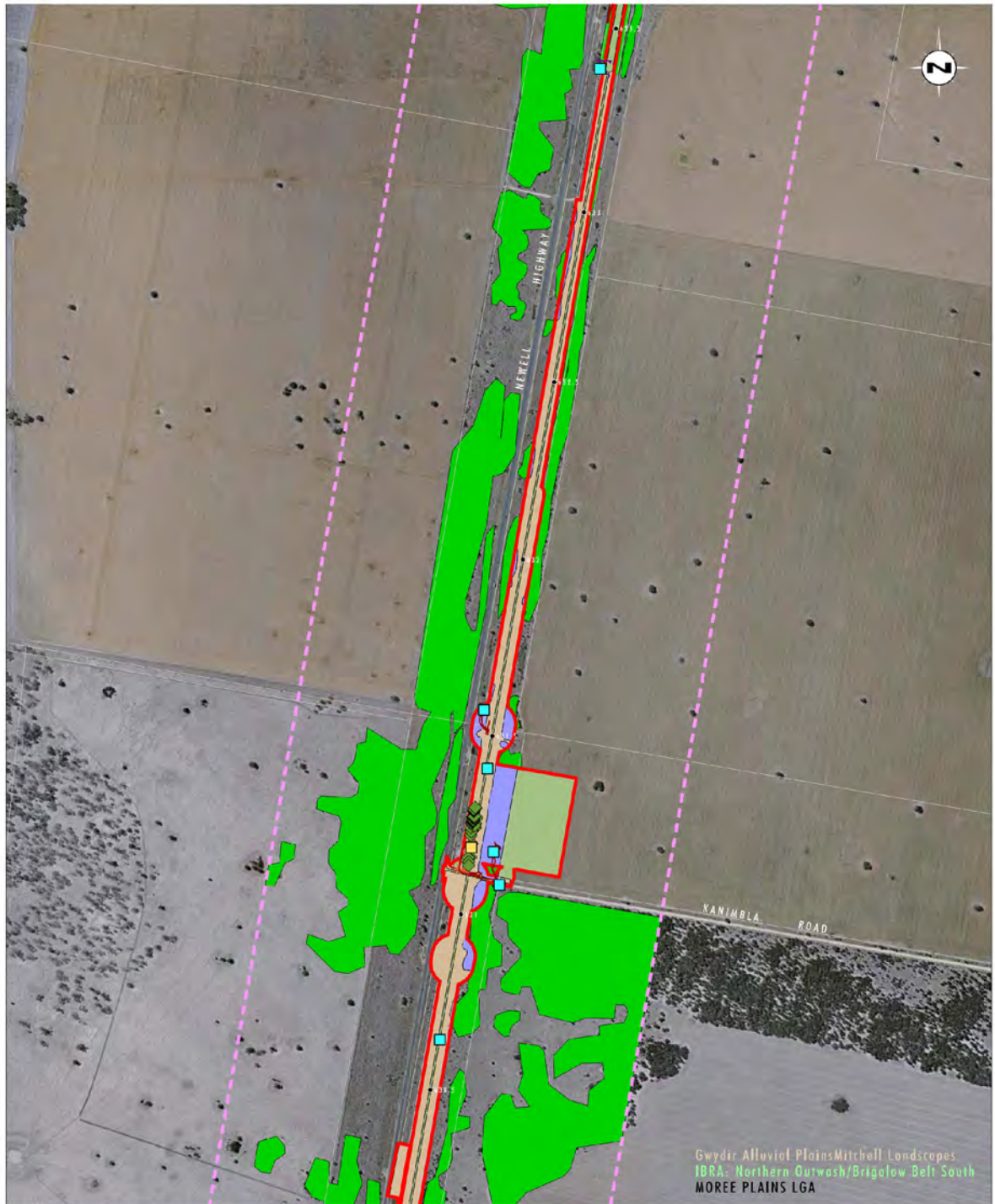


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A19
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

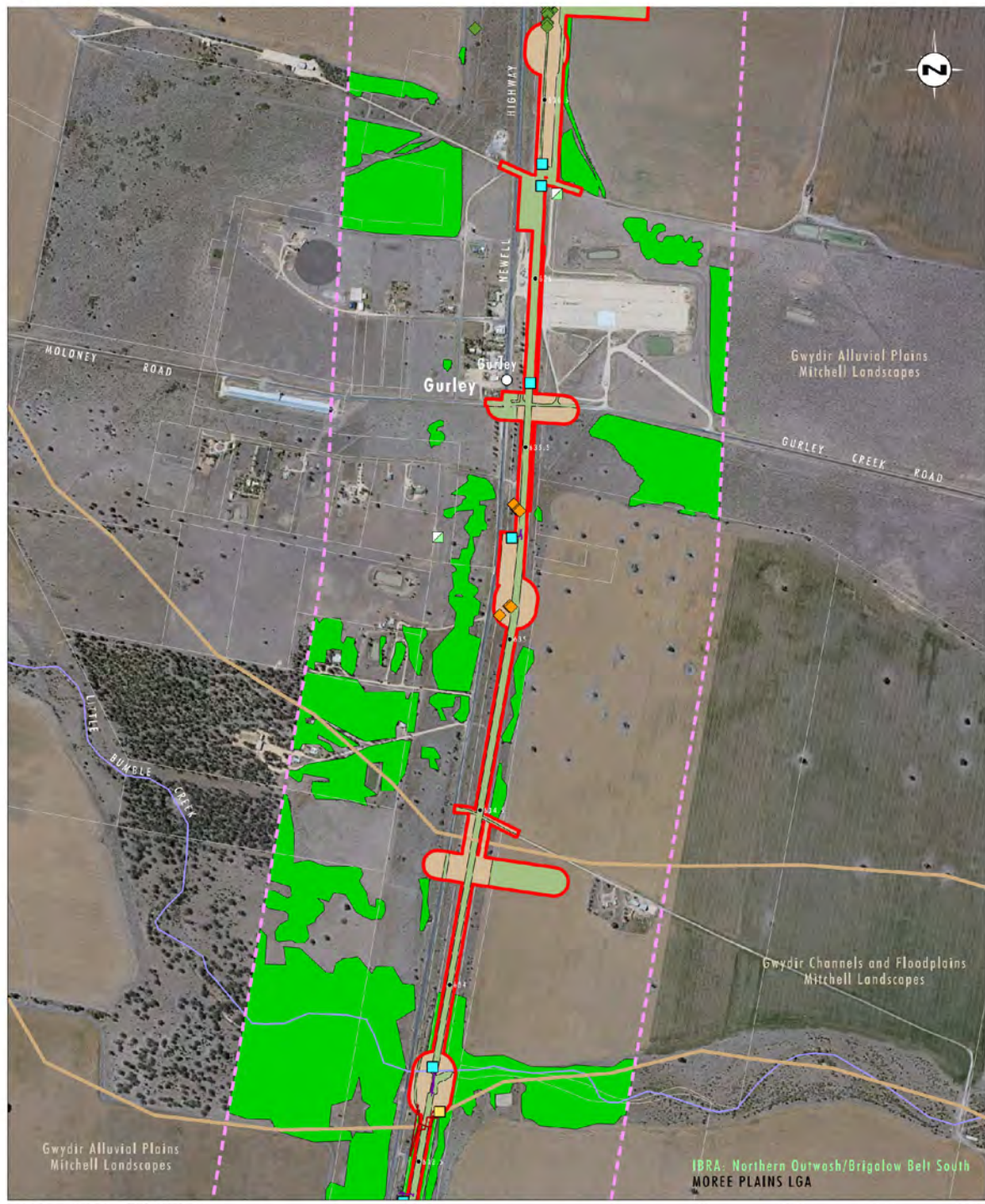


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A20
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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Legend

- Development Site
- 550m Buffer Area
- Rail Line Chainage

FIGURE A21

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

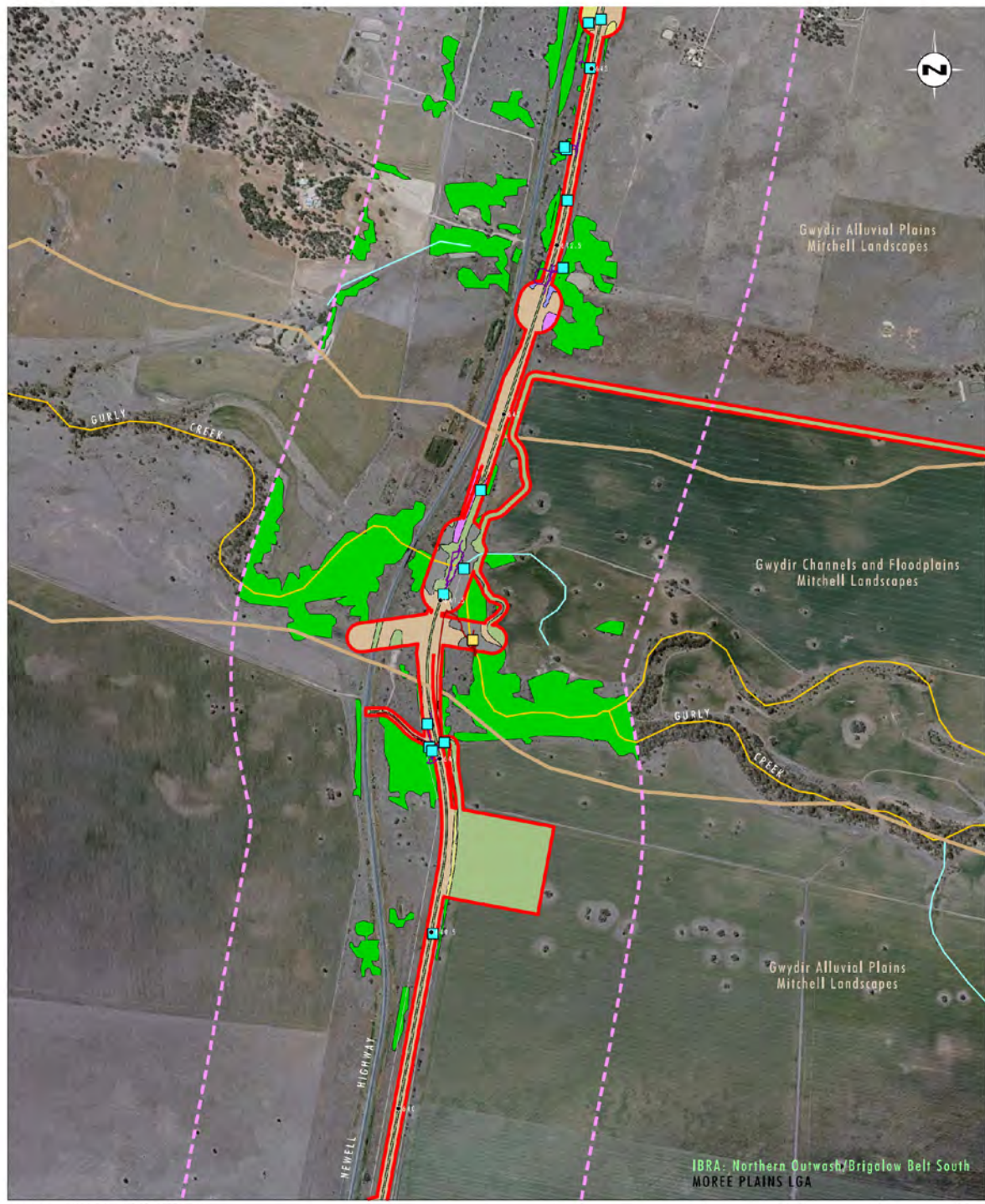


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A22
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

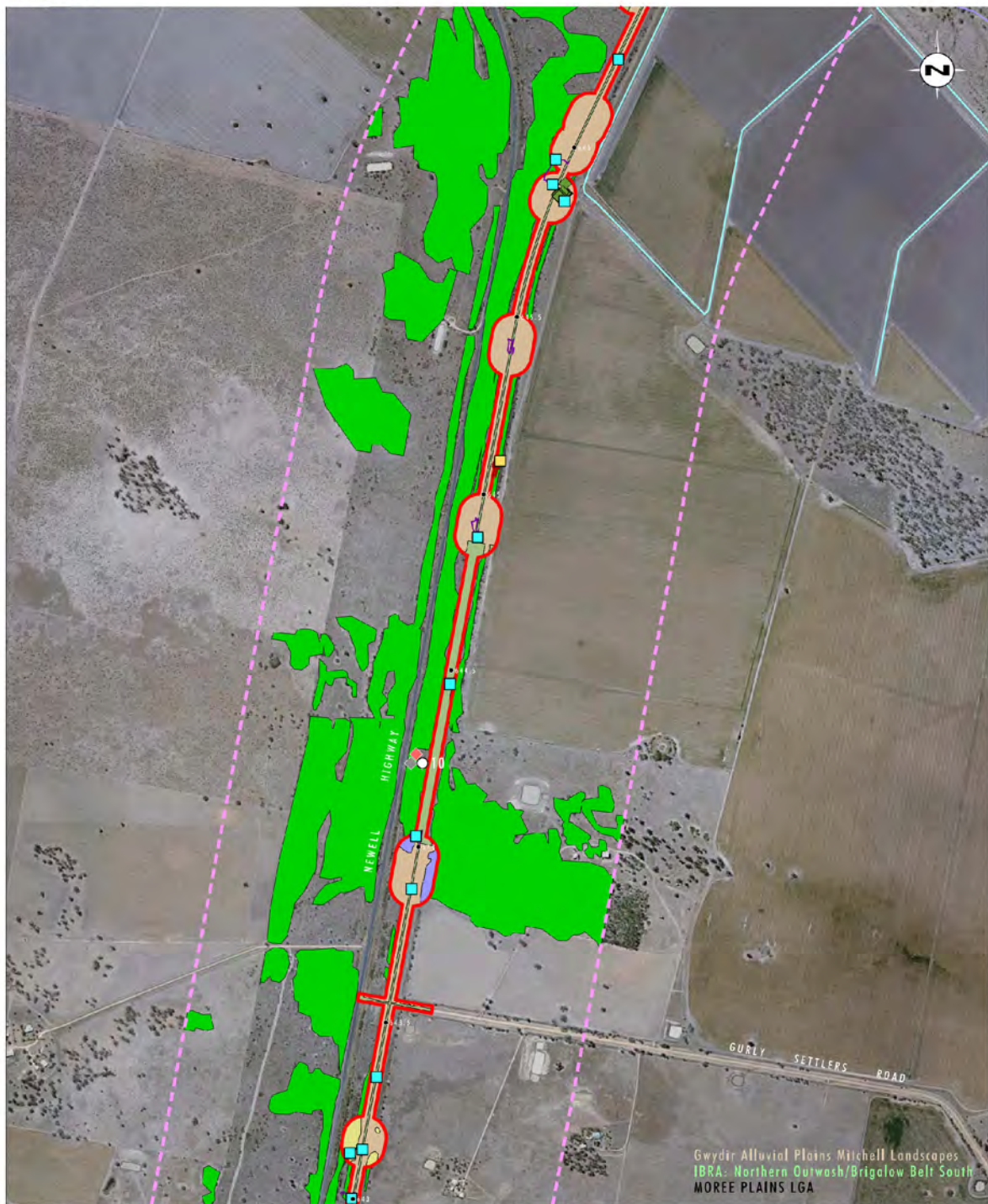


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 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
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- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A23
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

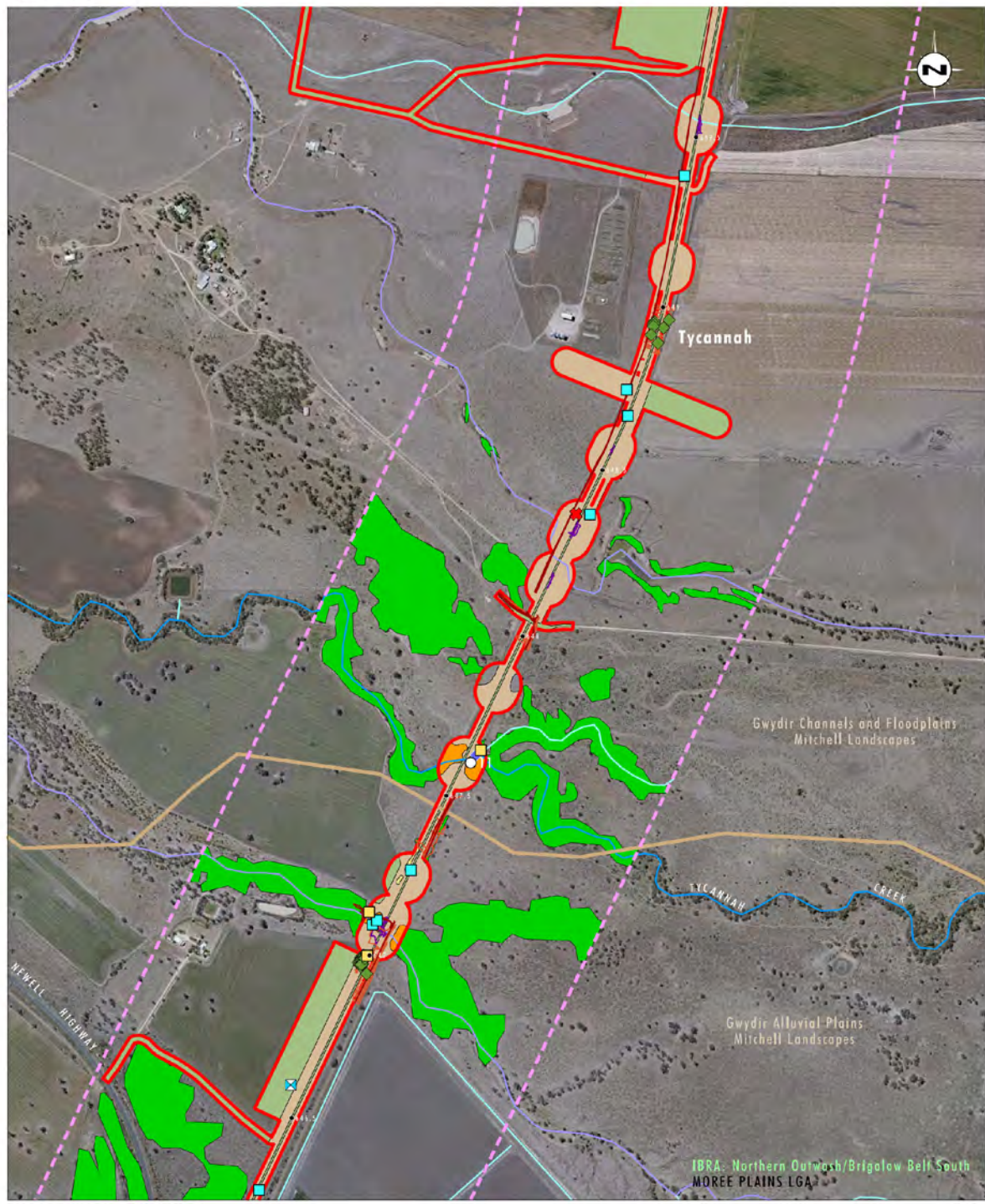


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A24
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

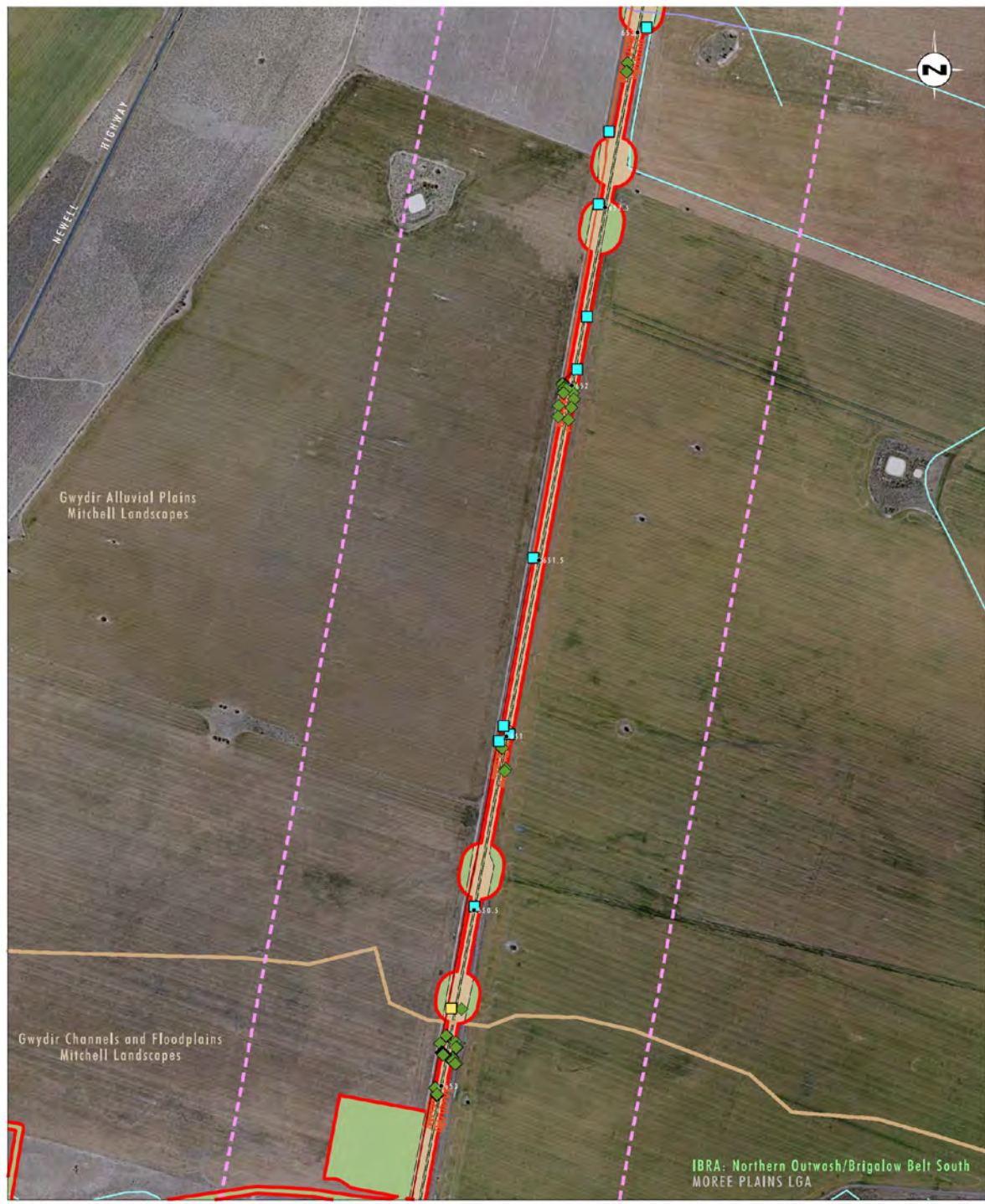


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
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- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A25
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page



- Legend**
- Development Site
 - 550m Buffer Area
 - Rail Line Chainage

FIGURE A26
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
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Legend

- Development Site
- 550m Buffer Area
- Rail Line Chainage

FIGURE A27

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

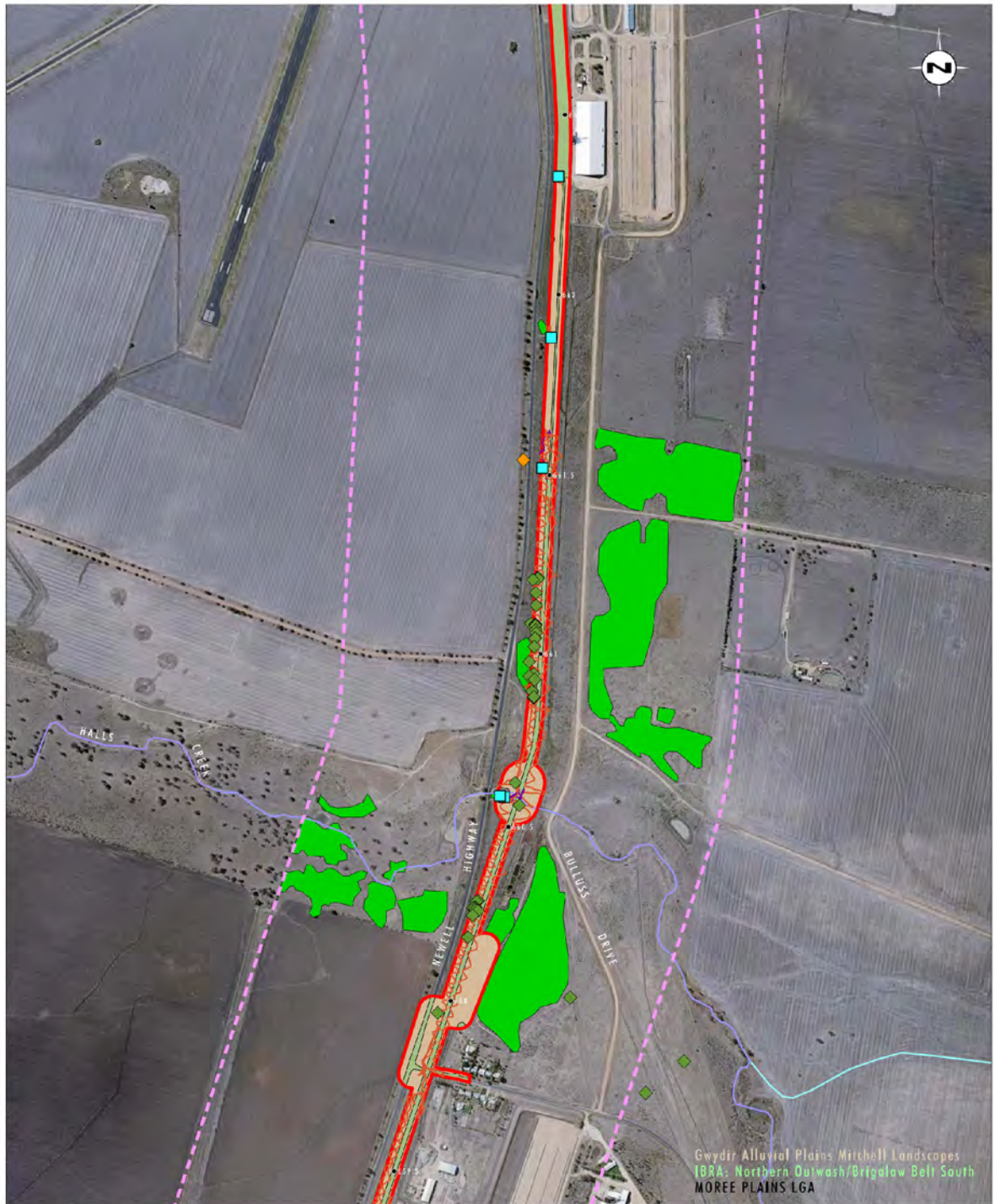


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

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Legend

- Development Site
- 550m Buffer Area
- Rail Line Chainage

FIGURE A28

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A29
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

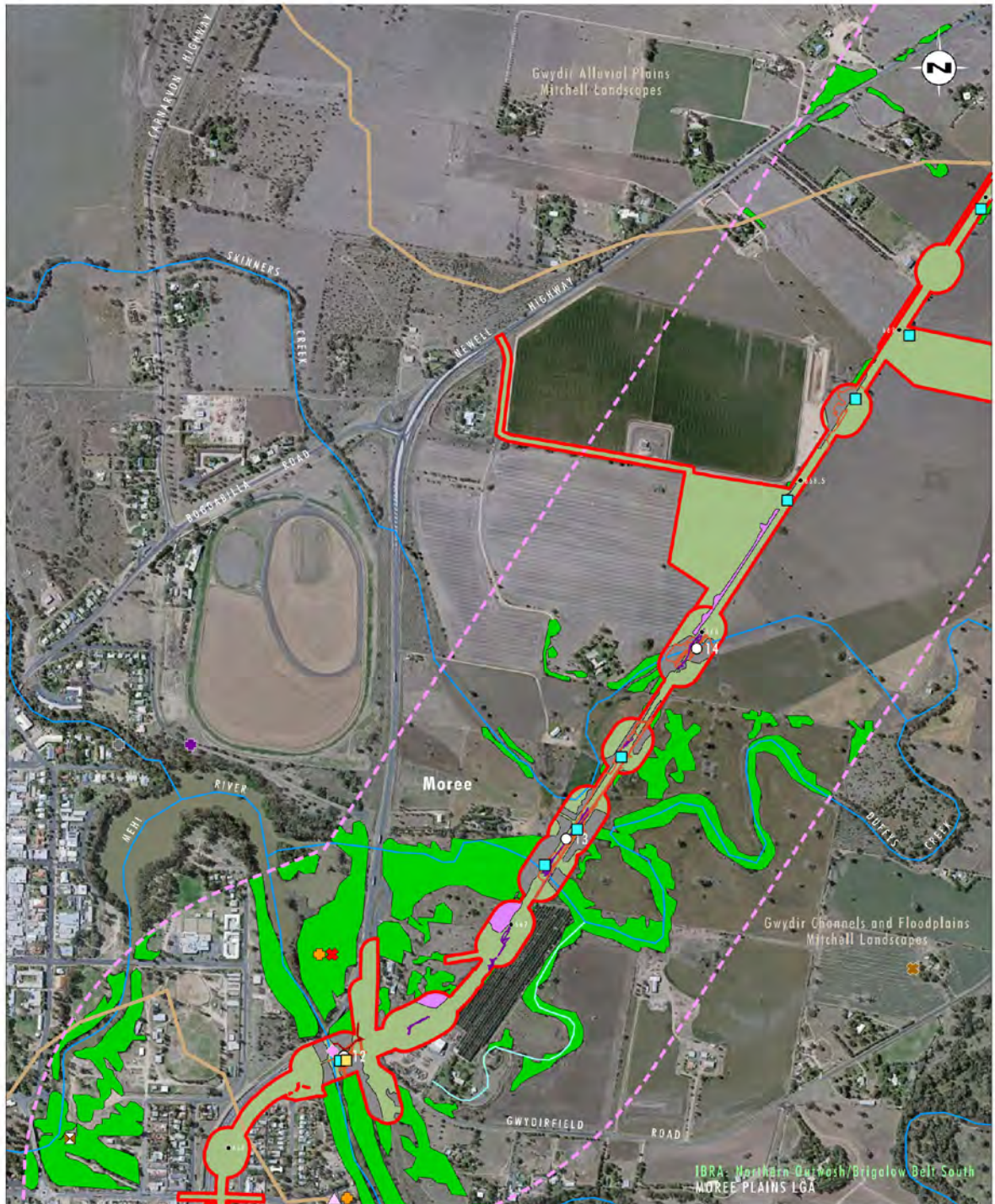


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A30
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

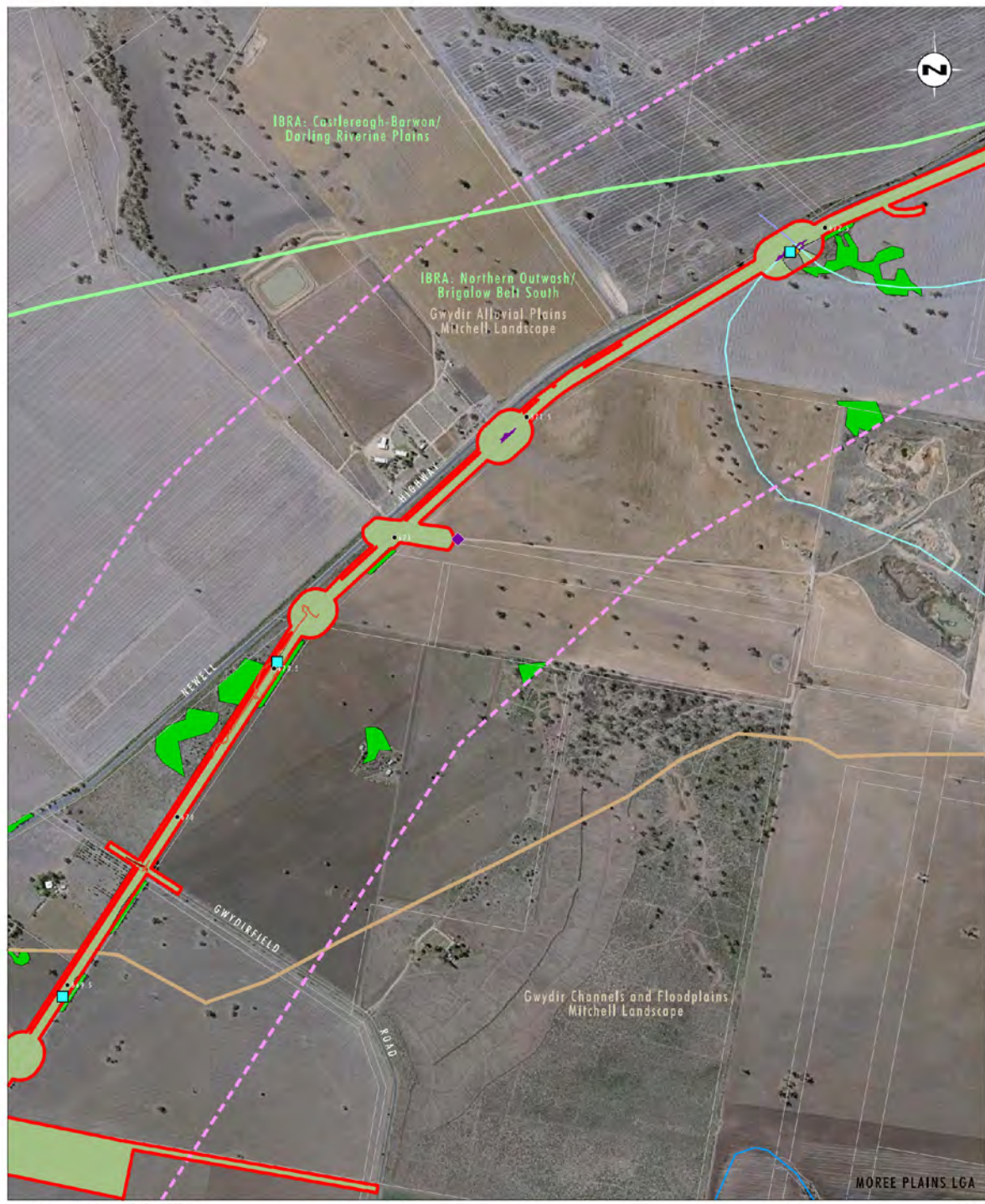


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A31
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

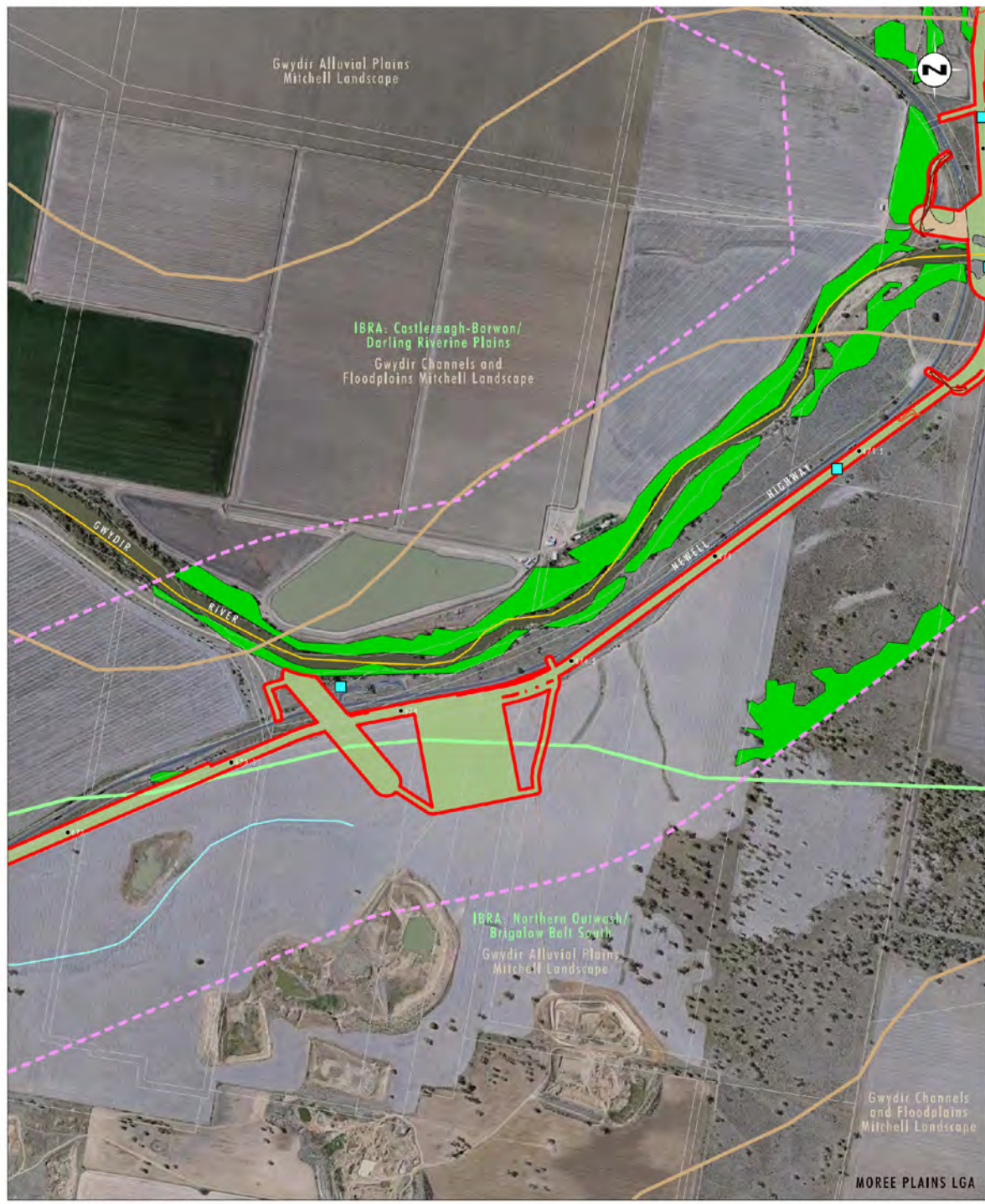


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A32
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

Legend

- Development Site
- 550m Buffer Area
- Mitchell Landscape Area
- IBRA Regions and Subregion Area
- Rail Line Chainage

FIGURE A33

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

IBRA: Northern Outwash/Brigalow Belt South
 MOREE PLAINS LGA

0 250 500 750m
 1:15 000

FIGURE A34
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

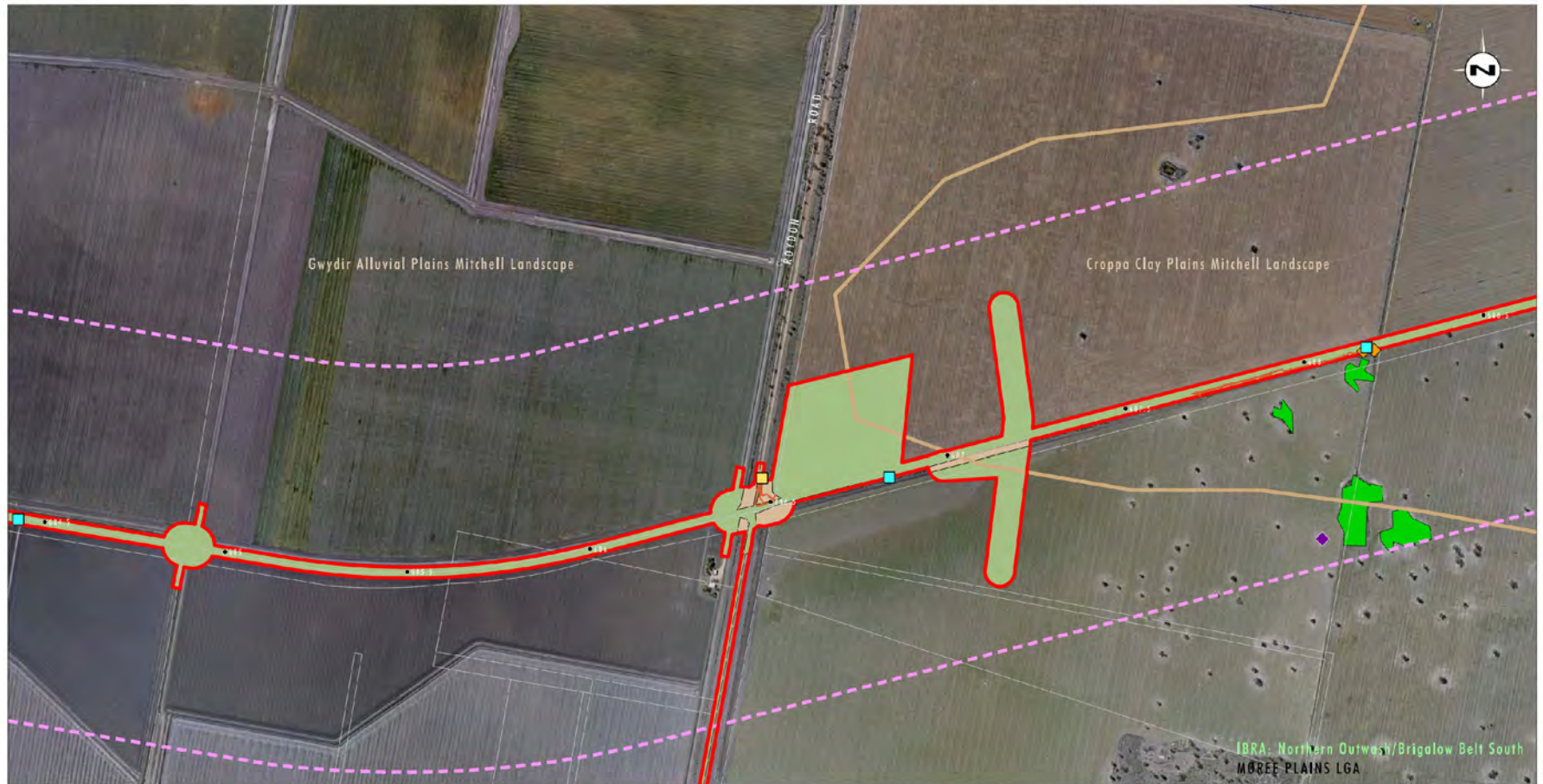


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

Legend

- Development Site
- 550m Buffer Area
- Mitchell Landscape Area
- Rail Line Chainage

File Name (A4): R05/3607_050.dgn
 20160718 16.36

FIGURE A35
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

0 250 500 750m
 1:15 000

FIGURE A36

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

Legend

- Development Site
- 500m Buffer Area
- Rail Line Chainage

FIGURE A37

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

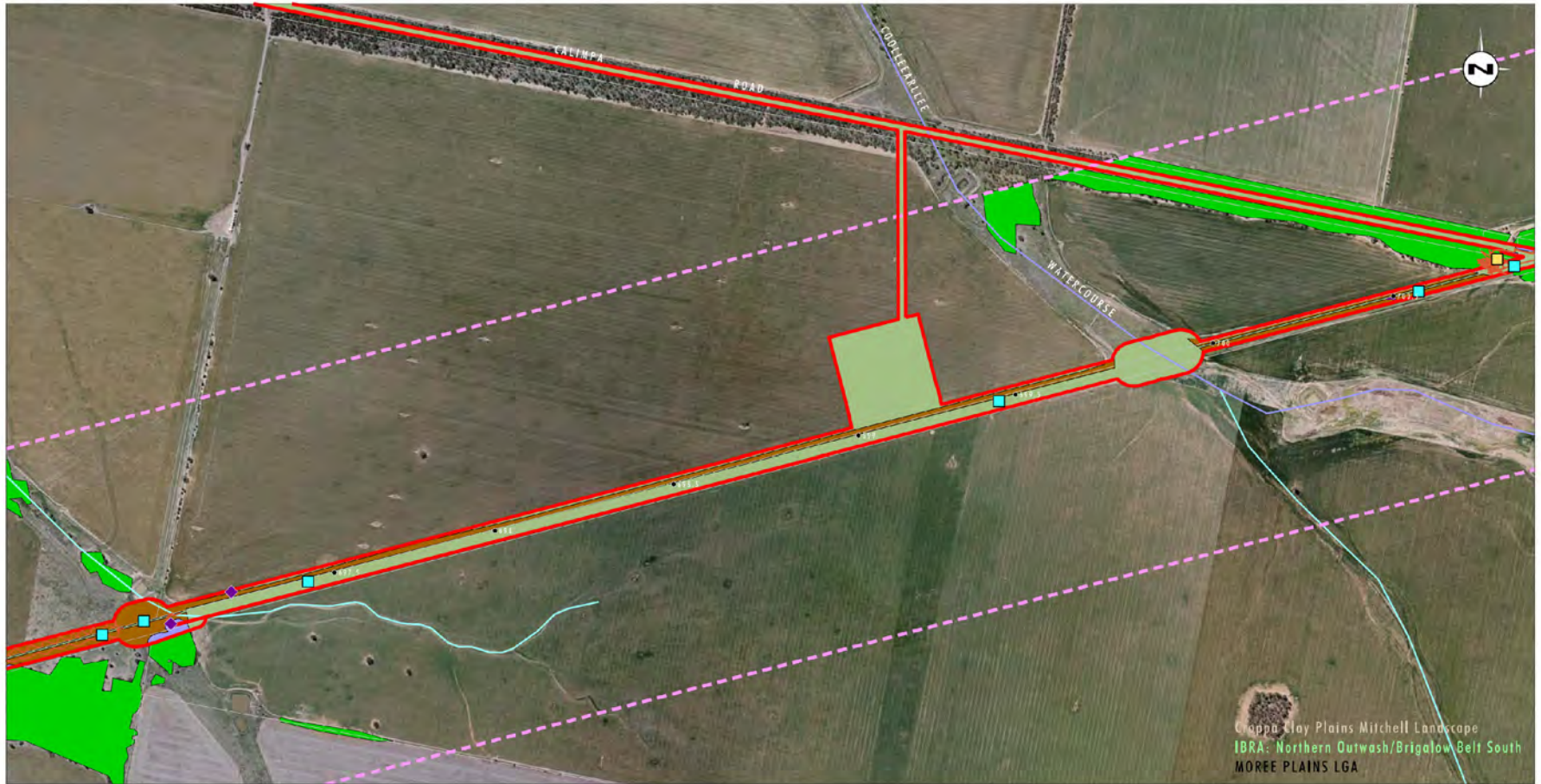


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - ◆ Rail Line Chainage

FIGURE A38
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
Note: For full legend, refer to legend page

0 250 500 750m
1:15 000

Legend

- Development Site
- 550m Buffer Area
- Rail Line Chainage

FIGURE A39
Survey Effort, Vegetation Map,
Threatened Species Locations
and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

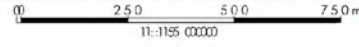
0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Local Government Area
 - Rail Line Chainage

FIGURE A40
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page



- Legend**
- Development Site
 - 550m Buffer Area
 - Local Government Area
 - Rail Line Chainage

FIGURE A41
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

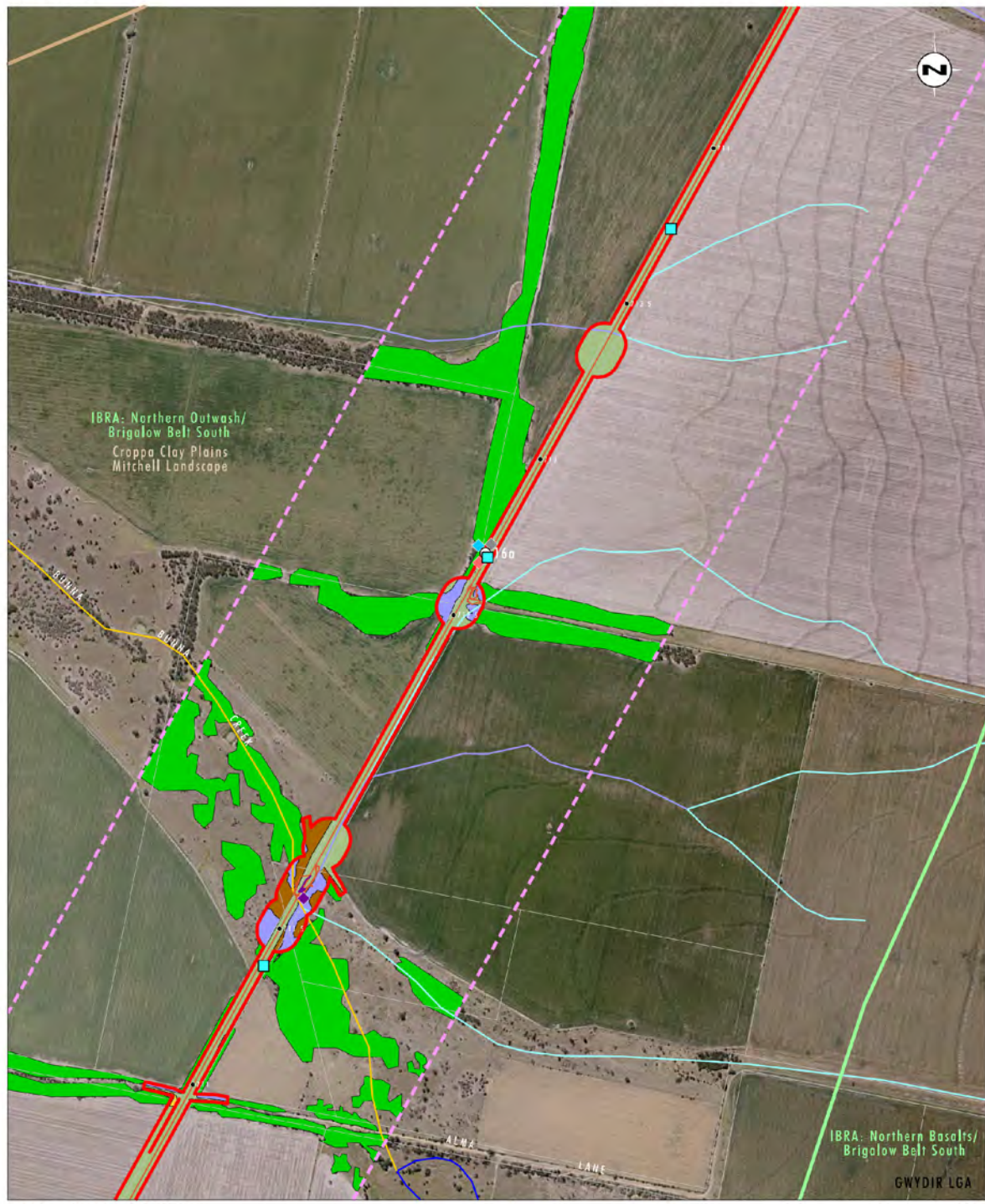


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A42
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

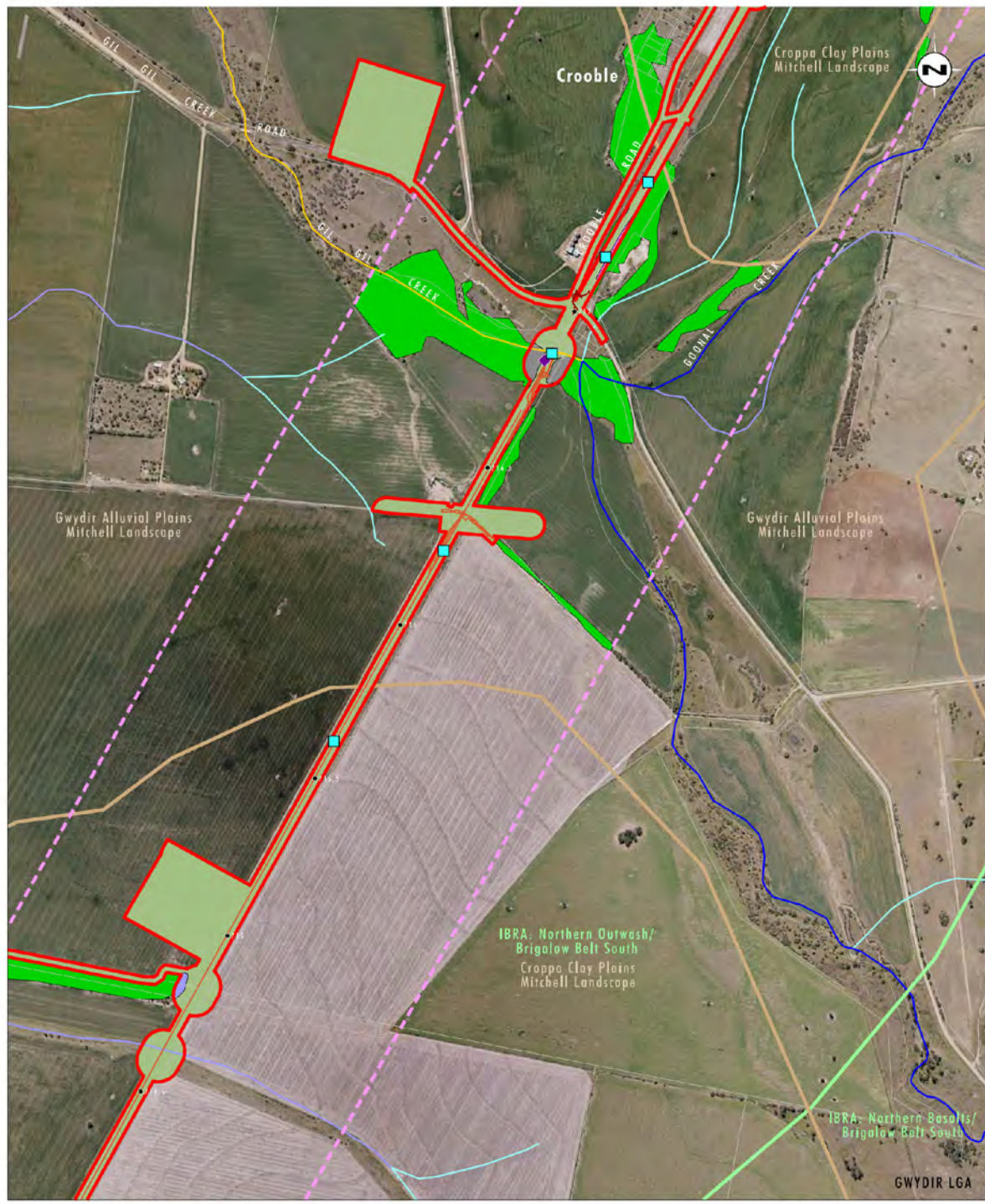


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A43
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

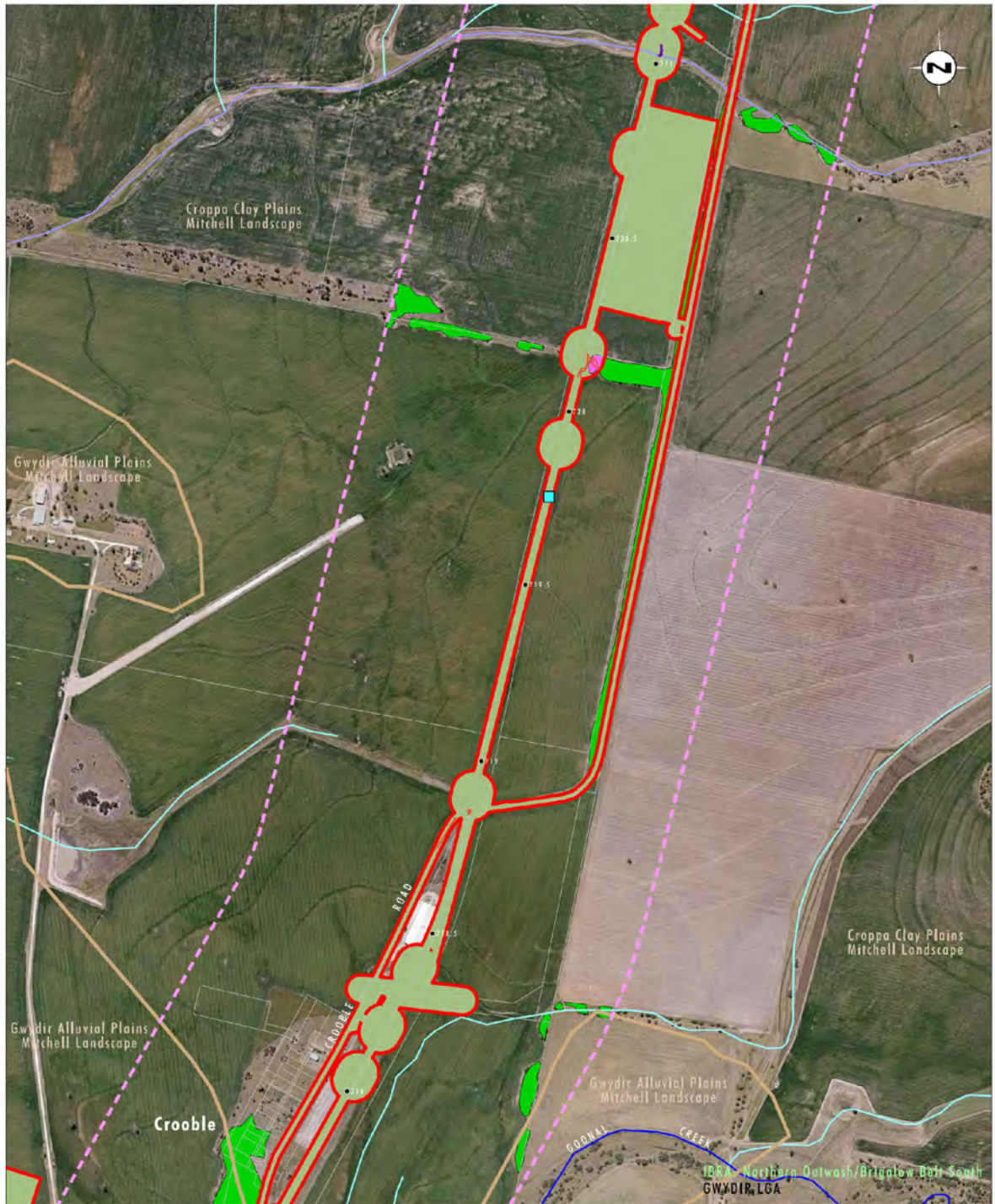


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page



Legend

- Development Site
- 550m Buffer Area
- Mitchell Landscape Area
- Rail Line Chainage

FIGURE A44

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

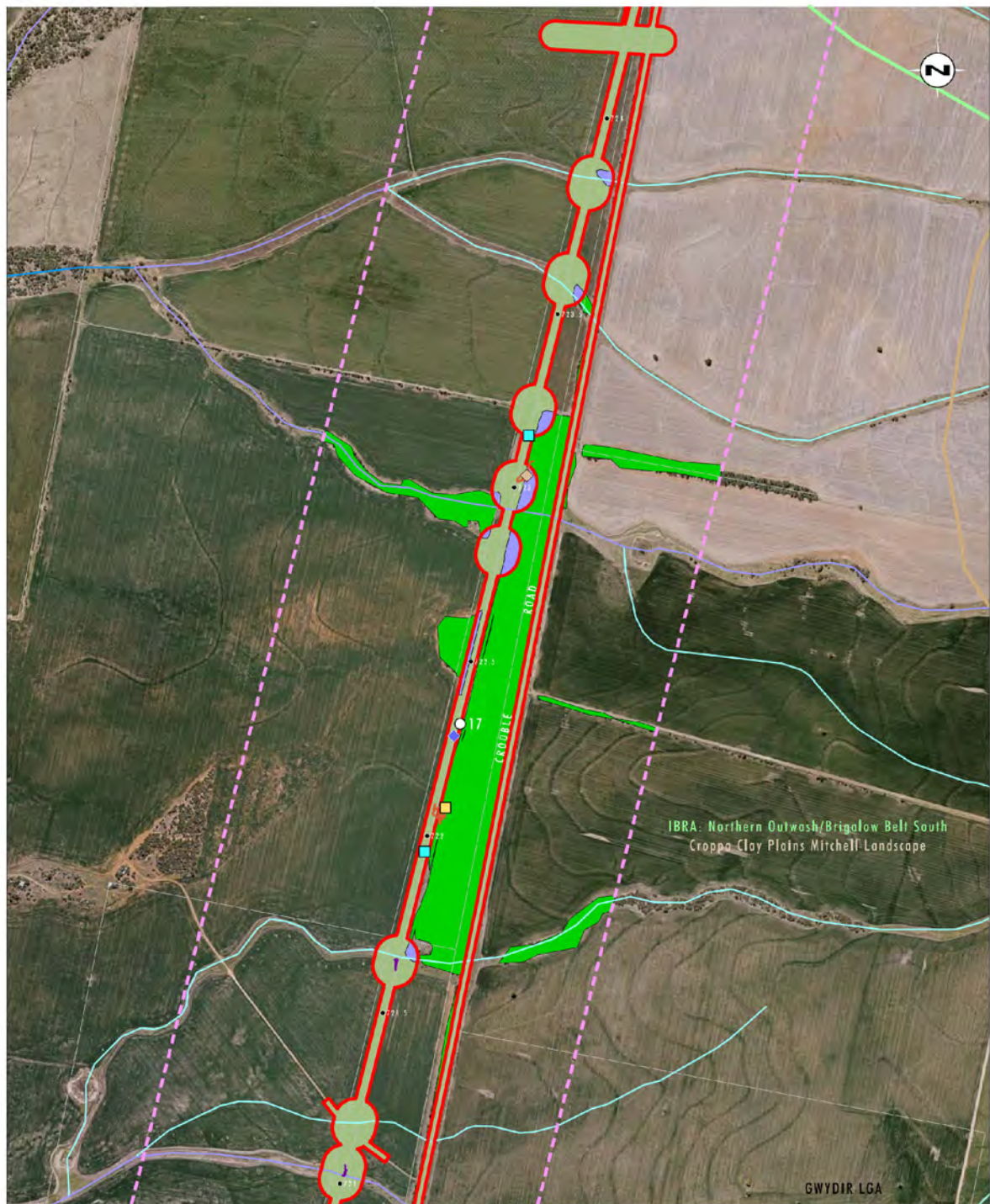


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

Legend

- Development Site
- 550m Buffer Area
- Mitchell Landscape Area
- IBRA Regions and Subregion Area
- Rail Line Chainage

FIGURE A45

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

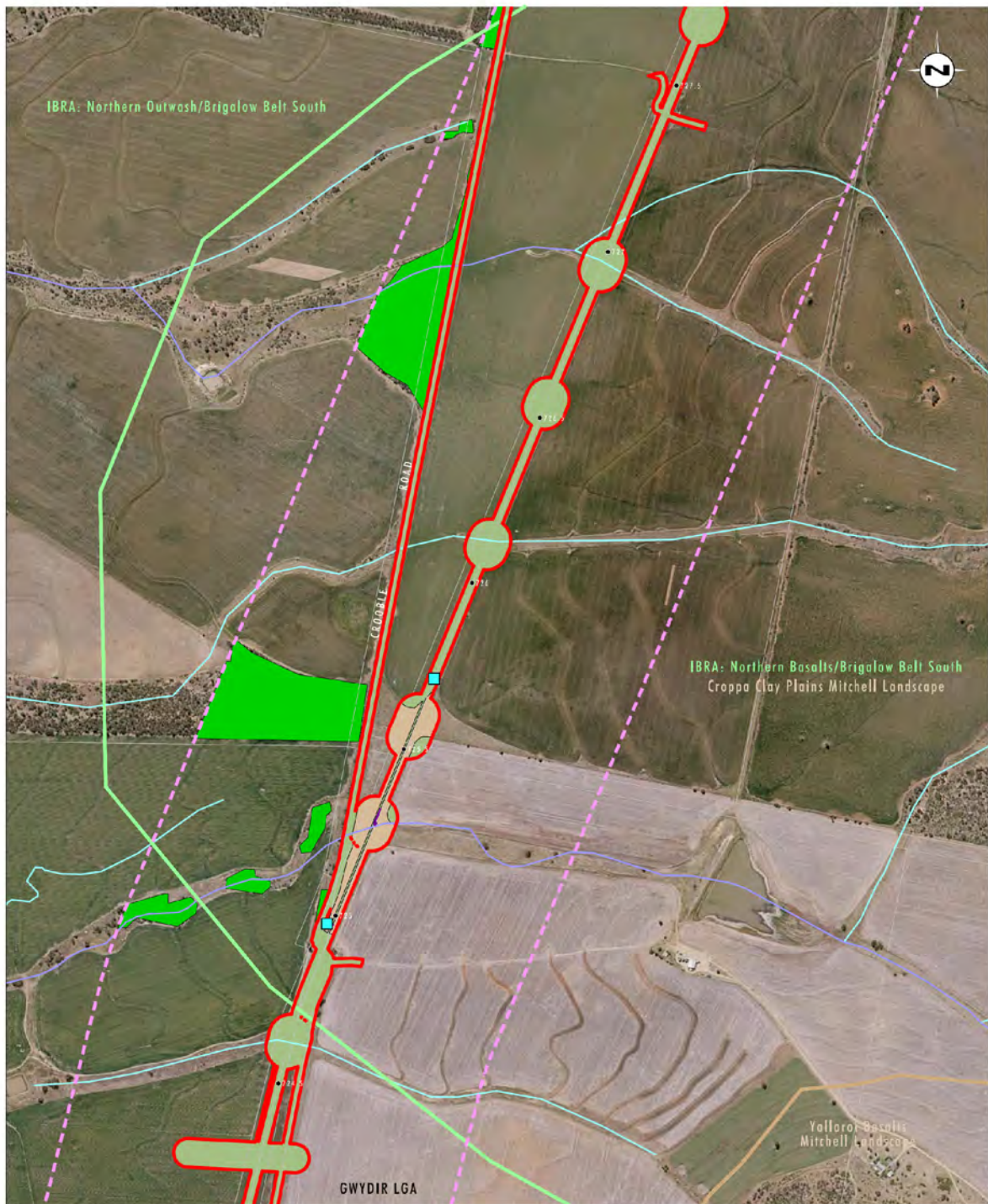


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page



Legend

- Development Site
- 550m Buffer Area
- Mitchell Landscape Area
- IBRA Regions and Subregion Area
- Rail Line Chainage

FIGURE A46

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

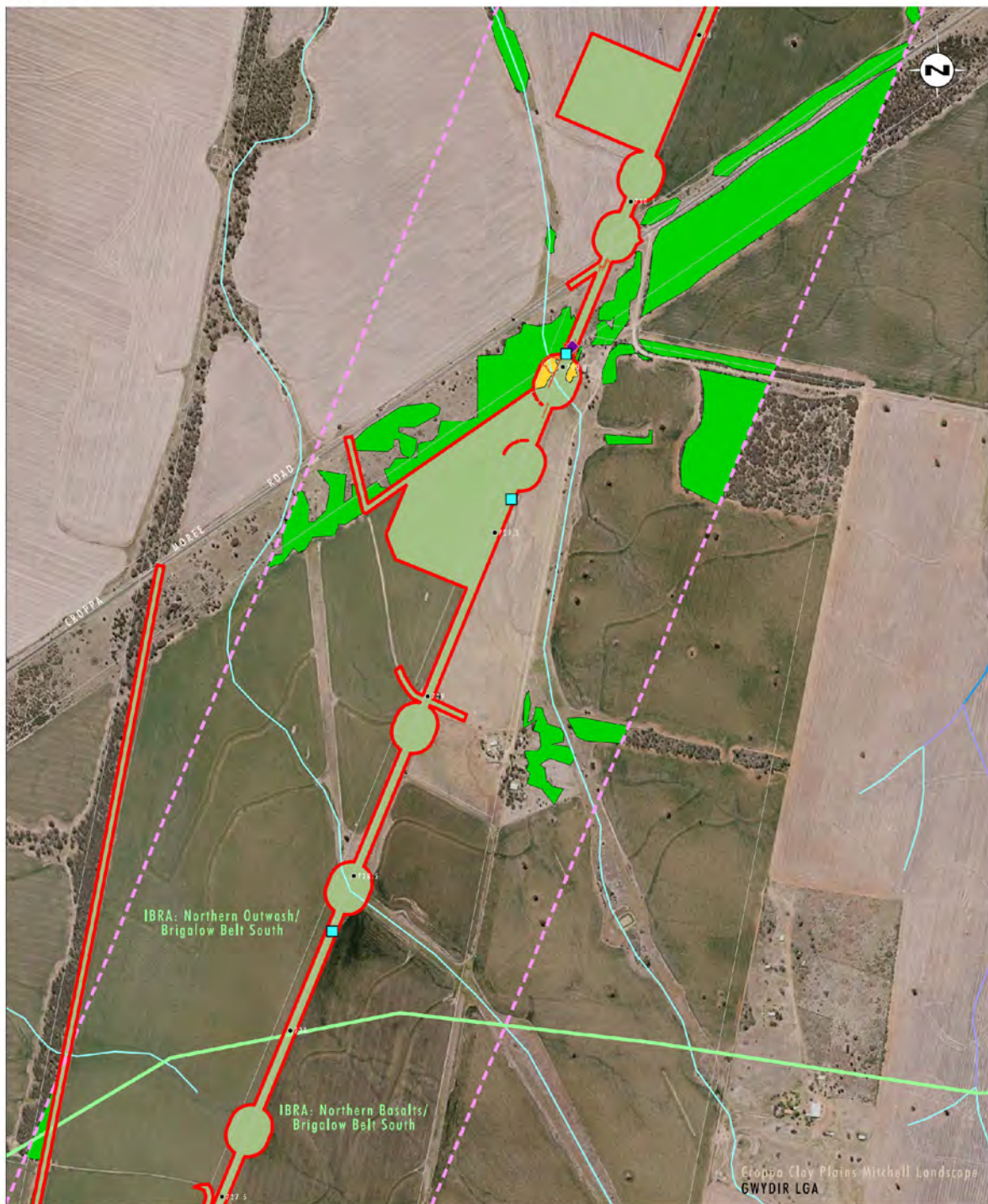


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

Legend

- Development Site
- 550m Buffer Area
- IBRA Regions and Subregion Area
- Rail Line Chainage

FIGURE A47

Survey Effort, Vegetation Map,
Threatened Species Locations
and Landscape Assessment

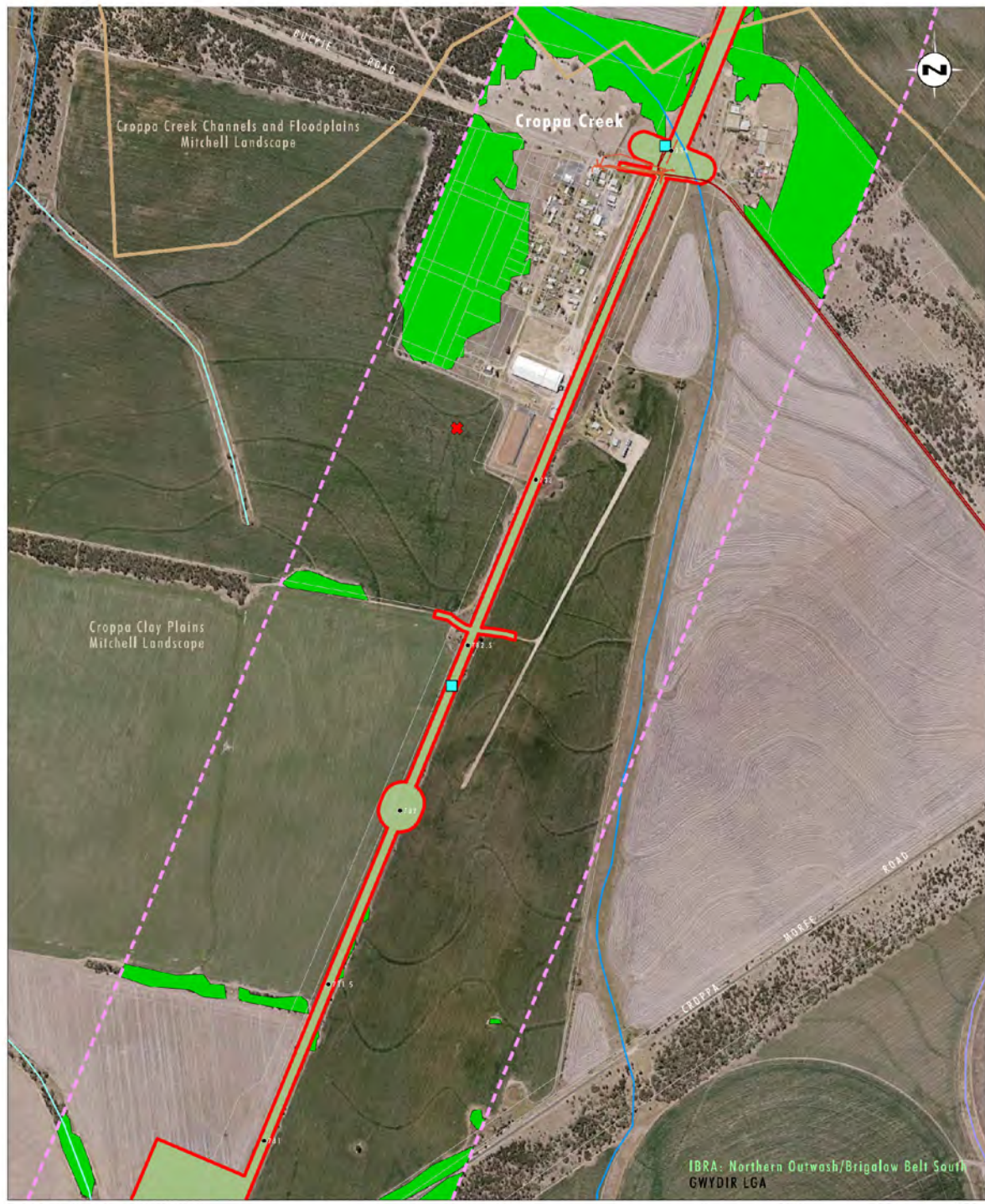


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A48
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

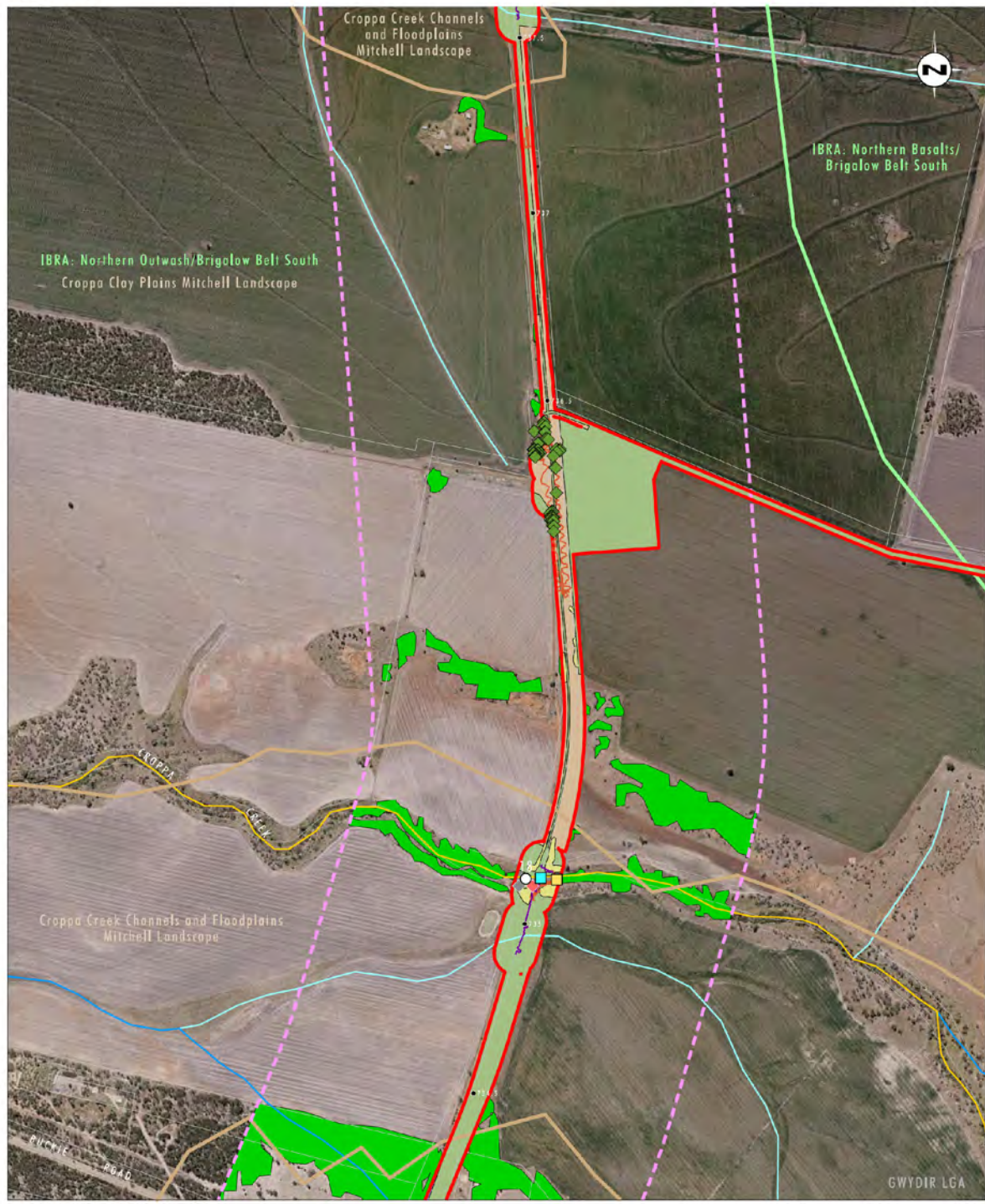


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A49
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

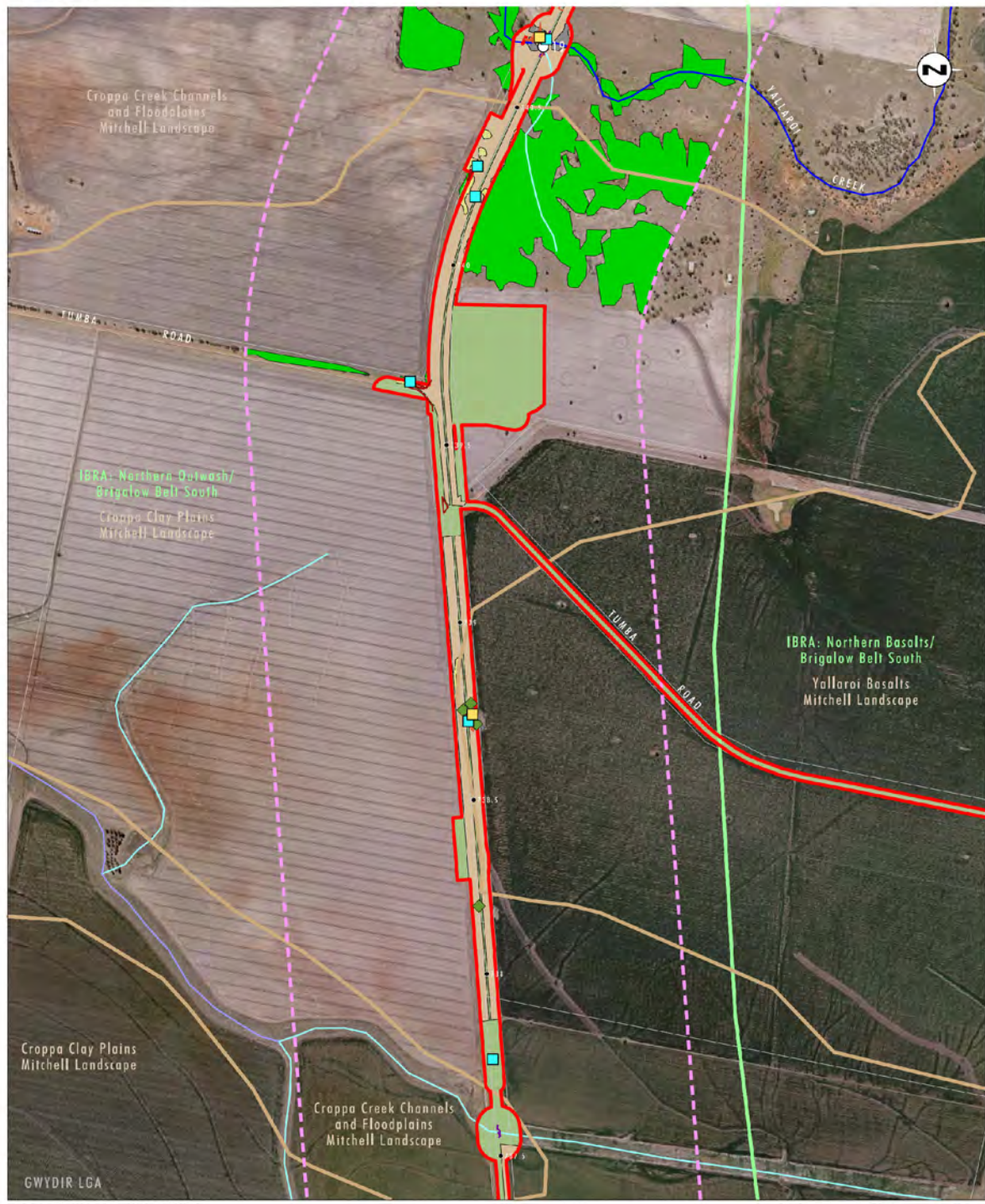


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A50
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

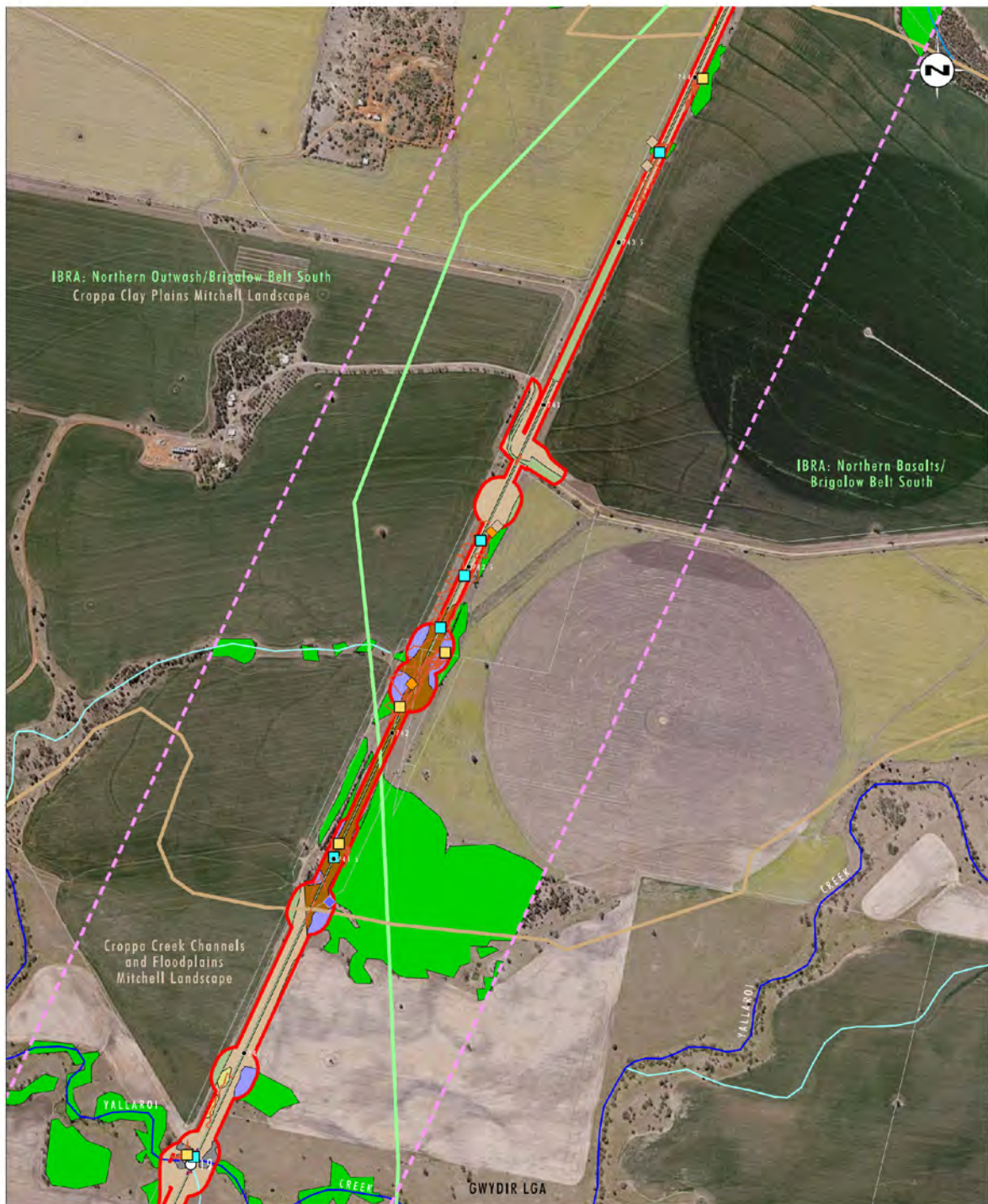


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A51
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

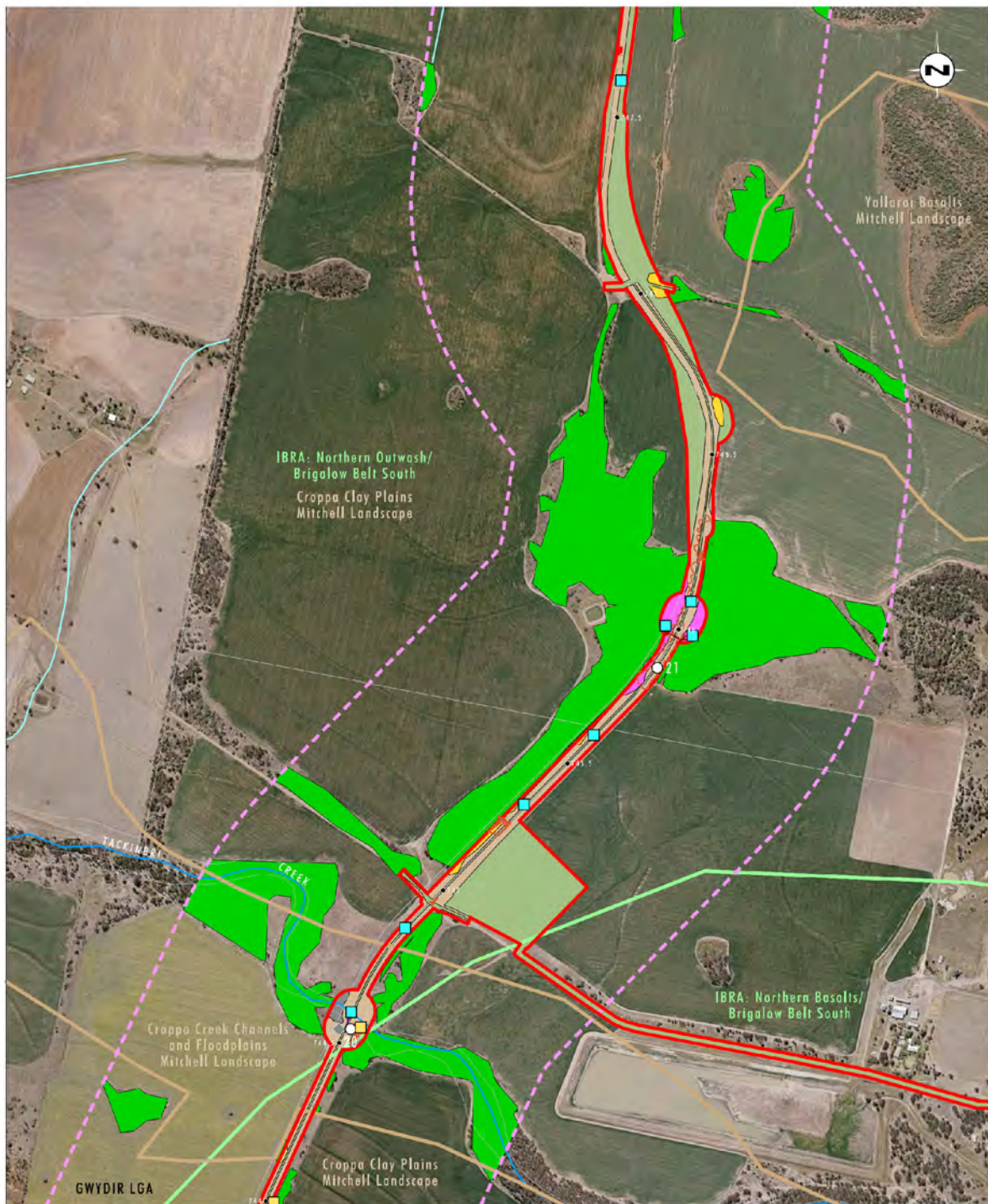


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A52
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

Legend

- Development Site
- 550m Buffer Area
- Mitchell Landscape Area
- IBRA Regions and Subregion Area
- Rail Line Chainage

FIGURE A53

Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

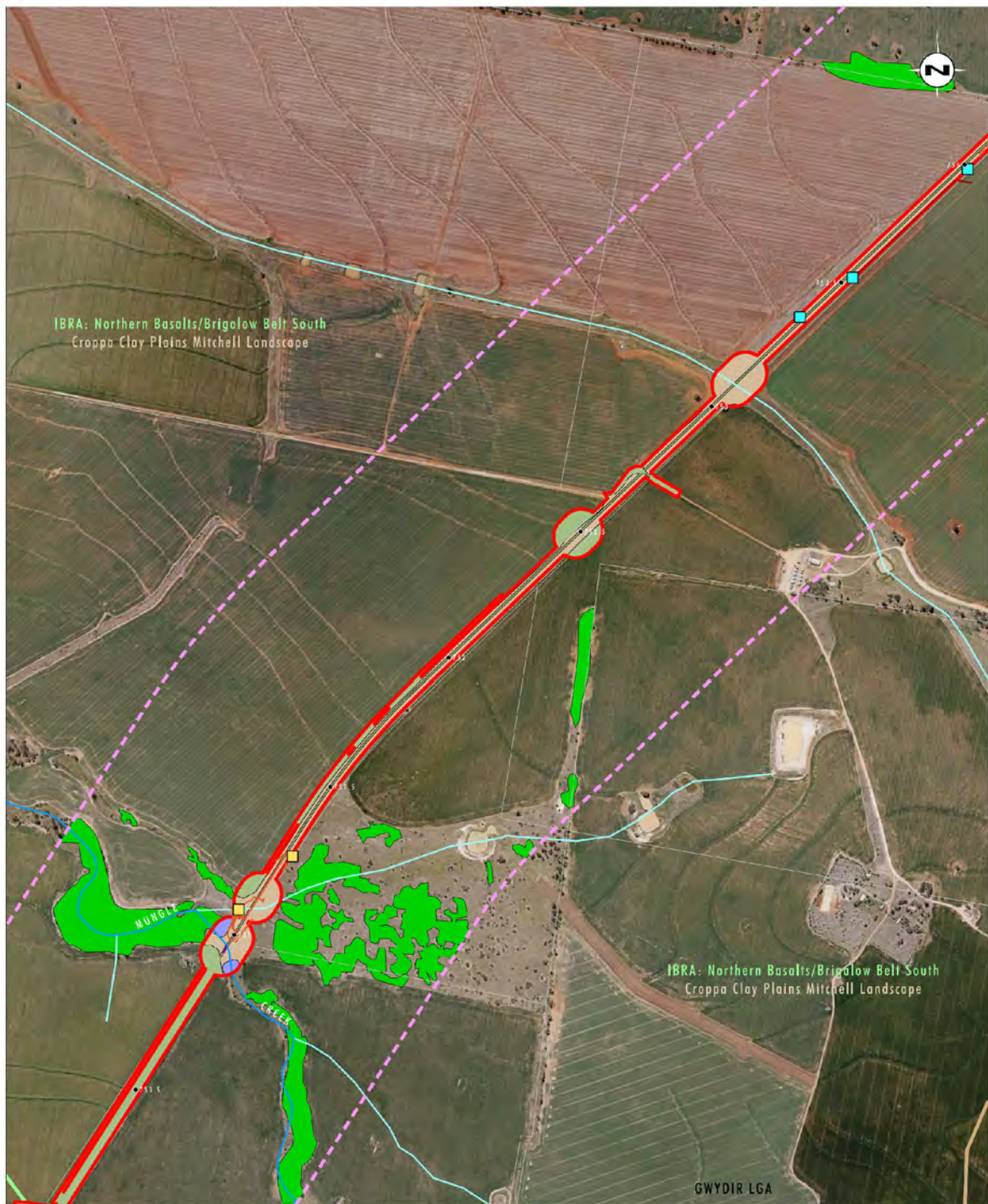


Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - IBRA Regions and Subregion Area
 - Rail Line Chainage

FIGURE A54
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

0 250 500 750m
 1:15 000

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A55
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment



Image Source: ARTC (2016)
 Data Source: ARTC (2016), BioNet Atlas of NSW Wildlife (OEH 2016), Umwelt (2016)
 Note: For full legend, refer to legend page

- Legend**
- Development Site
 - 550m Buffer Area
 - Mitchell Landscape Area
 - Rail Line Chainage

FIGURE A56
 Survey Effort, Vegetation Map,
 Threatened Species Locations
 and Landscape Assessment

Appendix E Trigger Action Response Plan

TRIGGER	ACTION	RESPONSIBILITY
WEEDS, PEST AND PATHOGEN		
<ul style="list-style-type: none"> ▶ A WONS, Priority Weed Species, plant pathogen or pest species is identified on-site. <p>NOTE: This includes an observed increase in the abundance or distribution of a WONS, Priority Weed Species, plant pathogen or pest species.</p>	<ul style="list-style-type: none"> - Ecologist consulted to confirm species / pathogen. - Mapping of affected areas or population undertaken immediately. - Exclusion set-up around impacted / infestation area. - Notify ARTC, Project ER and any relevant authorities. - Undertake management or control activities as per the Pest and Weed Management Appendix, or as otherwise directed by the Ecologist or Pest and Weed Contractor. - Investigate source / cause of the introduction or infestation. - Communicate any findings or change of management to the work force. - Update CEMP, sub-Plans and any ECM, as required. 	<p>Environment Manager Environmental Co-ordinator Ecologist Weed / Pest Management Contractor / Consultant Supervisor</p>
<ul style="list-style-type: none"> ▶ A Cane Toad is detected on the site. 	<ul style="list-style-type: none"> - Ecologist consulted to confirm presence. - Within 24 hours notify ARTC, Project ER and any relevant authorities. - Notification to include a management response to be prepared in consultation with a Cane Toad expert including monitoring and control actions to be implemented on the site to eradicate all toads within the CIZ. These will include manual removal of adults and if necessary, eggs, tadpoles and metamorph (juvenile) toads. <p><i>Advice from Cane Toad expert, Dr Matthew Greenlees: Cane toads have nor do not currently occur in the greater New England region - including in the area between Moree and Narrabri. The current known distribution of toads in New South Wales is essentially east of the Great Diving Range - a considerable distance from the area. In addition, current models predict that the climate in the region is unlikely to be suitable for toads becoming established (Kearney et al. 2008; Kolbe et al. 2010). There have been few historical records of individuals that have been translocated (accidentally) to the region, though never in numbers or to specific areas that have threatened them becoming established (see ALA 2021). If cane toads are detected in the area, expert advice should be sought</i></p>	<p>Environment Manager Environmental Co-ordinator Ecologist Cane Toad expert</p>

TRIGGER	ACTION	RESPONSIBILITY
	<p><i>immediately in initiating control and eradication measures. These will include manual removal of adults and if necessary, eggs, tadpoles and metamorph (juvenile) toads. Such measures have been demonstrated to be effective for local eradication of small established populations (Greenlees et al. 2018).</i></p>	
<p>▶ Where control of pests, pathogens and / or weeds is undertaken and follow-up monitoring confirms that the control works has not adequately controlled the risk (i.e. new germination / new weed growth, increase in abundance or distribution of pathogen or weed, low mortality of weed species, increase in population or distribution of pest species, etc).</p>	<ul style="list-style-type: none"> - Investigate reason for the additional / ongoing infestation. - Mapping of affected areas or population undertaken immediately. - Consult Ecologist and Weed and Pest Contractors regarding follow up / additional control works. - Notify ARTC, Project ER and any relevant authorities. - Communicate any findings or change of management to the work force. - Update CEMP, sub-Plans and any ECM as required. 	<p>Environment Manager Environment Coordinator Ecologist Weed / Pest Management Contractor / Consultant Supervisor</p>
ENVIRONMENTALLY SENSITIVE ENVIRONMENTS (GENERAL)		
<p>▶ Threatened species or EEC unexpectedly identified during the pre-clearance survey.</p>	<ul style="list-style-type: none"> - Exclusion area set-up around threatened species / EEC. - Notify ARTC, Project ER and any relevant authorities. - Enact the Project's Threatened Species / EEC Unexpected Finds Procedure. - Ecologist engaged to undertake a Test of Significance as per the Biodiversity Conservation Act, or similar test. - Ecologist to recommend additional controls or management requirements. - Communicate any findings or change of management to the work force. - Update CEMP, sub-Plans and any ECM as required. 	<p>Environment Manager Environment Coordinator Ecologist Supervisor</p>
<p>▶ Mapped native vegetation (EEC or otherwise) cleared or directly impacted outside the CIZ.</p>	<ul style="list-style-type: none"> - Stop works, protect the area and notify the Environment Manager. - Consult Project Ecologist regarding impact caused to vegetation. - Manage event in accordance with Project's Environmental Incident Procedure. - Notify ARTC, Project ER and any relevant authorities. 	

TRIGGER	ACTION	RESPONSIBILITY
	<ul style="list-style-type: none"> - Breach of CIZ investigated (using suitable investigation method) to understand root cause of incident. - Additional controls developed to avoid reoccurrence of incident. - Communicate any findings or change of management to the work force. - Update CEMP, sub-Plans and any ECM as required. 	
FAUNA		
<ul style="list-style-type: none"> ▶ Microbats confirmed in a structure (i.e. bridge or culvert) during the pre-clearance surveys (undertaken weekly for the month prior to works commencing). 	<ul style="list-style-type: none"> - Ecologist engaged to undertake exclusion works. This exclusion works must be undertaken by a suitably qualified and experienced Ecologist in accordance with industry best practice. - Ecologist consulted regarding installation of compensatory habitat. - Notify ARTC, Project ER and any relevant authorities. - Communicate any findings or change of management to the work force. - Update CEMP, sub-Plans and any ECM as required. - Undertaken monitoring to confirm no microbats return to structure. 	<p>Environment Manager Ecologist Supervisor</p>
<ul style="list-style-type: none"> ▶ Following exclusion works occurring (if required), microbats confirmed to return to the structure. 	<ul style="list-style-type: none"> -Ecologist engaged to undertake additional exclusion works. This exclusion works must be undertaken by a suitably qualified and experienced Ecologist in accordance with industry best practice. - Ecologist consulted regarding installation of compensatory habitat. - Notify ARTC, Project ER and any relevant authorities. - Communicate any findings or change of management to the work force. - Update CEMP, sub-Plans and any ECM as required. - Undertaken monitoring to confirm no microbats return to structure. 	
<ul style="list-style-type: none"> ▶ If partial exclusion is required whilst works are occurring on a structure and microbats remain in situ and the 	<ul style="list-style-type: none"> - Construction Team to stop and observe flyout event i.e. time, duration, approx. quantity of microbats leaving structure, general behaviour (leave structure and not return or short flight and return to structure, etc). 	<p>Construction Team Environment Manager Ecologist</p>

TRIGGER	ACTION	RESPONSIBILITY
<p>Construction Team observe daytime “flyout”.</p>	<ul style="list-style-type: none"> - Stop works and consult the Ecologist. - Ecologist consulted regarding whether works can proceed as is, or if additional controls need to be implemented based on the flyout event and observations. 	
<ul style="list-style-type: none"> ▶ Koala identified within the impact zone during pre-clearance surveys. 	<ul style="list-style-type: none"> - Exclusion established around Koala and local work crews notified of the find. - Enact the Project’s Threatened Species / EEC Unexpected Finds Procedure. - Ecologist immediately engaged regarding suitable management practises. <p>NOTE: The Project’s preference is not to interfere with the Koala and allow the individual to relocate on its own. Physical capture and relocation is last resort and will be only be undertaken by a suitably experienced Ecologist, in consultation with the Project ER, ARTC and DPIE.</p> <ul style="list-style-type: none"> - Surrounding food trees within the CIZ may be collared, if required. - Notify ARTC, Project ER and any relevant authorities. - Communicate any findings or change of management to the work force. - Update CEMP, sub-Plans and any ECM as required. 	<p>Environment Manager Ecologist</p>
<ul style="list-style-type: none"> ▶ Fauna species (threatened or otherwise) found on-site believed to be orphaned, sick, injured or killed. 	<ul style="list-style-type: none"> - Environment Manager consulted regarding taking the orphaned, sick or injured animal to Vet or WIRES carer (Wildlife Rescue Phone 1300 094 737). - All threatened (and other) species (injured, orphaned, sick or dead) would be taken to a Vet. Dead threatened species would require a cause of death and general health of individual provided by Vet. - Threatened species would require notification to Project ER, ARTC and the relevant authorities within 24hrs. - Fauna injuries/ mortalities recorded within a project fauna register. - A review of the work practices will be undertaken to minimise any further injury or death to fauna species. Additional avoidance or mitigation measures will be adapted as required. 	<p>All personnel Environmental Coordinator Ecologist</p>

TRIGGER	ACTION	RESPONSIBILITY
	See below for Five-clawed Worm-skink encounters.	
<ul style="list-style-type: none"> ▶ Five-clawed Worm-skink identified on-site. 	<ul style="list-style-type: none"> - Where Five-clawed Worm-skink/s is/are identified within anticipated habitat areas (I.e. all Stage 1 or Stage 3: Chainage 735.000 to 754.250), enact the Five-clawed Worm-skink encounter protocol (Appendix I) - Where Five-clawed Worm-skink/s is/are identified outside of anticipated habitat areas (outside the areas detailed above), enact the Unexpected Threatened Species Find Procedure (Appendix G) - All Five-clawed Worm-skink encounters shall be recorded within a project fauna register. - If the animal is not well enough to be relocated (injured), the project ecologist would determine requirement for euthanasia, rest period or veterinary treatment. - Deceased Five-clawed Worm-skinks and dropped tails would be retained and appropriately stored, with specimens sent to Australia Museum. 	<p>All personnel Environmental Coordinator Ecologist</p>

Appendix F Clearing Management Inspection Checklist

Clearing Management Inspection Checklist



To be completed prior and during construction works

*Person Conducting Inspection (Including Role):	Date:
Inspection Team Members (Including Roles):	
Work Description / Location:	
Relevant Supervisor / Leading Hand:	

Instructions: The Person conducting the inspection must do so in consultation with the Workers performing the task

Checklist Item	Yes/No/NA (✓/×/NA)	Actions / Leading Practice Identified / Documents Reviewed
1. Has the project obtained all permits, licences and approvals required for clearing works?		
2. Have the Project Engineer and Site Supervisor been consulted in preparation of the SEP?		
3. Does SEP document a) Clearing limits b) Exclusion zones c) Control measures d) Processes, equipment and resources required to undertake clearing works		
4. Have all Supervisors and site workers involved in clearing completed targeted and ongoing training (as required)?		
5. Have all relevant conditions associated with permits, licences and approvals been addressed? Where these are a hold point to works commencing have they been addressed before works started?		
6. Are any additional studies and/or site investigations required to quantify the impact on: a) Heritage values and/or b) Flora and fauna		
7. Are all erosion and sediment controls in place prior to the commencement of clearing works?		
8. Are clearing works sequenced and staged to minimise the area of exposed earth and time of exposure?		
9. Has the project developed and communicated an Unexpected Finds Protocol?		
Clearing Limits and Protected Areas		
10. Have all necessary clearing limits been established, demarcated, maintained and complied with?		
11. Protected heritage flora and fauna areas identified, demarcated and clearly signed		

Revision No:1

Document Number:T4MR-FRM-WHS-008-10

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Issue Date:10/04/2019

Clearing Management Inspection Checklist



To be completed prior and during construction works

Erosion and Sediment Controls		
12. Are controls appropriately implemented to protect receiving waters?		
13. Are controls appropriately maintained?		
Monitoring		
14. Have the necessary monitoring requirements been implemented? <i>e.g. Pre-clearing survey, fauna spotting, and heritage supervision</i>		
15. Are monitoring results available and communicated to stakeholders?		
Rehabilitation and Protection		
16. Are protected areas being rehabilitated / stabilised as required?		
17. Are plans for permanent protection being undertaken?		
Appreciative Enquiry		
18. Do the workers understand why clearing activities and land access need to be managed during construction?		
19. Do the workers understand the task? Have they been asked for input into how the task is to be done?		
20. Is the task being completed as planned? <i>Question the workers as to whether they think there is a better way to complete the task.</i>		

Actions				
QN No.	Action	Due Date	Person Responsible	Action Closed (Y/N)

Leading Practice			
QN No.	Leading Practice	Shared with Region (Y/N)	Person Responsible

Revision No:1

Document Number:T4MR-FRM-WHS-008-10

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Issue Date:10/04/2019

Page 2 of 2

Appendix G Unexpected Threatened Species / Endangered Ecological Community Find Procedure

Purpose

This procedure details the actions to be taken when a threatened species (flora or fauna) or an Endangered Ecological Community (EEC) is unexpectedly encountered during construction activities associated with the N2NS SP1 / Trans4m Rail Project.

Induction / Training

During the Project Induction, all Trans4m Rail and sub-Contractor personnel will be inducted on the identification of potential threatened species occurring on site and the relevant actions to be taken with regards to this procedure.

Scope

This procedure is applicable to all activities conducted by Trans4m Rail and sub-Contractor personnel that have the potential to come into contact with threatened species and EEC.

Procedure

1. Threatened Species unexpectedly encountered during clearing, excavation or other construction activities

If a threatened species, either flora or fauna, or an EEC is encountered prior to or during construction activities:

- STOP ALL WORK in the vicinity of the find.
- The area surrounding the find must be protected and the Trans4m Rail Supervisor and any other personnel working in the area must be immediately notified of the find.
- The Trans4m Rail Environment Manager / Coordinator must also be notified immediately who will contact ARTC and the Project Environmental Representative (ER).
- The Trans4m Rail Environment Manager / Coordinator will contact an Ecologist who will confirm the species / EEC is an unexpected find and / or threatened.
- If the find is confirmed not to be a threatened species or EEC, the Trans4m Rail Environment Manager will provide written approval to recommence works.
- If the species is confirmed to be a threatened species or EEC, Step 2 applies.

NOTE: Unexpected Finds will be immediately notified to ARTC and ARTC will notify the relevant regulatory agencies within 1 business day. A draft report must be provided to ARTC within 7 days and ARTC will provide a final version of the report to the relevant regulatory agencies with 14 days.

The report must include the following:

- a. Date and time of discovery;
- b. Details of the discovery site (GPS points, description of vegetation, soil, microhabitat features present);
- c. Details of how potential relocation sites will be identified;
- d. Details of the individual/s discovered, including photographs;
- e. Photographs of the site (general location, vegetation, habitat features where the individual/s was discovered);
- f. Maps / plans identifying the location of the discovery at an appropriate scale;
- g. Details of the person/s who made the discovery; and
- h. Mitigation measures to be implemented

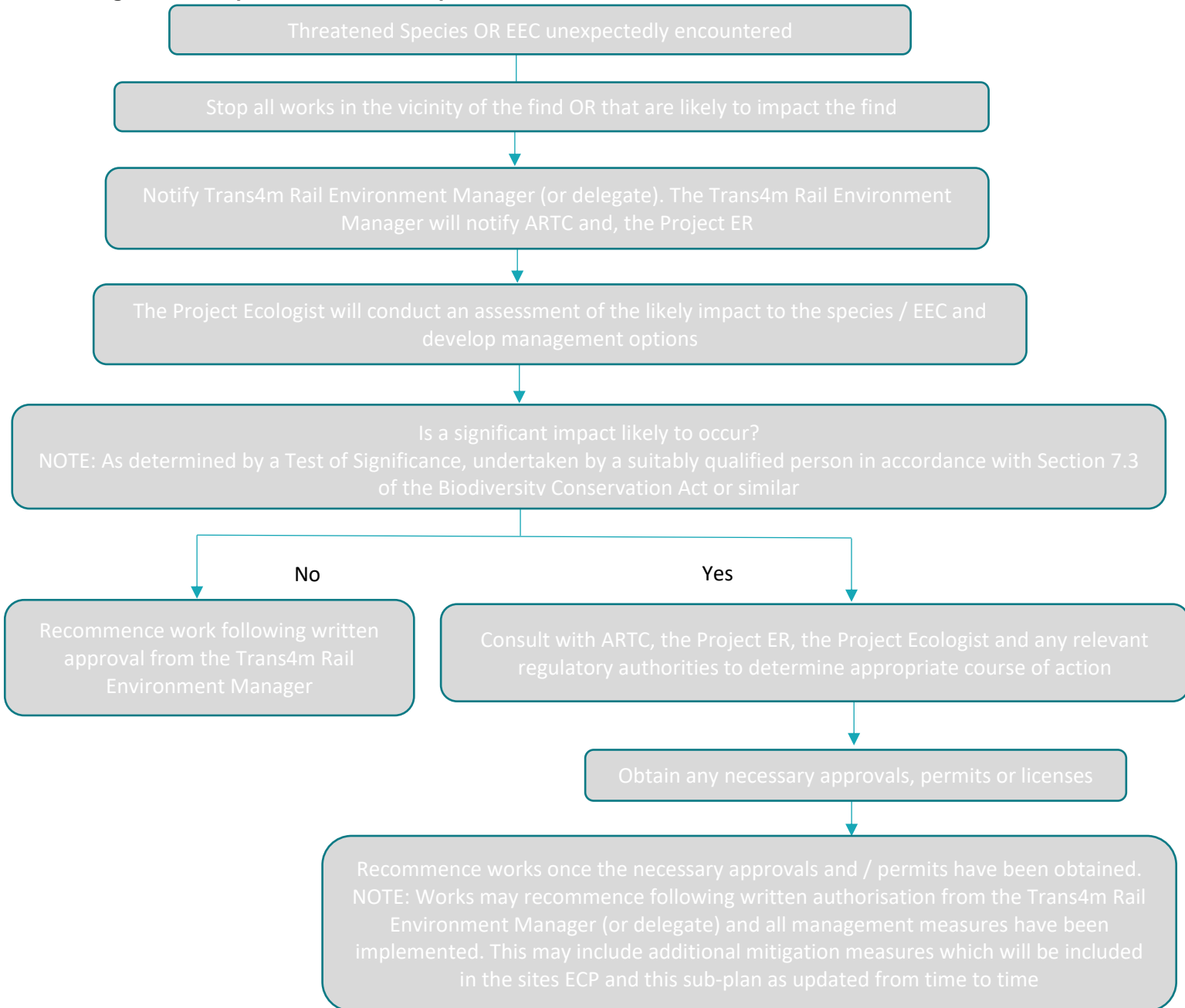
2. Assessment of Impact

In the event that the species is confirmed to be threatened, the Ecologist will undertake an assessment to determine the likely impact to the threatened species and appropriate management options developed i.e. Test of significance, in accordance with Section 7.3 of the *Biodiversity Conservation Act* or similar. This assessment will be documented.

NOTE: Trans4m Rail's Construction and Engineering personnel will be consulted to avoid any direct impacts to the threatened species or EEC.

3. Approvals
ARTC and Trans4m Rail will obtain any licences, permits or approvals required if the species is likely to be significantly impacted by the Project works.
4. Recommencement of Works
Works will recommence once necessary advice has been sought and permits obtained (if required). If permits are not required, works can recommence following authorisation from the Trans4m Rail Environment Manager (or delegate).

Figure 1: Unexpected Threatened Species / EEC Find Flow Chart



Appendix H Fauna Handling Procedure

Purpose

This procedure explains the actions to be taken if an animal or eggs are discovered on the Project site that require handling or rescue during vegetation and soil clearance and ongoing construction activities. The procedure relates primarily to injured shocked and juvenile individuals but also applies to nocturnal fauna or slow moving species that may not be capable of moving away from mobile plant and equipment.

Scope

This procedure is applicable to all native and introduced species that are found on the Project site.

Induction / Training

All Trans4m Rail and Contractor personnel will attend the Project induction, which will include a section on Fauna.

Procedure

In the event wildlife (including shocked, juvenile animals or eggs) are discovered on the Project site during vegetation and soil clearance and ongoing construction activities the following steps shall be taken:

1. **STOP ALL WORK** in the vicinity of the fauna and immediately notify an Environmental Officer.
2. Contact project ecologist to obtain positive identification and advice / recommendations of the subject species.
3. Preferably allow fauna to leave the area without intervention.
4. If immediately available, use a licensed fauna ecologist or wildlife carer with specific animal handling experience to carry out any fauna handling.
5. To minimise stress to native fauna and remove the risk of further injury an appropriately licensed and experienced person shall:
 - a. Attempt to herd animal into adjoining forest, outside the CIZ.
 - b. If capture is necessary, cover larger animals with a towel or blanket and place in a large cardboard box and/or cotton/calico bag.
 - c. Place smaller animals in a cotton/calico bag tied at the top.
 - d. Keep the animal in a quiet, warm, ventilated and place away from noisy construction activities.
 - e. Aquatic fauna are to be placed in plastic aquaria or a moistened plastic bag. Frogs will be transported in moistened plastic bags (1 frog/bag) with a small amount of leaf litter. Handling and translocation of frogs shall be in accordance with the Hygiene Protocol for the Control of Disease in Frogs (see Note 3).

Note 1. Some animals require particular training before being handled (e.g. venomous reptiles, raptors) and should only be handled by appropriately qualified and experienced personnel i.e. Project Ecologist or wildlife carer.

Note 2. If handling bats, the handler must be vaccinated against the Australian Bat Lyssavirus (ABL - a form of rabies).

Note 3. Any frog handling will be undertaken in accordance with the Hygiene Protocol for the Control of Disease in Frogs (DECC 2008). This protocol recommends onsite hygiene precautions be undertaken to minimise the transfer of disease between and within wild frog populations. Measures recommended include:

- i. Thoroughly cleaning/disinfecting footwear and equipment before entering frog habitat and when moving from one site to another.

- ii. In high risk areas, spraying/flushing vehicle tyres with a disinfecting solution and avoid driving through frog habitat.
 - iii. Cleaning/disinfecting hands between collecting samples/frogs (preference would be given to using bags, rather than bare hands to handle frogs).
 - iv. Limiting one frog or tadpole to a bag. Bags should not be reused.
6. If the animal cannot be handled (i.e. venomous reptiles);
- a. Exclude all personnel from the vicinity with fencing and / or signage; and
 - b. Record the exact location of the individual and provide details to the appropriate rescue agency.
7. Call the Project Ecologist immediately and follow any advice provided. The ecologist may nominate to contact a rescue agency (e.g. WIRES - 1300 094 737) to assist. Any decisions regarding the care of the animal will be made by the ecologist, with advice from the rescue agency as required. Contact details of key personnel are as follows:

In the event the rescue service and/or local veterinary service cannot be contacted, the injured animal will be delivered to the relevant agency as soon as practically possible. The injured animal should be recorded on the Fauna rescue and relocation register.

8. If the fauna species is a threatened species that is not identified in the EIS, the EO or EM must:
- a. Apply the Unexpected Finds Procedure (Appendix G of the BMP)
 - b. Immediately cease all work likely to affect the threatened species.
 - c. The EM shall contact the ARTC Environmental Officer to inform them of the situation.
 - d. The EM shall then contact the following stakeholders, in this order, to determine the appropriate corrective actions and additional safeguards to be undertaken:
 - i. EPA (Ph: 131555).
 - ii. Environmental Representative.
 - iii. Others as instructed by ARTC.
 - e. Following consultation with all relevant stakeholders, the EM shall implement any corrective actions and additional safeguards.
 - f. Following confirmation by the EM that all appropriate safeguards have been implemented, construction works shall recommence.
9. Relocation of fauna adjacent to the footprint will be undertaken by, or under advice from, the project ecologist or wildlife carer and will be recorded on the Fauna rescue and relocation register. If the animal is not injured or stressed, it may be released nearby in an area that is not to be disturbed by construction, in accordance with the following procedures:
- a. Sites identified as suitable release points by the Project Ecologist.
 - b. Release will be into similar habitat as close to the original area as possible.
 - c. If the species is nocturnal, release will be carried out at dusk.
 - d. Release would generally not be undertaken during periods of heavy rainfall.
 - e. Hollow-dependent species, particularly those with dependent young, shall be released into a temporary nest box.

Dewatering procedure and aquatic fauna relocation

Where necessary, aquatic fauna shall be relocated in accordance with the following steps:

1. Ensure all aquatic fauna relocation works are supervised by a suitably qualified aquatic ecologist.
2. Prior to the commencement of pumping, advice should be sought from the aquatic ecologist on pumping methods and the extent of drawdown.
3. The water level should be pumped down to a level that will allow the safe and effective implementation of capture methods, such as seine nets, dip nets and electrofishing.
4. A fine mesh screen ($\leq 5\text{mm}$) may be installed on the inlet of the pump or a fish basket used to remove the risk of native aquatic fauna being transferred through pump. A maximum depth of 500mm is typically required before fish salvage can commence but site-specific advice will be required from the aquatic ecologist.
5. Aquatic ecologist is to establish the presence of native and introduced aquatic fauna and plan relocation. Access to adjoining properties may be required for relocation, particularly when dewatering dams. The aquatic ecologist will ensure that native aquatic fauna species are released into suitable habitat as close to the original location as possible.
6. Native fish will be placed in tubs full of water sourced from the salvage site where they will be housed for brief periods before being transferred to the release site. Pest fish will be euthanized using an ice slurry.
7. Tadpoles will be placed in individual clip-seal bags and acclimatized to the release site (i.e. bag placed in waterbody for 30 minutes) before being released.
8. Following completion of relocation, a final check shall be undertaken to find any remaining fish or dying/dead fish.
9. All euthanized and dead fish will be transported to a licensed landfill facility for disposal.
10. Records will be kept on habitat type, method of water extraction, species, number of individuals and reproductive status of fish encountered.
11. Aquatic ecologist will prepare a report on the relocation, detail the source of the fish, the number and species of fish released and euthanized.

Project Ecologist responsibilities for fauna handling and rescue

The Project Ecologist will follow the relevant steps detailed below:

1. All fauna habitat will be clearly marked ("H" painted on four sides and red & white tape tied around trunk at eye height) seven days prior to the commencement of clearing. Targeted nocturnal surveys will be undertaken 24-48hrs prior to clearing; pre-clearing surveys (i.e. active searches for fauna) will occur immediately prior to clearing.
2. Surveys and rescue will be undertaken in accordance with the two-stage clearing process:

Stage 1 (under-scrubbing and non habitat tree removal) - all fauna that can be physically captured during targeted surveys (i.e. active searches, spotlighting, trapping) will be relocated into areas of suitable habitat adjacent to the project site (i.e. normally adjacent to the clearing footprint) as soon as possible after capture.

Stage 2 (habitat tree removal at least 48 hours after Stage 1) - all fauna captured will be relocated into areas of suitable habitat adjacent to the project site. Note – Habitat trees are to be felled using equipment that allows trees to be carefully felled with minimal impact (e.g. adequately sized harvester with rotating head).

3. Relocation of fauna captured during the clearing and associated works will take place in areas of suitable habitat as close as possible to the project site, taking into account:
 - a. The release site contains similar habitat and occurs as close to the point of capture as possible.
 - b. If the species is nocturnal, release will normally be carried out at dusk.
 - c. Hollow dependent nocturnal fauna will generally be housed in a nest box, which will be installed temporarily at the release site and unplugged at dusk. The box will be checked and, if unoccupied, retrieved the following day.
 - d. Release would not be undertaken during periods of heavy rainfall except for aquatic fauna.
 - e. Non-native fauna will be euthanised in accordance with licence conditions and Animal Care & Ethics Committee Approvals.
If the animal has been placed into care due to injury, age (i.e. young) or stress, upon its rehabilitation it will be released in an area, selected by the Project Ecologist, that will not be disturbed by the project construction works. The Project Ecologist will record and provide the capture and relocation data in the post clearing report.
4. To minimise stress to native fauna and/or remove the risk of further injury the Project Ecologist shall:
 - a. Cover larger animals with a towel or blanket and place in a suitable nest box, carry cage or canvas bag.
 - b. Place smaller animals in a cotton bag, tied at the top, or suitable nest box.
 - c. Place frogs/tadpoles in a plastic bag with a small amount of water and leaf litter. One individual per bag.
 - d. Fish and other aquatic life (i.e. turtles) place in plastic aquaria or plastic container with sufficient water.
 - e. For terrestrial fauna keep the animal in a quiet, warm, well-ventilated and dark place away from noisy activities.
 - f. For aquatic fauna species ensure there is sufficient water and adequate aeration. Notes on fauna handling.

Note 1. Some animals require particular handling (e.g. venomous reptiles, raptors) and should only be handled by appropriately qualified personnel i.e. Project Ecologist or wildlife carer.

Note 2. If handling bats, the handler must be vaccinated against the Australian Bat Lyssavirus (ABL) which is a form of rabies.

Note 3. Any frog handling would be undertaken in accordance with the Hygiene Protocol for the Control of Disease in Frogs (DECC 2008).

5. In the event an animal is injured the following fauna rescue services and local veterinary surgeries contact details are detailed above. In the event the rescue service and/or local veterinary service cannot be contacted, the most appropriate euthanasia method will be administered by the Project Ecologist (i.e. cervical dislocation for small vertebrates, ice slurry for introduced fish). This is to occur in accordance with applicable guidelines and legislative requirements. If the fauna species is identified as a threatened species that is not a species identified in the EIS, notify the Environmental Manager immediately. NOTE: Euthanasia is not to be undertaken by Project personnel unless under the approval of the Project Ecologist or T4MR Environment Manager.

The project ecologist will keep a register of all pre-clearing survey methods (including times, weather conditions, effort and results), fauna species captured (number of individuals, sex, age class and general health of each individual), release sites and dates, individuals taken into care and release date or fate.

6. In the event of a Five-clawed Worm-skink find, the above handling procedure would be applicable with the following exceptions; data collection and record (i.e. fauna register), treatment of injured and deceased individuals and reporting requirements (refer Appendix I).

Appendix I Five-clawed Worm-skink Encounter Procedure

Purpose

This procedure details the actions to be taken when a Five-clawed Worm-skink is encountered during construction activities associated with the N2NS SP1 / Trans4m Rail Project within the anticipated Five-clawed Worm-skink habitat area (All Stage 1 and Stage 3 (Chainage 735.000 to 754.250)).

Induction / Training

All Project personnel would be subject to a Five-clawed Worm-skink induction that includes:

- ▶ A general description of the Five-clawed Worm-skink (including photos and key identification features).
- ▶ Locations where Five-clawed Worm-skink surveys are required on the project site i.e. Stage 1 and Stage 3 (CH735.000 to CH754.250).
- ▶ Provision of Section 5 of this Biodiversity Management Plan.

Records of induction / toolbox training would be retained.

Scope

This procedure is applicable to all activities conducted by Trans4m Rail and sub-Contractor personnel that have the potential to come into contact with Five-clawed Worm-skinks.

Procedure

1. Five-clawed Worm-skink encountered during clearing, excavation or other construction activities

If a Five-clawed Worm-skink is encountered prior to or during construction activities:

- ▶ STOP ALL WORK in close vicinity of the find, or that would impact upon the find.
- ▶ The Project Ecologist will confirm the species, and record details of the find, including:
 - Stage and Chainage
 - Capture date and time;
 - Condition (Good, Injured, Deceased);
 - Microhabitat at capture site;
 - Soil at capture site;
 - Activity undertaken at time of find;
 - Detection method (e.g. survey);
 - GPS Coordinates for capture and relocation site;
 - Details of the person/s who made the discovery;
 - Description of microhabitat at capture site;
 - Description of vegetation/PCT;
 - Where practicable, validation photos from on top, side, below and close-up photos of forelimbs and hindlimbs; and
 - Series of measurements including; snout-vent length, tail length and total length.

Photographs of the site (general location, vegetation, habitat features where the individual/s was discovered) shall be captured each day for each work area.

- ▶ Series of measurements including; snout-vent length, tail length and total length.
 - Microhabitat details of find location
 - Soil crack density and size range (depth if possible)
 - % litter cover
 - % bare ground
 - % grass cover and/or tussock spacing
 - 3 most abundant groundcover species
 - Soil type, soil structure (blocky, small peds, massive) and pH if possible
 - Large surface debris abundance
 - Ground moisture levels (including recent rainfall amount if known/relevant).
- ▶ The Project Ecologist will assess the condition of the Five-clawed Worm-skink and determine whether it can be relocated.
- ▶ If relocated, the details of the relocation site and condition will be recorded
- ▶ If injured and unable to be relocated, the project ecologist would determine requirement for euthanasia, rest period or veterinary treatment.
- ▶ If deceased, specimens shall be preserved and sent to the Australian Museum or similar at regular intervals

NOTE: Five-clawed Worm-skink finds will be immediately notified to ARTC and ARTC will notify the relevant regulatory agencies as per **Section 5.11.5** of this BMP, and Step 3 below.

2. Recommencement of works

Works will recommence at the direction of the Trans4m Rail Environment Manager (or delegate) once the Five-clawed Worm-skink has been removed from the work area, and all necessary details recorded.

3. Reporting

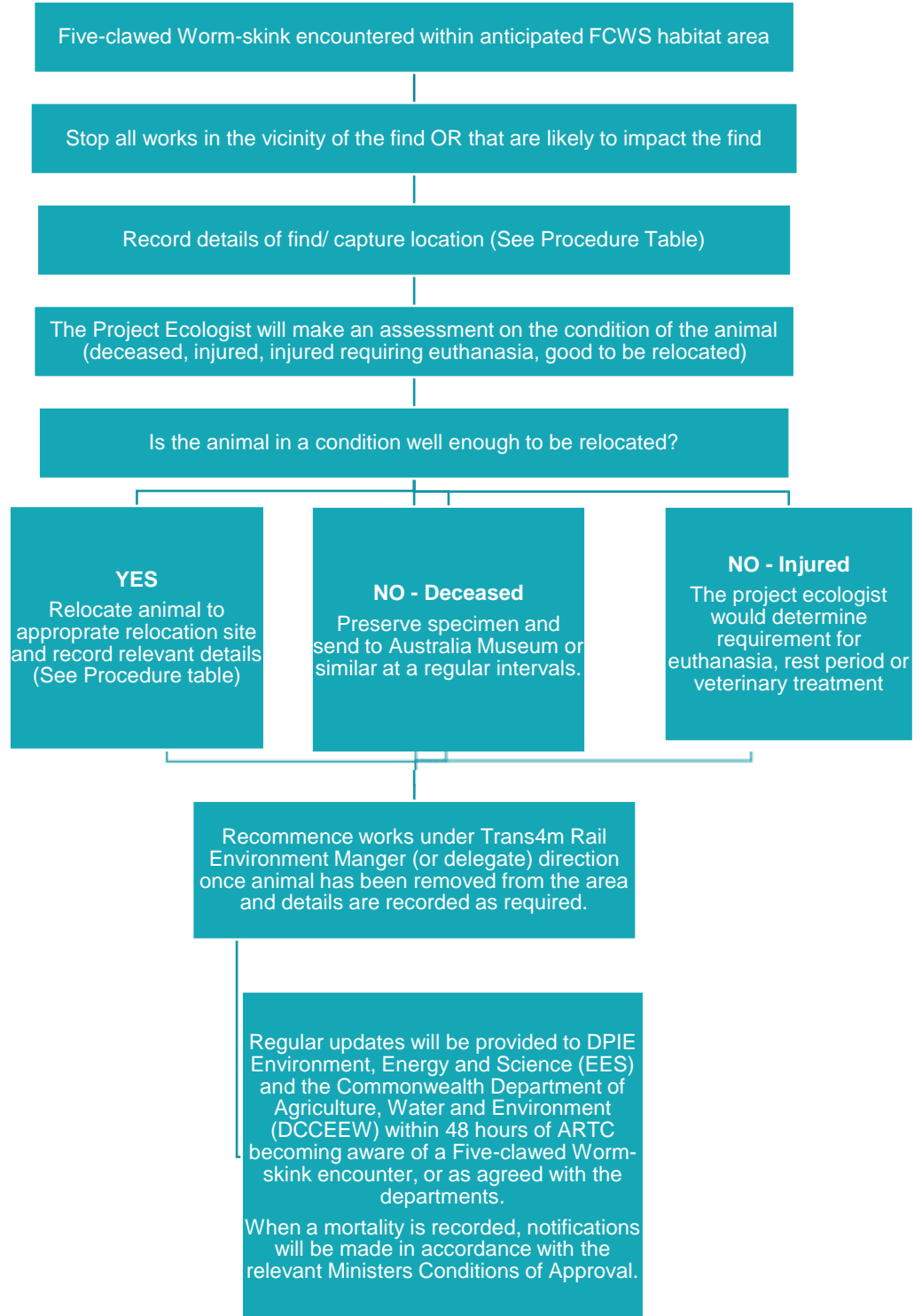
Regular updates will be provided to DPIE Environment, Energy and Science (EES) and the Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) within 48 hours of ARTC becoming aware of a Five-clawed Worm-skink encounter, or as otherwise agreed at the time with the departments. Information to be provided should include:

- ▶ Capture date and time,
- ▶ GPS Coordinates for capture and relocation site;
- ▶ Condition (Good, Injured, Deceased);
- ▶ Microhabitat at capture site,
- ▶ Soil at capture site,
- ▶ Activity undertaken at time of find;
- ▶ Detection method (e.g. survey).

A register of all finds will be maintained and be provided upon request from regulators.

When a mortality is recorded, notifications will be made in accordance with the relevant Ministers Conditions of Approval.

Figure 1: FCWS Find Flow Chart



Appendix J INLAND RAIL – NARRABRI TO NORTH STAR PHASE 1: FIVE-CLAWED WORM SKINK
(*Anomalopus mackay*) CONSTRUCTION SPECIES MANAGEMENT PLAN – Rev. 2, Dated 23/12/2022



INLAND RAIL – NARRABRI TO NORTH STAR PHASE 1:
FIVE-CLAWED WORM SKINK (*Anomalopus mackayi*)
CONSTRUCTION SPECIES MANAGEMENT PLAN

December 2022

Commercial in Confidence

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Abbreviations & Glossary of Terms

Abbreviation	Description
ARs	Artificial Refuges
ARTC	Australian Rail Track Corporation
BACI	Before-After-Control-Impact
BAM	Biodiversity Assessment Method
BAR	Biodiversity Assessment Report
BC Act (2017)	Biodiversity Conservation Act (2016)
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BMP	Biodiversity Management Plan
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CIZ	Construction Impact Zone
CSSI	Critical State Significant Infrastructure
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DECCW	Department of Environment Climate Change and Water
DPE	NSW Department of Planning and Environment
DPIE EES	DPIE Environment, Energy and Science
EA	Environmental Adviser
ECPs	Environmental Control Plans
EES	Environmental Effects Statement
EIS	Environmental Impact Statement
EM	Environmental Manager
EMS	Environmental Management System
EP&A Act (1979)	<i>Environmental Planning and Assessment Act (1979)</i>
EPA	Environmental Protection Authority
EPBC Act (1999)	<i>Environment Protection and Biodiversity Conservation Act (1999)</i>
ER	Environmental Representative
FCWS	Five-clawed Worm Skink (<i>Anomalopus mackayi</i>)
FFB	Framework for Biodiversity
GIS	Geographic Information Systems
IfC	Issued for Construction
LES	Lewis Ecological Surveys Pty Ltd
LGA	Local Government Area
LLS	Local Land Services (formerly LHPA)
MCoA	Minister's Conditions of Approval
MNES	Matters of National Environmental Significance
N2NS	Narrabri to North Star
NSW	New South Wales
PAS	Priorities Action Statement
PCT	Plant Community Type
PoM	Plan of Management
REMMs	Revised Environmental Management Measure
RFI	Request for Information

Abbreviation	Description
RtS	Response to Submissions
SSI	State Significant Infrastructure
SPIR	Submissions and Preferred Infrastructure Report
OEH	Office of Environment and Heritage
Threatened	Species listed on either the NSW <i>Biodiversity Conservation Act (2016)</i> and/or Commonwealth <i>Environment Protection and Biodiversity Conservation Act (1999)</i> .
TBDC	Threatened Biodiversity Data Collection
TSR	Travelling Stock Reserves
FCWS	Five-clawed Worm Skink (<i>Anamolopus mackayi</i>)
Endangered	Species listed as endangered under the NSW <i>Biodiversity Conservation Act (2016)</i>
Vulnerable	Species listed as vulnerable under the Commonwealth <i>Environment Protection and Biodiversity Conservation Act (1999)</i> .

1.0 INTRODUCTION

1.1 Purpose and Scope

Australian Rail Track Corporation Limited (ARTC – Inland Rail) has obtained approval to construct and operate Phase 1 of the Narrabri to North Star (N2NS) section of the Inland Rail (Figure 1-1). The project involves the upgrading of 185 kilometres of existing rail corridor and the construction of 1.7 kilometres of new track near Moree, New South Wales. The project is being delivered in two phases. Phase 1 of the Narrabri to North Star section is one of the most advanced sections of Inland Rail, and will comprise:

- upgrade of approximately 171 kilometres of track between Narrabri and North Star via Moree;
- constructing five new crossing loops;
- upgrading, relocating or consolidating almost 80 level crossings and five pedestrian crossings;
- installing 220 rail culverts;
- installing 98 road culverts and irrigation crossings;
- relocating power and telecommunications utilities, and
- minor changes to track alignments at Bellata, Gurley and Moree Stations.

More details are provided in Section 1-3 or alternatively accessing the following link:

<https://inlandrail.artc.com.au/where-we-go/projects/narrabri-to-north-star/>

The Project will provide a new freight rail project that will connect Melbourne and Brisbane through regional Victoria, New South Wales and Queensland. It is needed to complete the missing link in our national freight network, providing a fast and reliable connection between our regional centres and our capital cities transforming the way goods are transported around our country, strengthening our supply chain, and keeping our supermarket shelves stocked.

1.2 Construction Scope

The Project involves:

- upgrading the track, track formation, culverts and underbridges within the existing rail corridor, in two sections:
 - between Narrabri and Alice Street in Moree (a distance of about 93 kilometres), and
 - between Camurra North and North Star (a distance of about 80 kilometres);
- realigning the track within the existing rail corridor at Gurley and Moree stations;
- providing five new crossing loops within the existing rail corridor at Bobbiwaa, Waterloo Creek, Tycannah Creek, Coolleearlee, and Murgoo;

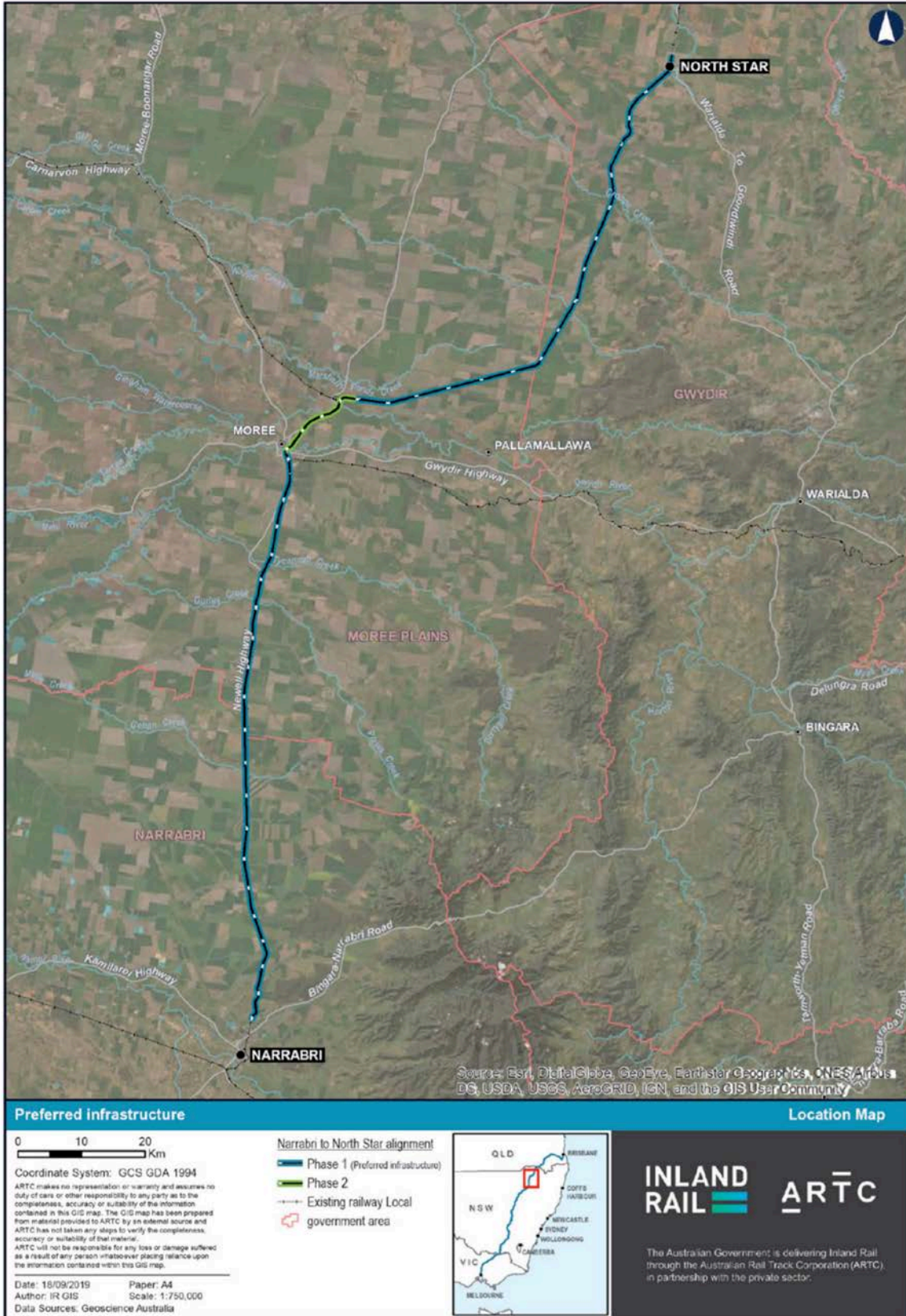


Figure 1-1. Location and route of the Inland Rail Project between Narrabri to North Star – Phase 1.

- removing the existing bridge and providing a new rail bridge over Croppa Creek; realigning about 1.5 kilometres of the Newell Highway near Bellata, and providing a new road bridge over the existing rail corridor (“the Newell Highway overbridge”);
- providing a new road bridge over the existing rail corridor at Jones Avenue in Moree (‘the Jones Avenue overbridge’), and
- Ancillary works to level crossings, signalling and communications, signage, fencing, noise attenuation structures, rail maintenance access roads, services and utilities.

The preferred infrastructure consists of two sections of single-track standard gauge railway, with crossing loops to accommodate double-stacked freight trains up to 1800 metres long. The preferred infrastructure includes components to accommodate possible future augmentation, including a possible future requirement for 3600 metres long trains (subject to a separate approval process).

1.3 Site Overview

1.3.1 Location and Environment

The Project is generally located within the existing rail corridor between Narrabri and North Star in north-western NSW. It traverses three local government areas (LGAs), with the southern section located in the Narrabri LGA, the middle section in the Moree Plains LGA, and the northern section in the Gwydir LGA. All three LGAs are predominantly rural, with the main local industries based around agriculture (mainly cotton and grains) and grazing. Moree Plains and Gwydir Shire both adjoin the NSW-Queensland border.

Construction is generally defined by fences located approximately 20 metres either side of the rail line, however, in some sections where fences are not present, construction may be wider extending out to about 30 to 40 metres from the rail line or wider where site compounds are proposed. Overall, the site is approximately 1,563 hectares.

The Project site is typical of the Border Rivers/Gwydir and Darling Riverine Plains Bioregions. The southern end is located immediately north of Narrabri on an embankment above the Namoi River before traversing the Gwydir River floodplain. At the northern end, North Star is located south of the Macintyre River within the Border Rivers basin. Between these two localities, the project crosses 90 watercourses. These include the Mehi River and Gwydir River, creeks including Mulgate Creek, Bobbiwa Creek, Gehan Creek, Tookey Creek and Gil Gil Creek along with a number of intermittent watercourses and irrigation channels and canals.

The Project also traverses the alluvial floodplain associated with the Mehi River and the Gwydir River. The terrain in this area is typically near level to gently undulating. The project also traverses the Gunnedah Basin crossing the Goondiwindi

thrust fault into the New England Fold Belt east of Camurra. The subsurface conditions of the Gunnedah Basin are dominated by Quaternary and Tertiary aged river plain sediments including black and red clayey silt and black and yellow brown clay soils. Exceptions to this include the Jurassic aged clayey sandstone unit north of Narrabri and partially consolidated polymictic gravel around Bellata. East of the Goondiwindi fault, variable soil conditions are mapped including deep reactive clays, basaltic soils along with red brown sandy and silty clay soils. Tertiary aged mafic volcanics outcrop intermittently from south of Moree to North Star.

The majority of the project has been heavily modified by past and ongoing disturbances associated with the rail reserve and surrounding agricultural activities. Clearance and maintenance of the rail corridor has resulted in the fragmentation and subsequent high level of disturbance and degradation of vegetation communities within the rail corridor. Patches of native vegetation still occur sporadically along the Project and are generally associated with riparian corridors, Travelling Stock Reserves (TSRs), road reserves or farm woodland remnants. These patches generally comprised a woodland community with the dominant canopy species including Bimble Box (*Eucalyptus populnea*), Belah (*Casuarina cristata*), Silver-leaved Ironbark (*Eucalyptus melanophloia*) and White Cypress Pine (*Callitris glaucophylla*). Extensive areas of natural grasslands also exist along the Project.

1.4 Planning Framework

The NSW Minister for Planning and Public Spaces approved the N2NS (Phase 1) Project under Section 5.19 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on 13 August 2020, which is referred to as the Division 5.2 Approval herein. ARTC Inland Rail are currently in the final planning and environmental approvals stage for Phase 2. The approval for N2NS Phase 1 incorporated the Minister's Conditions of Approval (MCoA).

Other documents which are part of the Division 5.2 Approval as set out in the MCoA for the approved project are the Inland Rail – Narrabri to North Star Submissions Preferred Infrastructure Report (ARTC, dated December 2019) and the updated Biodiversity Development Assessment Report (BDAR), Response to Submissions (RtS) on the Submissions and Preferred Infrastructure Report (SPIR) and Request for Information (RFI) responses.

The Project Environmental Impact Statement (EIS) was referred to the Australian Government Minister for the Environment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) as the project was determined to be a 'controlled action' and was subject to assessment via the bilateral agreement. The Australian Government Minister's approval was received on 1 October 2020 (EPBC 2016/7729) subject to a number of conditions being met and is here on referred to as the EPBC Approval.

The FCWS was assessed in the EIS Technical Report 2 Biodiversity Assessment Report (BAR; Umwelt 2017). As part of the assessment, targeted surveys were carried out for FCWS at all fauna survey locations except Site 8. FCWS were

not recorded within the original development footprint during the surveys informing the BAR (Umwelt 2017) and as such, was not considered further.

1.5 Unexpected Find of the FCWS

A spotter-catcher contractor conducting pre-clearing surveys in the Stage 3 section of N2NS recorded a potential FCWS at chainage 741.225 on the 5 July 2021. Specifically, the location was within Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains of the northern-eastern Darling Riverine Plains Bioregion (GeoLink 2021; Appendix A).

Through consultation with the NSW Department of Planning and Environment (DPE) and the Commonwealth Department of Agriculture, Water and the Environment (DAWE), a clearing procedure for the FCWS was agreed on following the requirements of the 'unexpected finds procedure' as detailed in the approved Construction Biodiversity Management Subplan – N2NS (Trans4m 2021). Following this clearance procedure, an additional 194 individuals have been recorded up to 21 March 2022 during pre-clearing and post-clearing works between chainage 609 and 614 in Stage 1, vicinity of chainage 629 in Stage 2 and between chainage 736 and 742 in Stage 3 (Appendix A). Of these, 74 individuals (38% total records) have been recorded as dead as a result of the clearing works, 85 individuals relocated and 35 recorded as dropped tails. More details are provided in Section 4.12.

In order to manage this new threatened species finding, ARTC Inland have contracted Lewis Ecological Surveys to prepare a species management plan to formalise the agreed to management actions so that impacts can be minimised during construction.

Refer to Figure 9-4 for an overview of Project Stage extents.

1.6 Construction Environmental Management Plan – Framework

The CEMP is the overarching 'road map' and management tool in relation to environmental performance during Project delivery. The CEMP links the relevant legislative and client requirements to the project's Environmental Management System (EMS) and describes the construction environmental management framework for the Project and the system for minimising and managing environmental risks. The CEMP and relevant management plans have been prepared in consideration of the MCoA, the Revised Environmental Management Measure's (REMMs) presented in the SPIR and Trans4m Rail's EMS. The CEMP provides the overall framework for the system and procedures to ensure environmental impacts are minimised and legislative and other requirements are fulfilled. A number of environmental management sub-plans are required to support the CEMP and have been outlined in Figure 1-2.

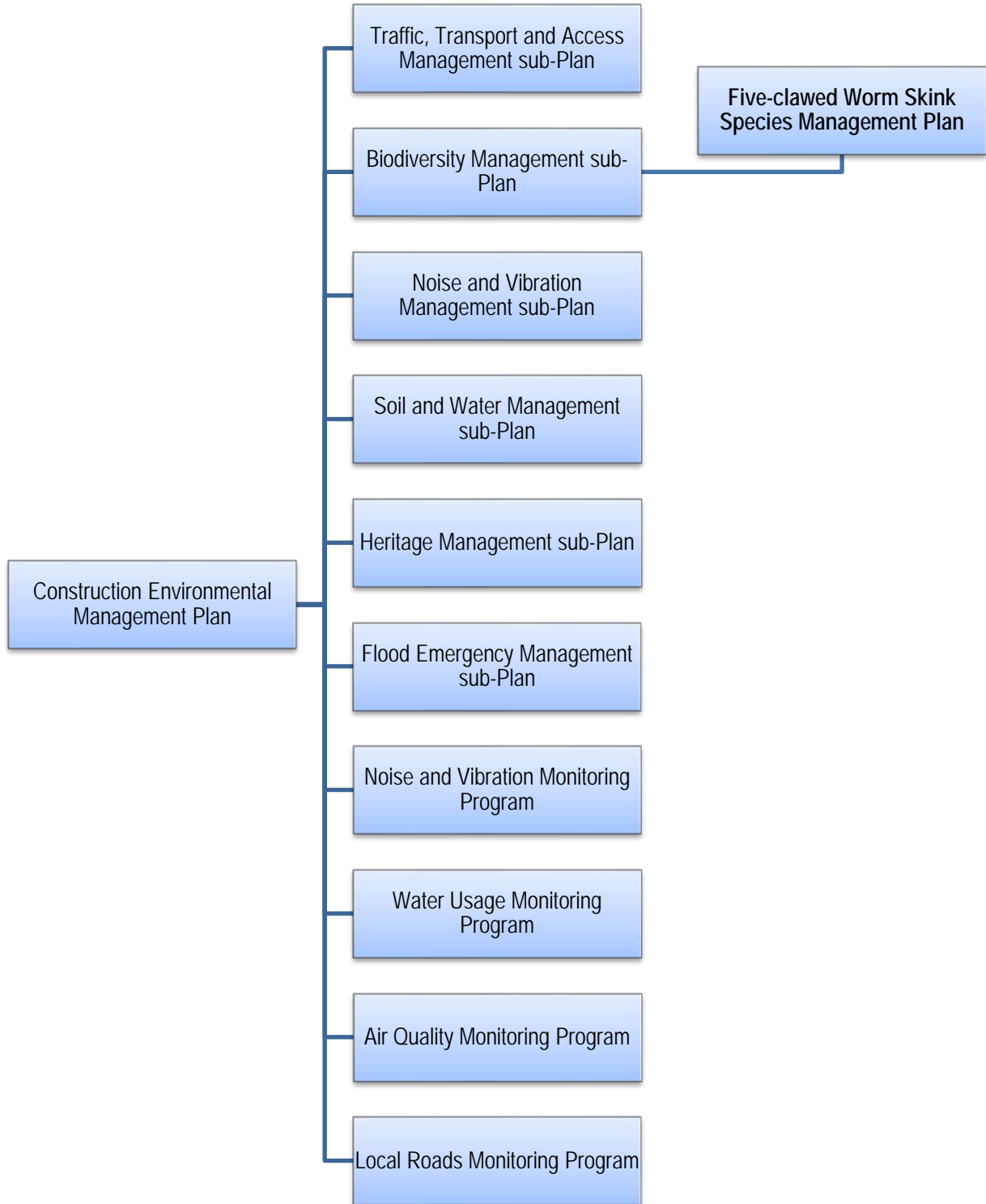


Figure 1-2. Construction Environmental Management Plan framework.

2.0 PROJECT CONDITIONS AND MANAGEMENT MEASURES APPLICABLE TO FCWS

The most relevant Project conditions and how the management actions proposed in this management plan relate to each condition is summarised in Table 2-1.

Table 2-1. Compliance summary of all conditions of approval and statements of commitments.

Source	Condition	Details of Compliance																																				
Inland Rail – Narrabri to North Star Phase 1																																						
NSW Minister for Planning and Public Spaces (Approved 13/08/2020)	E17 - The Proponent must minimise impacts to plant community types and not exceed the total areas impacted as identified in Table E1 (see below) . Table E1: Native Vegetation Impacted	Section 5.1.2																																				
	<table border="1"> <thead> <tr> <th>Vegetation Zone and Plant Community Type –PCT: ID and Type</th> <th>TEC under the EPBC Act (Ha)</th> <th>Total Area Impacted (Ha)</th> </tr> </thead> <tbody> <tr> <td>Zone 1 - PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion</td> <td><i>Weeping Myall Woodlands</i> – 9.16</td> <td>9.40</td> </tr> <tr> <td>Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaided clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion</td> <td><i>Brigalow (Acacia harpophylla dominant and codominant)</i> – 16.13</td> <td>6.48</td> </tr> <tr> <td>Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion</td> <td><i>Coolabah - Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions</i> – 1.74</td> <td>0.91</td> </tr> <tr> <td>Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion</td> <td><i>Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern NSW and Southern Qld</i> – 432.07</td> <td>290.67</td> </tr> <tr> <td>Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW</td> <td>Not listed</td> <td>61.38</td> </tr> <tr> <td>Zone 6 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Derived - Native Grasslands)</td> <td>Not listed</td> <td>125.64</td> </tr> <tr> <td>Zone 7 - PCT71 (BR127, NA126) Carbeen – White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and aeolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion</td> <td>Not listed</td> <td>0.00</td> </tr> <tr> <td>Zone 8 - PCT 78 River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion</td> <td>Not listed</td> <td>5.32</td> </tr> <tr> <td>Zone 9 - PCT 135 Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion</td> <td>Not listed</td> <td>4.80</td> </tr> <tr> <td>Zone 10 - PCT 413 Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion</td> <td>Not listed</td> <td>1.87</td> </tr> <tr> <td>Total Area Impacted</td> <td>459.10</td> <td>506.47</td> </tr> </tbody> </table>		Vegetation Zone and Plant Community Type –PCT: ID and Type	TEC under the EPBC Act (Ha)	Total Area Impacted (Ha)	Zone 1 - PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	<i>Weeping Myall Woodlands</i> – 9.16	9.40	Zone 2 - PCT35 (BR120, NA117) Brigalow – Belah open forest / woodland on alluvial often gilgaided clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	<i>Brigalow (Acacia harpophylla dominant and codominant)</i> – 16.13	6.48	Zone 3 - PCT39 (BR130, NA129) Coolabah – River Coolabah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	<i>Coolabah - Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions</i> – 1.74	0.91	Zone 4 - PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	<i>Natural Grasslands on Basalt and Fine-textured Alluvial Plains of Northern NSW and Southern Qld</i> – 432.07	290.67	Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Not listed	61.38	Zone 6 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Derived - Native Grasslands)	Not listed	125.64	Zone 7 - PCT71 (BR127, NA126) Carbeen – White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and aeolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion	Not listed	0.00	Zone 8 - PCT 78 River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Not listed	5.32	Zone 9 - PCT 135 Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Not listed	4.80	Zone 10 - PCT 413 Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	Not listed	1.87	Total Area Impacted	459.10	506.47
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Total Area Impacted	459.10	506.47																																				
	E18 - The Proponent must meet the biodiversity offset obligations for ecosystem and species credits as set out in Tables E2 and E3 , within two (2) years of the CSSI approval. The retirement of the biodiversity credits must be carried out in accordance with the <i>NSW Biodiversity Offsets Policy for Major Projects</i> and can be achieved by a combination of:	Section 7.0																																				

Source	Condition	Details of Compliance
	<p>(a) acquiring and retiring "biodiversity credits" within the meaning of the <i>Biodiversity Conservation Act 2016</i>; and/or</p> <p>(b) making a payment into the Biodiversity Conservation Fund; and/or</p> <p>(c) outlining in a Biodiversity Offset Strategy the provision of supplementary measures. The Strategy must be prepared in consultation with EES and DAWE.</p>	
	<p>E19 - The Proponent may review and update the ecosystem and species credit requirements in Tables E2 and E3, except as required by Condition E25, to reflect the final construction footprint and resulting extent and type of plant community types to be cleared. Amendments to the ecosystem and species credit requirements must be undertaken in consultation with EES and DAWE and submitted to the Planning Secretary for approval within six (6) months after the commencement of construction or as agreed in writing by the Planning Secretary.</p>	<p>Section 5.1.2; Section 7.0</p>
	<p>E20 - The review and update of credit requirements must be undertaken by:</p> <p>(a) using the vegetation mapping, and the extent of impact in the revised development footprint (Table 3.4) in the <i>July 2020 Addendum to the Inland Rail – Narrabri to North Star Biodiversity Assessment Report</i>; and/or</p> <p>(b) completing verification surveys to confirm the extent, type and condition of native vegetation to be impacted.</p> <p>Where verification surveys are required, they must be undertaken in consultation with EES. Any additional surveys must be undertaken at the time of year when groundcover is most likely to be predominantly native. If evaluation is not possible at a time when groundcover is most likely to be native, the assumed presence of any relevant species and ecosystems may be applied to conservatively evaluate impacts and associated credit requirements.</p>	<p>Section 5.1.1; Section 5.1.2; Section 7.0</p>
	<p>E22- Reuse of Timber</p> <p>Prior to vegetation clearing, the Proponent must consult with community and landcare groups and government agencies to determine if retained timber and root balls can be reused in habitat enhancement and rehabilitation work, before pursuing other disposal options. The retained timber and root balls may be used on or off the CSSI site.</p>	<p>5.2.6</p>
<p>Commonwealth Minister for the Department of Agriculture, Water and the Environment (Approved 1/10/2020)</p>	<p>Part A 1 (a) Implement conditions C4 and C9 of Part C, Schedule 2 of the State Infrastructure approval, where they relate to monitoring, managing, avoiding, mitigating, offsetting, recording, or reporting on, impacts to protected matters, with the exception of C9(a).</p>	<p>This document.</p>
	<p>Part A 1 (b) Ensure that the Weed Management Plan included in the Biodiversity Management Subplan required under condition C9 of Part C, Schedule 2 of the State Infrastructure approval, includes appropriate weed control measures to prevent the introduction and/or spread of weeds from construction areas to any retained area of Belson's Panic (<i>Homopholis belsonii</i>), Natural Grassland on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland, Brigalow (<i>Acacia harpophylla</i> dominant and codominant) and Weeping Myall Woodlands ecological communities.</p>	<p>5.2.6</p>
	<p>Part A 1 (c) Implement biodiversity conditions EI 7-E21 and E23-E26 of Part E, Schedule 2 of the State Infrastructure approval, where they relate to monitoring, managing, minimising, reducing, avoiding, mitigating, offsetting, recording, or reporting on, impacts to protected matters.</p>	<p>Section 5.0 Section 6.0</p>

3.0 PROJECT ROLES AND RESPONSIBILITIES

The key roles associated with this FCWS Management Plan include:

- Project Director;
- Construction Manager;
- Environmental Manager;
- Project Ecologist; and
- Environmental Representative.

Their roles have been summarised in Table 3-1, and as a team, they are responsible for the successful implementation of this plan. ARTC Inland Rail will work closely with the construction contractor in managing this plan and managing compliance with this plan, incident investigation and learning.

Table 3-1. Summary of roles and responsibilities for key personnel associated with this FCWS Construction Plan of Management.

Role	Responsibility	Organisation
Project Director	<p>Ensure that all personnel including sub-contractors complete an induction prior to mobilising for work.</p> <p>Provide necessary resources / facilities for the protection of the FCWS and its associated habitat as directed by the Environmental Manager.</p> <p>Ensure that all environmental incidents involving habitat disturbance, relocation or death are reported appropriately to the nominated ARTC Inland Rail representative.</p> <p>Ensure that corrective actions including FCWS management, communicated by the Environmental Manager are closed out within the stipulated timeframe.</p>	Construction Contractor
Construction Manager	<p>Confirm as part of inductions/pre-start and toolbox meetings that all personnel are familiar with the requirements for management of FCWS protection.</p> <p>Confirm with and report to the Environmental Manager, any suspected non-compliance by subcontractors or any contractor employees and site visitors over protection methods as per the Project CEMP and specifically, this FCWS Construction Management Plan.</p> <p>Follow instructions from Environmental Manager and Environmental Adviser in relation to the requirements for the management of habitat removal/relocation, open excavations, structural demolition/removal and FCWS relocation.</p>	Construction Contractor
Environmental Manager	<p>Undertake the investigation of any FCWS environmental incidents involving unplanned habitat disturbance, relocation failure or accidental death and incident reporting requirements in consultation with ARTC Inland Rail.</p>	Construction Contractor

Role	Responsibility	Organisation
	<p>Provide senior support to the Environmental Adviser(s) and site staff to ensure environmental works are carried out in accordance with the FCWS Management Plan.</p> <p>Ensure tool box talks cover procedures associated with FCWS including its identification.</p> <p>Consult as necessary, with ARTC Inland Rail Representative and Project Environmental Representative on matters relating to the FCWS.</p> <p>Control access into FCWS Relocation Sites</p>	
Environmental Adviser	<p>Assist in the delivery of Project specific inductions, environmental awareness training sessions, pre-starts and toolbox meetings.</p> <p>Ensure all employees and sub-contractors are aware of the protocols relating to habitat removal/relocation, open excavations and FCWS relocation in accordance with this FCWS Construction Management Plan.</p> <p>Submit incident reports when required for due diligence and communicate with the Environment Manager and client's Environmental Representative as necessary.</p>	Construction Contractor
Project Ecologist	<p>Be present during the removal or disturbance of all known or potential FCWS habitat</p> <p>Determine appropriate relocation points for captured FCWS in accordance with the FCWS Management Plan.</p> <p>Assist both the Environmental Manager and Environmental Adviser.</p> <p>Prepare a summary report following the completion of habitat removal and disturbance works.</p>	Construction Contractor
Environmental Representative	<p>Monitor the implementation of this FCWS Management Plan.</p> <p>Approve or reject minor amendments of the Construction Environmental Management Plan.</p> <p>Approve or reject out of hours works in accordance with MCoA E3 for matters relating to FCWS surveys and implementation of this construction management plan.</p>	Consultant

4.0 FIVE-CLAWED WORM SKINK (*ANOMALOPUS MACKAYI*)

4-1 Taxonomy

Scientific name: *Anomalopus mackayi*

Common name: Five-clawed Worm Skink



Plate 4-1. Adult Five-clawed Worm Skink (Photo – Steve K Wilson ©).

4-2 Description

The Five-clawed Worm-skink (*Anomalopus mackayi*) is a burrowing lizard with a worm-like body that can grow up to 270 mm total length. It tends to be dark brown above with a green-yellow underside (Swan 1990). This skink has short limbs with three fingers and two toes, and this feature is used to distinguish this species from the more common Two-clawed Worm Skink (*Anomalopus leuckartii*) which only has two toes on the front limbs (Cogger 1993; OEH 2017).

4.3 Distribution

The FCWS has been recorded along the western slopes of the Great Dividing Range, in north-eastern NSW and south-eastern Queensland (Wilson and Knowles 1988; Swan 1990; Sadler *et al.* 1996; Figure 4-1). Within this distribution, the skink generally inhabits grassy white box woodlands supported by moist black soils and river red gum – Coolibah – Bimble box woodland on deep cracking clay soils (OEH 2017), and lives in tunnel-like burrows within the soil, coming to the surface under fallen timber and leaf litter.

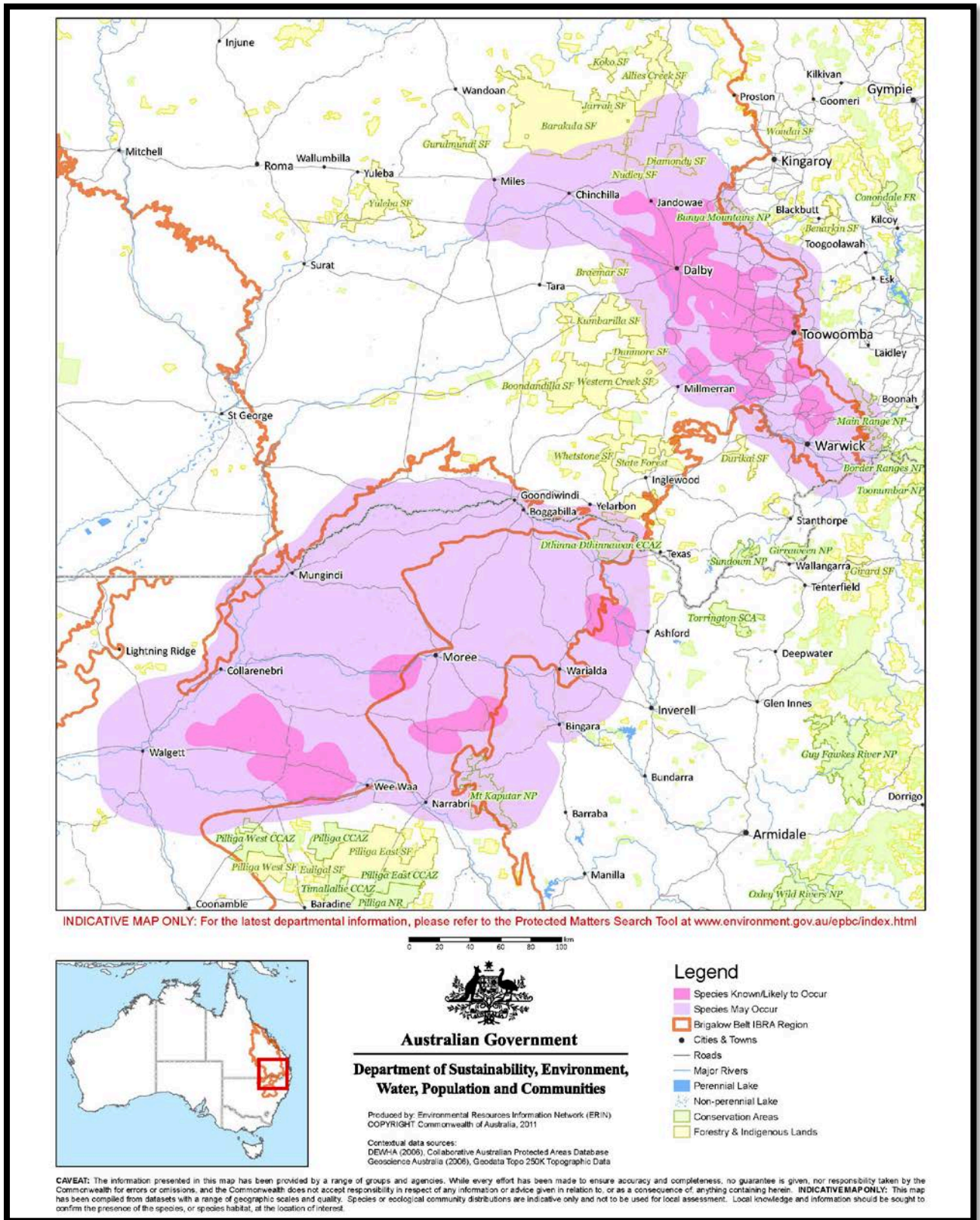


Figure 4-1. Known and predicted distribution of Five-clawed Worm Skin (source: DAWE 2022).

In New South Wales, FCWS is confined to the Namoi River and Gwydir River floodplains and the lower north-western slopes of the Great Dividing Range. The species ranges from the Wallangra-Masterman Range area in the east, south-west to the Narrabri-Wee Waa area, west along the northern edge of the Pilliga outwash demarcation to the south-west corner of the Namoi catchment south of Walgett, and bordered by the Barwon River in the west to the Mungindi area near the Queensland border (Spark 2010).

There is some thought of a range contraction eastwards. The most western record was made in the Goodooga area approximately 80 km west-north-west of Lightning Ridge sometime prior to 1970 (Sadler & Pressey 1994; Spark 2010). Another specimen was found approximately 20 km south of Walgett in 1905. Until Spark's survey of the Namoi catchment in late 2009–early 2010, no specimens had been found in the Namoi catchment since 1976 when the species was found at a site in the Narrabri-Wee Waa area (Cogger *et al.* 1993; NSW DECCW 2005ab; Spark 2010).

Specimens have been recorded from Old Burren, Goodooga, Burren Junction, Culgoora, Yetman road 6.9 km north-north west of Wallangra, Wee Waa, Millie, Terry Hie Hie and Bellata (Greer & Cogger 1985; Shea *et al.* 1987; NSW DECCW cited in Sass *et al.* 2009).

4.4 Population Information

Prior to works on the N2NS, there were no population or density estimates for the FCWS. This is most probably due to its cryptic habits which has also made its detection difficult. The N2NS project contributes to the species knowledge with some population density estimates provided in Section 4.12.

4.5 Land Tenure of Populations

Most known populations of FCWS occur outside of the reserve system on private lands and within transport corridors and travelling stock reserves. A population is known from within the Terry Hie Hie Community Conservation Area (BioNet 2022).

Potential habitat may be inferred based on the presence of soil types and PCTs known to support FCWS within a region where FCWS is predicted to occur (refer Figure 4-1). Potential distribution and habitat associations for the FCWS are described further at Section 4.3 and Section 4.6 respectively.

Potential habitat exists at Lake Broadwater Conservation Park, Southwood National Park, Narran Lake Nature Reserve, Killamey State Conservation Area, Bobbiwa State Conservation Area, Couradda State Conservation Area, Moema State Conservation Area, Bullala, Burren Yurrul National Park, Burren Yurrul Nature Reserve, Boomi Nature Reserve, Dthinna Dthinnawan National Park, Kwiambal National Park, Careunga Nature Reserve, Budelah Nature Reserve, Gwydir Wetlands State Conservation Area, Kirramingly Nature Reserve, Barwon Nature Reserve, Barwon State Conservation Area, Midkin Nature Reserve, Gamilaroi Nature Reserve and Taringa Nature Reserve (Cogger *et al.* 1993; pers. obs).

Some other public reserves such as Yetman, Culgoora and Jacks Creek State Forest also provide potential habitat for FCWS.

4.6 Habitat Associations

4.6.1 Habitat on the Floodplains

On the floodplains of northern New South Wales, the FCWS occurs in grasslands and grassy, open woodlands on heavy black and grey, alluvial cracking clay soils from 135–200 m above sea level (Sadler & Pressey 1994; NSW DECCW 2005ab; Spark 2010). During dry periods, the species tends to shelter where moisture is available. For example, they may take refuge in deep cracks within alluvial clay soils. Sufficient rainfall following extended dry conditions is likely to bring the skink to the surface (Brigalow Belt Reptiles Workshop 2010). The species has been recorded in grasslands dominated by Mitchell Grass (*Astrebla* spp.) and River Red Gum (*Eucalyptus camaldulensis*) - Coolibah (*E. coolabah* subsp. *coolabah*) - Bimble/Poplar Box (*E. populnea* subsp. *bimbil*) - Weeping Myall (*Acacia pendula*) grassy woodlands to open forests with grasses typically of the genera *Austrodanthonia*, *Austrostipa*, *Bothriochloa*, *Chloris*, *Enteropogon* and *Themeda* (Brigalow Belt Reptiles Workshop 2010).

Floodplain surveys have shown, however, that the species has no preference for particular vegetation types on alluvial cracking clays. Cracking clay soils on the Namoi and Gwydir floodplains support a wide variety of vegetation communities which can be considered suitable habitat for the FCWS (Spark 2010; GeoLink 2022).

4.6.2 Habitat on the lower western slopes of the Great Dividing Range

On the lower north-western slopes of the Great Dividing Range in New South Wales, the species occurs in White Box (*Eucalyptus albens*) and sometimes ironbark-mixed, grassy woodland on self-mulching, friable, basalt derived, red-black to black clay-loam soils. The species has been found occurring in burrows in open paddocks with few trees, cropped grass and moist black soil (Swan 1990; Sadler & Pressey 1994; Spark 2010). Shea *et al.* (1987) found five specimens under logs in open paddocks surrounded by open eucalypt woodland, and one specimen under a log in a largely cleared woodland in the vicinity of granite outcrops.

4.6.3 Microhabitat Observations

FCWS tends to shelter at the soil surface where moisture is sufficiently retained under decaying leaf litter, coarse woody debris or artificial debris. The species also lives in cavities in rotting tree bases, logs and in tussock bases. It is known to dig permanent tunnel-like burrows in loose, friable, humic soils in woodlands on slight basalt rises (Sadler & Pressey 1994; NSW DECCW 2005ab).

4.6.4 N2NS Inland Rail Project Observations

Refer to Section 4.12 for details of FCWS habitat associations observed during the construction of the N2NS Inland Rail Project.

4.7 Life Cycle

Very little is known about the biology of FCWS. Average clutch size or mortality rates for newborns is unknown. One specimen was observed laying three eggs in spring (NSW DECCW 2005ab). The few known adults collected in spring were reproductively active, with females carrying one or two eggs.

4.8 Feeding

No information is available about the species' feeding behaviour in the wild; however, it is believed to feed on arthropods, such as white ants. Captive specimens have been recorded eating mealworms (NSW DECCW 2005ab; Brigalow Belt Reptiles Workshop 2010). In captivity, it has been known to eat crawling insects and insect larvae.

4.9 Movement Patterns

Nothing is known on the movement patterns of the FCWS. The Department of Environment and Conservation has prepared a Priorities Action Statement (PAS) that identifies studying the movement patterns and habitat use of FCWS through mark-recapture techniques as having a 'medium' priority.

4.10 Threats and Conservation Status

The FCWS has undergone a decline in the past few decades. A number of factors that may contribute to this decline have been identified as (Cogger *et al.* 1993; NSW DECCW 2005ab; TSN 2008b):

- **Land clearing** for agriculture has been particularly severe within the species' range (Brigalow Belt Reptiles Workshop 2010).
- **Overgrazing** which compacts soil, making it difficult for the species to find suitable shelter (Brigalow Belt Reptiles Workshop 2010).
- **Removal of ground debris** including ground litter, fallen timber and logs that results in reduced soil moisture. This means the soils are drier, making it harder for the species to access suitable habitat. Removing logs and timber also reduces the amount of shelter available for the species (Brigalow Belt Reptiles Workshop 2010).
- **Use of agricultural chemicals** that poison and pollute the soil which may adversely affect the species (Brigalow Belt Reptiles Workshop 2010).
- **Feral species** resulting in their predation from cats and foxes, is a threat facing much of Australia's native wildlife including the FCWS (NSW NPWS 1999av).

4.11 Threat Abatement and Recovery

The *Action Plan for Australian Reptiles* states that knowledge of the FCWS is inadequate. More research into the species is needed in order to define objectives and actions to assist in recovery (Cogger *et al.* 1993). The report identifies three crucial research areas:

- ground surveys to determine the full geographic range and habitat requirements of the species;
- research into basic biology and ecology of the species, and
- research into the species' decline and major factors behind the decline.

Six management actions were identified in the plan. These include:

- deferring of licenses to clear remnant woodland within the species' known range;
- surveying known habitat in reserves;
- surveying known habitat outside of reserves;
- developing and promoting guidelines for landowners to help reduce the impact of current land use;
- establishing appropriate reserves if the existing reserves are deemed inadequate, and
- developing community awareness of the species (Cogger *et al.* 1993).

These actions are combined with three objectives also detailed in the plan. The objectives include:

- conducting the research required;
- ensuring existing populations are managed in reserve systems, and
- implementing land management practices which promote the maintenance of secure, viable populations outside of reserve systems (Cogger *et al.* 1993).

Approved conservation advice given by the Department (TSSC 2008di) outlines a number of actions essential to the conservation of the FCWS. The actions and objectives of the advice are sourced from various State agencies, hence they are consistent with those mentioned above. Mitigation measures or approaches that have been developed for the FCWS are (Brigalow Belt Reptiles Workshop 2010):

- alternative project locations;
- avoid clearing/ retain habitat;
- design proposed action to avoid habitat disturbance;
- establish adequate buffer zones to protect habitat;
- implement measures to exclude cattle from habitats;

- maintain habitat connectivity across the landscape, e.g., along roadside reserves, uncultivated lands between cropped and pasture-improved areas;
- retain shelter habitat features in place;
- devise and implement a habitat management plan specific to the FCWS;
- implement measures to reduce the risk of invasive and predatory species accessing reptile habitat species habitat, e.g. Buffel Grass;
- devise and implement an appropriate fire management plan, and
- devise and implement water management, sediment erosion and pollution control plans.

4.12 Current Context of FCWS and the Project

The entire N2NS project is located within the Department of Agriculture, Water and the Environment (DAWE 2022) FCWS distribution map (Figure 4-1), with:

- Stage 1 chainage 603.000 to 625.000: mapped as 'Species Known / Likely to Occur'
- The remainder of the site: mapped as 'Species may Occur'.

The FCWS was assessed in EIS Technical Report 2 Biodiversity Assessment Report (BAR; Umwelt 2017). As part of the assessment, targeted surveys were carried out for FCWS at all fauna survey locations except Site 8. No FCWS were recorded during these surveys informing the BAR (Umwelt 2017) and as such, was not considered further.

An unexpected ecological find was made on the 5 July 2021 when a spotter-catcher contractor recorded a FCWS at chainage 741.225 within Zone 4 (GeoLINK 2021). Habitat at this location was summarised as PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains (northern-eastern Darling Riverine Plains Bioregion). The habitat condition was noted as Moderate – Good Natural Grassland.

In response to the unexpected find, the contractor initiated the 'unexpected finds' procedure as detailed within the Construction Biodiversity Management Subplan – N2NS (Trans4m Rail 2021, Revision 1). Specifically, this involved:

- Stopping all work within the vicinity of the find and notifying relevant contract and ARTC Inland Rail personnel;
- Consultation with DPIE – BCS and DAWE in relation to the unexpected find, and
- Preparation of a test of significance pursuant to both the *EPBC Act* (1999) and *BC Act* (2016; Appendix B).

Subsequent consultation with DPIE – BCS and DAWE resulted in the development of a specific clearing procedure for the FCWS as detailed in Section 5. Habitat areas were identified within the project boundary (Stage 1: Chainage 603.000 to 625.000 and Stage 3: Chainage 735.000 to 754.250) for implementation of targeted FCWS mitigation measures.

Following the adoption of this clearance procedure, an additional 248 individuals have been recorded up to 16 September 2022 during pre-clearing and post-clearing works between chainage 609 and 614 in Stage 1, vicinity of chainage 629 in

Stage 2 and between chainage 736 and 742 in Stage 3 (ARTC 2022). Of these, 87 individuals (35% total records) have been recorded as dead as a result of the clearing works, 116 individuals relocated and 45 recorded as dropped tails.

Some population density estimates have been provided from earlier works conducted on Stage 3 of the N2NS project between chainage 736 and 742 where 116 individuals were recorded from approximately 6.6 hectares of stripped habitat in the construction impact zone (ARTC 2022; GeoLINK 2022). This was summarised further according to plant community type and included:

- Non-native vegetation – 23 individuals in 2.6 hectares of stripped habitat. This equates to a density of almost 9 individuals per hectare.
- Zone - 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion – Moderate to Good condition – 1 individual in 0.07 hectares of stripped habitat. The area of habitat is too small to provide a reliable form of density.
- Zone - 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion – 87 individuals within 2.9 hectares of stripped habitat. This equates to 30 individuals per hectare.
- Zone - 5 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW – Moderate to Good condition – 2 individuals within 0.4 hectares of stripped habitat. This equates to 5 individuals per hectare.
- Zone - 6 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW-Derived Native Grasslands – 3 individuals within 0.6 hectares of stripped habitat. This equates to 5 individuals per hectare.

The highest density of FCWS tends to occur in Zone - 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains (GeoLink 2022). Their surveys found soil types rather than plant community type tends to form an important microhabitat feature with the highest densities occurring in cracking black clays although lower densities do occur on red cracking clays and seldom red gravel loam.

The following vegetation zones are also considered habitat for the FCWS according to the Threatened Biodiversity Data Collection (TBDC):

- Zone - 2 - PCT-35 BVT-BR120, NA117-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion– Moderate to Good condition, and
- Zone - 3 - PCT-39 BVT-BR130, NA129-Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion – Moderate to Good condition

An updated Test of Significance carried out for the species concluded the N2NS section of the Inland Rail Project is likely to have a significant impact on the species (Umwelt 2021). To alleviate some of these impacts, a series of management actions have been proposed and are outlined in Section 5.

5.0 FIVE-CLAWED WORM SKINK MANAGEMENT

ARTC – Inland Rail propose the following management actions to reduce impacts on the FCWS population during the planning, construction and operation of the Project. The management actions fall into three broad categories.

1. Planning management actions which include:

- Performing additional studies to understand the potential for FCWS encounters during construction;
- Investigate opportunities to reduce clearing of FCWS habitat;
- Updating significance assessment pursuant to the *Biodiversity Conservation Act (2016)* and the *Environment Protection and Biodiversity Conservation Act (1999)*, and
- Developing a species management plan (i.e. this report) for FCWS that can assist the current project and provide the platform for FCWS consideration at other locations where the species may occur.

2. Construction management actions include:

- Known and likely FCWS habitat identified on Environmental Control Plans (ECPs);
- Develop a survey prescription for adequately surveying areas prior to and during various construction activities;
- Outline the data collection requirements for all captured FCWS;
- Develop management initiatives for the protection of FCWS habitat adjacent to the construction impact zone and protection of relocation sites;
- Develop guidelines that provide improved opportunities for habitat augmentation of relocation sites and areas nominated for landscape treatments;
- Outline the 'expected finds' procedure (Appendix I Five-clawed Worm-skink Encounter Procedure as included in the N2NS Construction Biodiversity Sub-plan), and
- Outline a framework for allowing this management plan to be progressively updated in light of new findings and information.
- Implementation of identified mitigation measures.

3. Operational management actions include:

- Implementation of the FCWS monitoring program.

5.1 Planning Management Actions

5.1.1 Additional Studies

Additional studies will be performed to assist in identifying the potential for FCWS encounters during construction. This would focus on engaging a soil scientist (i.e. Elder Enviro 2022) to assess soil types throughout the project given that

earlier investigations (i.e. GeoLINK 2021; 2022) have shown FCWS prefer black cracking clays, but may also inhabit red cracking clays and rarely red gravel loam. The Biodiversity Management Plan has also been updated to Version 3 and includes a Section 5 that specifically relates to FCWS.

5.1.2 Reduce Clearing in FCWS Habitat Areas

The project team would explore opportunities to reduce the CIZ clearing footprint. This would be managed by both Trans4mRail and ARTC. An addendum FBA BAR has already been completed which has assessed impacts to biodiversity values including FCWS within the refined Issued for Construction (IFC) Construction Impact Zone (Umwelt 2021). This approach accords with MCoA E19:

The Proponent may review and update the ecosystem and species credit requirements in Tables E2 and E3, except as required by Condition E25, to reflect the final construction footprint and resulting extent and type of plant community types to be cleared. Amendments to the ecosystem and species credit requirements must be undertaken in consultation with EES and DAWE and submitted to the Planning Secretary for approval within six (6) months after the commencement of construction or as agreed in writing by the Planning Secretary.

Observations of reduced clearing in FCWS habitat areas was observed by the author in Stage 3 of the project. The CIZ was revised in June 2022 and approved by DPE (see Table E1 in Table 2-1).

5.1.3 Test of Significance Assessments for FCWS

Both the 5 part test pursuant to the *Biodiversity Conservation Act (2016)* and the Test of Significance pursuant to the *Environment Protection and Biodiversity Conservation Act (1999)* have been completed.

The 5 part test completed by Trans4mRail sub contractor ecologists relied on the pre cautionary principal and concluded a significant impact on FCWS populations may occur (Umwelt 2021; Appendix B). In reaching this conclusion they relied on the NSW Office of Environment and Heritage *Threatened Species Test of Significance Guidelines* (OEH 2018). The Test of Significance reached a similar conclusion, suggesting the project is likely to result in a significant impact on an important population of the FCWS (Umwelt 2021; Appendix B).

5.1.4 Developing a Species Management Plan

This document represents the species management plan and is designed to bring together the available information including the commitments and management actions that have been formulated between stakeholder groups since the unexpected finds procedure was implemented in July 2021 (Appendix C). This document also has the capacity to provide a platform for FCWS consideration at other locations where the species may occur along the route of the Inland Rail Project.

5.2 Construction Management Actions for FCWS

5.2.1 Identification of FCWS Habitat on Environmental Control Plans

Locations of 'known' and 'likely to occur' FCWS habitat areas (as defined within Figure 4-1 *FCWS distribution map* (DAWE 2022)) will be updated on Environmental Control Plans (ECPs) in accordance with the Construction Biodiversity Management Subplan (pp 25). This will assist in the implementation of agreed to management actions outlined in this plan of management. Environmental Control Plans would be updated from time to time or on an as required basis as new information informs the project.

Additionally, Environmental Control Plans will be updated periodically to include 'Known' FCWS habitat as determined from FCWS finds during the construction of the Narrabri to North Star Inland Rail Project. Known FCWS habitat identified in this way will include a 100m buffer around any FCWS find record, as identified in Appendix A.

5.2.2 Specific FCWS Induction

All personnel including sub-contractors are required to undergo an induction to work on the project. This induction addresses FCWS and provides information in relation to:

- A general description of the FCWS (including photos and key identification features).
- Locations where FCWS surveys are required on the project site (i.e. Stage 1 and Stage 3 CH735.000 to CH754.250).
- Records kept from the induction / toolbox training.

Visitors and delivery personnel are to be accompanied by a full inducted person at all times in accordance with the CEMP (Trans4Rail 2021). Signage is also provided at the various site offices (Plate 5-1).

5.2.3 Develop a Survey Prescription to Adequately Survey Area Before and During Construction Activities

Developing a survey prescription to adequately survey the area before and during construction activities would involve the following in FCWS habitat areas:

- An ecologist would perform a pre-clearing inspection to determine the suitability of the site for pre-clearing surveys before slashing commences. A pre-clearing survey involving active searches under logs and shelter sites would only be undertaken where these attributes occur. No pre-clearing survey involving active search would be undertaken in areas that comprise only dense tall grasses given there is little opportunity for the surveyor to actively search and locate FCWS. The same approach would occur where the area is inundated. Skinks captured during this stage would need to be retained until such a time the slashing has been completed adjacent to the relocation site. In most cases, this should not last for more than a few hours and accord with the Ecologists Animal Care and Ethics Approval Permit.

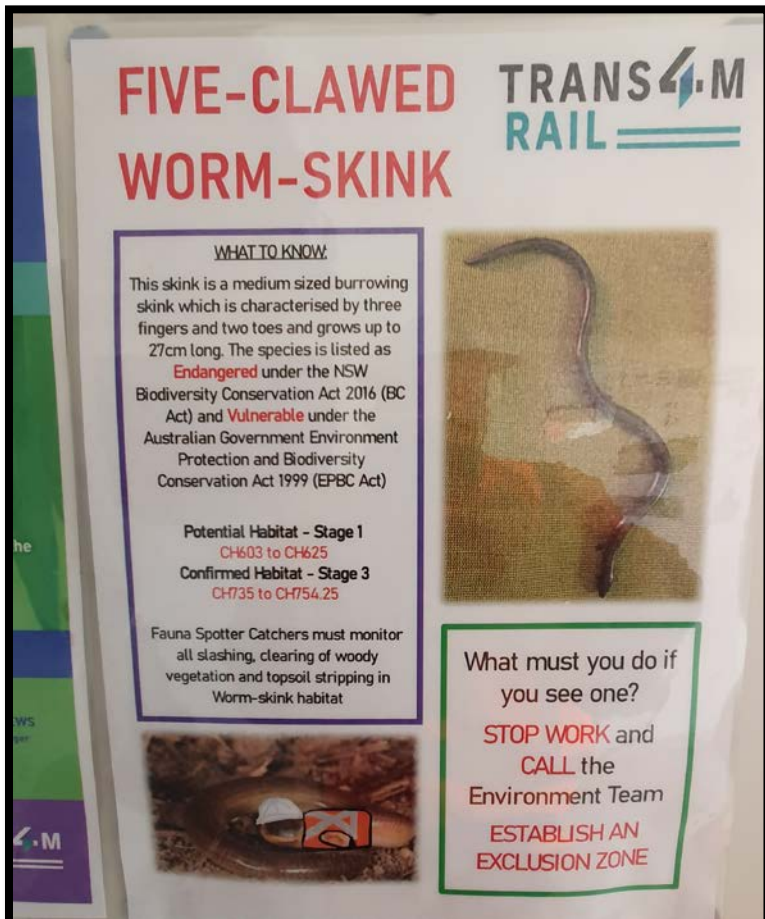


Plate 5-1. Example of FCWS signage at site offices in Stage1 and 3.

- An ecologist or spotter-catcher to perform clearing supervision when the slasher is mowing vegetation. The slasher should be set at a cutting height that is near to the ground (<100 mm) in order to reduce the suitability of the retained habitat. The ecologist/spotter-catcher would turn suitable materials such as logs, disused sleepers, refuse whilst looking for dispersing skinks. Skinks captured during this stage would need to be retained until such a time the slashing has been completed adjacent to the relocation site noting that a series of measurements and habitat information is to be recorded (see Section 5.2.4).
- Slashed vegetation should be wind rowed to the edge of the CIZ to provide temporal refuge sites. This should be performed in a way so as to reduce the suitability of the habitat for FCWS within the CIZ. Ideally, slashing should seek to windrow the slashing material with each up and down pass so that it concentrates the windrowed material to enable more efficient FCWS checks prior to soil disturbance works.



Plate 5-2. Slashing on vegetation prior to stripping in Stage 1.

- Relocation sites should be established based on the capture sites. Silt fence is proposed to assist in delineating these areas and to reduce habitat permeability between the relocation site and the CIZ (Plate 5-3).
- Once the above works are completed within a given area, a minimum waiting period of 2 days/nights and up to 5 days/nights is proposed before topsoil stripping can commence. This adopted period should enable sufficient time for uncaptured FCWS to move of their own accord and be determined in consultation with Project Ecologist. The Project Ecologist should consider site-specific conditions at the time of clearing including the outcomes of any pre-clearing surveys, soil conditions (presence of moisture / cracking / baking), daytime temperatures and other factors that in the opinion of the Project Ecologist may or may not contribute to hostile ground conditions for the FCWS.



Plate 5-3. Example of a FCWS relocation hub installed in Stage 1 supported by environmental signage.

Once the adopted period has elapsed within a slashed area, the ecologist/spotter-catcher will implement the following measures during soil disturbance activities (e.g. topsoil stripping):

- A site assessment by a senior ecologist to determine the site suitability for FCWS. This survey is to determine if the area contains suitable habitat as opposed to unsuitable habitat which could include inundated or saturated areas or simply non-black cracking soils or highly trafficked areas such as driveways and road verges. Area still deemed as suitable habitat for FCWS would have the following procedures:
 - A daytime pre-stripping survey for FCWS focusing on the most likely micro habitat components in the CIZ. This survey would occur within 2 days of the topsoil stripping with the completed survey area being clearly demarcated by either plastic bollards, witches hats or pennant flagging to ensure no topsoil stripping occurs in areas not yet surveyed.
 - Topsoil stripping surveys to a depth of 100 mm would then be performed to capture and relocate displaced FCWS (Plate 5-4). At least one ecologist or spotter catcher will be assigned per machine (i.e. excavator, dozer, grader or scrapper). Should a scrapper be used, an ecologist or spotter catcher will be present to inspect the material at the recipient site.
 - Salvaged FCWS would be assessed for signs of injury, measurements recorded and habitat data collected as per Section 5.2.4.



Plate 5-4. Example of top soil stripping to 100 mm depth at 599.02 in Stage 1.

5.2.4 Data Collection Requirements for Captured FCWS

Any FCWS captured during the course of implementing this plan would have the following data collected and recorded in the register:

- Stage of project and chainage;
- Capture date and time;
- Condition of the skink (Good, Injured, Deceased);
- Microhabitat at capture site;
- Soil at the capture site;
- Activity undertaken at time of find;
- Detection method (e.g. survey);
- GPS coordinates for capture and relocation site;
- Details of the person/s who made the discovery;
- Description of vegetation / PCT;

- Where practicable, validation photos from on top, side, below and close-up photos of forelimbs and hind limbs;
- Series of measurements including; snout-vent length, tail length and total length,
- Photographs of the site (general location, vegetation, habitat features where the individual/s was discovered) were captured each day for each work area, and
- Deceased or euthanised individuals will be forwarded to the *Australian Museum* for research purposes.

The following habitat data would be collected from a 100m² area from the capture site if it is undisturbed from construction otherwise the adjacent area outside of the CIZ:

- Soil crack density and size range (depth if possible);
- Percentage (%) litter cover;
- Percentage (%) bare ground;
- Percentage (%) grass cover and/or tussock spacing;
- Three most abundant groundcover species;
- Soil type, soil structure (blocky, small peds, massive) and pH if possible;
- Large surface debris abundance expressed as percentage (%) cover over 100m², and
- Ground moisture levels (including recent rainfall amount if known/relevant).

The Project Ecologist or the Environmental Manager for Trans4M Rail will manage this register. The register will be provided with each incident notification and live FCWS find report, and it will be made available to regulatory agencies. A copy of the register is provided in Appendix D.

5.2.5 Identifying and Establishing FCWS Relocation Sites

i. Site Identification

Relocation sites will be identified based on the captures from pre clearing and clearing supervision surveys. This will ensure FCWS are moved a minimal distance from their capture site and still potentially within their home range. In some cases, FCWS relocation sites may be identified based on suitable habitat along the alignment and before the commencement of construction works so as to assist in the scheduling of construction resources. When this occurs, a relocation site will be selected using the following criteria:

- The area is adjacent to or comprises native grassland or woodland on public land;
- A relocation site must be as close as possible to the capture site;
- Sites must support suitable microhabitat of loose friable soil, with areas of leaf litter, mulch or dense vegetative groundcover which provides cover and foraging resources at least 100m² in area, and
- Relocation sites will be mapped and a GIS layer developed.

ii. Site Establishment

Establishing a FCWS relocation site will involve:

- Creating a minimum 100 m² relocation area at 200 m intervals (where possible);
- Installing hay bales (minimum one per 25m²) with each bale measuring approximately 1m x 0.4 x .46. Slashed vegetation and/or woody debris should also be used as an alternative;
- Erection of an exclusion fence (silt fence) along the CIZ boundary at the hub plus 10 m either side of the relocation hub where practicable. If this is not possible, it must be documented within the FCWS capture register (see Section 5.2.4).
- Appropriate signage and a high visibility boundary at every relocation site, where practicable.
- Relocation of up to 10 adults and 5 sub adult skinks per 100m².
- Sites that receive captured/relocated FCWS will be GPS and a register created as part of an environmental sensitive zone for ARTC operations.

5.2.6 Habitat Enhancement and Refuge Replacement

Two phases of habitat enhancement / refuge placement would be implemented during construction:

- Phase 1: temporary habitat enhancement comprising works undertaken during clearing and grubbing activities.

Its key objective is to enhance the retained habitat and assist in the relocation of FCWS captured during the clearing and topsoil stripping stage of works (Plate 5-5).

- Phase 2: permanent habitat enhancement with works scheduled to be undertaken during landscaping activities.

Its key objective is to encourage re-colonisation of the site and improve or at least restore areas impacted by construction for FCWS.

Phase 1 temporary habitat enhancement includes the placement of hay bales at 100 m intervals on land within the construction boundary.

More permanent habitat enhancement in Phase 2 will include the placement of coarse woody debris (e.g. logs, sleepers, or mulched woody vegetation piles) within the construction boundary. Where available, woody debris will be placed in a manner that is reflective of the pre-construction landscape. As an example, at Yallaroi Creek (CH740.59), woody debris were placed at an average rate of one piece per 10m², whereas in open areas where no vegetation was removed, no woody debris were placed.



Plate 5-5. Temporary habitat enhancement works in Stage 3 using timber and hay biscuits to increase ground cover for relocated FCWS.

5.2.7 Unexpected Five-clawed Worm Skink Finds Procedure

An Unexpected Threatened Species Find Protocol is outlined in Appendix G of the Construction BMP (Appendix E). In addition, an unexpected finds procedure has been developed to manage instances where FCWS may be detected during pre-clearing surveys, clearing operations or at any other time throughout construction outside of the following:

- Stage 1: All of Stage 1, including Chainage 603.000 to 625.000 identified through DAWE predictive modelling,
- Stage 2B: Chainage 641.08 – 647.00 following finds and extrapolating likely habitat and
- Stage 3: Chainage 735.000 to 754.250 following finds and extrapolating likely habitat.

In an unexpected finds instance, the management strategies outlined in this plan will be adopted for up to 500m on either side of the capture and include:

- Additional pre-clearing and topsoil stripped surveys as deemed appropriate by the Project Ecologist;
- Relocation of individuals using the framework developed in this plan;
- Data capture of the individual and habitat data outlined in this plan;
- Updating of relocation sites, FCWS register, construction drawings and environmental control plans; and
- A periodic examination and review of the adequacy of the proposed mitigation measures proposed in consultation with DPE and DAWE.

5.2.8 Updates to this Plan

This plan should be updated in circumstances where new information necessitates such an update is required in consultation with the relevant departments (i.e. DPE; DAWE). For example, once all the monitoring sites have been finalised for the trial survey (see Section 6.0).

6.0 FIVE-CLAWED WORM SKINK MONITORING PROGRAM

The following FCWS monitoring program has taken into account the principals outlined in the NSW Office of Environment and Heritage publication *Saving our Species Monitoring, Evaluation and Reporting: Guidelines for conservation projects* (OEH 2018).

Monitoring the response of FCWS populations to management actions on the N2NS project such as pre-clearing surveys, habitat augmentation and skink relocations is crucially important for assessing the overall effectiveness. For rare cryptic species like the FCWS, obtaining estimates of absolute abundance would be time consuming, labour intensive and disappointingly imprecise. When estimates of absolute abundance are not necessary in order to track changes over time or responses to management interventions, then a relatively simple and efficient method involving the collection of presence–absence data can be used (MacKenzie *et al.* 2006). This entails surveying the area of interest and noting whether the target species is present (Peres-Neto *et al.* 2001).

The FCWS was found during construction of the project and reported as an unexpected find. With this in mind, a survey design such as the Before-After-Control-Impact (BACI) survey design cannot be performed, simply because no data is available before the impact occurred, and finds are happening during the construction or impact phase of the project. With this in mind, it is possible to develop a more simplified design that monitors an impact site against an adjacent reference site provided they can have sufficient physical separation to enable independence.

A key consideration in this monitoring program is the fact that habitat is being removed or disturbed and that displaced FCWS are being captured via a series of management actions and relocated to nearby sites. Accordingly, relocation sites will need to be treated as an impact site to assess whether the species persists within the rail corridor. Relocation sites will need to have received at least one FCWS to be considered suitable and these have been referred to as relocation hubs. Disturbance impact sites located within the construction disturbance footprint will also be monitored to assess whether the species may recolonise areas disturbed during construction works. These disturbance impact sites will be established in areas where FCWS were encountered during ground disturbing construction works. They will be located in close proximity to relocation sites, and for the purposes of any statistical analysis may be treated as one site. An adjacent reference site will need to be located an appropriate distance away from these impact sites such that the data (i.e. resident skink population) can be considered independent, that is individuals are not likely to inhabit both treatment sites. A minimum distance of 75 m has been assumed but this may need to be revised in Stage 3 of the project. Options to simply select more distant sites may be undertaken in instances where data independence assumptions cannot be met and the alternative reference site occurs in the same plant community and soil type.

6.1 Site Selection

Fifteen (15) relocation, 15 disturbance and 15 reference monitoring sites have been proposed and these have been summarised in Table 6-1 and their locations depicted in Appendix A. These sites comprise an 'impact site situated at a relocation hub that received relocated FCWS along with the management actions therein (i.e. hay bales, exclusion fencing)', an 'impact site' situated in the construction disturbance footprint where FCWS were encountered during ground disturbing works', and a 'reference' site located some distance away unaffected by the project. Where possible, reference sites have been located at least 200 m away and at times a number of kilometres from the impact site but within the same PCT and local area. The monitoring sites are summarised as:

- Seven sites in Stage 1 between The Clump Road (Ch.603430) to just north of Bellata (Ch.616.05);
- One site in Stage 2 between Waterloo Creek and Kanimbla Lane at Ch.629.55 and
- Seven sites in Stage 3 between Tumba Road (Ch.739.70) to Tackinbri Creek (Ch.744.00).

A map depicting their locations is provided in Appendix A.

Monitoring surveys will require a protection officer in accordance with ARTC's workplace health and safety requirements for on ground works within the rail corridor.

6.2 Sampling Design and Regime

Conventional survey methods comprising pitfall traps and active searches are likely to produce unreliable results for FCWS (Spark 2010; DAWE 2022). Meanwhile, the use of artificial refuges (ARs) are increasingly used to survey for this species (i.e. Spark 2010) and for other kinds of cryptic herpetofauna (Michael *et al.* 2012).

Given the above considerations, sampling will rely on the use of artificial refuges with a minimum distance between each shelter site of 5m taking into account that some sites in Section 3 around Croppa Creek are relatively small in area (i.e. 1000-2000m²). Each site would comprise the following:

- 5 rubber tiles made from industrial conveyor belt at least 5 mm in thickness (~1.5m L x 0.75 m W).
- 5 x 1m² carpet (similar type rather than a specific type or brand).

Note: Additional tiles or carpets may be installed at the discretion of the Project Ecologist where practical and where site features physically permit their installation.

This approach would account for variation in both ambient temperature and moisture availability. For example, cooler weather conditions may result in increased captures beneath tiles whilst sampling during hot weather may result in increased detection beneath carpet. This will avoid confounding sampling situations such as surveying during unsuitable weather.

Artificial refuge sites would be installed 12 weeks ahead of scheduled monitoring. Monitoring will generally be performed in early autumn (i.e. March-mid April) and late spring (i.e. mid October-November), however may be carried outside of these periods where favourable seasonal conditions permit. This time period has been selected to compensate for the

variability in ambient temperature whilst accounting for periods of rainfall based on the long-term climatic averages for Moree (BoM 2022). Surveying at this time of the year should also alleviate concerns associated with excessive heat (>40 degrees Celsius) or it being too cold (<20 degrees Celsius), thereby increasing the likelihood of detection. In determining appropriate survey periods, consideration will also be given to factors such as preceding rainfall conditions and soil moisture levels. Soil moisture content is considered a key trigger for monitoring events.

The survey would require the surveyor (i.e. ecologist) to inspect each artificial site on one morning occasion (0630-1200hrs) and again on an afternoon occasion (1300-1930hrs) with two visits per sampling period. A third visit during the first survey may be considered appropriate based on the type of analysis proposed in Section 6.3.

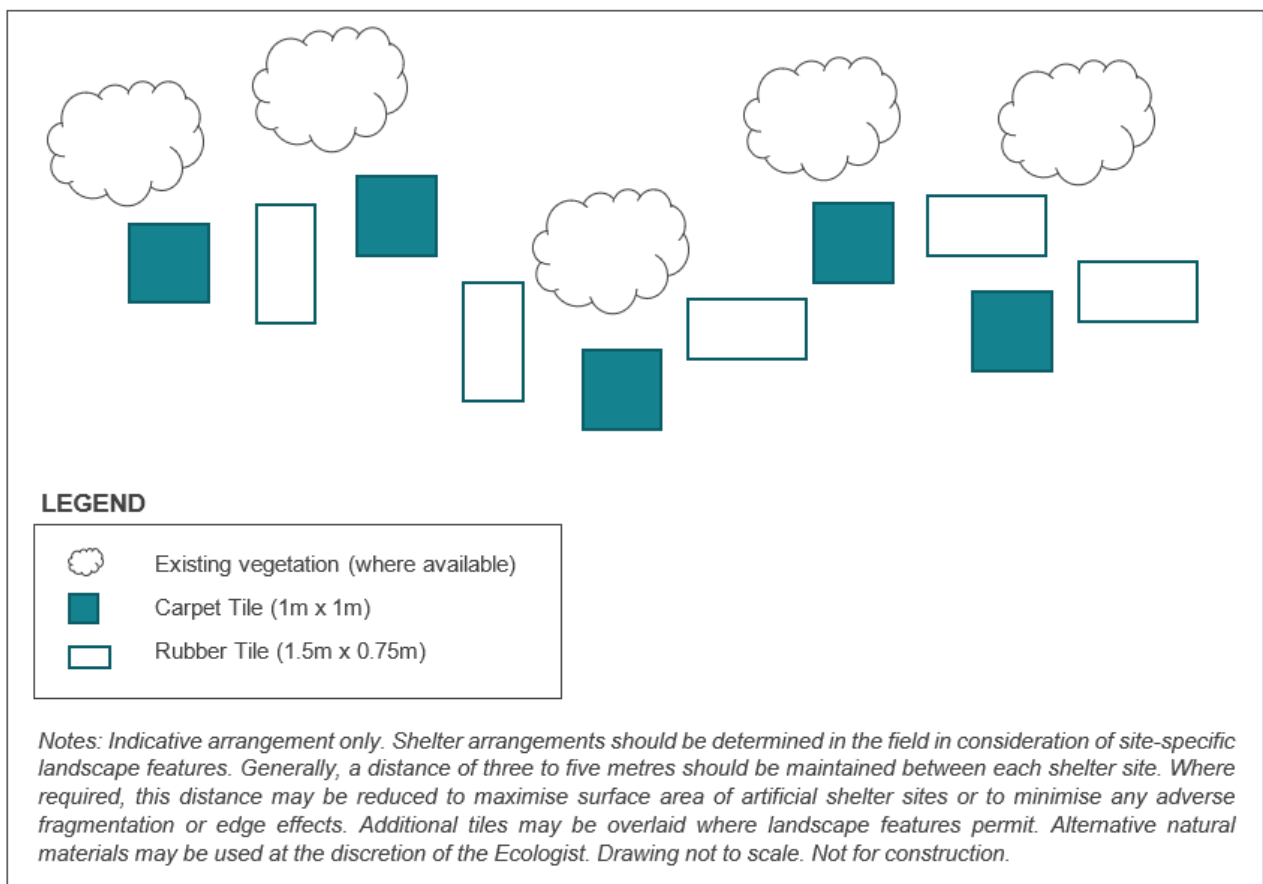


Figure 6-1. Generalised Shelter Site Arrangement

Table 6-1. Proposed FCWS monitoring sites for N2NS Section of the Inland Rail Project.

Site Number	N2NS Stage	Impact (A Sites) Relocation Hubs	PCT	No. FCWS Relocated	Impact (C Sites) Disturbance Footprint (to be ground truthed)	Reference (B Sites) Reference Site	Comments
1	1	Ch.603.43 E- 190434.81 N- 6673850.99 Relocation Hub 1-2	52/135	2	Ch. 603.02 E - 190382.54 N - 6673440.32	East of Newell Highway and south of Bulldog Creek in PCT52/135 E- 190520.79 N- 6674230.21	If the reference site becomes unsuitable, select site along The Clump Road. May require some landholder consultation to enable site installation and monitoring.
2	1	Ch. 609.30 E- 190395.54 N- 6679502.78 Relocation Hub S1-23	56	1	Ch. 609.34 E - 190401.37 N - 6679451.23	10 Mile Lane Road Reserve where it bisects Ten Mile Creek with PCT 56. E- 186326.23 N- 6672657.63	May require some consultation with adjacent land owners to advise of the field activities.
3	1	Ch.609.73 E- 190419.69 N- 6680140.98 Relocation Hub 1-24	52	1	Ch. 609.75 E - 190386.49 N - 6680162.92	Valorban Lane east of Newell Highway in PCT52 E- 190746.97 N- 6679919.52	Approximate location provided here. Site establishment in road reserve in most suitable PCT52 in the first 2 km of Valorban Lane. e.g. E- 190841.66 N- 6680064.25
4	1	Ch.612.60 E- 190283.30 N- 6682895.39 Relocation Hub 1-35	52	1	Ch. 612.63 E - 190257.62 N - 6682971.59	East side of Newell Highway with PCT 52 in the vicinity of: E-190331.51 N-6682891.81	Site establishment to occur within 500m of supplied coordinates depending on suitability of PCT52.
5	1	Ch.613.48 E- 190159.83 N - 6683903.58 Relocation Hub S1-39	52	1	Ch. 613.45 E - 190201.42 N - 6683823.83	East side of Newell Highway with PCT 52 in the vicinity of: E-190331.51 N-6682891.81	Site establishment to occur within 500m of supplied coordinates depending on suitability of PCT52.

Site Number	N2NS Stage	Impact (A Sites) Relocation Hubs	PCT	No. FCWS Relocated	Impact (C Sites) Disturbance Footprint (to be ground truthed)	Reference (B Sites) Reference Site	Comments
6	1	Ch.615.15 in Exotic Grassland E- 190061.26 N- 6685461.04 Relocation Hub S1-44	EG	9	Ch.615.10 E - 190150.29 N - 6685341.72	~800m along Millie Road on southern side at approximate: E- 189351.75 N- 6686259.34	Ensure site features are similar in terms of Rhodes, Johnson & Foxtail Grass otherwise amend reference site to ensure similar soil and exotic grassland.
7	1	Ch.616.05 E-190027.49 N- 6686999.94 Relocation Hub S1-45	52	6	Ch. 616.07 E - 190050.02 N - 6687064.81	2 km along Berrigal Road and locate most suitable PCT52 to establish site around: E- 192195.23 N- 6685837.39	Ensure site is located in the same PCT. Field data also shows some integration with PCT27 Weeping Myall so some tolerance given towards reference site including this.
8	2	Ch.629.55 E- 189884.46 N- 6699939.02	56	8	Ch. 629.58 E - 189840.88 N - 6699818.47	West side of Newell Highway in PCT 56 E- 189693.14 N- 6699779.47	Ensure same PCT is selected. Coordinates provided are indicative only. No relocation hub used at the impact site.
9	3	Ch.739.70 (Tumba Road) E-237731.33 N-6780796.30 Relocation Hub 1	27,52	13	Ch. 739.58 E - 237822.15 N - 6780847.26	1.5 km west along Tumba Road from impact site within road reserve. E-236270.73 N-6781010.10	May need to liaise with landholder as to the proposed activities. Exact location to match either PCT 27 or 52.
10	3	Ch.740.30 West (between Tumba Road and Yallaroi Creek) E-237879.30	27	13	Ch. 740. 27 E - 237887.40 N - 6781310.28	200 m east of the impact site on eastern side of rail line on Myala Feedlot land in PCT 27. E- 238037.90	Select an area of PCT 27 that best matches the impact site. Obtain permission from Myola Feedlot management to access land.

Site Number	N2NS Stage	Impact (A Sites) Relocation Hubs	PCT	No. FCWS Relocated	Impact (C Sites) Disturbance Footprint (to be ground truthed)	Reference (B Sites) Reference Site	Comments
		N-6781368.36 Relocation Hub 3				N- 6781427.62	If not suitable install site at the boundary of ARTC and private property.
11	3	Ch.740.59 Yallaroi Creek South E- 237974.02 N- 6781661.23 Relocation Hub 5	56	4	Ch. 740.54 E - 237942.70 N - 6781466.08	300 m to the west of impact site in PCT56. E- 237730.57 N- 6781746.16	If access cannot be arranged, alternative site on Croppa Creek Road where it cross Yallaroi Creek. Approximate coordinates: E- 242404.88 N- 6782582.22
12	3	Ch.740.72 Yallaroi Creek (north) E- 237983.54 N- 6781793.54 Relocation Hub 7	78	4	Ch. 740.75 E - 238089.94 N - 6781832.13	Yallaroi Creek (east of rail) E- 238136.27 N- 6781743.98	Access beneath rail bridge and select similar PCT78.
13	3	Ch.740.94 (East) E- 238216.55 N- 6781982.97 Relocation Hub 9	27	6	Ch. 741.05 E - 238265.36 N - 6782188.53	Croppa Creek Road in PCT27 E- 242375.85 N- 6782151.99	Locate PCT27 in vicinity of provided coordinates.
14	3	Ch.742.26 (East) E- 238703.91 N- 6783215.79 Relocation Hub 12	56	7	Ch. 742.70 E - 238717.86 N - 6783323.23	Boonery Park Road in PCT56 E- 239051.72 N- 6783646.57	Establish in road reserve.

Site Number	N2NS Stage	Impact (A Sites) Relocation Hubs	PCT	No. FCWS Relocated	Impact (C Sites) Disturbance Footprint (to be ground truthed)	Reference (B Sites) Reference Site	Comments
15	3	Ch.744.00 (East) E- 239340.34 N- 6784797.49 Relocation Hub 14	56	2	Ch. 743.95 E - 239269.83 N - 6784746.80	Eastern side of Croppa Creek Road in PCT56 E- 242706.56 N- 6784702.77	Fine tune site to align with PCT56 and similar habitat condition during site installation.

A number of other parameters will need to be collected at each site and survey. They include:

- Rainfall - raining, within past 7 days, greater than 7 days;
- Temperature – measured at the start of the survey with a portable thermometer;
- Habitat – impacted by construction or not impacted;
- Year – Sampling year;
- Season – autumn and spring, and
- Some micro habitat measurements estimated from a 5 x 5 m area:
 - Soil Cracks – extensive (evident in most nested 1m² quadrats), present (present within the 25m² quadrat) and absent;
 - Groundcover attributes - % log, % vegetative cover, % bare soil % litter. Again this is estimated using a rapid assessment approach.

The value to each of the above attributes or covariates in the overall monitoring program is tied to the statistical analysis used to measured occupancy and detectability between the two treatments discussed below.

6.3 Statistical Analysis

Occupancy models were developed to solve the problems created by imperfect detectability (MacKenzie *et al.* 2002, 2003, 2004). That is surveying for a species and not finding it at a site when it is in fact present, a common outcome for field biologists. This makes occupancy models particularly suitable for cryptic or rare species like the FCWS. Often it is impossible or simply not practicable to estimate abundance of rare species, but the estimation of occupancy for these species is still possible (MacKenzie *et al.* 2006).

Occupancy models use information from repeated surveys at each site to estimate detectability which is always a measure of <1. Detectability may vary with site characteristics (e.g. habitat variables) or survey characteristics (e.g. weather conditions), whereas occupancy relates only to site characteristics. The technique is very similar to estimating abundance from mark-recapture data but does not require any marking of animals which is applicable here as we focus on population persistence at the relocation hubs. Necessary information for occupancy models is simply a record of whether a species was detected or not detected during each survey of each site, often referred to as detection history which can be converted to mathematical statements.

There are a number of software packages available to assist in occupancy analysis. The software program PRESENCE was created exclusively for occupancy analysis and is available at <http://www.mbr-pwrc.usgs.gov/software.html>. Occupancy analysis has also been incorporated into MARK, which is available at <http://www.phidot.org/software/mark/>. Another is the statistical computing environment, R which is available at <https://www.r-project.org/> (R Core Team 2018).

A monitoring program of this nature will need to account for heterogeneity, or simply variation that can arise whilst field biologists perform their sampling. For example, the variation in detection probability caused by rainfall leading up to and during the survey can easily be incorporated to obtain unbiased estimates of occupancy using a model based approach. It is this model based approach that will assist in our understanding of impacts and management actions arising from the project.

The first year of monitoring should be a 'trial period' for the purpose of assessing sample design. This trial period would be analysed using single-season occupancy and consider methods such as artificial shelter type (the detection rate can be compared between the two), time of day (detection rate comparison) and sample size effect (to determine how many replicates (# sites plus # repeat visits) are needed in subsequent monitoring events). The advantage of treating the first season as a trial is the monitoring program will have a chance to optimise the survey design, thereby increasing cost efficiencies. Importantly, it will still be possible for the data from the trial to be used in the final analysis and thereby contribute to the overall monitoring program.

The advantage of implementing the FCWS monitoring program as a multi-season approach, in contrast to running single-season analysis each season, is that ARTC will become informed about population processes (colonisation/extinction) and test theories of population dynamics (equilibrium/non-equilibrium, random/Markovian). Markovian is where what occurs in period t influences what occurs in $t+1$, something that is quite plausible in ecology. Estimating occupancy tends to be more robust when population dynamics are included, especially when the monitoring program will extend over a number of years.

With occupancy modelling, covariates either influence occupancy, detection or in rarer cases, both. Variables such as habitat can influence both, but probably not in this case given the program proposes to use artificial refuges. Site level variables such as the extent of vegetative ground cover, litter cover, extent of cracking in the soils will influence occupancy. Variables that change frequently and are measured at the survey level, usually only influence detection rate. E.g. temperature, artificial shelter type, cloud cover, rainfall. In the event that environmental factors affect all sites equally, these should be estimated separately using a generalised linear model, plotting occupancy on the y-scale and rainfall on the x-scale. For example, no rainfall being recorded across the survey period.

As a guide, the following models should be considered for analysis that are influenced by population dynamics:

- Occupancy (1st time), Colonisation (.), Extinction (.) p (.);
- Occupancy (1st time), Colonisation (relocation), Extinction (relocation) p (.);
- Occupancy (1st time), Colonisation (relocation*year), Extinction (relocation*year) p (.);
- Occupancy (1st time), Colonisation (habitat), Extinction (habitat) p (.);
- Occupancy (1st time), Colonisation (year), Extinction (year) p (.);

- Occupancy (1st time), Colonisation (relocation*habitat), Extinction (relocation*habitat) p (.);

1st time = occupancy is only directly estimated for the first period and then is derived from colonisation and extinction estimates.

(.) = constant.

By using an appropriate model selection method (most likely Akaike information criterion - AIC), it will enable the monitoring program to find out if the parameters vary between the relocation site and the reference site. By measuring over years, you can find out the dynamics of this influence. For e.g. the FCWS may become gradually extinct Occupancy (relocation*year) from the relocation sites compared to reference sites. Again, a program like this benefits so much more when estimating over time and it is why sampling has been proposed over a number of years.

6.4 How Many Years to Monitor

The monitoring period should ideally commence in March of 2023 (Year 1) with this year being the trial period or trial study. The opportunity to commence monitoring earlier is constrained by construction in Stage 1 – Phase 1 coupled by the need to install artificial shelters for at least 12 weeks before the first survey commences. A minimum period of 12 weeks post release of any FCWS should also be considered to account for any short-term temporal affects.

The proposed FCWS monitoring schedule is set out in Table 6-2 below. Monitoring should continue until Year 4 (Trial in Year 1 and Refined Design for Years 2-4) when the overall effectiveness of the program and the management actions can be reviewed and assessed. It is intended that a minimum of five monitoring events be carried out under favourable conditions, as described at Section 6-2. Should unfavourable conditions persist within the scheduled monitoring period, monitoring actions may be suspended, and if necessary the monitoring schedule revised for years beyond 2026, to 2033.

Table 6-2. Proposed FCWS monitoring schedule for N2NS.

Year	Autumn*	Spring*	Output
2023	Survey 45 Sites (15 each treatment)	Survey 45 Sites (15 each treatment)	Survey Year 1 Report 'Trial Period'. Make key recommendations on future survey design informed by statistical analysis.
2024	TBA based on Year 1 Trial	TBA based on Year 1 Trial	Survey Year 2 Report Optimal Survey
2025	TBA based on Year 1 Trial	TBA based on Year 1 Trial	Survey Year 3 Report – Optimal Survey
2026	TBA based on Year 1 Trial	TBA based on Year 1 Trial	Survey Year 3 Report – Optimal Survey Key Outcome – Determine outcomes from the project in terms of quantifying and qualifying impacts to FCWS

* Monitoring events may be carried out outside of autumn / spring periods where favourable seasonal conditions permit.

7.0 INSPECTION AND MONITORING IN RELATION TO THE FCWS

Inspection, monitoring and surveillance regimes are detailed in the main CEMP document prepared by Trans4m Rail. The table below summarise important actions relevant to FCWS management.

Table 7-1. Environmental monitoring requirements relevant to FCWS management.

Inspection	Objectives	Responsibility	Output	Timing
Site Inspection	Review status of all controls and general environmental performance	Environmental Coordinator/s	Weekly Environmental Checklist	Weekly (and post rainfall events that trigger runoff)
Site Inspection	Observe general environmental performance	Environmental Manager/ Environmental Advisor	Correct any observed Non-Conformances as they arise	As required to coincide with inspections
Site surveys	Ensure surveys are being completed prior to and during the disturbance and removal of known and potential FCWS habitat and relocating individual FCWS in accordance with this plan	Project Ecologist	Daily pre-clearing checklist and post clearing report	Daily and at completion of construction activities that seek to disturb and remove known and potential FCWS habitat

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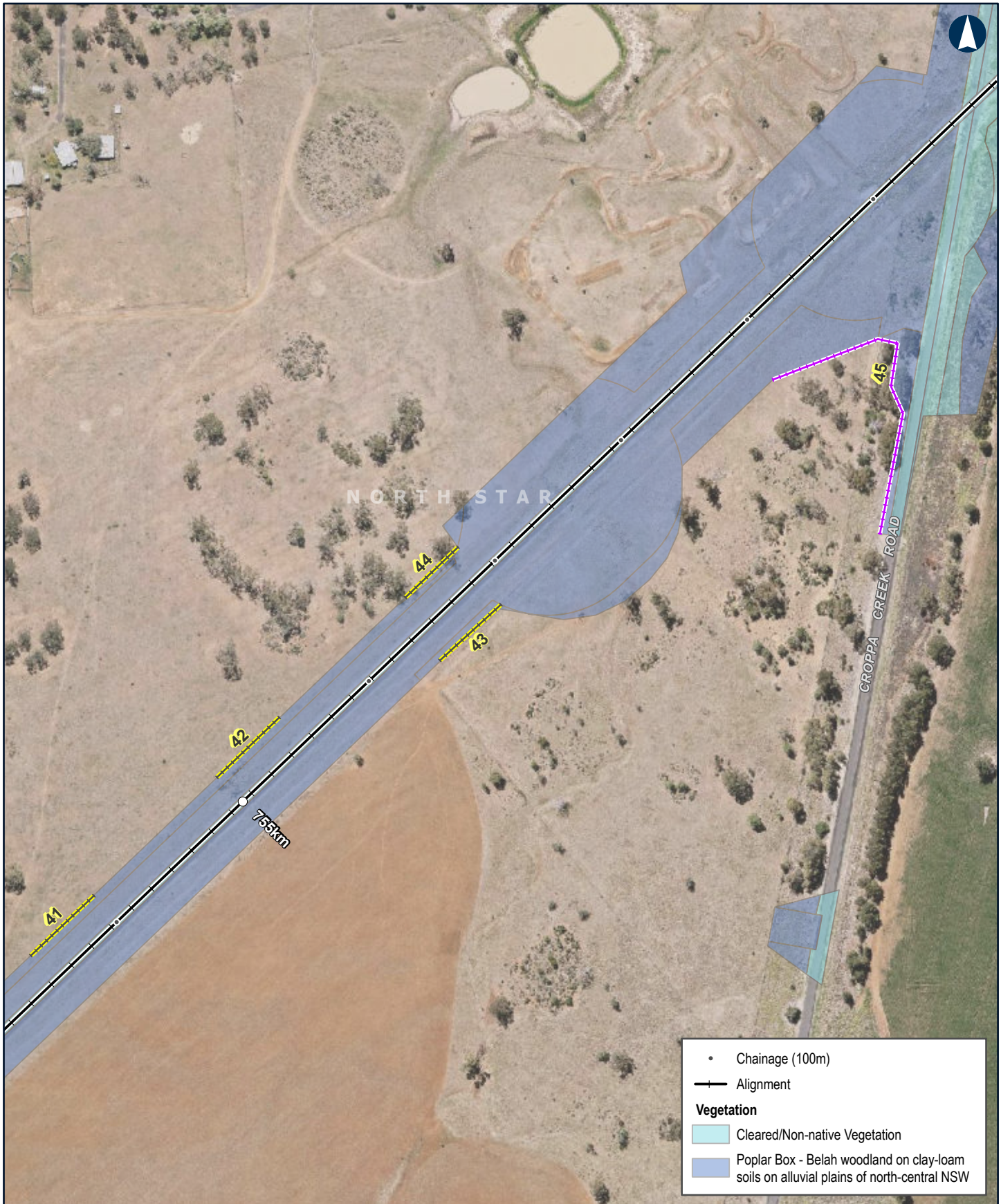
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9.0 APPENDIX A – FCWS MAPPING



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

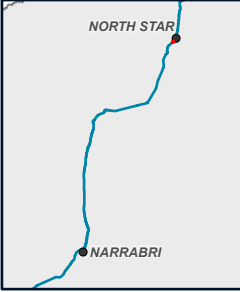
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 Approver: Jasmine Walden Rev: 1

- FCWS relocation hub (fenced)
- FCWS relocation hub (not fenced)



ARTC

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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

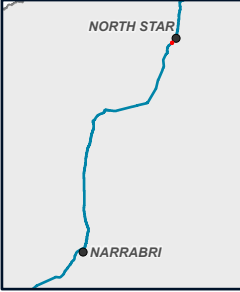
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 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



ARTC

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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Light Blue: Cleared/Non-native Vegetation
- Dark Blue: Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Green: Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

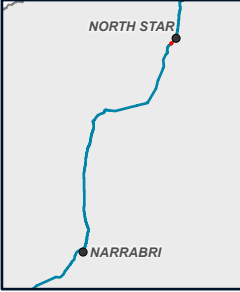
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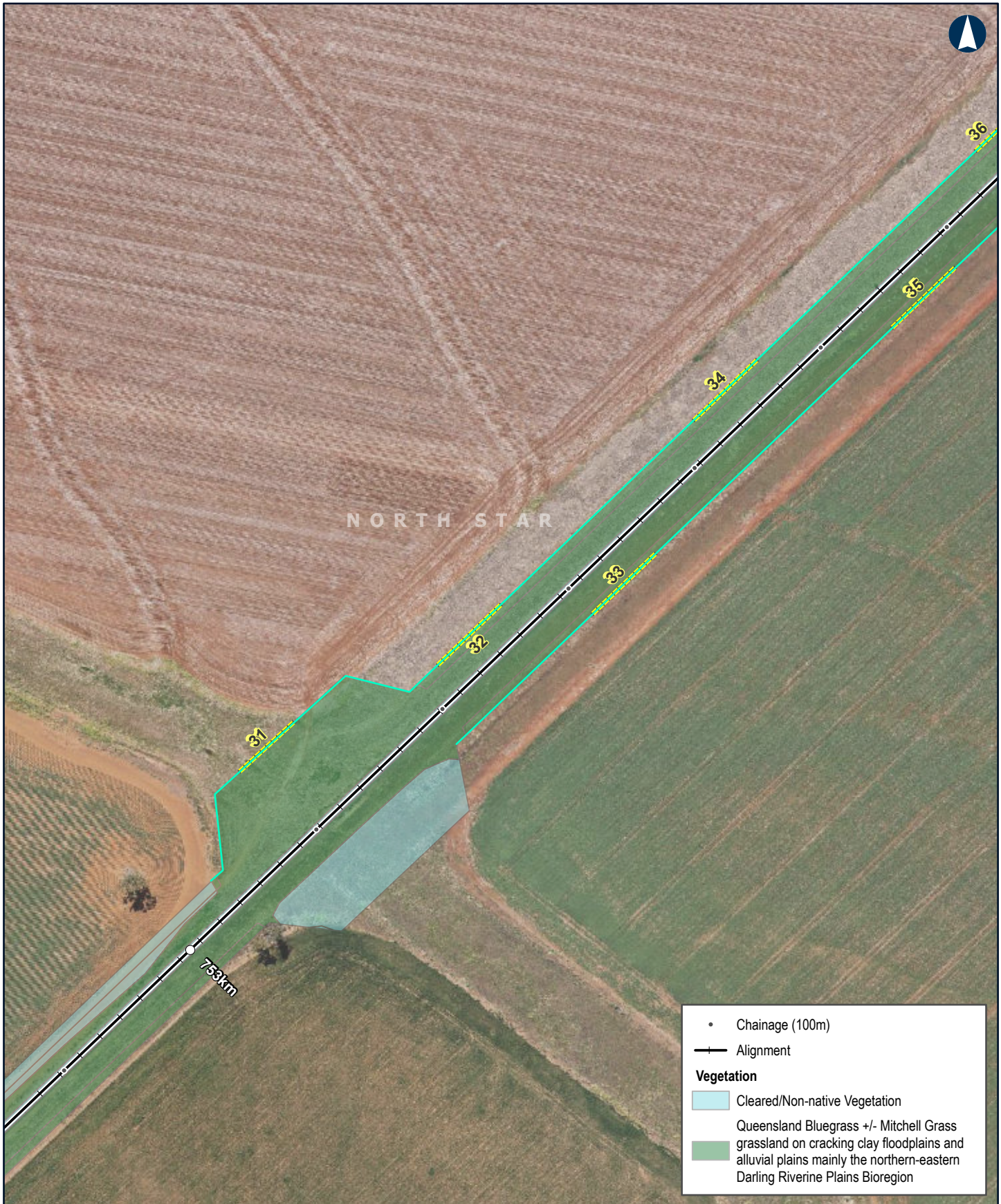
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Approver: Jasmine Walden Rev: 1

- Green line: FCWS - Habitat Enhancement
- Yellow dashed line: FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass
grassland on cracking clay floodplains and
alluvial plains mainly the northern-eastern
Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

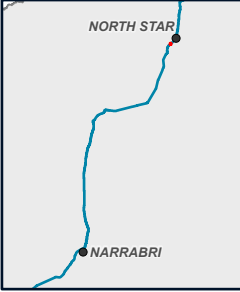
MAP 4 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)

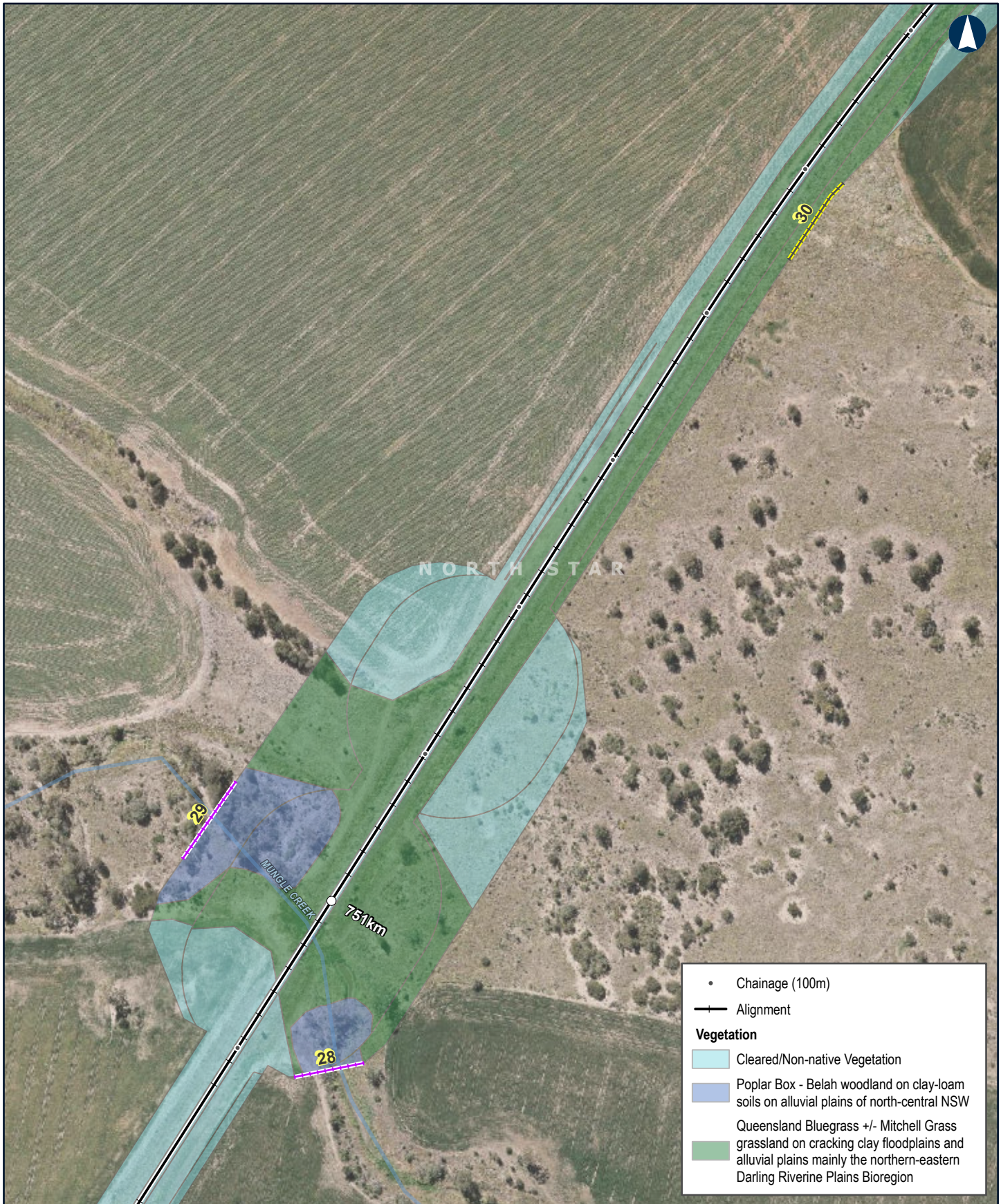


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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Light Blue: Cleared/Non-native Vegetation
- Dark Blue: Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Green: Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

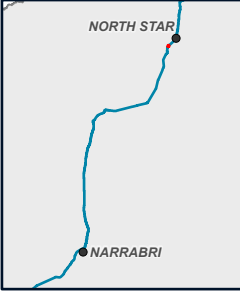
FCWS Interactions and Relocations

50 0 50
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

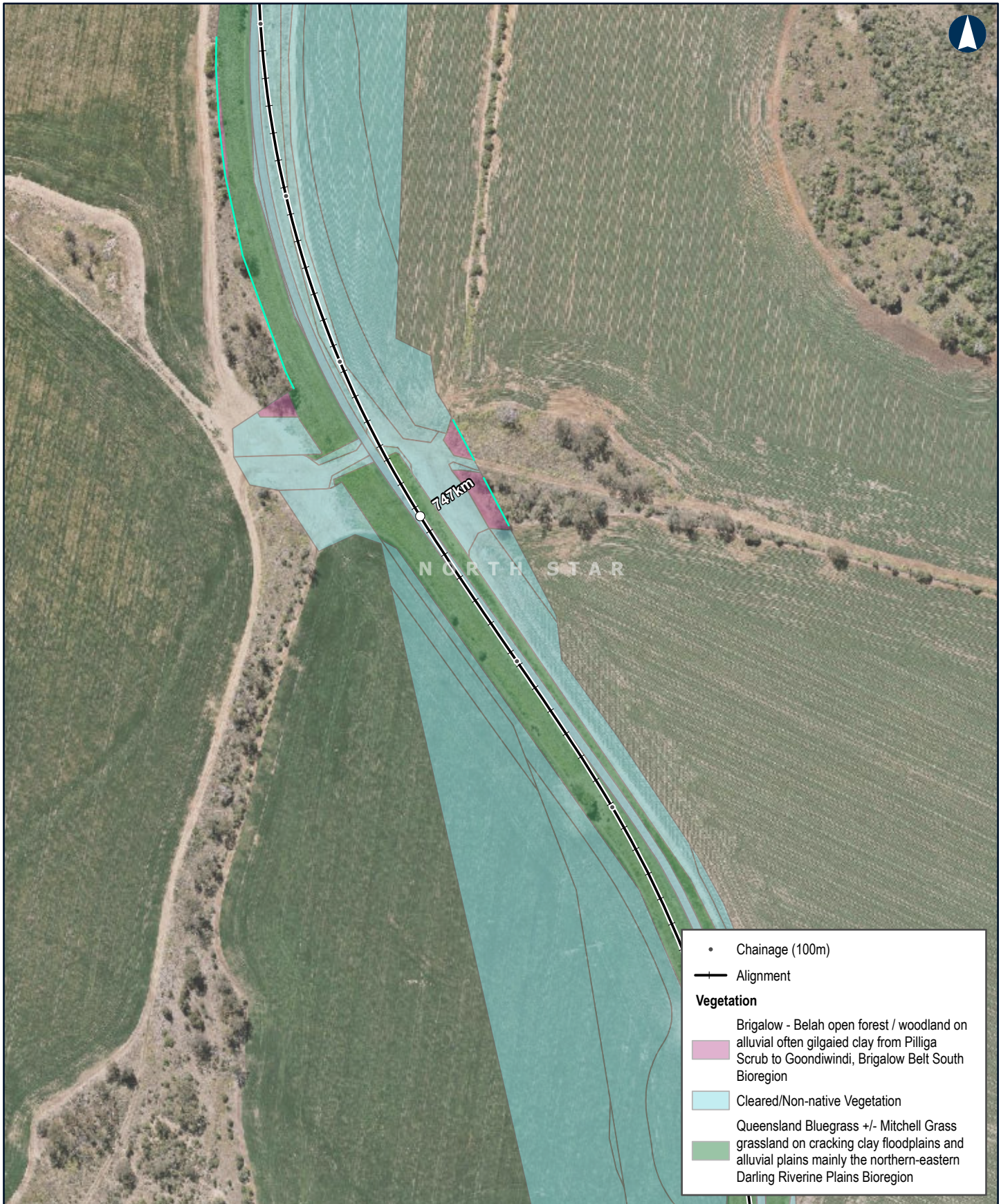
- FCWS relocation hub (fenced)
- FCWS relocation hub (not fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

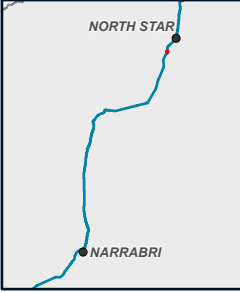
FCWS Interactions and Relocations

50 0 50
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

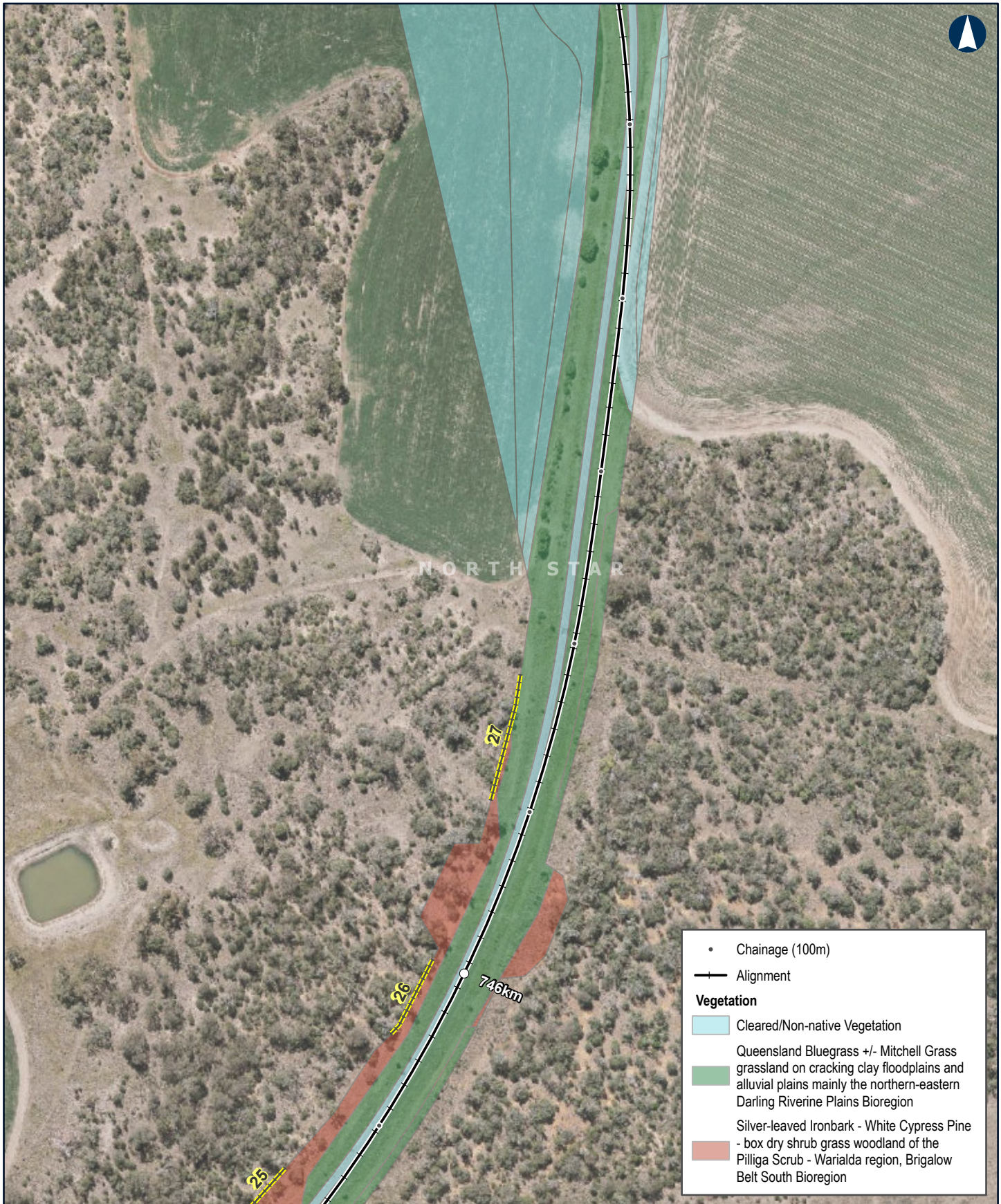
FCWS - Habitat Enhancement



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

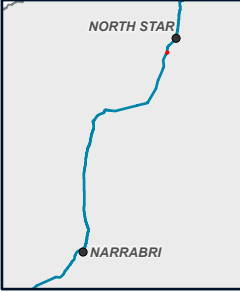
MAP 7 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

FCWS relocation hub (fenced)



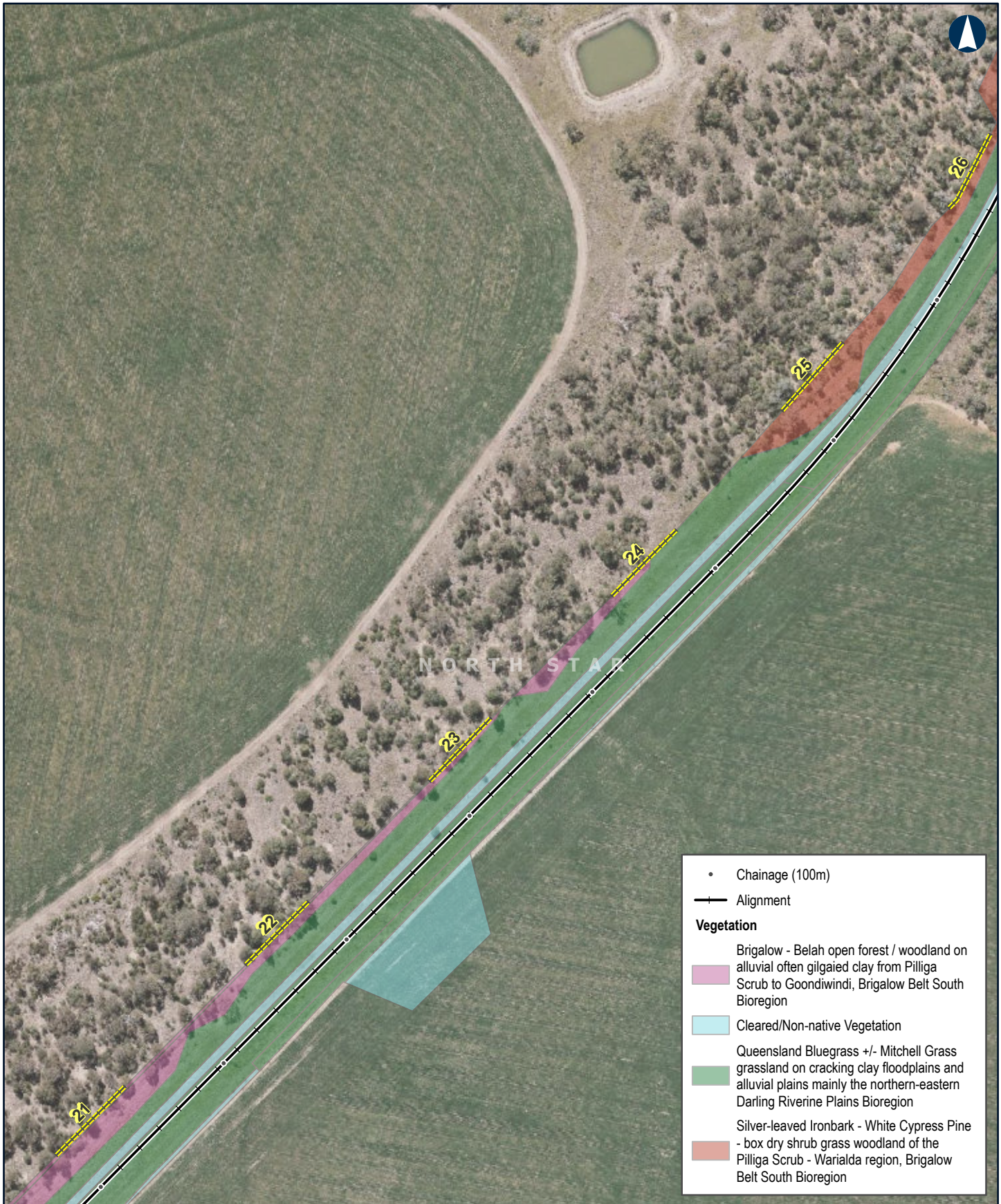
ARTC

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Data Sources: QSpatial, NSW Spatial Services



NARRABRI TO NORTH STAR

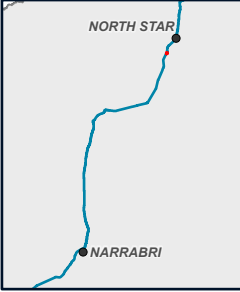
FCWS Interactions and Relocations

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

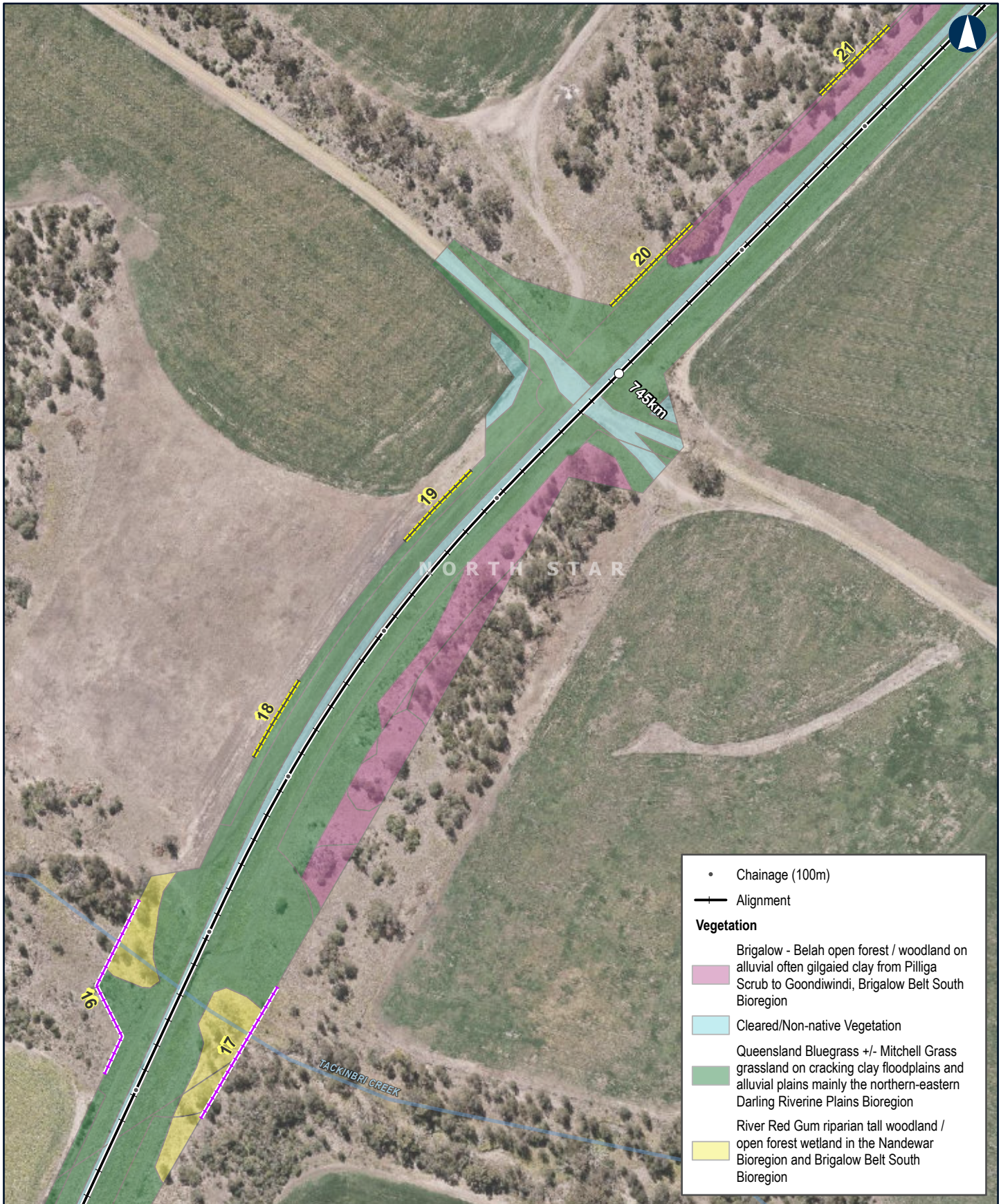
Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

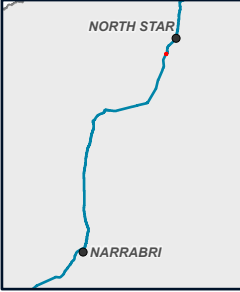
FCWS Interactions and Relocations

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Coordinate System: GDA 1994 MGA Zone 55

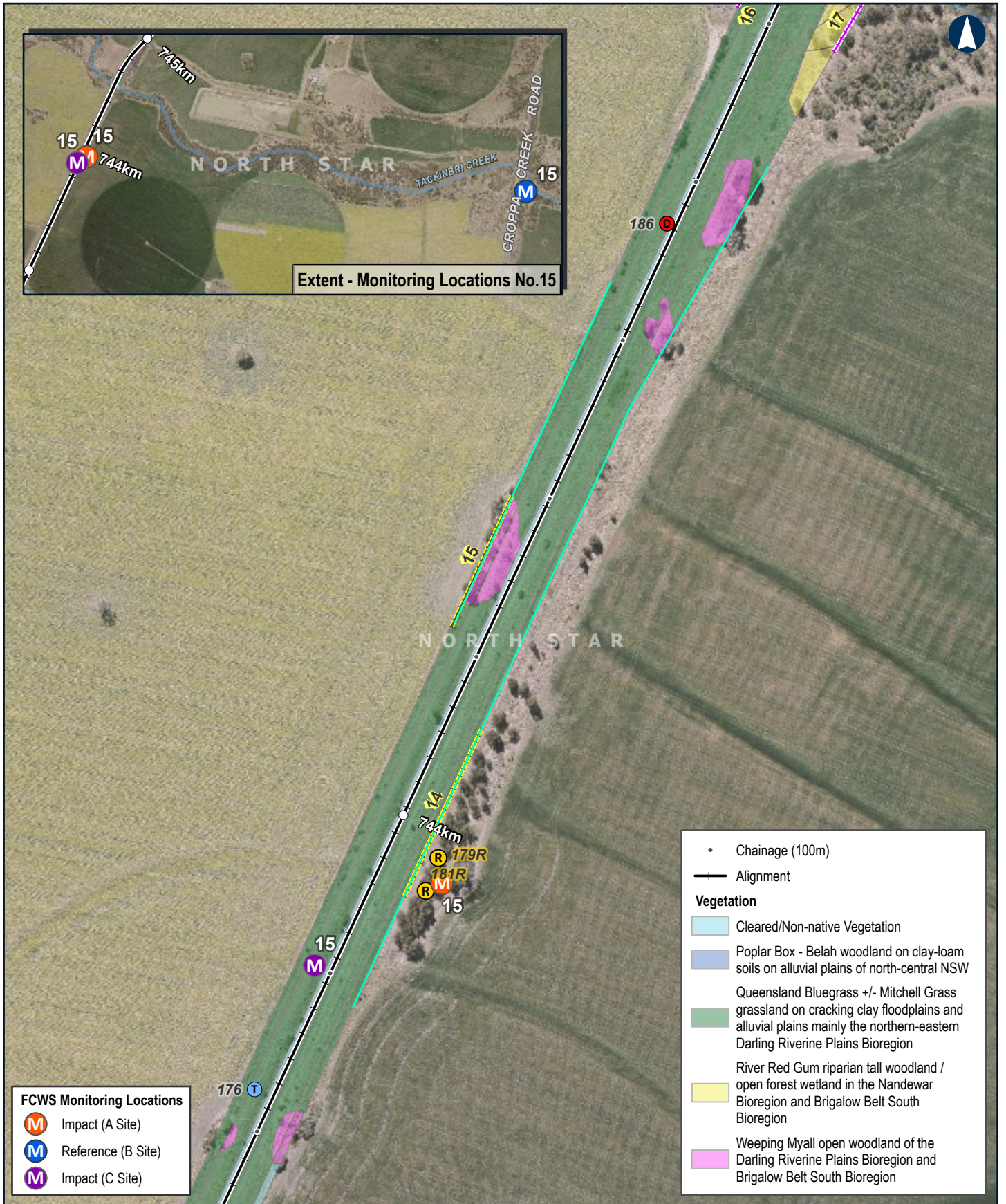
Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

— FCWS relocation hub (fenced)
— FCWS relocation hub (not fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

FCWS Monitoring Locations

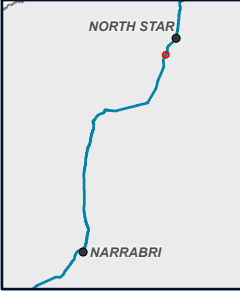
- (M) Impact (A Site)
- (M) Reference (B Site)
- (M) Impact (C Site)

NARRABRI TO NORTH STAR FCWS Interactions and Relocations MAP 10 OF 57

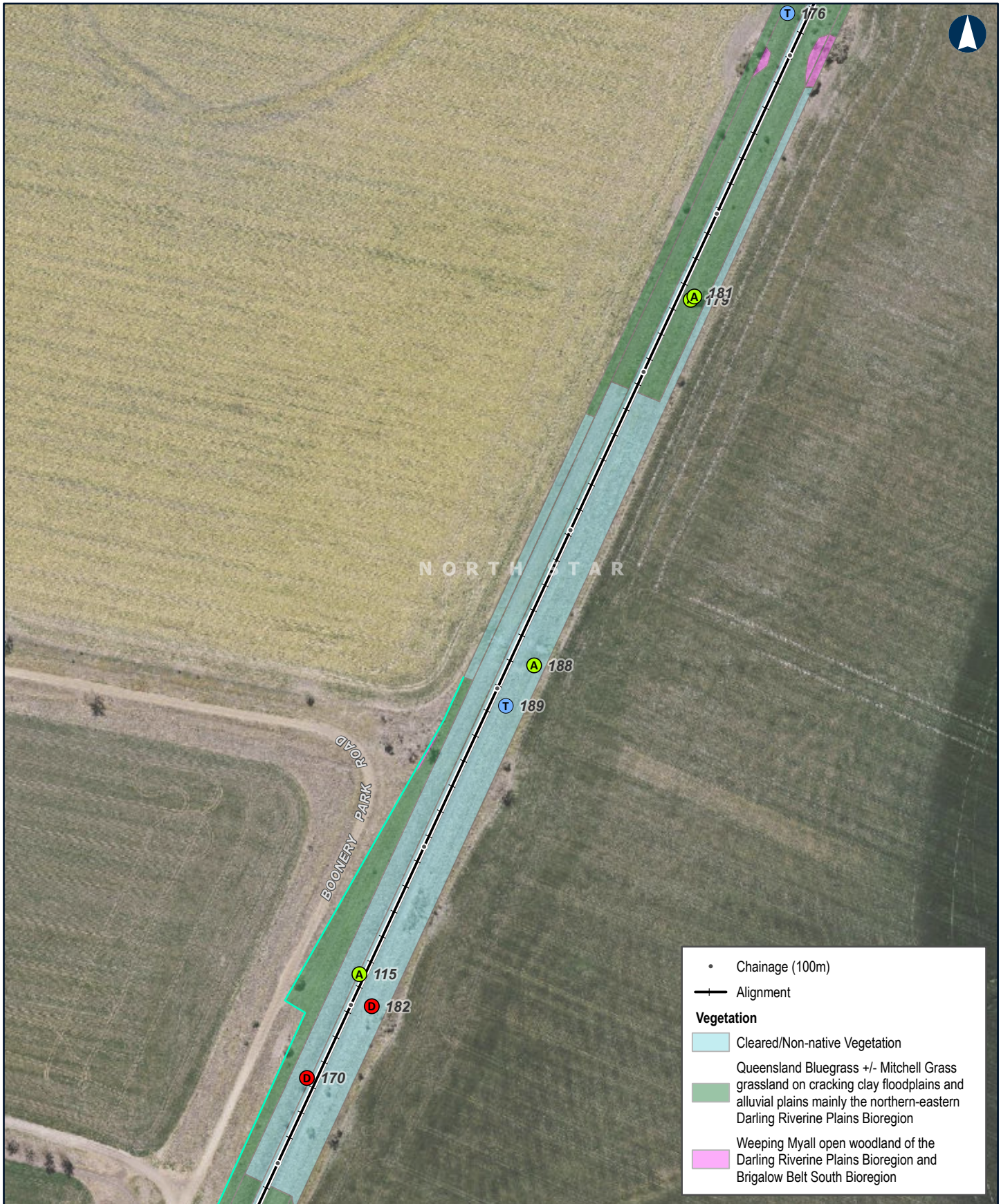
50 0 50 m
 Coordinate System: GDA 1994 MGA Zone 55
 Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: JW Rev: 1

FCWS - Condition

- (D) Deceased
- (T) Tail only
- (R) FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)
- FCWS relocation hub (not fenced)



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- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 11 OF 57

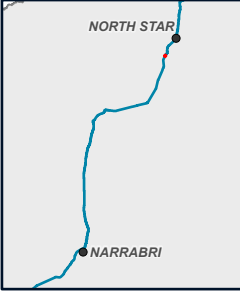
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

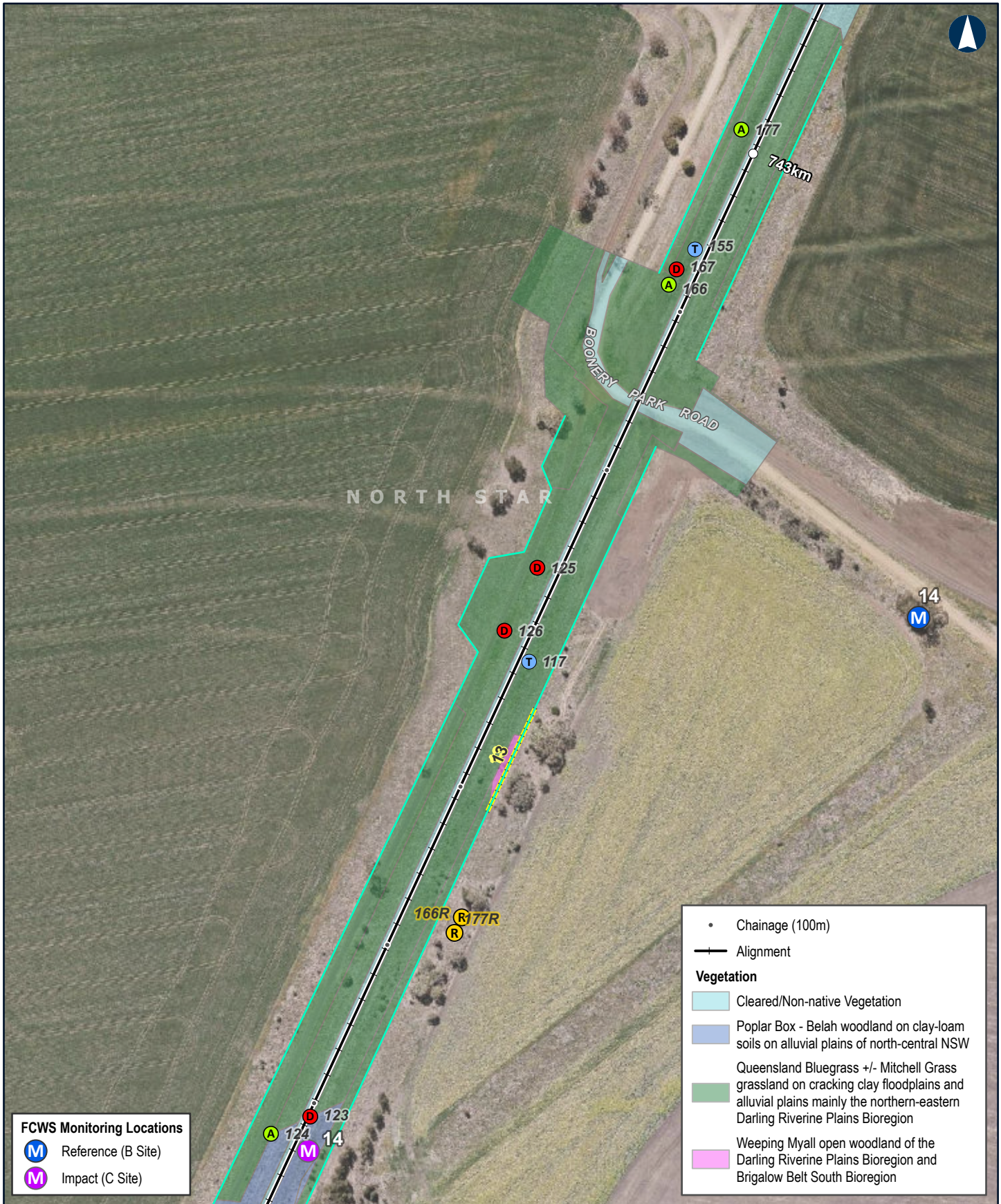
- (A) Alive
- (D) Deceased
- (T) Tail only
- FCWS - Habitat Enhancement



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Data Sources: QSpatial, NSW Spatial Services



FCWS Monitoring Locations

- M Reference (B Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

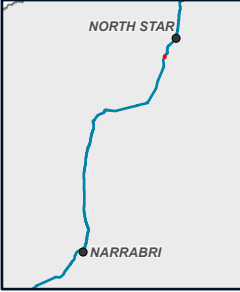
50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

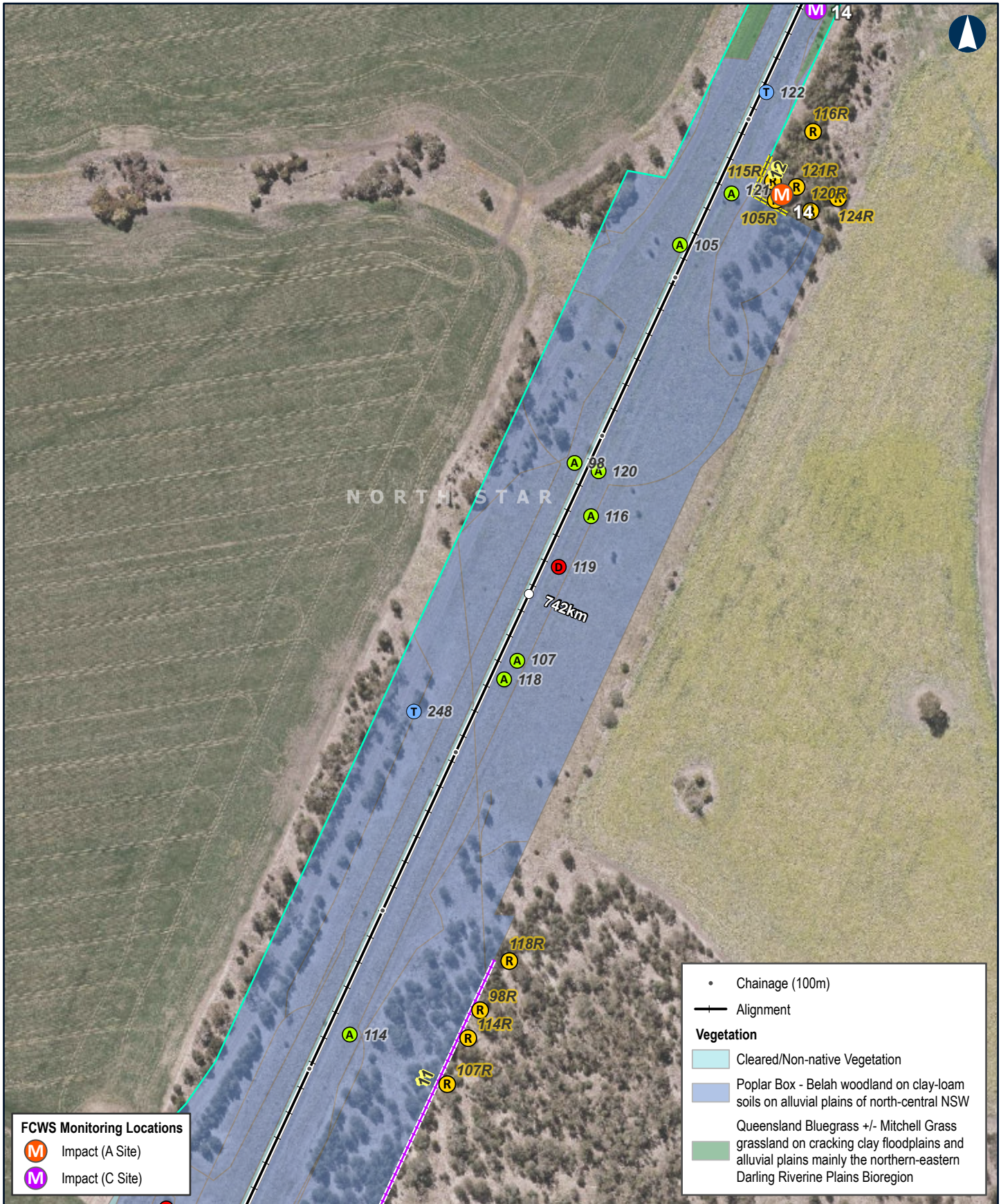
Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- D Deceased
- T Tail only
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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FCWS Monitoring Locations

- M Impact (A Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

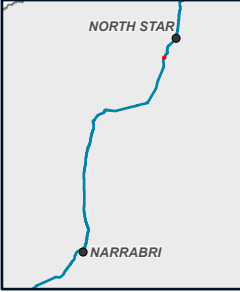
FCWS - Condition

- A Alive
- D Deceased
- T Tail only
- R FCWS - Relocations

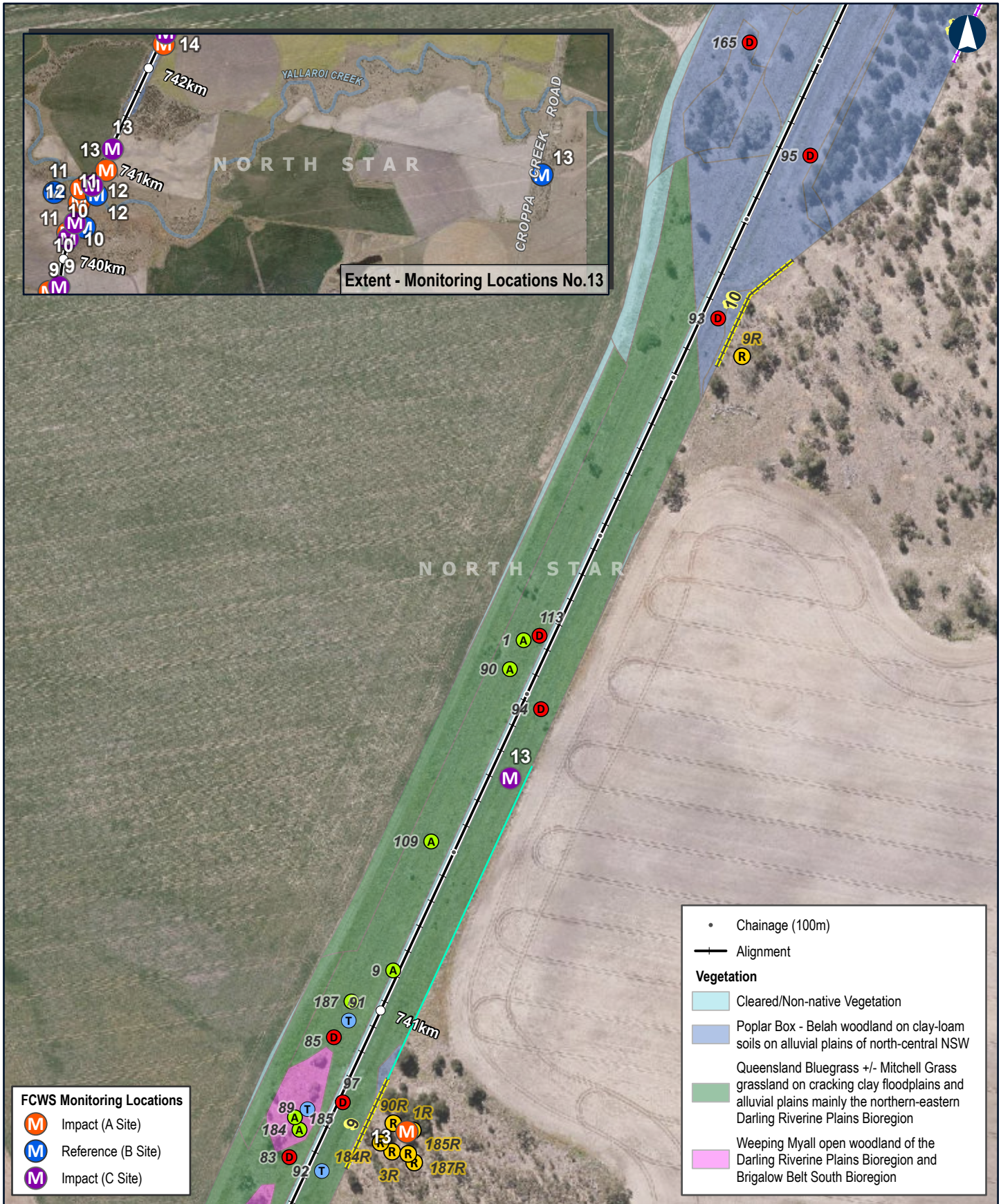
 FCWS - Habitat Enhancement

 FCWS relocation hub (fenced)

 FCWS relocation hub (not fenced)



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Extent - Monitoring Locations No.13

FCWS Monitoring Locations

- M Impact (A Site)
- M Reference (B Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

50 0 50
m

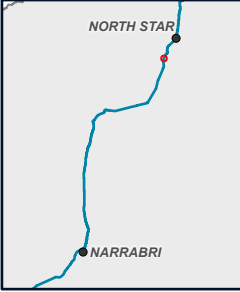
Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Grant Brown Rev: 1

FCWS - Condition

- A Alive
- D Deceased
- T Tail only
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)
- FCWS relocation hub (not fenced)

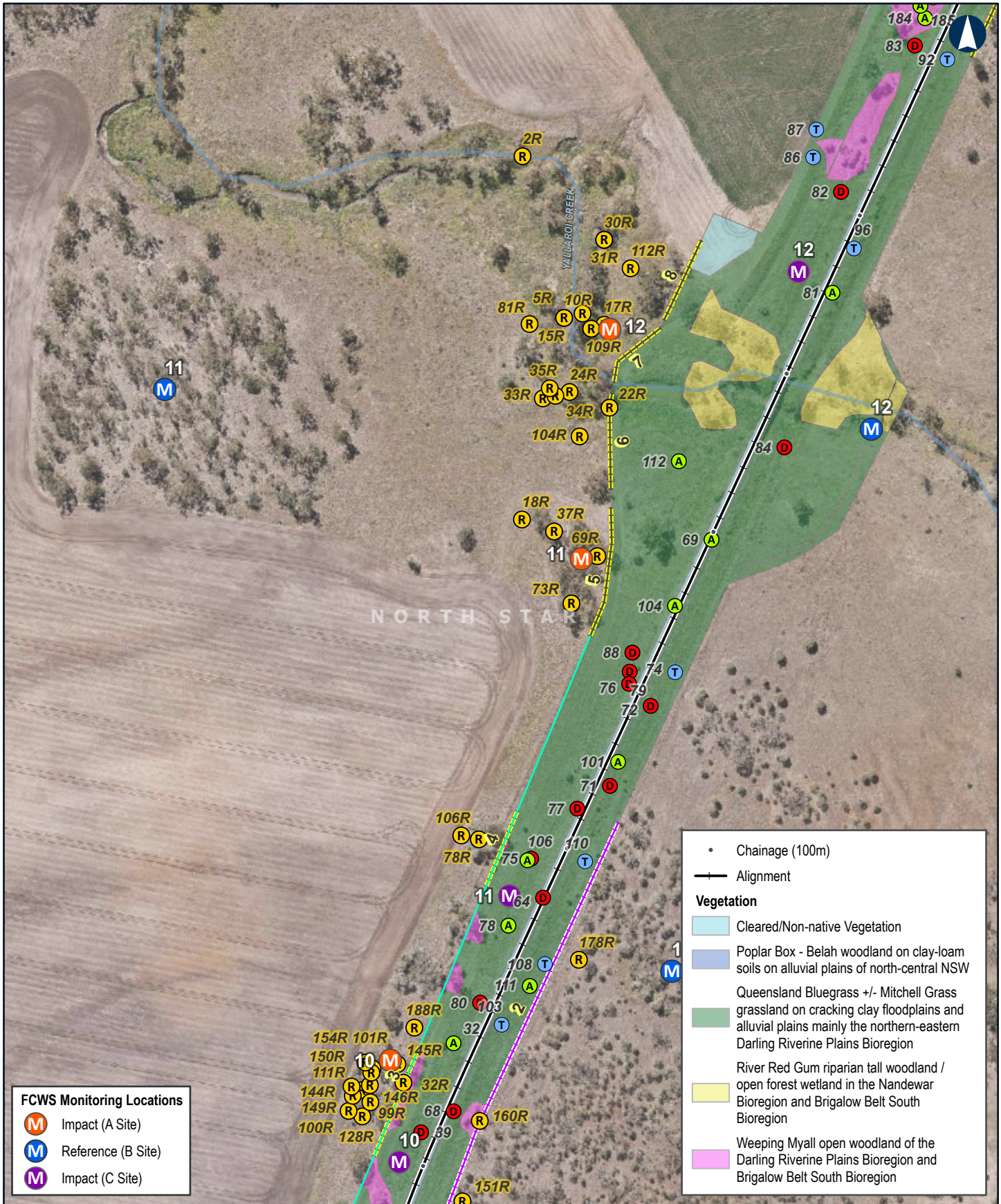
Data Sources: QSpatial, NSW Spatial Services



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Notes: Inset scale 1:50,000
Inset shows the extent of monitoring locations that are outside the scale of the main map

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FCWS Monitoring Locations

- M Impact (A Site)
- M Reference (B Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

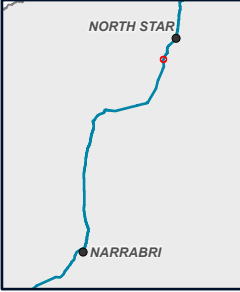
FCWS - Condition

- A Alive
- D Deceased
- T Tail only
- R FCWS - Relocations

— FCWS - Habitat Enhancement

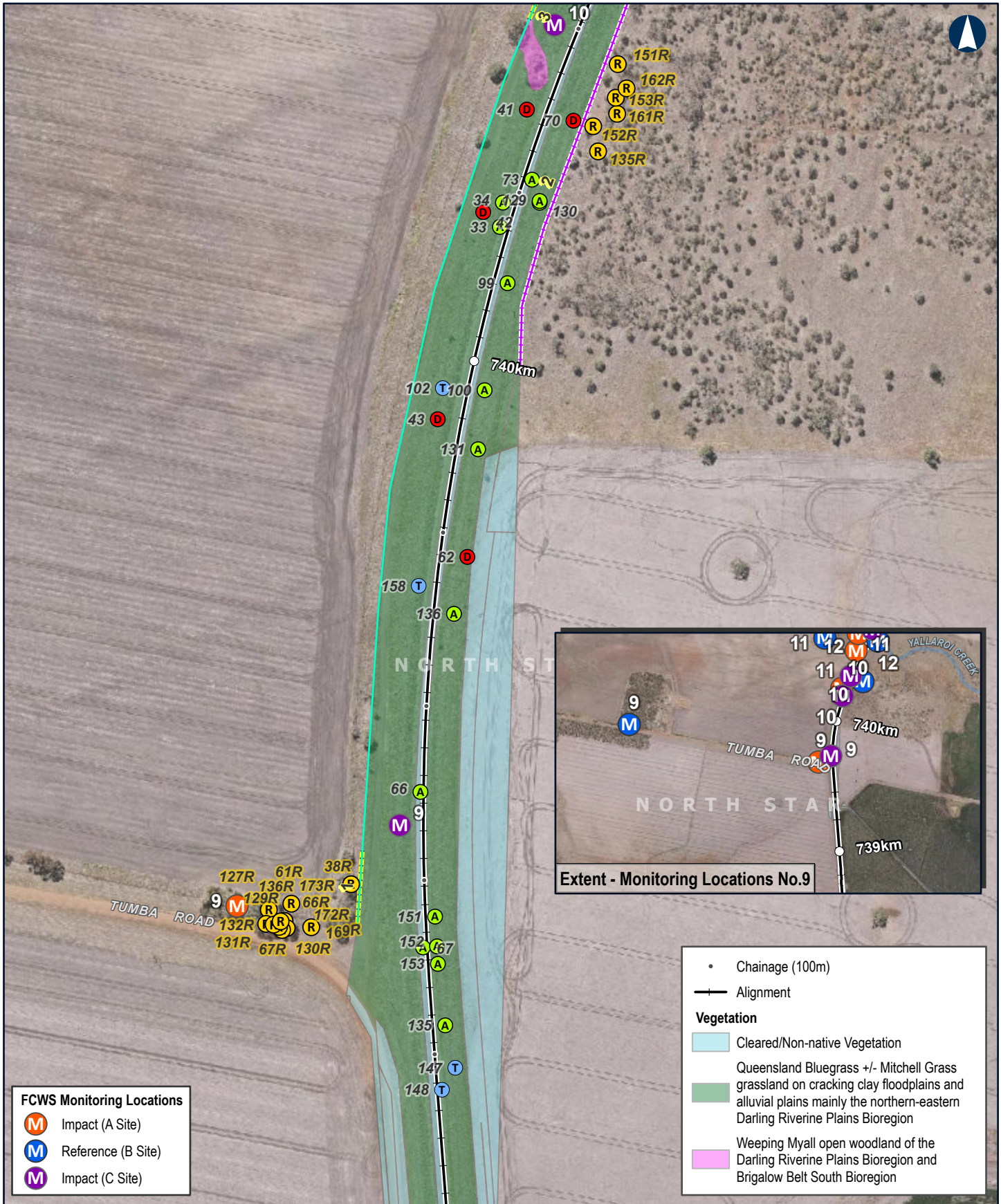
— FCWS relocation hub (fenced)

— FCWS relocation hub (not fenced)



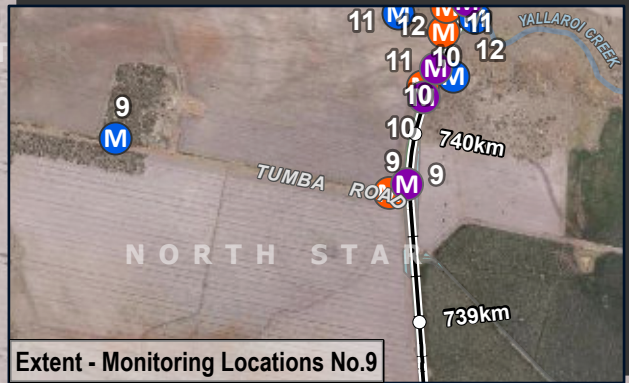
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FCWS Monitoring Locations

- M Impact (A Site)
- M Reference (B Site)
- M Impact (C Site)



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

50 0 50
m

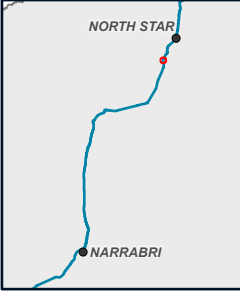
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Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

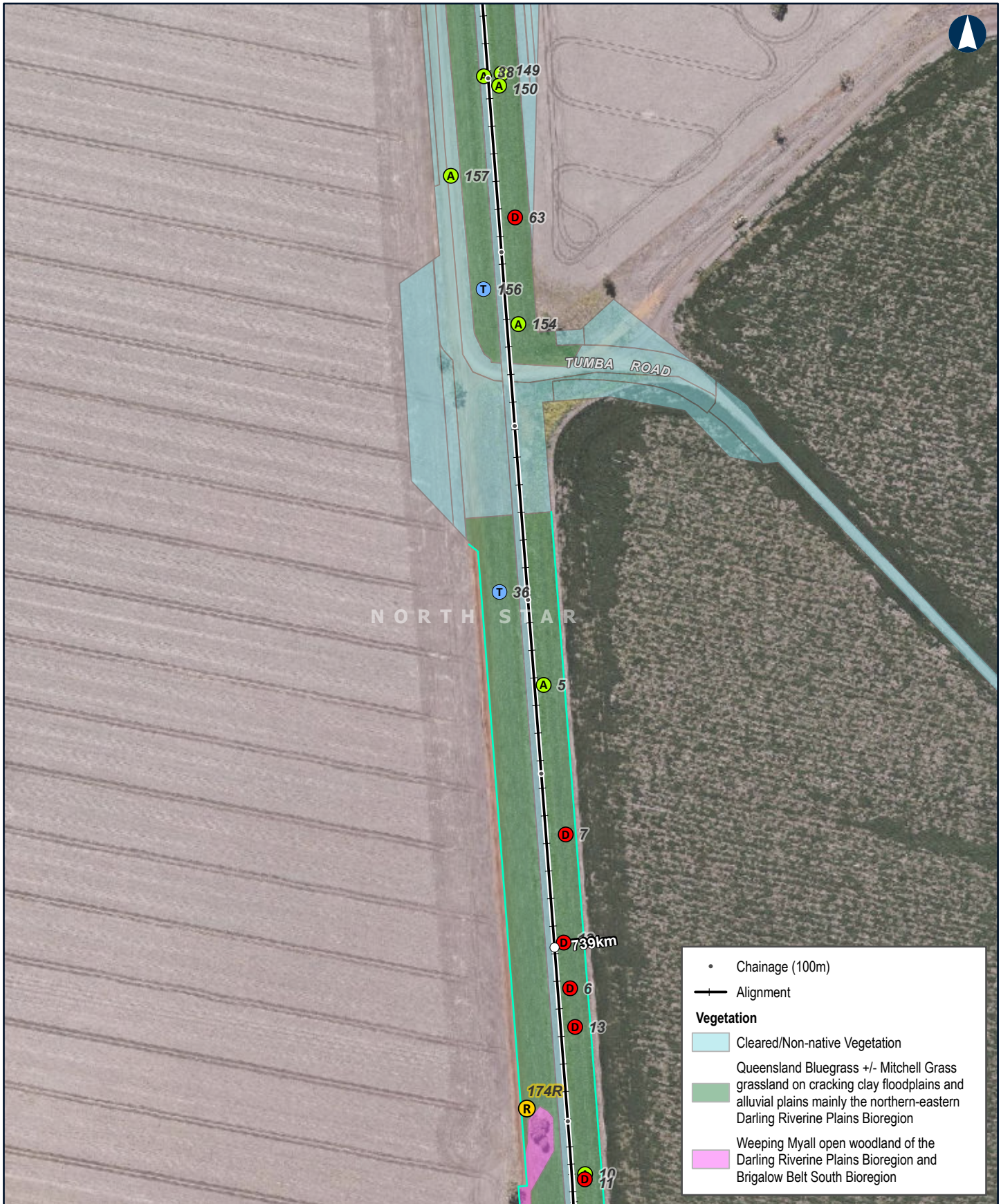
- A Alive
- D Deceased
- T Tail only
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)
- FCWS relocation hub (not fenced)

Data Sources: QSpatial, NSW Spatial Services



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- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

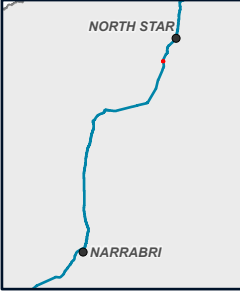
50 0 50
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- Alive
- Deceased
- Tail only
- FCWS - Relocations
- FCWS - Habitat Enhancement



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
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- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

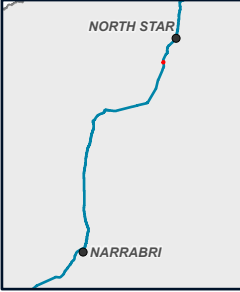
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

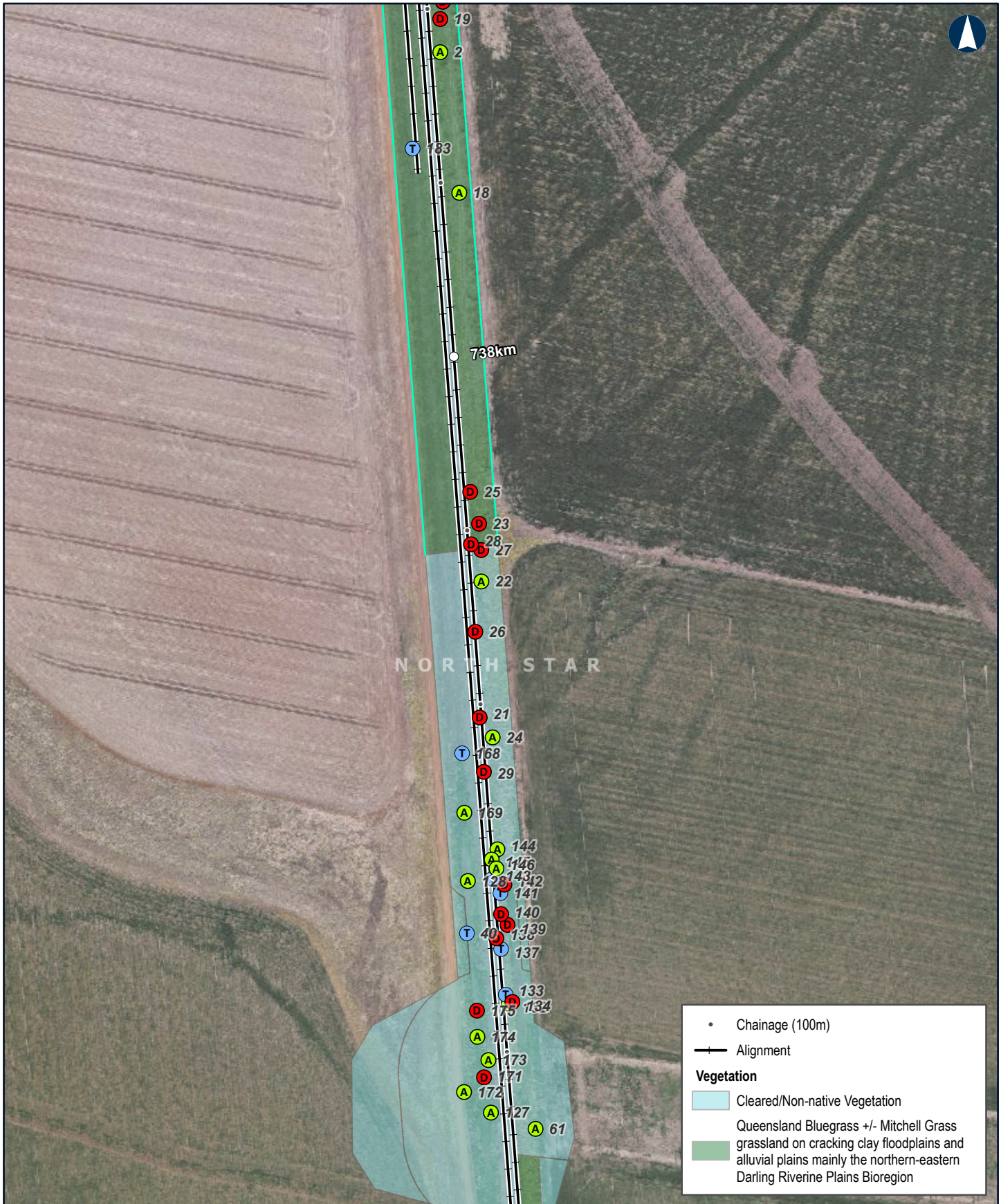
FCWS - Condition

- Ⓐ Alive
- Ⓓ Deceased
- Ⓙ Tail only
- FCWS - Habitat Enhancement



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- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass
grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

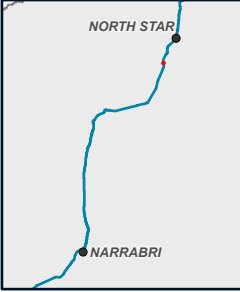
50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- D Deceased
- T Tail only
- FCWS - Habitat Enhancement



ARTC

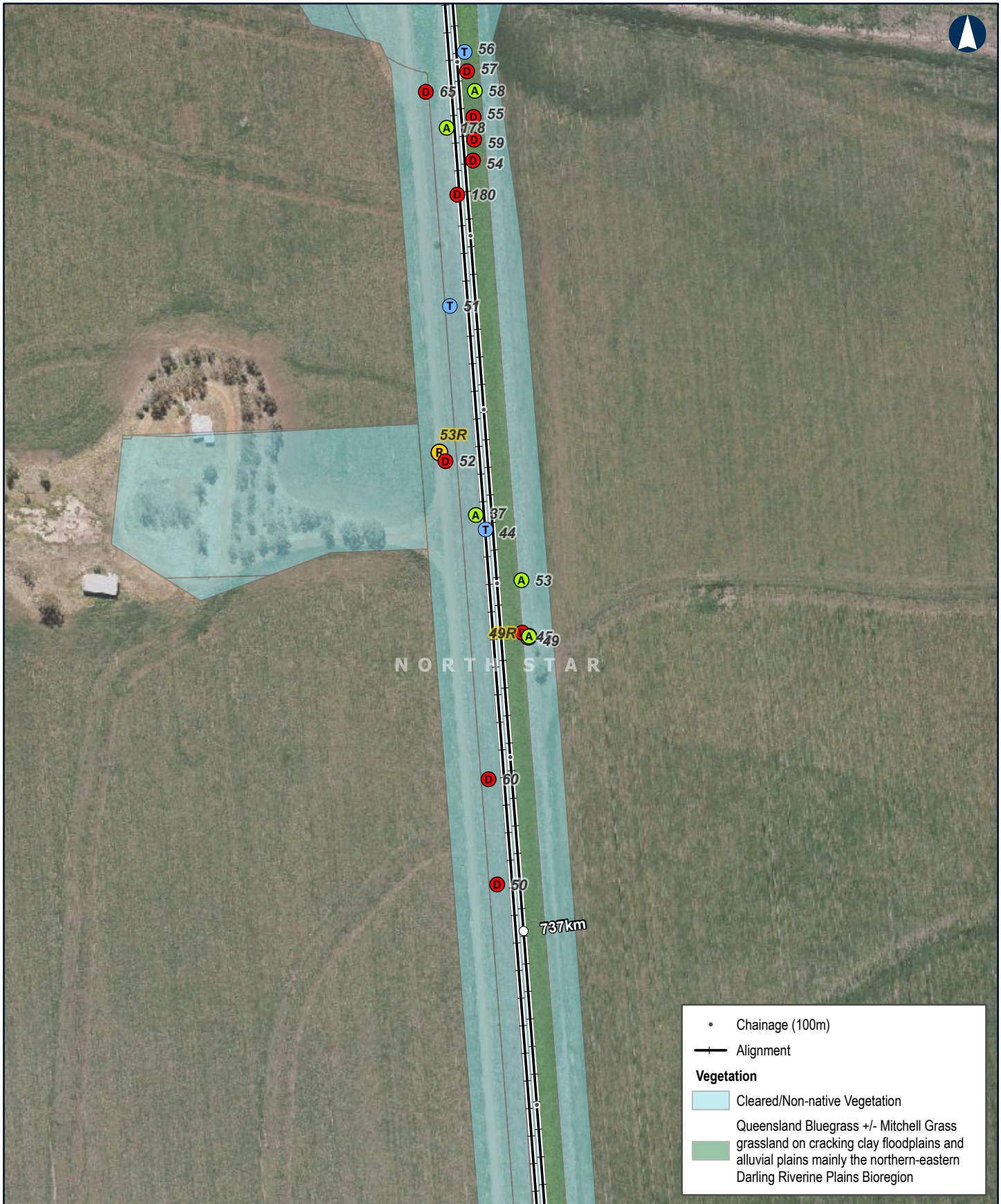
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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass
grassland on cracking clay floodplains and
alluvial plains mainly the northern-eastern
Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 20 OF 57

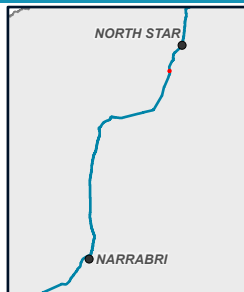
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m

Coordinate System: GDA 1994 MGA Zone 55

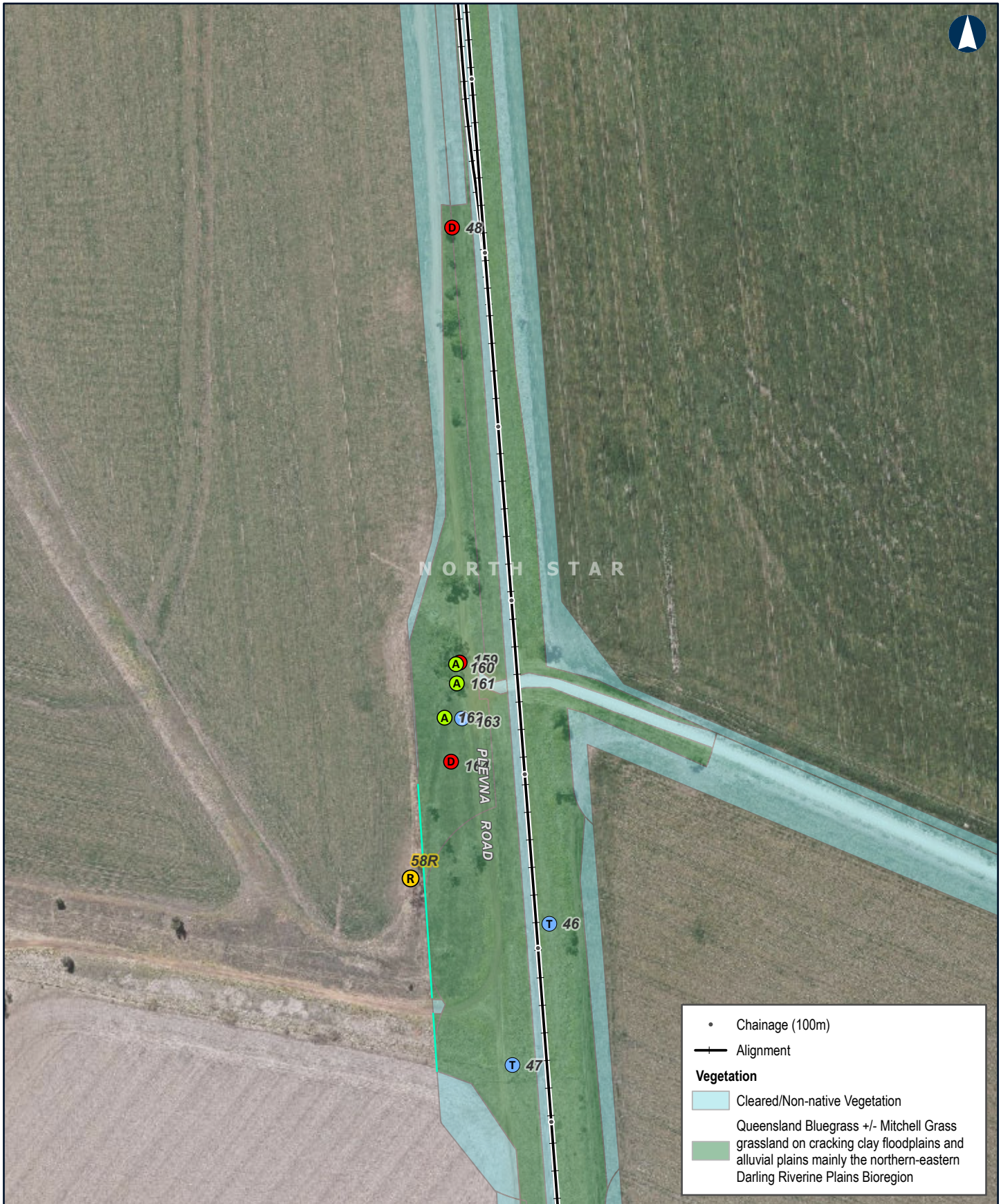
Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- (A) Alive
- (D) Deceased
- (T) Tail only
- (R) FCWS - Relocations



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- Chainage (100m)
- Alignment

Vegetation

- Light Blue: Cleared/Non-native Vegetation
- Green: Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

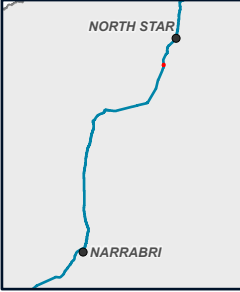
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

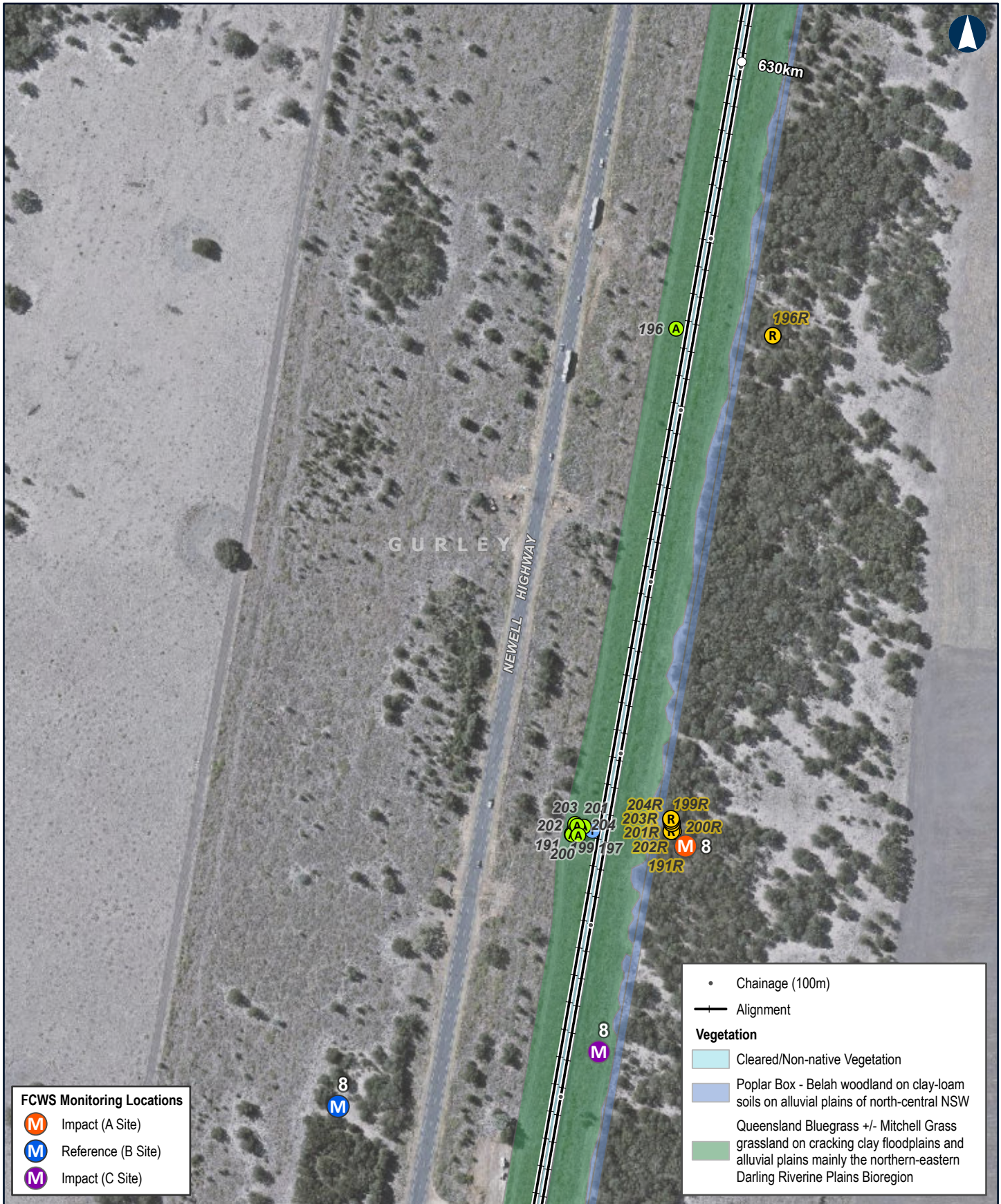
FCWS - Condition

- A Alive
- D Deceased
- T Tail only
- R FCWS - Relocations
- Green Line FCWS - Habitat Enhancement



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FCWS Monitoring Locations

- M Impact (A Site)
- M Reference (B Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass
- grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

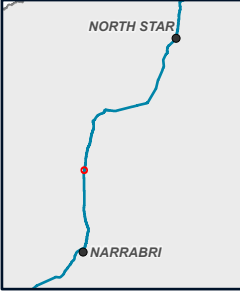
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m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- T Tail only
- R FCWS - Relocations



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Data Sources: QSpatial, NSW Spatial Services



FCWS Monitoring Locations

- M Reference (B Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass
- grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

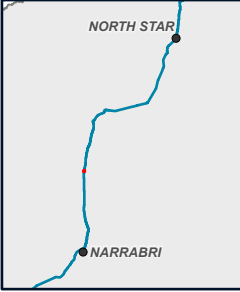
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- R FCWS - Relocations



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion
- Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 24 OF 57

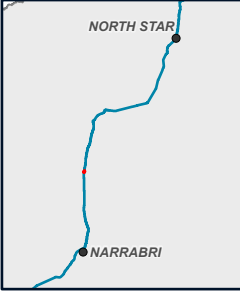
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- D Deceased
- R FCWS - Relocations

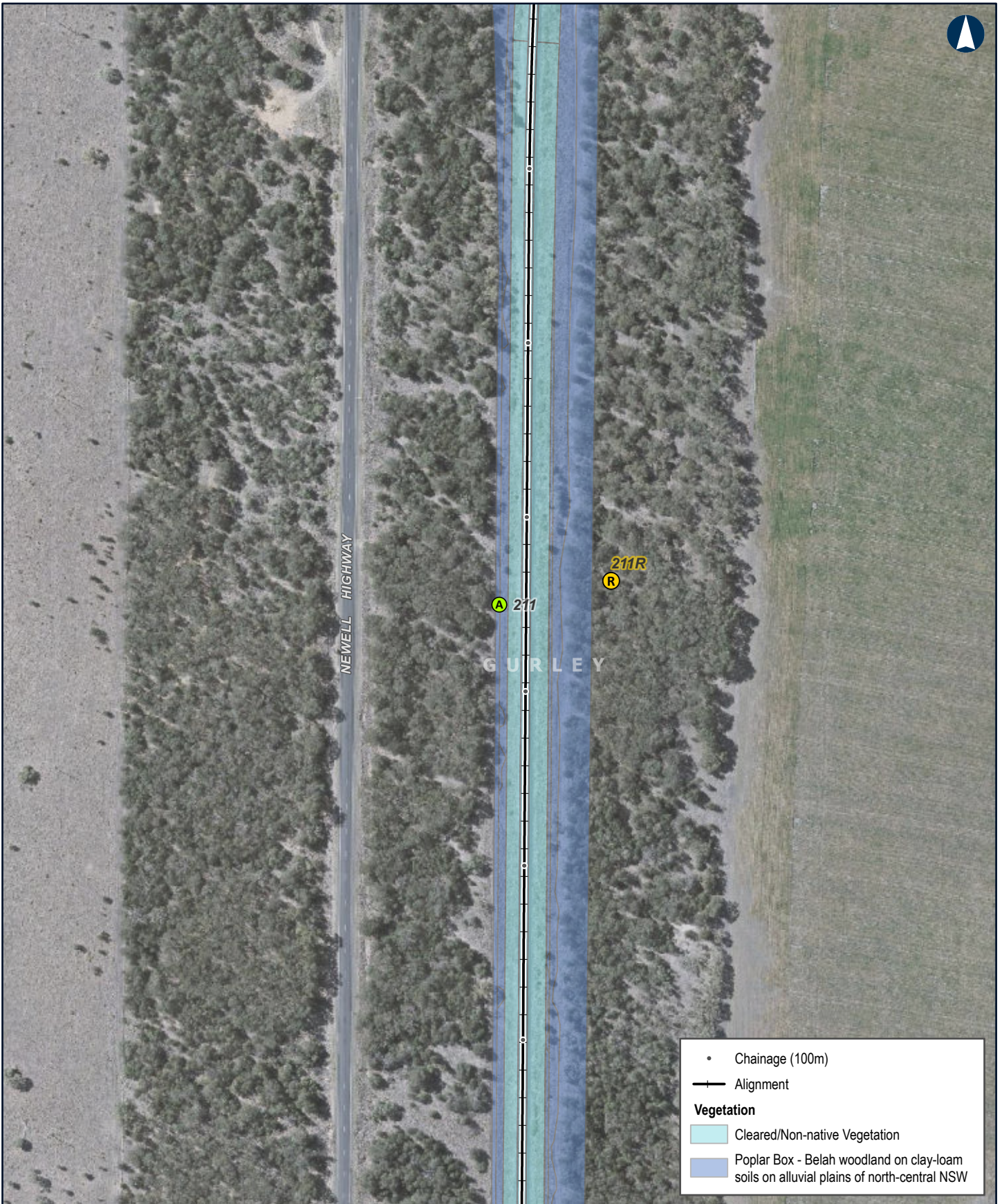


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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment
- Vegetation**
- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 25 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

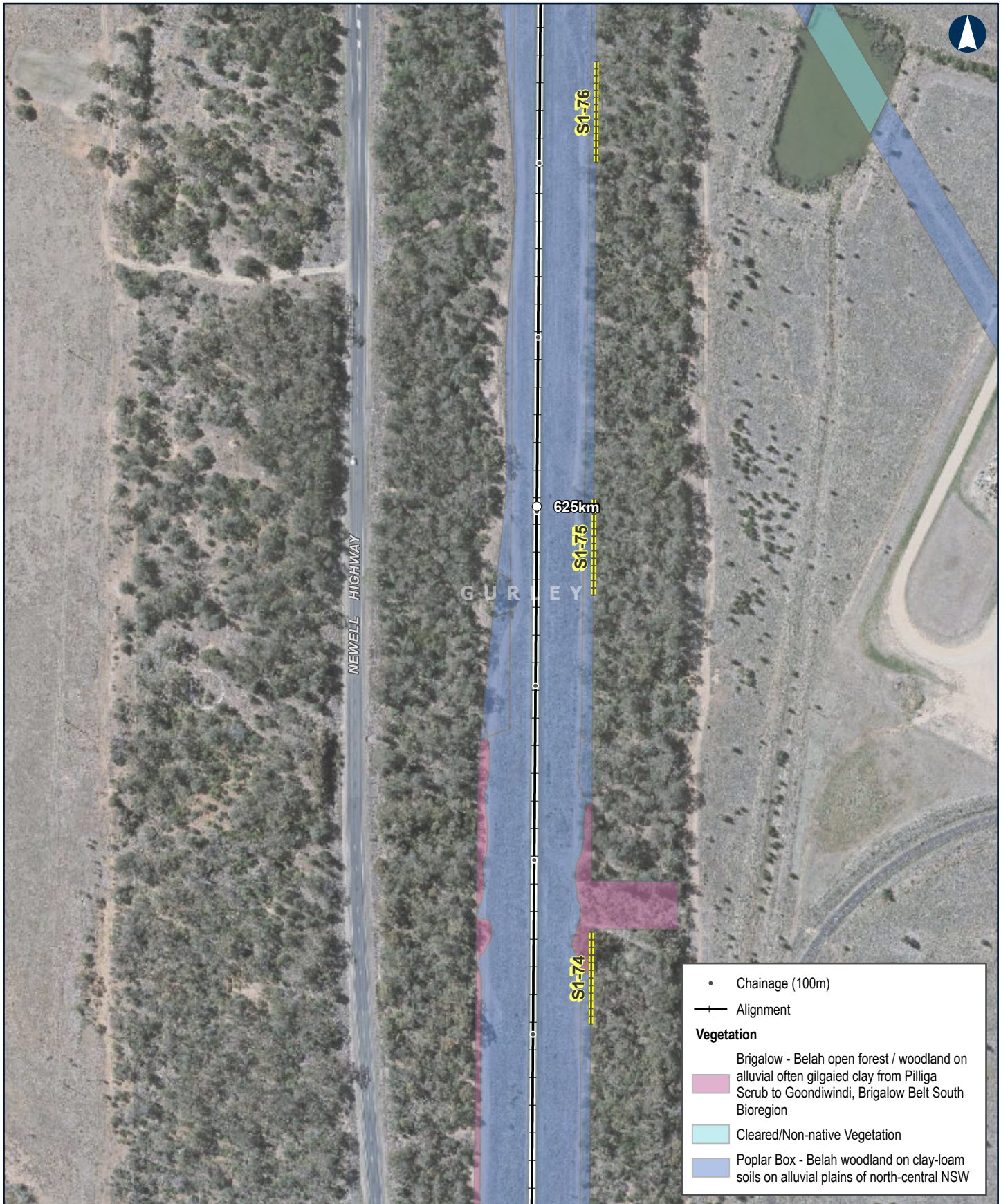
FCWS - Condition

- Ⓐ Alive
- Ⓡ FCWS - Relocations



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

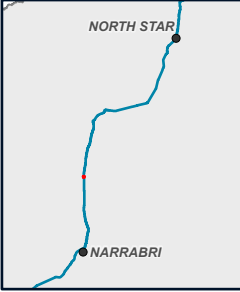
FCWS Interactions and Relocations

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

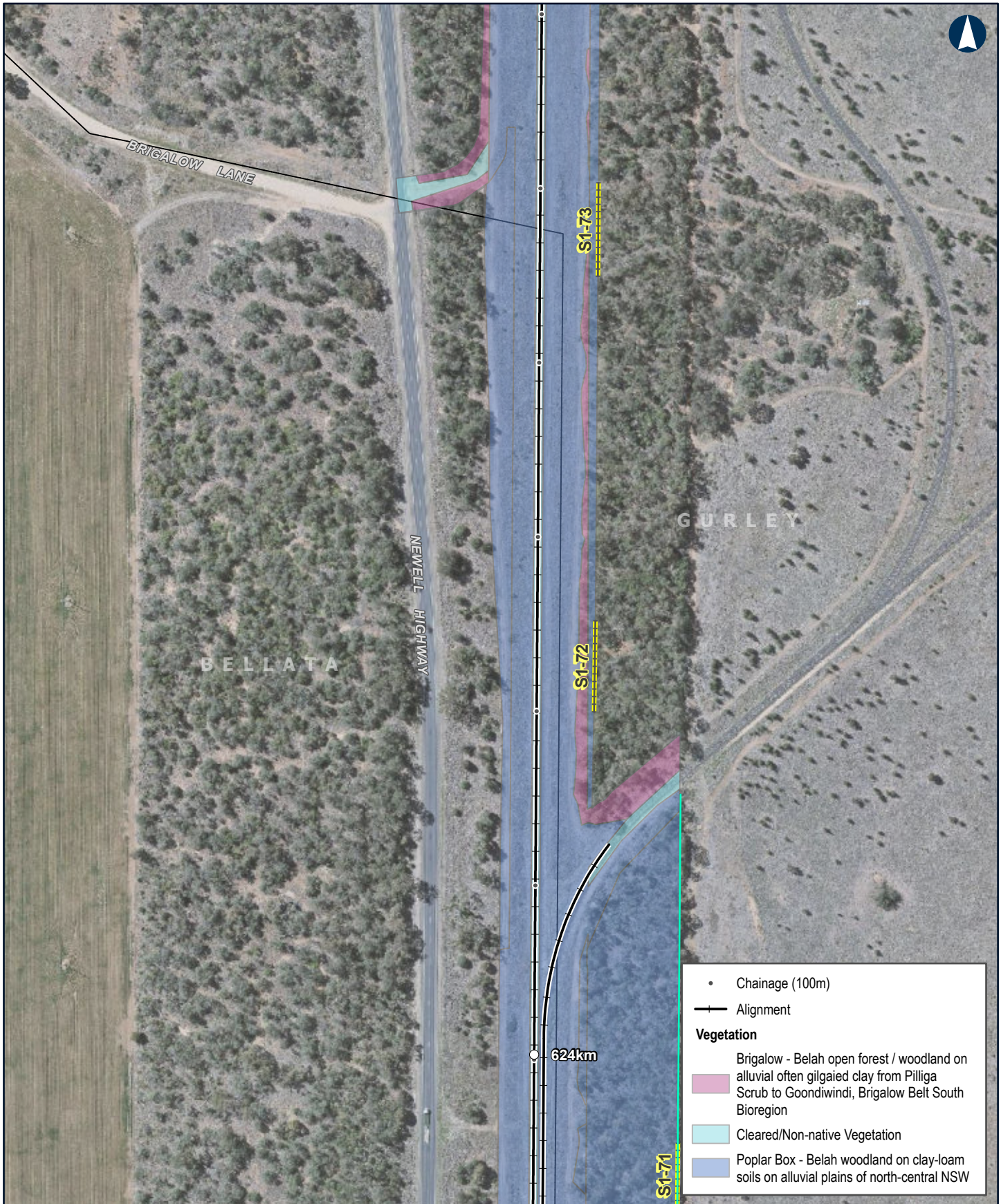
FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondwindi, Brigalow Belt South Bioregion
- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

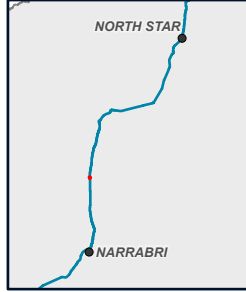
MAP 27 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

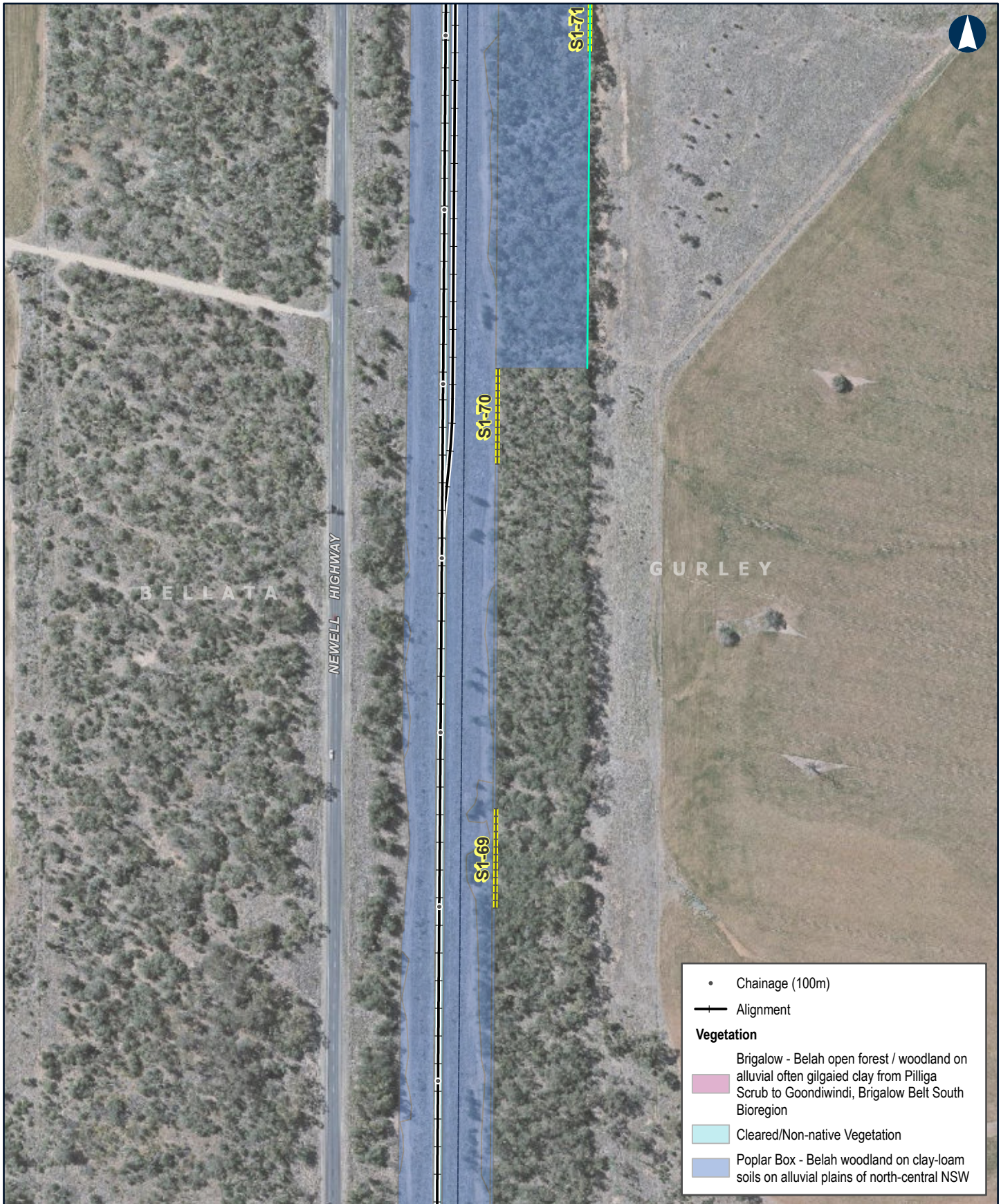
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion
- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

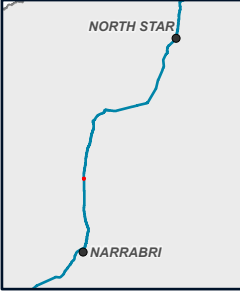
MAP 28 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

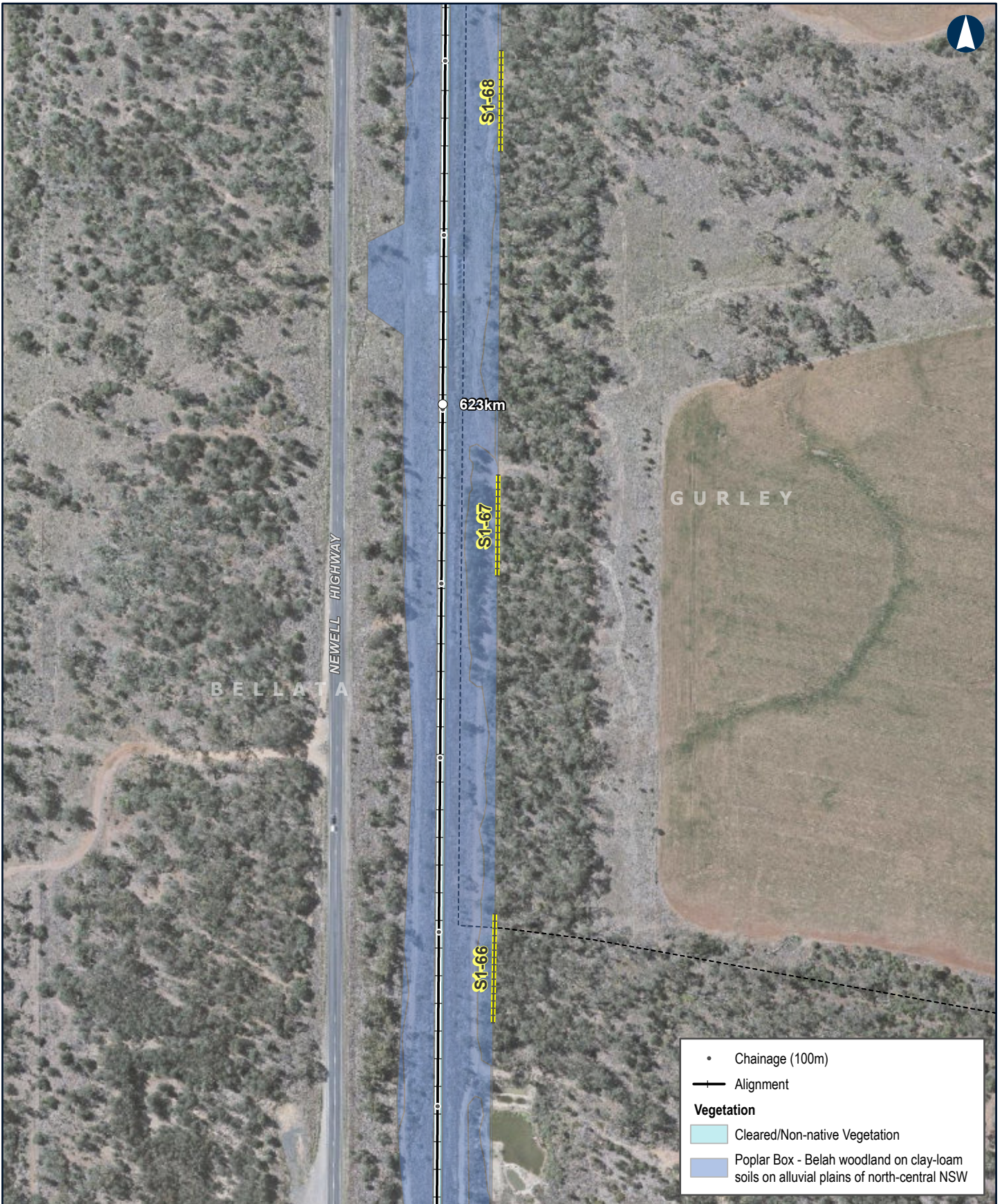
FCWS - Habitat Enhancement
FCWS relocation hub (fenced)



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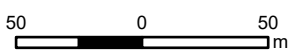
Data Sources: QSpatial, NSW Spatial Services



NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 29 OF 57



FCWS relocation hub (fenced)

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

Data Sources: QSpatial, NSW Spatial Services



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- Chainage (100m)
- Alignment

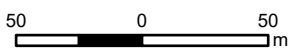
Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 30 OF 57



FCWS relocation hub (fenced)



Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

Data Sources: QSpatial, NSW Spatial Services

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- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

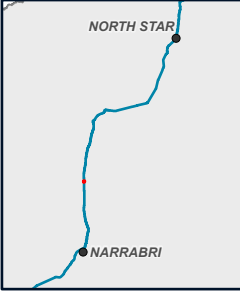
MAP 31 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Light Blue: Cleared/Non-native Vegetation
- Dark Blue: Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

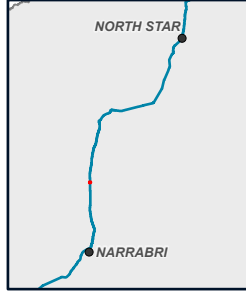
MAP 32 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

— FCWS - Habitat Enhancement
— FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

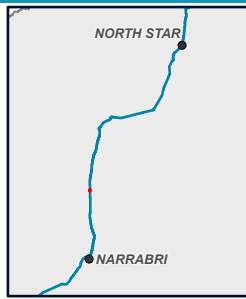
MAP 33 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

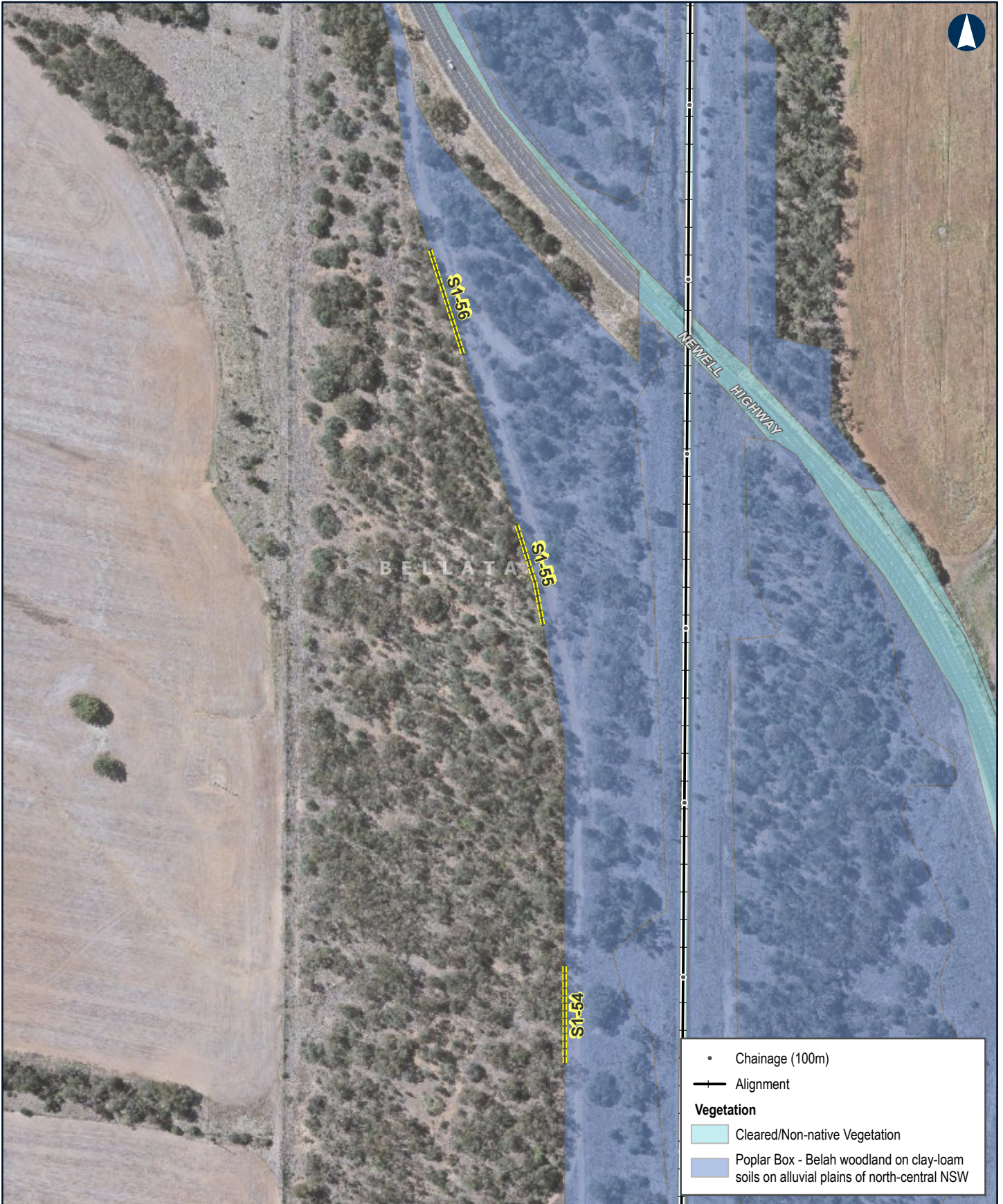
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

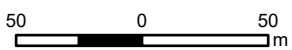
Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 34 OF 57



FCWS relocation hub (fenced)



Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

Data Sources: QSpatial, NSW Spatial Services

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- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

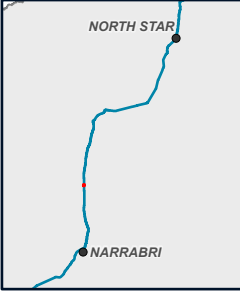
MAP 35 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

- FCWS relocation hub (fenced)
- FCWS relocation hub (not fenced)



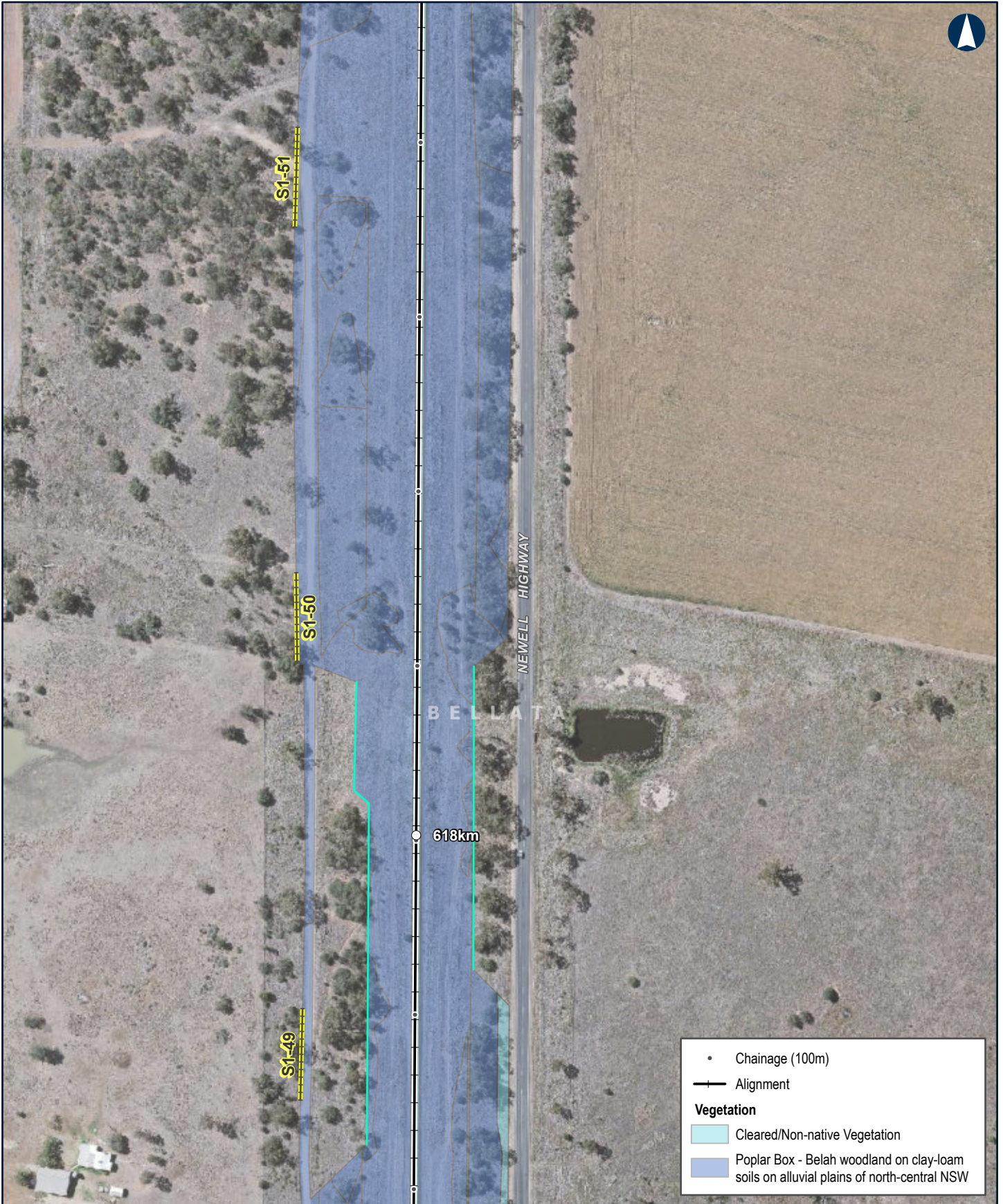
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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

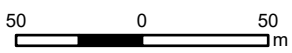
Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 36 OF 57



Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)

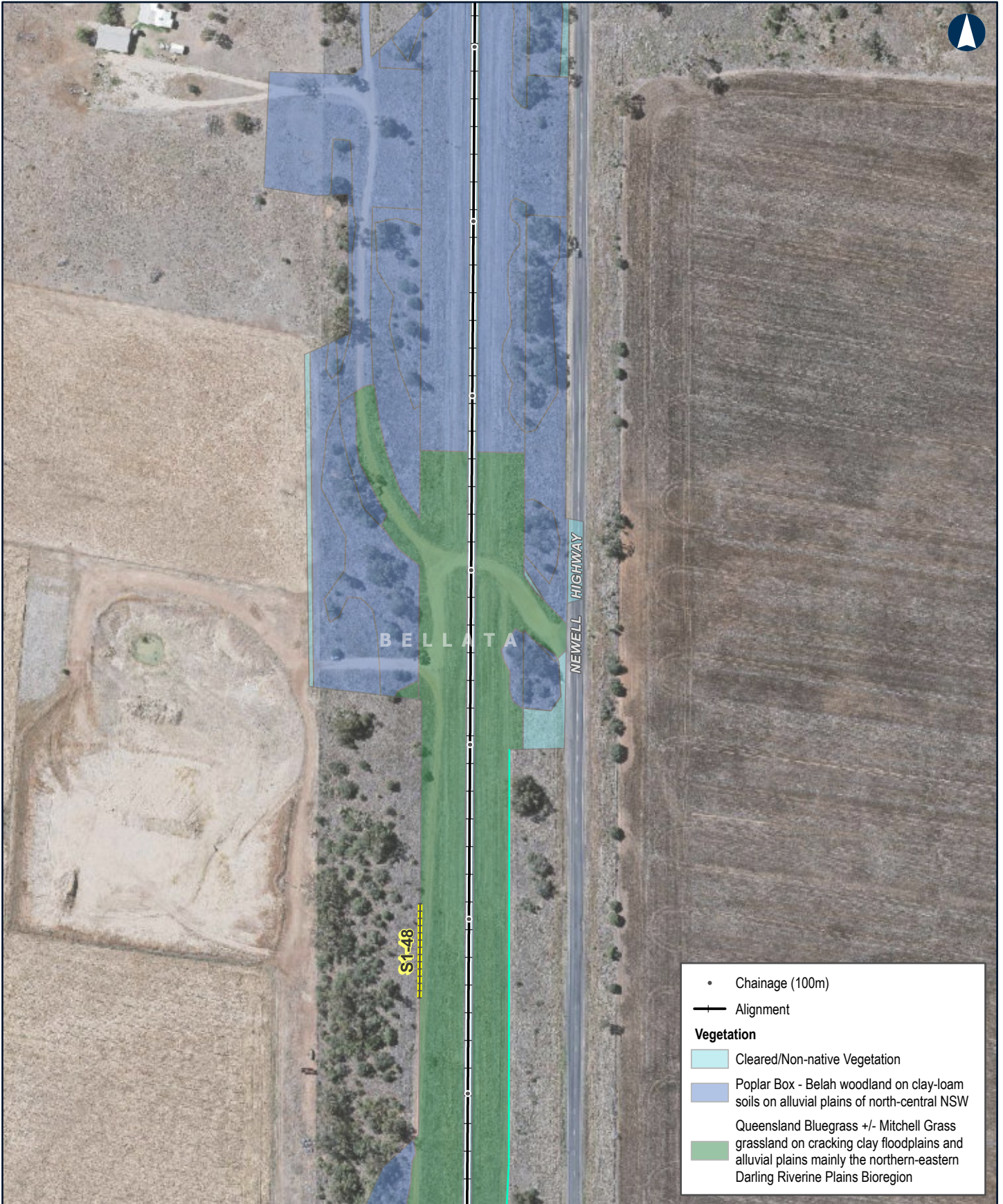


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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

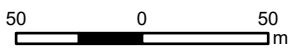
Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 37 OF 57



Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)

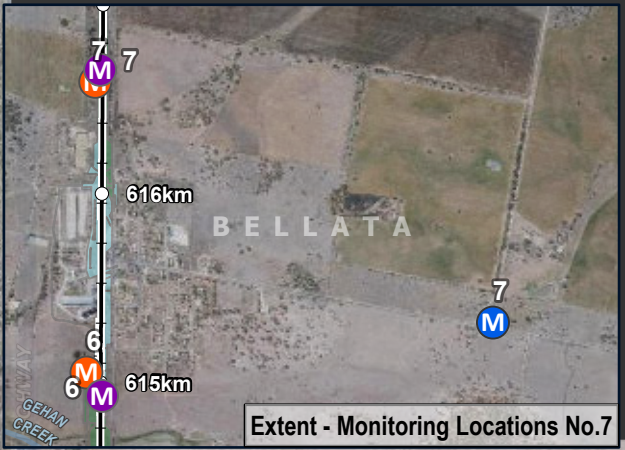
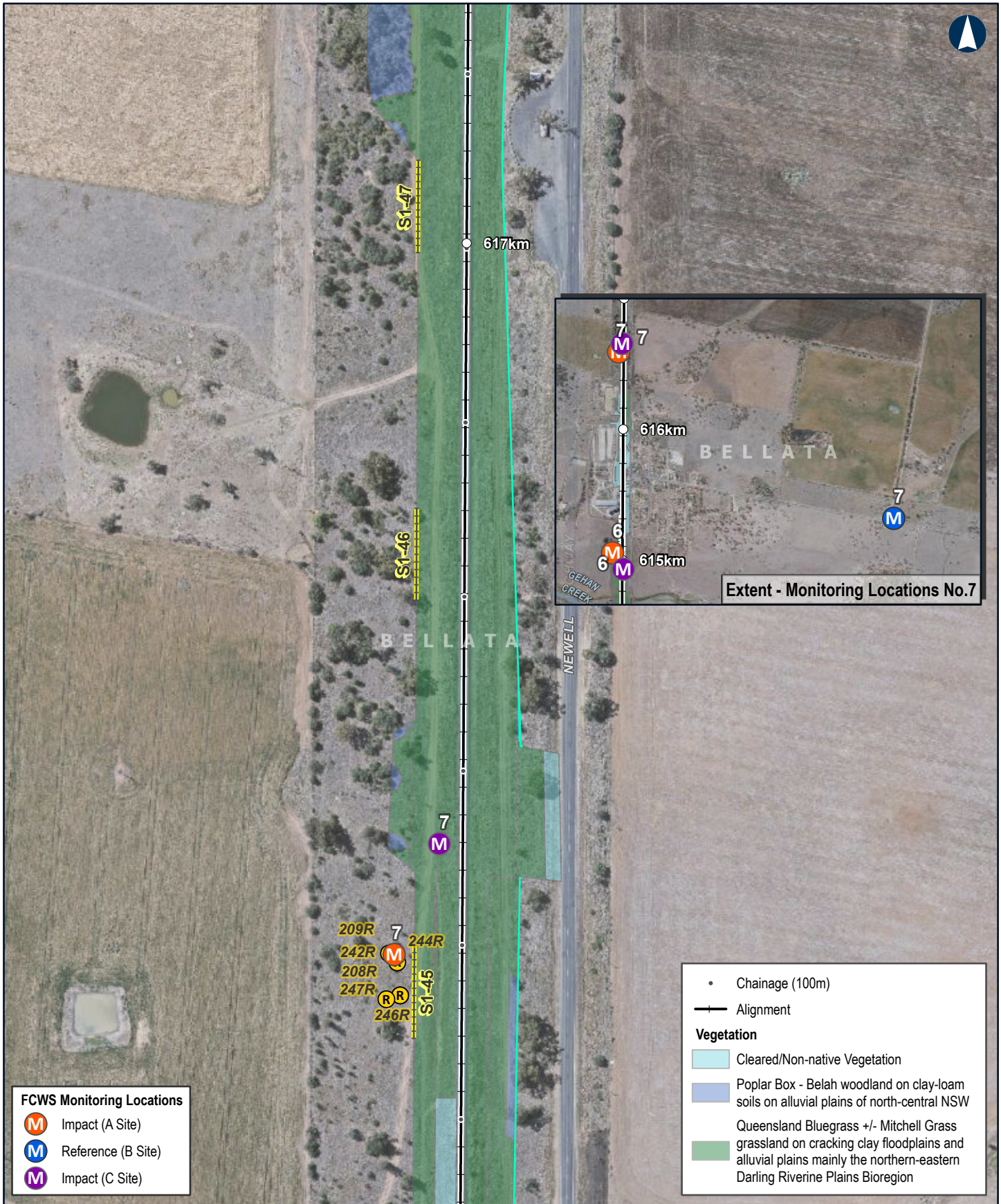


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Data Sources: QSpatial, NSW Spatial Services







FCWS Monitoring Locations

-  Impact (A Site)
-  Reference (B Site)
-  Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

-  Cleared/Non-native Vegetation
-  Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
-  Queensland Bluegrass +/- Mitchell Grass
-  grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion




NARRABRI TO NORTH STAR

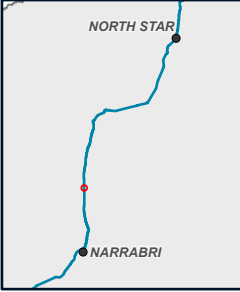
FCWS Interactions and Relocations

50 0 50
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

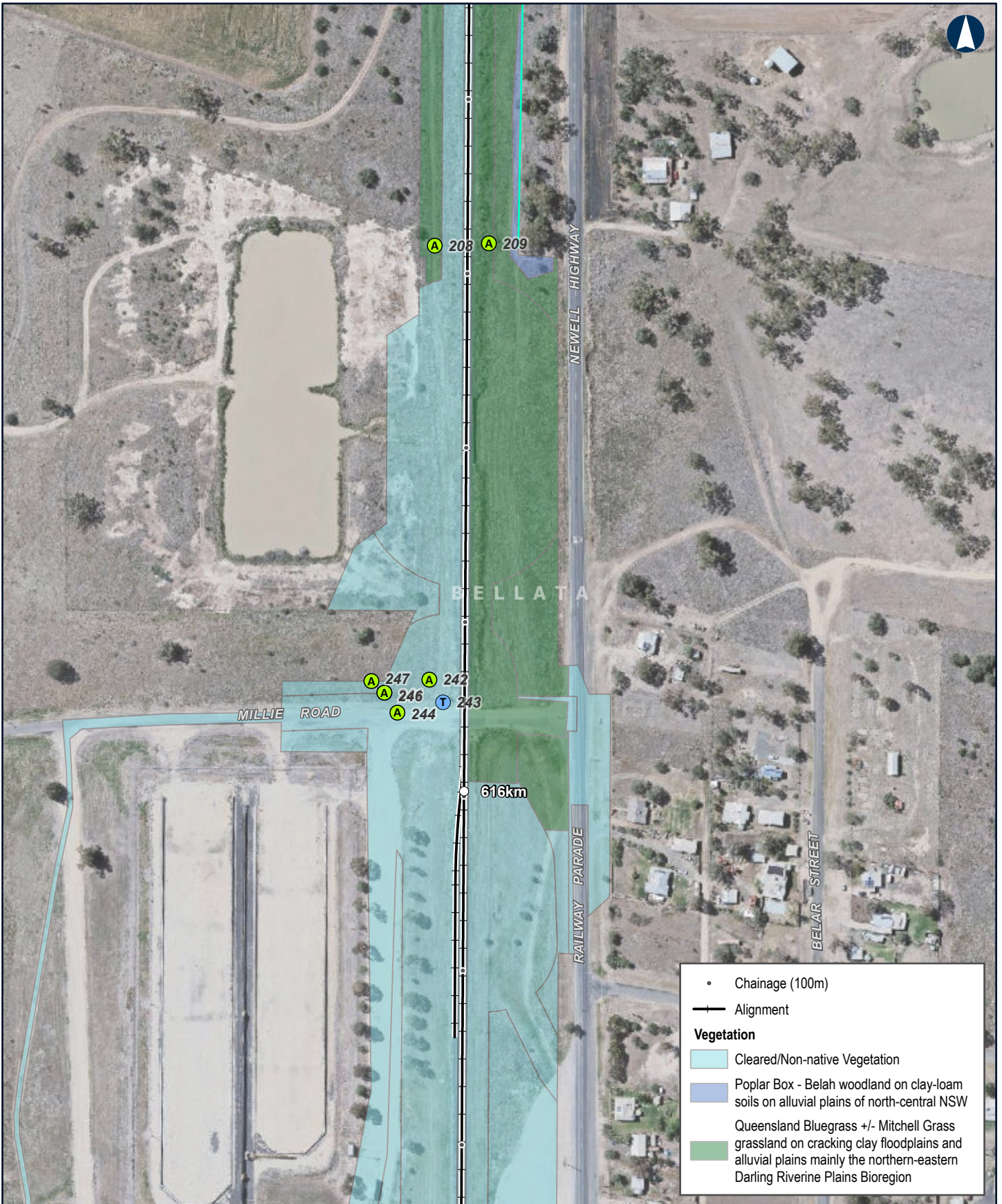
-  FCWS - Relocations
-  FCWS - Habitat Enhancement
-  FCWS relocation hub (fenced)



Notes: Inset scale 1:40,000
Inset shows the extent of monitoring locations that are outside the scale of the main map

Data Sources: QSpatial, NSW Spatial Services

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- Chainage (100m)
- Alignment

Vegetation

- Light Blue: Cleared/Non-native Vegetation
- Dark Blue: Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Green: Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 39 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- D Deceased
- T Tail only
- FCWS - Habitat Enhancement



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment
- Vegetation**
- Cleared/Non-native Vegetation

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 40 OF 57

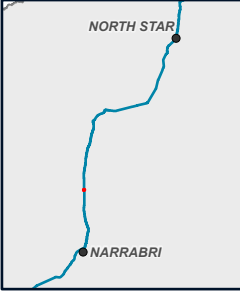
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

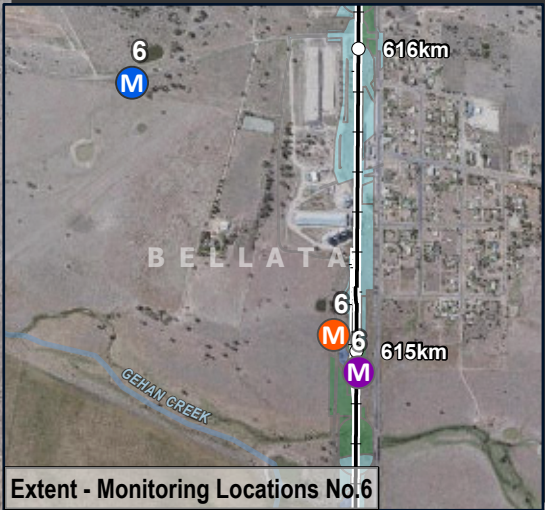
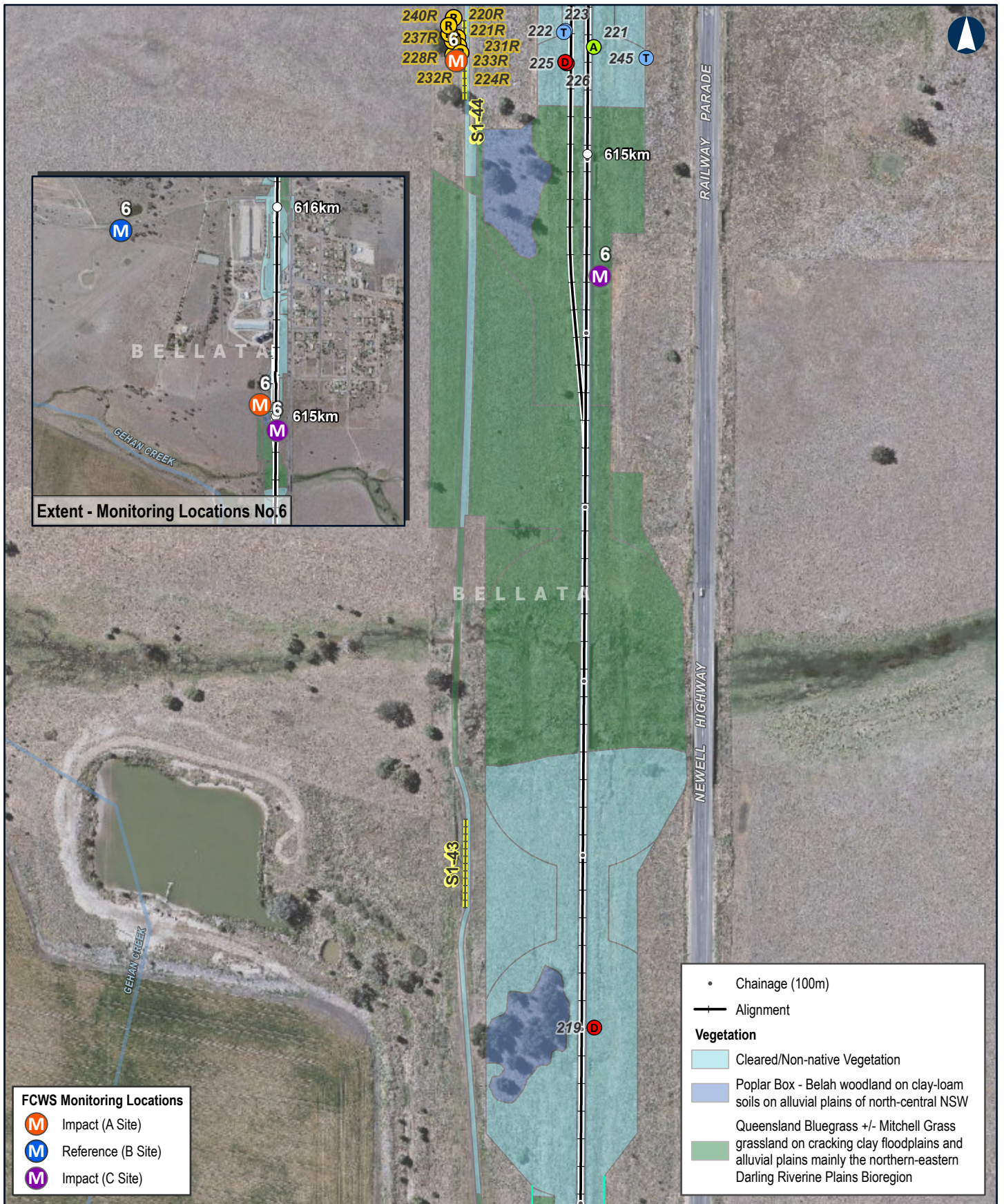
- Ⓐ Alive
- ⓓ Deceased
- Ⓣ Tail only
- Ⓡ FCWS - Relocations



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Data Sources: QSpatial, NSW Spatial Services



FCWS Monitoring Locations

- Impact (A Site)
- Reference (B Site)
- Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

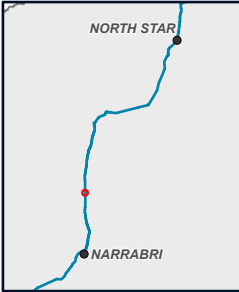
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

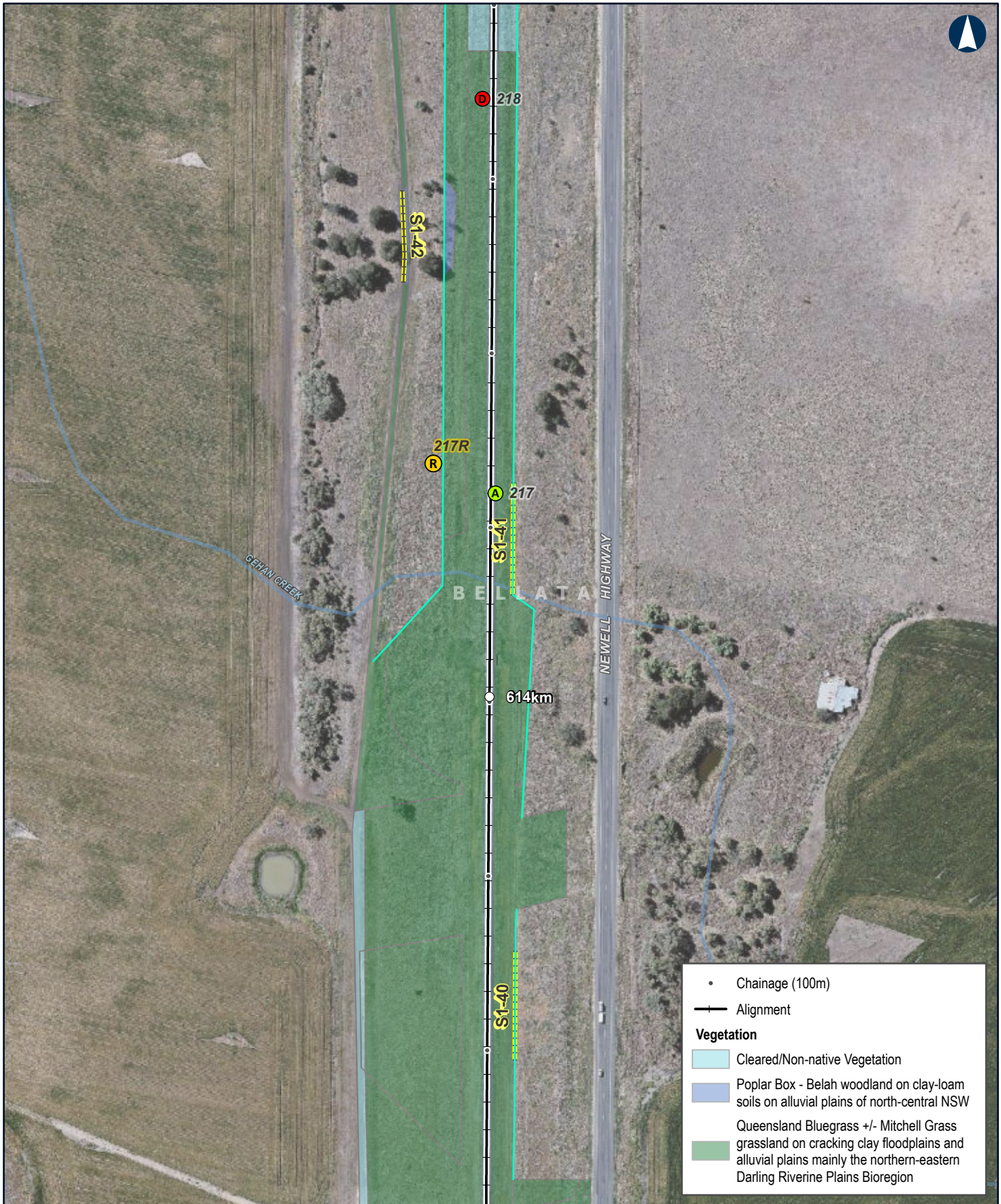
- Alive
- Deceased
- Tail only
- FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



Notes: Inset scale 1:25,000
Inset shows the extent of monitoring locations that are outside the scale of the main map

Data Sources: QSpatial, NSW Spatial Services

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- Chainage (100m)
- Alignment

Vegetation

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NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

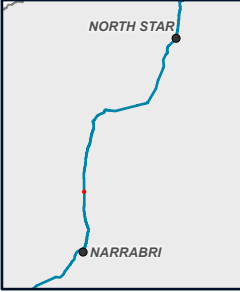
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- D Deceased
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)

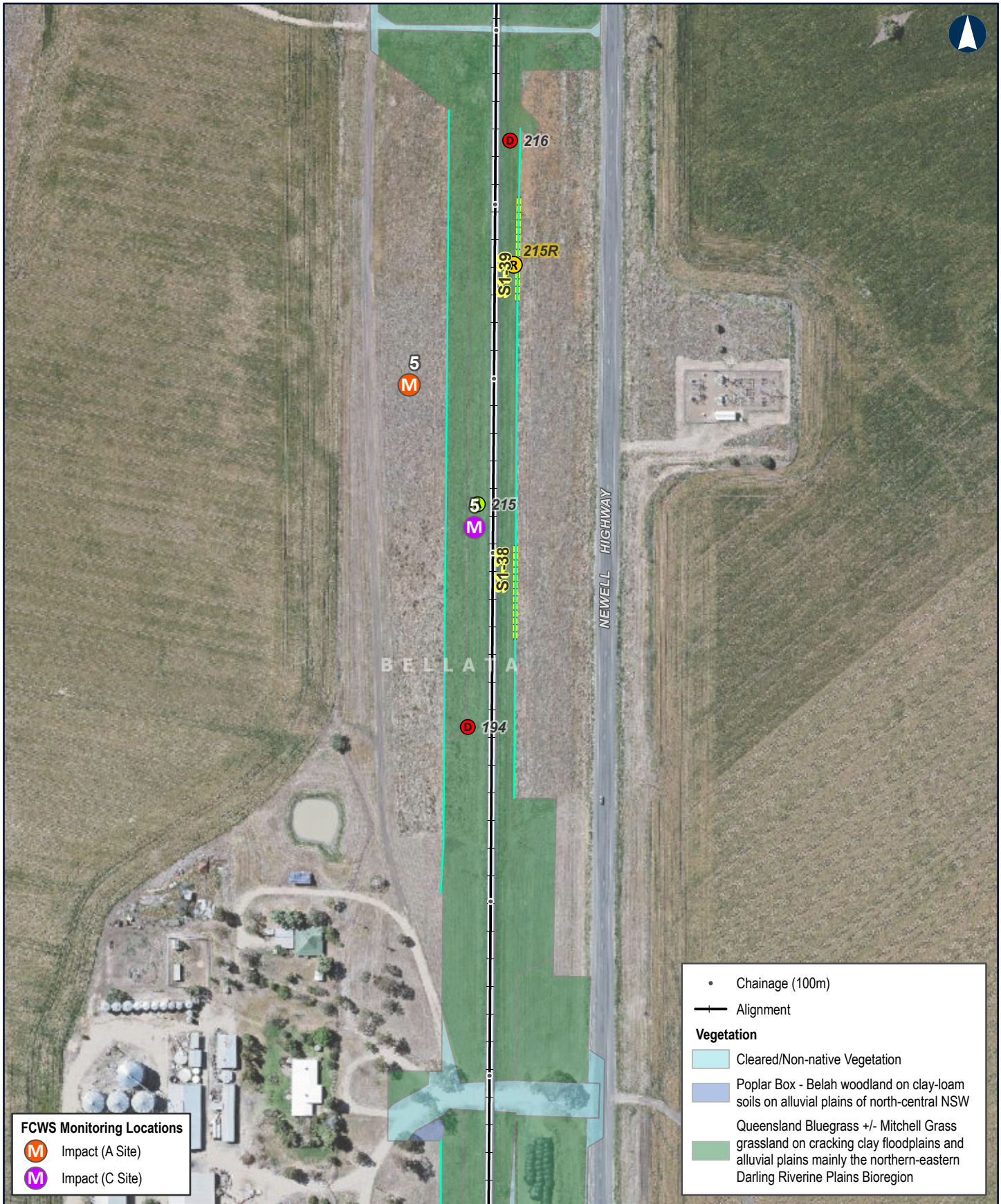


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FCWS Monitoring Locations

- M Impact (A Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 43 OF 57

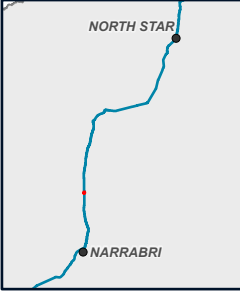
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

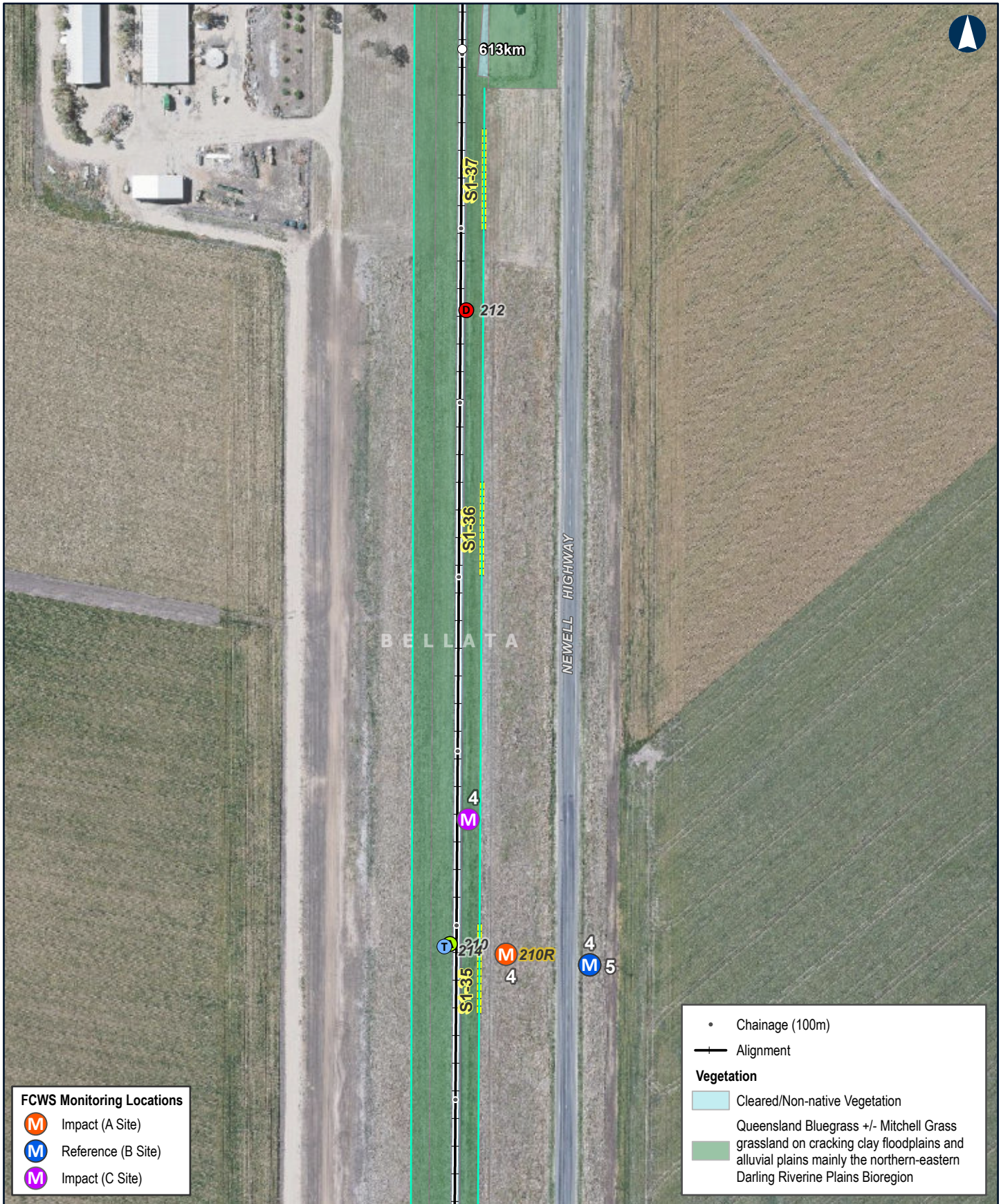
FCWS - Condition

- A Alive
- D Deceased
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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FCWS Monitoring Locations

- M Impact (A Site)
- M Reference (B Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

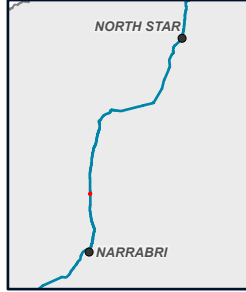
50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

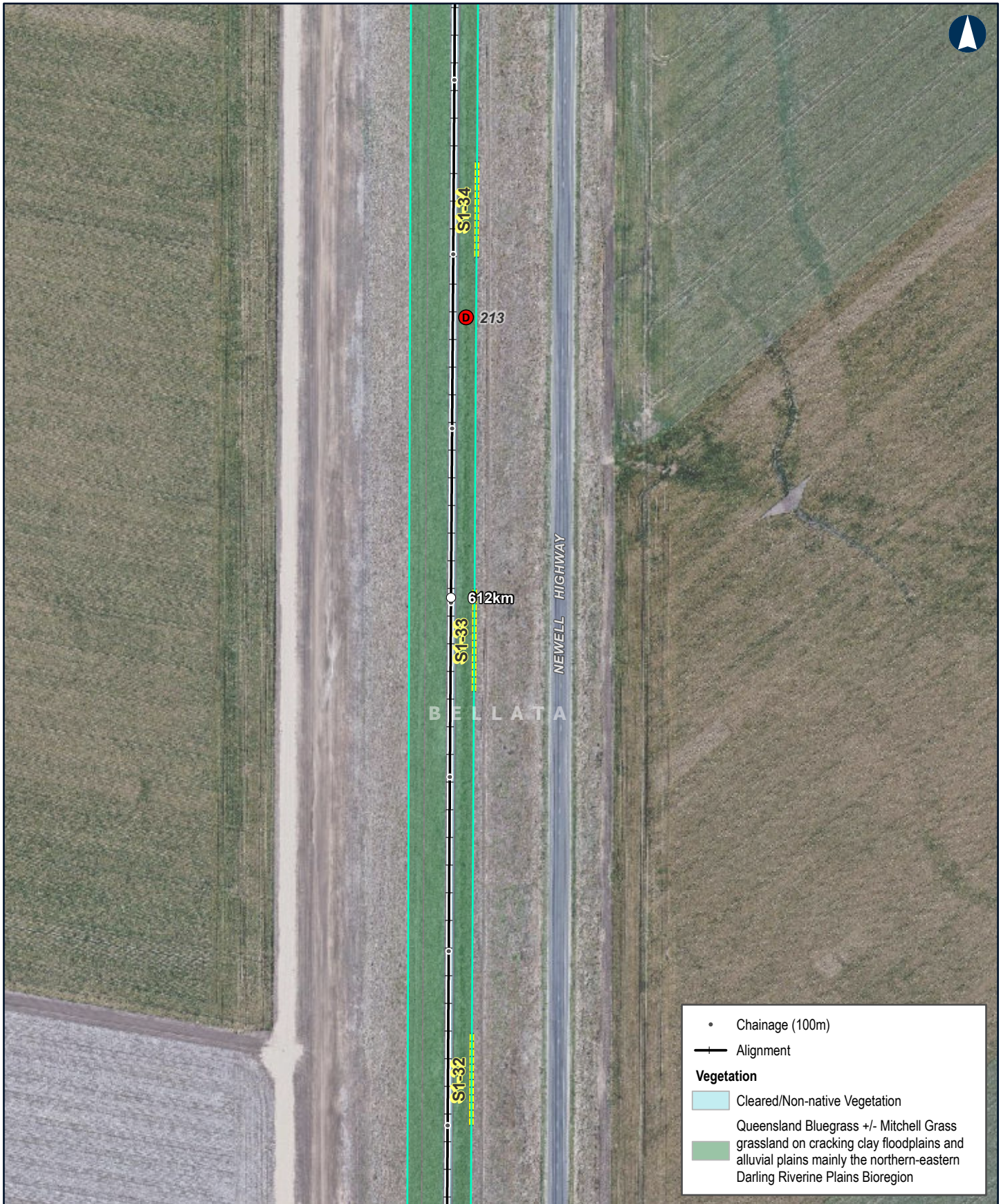
- A Alive
- D Deceased
- T Tail only
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 45 OF 57

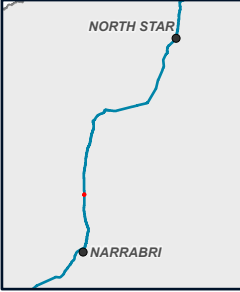
50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

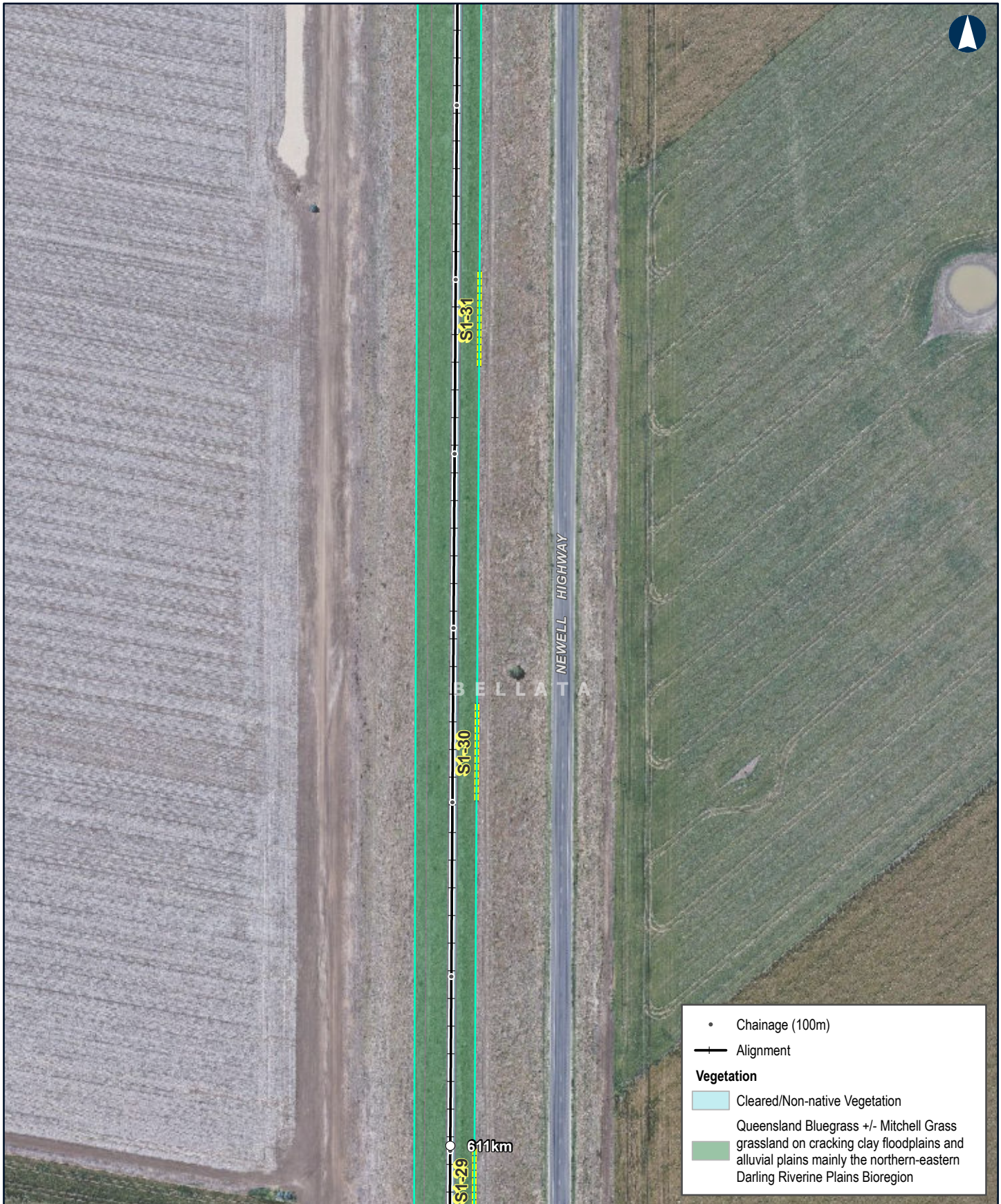
- ⓓ Deceased
- FCWS - Habitat Enhancement
- - - FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass
- grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

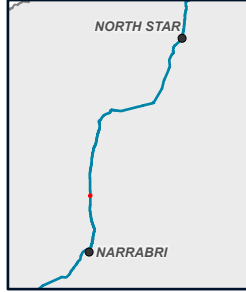
MAP 46 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

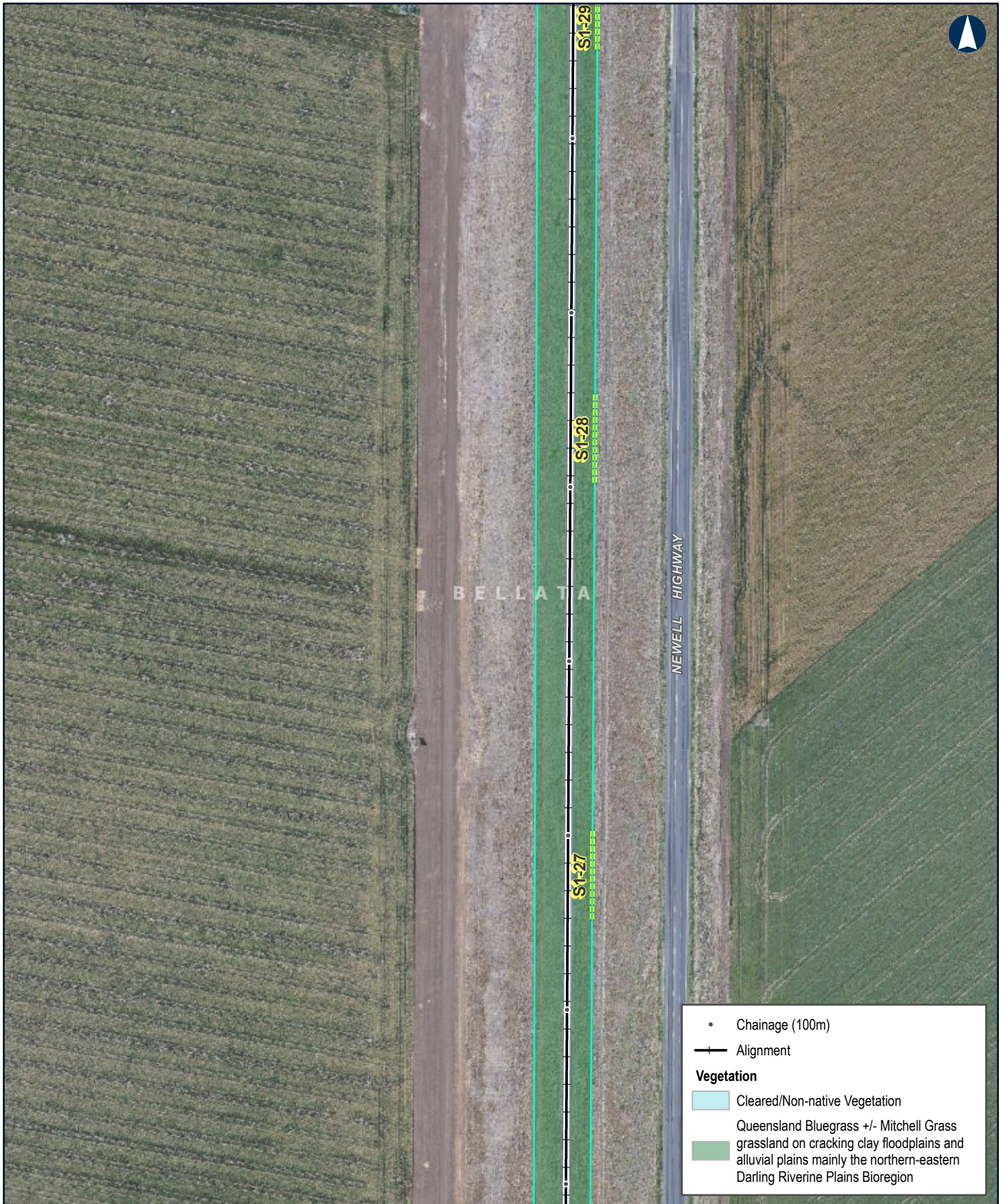
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 47 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)

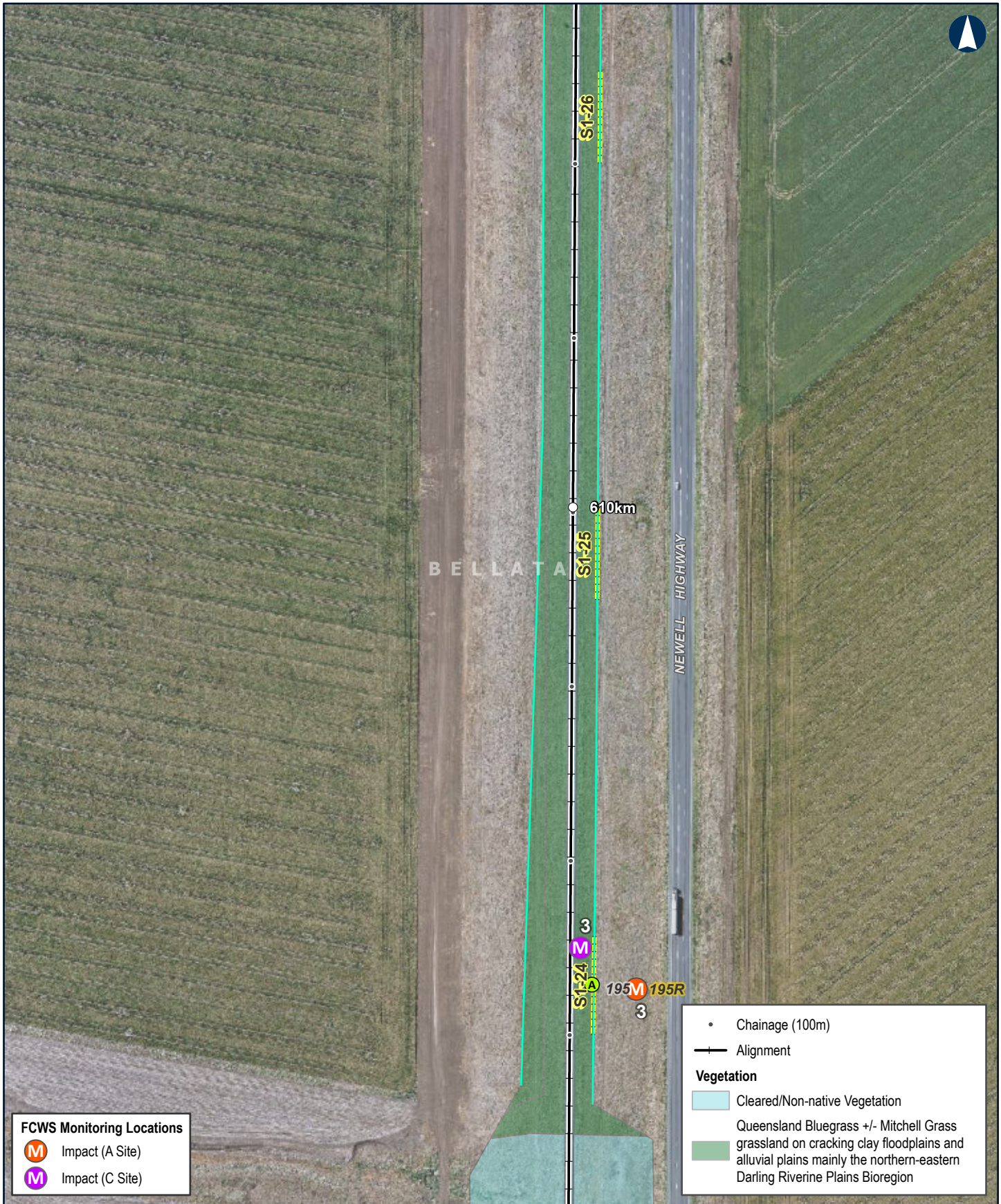


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Data Sources: QSpatial, NSW Spatial Services



FCWS Monitoring Locations

- Impact (A Site)
- Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 48 OF 57

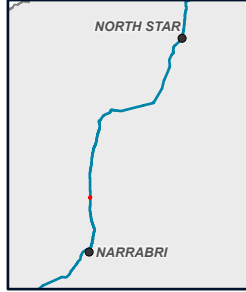
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

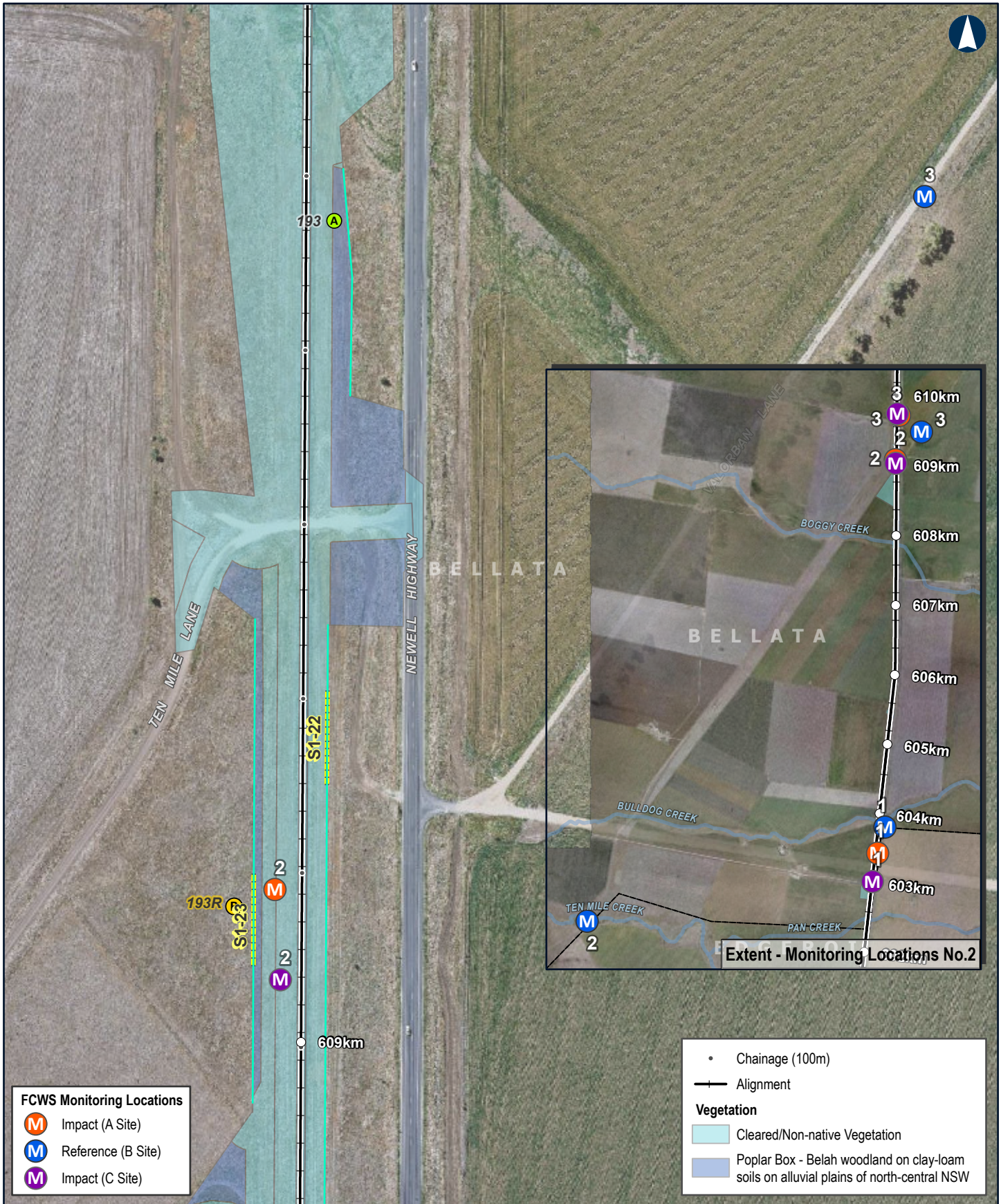
- Alive
- FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



FCWS Monitoring Locations

- M Impact (A Site)
- M Reference (B Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR **FCWS Interactions and Relocations** MAP 49 OF 57

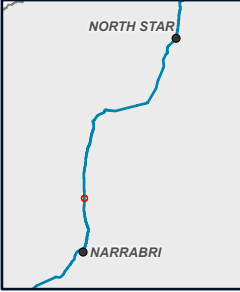
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Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



ARTC

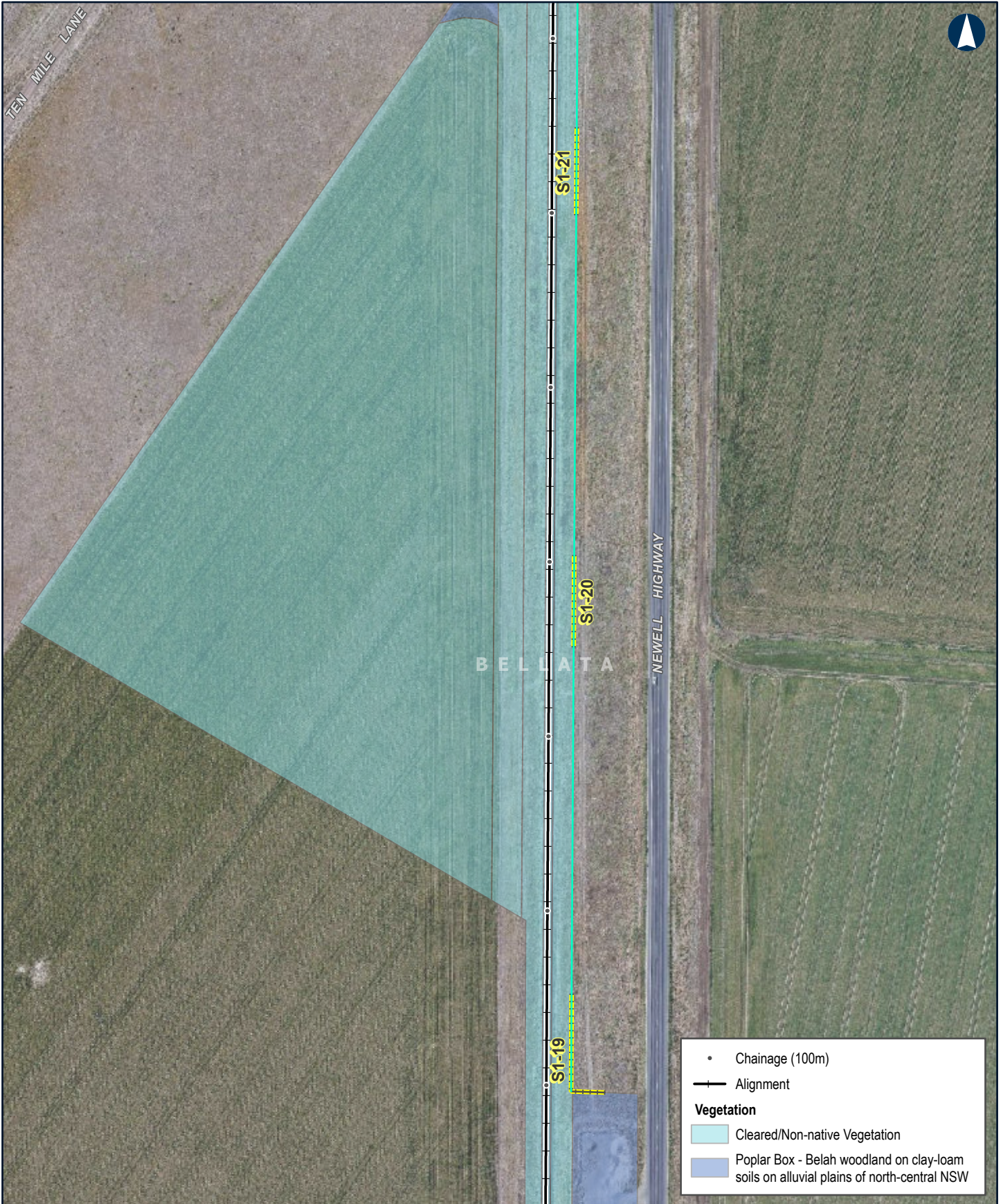
INLAND RAIL

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Notes: Inset scale 1:75,000
Inset shows the extent of monitoring locations that are outside the scale of the main map

Data Sources: QSpatial, NSW Spatial Services

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- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 50 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)

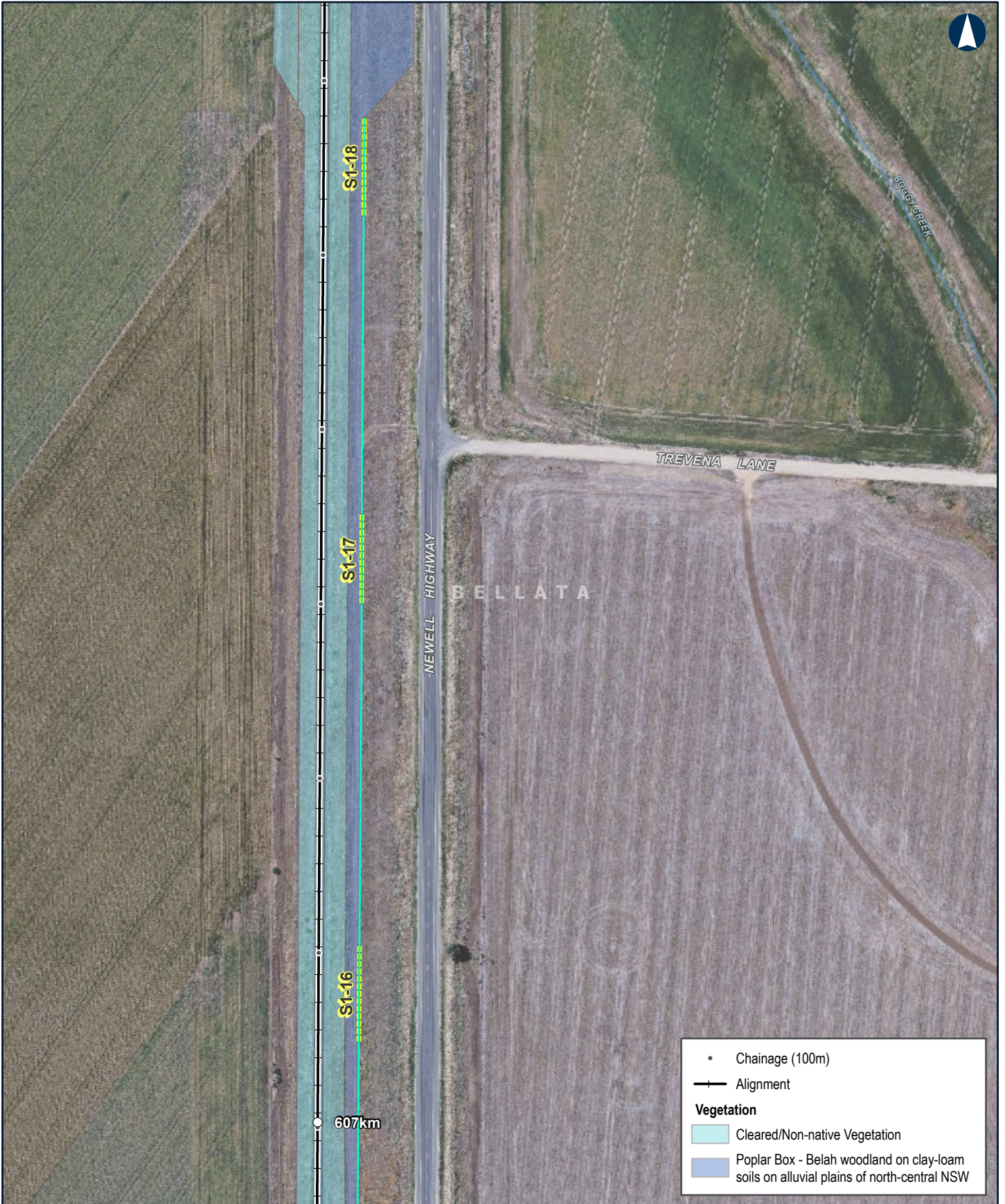


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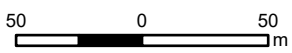
Data Sources: QSpatial, NSW Spatial Services



NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 51 OF 57



Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

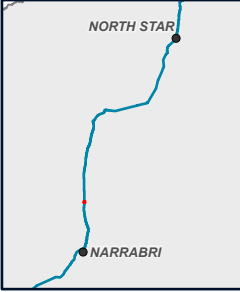
MAP 52 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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- Chainage (100m)
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- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

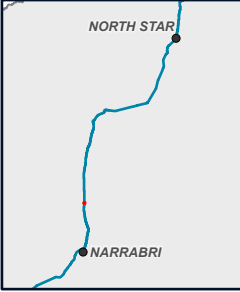
MAP 53 OF 57

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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 54 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

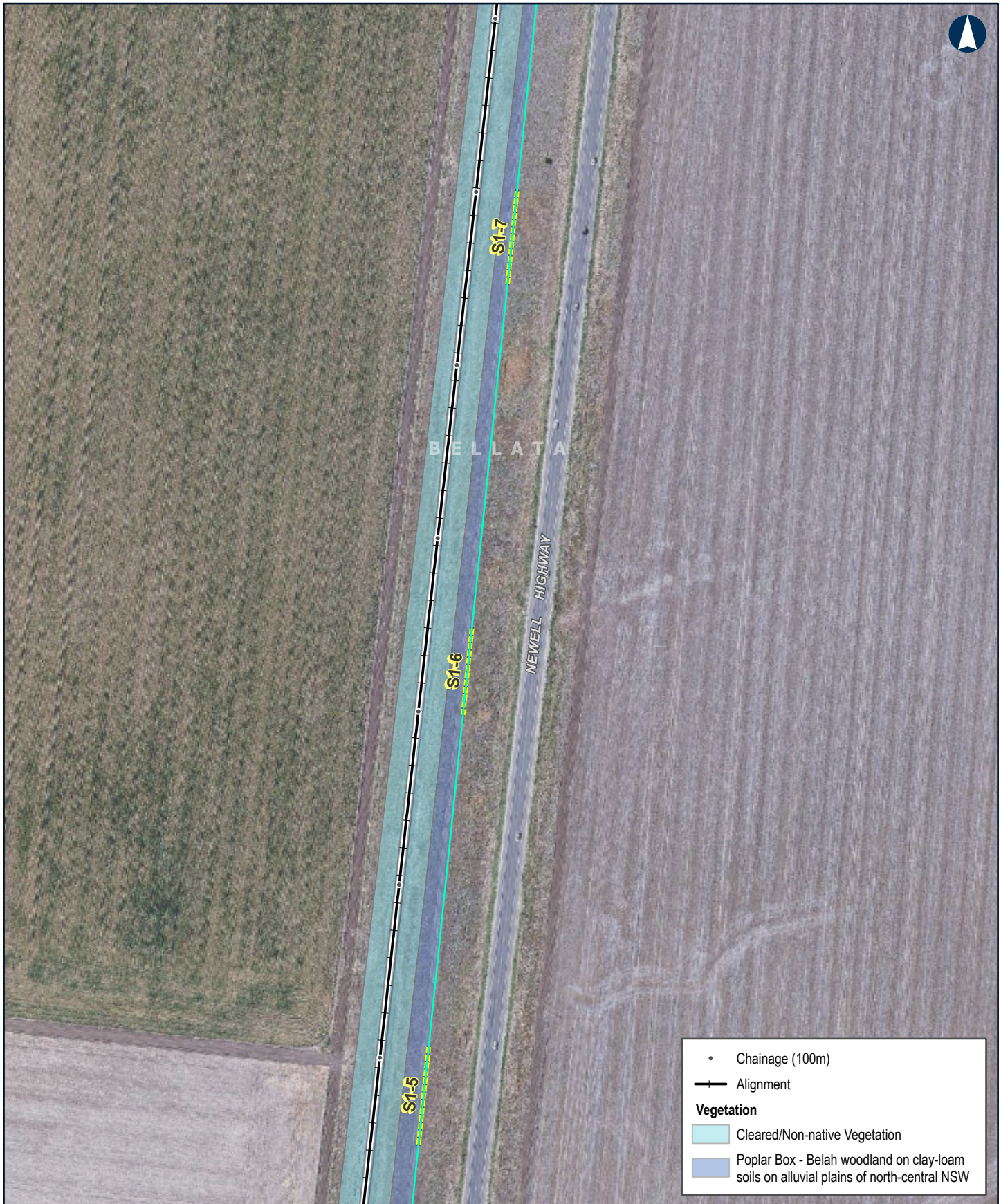
Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

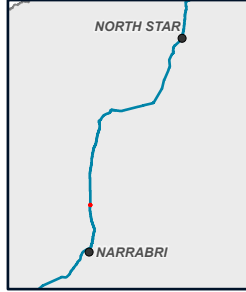
MAP 55 OF 57

50 0 50
m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



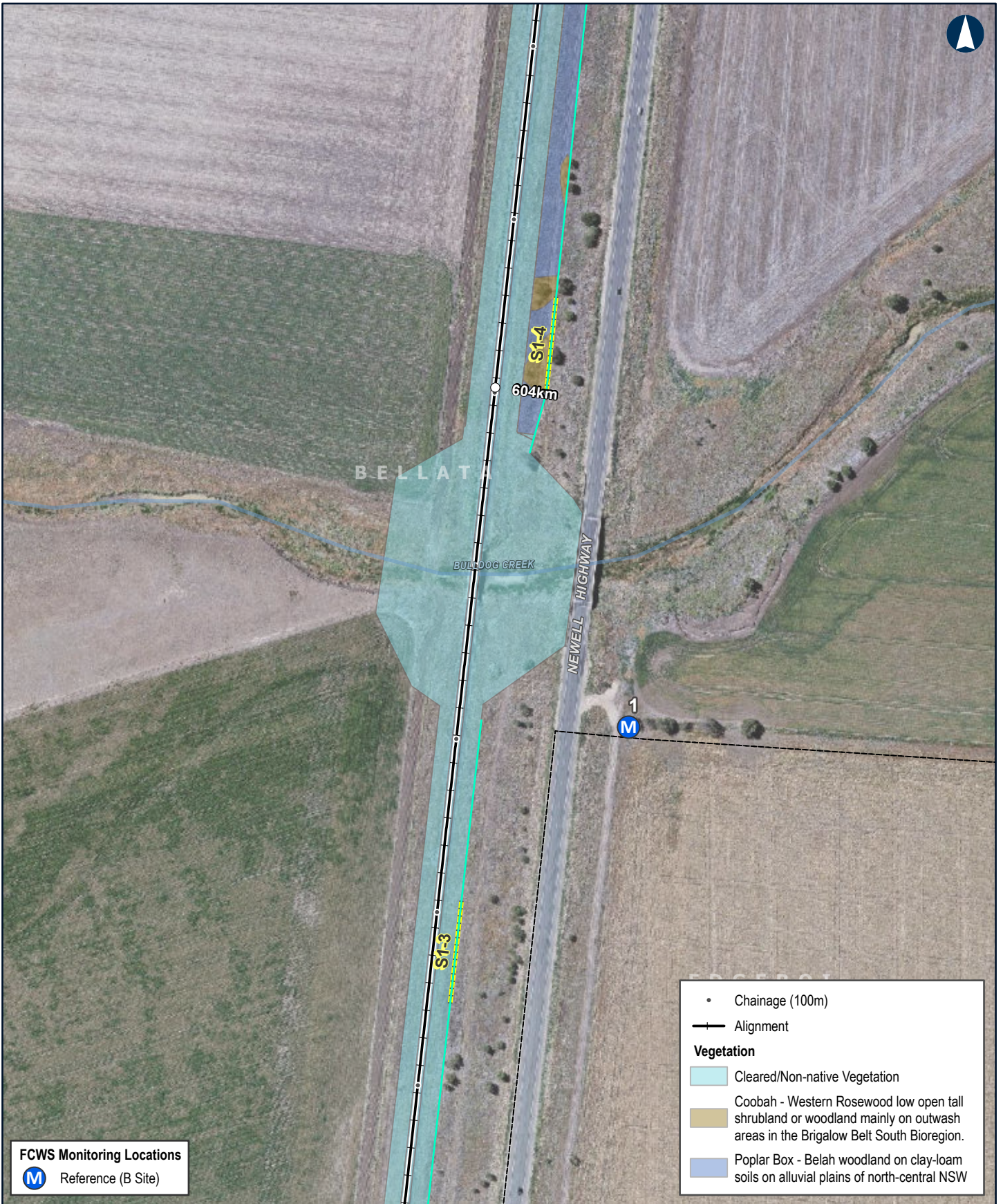
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Data Sources: QSpatial, NSW Spatial Services



FCWS Monitoring Locations
 Reference (B Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion.
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 56 OF 57

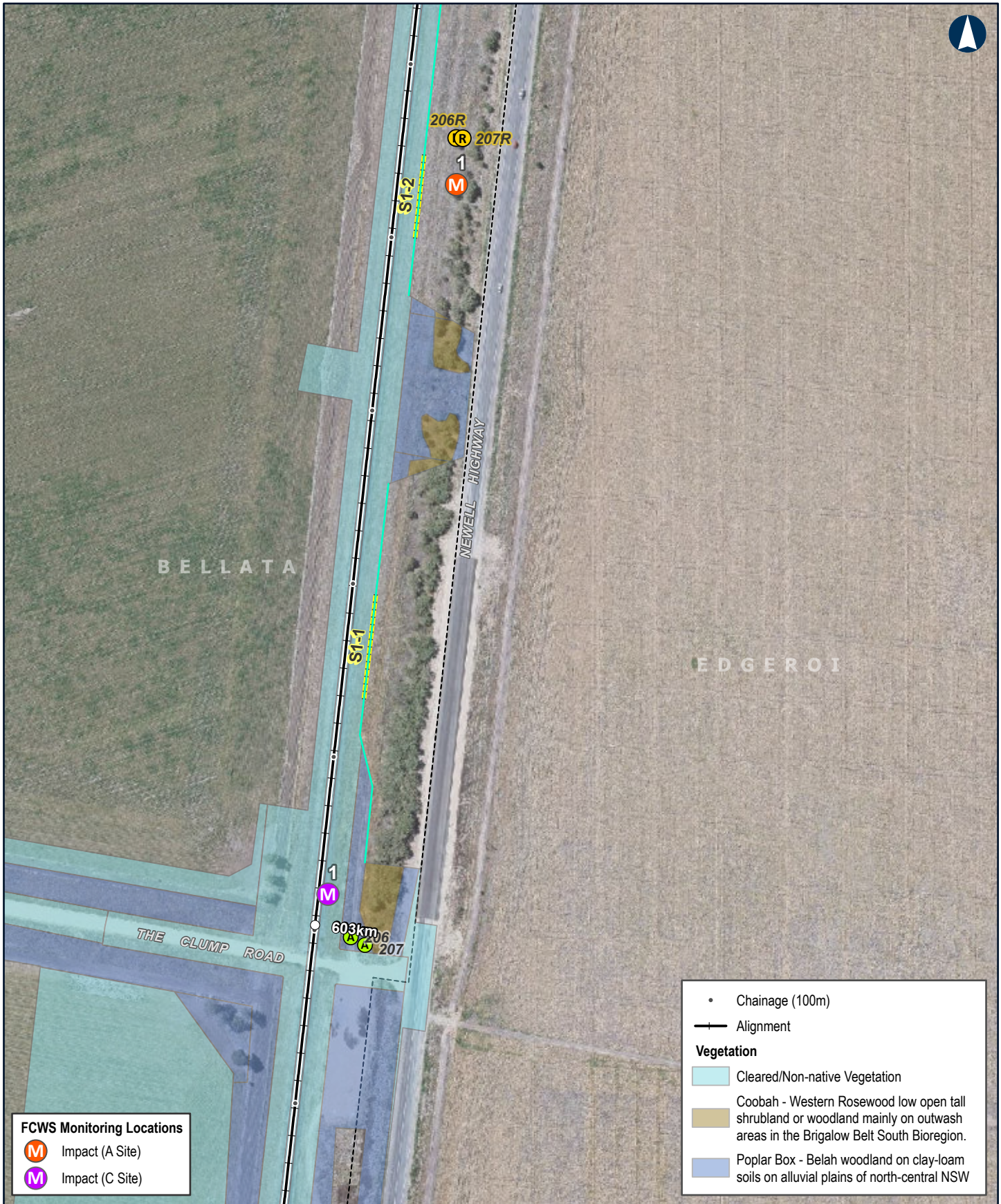
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 m
 Coordinate System: GDA 1994 MGA Zone 55
 Date: 20/12/2022 Paper: A4
 Author: IR GIS (JB) Scale: 1:3,000
 Approver: Jasmine Walden Rev: 1

FCWS - Habitat Enhancement
 FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services



FCWS Monitoring Locations

- M Impact (A Site)
- M Impact (C Site)

- Chainage (100m)
- Alignment

Vegetation

- Cleared/Non-native Vegetation
- Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion.
- Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW

NARRABRI TO NORTH STAR

FCWS Interactions and Relocations

MAP 57 OF 57

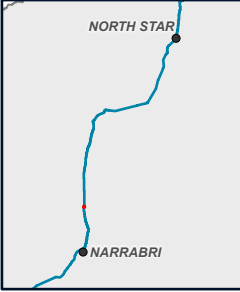
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m

Coordinate System: GDA 1994 MGA Zone 55

Date: 20/12/2022 Paper: A4
Author: IR GIS (JB) Scale: 1:3,000
Approver: Jasmine Walden Rev: 1

FCWS - Condition

- A Alive
- R FCWS - Relocations
- FCWS - Habitat Enhancement
- FCWS relocation hub (fenced)



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Data Sources: QSpatial, NSW Spatial Services

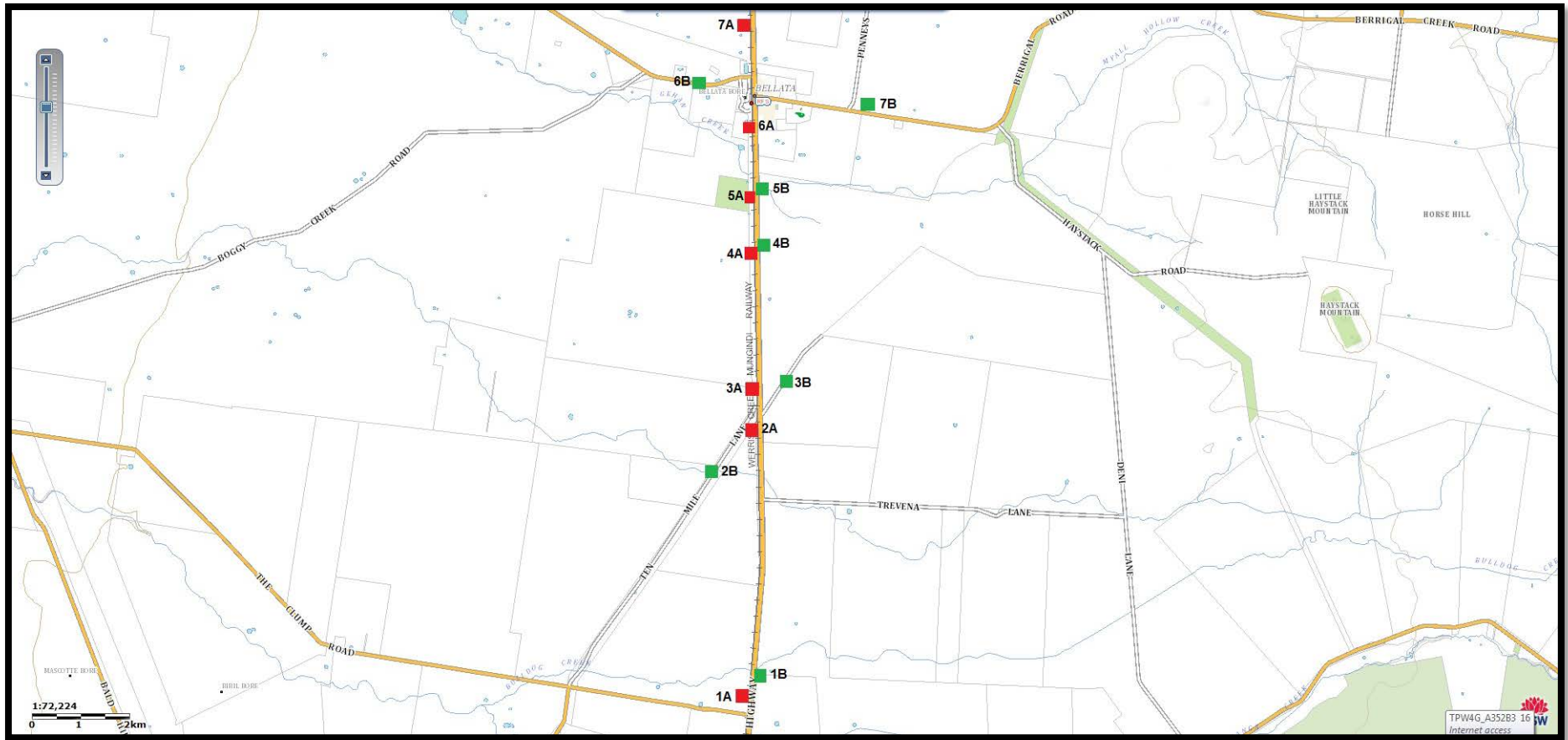


Figure 9-1. Location of monitoring sites in Stage 1 The Clump Road and Bellata.

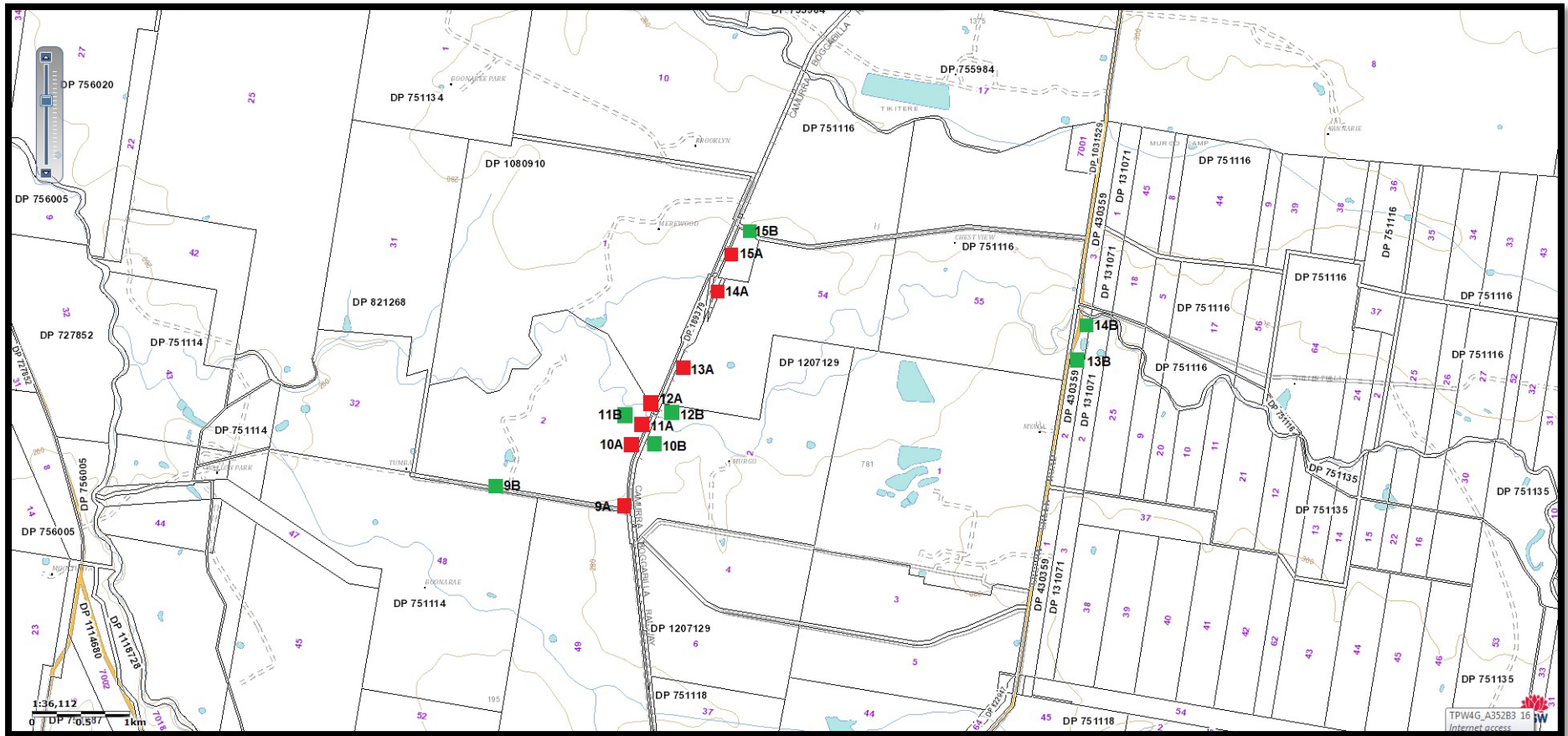


Figure 9-3. Location of monitoring sites in Stage 3 between Croppa Creek and North Star.

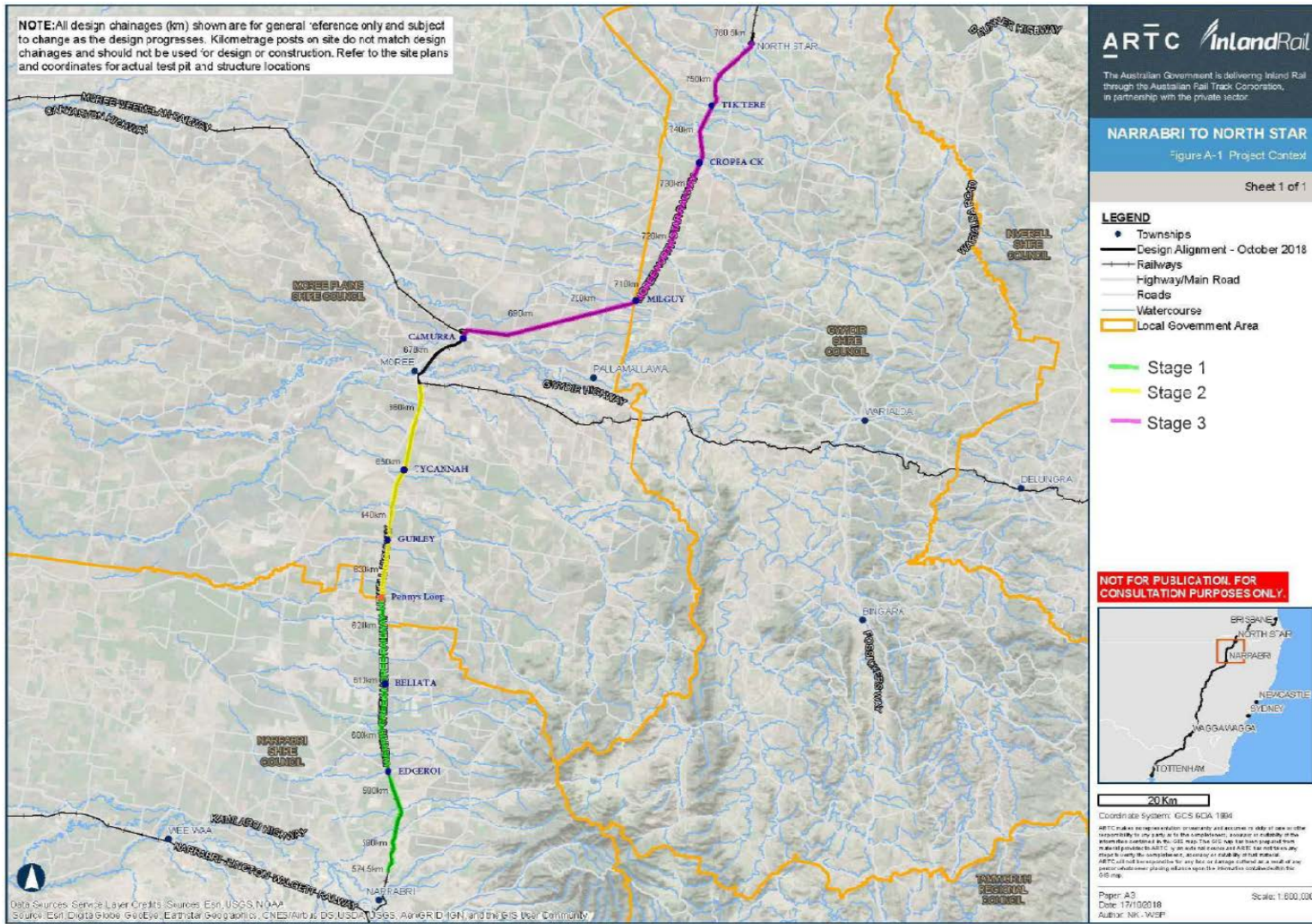


Figure 9-4. N2NS Project Stages.

10.0 APPENDIX B – FCWS SIGNIFICANCE ASSESSMENTS

10.1 Five-part Test of Significance under the BC Act (2016)

The following was prepared by Umwelt (2021).

The five-clawed worm-skink (*Anomalopus mackayi*) is a burrowing lizard with a worm-like body that can grow up to 27 centimetres long (OEH 2017). The five-clawed worm-skink is dark brown above with a green yellow underside (Swan 1990). This skink has short limbs with three fingers and two toes. This feature is used to distinguish this species from the more common two-clawed worm-skink which only has two toes on the front limbs (OEH 2017).

The five-clawed worm-skink has been recorded along the western slopes of the Great Dividing Range, in north-eastern NSW and south-eastern Queensland (Sadlier et al. 1996; Swan 1990; Wilson and Knowles 1988). Within this distribution, the five-clawed worm-skink inhabits grassy white box woodlands supported by moist black soils and river red gum – Coolibah – Bimble box woodland on deep cracking clay soils (OEH 2017). The five-clawed worm-skink lives in tunnel-like burrows within the soil, coming to the surface under fallen timber and leaf litter.

The local population of a threatened fauna species is defined in the Threatened Species Test of Significance Guidelines as '*The population that occurs in the study area*' (OEH 2018). This may be extended to include '*those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area*' (OEH 2018).

For the purposes of this assessment, the local population has been defined as occurring within the extent of ground-truthed vegetation mapping prepared by Umwelt (2020) as part of the broader approved Submissions and Preferred Infrastructure Report (SPIR) Construction Impact Zone (CIZ). It is noted that the local population may extend further than the SPIR CIZ as part of adjoining habitat.

This test of significance is based on the following datasets provided by ARTC and prepared by GeoLink:

- five-clawed worm-skink register – excel spreadsheet labelled as "3753_FCWS RegisterMaster_Geolink06122021"
- five-clawed worm-skink soil stripping area – excel spreadsheet labelled "FCWS RFI Calculations as of November 30 2021". Note that the density of five-clawed worm-skinks within each vegetation zone is based on this soil stripping spreadsheet which reports 98 individuals recorded. For this test of significance, the additional 18 individuals subsequently recorded have been attributed to vegetation zones within the 6.6 hectares of stripped area as noted in the spreadsheet "3753_FCWS RegisterMaster_Geolink06122021".
- The IFC CIZ as detailed in Umwelt (2021).

a. in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

According to the BioNet atlas of NSW wildlife (accessed 1/12/2021), there are two records (1992 and 2008) of the five-clawed worm-skink within 10 kilometres of the IFC CIZ. A potential record of the five-clawed worm-skink was made during pre-clearance surveys on 5 July 2021 (GeoLink 2021) in the northern section of the CIZ at chainage 741.225. Since this initial potential detection, a total of 116 individuals have been recorded by GeoLink as part of pre-clearing and post-clearing works between chainage 736 and 742. Of the 116 individuals recorded, 55 individuals have been recorded as dead as part of clearing works, 18 detected as dropped tails and 43 individuals relocated. These works have resulted in the potential death of approximately 47% to 63% (if dropped tails are counted as mortality) per cent of the recorded individuals.

The 116 individuals have been recorded from approximately 6.6 hectares of stripped habitat in the CIZ, comprising the following breakdown:

- Non-native vegetation – 23 individuals in 2.6 hectares of stripped habitat
- Zone - 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion – Moderate to Good condition – 1 individual in 0.07 hectares of stripped habitat
- Zone - 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion – 87 individuals within 2.9 hectares of stripped habitat
- Zone - 5 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of northcentral NSW – Moderate to Good condition – 2 individuals within 0.4 hectares of stripped habitat.
- Zone - 6 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of northcentral NSW-Derived Native Grasslands – 3 individuals within 0.6 hectares of stripped habitat.

Further to these vegetation zones the following vegetation zones are also considered habitat based according to the Threatened Biodiversity Data Collection (TBDC):

- Zone - 2 - PCT-35 BVT-BR120, NA117-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion– Moderate to Good condition
- Zone - 3 - PCT-39 BVT-BR130, NA129-Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion – Moderate to Good condition.

For the purposes of this assessment, the local population has been defined as occurring within the extent of ground-truthed vegetation mapping prepared by Umwelt as part of the broader approved SPIR CIZ (Umwelt 2020). Based on this area and the detection rates per hectare as part of clearing surveys, it is estimated that the local population could comprise 21,100 individuals. This is based on the density of individuals recorded within each vegetation zone. In the absence of recorded individuals within a vegetation zone the overall average density has been applied. Of this, an estimated 12,000 individuals occur in the IFC CIZ. The IFC CIZ will be subject to different levels of disturbance. Topsoil stripping will result in direct disturbance to approximately 1,500 individuals. The remainder of the IFC CIZ will not result in topsoil stripping and will include laydown areas and slashing for sight lines. The area of the IFC CIZ which will not have topsoil stripped is estimated to contain 10,500 individuals.

Based on a mortality rate of 47%, the proposed development would result in the removal of an estimated 705 individuals, whilst based on a mortality rate of 63%, the proposed development would result in the removal of an estimated 945 individuals. Furthermore, the proposal would result in the disturbance of habitat to an estimated 10,500 individuals from a local population size of 21,100. This represents removal of approximately 3%-4% of the local population and the disturbance of habitat of 50% of the local population. Based on this assessment the proposed development is considered likely to have an adverse effect on the lifecycle of the five-clawed worm-skink such that a viable local population of the species is likely to be placed at risk of extinction.

b. in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction, c. in relation to the habitat of a threatened species or ecological community:

Not applicable to a threatened species.

c. in relation to the habitat of a threatened species or ecological community:

i. the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

(i) Five-clawed worm-skinks have been recorded within five vegetation zones within the IFC CIZ, namely:

- Cleared/Non-native vegetation
- Zone - 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion (Moderate to Good)
- Zone - 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion (Moderate to Good Natural Grassland)
- Zone - 5 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Moderate to Good condition)
- Zone - 6 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW-Derived Native Grasslands (Moderate to Good Derived Native Grassland).

In addition, the species is associated with two PCTs within the TBDC, which comprise two vegetation zones within the IFC CIZ as follows:

- Zone 2 - PCT35 (BR120, NA117) Brigalow - Belah open forest/woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion (Moderate to Good)
- Zone 3 - PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion (Moderate to Good)

Based on the known and predicted habitat detailed above, approximately 95.6 hectares of five-clawed worm-skink habitat would be directly removed (topsoil stripped) by the development and disturbance (slashing and laydown areas) to approximately 692.5 hectares of habitat within the IFC CIZ. Of this, 333.9 hectares is comprised of cleared/non-native vegetation which in addition to exotic vegetation includes areas of cropping land and built environments such as internal roads and farm infrastructure. This species has been recorded in open paddocks with few trees, cropped grass and moist black soils (DAWE 2021). For this assessment, cleared/non-native vegetation representing potential habitat for the five-clawed worm-skink has been defined as occurring within 130 metres from native vegetation zones associated with this species. The 130-metre buffer is based on the maximum distance of recorded individuals to date from the edge of native vegetation zones into cleared/non-native vegetation. The railway centre line has also been buffered by three metres and this area removed as potential habitat. It is likely that only a proportion of land mapped within this vegetation zone would provide suitable habitat for five-clawed worm-skink. Specifically, areas of suitable habitat within cleared/non-native vegetation would include areas of exotic grassland, or areas of cropping land on cracking black clay immediately adjacent to retained native or exotic vegetation. The adjacent cropped land comprises regularly disturbed soil and is considered lower quality habitat than the exotic grasslands present in the corridor where the current records of the five-clawed worm-skink have been made. As a result, the area of suitable five-clawed worm-skink habitat expected to be cleared is likely an overestimate.

(ii) The native vegetation within the IFC CIZ has been subject to high levels of fragmentation due to land use and vegetation clearance from agricultural land use practices. As a result, it is likely that the previous extent of the species has been reduced and fragmented. The individuals recorded during clearing works occur in both retained native vegetation as well as within disturbed non-native vegetation, indicating that the species possesses an ability to persist in fragmented landscapes. Whilst the development would reduce the size of the patches of suitable habitat for the species within and adjacent to the IFC CIZ, this reduction is unlikely to result in a significant increase in fragmentation of habitat for the species, given the level of fragmentation of the species habitat across the local population. No new or additional areas of five-clawed worm-skink habitat would be fragmented or isolated as a result of the development.

(iii) The development would result in the direct removal (topsoil stripped) of approximately 95.6 hectares of five-clawed worm-skink habitat and disturbance (slashing and laydown areas) to approximately 692.5 hectares of five-clawed worm-skink habitat within the IFC CIZ. As discussed above, the local population has been defined as occurring within the extent of ground-truthed vegetation mapping prepared by Umwelt as part of the broader approved SPIR CIZ. Based on this area and the detection rates per hectare as part of clearing surveys, it is estimated that the local population could comprise 21,100 individuals occurring across approximately 1,526.8 hectares of suitable habitat within the SPIR CIZ. As such, clearing impacts from the development would result in the direct removal of approximately 6% of the local population's habitat and the disturbance of approximately 45% of suitable habitat for the local population.

As discussed above, areas of suitable habitat for five-clawed worm-skink include Cleared/Non-native vegetation which in addition to exotic vegetation includes areas of cropping land and built environments such as internal roads and farm infrastructure. As such, it is likely that only a proportion of land mapped within this vegetation zone would provide suitable habitat for five-clawed worm-skink and as a result, the area of suitable five-clawed worm-skink habitat expected to be cleared is likely an overestimate. Furthermore, GeoLink has recorded 23 individuals of the species within non-native vegetation from approximately 2.6 hectares of clearing, whereas 93 individuals have been recorded within native vegetation from approximately 4.1 hectares of clearing. This indicates that not only is the suitable habitat within cleared/non-native vegetation likely to be overestimated, the available habitat within the zone itself is likely to be more marginal in quality and condition compared to areas of native vegetation. As such, areas of native vegetation are likely to be more important to the long survival of the local population of five-clawed worm-skink than areas of non-native vegetation.

The development would remove/disturb 333.9 hectares of suitable five-clawed worm-skink habitat within cleared/non-native vegetation, of 679 hectares of this zone occurring across the SPIR CIZ. This represents a 49% reduction of the poorer quality, more marginal habitat within the local population. The development would result in the direct removal (topsoil stripped) of approximately 95.6 hectares of five-clawed worm-skink habitat and disturbance (slashing and laydown areas) to approximately 692.5 hectares of habitat within the IFC CIZ comprised of the following vegetation zones:

- Zone - 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion (Moderate to Good)
- Zone 2 - PCT35 (BR120, NA117) Brigalow - Belah open forest/woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion (Moderate to Good)
- Zone 3 - PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion (Moderate to Good condition)
- Zone - 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion (Moderate to Good Natural Grassland)
- Zone - 5 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Moderate to Good condition)
- Zone - 6 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW-Derived Native Grasslands (Moderate to Good Derived Native Grassland).

Approximately 847.7 hectares of this better quality five-clawed worm-skink habitat comprising the zones listed above occurs across the SPIR CIZ. The direct removal (topsoil stripping) of 50.8 hectares of native vegetation within these vegetation zones represents approximately a 6% reduction in the better-quality habitat across the local population. Further to this, disturbance (slashing and laydown areas) to approximately 403.4 hectares of habitat within the IFC CIZ represents disturbance of approximately 48% of the better-quality habitat.

The better quality habitat across the local occurrence is considered important to the long-term survival of the five-clawed worm-skink in the locality.

d. whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The declared areas of outstanding biodiversity value (AOBV) are as follows:

- Gould's Petrel – critical habitat declaration
- Little penguin population in Sydney's North Harbour – critical habitat declaration
- Mitchell's Rainforest Snail in Stotts Island Nature Reserve – critical habitat declaration
- Wollemi Pine – critical habitat declaration.

The development would not impact any of the declared AOBVs.

e. whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

Threatening process means a process that threatens or may have the capability to threaten the survival or evolutionary development of species, populations or ecological communities. Key threatening processes are listed under the BC Act.

The Proposal constitutes, and/or is part of, and/or would be likely to result in the operation of, and/or increase the impact of, a number of key threatening process that particularly relate to five-clawed worm-skink:

- Clearing of native vegetation
- Invasion of native plant communities by exotic perennial grasses
- Removal of dead wood and dead trees.

Conclusion

The local population of five-clawed worm-skink is estimated to be approximately 21,100 individuals, based on the area of suitable habitat within the SPIR CIZ and species detection rates per hectare as defined by the clearance work already commenced as part of the project. Of the total local population size, it is estimated that 12,000 individuals occur in the IFC CIZ. Based on the estimated density rates per hectare, the development would remove approximately 705 individuals (based on a mortality rate of 47%) to 945 individuals (based on a mortality rate of 63%), representing a reduction of approximately 3%-4% of the local population. Further to this, areas of the IFC CIZ where topsoil will not be stripped (comprising slashing and laydown areas) would disturb habitat for approximately 10,500 individuals or 50% of the local population.

Based on the known and predicted habitat within the IFC CIZ, approximately 95.6 hectares of five-clawed worm-skink habitat would be directly removed (topsoil stripped) by the development and disturbance (slashing and laydown areas) to approximately 692.5 hectares of habitat within the IFC CIZ, which represents approximately a 6% direct removal of the local population's habitat and the disturbance of approximately 45% of suitable habitat for the local population. Whilst the species has been found to occur within both native and exotic vegetation, five-clawed worm-skink have been more frequently found within areas of native vegetation such that the density per hectare within these areas are substantially higher than within areas of exotic vegetation, indicating that areas of native vegetation are likely to be more important to the long survival of the local population of five-clawed worm-skink than areas of non-native vegetation. The proposed development would remove 7% (topsoil stripping) and disturb (slashing and laydown areas) a further 43% five-clawed worm-skink habitat comprised of exotic vegetation within the SPIR CIZ. Whilst the proposed development would remove 6% (topsoil stripping) and disturb (slashing and laydown areas) a further 48% five-clawed worm-skink habitat comprised of native vegetation. As a result, the development would significantly impact areas of habitat important to the survival of the local population.

In light of the above, the proposed works are likely to have a significant impact the local population of five-clawed worm-skink.

10.2 Test of Significance under the EPBC Act (1999)

The following was prepared by Umwelt (2021).

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: (a) lead to a long-term decrease in the size of an important population of a species.

According to the *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (DoSEWPAC, 2011), important habitat for five-clawed worm-skink is considered to be a surrogate for an important population due to the difficult nature of their detection and lack of knowledge regarding population size. Suitable habitat is considered to be important habitat if it is:

- habitat where the species has been identified during a survey
- near the limit of the species' known range
- large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations) a habitat type where the species is identified during a survey, but which was previously thought not to support the species.

Given that the species has been identified within suitable habitat, the suitable habitat within the IFC CIZ is considered to be important habitat and therefore, the local population within the IFC CIZ meets the requirements of an important population under the *EPBC Act*.

A potential record of the Five-clawed Worm-skink was made during pre-clearance surveys on 5 July 2021 (GeoLink 2021) in the northern section of the CIZ at chainage 741.225. Since this initial potential detection, a total of 116 individuals have been recorded by GeoLink as part of pre-clearing and post-clearing works between chainage 736 and 742. Of the 116 individuals recorded, 55 individuals have been recorded as dead as part of clearing works, 18 detected as dropped tails and 43 individuals relocated. These works have resulted in the potential death of approximately 47% to 63% (if dropped tails are counted as mortality) per cent of the recorded individuals.

The 116 individuals have been recorded from approximately 6.6 hectares of stripped habitat in the CIZ, comprising the following breakdown:

- Non-native vegetation – 23 individuals in 2.6 hectares of stripped habitat.
- Zone - 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion – Moderate to Good condition – 1 individual in 0.07 hectares of stripped habitat.
- Zone - 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion – 87 individuals within 2.9 hectares of stripped habitat.

- Zone - 5 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of northcentral NSW – Moderate to Good condition – 2 individuals within 0.4 hectares of stripped habitat.
- Zone - 6 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of northcentral NSW-Derived Native Grasslands – 3 individuals within 0.6 hectares of stripped habitat.

Further to these vegetation zones the following vegetation zones are also considered habitat based according to the Threatened Biodiversity Data Collection (TBDC):

- Zone - 2 - PCT-35 BVT-BR120, NA117-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion– Moderate to Good condition.
- Zone - 3 - PCT-39 BVT-BR130, NA129-Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion – Moderate to Good condition.

For the purposes of this assessment, the important population has been defined as occurring within the extent of ground-truthed vegetation mapping prepared by Umwelt as part of the broader approved SPIR CIZ (Umwelt 2020). Based on this area and the detection rates per hectare as part of clearing surveys, it is estimated that the important population could comprise 21,100 individuals. This is based on the density of individuals recorded within each vegetation zone. In the absence of recorded individuals within a vegetation zone the overall average density has been applied. Of this, an estimated 12,000 individuals occur in the IFC CIZ. The IFC CIZ will be subject to different levels of disturbance. Topsoil stripping will result in direct disturbance to approximately 1,500 individuals. The remainder of the IFC CIZ will not be subject to topsoil stripping but will include laydown areas and slashing for sight lines. The area of the IFC CIZ which will not have topsoil stripped is estimated to contain 10,500 individuals. Based on a mortality rate of 47%, the proposed development would result in the removal of an estimated 705 individuals, whilst based on a mortality rate of 63%, the proposed development would result in the removal of an estimated 945 individuals. Furthermore, the proposal would result in the disturbance of habitat to an estimated 10,500 individuals from a local population size of 21,100. This represents removal of approximately 3%-4% of the local population and the disturbance of habitat of 50% of the local population. Given this, the project is considered to have the potential to lead to a long-term decrease in the size of an important population of the five-clawed worm-skink.

b) reduce the area of occupancy of an important population

Five-clawed worm-skinks have been recorded within five vegetation zones within the IFC CIZ, namely:

- Cleared/Non-native vegetation.
- Zone - 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion (Moderate to Good).

- Zone - 4 - PCT-52 BVT-BR191, NA187-Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion (Moderate to Good Natural Grassland).
- Zone - 5 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW (Moderate to Good condition).
- Zone - 6 - PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW-Derived Native Grasslands (Moderate to Good Derived Native Grassland).

In addition, the species is associated with two Plant Community Types (PCTs) within the TBDC, which comprise two vegetation zones within the IFC CIZ as follows:

- Zone 2 - PCT35 (BR120, NA117) Brigalow - Belah open forest/woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion (Moderate to Good).
- Zone 3 - PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion (Moderate to Good).

Based on the known and predicted habitat detailed above, approximately 95.6 hectares of five-clawed worm-skink habitat would be directly removed (topsoil stripped) by the development and disturbance (slashing and laydown areas) to approximately 692.5 hectares of habitat within the IFC CIZ. Of this, 333.9 hectares is comprised of cleared/non-native vegetation which in addition to exotic vegetation includes areas of cropping land and built environments such as internal roads and farm infrastructure. This species has been recorded in open paddocks with few trees, cropped grass and moist black soils (DAWE 2021). For this assessment, cleared/non-native vegetation representing potential habitat for the five-clawed worm-skink has been defined as occurring within 130 metres from native vegetation zones associated with this specie. The 130-metre buffer is based on the maximum distance of recorded individuals to date from the edge of native vegetation zones into cleared/non-native vegetation. The railway centre line has also been buffered by three metres and this area removed as potential habitat. It is likely that only a proportion of land mapped within this vegetation zone would provide suitable habitat for five-clawed worm-skink. Specifically, areas of suitable habitat within cleared/non-native vegetation would include areas of exotic grassland, or areas of cropping land on cracking black clay immediately adjacent to retained native or exotic vegetation. The adjacent cropped land comprises regularly disturbed soil and is considered lower quality habitat than the exotic grasslands present in the corridor where the current records of the five-clawed worm-skink have been made. As a result, the area of suitable five-clawed worm-skink habitat expected to be cleared is likely an overestimate.

(c) fragment an existing important population into two or more populations

The native vegetation within the IFC CIZ has been subject to high levels of fragmentation due to land use and vegetation clearance from agricultural land use practices and maintenance as an existing railway corridor. As a result, it is likely that the previous extent of the species has been reduced and fragmented. The individuals recorded during clearing works occur in both retained native vegetation as well as within disturbed non-native vegetation, indicating that the species possesses an ability to persist in fragmented landscapes. Whilst the development would reduce the size of the patches of suitable habitat for the species within and adjacent to the IFC CIZ, this reduction is unlikely to result in a significant increase in fragmentation of habitat for the species, given the level of fragmentation of the species habitat across the local population. As a result, it is considered unlikely that the project will fragment an existing important population into two or more populations.

(d) adversely affect habitat critical to the survival of a species

'Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:

- for activities such foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long-term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

Whilst the five-clawed worm-skink has been determined to be an important population within the IFC CIZ, it is not considered to comprise habitat critical to the survival of this species. A substantial amount of similarly suitable habitat occurs in the locality which will not be disturbed by the project.

(e) disrupt the breeding cycle of an important population

Given the details discussed above regarding the amount of habitat and estimated number of individuals, the project is likely to interfere with the breeding cycle of the five-clawed worm-skink.

(f) modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Of the 116 individuals recorded, 55 individuals have been recorded as dead as part of clearing works, 18 detected as dropped tails and 43 individuals relocated. These works have resulted in the potential death of approximately 47% to 63% (if dropped tails are counted as mortality) of the recorded individuals. These figures indicate that the project may be causing the species to decline in the locality.

(g) result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

The potential for indirect impacts and deterioration of remaining habitat is considered low, given the existing site disturbance and presence of weeds from historical management as a rail corridor and proximity to adjacent agricultural land. The project is considered unlikely to result in invasive species that are harmful to the five-clawed worm-skink becoming further established in the species habitat.

(h) introduce disease that may cause the species to decline, or

The project is unlikely to result in the introduction of a disease that may cause the species to decline.

(i) interfere substantially with the recovery of the species.

Given the high mortality rate of the species recorded to date, the project is considered likely to substantially interfere with the recovery of the species.

Conclusion

Based on the above, the project is likely to result in a significant impact on an important population of the five-clawed worm-skink.

11.0 APPENDIX C – REGULATOR CORRESPONDENCE RECORDS

12.0 APPENDIX D – FCWS REGISTER

Table 12-1. The FCWS Register up until the 07th October 2022.

RefNo	Capture Date and Time	Capture Easting GDA94	Capture Northing GDA94	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Constructio nActivity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA94	Release Northing GDA94	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recome ncent			
1	05/07/2021 2:30	238269.13	6782267.72	80.00	50.00	130.00	Adult	Good (tail dropped)	Log	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Slashing	Diurnal - pre-clearing/ disturbance active searches		741.23	Alive	QG, BK	No	No	238219.90	6781983.96	Similar habitat in proximity to capture site	Dense vegetation	56 Poplar Box Belah Woodland	Black cracking clay	Yes		No	First project find triggering unexpected find procedure					
2	16/10/2021 13:45	238035.23	6779304.18	93.87	105.74	199.61	Adult	Good	Under sleeper, black clay cracking soil, heavily disturbed and weeded, 2m east of rail ballast	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil										Slashing	Diurnal - pre-clearing/ disturbance active searches		738.17	Alive	QG, VP	Yes	Yes	237928.59	6781890.16	Similar habitat to discovery site, with black clay soils. Woodland habitat outside of CIZ boundary. Close to previous FCWS capture.	Cracking black clay soil, Under log	78 River Red Gum Riparian Woodland	Dark clay soil	Yes		Yes	Veg heavily weeded, crop land either side of CIZ					
3	17/10/2021 9:50	237993.60	6779657.88	114.07			Adult	Good (tail dropped)	Cracking black clay soils - found after being dug up by slasher	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil										Slashing	Diurnal - pre-clearing/ disturbance active searches		738.54	Alive	VP	Yes	Yes	238221.61	6781965.60	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.	Cracking black clay soil, Under log	56 Poplar Box Belah Woodland	Dark clay soil	Yes		Yes	Veg heavily weeded, crop land either side of CIZ					
4	17/10/2021 10:46	237965.40	6779874.79				Adult	Dead	Cracking black clay soils - found after being dug up by slasher	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil										Slashing	Diurnal - post clearing search	Slasher	738.75	Dead	VP	Yes	Yes								No							
5	18/10/2021 8:29	237910.63	6780272.12	79.29	74.21	153.50	Adult	Fair	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	739.15	Alive	VP	Yes	Yes	237937.50	6781794.23	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.	Black cracking clay soils. Remnant red gum woodland	78 River Red Gum Riparian Woodland	Dark clay soil	Yes		No					
6	18/10/2021 8:58	237935.34	6780098.54	78.62	99.38	178.00	Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.98	Dead	VP	Yes	Yes								NA						
8	18/10/2021 10:00	237965.49	6779890.91				Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.76	Dead	VP	Yes	Yes								N/A	Head =9.31mm					
7	18/10/2021 9:15	237927.86	6780186.71	107.29			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	739.06	Dead	VP	Yes	Yes								No						
9	18/10/2021 12:13	238204.44	6782074.52	99.23	64.40	163.27	Adult	Good	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	741.02	Alive	QG	Yes	Yes	238385.79	6782436.99	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.	Woodland, soft soil, good cover, plenty of leaf litter	56 Poplar Box Belah Woodland	Dark clay soil	Yes		Yes	Head=8.8mm				
10	18/10/2021 14:13	237948.64	6779993.04				Adult	Good	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.87	Alive	VP	Yes	Yes	237957.12	6781798.77	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.	Woodland, soft soil, good cover, plenty of leaf litter	78 River Red Gum Riparian Woodland	Dark clay soil	Yes		Yes	Measurement data loss due to GIS program error				
11	18/10/2021 14:19	237948.72	6779990.03				Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.87	Dead	VP	Yes	Yes							No	-						
12	18/10/2021 14:34	237929.52	6780125.13	78.51			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	739	Dead	VP	Yes	Yes							Yes	Tail missing						
13	18/10/2021 14:53	237939.23	6780077.25	89.42			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.95	Dead	VP	Yes	Yes							No	Missing tail, SV length approx						
14	18/10/2021 16:09	237958.87	6779887.00	68.52			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.76	Dead	VP	Yes	Yes							No	-						
15	19/10/2021 9:04	238019.10	6779452.80	68.36			Subadult	Good	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.33	Alive	VP	Yes	Yes	237957.12	6781798.77	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.	Woodland, soft soil, good cover, plenty of leaf litter	78 River Red Gum Riparian Woodland	Dark clay soil	Yes		Yes	Tail missing				
16	19/10/2021 9:28	238023.20	6779424.95	108.02			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.3	Dead	VP	Yes	Yes							No	Dead following dozer						
17	19/10/2021 9:57	238007.09	6779567.45	80.24			Adult	Fair	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.45	Alive	VP	Yes	Yes	237980.32	6781796.02	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.		78 River Red Gum Riparian Woodland	Dark clay soil	Yes		Yes	Missing tail				
18	19/10/2021 11:41	238049.86	6779223.68	93.01			Adult	Fair	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.1	Alive	VP	Yes	Yes	237938.87	6781682.04	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.		56 Poplar Box Belah Woodland	Dark clay soil	Yes		Yes	Tail missing				
19	19/10/2021 12:03	238033.55	6779322.94	109.83			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.19	Dead	VP	No	No							No							
20	19/10/2021 12:08	238034.80	6779332.97				Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	738.2	Dead	VP	No	No							No	Bottom half of body missing						
22	19/10/2021 12:40	238073.66	6779001.63	92.44			Adult	Fair	Black cracking clay soils; found during grubbing surveys	Exotic Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.87	Alive	VP	Yes	Yes	237965.73	6781748.65	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.		78 River Red Gum Riparian Woodland	Dark clay soil	Yes		No					
24	19/10/2021 13:01	238085.49	6778912.96	85.72	105.20	190.92	Adult	Good	Black cracking clay soils; found during grubbing surveys	Exotic Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.78	Alive	VP	Yes	Yes	237962.40	6781756.47	Similar habitat to discovery site, with black clay soils. Habitat outside of CIZ boundary. Close to previous FCWS capture.	Dense groundcover	78 River Red Gum Riparian Woodland	Dark clay soil	Yes		Yes					
25	19/10/2021 13:15	238064.59	6779052.85				Adult	Dead (euthanised)	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.92	Dead	VP	No	No							No	Broken back - euthanased						
26	19/10/2021 13:31	238071.72	6778972.58	105.77			Adult	Dead	Black cracking clay soils; found during grubbing surveys	Exotic Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.85	Dead	VP	No	No							No							
21	19/10/2021 12:38	238077.46	6778924.34				Adult	Dead	Black cracking clay soils; found during grubbing surveys	Exotic Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.8	Dead	VP	Yes	Yes							No	Cut in half						
23	19/10/2021 12:58	238071.20	6779034.75	80.69	91.40	172.09	Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.9	Dead	VP	No	No							No							
27	19/10/2021 14:40	238072.68	6779019.91	114.99			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.88	Dead	VP	Yes	Yes							No							
28	19/10/2021 14:59	238067.38	6779022.58	84.18			Adult	Dead	Black cracking clay soils; found during grubbing surveys	52 QLD Bluegrass/Mitchell Grass Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.89	Dead	VP	Yes	Yes							No							
29	19/10/2021 15:38	238080.55	6778892.82	114.77			Adult	Dead	Black cracking clay soils; found during grubbing surveys	Exotic Grassland	Dark clay soil											Topsail removal	Diurnal - post topsail removal search	Dozer	737.77	Dead	VP	Yes	Yes							No							
31	05/11/2021 21:36	237959.52	6779723.02	109.00			Adult	Good, old tail damage	Old rail metal	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Nocturnal - active searches		738.6	Alive	DSA, VP	No	No	237977.76	6781844.67	Same soil, close to capture, veg cover, lg	Log, dense ground cover	78 River Red Gum Riparian Woodland	Black clay	Yes		No	Active search during nocturnal survey trial				

RefNo	Capture Date and Time	Capture Easting GDA84	Capture Northing GDA84	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Constructio nActivity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA84	Release Northing GDA84	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recome ncent
30	05/11/2021 20:02	238004.02	6779375.93	81.00	92.00	173.00	Adult	Good	Below large rock	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Nocturnal - active searches		738.25	Alive	DSA, VP	No	No	237977.76	6781844.67	Same soil, close to capture, veg cover, log	Log, dense ground cover	78 River Red Gum Riparian Woodland	Black clay	Yes		No	Active search during nocturnal survey trial		
34	15/11/2021 13:50	237863.30	6781206.98	83.00	108.00	191.00	Adult	Good	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Excavator	740.1	Alive	BK	Yes	No	237954.40	6781753.88	Similar soils, close proximity to other FCWS finds		78 River Red Gum Riparian Woodland	Black cracking clay	Yes		Yes			
32	15/11/2021 6:49	237914.52	6781380.24	110.00			Adult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail ripping	Diurnal - post ripping search	Grader	740.27	Alive	DSA	No	No	237887.43	6781355.93	Same habitat	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		No			
33	15/11/2021 13:42	237861.81	6781192.77	115.00	133.00	248.00	Adult	Good	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail ripping	Diurnal - post ripping search	Grader	740.08	Alive	BK	Yes	No	237947.27	6781752.01	Good native vegetation with dead wood laying around	Dense vegetation	78 River Red Gum Riparian Woodland	Black cracking clay	Yes		No			
35	15/11/2021 14:20	237969.56	6779621.46	85.00			Adult	Good (tail dropped)	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Red cracking clay										Topsail ripping	Diurnal - post ripping search	Grader	738.5	Alive	BJM, DSA	Yes	No	237950.94	6781758.01	Native vegetation with dead wood available	Dense vegetation	78 River Red Gum Riparian Woodland	Black cracking clay	Yes		No			
37	15/11/2021 22:15	238139.36	6778374.89	90.00	100.00	190.00	Adult	Good	Mulched vegetation	Exotic Grassland	Black cracking clay										Topsail removal	Nocturnal - active searches		737.25	Alive	VP and BJM	Yes	Yes	237957.59	6781676.11	Similar soil, close to other FCWS finds	Tree root	78 River Red Gum Riparian Woodland	Black cracking clay	Yes		No	Higher sand content with black clay. Found under mulched grass while pre-clearing.		
36	15/11/2021 16:24	237882.62	6780324.41					Tail only	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	739.21	Tail only	VP and BJM	No	No							No	Likely FCWS death				
38	16/11/2021 5:40	237859.47	6780618.84	108.00			Adult	Good	Mulched vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - pre-clearing/ disturbance active searches		739.5	Alive	DSA	No	No	237796.00	6780812.08	Same habitat and soil	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		No			
40	16/11/2021 9:45	238075.93	6778800.43					Tail only	N/A	Exotic Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	737.67	Alive	DSA	No	No							No	Tail only, found post topsail stripping after area had been ripped. Non native grassland.				
45	16/11/2021 16:30	238169.29	6778308.56	110.00	120.00	230.00	Adult	Dead (euthanised)	N/A	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	737.17	Dead	BJM	Yes	No							No	Found with broken spine on an area that had been ripped, while topsail stripping was occurring. Had to be euthanised via blunt force trauma. Area was ripped earlier that day. Grader used.				
44	16/11/2021 16:20	238145.24	6778366.66					Tail only	N/A	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	737.23	Tail only	BJM	No	No							No	Found FCWS tail during topsail stripping after ripping.				
39	16/11/2021 9:30	237899.49	6781327.64					Dead	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Excavator	740.22	Dead	BK	No	No							No	Found during vegetation/topsoil removal on steep batter in cutting. Excavator was undertaking work as it was too steep for a grader.				
41	16/11/2021 11:30	237873.80	6781260.79					Dead	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Excavator	740.14	Dead	BK	No	No							No	Found during vegetation/topsoil removal on steep batter in cutting. Excavator was undertaking work as it was too steep for a grader.				
42	16/11/2021 11:40	237852.20	6781201.47	60.00			Subadult	Dead (euthanised)	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Excavator	740.08	Dead	BK	No	No							No	Found during vegetation/topsoil removal on steep batter in cutting. Excavator was undertaking work as it was too steep for a grader.				
43	16/11/2021 13:40	237832.25	6781080.89					Dead	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Excavator	739.95	Dead	BK	No	No							No	Found during vegetation/topsoil removal on steep batter in cutting. Excavator was undertaking work as it was too steep for a grader.				
49	17/11/2021 15:15	238172.62	6778306.85				Adult	Good	Log	Exotic Grassland	Black cracking clay										Slashing	Diurnal - post clearing search	Slasher	737.17	Alive	BK	No	No	238172.69	6778306.86		Exotic Grassland				No	Self relocated out of corridor, pile of wooden sleeps made so it has suitable habitat away from construction. Exotic grassland.			
46	17/11/2021 8:22	238273.30	6777457.72					Tail only	N/A	52 QLD Bluegrass/ Mitchell Grass Grassland	Red cracking clay										Topsail removal	Diurnal - post removal search	Grader	736.3	Tail only	DSA	No	No							No	Fewe tail, likely mortality in wind-rowed topsail (body not found). In topsail ripping trial area.				
47	17/11/2021 8:37	238256.25	6777376.18					Tail only	N/A	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	736.24	Tail only	DSA	No	No							No	Exotic grassland. Tail only found.				
48	17/11/2021 15:07	238196.68	6777854.20					Dead	N/A	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	736.72	Dead	DSA	No	No							No	Exotic grassland. Dead (not complete skink). Ripping not undertaken due to underground utilities				
50	17/11/2021 15:29	238162.01	6778163.50					Dead	N/A	Exotic Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	737.03	Dead	DSA	No	No							No	Exotic grassland. Dead (not complete skink). Ripping not undertaken due to underground utilities				
52	18/11/2021 14:26	238120.23	6778405.32	89.00			Adult	Dead	N/A	Exotic Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	737.275	Dead	DSA	No	No							No	Grader.				
51	18/11/2021 14:09	238117.58	6778494.08				Adult	Tail only	N/A	Exotic Grassland	Black cracking clay										Topsail removal	Diurnal - post removal search	Grader	737.36	Tail only	DSA	No	No							No	Tail only detected, significant soil compaction, likely dead				

RefNo	Capture Date and Time	Capture Easting GDA84	Capture Northing GDA84	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Construction Activity	FCWS detection method	Equipment	Chainage	Condition Analysis	Survivor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA84	Release Northing GDA84	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recement	
53	18/11/2021 15:21	238166.90	6778338.89	110.00			Subadult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Excavator	737.2	Alive	BK	No	No	238116.32	6778409.77			52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No		Dispersed animal in habitat outside of topsail stripping area. Topsail stripping complete.	No	Found during excavator stripping in V drain. Animal dispersed during processing outside of the grubbing area, within SPIR		
54	18/11/2021 16:01	238127.30	6778577.68					Dead	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	737.45	Dead	VP	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No			Tail only - body could not be located (see photo). Grubbing with grader			
55	18/11/2021 16:10	238125.82	6778602.73	105.00	124.00	229.00	Adult	Dead	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	737.47	Dead	VP	Yes	Yes					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
56	18/11/2021 16:19	238118.67	6778640.41					Tail only	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	737.52	Tail only	VP	Yes	Yes					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
57	18/11/2021 16:25	238120.68	6778628.93	108.00				Dead	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	737.49	Dead	VP	Yes	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader. Half of tail missing.		
58	18/11/2021 16:33	238125.84	6778617.89	85.00			Subadult	Fair	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	737.48	Alive	VP	Yes	Yes	238192.25	6777479.91	Similar soil, close to other FCWS finds	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No		Topsail stripping completed.	No	Grader. Tail missing		
59	18/11/2021 16:38	238127.05	6778590.36	112.00			Adult	Dead	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	737.45	Dead	VP	Yes	Yes					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
60	19/11/2021 8:07	238153.67	6778224.22					Dead	Soil crack	Exotic Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Excavator	737.08	Dead	BK	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Excavator		
65	19/11/2021 11:24	238098.10	6778616.17	105.00			Adult	Dead	Mulched vegetation	Exotic Grassland	Red cracking clay										Topsail removal	Diurnal - post topsail removal search	Excavator	737.48	Dead	BK	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No						
66	19/11/2021 11:32	237832.82	6780867.03	130.00			Adult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - pre-clearing/disturbance active searches		739750	Alive	QG, DA	No	No	237758.96	6780789.11	Cover, soil, close to capture sight	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes				Grader		
67	19/11/2021 11:35	237839.09	6780778.13	90.00			Subadult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	739.66	Alive	QG, DA	No	No	237758.96	6780789.11	Cover, soil, close capture site	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes				Grader		
61	19/11/2021 8:37	238120.68	6778690.23	125.00			Adult	Good (tail dropped)	Mulched vegetation	Exotic Grassland	Black cracking clay										Slashing	Diurnal - pre-clearing/disturbance active searches		737.56	Alive	QG	No	No	237749.65	6780795.03	Cover, vegetation, soil	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes				Lost tail		
69	19/11/2021 12:14	238047.96	6781675.57	111.00			Adult	Good (tail dropped)	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.59	Alive	DSA	No	No	237983.10	6781663.24	Similar habitat, soil and proximity	Log	56 Poplar Box Belah Woodland	Black cracking clay	Yes				Grader		
73	19/11/2021 13:19	237879.09	6781221.30	89.00			Adult	Good (tail dropped)	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.11	Alive	DSA	No	No	237969.63	6781635.40	Similar habitat, soil and proximity	Log	56 Poplar Box Belah Woodland	Black cracking clay	Yes				Grader		
63	19/11/2021 11:00	237880.71	6780539.19					Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	739.42	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader.		
62	19/11/2021 9:40	237852.51	6781002.91					Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	739.88	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader.		
64	19/11/2021 11:01	237962.04	6781466.45					Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.37	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader.		
72	19/11/2021 13:12	238018.32	6781579.05					Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.49	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader.		
70	19/11/2021 12:30	237901.25	6781256.24					Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.15	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader.		
71	19/11/2021 12:41	237996.86	6781532.20					Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.44	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader.		
68	19/11/2021 12:01	237916.85	6781340.67					Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.23	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader.		
75	19/11/2021 14:48	237953.54	6781487.73					Dead	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.38	Dead	BJM	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
77	19/11/2021 15:13	237978.62	6781517.70					Dead	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.42	Dead	BJM	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
78	19/11/2021 15:22	237943.30	6781449.17	99.00	111.00	210.00	Adult	Good	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.35	Alive	BJM	No	No	237923.54	6781497.52	Similar habitat, soil and proximity	Log	27 Weeping Myall Woodland	Black cracking clay	Yes				Grader		
79	19/11/2021 15:55	238004.62	6781598.36	85.00			Adult	Dead	N/A	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.52	Dead	BJM	Yes	Yes					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
76	19/11/2021 15:10	238005.31	6781591.15				Adult	Dead	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.5	Dead	BJM	Yes	Yes					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
74	19/11/2021 13:53	238031.31	6781598.69					Tail only	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.51	Tail only	BJM	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
80	19/11/2021 16:40	237929.24	6781403.77				Adult	Dead	N/A	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.3	Dead	BJM	Yes	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader		
90	20/11/2021 10:04	238261.97	6782251.28	85.00	115.00	200.00	Adult	Good	Log	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	741.21	Alive	QG, DA	No	No	238208.53	6781987.45	Cover, soil, close capture site	Log	56 Poplar Box Belah Woodland	Black cracking clay	Yes				Grader, found under railway sleeper		
98	20/11/2021 14:56	238592.99	6783055.83	85.00	85.00	170.00	Adult	Good	Mulched vegetation	56 Poplar Box-Belah Woodland	Black cracking clay										Topsail removal	Diurnal - pre-clearing/disturbance active searches		742.07	Alive	QG	No	No	238554.93	6782739.72	Cover, soil, outside CIZ	Log	56 Poplar Box Belah Woodland	Black cracking clay	No		Topsail stripping completed. Large area of offsite habitat.	No	No machines, raking ahead		
81	20/11/2021 7:10	238110.39	6781821.11	120.00	110.00	230.00	Adult	Good	Log	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Slashing	Diurnal - pre-clearing/disturbance active searches		740.75	Alive	BK	No	No	237967.56	6781801.79	In proximity to capture	Leaf litter	78 River Red Gum Riparian Woodland	Black cracking clay	Yes				Approx. measurements.		
82	20/11/2021 7:41	238111.53	6781879.05	102.00				Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.82	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader. Euthanased		
83	20/11/2021 7:46	238150.32	6781965.41	82.00	102.00	184.00	Subadult	Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.91	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader. Euthanased		
84	20/11/2021 7:46	238086.90	6781730.95	87.00			Subadult	Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.65	Dead	DSA	No	No					52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	No				Grader. Euthanased		
88	20/11/2021 9:46	238005.70	6781608.																																						

RefNo	Capture Date and Time	Capture Easting GDA84	Capture Northing GDA84	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Construction Activity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA84	Release Northing GDA84	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recement		
96	20/11/2021 13:30	238121.01	6781847.03					Tail only	N/A	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsail removal	Diurnal - post topsail removal search	Grader	740.78	Tail only	DSA	No	No							No	Grader						
86	20/11/2021 9:30	238094.75	6781897.91					Tail only	N/A	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Grader	740.82	Tail only	DSA	No	No							No	Grader					
87	20/11/2021 9:45	238096.47	6781914.08					Tail only	N/A	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Grader	740.84	Tail only	DSA	No	No							No	Grader					
89	20/11/2021 10:00	238159.28	6781993.00					Tail only	N/A	27 Weeping Myall Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Grader	740.93	Tail only	DSA	No	No							No	Grader					
91	20/11/2021 10:30	238179.63	6782045.16					Tail only	N/A	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Grader	740.98	Tail only	DSA	No	No							No	Grader					
99	30/11/2021 7:00	237867.63	6781160.54	102.00	95.00	197.00	Adult	Good	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - pre-clearing/ disturbance active searches		740.04	Alive	DSA, GH	No	No	237864.89	6781335.42	Suitable habitat, proximate to capture site	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		No	Grader previously partially removed topsail from			
100	30/11/2021 8:15	237858.17	6781098.95	75.00	100.00	175.00	Subadult	Good	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	739.98	Alive	DSA, GH	No	No	237856.88	6781338.14	Suitable habitat proximate to capture site	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		No	Excavator topsail removal to complete works attempted by grader			
101	30/11/2021 9:30	238001.01	6781546.13	90.00	130.00	220.00	Adult	Good	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	740.45	Alive	DSA, GH	No	No	237869.28	6781363.18	Suitable habitat proximate to capture site	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		No	Excavator topsail removal on batter impacted by grader			
102	30/11/2021 9:30	237834.34	6781098.83					Tail only	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	739.98	Tail only	DSA	No	No							No	Excavator topsail removal on batter. Tail only found. Soil not compacted so survival possible. No further disturbance to soil pile					
103	30/11/2021 9:45	237941.59	6781392.08					Tail only	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	740.28	Tail only	DSA, GH	No	No							No	Excavator topsail removal. Soil not compacted and no further disturbance to relocated topsail.					
104	30/11/2021 19:58	238029.42	6781636.95	100.00			Adult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Nocturnal - active searches		740.55	Alive	QG, BM	No	No	237969.43	6781731.32	Close capture site, soil, outside CIZ	Dense vegetation	78 River Red Gum Riparian Woodland	Black cracking clay	Yes		No	Tail regrowing			
105	30/11/2021 21:15	238647.11	6783184.13	90.00			Subadult	Good (tail dropped)	Mulched vegetation	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Nocturnal - active searches		742.22	Alive	QG, BM	No	No	238700.52	6783212.39	Soil, close capture site, cover, outside CIZ	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	Yes		No				
110	02/12/2021 11:38	237984.75	6781488.37					Tail only	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	740.39	Tail only	VP	No	No							No	Excavator					
107	02/12/2021 9:00	238565.58	6782941.41	110.00	125.00	235.00	Adult	Good	Mulched vegetation	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - pre-clearing/ disturbance active searches		741.95	Alive	QG	No	No	238538.25	6782696.40	Cover, soil, close capture site	Log	56 Poplar Box-Belah Woodland	Black cracking clay	No		Topsoil stripping completed. Large area of offsite habitat.	No	Pre-clear no machines		
106	02/12/2021 8:37	237951.76	6781486.69	80.00	95.00	175.00	Adult	Good	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - pre-clearing/ disturbance active searches		740.38	Alive	DSA	No	No	237913.36	6781499.24	Proximate to capture site	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		No				
108	02/12/2021 10:45	237965.38	6781428.10				Adult	Tail only	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Red cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	740.33	Tail only	GH	No	No							No						
111	02/12/2021 12:00	237957.09	6781414.64	85.00	80.00	165.00	Subadult	Good	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Red cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	740.3	Alive	GH	No	No	237863.85	6781350.45	Cover, soil, close capture site	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		No				
112	02/12/2021 14:54	238027.44	6781719.74	120.00	80.00	200.00	Adult	Good	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Red cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	740.63	Alive	GH	No	No	237993.73	6781829.10	Cover, soil, close capture site	Dense vegetation	78 River Red Gum Riparian Woodland	Black cracking clay	Yes		No				
109	02/12/2021 21:30	238222.29	6782149.64	80.00	112.00	192.00	Adult	Good	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Nocturnal - active searches		741.1	Alive	QG	No	No	237972.94	6781793.36	Cover, close capture site	Log	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	Yes		No	No machines			
113	03/12/2021 12:10	238277.81	6782271.34					Dead	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	741.23	Dead	VP	No	No							No	Back of tail and mid body section detected - cut by excavator					
114	03/12/2021 18:14	238480.62	6782722.39	105.00	25.00	130.00	Adult	Good	N/A (found during topsail removal)	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	741.72	Alive	GH	No	No	238548.93	6782723.40		Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	No		Topsoil stripping completed. Large area of offsite habitat.	No	Healthy, tail dropped not long ago but healed		
115	04/12/2021 16:11	239022.33	6784110.87	125.00	55.00	175.00	Adult	Good	Tree root	Exotic Grassland	Black cracking clay											Tree clearing	Diurnal - post topsail removal search	Excavator	743.22	Alive	GH, QG	No	No	238698.33	6783223.08	Closest to capture site, outside CIZ	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	Yes		No	Tail regrowing			
116	06/12/2021 21:41	238603.91	6783026.41	110.00	115.00	225.00	Adult	Good	Log	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Nocturnal - active searches		742.05	Alive	QG, BM	No	No	238719.91	6783252.71	Cover, soil, outside CIZ, close capture site	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	Yes		No	No machines			
117	07/12/2021 11:05	238830.44	6783609.86					Tail only	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.68	Tail only	VP	No	No							No	Excavator - body could not be located					
118	07/12/2021 15:04	238559.31	6782929.79	55.00	25.00	80.00	Subadult	Good	N/A (found during topsail removal)	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	741.94	Alive	GH	No	No	238570.19	6782768.75	Heavy vegetation, plenty of cover	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	No		Topsoil stripping completed. Large area of offsite habitat.	No			
119	07/12/2021 15:10	238587.38	6782996.40	0.00			Adult	Dead	N/A (found during topsail removal)	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.02	Dead	GH	No	No							No						
120	07/12/2021 15:31	238607.33	6783051.56	90.00	55.00	145.00	Adult	Good	N/A (found during topsail removal)	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.07	Alive	GH	No	No	238720.84	6783207.14	Plenty of cover, good vegetation	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	Yes		No				
121	07/12/2021 15:40	238674.57	6783214.54	75.00	90.00	165.00	Adult	Good	N/A (found during topsail removal)	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.25	Alive	GH	No	No	238712.06	6783220.58	Good vegetation, covered area	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	Yes		No				
122	07/12/2021 16:37	238691.80	6783273.59					Tail only	Mulched vegetation	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.31	Tail only	QG, BM	No	No							No						
123	07/12/2021 16:40	238718.40	6783343.18					Dead	Mulched vegetation	56 Poplar Box-Belah Woodland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.39	Dead	GH	No	No							No	Unsure age, only recovered half of body					
124	07/12/2021 16:45	238696.30	6783331.78	105.00		105.00	Adult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.37	Alive	QG, BM	No	No	238736.05	6783215.32	Cover, outside CIZ, close capture site	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay	Yes		No				
125	08/12/2021 14:31	238831.72	6783663.75				Adult	Dead (euthanised)	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.73	Dead	GH	No	No							No						
126	08/12/2021 14:34	238814.80	6783626.65				Adult	Dead (euthanised)	N/A (found during topsail removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	742.7	Dead	GH	No	No							No						
127	09/12/2021 9:40	238095.18	6778698.09	117.00	122.00	237.00	Adult	Good	Soil crack	Exotic Grassland	Black cracking clay											Topsail removal	Diurnal - post topsail removal search	Excavator	737.56	Alive	VP	No	No	237731.33	6780796.30	Closest suitable habitat outside CIZ, within SPIR	Dense vegetation	27 Weeping Myall Woodland								

RefNo	Capture Date and Time	Capture Easting GDA84	Capture Northing GDA84	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Constructio nActivity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA84	Release Northing GDA84	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recement		
130	09/12/2021 14:01	237884.01	6781208.77	115.00	8.00	123.00	Adult	Good (tail dropped)	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	740.1	Alive	GH	Yes	N/A	237757.83	6780783.86	Good thick vegetation	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		Yes	Successfully relocated				
131	09/12/2021 14:05	237855.80	6781065.12	125.00	130.00	255.00	Adult	Good	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Excavator	739.52	Alive	GH	Yes	Yes	237748.52	6780786.89		Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		Yes	Successfully relocated				
128	09/12/2021 13:45	238075.48	6778830.08	89.00			Subadult	Good (tail dropped)	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.7	Alive	VP	Yes	Yes	237869.11	6781343.77	Soil, veg, proximity to other finds	Tree root	27 Weeping Myall Woodland	Black cracking clay	Yes		Yes	Water reeds around culvert				
132	09/12/2021 14:30	238101.83	6778761.15	85.00	110.00	195.00	Adult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.65	Alive	QG	Yes	Yes	237755.99	6780785.54	Outside CIZ, soil, close capture site,	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes			No				
133	09/12/2021 14:45	238099.94	6778765.95					Tail only	N/A (found during topsoil removal)	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.64	Tail only	QG	No	Yes								No						
134	09/12/2021 14:45	238104.48	6778762.48					Dead (euthanised)	N/A (found during topsoil removal)	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.63	Dead	QG	Yes	Yes									No					
136	10/12/2021 7:29	237847.40	6780970.47	110.00	130.00	240.00	Adult	Good	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Excavator	739.85	Alive	GH	Yes	Yes	237752.82	6780786.69	Good thick vegetation	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes			No	Gravid, healthy			
137	10/12/2021 7:53	238095.56	6778792.25					Tail only	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.66	Tail only	VP	Yes	Yes									No					
138	10/12/2021 8:06	238092.82	6778798.12				Adult	Dead (euthanised)	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.67	Dead	VP	Yes	Yes										No				
139	10/12/2021 8:12	238098.56	6778805.59				Adult	Dead (euthanised)	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.65	Dead	VP	Yes	Yes											No			
140	10/12/2021 8:26	238095.12	6778811.85					Dead	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.67	Dead	VP	Yes	Yes											No			
141	10/12/2021 8:33	238093.64	6778823.95					Tail only	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.68	Tail only	VP	Yes	Yes											No			
142	10/12/2021 8:37	238096.11	6778828.64					Dead	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.69	Dead	VP	Yes	Yes										No	Back half of body only			
143	10/12/2021 8:49	238089.09	6778832.21					Tail only	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.7	Tail only	VP	Yes	Yes										No				
144	10/12/2021 9:26	238091.05	6778848.61	85.00	93.00	178.00	Subadult	Good	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.72	Alive	VP	Yes	Yes	237868.30	6781353.55			27 Weeping Myall Woodland	Black cracking clay	Yes			No				
145	10/12/2021 9:45	238088.40	6778842.76	115.00			Adult	Good	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.71	Alive	VP	Yes	Yes	237883.47	6781366.41		Tree root	27 Weeping Myall Woodland	Black cracking clay	Yes			No	Part tail missing			
146	10/12/2021 9:45	238091.29	6778837.54	121.00			Adult	Good (tail dropped)	Soil crack	Exotic Grasland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.71	Alive	VP	Yes	Yes	237868.80	6781360.77		Tree root	27 Weeping Myall Woodland	Black cracking clay	Yes			N/A				
147	10/12/2021 11:47	237860.92	6780710.02					Tail only	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil ripping	Diurnal - post topsoil removal search	Excavator	739.6	Tail only	GH	No	No										N/A				
148	10/12/2021 11:54	237853.58	6780697.39					Tail only	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.58	Tail only	GH	No	No										N/A				
149	10/12/2021 13:49	237868.65	6780620.88	109.00	110.00	219.00	Adult	Good	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.5	Alive	VP and GH	Yes	Yes	237858.84	6781346.94		Tree root	27 Weeping Myall Woodland	Black cracking clay	Yes			No				
150	10/12/2021 13:57	237868.07	6780613.70	92.00	112.00	204.00	Adult	Good	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.5	Alive	VP and GH	Yes	Yes	237857.87	6781352.20		Leaf litter	27 Weeping Myall Woodland	Black cracking clay	Yes			No				
151	10/12/2021 15:03	237844.93	6780796.44	85.00	5.00	90.00	Subadult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.67	Alive	GH	N/A	Yes	237924.72	6781289.67	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	No			Topsoil stripping completed. Large area of offsite habitat.	No				
152	10/12/2021 15:05	237847.08	6780779.22	106.00	142.00	248.00	Adult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.65	Alive	GH	N/A	Yes	237912.46	6781253.40	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	No			Topsoil stripping completed. Large area of offsite habitat.	No				
135	09/12/2021 15:45	237854.09	6780733.62	104.00	115.00	219.00	Adult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.64	Alive	GH	No	No	237915.99	6781239.14	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	No			Topsoil stripping completed. Large area of offsite habitat.	No				
153	10/12/2021 15:10	237847.79	6780768.94	112.00	5.00	117.00	Adult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.65	Alive	GH	N/A	Yes	237925.82	6781261.21	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	No			Topsoil stripping completed. Large area of offsite habitat.	No				
154	10/12/2021 15:33	237886.30	6780478.03	87.00	95.00	182.00	Adult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay										Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.35	Alive	VP and GH	Yes	Yes	237865.05	6781366.37	Leaf litter	27 Weeping Myall Woodland	Black cracking clay	Yes			No					
155	14/12/2021 16:34	238913.28	6783850.85					Tail only	Mulched vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Red gravel loam										Topsoil removal	Diurnal - pre-clearing/ disturbance active searches		742.94	Tail only	DSA	N/A	Yes				Dense vegetation		Red gravel loam	N/A			N/A	Tail only, found during DPIE inspection. Black clay topsoil with red subsoil in cutting with gravel component.			
156	11/01/2022 7:48	237865.14	6780497.35				Adult	Tail only	N/A (found during topsoil removal)	Exotic Grasland	Black cracking clay	1-20%	0.5	3	N/A	61-80%	1-20%				Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.37	Tail only	GH	No	Yes								N/A		N/A	Yes			
157	11/01/2022 8:23	237842.76	6780560.54				Subadult	Good	N/A (found during topsoil removal)	Exotic Grasland	Black cracking clay	0%	3	15	0%	81-100%	1-20%				Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.45	Alive	GH	No	Yes								N/A		N/A	Dispersed down soil crack and could not be found. Area left overnight to enable fauna to disperse.	Yes		
158	11/01/2022 12:50	237826.18	6780985.31					Tail only	Soil crack	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	N/A	3	8	21-40%	1-20%	41-60%	Queensland bluegrass, Mitchell grass, Johnson grass	21-40%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	739.9	Tail only	VP	Yes	Yes									N/A		N/A	Tail only - regrowth tail. Tail sample collected (ref. 1.).	Yes	
159	11/01/2022 16:15	238214.22	6777605.07	89.00	109.00	198.00	Adult	Dead	Dense vegetation	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	1-20%	2	4	41-60%	1-20%	41-60%	Rhodes grass, fleabane, exotic grass	21-40%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	736.5	Dead	BK	Yes	Yes									N/A		N/A	Yes		
160	12/01/2022 7:16	238212.23	6777604.14	75.00	20.00	95.00	Subadult	Good (tail dropped)	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	1-20%	0.5	0.5	1-20%	1-20%	41-60%		21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	736.46	Alive	GH	No	Yes	237932.27	6781336.28	Suitable habitat	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	No			Topsoil removal in area complete	No			
161	12/01/2022 9:35	238213.09	6777592.58	40.00	40.00	80.00	Juvenile	Fair	N/A (found during topsoil removal)	52 QLD Bluegrass/Mitchell Grass Grassland	Black cracking clay	1-20%	0.5	2	1-20%	1-20%	41-60%		21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	736.45	Alive	GH	Yes	No	237924.56	6781270.38	Suitable habitat	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	No			Topsoil removal in area complete	Yes			
162	12/01/2022 9:46	238207.44	6777572.82	90.00	80.00	170.00	Adult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass																																

RefNo	Capture Date and Time	Capture Easting GDA84	Capture Northing GDA84	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Construction Activity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA84	Release Northing GDA84	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recome ncent				
164	12/01/2022 9:57	238211.83	6777548.27	105.00	38.00	143.00	Adult	Dead	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	0.5	0.5	1-20%	1-20%	41-60%		1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	736.42	Dead	GH	Yes	No									No	GA12012022_B	Yes					
165	12/01/2022 14:34	238380.60	6782617.47	84.00	6.00	90.00	Adult	Dead	N/A (found during topsoil removal)	56 Poplar Box-Belah Woodland	Black cracking clay	0%			1-20%	41-60%	21-40%		0%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	741.6	Dead	GH	Yes	Yes										No	GH120122_C	Yes				
168	14/01/2022 8:35	238067.76	6778902.94				Tail only	Soil crack		52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	N/A			1-20%	1-20%	61-80%	Q b g: m g: Johnson grass	21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.77	Tail only	VP	Yes	No										No	VP_14122_A	Yes				
169	14/01/2022 9:53	238071.26	6778869.05	80.00	70.00	150.00	Subadult	Good	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	N/A			1-20%	1-20%	61-80%	Johnson grass, nigura burr.	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.74	Alive	VP	Yes	Yes	237774.44	6780786.30	Similar soil, others found nearby	Tree root	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay			Yes			Yes	VP_140122_B	Yes		
166	14/01/2022 8:20	238898.80	6783829.61	70.00			Subadult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	1	4	1-20%	0%	81-100%		0%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	742.91	Alive	GH	Yes	Yes	238798.96	6783461.53	Suitable habitat	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay			Yes	Topsoil removal in area complete	No		Yes			
167	14/01/2022 8:30	238903.13	6783839.16					Dead	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	1	4	1-20%	0%	81-100%		0%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	742.93	Dead	GH	No	Yes									No	GH14012022_A	Yes					
170	14/01/2022 10:45	238994.88	6784049.78					Dead	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	3	30	1-20%	0%	61-80%		0%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	743.14	Dead	GH	No	Yes									No	GH14012022_B	Yes					
171	14/01/2022 13:05	238089.65	6778717.94				Adult	Dead	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	3	5	21-40%	1-20%	1-20%	Johnson grass, neguru burr, Flea bane	21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.6	Dead	VP	Yes	Yes										No	VP_120122_C	Yes				
172	14/01/2022 13:50	238079.04	6778709.42				Adult	Good (tail dropped)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	N/A			1-20%	1-20%	81-100%	Johnson grass, fleabane, Queensland bluegrass	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.56	Alive	VP	Yes	Yes	237756.75	6780788.76	Similar soils, has been fenced	Tree root	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay			Yes		No		Yes	VP_140122_D	Yes	
173	14/01/2022 14:13	238091.66	6778728.13	80.00			Adult	Good (tail dropped)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	N/A			21-40%	1-20%	61-80%	Johnson grass, neguru burr, fleabane	21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.55	Alive	VP	Yes	Yes	237762.37	6780799.19	Suitable habitat	Leaf litter	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay			Yes		No		Yes			
174	14/01/2022 15:56	238085.37	6778740.56	96.00			Adult	Fair	Dense vegetation	Exotic Grassland	Black cracking clay	1-20%	3	10	21-40%	1-20%	21-40%	Rhodes grass, foos parsley, Urochloa grass	21-40%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.61	Alive	BK	Yes	Yes	237913.76	6780028.85	Lots of leaf litter and Woody debris	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay			No	Relocated to a dense vegetation area out of work corridor	Yes	Dropped tail	Yes			
175	15/01/2022 11:18	238084.26	6778756.12	112.00			Adult	Dead (euthanised)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	N/A			1-20%	1-20%	61-80%	Johnson grass, Fleabane	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.625	Dead	VP	Yes	Yes										No		Yes				
177	15/01/2022 14:00	238936.02	6783921.36	100.00			Adult	Good (tail dropped)	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	0.2	0.5	1-20%	61-80%	1-20%		0%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	743.01	Alive	GH	No	Yes	238795.22	6783452.44	Suitable habitat	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay			No	Relocated to a dense vegetation area out of work corridor	No		Yes			
176	15/01/2022 12:14	239239.30	6784674.21				Adult	Tail only	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	0.2	1	1-20%	41-60%	21-40%		0%	Dry	Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Excavator	743.83	Tail only	GH	No	No											No	GH15012022_A	Yes			
179	17/01/2022 11:29	239191.58	6784506.65	116.00			Adult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	N/A			81-80%	1-20%	21-40%	Queensland bluegrass, Mitchell grass, fleabane	61-80%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	743.65	Alive	VP	Yes	Yes	239337.48	6784811.94	Established release hub	Leaf litter	56 Poplar Box-Belah Woodland	Black cracking clay			Yes		Yes		Yes	VP_170122_A	Yes	
178	17/01/2022 11:00	238111.39	6778596.05	120.00	110.00	230.00	Adult	Good	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	21-40%	1	4	1-20%	0%	81-100%		0%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.46	Alive	GH	Yes	No	237984.31	6781431.48	Suitable habitat	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay			No	Relocated to a dense vegetation area out of work corridor	Yes	Cleared zone at capture site	Yes			
180	17/01/2022 13:10	238118.88	6778558.38				Adult	Dead	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	41-60%	1.5	5	1-20%	0%	81-100%		0%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	737.425	Dead	GH	No	No										No	GH17012022_A	Yes				
181	18/01/2022 10:12	239193.59	6784509.21	96.00	20.00	116.00	Adult	Good (tail dropped)	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	0%			81-100%	1-20%	0%		1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Grader	743.65	Alive	GH	No	Yes	239331.21	6784792.74	Suitable habitat	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay			Yes		Yes		Yes			
182	18/01/2022 12:45	239030.36	6784092.51	50.00	55.00	105.00	Juvenile	Dead	N/A	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	N/A			1-20%	21-40%	41-60%	Old bluegrass, Mitchell grass,	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Grader	743.2	Dead	VP	Yes	Yes										No	VP_180122_A	Yes				
183	18/01/2022 15:40	238022.36	6779247.72				Tail only	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	0%				1-20%	21-40%	1-20%	Urochloa grass, Rhodes grass, fleabane	1-20%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	738.125	Tail only	BK	Yes	Yes											No	N/A	Yes			
184	20/01/2022 19:30	238154.53	6781981.30	96.24	122.27	218.51	Adult	Good	Mulched vegetation	27 Weeping Myall Woodland	Black cracking clay	0%	0	0	0%	0%	81-100%	Mitchel grass, greens panic, flea bane	0%	Surface water present	Topsoil removal	Nocturnal - active searches	Other (see comments)	740.92	Alive	QG	No	No	238208.65	6781971.16	Suitable adjacent habitat	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay			Yes		No	Rain and wet conditions are likely to have improved detection probability	Yes		Yes	
185	21/01/2022 10:29	238151.50	6781988.10	105.00	114.00	219.00	Adult	Good	N/A (found during topsoil removal)	27 Weeping Myall Woodland	Black cracking clay	21-40%	1	1	21-40%	1-20%	41-60%	Native grass, Urochloa grass, foos parsley	1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Excavator	740.925	Alive	BK	Yes	Yes	238201.78	6781975.97	Suitable adjacent habitat	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay			Yes		Yes		Yes			
186	21/01/2022 11:28	239450.27	6785182.10	103.00	121.00	124.00	Adult	Dead (euthanised)	N/A	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay				21-40%	21-40%	41-60%	Old bluegrass, Mitchell grass, Buffel grass	1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Grader	744.375	Dead	VP	Yes	Yes											No	N/A	Yes			
187	21/01/2022 13:49	238181.06	6782056.11	114.00	102.00	216.00	Adult	Good	N/A (found during topsoil removal)	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	41-60%	Urochloa grass, foos parsley, native grass	1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Excavator	740.99	Alive	BK	Yes	Yes	238217.95	6781970.37	Relocation hub, fencing in place, dense vegetation	Dense vegetation	56 Poplar Box-Belah Woodland	Black cracking clay			Yes		Yes		Yes	Bk21012022B	Yes	
188	22/01/2022 8:11	239113.05	6784292.57	102.00	105.00	207.00	Adult	Good	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	41-60%		1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Excavator	743.42	Alive	BK	Yes	Yes	237892.10	6781387.81	Relocation hub in area of know habitat; construction activities limited access to closer hubs	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay			Yes		Yes		Yes	Bk22012022A	Yes	
189	22/01/2022 8:28	239098.22	6784269.23				Tail only	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	41-60%		1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Excavator	743.39	Tail only	BK	No	Yes											No	N/A	Yes				
190	22/01/2022 12:45	237969.87	6779618.52				Tail only	Mulched vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	2	1	41-60%	1-20%	1-20%		41-60%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Excavator	738.48	Tail only	BK	Yes	Yes												No	N/A	Yes			
191	22/02/2022 8:15	189818.83	6699942.43	95.00	0.00		Adult	Good (tail dropped)	Leaf litter	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	1	0.5	41-60%	21-40%	21-40%	Area slashed: Mimosa Bush, Box Thorn	1-20%	Dry	Tree clearing	Diurnal - post clearing search	Other (see comments)	629.55	Alive	QG,BK	Yes	Yes	189882.98	6699938.10	Soil cracks, same soil as capture spot, woody debris, grass cover	Soil crack	56 Poplar Box-Belah Woodland	Black cracking clay			No	No other construction works required on eastern side or rail corridor	Yes	Bobcat clearing veg/loose soil around tree				

RefNo	Capture Date and Time	Capture Easting GDA84	Capture Northing GDA84	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Constructio nActivity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA84	Release Northing GDA84	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recome ncent					
192	25/02/2022 16:40	189771.80	6699612.43	89.00	120.00	209.00	Adult	Good	Mulched vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	0	0	41-60%	1-20%	1-20%	Mulched veg. area slashed prior	1-20%	Saturated	Other (see comments)	Diurnal - pre-clearing/ disturbance active searches	Other (see comments)	629.22	Alive	SG, BK	Yes	Yes	189646.50	6699696.48	Woody layer under a fallen tree, not flooded, higher than the pooled water	Log	56 Poplar Box Belah Woodland	Black cracking clay	No	No works on east side, private property fence exists	Yes								
193	15/03/2022 13:10	190409.41	6679887.89	60.00	75.00	135.00	Subadult	Good	Pitfall trapping	56 Poplar Box-Belah Woodland	Black cracking clay	41-60%	1.5	10	61-80%	1-20%	21-40%		1-20%	Dry	Other (see comments)	Other (see comments)	Other (see comments)	609.3	Alive	BM, CH	Yes	Yes	190372.67	6679491.86	Same soil and vegetation as capture site	Dense vegetation	56 Poplar Box Belah Woodland	Black cracking clay	Yes		Yes	Pitfall trapping as part of trial. Pitfall trap night 1. Entered trap between morning check (7.50am) and midday check (1.10pm). Photos not on collector							
194	18/03/2022 16:00	190203.65	6683709.20	121	64	185	Adult	Dead	Mulched vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	0%	0	0	1-20%	81-100%		Mitchell grass, Rhodes grass, flea bane	0%	Moist (crumb textured)	Slashing	Diurnal - post clearing search	Slasher	613.3	Dead	SG	Yes	No									N/A	A1	Yes	#####					
195	03/04/2022 11:00	190394.20	6680142.20	100			Adult	Good (tail dropped)	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	1	1	41-60%	1-20%	1-20%	Saltbush		Moist (crumb textured)	Topsoil removal	Diurnal - post clearing search	Excavator	609.73	Alive	BK	Yes	Yes	190419.70	6680140.98	Same soil and vegetation as capture site	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		Yes	FCWS found during soil fence installation at relocation hub	Yes						
196	07/04/2022 7:20	189863.59	6700235.32	95	159	209	Adult	Good (tail dropped)	Mulched vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	0	0	0%	1-20%	81-100%	Mimosa	1-20%	Saturated	Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Excavator	629.85	Alive	SG	Yes	No	189919.17	6700234.20	Proximal to location woodland	Mulched vegetation	56 Poplar Box Belah Woodland	Black cracking clay	No	Relocated east of rail where no work is proposed.	Yes		Dropped tail fragment 45mm included in tail length. Photos unable to be attached.	Yes					
197	08/04/2022 8:44	189830.68	6699944.98				Adult	Tail only	Leaf litter	52 QLD Bluegrass/ Mitchell Grass Grassland	Red cracking clay	0%	0	0	0%	1-20%	81-100%		1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Excavator	629.55	Tail only	SG	Yes	Yes			N/A	N/A		N/A				Temporary buffer around sites fenced off	Yes						
198	08/04/2022 15:30	189729.24	6688950.60	103	120	223	Adult	Good	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	0%	0	0	0%	0%	81-100%	belah unidentified grasses	0%	Saturated	Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Excavator	628.55	Alive	SG	Yes	Yes	189788.99	6688952.57	adjacent myall woodland across rail where no works is proposed	Leaf litter	27 Weeping Myall Woodland	Black cracking clay	No	No works on east side of rail	Yes	-		Yes					
199	09/04/2022 10:25	189820.35	6699945.63	103	125	228	Adult	Good	Other (see comments)	52 QLD Bluegrass/ Mitchell Grass Grassland	Other (see comment)	0%	0	0	41-60%	0%	21-40%	belah wilga	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Excavator	629.55	Alive	SG	Yes	Yes	189876.35	6699948.90	Suitable soil and habitat. No work on eastern side of rail.	Leaf litter	56 Poplar Box Belah Woodland	Black cracking clay	No	No works on eastern side of rail	Yes		microhabitat soil rich humus at base of belah tree	Yes					
200	09/04/2022 10:25	189819.21	6699942.19	93	120	213	Subadult	Good	Other (see comments)	56 Poplar Box-Belah Woodland	Other (see comment)	0%	0	0	41-60%	21-40%	1-20%	belah wilga	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	629.55	Alive	SG	Yes	Yes	189876.80	6699947.05	Suitable soil and habitat. No work on eastern side of rail.	Leaf litter	56 Poplar Box Belah Woodland	Black cracking clay	No	No works on eastern side of rail	Yes		soil micro habitats rich humus under belah	Yes					
201	09/04/2022 10:45	189825.54	6699947.14	64	75	139	Juvenile	Good	Other (see comments)	52 QLD Bluegrass/ Mitchell Grass Grassland	Other (see comment)	0%	0	0	41-60%	21-40%	21-40%	belah wilga	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	629.55	Alive	SG	Yes	Yes	189875.89	6699947.09	Suitable soil and habitat. No work on eastern side of rail.	Leaf litter	56 Poplar Box Belah Woodland	Black cracking clay	No	No works on eastern side of rail	Yes		soil micro habitat rich humus	Yes					
202	09/04/2022 14:02	189820.52	6699948.44	59	71	130	Juvenile	Fair	Other (see comments)	52 QLD Bluegrass/ Mitchell Grass Grassland	Other (see comment)	0%	0	0	41-60%	21-40%	41-60%	belah wilga	21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post clearing search	Excavator	629.55	Alive	SG	Yes	Yes	189875.95	6699951.72	Suitable soil and habitat. No work on eastern side of rail.	Leaf litter	56 Poplar Box Belah Woodland	Black cracking clay	No	No works on eastern side of rail	Yes		soil micro habitat rich humus	Yes					
203	09/04/2022 14:03	189821.79	6699947.44	125	65	190	Adult	Good (tail dropped)	Other (see comments)	52 QLD Bluegrass/ Mitchell Grass Grassland	Other (see comment)	0%	0	0	41-60%	21-40%	1-20%	belah wilga	21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post clearing search	Excavator	629.55	Alive	SG	Yes	Yes	189875.46	6699953.08	Suitable soil and habitat. No work on eastern side of rail.	Leaf litter	56 Poplar Box Belah Woodland	Black cracking clay	No	No works on eastern side of rail	Yes		soil micro habitat rich humus	Yes					
204	09/04/2022 14:03	189822.72	6699942.08	112	56	168	Adult	Good (tail dropped)	Other (see comments)	52 QLD Bluegrass/ Mitchell Grass Grassland	Other (see comment)	0%	0	0	41-60%	21-40%	21-40%	belah wilga	21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post clearing search	Excavator	629.55	Alive	SG	Yes	Yes	189875.29	6699954.21	Suitable soil and habitat. No work on eastern side of rail.	Leaf litter	56 Poplar Box Belah Woodland	Black cracking clay	No	No works on eastern side of rail	Yes		soil micro habitat rich humus	Yes					
205	12/04/2022 8:26	189723.23	6698933.98	115	55	170	Adult	Dead	Log	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	0%	0	0	1-20%	81-100%	1-20%	Johnson grass, blue grass, Mitchell grass	61-80%	Moist (crumb textured)	Other (see comments)	Diurnal - post clearing search	Other (see comments)	628.53	Dead	GG	Yes	Yes										A1. Found when removing old timber slippers with a bobcat	Yes						
206	22/04/2022 12:35	190396.90	6673416.31	120	80	200	Adult	Good (tail dropped)	Soil crack	56 Poplar Box-Belah Woodland	Black cracking clay	21-40%	3	5	1-20%	21-40%	41-60%	Johneon grass, Rhodes grass, wattle	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	602.95	Alive	CH	Yes	Yes	190433.26	6673877.69	Suitable habitat in proximity to find	Tree root	Other (see comments)	Black cracking clay	Yes		Yes	Relocated to PCT 135. Closest established relocation hub	Yes						
207	22/04/2022 13:00	190405.29	6673412.33	100	70	170	Adult	Good	Tree root	56 Poplar Box-Belah Woodland	Black cracking clay	1-20%	3	5	1-20%	21-40%	41-60%	Johneon grass, Rhodes grass, wattle	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	602.95	Alive	CH	Yes	Yes	190436.99	6673877.73	Suitable habitat in proximity to find	Tree root	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		Yes	Relocated to PCT 135. Closest established relocation hub; relocation site same as FCWS 206	Yes						
208	06/05/2022 11:00	190060.36	6686722.59	110	140	250	Adult	Good	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	1	1	21-40%	1-20%	21-40%	Exotic grasses	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	616.32	Alive	MH	Yes	Yes	190032.13	6686976.70	Suitable habitat in proximity to find	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		Yes		Yes						
209	06/05/2022 15:00	190091.33	6686725.52	80	140	220	Adult	Good	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	21-40%	Exotic Grasses	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post clearing search	Excavator	616.32	Alive	MH	Yes	Yes	190029.49	6686995.54	Suitable habitat in proximity to find	Dense vegetation	27 Weeping Myall Woodland	Black cracking clay	Yes		Yes		Yes						
210	09/05/2022 16:08	190250.81	6682899.62	60	80	140	Juvenile	Good (tail dropped)	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	5	20	21-40%	41-60%	1-20%	couche, Rhodes, flea bane	1-20%	Moist (crumb textured)	Slashing	Diurnal - post clearing search	Slasher	612.6	Alive	CH	Yes	Yes	190283.30	6682895.39	Suitable habitat in proximity to find	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		Yes		Yes						
211	10/05/2022 11:45	189606.90	6696849.16	90	100	190	Adult	Good (tail dropped)	N/A (found during topsoil removal)	56 Poplar Box-Belah Woodland	Black cracking clay	1-20%	3	2	1-20%	41-60%	21-40%	Johnson grass, two toned green panic	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - pre-clearing/ disturbance active searches	Dozer	626.45	Alive	CH, QG	Yes	Yes	189670.28	6696866.15	Log, black cracking clay, outside cz.	Dense vegetation	56 Poplar Box Belah Woodland	Black cracking clay	No	Relocated on opposite side of rail where no works are proposed	No			Yes					
212	15/05/2022 7:48	190241.14	6683263.41	100	80	180	Adult	Dead (euthanised)	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	20	50	1-20%	1-20%	41-60%	Rhodes grass, couche grass, button grass	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	612.82	Dead	BM, AR, LS	Yes	No											A1	Yes					
213	15/05/2022 8:27	190277.05	6682574.87	100	100	200	Adult	Dead	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	2	5	1-20%	21-40%	41-60%	Rhodes grass, couche grass, Mimosa bush	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post clearing search	Dozer	612.13	Dead	BM, LS, AR	Yes	No												A2	Yes				
214	15/05/2022 12:06	190247.69	6682898.00				Adult	Tail only	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	2	4	21-40%	1-20%	41-60%	Mimosa bush, Rhodes grass, couche	1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Dozer	612.49	Tail only	CH, BM, LS, AR	No	No														A3	Yes		
215	15/05/2022 13:24	190202.71	6683837.24	120	100	220	Adult	Good	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	1-20%	3	5	21-40%	1-20%	61-80%	Rhodes grass, Mimosa bush, foels Parsley	1-20%	Surface water present	Topsoil removal	Diurnal - post topsoil removal search	Dozer	613.43	Alive	BM	Yes	Yes	190216.14	6683975.57	Suitable habitat in proximity to find	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	No		Yes		Yes						
216	15/05/2022 16:03	190210.28	6684046.71	80		80	Adult	Dead	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	15	10	1-20%	21-40%	41-60%	Johnson, Mimosa bush, Rhodes grass	1-20%	Surface water present	Topsoil removal	Diurnal - post topsoil removal search	Dozer	613.625	Dead	LS, CH	Yes	Yes														A4	Yes		

RefNo	Capture Date and Time	Capture Easting GDA94	Capture Northing GDA94	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Constructio nActivity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA94	Release Northing GDA94	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recome ncement						
217	16/05/2022 9:58	190182.50	6684529.00	100			Adult	Good (tail dropped)	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	5	8	21-40%	1-20%	41-60%	Johnson grass, Rhodes grass, foxtail grass, foxtail grass	1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Dozer	614.125	Alive	MR, AR, QG	Yes	Yes	190146.00	6684544.25	Suitable habitat in proximity to find	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		Yes		Yes	Yes	#####					
218	16/05/2022 11:48	190163.23	6684754.81	110	90	200	Adult	Dead	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	41-60%	2	10	1-20%	1-20%	1-20%	Field parsley, African thorn bush, casuarina	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	614.35	Dead	BM, MR	No	No										A1	Yes	#####						
219	16/05/2022 12:14	190169.54	6684910.27	100	80	180	Adult	Dead	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	21-40%	5	8	21-40%	1-20%	41-60%	Johnson grass, Rhodes grass and couche grass	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	614.5	Dead	CH, LS	Yes	No											A2	Yes	#####					
220	16/05/2022 15:17	190139.99	6685524.52	110	90	200	Adult	Good	Soil crack	Exotic Grassland	Black cracking clay	21-40%	3	7	21-40%	1-20%	61-80%	Rhodes grass, Johnson grass, couche	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.1	Alive	AR, LS, QG	Yes	Yes	190061.23	6685474.27	Suitable habitat in proximity to find	Soil crack	Exotic Grassland	Black cracking clay	Yes		No		Yes	#####						
221	16/05/2022 15:28	190139.79	6685473.04	120	90	210	Adult	Fair	Soil crack	Exotic Grassland	Black cracking clay	21-40%	3	7	21-40%	1-20%	41-60%	Johnson, Rhodes, couche	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.05	Alive	CH, LS	Yes	Yes	190062.03	6685469.59	Suitable habitat in proximity to find	Soil crack	Exotic Grassland	Black cracking clay	Yes		No		Yes	#####						
222	16/05/2022 15:29	190122.93	6685481.49				Subadult	Tail only	Soil crack	Exotic Grassland	Black cracking clay	21-40%	3	7	21-40%	1-20%	41-60%	Johnson grass, Rhodes grass, invasive weed (unidentified)	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.075	Tail only	CH, QG	No	No										A3		#####						
223	16/05/2022 15:29	190122.11	6685480.60				Adult	Tail only	Soil crack	Exotic Grassland	Black cracking clay	21-40%	3	7	21-40%	1-20%	41-60%	Johnson grass, Rhodes grass, invasive weed (unidentified)	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.075	Tail only	CH, QG	No	No											A4	Yes	#####					
224	16/05/2022 15:36	190141.81	6685522.43	110			Adult	Good (tail dropped)	Soil crack	Exotic Grassland	Black cracking clay	21-40%	3	7	21-40%	1-20%	41-60%	Johnson grass, Rhodes grass, couche	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.125	Alive	CH, LS	Yes	Yes	190059.33	6685464.33	Suitable habitat in proximity to find	Soil crack	Exotic Grassland	Black cracking clay	Yes		No		Yes	#####						
225	16/05/2022 15:51	190124.84	6685462.84	100			Subadult	Dead	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	21-40%	3	7	0%	1-20%	61-80%	rhodes grass, johnson grass	1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.05	Dead	QG, CH	No	No											A5	Yes	#####					
226	16/05/2022 15:51	190123.80	6685463.60	50	40	90	Subadult	Dead (euthanised)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	21-40%	3	7	0%	1-20%	61-80%	rhodes grass, johnson grass	1-20%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.05	Dead	QG, CH	No	Yes												A6	Yes	#####				
227	17/05/2022 7:58	190140.19	6685698.63		50	0	Subadult	Tail only	Soil crack	Exotic Grassland	Black cracking clay	21-40%	3	7	21-40%	1-20%	41-60%	couche grass, Johnson grass, Rhodes grass	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.3	Tail only	CH, AR	No	No												A1	Yes	#####				
228	18/05/2022 10:35	190111.56	6685707.76	100	40	140	Adult	Good (tail dropped)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	0%	1	1	21-40%	1-20%	41-60%	Johnson grass, foxtail grass, couche grass	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Dozer	615.3	Alive	LS, CH	Yes	Yes	190058.55	6685472.31	Suitable habitat in proximity to find	Soil crack	Exotic Grassland	Black cracking clay	Yes		No		Yes	#####						
229	18/05/2022 11:13	190116.59	6685670.05		40			Tail only	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	N/A	21-40%	61-80%	johnson grass, feather top rhodes, panic grass	N/A	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.26	Tail only	QG, CH, LS	No	Yes												Ref number on specimen bag: 18052	Yes	#####				
230	18/05/2022 11:52	190118.16	6685646.77				Adult	Dead	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	21-40%	20	20	1-20%	N/A	61-100%	johnson grass, feather top rhodes and panic grass	1-20%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.25	Dead	LS	Yes	Yes													Ref number on specimen bag: 18053	Yes	#####			
231	18/05/2022 12:09	190119.43	6685631.28	110			Adult	Good (tail dropped)	Dense vegetation	Exotic Grassland	Black cracking clay	1-20%	1	1	21-40%	1-20%	41-60%	Johnson grass, Rhodes grass, foxtail grass	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.23	Alive	QG, CH	Yes	Yes	190063.53	6685465.69	relocation hub	Soil crack	Exotic Grassland	Black cracking clay	Yes		No		18054 ref number for specimen	Yes	#####					
232	18/05/2022 12:20	190119.01	6685620.73	115	80	195	Adult	Good (tail dropped)	Other (see comments)	Exotic Grassland	Black cracking clay	1-20%	1	1	21-40%	1-20%	41-60%	Rhodes, Johnson & foxtail grass	21-40%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.225	Alive	LS, CH	Yes	Yes	190061.26	6685461.04	relocation hub	Soil crack	Exotic Grassland	Black cracking clay	Yes		No		Specimen ref number for tail: 18055. Found under dense vegetation on Ballast edge	Yes	#####					
233	18/05/2022 12:39	190124.34	6685603.08	60	70	130	Juvenile	Good	Dense vegetation	Exotic Grassland	Black cracking clay	1-20%	10	10	1-20%	0%	61-100%	johnson grass, rhodes grass, african lovegrass	0%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.2	Alive	LS	Yes	Yes	190056.40	6685476.37	relocation hub	Dense vegetation	Exotic Grassland	Black cracking clay	Yes		No		18056	Yes	#####					
234	18/05/2022 13:29	190131.10	6685575.62		40			Tail only	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	0%	0	0	0%	1-20%	61-80%	johnson grass, african lovegrass, rhodes	0%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.15	Tail only	QG, CH	No	Yes												specimen ref on bag: 18057	Yes	#####				
235	18/05/2022 14:09	190127.00	6685552.51		60			Dead	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	0%	0	0	1-20%	1-20%	61-100%	johnson grass, rhodes grass, african love grass	0%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.15	Dead	QG	No	Yes													Specimen ref no. 18058	Yes	#####			
236	18/05/2022 15:09	190122.92	6685543.01				Adult	Dead (euthanised)	Soil crack	Exotic Grassland	Black cracking clay	21-40%	20	30	1-20%	0%	61-80%	johnson grass, african love grass, mimosa bush	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.125	Dead	LS	No	No														no release animal euthanised. 18059	Yes	#####		
237	19/05/2022 9:42	190137.87	6685574.15	95			Adult	Good (tail dropped)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	0%	0	0	0%	1-20%	61-100%	johnson grass, rhodes	0%	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.15	Alive	QG	Yes	Yes	190058.48	6685485.53	Suitable habitat in proximity to find	Dense vegetation	Exotic Grassland	Black cracking clay	N/A		No		ref no. 19054	Yes	#####					
238	19/05/2022 9:42	190136.25	6685569.64	110			Adult	Dead (euthanised)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	N/A			N/A	1-20%	61-100%	Johnson grass, Rhodes	N/A	Dry	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.15	Dead	AR	No	Yes															19052	Yes	#####	
239	19/05/2022 9:53	190137.16	6685568.69		120		Adult	Tail only	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	N/A			N/A	1-20%	61-80%	Johnson&E™ s grass, Rhodes	N/A	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.15	Tail only	AR	No	Yes																19053	Yes	#####
240	19/05/2022 10:30	190137.61	6685552.76	60	70	130	Subadult	Good (tail dropped)	Soil crack	Exotic Grassland	Black cracking clay	41-60%	20	30	1-20%	0%	61-80%	johnson grass, sunflower, rhodes	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	615.15	Alive	LS	Yes	Yes	190055.84	6685480.84	Suitable habitat in proximity to find	Soil crack	Exotic Grassland	Black cracking clay									19051. tail fell off during measurements, bagged separately	Yes	#####	
241	25/05/2022 10:14	190044.90	6686464.81	120	150	270	Adult	Dead (euthanised)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	1-20%	0%	61-100%	Exotic grasses	0%	Saturated	Topsoil removal	Diurnal - post topsoil removal search	Excavator	616.05	Dead	DM	No	No																25051	Yes	#####
242	25/05/2022 14:21	190070.30	6686473.62	50	90	140	Subadult	Good (tail dropped)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	1-20%	Exotic grasses	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	616.06	Alive	MH	Yes	No	190024.51	6687000.37	Suitable habitat in proximity to find	Soil crack	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		No		25057	Yes	#####					
243	25/05/2022 14:21	190078.79	6686461.06				Juvenile	Tail only	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	1-20%	Exotic grasses	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	616.05	Tail only	MH	No	No																25055	Yes	#####
244	25/05/2022 14:30	190052.97	6686453.74	60	80	140	Subadult	Good	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	1-20%	Exotic Grasses	N/A	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	616.05	Alive	MH	Yes	Yes	190027.49	6686999.94	Suitable habitat in proximity to find	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes								Yes	#####		

RefNo	Capture Date and Time	Capture Easting GDA84	Capture Northing GDA84	SVL (mm)	Tail Length (mm)	Total Length (mm)	Age	Condition	Microhabitat at capture site	PCT at capture site	Soil at capture site	Capture Soil Crack Density	Capture Largest Soil Crack	Capture Soil Crack Depth	Capture Perc Litter Cover	Capture Perc Bare Ground	Capture Perc Ground Veg Cover	Capture 3 most abundant groundcover	Capture Large Surface Debris Abundance	Capture Wetness Ground	Construction Activity	FCWS detection method	Equipment	Chainage	Condition Analysis	Surveyor Initials	Photograph of Animal	Photograph of capture site	Release Easting GDA84	Release Northing GDA84	Why is site suitable for reloca	Microhabitat at release site	PCT at release site	Soil at release site	Is temporary exclusion fencing	Justification for no fence	Photograph of release site	Comment	Approval	Time of Recome ncement
245	25/05/2022 15:00	190170.21	6685468.30				Adult	Tail only	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	1-20%	1-20%	1-20%	Exotic	1-20%	Moist (crumb textured)	Topsoil removal	Diurnal - post clearing search	Excavator	615.05	Tail only	MH	Yes	No								25054	Yes	#####		
246	25/05/2022 15:00	190044.90	6686464.81	90	110	200	Adult	Good	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	0%	0	0	0%	1-20%	81-100%	Exotic and native grasses - roadside	0%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	616.05	Alive	DM	No	No	190032.13	6686976.70	Suitable habitat in proximity to find	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		No	25054	Yes	#####
247	25/05/2022 15:00	190037.12	6686471.07	150	100	250	Adult	Good (tail dropped)	N/A (found during topsoil removal)	Exotic Grassland	Black cracking clay	1-20%	1	1	0%	0%	81-100%	Exotic and native grasses - roadside	0%	Moist (crumb textured)	Topsoil removal	Diurnal - post topsoil removal search	Excavator	616.05	Alive	DM	No	No	190024.37	6686974.08	Suitable habitat in proximity to find	Dense vegetation	52 QLD Bluegrass/ Mitchell Grass Grassland	Black cracking clay	Yes		No	25055	Yes	#####
248	16/09/2022 9:00	238508.29	6782908.95	0	0	0	Adult	Tail only	Other (see comments)	56 Poplar Box-Belah Woodland	Black cracking clay	N/A	0	0						Other (see comments)	Other (see comments)	Other (see comments)	741920	Tail only	LS	N/A	N/A				N/A					N/A				

13.0 APPENDIX E – UNEXPECTED THREATENED SPECIES FIND PROTOCOL OUTLINED IN THE CONSTRUCTION BIODIVERSITY MANAGEMENT PLAN



Appendix G Unexpected Threatened Species / Endangered Ecological Community Find Procedure

Purpose

This procedure details the actions to be taken when a threatened species (flora or fauna) or an Endangered Ecological Community (EEC) is unexpectedly encountered during construction activities associated with the N2NS SP1 / Trans4m Rail Project.

Induction / Training

During the Project Induction, all Trans4m Rail and sub-Contractor personnel will be inducted on the identification of potential threatened species occurring on site and the relevant actions to be taken with regards to this procedure.

Scope

This procedure is applicable to all activities conducted by Trans4m Rail and sub-Contractor personnel that have the potential to come into contact with threatened species and EEC.

Procedure

<p>1. Threatened Species unexpectedly encountered during clearing, excavation or other construction activities</p>
<p>If a threatened species, either flora or fauna, or an EEC is encountered prior to or during construction activities:</p> <ul style="list-style-type: none"> • STOP ALL WORK in the vicinity of the find. • The area surrounding the find must be protected and the Trans4m Rail Supervisor and any other personnel working in the area must be immediately notified of the find. • The Trans4m Rail Environment Manager / Coordinator must also be notified immediately who will contact ARTC and the Project Environmental Representative (ER). • The Trans4m Rail Environment Manager / Coordinator will contact an Ecologist who will confirm the species / EEC is an unexpected find and / or threatened. • If the find is confirmed not to be a threatened species or EEC, the Trans4m Rail Environment Manager will provide written approval to recommence works. • If the species is confirmed to be a threatened species or EEC, Step 2 applies. <p>NOTE: Unexpected Finds will be immediately notified to ARTC and ARTC will notify the relevant regulatory agencies within 1 business day. A draft report must be provided to ARTC within 7 days and ARTC will provide a final version of the report to the relevant regulatory agencies with 14 days. The report must include the following:</p> <ol style="list-style-type: none"> a. Date and time of discovery; b. Details of the discovery site (GPS points, description of vegetation, soil, microhabitat features present); c. Details of how potential relocation sites will be identified; d. Details of the individual/s discovered, including photographs; e. Photographs of the site (general location, vegetation, habitat features where the individual/s was discovered); f. Maps / plans identifying the location of the discovery at an appropriate scale; g. Details of the person/s who made the discovery; and h. Mitigation measures to be implemented
<p>2. Assessment of Impact</p>
<p>In the event that the species is confirmed to be threatened, the Ecologist will undertake an assessment to determine the likely impact to the threatened species and appropriate management options developed i.e. Test of significance, in accordance with Section 7.3 of the <i>Biodiversity Conservation Act</i> or similar. This assessment will be documented.</p>

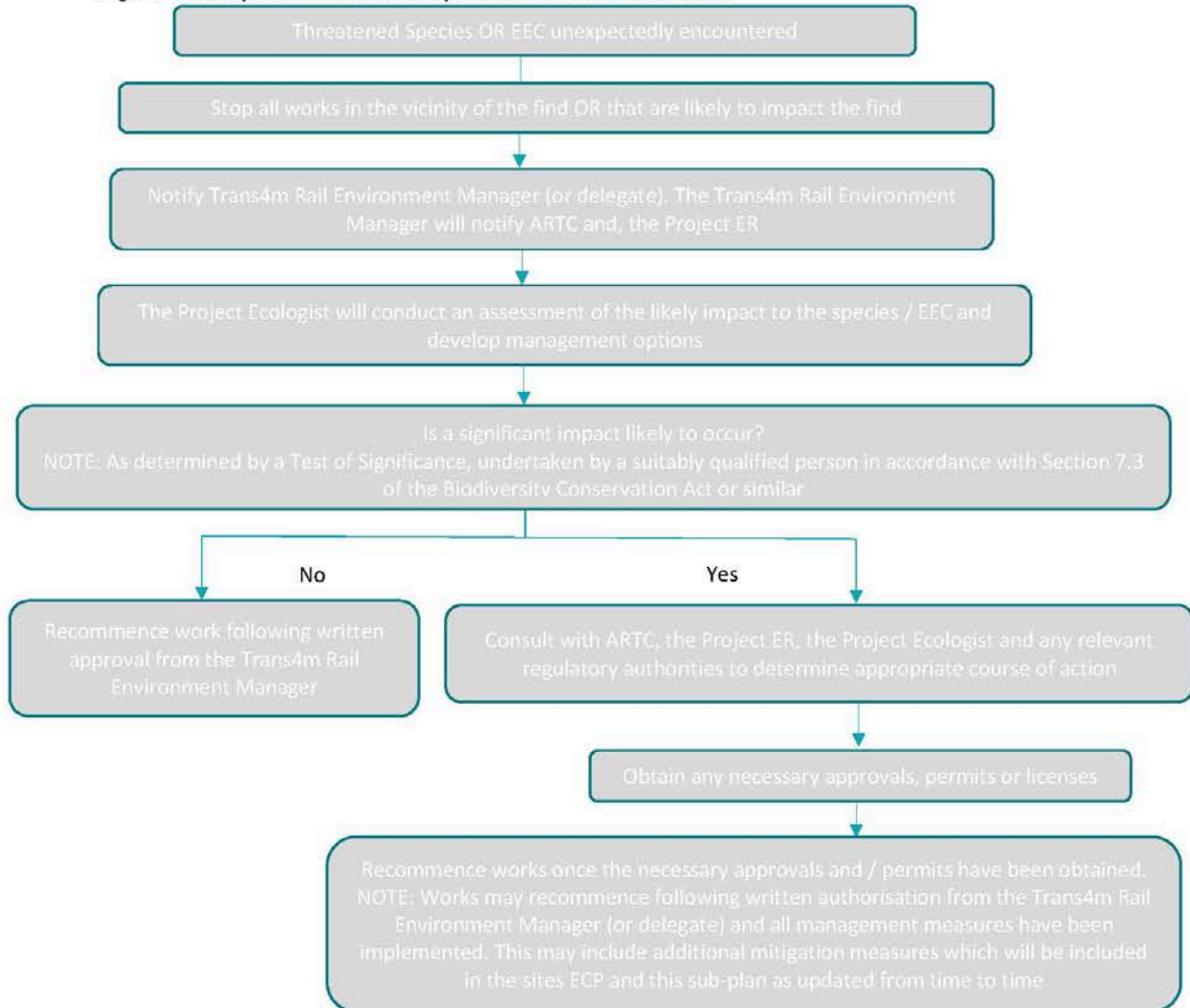
Revision No: 3

T4RM Document Number: 7632-T4MR-PL-PES-001-04
ARTC Document Number: 5-0018-260-PES-00-PL-0005

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Issue Date: 0/01/2022

NOTE: Trans4m Rail's Construction and Engineering personnel will be consulted to avoid any direct impacts to the threatened species or EEC.
3. Approvals
ARTC and Trans4m Rail will obtain any licences, permits or approvals required if the species is likely to be significantly impacted by the Project works.
4. Resumption of Works
Works will recommence once necessary advice has been sought and permits obtained (if required). If permits are not required, works can recommence following authorisation from the Trans4m Rail Environment Manager (or delegate).

Figure 1: Unexpected Threatened Species / EEC Find Flow Chart



Revision No: 3

T4RM Document Number: 7632-T4MR-PL-PES-001-04
ARTC Document Number: 5-0018-260-PES-00-PL-0005

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Issue Date: 0/01/2022

14.0 APPENDIX F – AGENCY /KEY STAKEHOLDER COMMENTS ON THIS PLAN

14.1 Project Environmental Representative (ER)

14.2 NSW Department of Planning and Environment



Department of Planning and Environment

Our ref: DOC22/434088
Your Ref: SSI-7474

Peter Borrelli
Project Director N2NS
ARTC Inland Rail
PBorrelli@ARTC.com.au

Dear Peter

Inland Rail Narrabri to North Star Phase 1 (SSI-7474) – Five-clawed Worm Skink Construction Species Management Plan – report dated May 2022

Thank you for your email dated 19 May 2022 to the Biodiversity, Conservation and Science Directorate (BCS) of the Department of Planning and Environment (DPE) requesting feedback on the draft version of the Five-clawed Worm Skink Construction Species Management Plan (SMP).

The SMP has been written specifically for implementation on the Narrabri to North Star Phase 1 project rather than being a generic plan that applies to all relevant Inland Rail projects. As a result, parts of the SMP are redundant given that most of the topsoil stripping works have been completed for the project, but they can form the basis of SMPs that will be required for other relevant projects (North Star to Border, Narrabri to North Star Phase 2, and potentially Narramine to Narrabri).

BCS understands that Phil Spark has met with ARTC regarding the Five-clawed Worm Skink finds and it is noted in the SMP that he was contacted with regards to the development of the plan. BCS is interested in whether Mr Spark provided a report following his visit to site, and whether his feedback has been included where relevant in the SMP.

A key component of the SMP involves applying lessons learnt from Stage 3 to Stage 1. The Stage 3 Works Summary Report provides a solid basis for the relative success of different mitigation measures, and provides a preliminary analysis of habitat preference. The Summary Report should be reviewed to ensure that all relevant information has been included in the SMP.

One of the outcomes of Stage 3 was that the incidence of skink finds appeared to increase when soil moisture content increased, thus reducing soil cracks and potentially forcing skinks to the soil surface. The monitoring program should therefore be based on using soil moisture content as a trigger for a monitoring event to increase the chance of detectability.

BCS's detailed comments and recommendations are provided in **Attachment A**. If you require any further information regarding this matter, please contact Renee Shepherd, Principal Project Manager, via renee.shepherd@environment.nsw.gov.au or (02) 6883 5355.

Yours sincerely

Sarah Carr
Director North West
Biodiversity, Conservation and Science Directorate

10 June 2022

Attachment A – BCS's Detailed Comments and Recommendations
Cc: Grant Brown, Team Leader Infrastructure Assessment, DPE

Attachment A

BCS's Detailed Comments and Recommendations

**Inland Rail Narrabri to North Star Phase 1 – Five-clawed Worm Skink
Construction Species Management Plan – May 2022 version**

Report Reference	Comment and recommendation
1.5 Unexpected Find of the FCWS	This section refers to the different Stages of the project. A diagram is required illustrating the relative location of each Stage along the alignment.
4.5 Land Tenure of Populations	Provide justification as to why the five named reserves might contain Five-clawed Worm Skinks (FCWS). Is this because of proximity, potential habitat, or other reasons? The 1993 reference provided is now quite dated. A BioNet search should show records in the Terry Hie Hie Community Conservation Area.
4.6 Habitat Associations	This section should include an analysis of the information collected in the FCWS register for the N2NS project, particularly in relation to soils and vegetation. Utilising some of the analysis from section 6 of the Stage 3 Works Summary Report would be beneficial.
4.12 Current Context of FCWS and the Project	The third paragraph should be expanded to provide detail on the specific components that are included in the "development of a specific clearing procedure". Relevant information could be inserted here from the Stage 3 Works Summary Report, particularly sections 3 and 5. The current number of FCWS finds referred to in this section should be updated. Insert a map of FCWS finds to date to illustrate the geographic distribution of records along the alignment, including highlighting the different Stages of the project.
5.0 Five-clawed Worm Skink Management	(2) Construction management actions - sixth dot point – does this "expected finds" procedure refer to Appendix I in the Construction BMP? If so, this should be stated explicitly. An additional explanation could be added to this dot point, indicating that the BMP should clearly state which parts of the alignment the full Unexpected Threatened Species Find protocol will be enacted within, and which parts will be subjected to the FCWS Encounter Protocol. Add an additional dot point which states "implementation of relevant mitigation measures".
5.1.1 Additional studies	Will a soil scientist still be engaged to assess soil types given that topsoil stripping works are largely complete?
5.1.2 Reduce clearing in FCWS Habitat Areas	Reducing clearing is the most effective measure that can be implemented to reduce impacts to the FCWS and should be considered throughout the implementation of the project.
5.1.3 Updating Test of Significance Assessments for FCWS	This section states that tests of significance have been completed, but the title implies that the tests will be updated. Is this proposed to occur? Given that both tests have concluded a significant impact, is there any benefit to completing an updated test?
5.2 Construction Management Actions for FCWS	An additional heading and commentary should be added to this section stating that deceased skinks have been collected and will be provided to the Australian Museum for research purposes.
5.2.1 Identification of FCWS Habitat on Environmental Control Plans	The "known" and "likely to occur" habitat areas should be identified and mapped in the SMP.

5.2.2 Specific FCWS Induction	The second dot point should be amended for Stage 1 to state that FCWS surveys are required for the entire Stage, not just CH603.00-625.00.
5.2.3 Develop a Survey Prescription	<p>In addition to windrowing slashed vegetation to the edge of the Construction Impact Zone (CIZ) it has been suggested that as much of the remaining slashed vegetation in the CIZ should be removed. Several types of machinery can complete this removal. Consideration should be given to including this activity.</p> <p>Fifth dot point (page 24) – the second sentence should read “this should enable sufficient time for uncaptured FCWS to move of their own accord”.</p> <p>Previously a 7-day period had been agreed to between topsoil stripping and slashing – BCS does not support a 2-day period without further discussion and justification. The Stage 3 report also references a period of 7 days.</p> <p>This section mentions the use of a scrapper. It is not clear what this machinery is or in which situations it would be used. The dot point states that where a scrapper is used, an ecologist or spotter catcher would inspect the material at the recipient site. Does this mean that a scrapper is not involved in the removal of topsoil so there is no impact site to inspect? As discussed in previous meetings, the FCWS register indicates that the use of excavators results in the highest survival rate of encountered skinks, so where possible that item of machinery is preferred.</p>
5.2.4 Data Collection Requirements for Captured FCWS	<p>It would be beneficial if the chainage and Stage of project could be recorded for each FCWS capture.</p> <p>Final paragraph (page 27) – state that the register will be provided with each incident notification and live FCWS-find report, and it will be made readily available for regulatory agencies.</p>
5.2.5 Identifying and Establishing FCWS Relocation Sites	<p>(i) Site Identification - although some sites will be located according to FCWS captures, other sites will be pro-actively created according to the presence of suitable habitat along the alignment – this should be articulated.</p> <p>(ii) Site establishment - other material has been proposed for habitat enhancement including woody debris.</p> <p>Will the relocation sites be demarcated in the longer term once construction has been completed? If yes, how will they be identified? Will more permanent signage be installed?</p>
5.2.6 Habitat Enhancement and Refuge Replacement	Explanation is required as to why the placement of hay bales is only to occur on freehold land in the construction boundary – is there other tenures of land present and what precludes them from receiving habitat enhancement measures?
5.2.7 Unexpected Five-clawed Worm Skink Finds Procedure	<p>The Stage 2B Chainage 641.08-647.00 has not been identified before as being relevant to the Unexpected FCWS Finds Procedure. Is this based on the most recent finds in Stage 2? Will the BMP be updated to be consistent with the SMP?</p> <p>The sentence after the first three dot points stating that the chainages in each stage have been identified because “individuals can move into these areas following the field surveys” is not correct. The chainages in Stage 3 were identified following FCWS finds and extrapolating likely habitat, and the Stage 1 chainages were identified through the DAWE predictive modelling for the FCWS.</p> <p>Additional text should be added to the first paragraph referring to the Unexpected Threatened Species Find Protocol in Appendix G of the Construction BMP to provide clarity around the protocol that must be enacted outside of those chainages. Consideration should be given to including the protocol as an appendix to the report.</p>
6.0 Five-clawed Worm Skink Monitoring Program	<p>It is not clear whether the “adjacent monitoring site” will also be located in the relocation hub, or whether these sites will be in the broader rail corridor. This needs to be clarified. A diagram of the proposed survey design would be beneficial.</p> <p>This comment is also relevant to section 6.2 – if “adjacent monitoring sites” are located in the broader rail corridor, consideration should be given to placing artificial refuge sites in areas that are unlikely to be disturbed by rail maintenance activities, including slashing of the corridor. Appropriate signage should be considered.</p>

<p>6.1 Site Selection</p>	<p>Are the "paired sites" referred to in this section the same as the "impact site" and "adjacent reference site" described in section 6.0?</p> <p>Justification is required to support why only 15 sites have been proposed – this seems to be a small number given the extent of the FCWS finds across all three Stages of the project. Consideration should be given to determining a minimum number of individuals that would be required to be captured to provide a meaningful sample size (e.g. 10 individuals) and implementing adequate sampling sites to attempt to meet that target number. The proposed initial trial period could be used to test the appropriate number of sample sites. Limiting the number of monitoring sites will limit the chance of capturing individuals, and therefore will limit the conclusions that can be made from the monitoring program and the likely impact of the project on the FCWS population.</p> <p>The comment stating that some sites will be removed from the monitoring program if FCWS are not located in Stage 1 can be deleted, given that finds have now been recorded in this Stage.</p> <p>A map of the proposed monitoring sites should be included.</p>
<p>6.2 Sampling Design and Regime</p>	<p>A diagram of the proposed artificial refuge layouts would be beneficial.</p> <p>Terracotta tiles are unlikely to be useful as they are small and likely to dry the ground out. They are suitable for basking species in cold weather but not likely for FCWS. Despite this, the outcomes of the trial will confirm their usefulness.</p> <p>Carpets should be larger than the proposed 1m² to enhance insulation and moisture retention. The carpet should be old/weathered/have water holding capacity to increase its habitat value. Phil Spark has created some artificial refuge sites for FCWS monitoring which include a range of materials – consideration should be given to adopting the same approach. BCS can provide examples of Phil's refuge sites if required.</p> <p>Artificial refuge sites should be installed as soon as possible after construction. Refuge sites can be placed in the relocation hubs now to enhance habitat. The current season is excellent and immediate installation would potentially allow for a spring/early summer trial to test capture rates.</p> <p>The artificial refuge sites should be permanent rather than temporary sites. Installing artificial refuge sites 12 weeks before scheduled monitoring limits the ability of monitoring to respond to appropriate seasonal conditions.</p> <p>Rather than basing the monitoring program on an autumn and spring frequency, it should be based on the presence of suitable soil moisture conditions. The FCWS records to date indicate a correlation between finds and rainfall/soil moisture, where soil cracks are minimal, and skinks move closer to the soil surface. Monitoring on a strictly seasonal basis may reduce detectability of the skinks. BCS recommends that each monitoring event be confirmed in consultation with us to ensure that conditions are selected to increase the chance of detectability.</p> <p>Fourth paragraph – suggest deletion of "this will result in four surveys per annum with two surveys in each season". As described above, surveys should be in response to appropriate seasonal conditions (adequate soil moisture) rather than be dictated by a calendar timing – if these seasons are dry it is unlikely that the monitoring will detect the presence of the FCWS.</p>
<p>6.4 How Many Years to Monitor</p>	<p>As previously discussed, it is recommended that the monitoring periods be amended so that they are based on soil moisture content rather than an annual event. Five monitoring events over a 10-year period would be reasonable and would account for dry periods when skinks are likely to be deep in the soil cracks rather than being at the soil surface. Monitoring events could occur in consecutive years when conditions are favourable, or monitoring could be suspended over a period while conditions are dry. The trial period should not be considered one of the five monitoring events unless it results in a favourable capture rate (e.g. more than 10 skinks). Potentially a trial could occur this spring/early summer.</p>



Tim Lennon
Program Environment Lead - Regulatory
ARTC Inland Rail
TLennon@ARTC.com.au

Dear Tim

Inland Rail Narrabri to North Star Phase 1 (SSI-7474) – Five-clawed Worm Skink Construction Species Management Plan – report dated August 2022

Thank you for your email dated 24 October 2022 to the Biodiversity, Conservation and Science Directorate (BCS) requesting feedback on the August 2022 version of the Five-clawed Worm Skink Construction Species Management Plan (SMP).

BCS's detailed review and recommendations on the SMP are provided in **Attachment A**, and comments and recommendations on the Construction Biodiversity Management Sub-Plan (BMP) are provided in **Attachment B**. Our review covered the following three documents:

- the August 2022 version of the SMP
- the 21 September version of the Construction Biodiversity Management Sub-Plan
- the correspondence provided to NSW Planning from ARTC (dated 12 October 2022) summarising how BCS's comments have been addressed in the latest version of the SMP.

Many of the recommendations made by BCS in our review of the May 2022 version of the SMP have been incorporated into the August version of the SMP. However, BCS remains concerned with many details relating to the proposed monitoring program. While the monitoring design seeks to determine whether skinks remain in the relocation hubs, no monitoring is proposed to determine whether skinks have been able to recolonise the disturbed areas along the corridor. In addition, the proposed seasonal monitoring is not considering soil moisture conditions, and this will likely result in a negligible to zero chance of recording individuals, thus invalidating the survey.

BCS welcomed the opportunity to discuss these matters with ARTC on 9 November 2022 and explain our concerns. As discussed in the meeting, the BCS accountable officer for the species, Terry Mazzer, is willing to speak directly to Ben Lewis about the monitoring program to ensure that a robust survey design is created which maximises the chance of survey success.

If you require any further information regarding this matter, please contact Renee Shepherd, Principal Project Manager, via renee.shepherd@environment.nsw.gov.au or (02) 6883 5355.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Sarah Carr'.

Sarah Carr
Director North West
Biodiversity, Conservation and Science Directorate

11 November 2022

Attachment A – BCS's Detailed Comments and Recommendations – Five-clawed Worm Skink SMP
Attachment B – BCS's Detailed Comments and Recommendations – Construction BMP
Cc: Jess Athas, Team Leader Freight Team, DPE

BCS's Detailed Comments and Recommendations

Inland Rail Narrabri to North Star Phase 1 – Five-clawed Worm Skink Construction Species Management Plan – August 2022 version

Report Reference	BCS comment and recommendation (10 June 2022)	ARTC response (12 October 2022)	BCS response (November 2022)
1.5 Unexpected Find of the FCWS	This section refers to the different Stages of the project. A diagram is required illustrating the relative location of each Stage along the alignment.	Diagrams of locations have been provided as part of Appendix A (Figures 9-1, 9-2 and 9-3) due to the number of figures required to indicate the relative location as requested.	Figures 9-1, 9-2 and 9-3 do not depict the entire stages of the project. Detailed figures are not required – a figure contained to one (or two) pages only is sufficient. The figure could also include the chainages between stage boundaries. Not adequately addressed.
4.5 Land Tenure of Populations	Provide justification as to why the five named reserves might contain Five-clawed Worm Skinks (FCWS). Is this because of proximity, potential habitat, or other reasons? The 1993 reference provided is now quite dated. A BioNet search should show records in the Terry Hie Hie Community Conservation Area.	Section 4.5 was updated to include Bionet Record from THH and justification of where reserves may contain FCWS. Also referenced a number of new reserves with potential habitat.	This section has been amended but there is still no justification stating why the named reserves potentially provide habitat. Also note that the list of reserves has been substantially expanded, which provides a stronger reason for the SMP to provide insight into why these areas are considered to provide potential habitat. It gives the impression that the skinks are well represented in existing reserves. Not adequately addressed.
4.6 Habitat Associations	This section should include an analysis of the information collected in the FCWS register for the N2NS project, particularly in relation to soils and vegetation. Utilising some of the analysis from section 6 of the Stage 3 Works Summary Report would be beneficial.	Analysis of information collected in the FCWS register has been included in the revised in Section 4.12.	Information is presented in Section 4.12 based on the FCWS register. However, this section does not appear to have been amended since the May 2022 version. If Section 4.6 is not going to be updated to include project-based information, it should at least refer to Section 4.12 for

			the most recent site-based information on habitat associations. Not adequately addressed.
4.12 Current Context of FCWS and the Project	The third paragraph should be expanded to provide detail on the specific components that are included in the “development of a specific clearing procedure”. Relevant information could be inserted here from the Stage 3 Works Summary Report, particularly sections 3 and 5.	Queries detailing specific components of specific clearing procedures are addressed in Section 5.	It is acknowledged that Section 5 contains specific clearing procedures. The comment made by BCS refers to providing context to the statement that a specific clearing procedure has been created. If additional information is not provided in Section 4.12 there should at least be reference to detailed information in Section 5, eg. “...resulted in the development of a specific clearing procedure for the FCWS <u>as detailed in Section 5</u> ”. Not adequately addressed.
	The current number of FCWS finds referred to in this section should be updated.	Not addressed.	Figures have not been updated. Not adequately addressed.
	Insert a map of FCWS finds to date to illustrate the geographic distribution of records along the alignment, including highlighting the different Stages of the project.	Maps showing distribution of FCWS are included in figures presented in Appendix A.	Appendix A inserted with all FCWS records. Stages of the project have not been identified, however this can be addressed by implementing the recommendation related to report reference 1.5 above.
5.0 Five-clawed Worm Skink Management	(2) Construction management actions - sixth dot point – does this “expected finds” procedure refer to Appendix I in the Construction BMP? If so, this should be stated explicitly. An additional explanation could be added to this dot point, indicating that the BMP should clearly state which parts of the alignment the full Unexpected Threatened Species Find protocol will be enacted within, and which parts will be subjected to the FCWS Encounter Protocol.	The requested information on construction management actions and where the Unexpected Threatened Species Find protocol will be specifically enacted is contained within Section 5.2.7 and includes an additional area Stage 2B: Chainage 641.08 – 647 that was not shown in Appendix I of the Construction BMP.	It is acknowledged that Section 5.2.7 contains information on the Unexpected Threatened Species Find protocol. However, the comment made by BCS is about providing clarifying information to the relevant dot point in Section 5.0. Additional dot point not added. Not adequately addressed.
	Add an additional dot point which states “implementation of relevant mitigation measures”.	Not addressed.	Additional dot point not added. Not adequately addressed.

5.1.1 Additional studies	Will a soil scientist still be engaged to assess soil types given that topsoil stripping works are largely complete?	As detailed in this Section 5.1.1, a soil scientist will be engaged if any further topsoil stripping is required. As noted in the comment, topsoil stripping works are completed given the late stage of the Project. This was based of referenced study Elder Enviro (2022). Stage 1 - Soil Investigation Five Clawed Worm Skink Distribution. Report prepared for: Trans4m Rail.	Recommendation addressed.
5.1.2 Reduce clearing in FCWS Habitat Areas	Reducing clearing is the most effective measure that can be implemented to reduce impacts to the FCWS and should be considered throughout the implementation of the project.	Reduced clearing is noted and agreed to be the most effective measure to reduce impacts.	Recommendation addressed.
5.1.3 Updating Test of Significance Assessments for FCWS	This section states that tests of significance have been completed, but the title implies that the tests will be updated. Is this proposed to occur? Given that both tests have concluded a significant impact, is there any benefit to completing an updated test?	Amended the title of this section and removed the word "updating".	Title updated. Recommendation addressed.
5.2 Construction Management Actions for FCWS	An additional heading and commentary should be added to this section stating that deceased skinks have been collected and will be provided to the Australian Museum for research purposes.	Added comment of <i>"Deceased or euthanised individuals will be forwarded to the Australian Museum for research purposes"</i> to the last dot point of Section 5.2.4.	Additional dot point added to section 5.2.4. Recommendation addressed.
5.2.1 Identification of FCWS Habitat on Environmental Control Plans	The "known" and "likely to occur" habitat areas should be identified and mapped in the SMP.	The available GIS data with FCWS mapping, PCTs, relocation hubs etc. is shown in the figures presented in Appendix A.	Clarification is required. Does "known" and "likely to occur" habitat areas in this context refer to the Commonwealth mapping, or something different? It is not clear where these habitat areas are, and that is why BCS has requested that the maps be included in the SMP. It is acknowledged that the BMP has been updated on page 25 to reference the known and potential FCWS habitat, so again, an example of this mapping is required. Recommendation not addressed.

5.2.2 Specific FCWS Induction	The second dot point should be amended for Stage 1 to state that FCWS surveys are required for the entire Stage, not just CH603.00-625.00.	Section 5.2.2 dot point 2 was amended to include that FCWS surveys are required for the entirety of Stage 1.	Updated. Recommendation addressed.
5.2.3 Develop a Survey Prescription	In addition to windrowing slashed vegetation to the edge of the Construction Impact Zone (CIZ) it has been suggested that as much of the remaining slashed vegetation in the CIZ should be removed. Several types of machinery can complete this removal. Consideration should be given to including this activity.	Recommendations of types of machinery to remove remaining slashed vegetation in the CIZ were explored (i.e., windrowing with hay rakes, tedder rake) however these types of machinery were considered to not meet safety compliance requirements on a construction site.	ARTC commentary acknowledged. Recommendation addressed.
	Fifth dot point (page 24) – the second sentence should read “this should enable sufficient time for uncaptured FCWS to move of their own accord”.	Sentence was amended to “ <i>This should enable sufficient time for uncaptured FCWS to move of their own accord</i> ”.	Updated. Recommendation addressed.
	Previously a 7-day period had been agreed to between topsoil stripping and slashing – BCS does not support a 2-day period without further discussion and justification. The Stage 3 report also references a period of 7 days.	Comment on suitable timeframe between topsoil stripping and slashing stage is noted to be discussed further.	Discussion yet to occur. BCS’s position is that the 7-day period should be reinstated. Recommendation outstanding.
	This section mentions the use of a scrapper. It is not clear what this machinery is or in which situations it would be used. The dot point states that where a scrapper is used, an ecologist or spotter catcher would inspect the material at the recipient site. Does this mean that a scrapper is not involved in the removal of topsoil so there is no impact site to inspect? As discussed in previous meetings, the FCWS register indicates that the use of excavators results in the highest survival rate of encountered skinks, so where possible that item of machinery is preferred.	Comments of queries of use of a scrapper as part of the topsoil stripping process (it is one of the options for machinery to be used). A scrapper is used to collect soil material were there is a large surplus and reposition as required to another location. Either as a fill or soil stockpile. A scrapper could be viewed as an excavator bucket on wheels, so it collects a large volume and then is able to deposit it at another location. It’s this other location where it is suggested the ecologist or spotter catcher could be to supervise the removal and deposition of that material.	ARTC commentary acknowledged. Recommendation addressed.
5.2.4 Data Collection Requirements	It would be beneficial if the chainage and Stage of project could be recorded for each FCWS capture.	Have updated section to include: - stage of Project and chainage is included in data / record.	Updated. Recommendation addressed.

for Captured FCWS	Final paragraph (page 27) – state that the register will be provided with each incident notification and live FCWS-find report, and it will be made readily available for regulatory agencies.	The finds register will be included with each incident notification and live FCWS-find report will be made readily available to regulatory agencies.	Updated. Recommendation addressed.
5.2.5 Identifying and Establishing FCWS Relocation Sites	(i) Site Identification - although some sites will be located according to FCWS captures, other sites will be pro-actively created according to the presence of suitable habitat along the alignment – this should be articulated.	(i) Site Identification – updated wording within this section to articulate that although some sites will be located according to FCWS captures, other sites will be pro-actively created according to the presence of suitable habitat along the alignment.	Updated. Recommendation addressed.
	(ii) Site establishment - other material has been proposed for habitat enhancement including woody debris.	(ii) Site establishment – updated to include woody debris as a suitable material to use at relocation sites.	Updated. Recommendation addressed.
	Will the relocation sites be demarcated in the longer term once construction has been completed? If yes, how will they be identified? Will more permanent signage be installed?	To suitably capture relocation sites in the longer-term post-construction updated this section to include “ <i>Sites that receive captured/relocated FCWS will be GPS and a register created as part of an environmental sensitive zone for ARTC operations</i> ”.	Updated. Recommendation addressed.
5.2.6 Habitat Enhancement and Refuge Replacement	Explanation is required as to why the placement of hay bales is only to occur on freehold land in the construction boundary – is there other tenures of land present and what precludes them from receiving habitat enhancement measures?	Query on why freehold tenure land within construction boundary. Word 'freehold' has been removed.	Section 5.2.6 updated and “freehold land” has been deleted – therefore hay bales will be located throughout the construction boundary, regardless of tenure. However, the placement of woody debris every 10 metres has been removed from the latest version of the SMP – request that this change to be explained.
5.2.7 Unexpected Five-clawed Worm Skink Finds Procedure	The Stage 2B Chainage 641.08-647.00 has not been identified before as being relevant to the Unexpected FCWS Finds Procedure. Is this based on the most recent finds in Stage 2? Will the BMP be updated to be consistent with the SMP?	Yes, the BMP will be updated to be consistent with the SMP as queried. Wording updated within this section ". Stage 1: Chainage 603.000 to 625.000 identified through DAWE predictive modelling, . Stage 2B: Chainage 641.08 – 647.00 following finds and extrapolating	The SMP still states Stage 1 chainages 603.00-625.00 are only subject to the FCWS-specific finds procedure – whereas the BMP states the procedure applies to all of Stage 1. It has been agreed the procedure can apply to all of Stage 1 – ensure consistency between documents.

		likely habitat and - Stage 3: Chainage 735.000 to 754.250 following finds and extrapolating likely habitat.	The BMP does not list Stage 2B CH641.08-647.00 as being applicable to the FCWS-specific finds procedure – ensure consistency between documents.
	The sentence after the first three dot points stating that the chainages in each stage have been identified because “individuals can move into these areas following the field surveys” is not correct. The chainages in Stage 3 were identified following FCWS finds and extrapolating likely habitat, and the Stage 1 chainages were identified through the DAWE predictive modelling for the FCWS.	No response.	Sentence has been deleted. Recommendation addressed.
	Additional text should be added to the first paragraph referring to the Unexpected Threatened Species Find Protocol in Appendix G of the Construction BMP to provide clarity around the protocol that must be enacted outside of those chainages. Consideration should be given to including the protocol as an appendix to the report.	The Unexpected Threatened Species Find Protocol had been included in Appendix E as suggested.	Text added regarding the Unexpected Threatened Species Find Protocol and Appendix E added. Recommendation addressed.
6.0 Five-clawed Worm Skink Monitoring Program	It is not clear whether the “adjacent monitoring site” will also be located in the relocation hub, or whether these sites will be in the broader rail corridor. This needs to be clarified. A diagram of the proposed survey design would be beneficial.	Description of “adjacent monitoring site” is noted as relocation hub is the monitored 'impact' site. This is detailed in paragraph 4 of Section 6.0. Adjacent monitoring sites are outside of areas likely to be impacted by maintenance activities (i.e. near trees and bushes beyond the CIZ and any associated buffer zones for vegetation growing near rail line).	ARTC commentary acknowledged. Location of monitoring sites included in Figures 9-1 to 9-3 in Appendix A. Now that the “impact site” and “adjacent monitoring site” locations are understood, BCS is concerned that the monitoring design as outlined is limited only to determining whether skinks are persisting in the relocation hubs (which is valid). However, equal importance should be given to determining whether skinks have recolonised the disturbed sites in the

	<p>This comment is also relevant to section 6.2 – if “adjacent monitoring sites” are located in the broader rail corridor, consideration should be given to placing artificial refuge sites in areas that are unlikely to be disturbed by rail maintenance activities, including slashing of the corridor. Appropriate signage should be considered.</p>	<p>GIS layers for environmentally sensitive zones as part of ARTC operations to identify these locations.</p>	<p>corridor. We strongly recommend that the monitoring design is amended, and it incorporates sites in disturbed areas, focussed on where skinks were recorded during topsoil stripping works (to increase future recording success). If skinks are found in these disturbed sites, then it may be reasonable to conclude that the project is having less of an impact on the population than previously suggested.</p>
<p>6.1 Site Selection</p>	<p>Are the “paired sites” referred to in this section the same as the “impact site” and “adjacent reference site” described in section 6.0?</p>	<p>Difference between “paired sites” and “impact site” is elaborated in Section 6.1 with "A paired site comprises an 'impact site' situated at a relocation hub that received relocated FCWS' and a 'reference site' located some distance away is unaffected by the project. The sites are summarised as:" Most of the finds are somewhat concentrated when considered from a biometrician perspective. It's very important to have the following: an impact site that received a range of the prescribed management actions like it was a relocation hub with its exclusion fencing, hay bales/woody debris and it received relocated skinks. Then to pair it up with a 'reference site' that occurs near enough to your impact site yet far enough away to be considered 'independent' but was unaffected by the project. At the same time, one needs to consider land tenure so these 'reference' sites are across an area that is predominantly privately owned with a focus on cultivation agriculture. More sites within in Stage 2 would be preferable however need to be supported by that 'impact site' that has received those treatments. Remember</p>	<p>Following from the comments in 6.0 above, if the monitoring design is amended to include disturbed sites, additional sites will be available for monitoring, thereby increasing the chance of success of recording skinks. Using the find success of Phil Spark’s monitoring program for the skinks, it is likely that the current proposed design will result in a find success rate of less than 1 percent – potentially one skink per season. This level of effort will not allow meaningful conclusions to be made from the surveys. BCS recommends that an amended design be provided for discussion.</p>

		looking at occupancy and not abundance/number of individuals.	
	Justification is required to support why only 15 sites have been proposed – this seems to be a small number given the extent of the FCWS finds across all three Stages of the project. Consideration should be given to determining a minimum number of individuals that would be required to be captured to provide a meaningful sample size (e.g. 10 individuals) and implementing adequate sampling sites to attempt to meet that target number. The proposed initial trial period could be used to test the appropriate number of sample sites. Limiting the number of monitoring sites will limit the chance of capturing individuals, and therefore will limit the conclusions that can be made from the monitoring program and the likely impact of the project on the FCWS population.	Number of site suggestions – refer to comments above and the limit of sites has been the result of the way FCWS have been found, their relative concentrated nature, particularly at relocation hubs which is the focus of the impact site for monitoring and cannot have them on top of one another otherwise it simply amounts to pseudo- replication.	
	The comment stating that some sites will be removed from the monitoring program if FCWS are not located in Stage 1 can be deleted, given that finds have now been recorded in this Stage.	No response.	Sentence removed. Recommendation addressed.
	A map of the proposed monitoring sites should be included.	Mapping of proposed monitoring sites has been provided in Appendix A.	Figures 9.1-9.3 included. Table 6.1 updated with more details. Recommendation addressed.
6.2 Sampling Design and Regime	A diagram of the proposed artificial refuge layouts would be beneficial.	Each site is different in its configuration therefore difficult to provide a diagram for as requested. For example, roadside configuration would be more linear.	A generalised or idealised diagram of a site would be beneficial to understand the proposal. Recommendation not addressed.
	Terracotta tiles are unlikely to be useful as they are small and likely to dry the ground out. They are suitable for basking species in cold weather but not likely for FCWS. Despite this, the outcomes of the trial will confirm their usefulness.	The terracotta option has been replaced with industrial conveyor belt tile as suitable artificial refuge material. Current trials running have shown this material to be excellent for frogs, a range of skinks and snakes.	Update noted and supported. Recommendation addressed.

	<p>Carpets should be larger than the proposed 1m² to enhance insulation and moisture retention. The carpet should be old/weathered/have water holding capacity to increase its habitat value. Phil Spark has created some artificial refuge sites for FCWS monitoring which include a range of materials – consideration should be given to adopting the same approach. BCS can provide examples of Phil’s refuge sites if required.</p>	<p>Noted on suggestion for suitable size of carpet to be used as part artificial refuge type. However, proposed monitoring sites may prove a little more difficult with larger-sized pieces of carpet to position between the existing habitat in the relocation hub (impact treatments). Consideration is also given to those sites with exposed nature with some sites along public roads and largely more visible pieces may be prone to disturbance by the public.</p> <p>A more discrete approach is preferred to avoid disturbance as a number of the sites interface with public use areas like roads. Approach will enable a useful comparison between those set up and used by NES and ARTC Inland Rail approach.</p> <p>BSC’s offer to provide examples of Phil Spark’s refuge sites - an email request by the has been submitted by the ecologist (report author) for this information.</p>	<p>ARTC commentary acknowledged, however BCS remains concerned that the 1m² carpet squares will not be large enough to be as effective as they could be. Phil Spark’s artificial refuge sites (examples of which were provided to the ecologist on 7 July 2022 following the request for the information) are the best-known practice for establishing habitat. Larger artificial refuge sites will retain soil moisture for longer. Noting site constraints in some locations, we would be interested to know how many monitoring sites could accommodate larger artificial habitats, which may in turn increase the chance of recording individuals.</p>
	<p>Artificial refuge sites should be installed as soon as possible after construction. Refuge sites can be placed in the relocation hubs now to enhance habitat. The current season is excellent and immediate installation would potentially allow for a spring/early summer trial to test capture rates.</p>	<p>It is the intent once the SMP is finalised, to install artificial refuge sites and be permanent locations. The 12 weeks period prior to monitoring is intended as a bedding in or minimum time and with the wetter than usual season it would enable some distinction to take place between tile and carpet options.</p>	<p>ARTC commentary acknowledged. Every effort should be made to install the artificial refuge sites as soon as possible so that if favourable conditions remain in autumn 2023, monitoring can occur. Recommendation addressed.</p>
	<p>The artificial refuge sites should be permanent rather than temporary sites. Installing artificial refuge sites 12 weeks before scheduled monitoring limits the ability of monitoring to respond to appropriate seasonal conditions.</p>		

	<p>Rather than basing the monitoring program on an autumn and spring frequency, it should be based on the presence of suitable soil moisture conditions. The FCWS records to date indicate a correlation between finds and rainfall/soil moisture, where soil cracks are minimal, and skinks move closer to the soil surface. Monitoring on a strictly seasonal basis may reduce detectability of the skinks. BCS recommends that each monitoring event be confirmed in consultation with us to ensure that conditions are selected to increase the chance of detectability.</p>	<p>Intent is to conduct monitoring at the indicated time frames which tend to coincide with the more reliable 'wetter' periods.</p> <p>Specific detail has been added to this section that relates to soil moisture/rainfall during monitoring.</p>	<p>It is not clear what information has been added to this version of the SMP relating to soil moisture/rainfall during monitoring. This section states early autumn and late spring periods have been chosen to account for rainfall based on long term climatic averages, but there is no guarantee that any given monitoring period will align with suitable soil moisture conditions. If monitoring occurs without considering the soil moisture conditions, it will invalidate the entire seasonal survey. If monitoring occurs when the soil is dry and cracks are present, it is likely no skinks will be recorded as they will be in the soil cracks, not on the soil surface. BCS strongly recommends the consideration of soil moisture forms the basis of survey timing.</p>
<p>6.4 How Many Years to Monitor</p>	<p>As previously discussed, it is recommended that the monitoring periods be amended so that they are based on soil moisture content rather than an annual event. Five monitoring events over a 10-year period would be reasonable and would account for dry periods when skinks are likely to be deep in the soil cracks rather than being at the soil surface. Monitoring events could occur in consecutive years when conditions are favourable, or monitoring could be suspended over a period while conditions are dry. The trial period should not be considered one of the five monitoring events unless it results in a favourable capture rate (e.g. more than 10 skinks). Potentially a trial could occur this spring/early summer.</p>	<p>Occupancy analysis related monitoring is the key. Surveys would be undertaken at indicated times within this section and with adequate soil moisture (reflected in long term climatic averages for past 25-30 years around Moree). The repeated surveys enable an occupancy model to be created using variables, particularly in the trial which will assist in refining the monitoring program.</p> <p>The point is to establish the trial survey and be guided by the statistics and let mathematics assess factors such as artificial shelter type (the detection rate can be compared between the two), time of day (detection rate comparison) and sample size effect (to determine how</p>	<p>See comments made above in relation to 6.2.</p>

		many replicates (number of sites plus, number of repeat visits) are needed in subsequent monitoring events.	
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