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JUNE 2022 ADDENDUM TO THE INLAND RAIL – NARRABRI TO NORTH STAR

Biodiversity Assessment Report

FINAL

June 2022

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Biodiversity Assessment Report

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Australian Rail Track Corporation

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Environmental & Social Consultants

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Disclaimer

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1.0 Background

Umwelt (Australia) Pty Limited (Umwelt) has been engaged by Australian Rail Track Corporation (ARTC) to carry out additional biodiversity surveys and to prepare an addendum to the Framework for Biodiversity Assessment (FBA) Biodiversity Assessment Report (BAR) (Umwelt, 2107) which supports the Environmental Impact Statement (EIS) for the N2NS portion of the Inland Rail Project. This Addendum FBA BAR assesses impacts to biodiversity values within a refined Issued For Construction (IFC) Construction Impact Zone (CIZ) and portions of which fall outside the outside the approved Submissions and Preferred Infrastructure Report (SPIR) CIZ (limited to Phase 1 of the N2NS) (Umwelt 2020). The IFC CIZ has been substantially reduced overall from the approved SPIR CIZ, however in some areas, detailed design had to expand the construction footprint beyond the originally assessed proposal site and additional assessment areas defined in the EIS, to allow for ancillary works including fence relocations, sight lines, signalling upgrades, utilities relocation and the provision of a rail maintenance access road.

The IFC CIZ Development Footprint covers an area of approximately 1234.36 hectares (ha), the majority of which falls within the SPIR CIZ Development Footprint (refer to **Appendix A**). The IFC CIZ Development Footprint has been revised from the SPIR CIZ Development Footprint to reduce the overall impact on native vegetation and threatened species habitat in accordance with conditions of approval E19. The revised IFC CIZ Development Footprint incorporates construction and design elements in the footprint.

The IFC CIZ Development Footprint includes approximately 36.35 ha of previously unsurveyed areas, hereafter referred to as the "Additional Disturbance Area" (refer to **Appendix A**), adjacent to the original Development Footprint (Umwelt 2017) and the SPIR CIZ Development Footprint (Umwelt 2020). This Additional Disturbance Area has substantially reduced since the previous December 2021 addendum report (Umwelt 2021a), which was formerly 53.81 ha. Umwelt have undertaken additional ecology surveys within this Additional Disturbance Area in accordance with FBA and to meet the Department of Planning and Environment's (DPE) assessment requirements for the IFC CIZ Development Footprint.

Field surveys were carried out in February and April 2021 within the Additional Disturbance Area and previously inaccessible areas. Subsequent to these surveys, a revised IFC CIZ Development Footprint was developed which increased the Additional Disturbance Area from that assessed in early 2021. Project timeframe constraints precluded further field verification across the increased Additional Disturbance Area and a desktop assessment of these areas has been completed. A conservative approach was adopted for mapping native vegetation (particularly native grassland) and assumed presence of species credit habitat has been applied.

In July 2021, a five-clawed worm-skink (*Anomalopus mackayi*), listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and endangered under the NSW *Biodiversity Conservation Act 2016,* was recorded within the IFC CIZ Development Footprint by a spotter-catcher contractor carrying out pre-clearance surveys. Through consultation with agencies, a clearing procedure for the five-clawed worm-skink was agreed on following the requirements of the unexpected finds procedure as detailed in the approved Construction Biodiversity Management Subplan – N2NS (Trans4m 2022). Following this clearance procedure, an additional 247 individuals have been recorded during pre-clearing and post-clearing works between chainage 603 to 630 and 735 to 744. Of these, 87 individuals have been recorded as dead as a result of the clearing works, 116 individuals relocated and 44 recorded as dropped tails. The species was surveyed for as part of field investigations carried out for

the BAR (Umwelt, October 2017); however, it had been discounted from further assessment as no individuals of the species were recorded. An Assessment of Significance carried out for the species (Umwelt 2021b) concluded that the N2NS section of the Inland Rail Project is likely to have a significant impact on the species. A species management plan (SMP) has been prepared for the five-clawed worm-skink and is under review by BCD at the time this report was prepared.

Revised biodiversity credit requirements have been calculated based on the revised IFC CIZ Development Footprint.

1.1 Purpose of this Report

As detailed in initial correspondence (15/01/2020) and formal correspondence (21/01/2020) from the Department of Planning and Environment (DPE), this addendum report addresses the reporting requirements associated with a change to the development footprint, as detailed in **Table 1.1** below. References to the relevant sections of this addendum report are also included for each of the requirements.

Additionally, this addendum report addresses the relevant biodiversity consent conditions contained within the DPE Conditions of Approval of Inland Rail – Narrabri to North Star Phase 1 (SSI 7474 –13 August 2020), as detailed in **Table 1.2** below. Further to this, this addendum report provides responses to the Biodiversity and Conversation Division (BCD) correspondence (14 February 2022) on the previous version of the addendum report (Umwelt 2021a), as detailed in **Table 1.3** below.

Table 1.1 Addendum Report Requirements According to Correspondence from DPE

Initial Correspondence (15/01/20)	Formal Correspondence (21/01/2020)	Where Addressed in this Addendum Report
Clear description of the new footprint, including background to why the revised footprint is required.	N/A	**Section 1.0** Background
Clear description stating how the updated vegetation map was developed.	N/A	**Section 2.0** Vegetation Map Updates
Discussion of the assessment methodology, including justification of the desktop approach due to ongoing drought conditions and provision for a rapid field assessment to validate the "edge matching" of PCTs included in the briefing note of 3 December 2019 (Umwelt).	Complete a rapid field assessment to validate the edge matching of PCT's undertaken by desktop assessments. Results to be provided should include the field data collected, number of plots, photographs and locations of the rapid plots.	**Section 2.0** Vegetation Map Updates Field survey data (including spatial files) provided to the BCD
Updated vegetation map reproduced at a scale where individual PCTs are clearly displayed.	Develop an updated vegetation map, produced at scale where individual PCT's are easily identified.	**Appendix A** Updated Vegetation Map Figures
Updated areas of each vegetation zone, including discussion of whether the existing survey effort meets the minimum plot requirement for each vegetation zone as per Table 3 of the FBA.	Provide BCD with updated spatial files, including the amended footprint, updated vegetation map and location of rapid assessment plots.	**Section 4.0** Ecosystem Credit Updates Spatial files (including IFC CIZ, updated vegetation map and rapid assessment points) provided to the BCD
Updated species credit obligations, and how they have been calculated in the absence of targeted surveys.	Amended species credit polygons, including spatial format, should be provided for all species credit species.	**Section 3.0** Species Credit Updates Spatial files with revised species polygons have been provided to the BCD
Discussion as to whether any new species credit species are assumed to be present in the expanded footprint.	N/A	**Section 3.2** Candidate Threatened Flora and Fauna Species Updates
Discussion (if relevant) of staging of the proposal, including a clearly defined credit obligation (ecosystem and species credits) for each stage.	N/A	Not relevant
Discussion of updated impacts to Matters of National Environmental Significance (MNES) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).	N/A	**Section 6.0** Updated Impacts on MNES

Initial Correspondence (15/01/20)	Formal Correspondence (21/01/2020)	Where Addressed in this Addendum Report
Finalisation and submission of the updated BBAM calculator, credit reports and new spatial files.	N/A	**Appendix D** Updated Final Credit Reports Four BBAM credit calculator assessments submitted to the BCD Spatial files (including IFC CIZ, updated vegetation map and rapid assessment points) provided to the BCD
A rapid field assessment is required to ensure the results of the desktop approach is an accurate representation of what is on the ground. Impacts to any new PCTs should be identified and included in the vegetation map, BAR addendum and BBAM calculator.	Complete a rapid field assessment to validate the edge matching of PCT's undertaken by desktop assessments. Results to be provided should include the field data collected, number of plots, photographs and locations of the rapid plots. Develop an updated vegetation map, produced at scale where individual PCT's are easily identified. PCT's included the species credit polygons according to the Threatened Biodiversity Data Collection not previously identified in the BAR should be listed.	**Section 2.0** Vegetation Map updates Field survey data (including spatial files) provided to the BCD **Appendix A** Updated Vegetation Map Figures **Section 3.0** Species Credit Updates
N/A	Provide details regarding how the additional impact to the koala was determined.	**Section 3.5.1** Koala

Table 1.2 Relevant DPE Biodiversity Consent Conditions

Biodiversity Consent Condition	Where Addressed in this Addendum Report
E17 - The Proponent must minimise impacts to plant community types and not exceed the total areas impacted as identified in Table E1.	**Section 4.0** Ecosystem Credit Updates - **Table 4.1**
E18 - The Proponent must meet the biodiversity offset obligations for ecosystem and species credits as set out in Tables E2 and E3, within two years of the CSSI approval. The retirement of the biodiversity credits must be carried out in accordance with the NSW Biodiversity Offsets Policy for Major Projects and can be achieved by a combination of: (a) acquiring and retiring "biodiversity credits" within the meaning of the *Biodiversity Conservation Act 2016* (BC Act); and/or (b) making a payment into the Biodiversity Conservation Fund; and/or (c) outlining in a Biodiversity Offset Strategy the provision of supplementary measures. The Strategy must be prepared in consultation with EES and DAWE.	Not applicable to this addendum report.

Biodiversity Consent Condition	Where Addressed in this Addendum Report
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 months after the commencement of construction or as agreed in writing by the Planning Secretary.	**Section 3.0** Species Credit Updates **Section 4.0** Ecosystem Credit Updates **Section 5.0** Comparison of Revised Biodiversity Credits to Approved Credits to be Retired
E20 - The review and update of credit requirements must be undertaken by: (a) using the vegetation mapping, and the extent of impact in the revised development footprint (Table 3.4) in the July 2020 Addendum to the Inland Rail – Narrabri to North Star Biodiversity Assessment Report; and/or (b) completing verification surveys to confirm the extent, type and condition of native vegetation to be impacted. 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.	**Section 2.0** Vegetation Map Updates **Section 3.0** Species Credit Updates
E21 - The Proponent must submit to the Planning Secretary for information a copy of the Credit Retirement Report for the retirement of the ecosystem and species credits required by Condition E18 within one month of receiving the report.	**Appendix D** Revised Final Credit Reports
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.	Not applicable to this addendum report.
E23 - The Proponent must reduce the area of koala habitat, identified in Table E4, that is impacted by the CSSI by at least 25%, or as otherwise agreed by the Planning Secretary.	**Section 3.5** Revised Species Credit Requirements Overall, 58% reduction as part of the IFC CIZ Development Footprint.
E24 - The Proponent must submit a report on the final construction footprint demonstrating how impacts to the plant community types identified in Table E4 have been reduced. This must be provided to the Planning Secretary, EES and DAWE for information, within six months after the commencement of construction or as agreed by the Planning Secretary.	**Section 4.0** Ecosystem Credit Updates **Section 5.0** Comparison of Revised Biodiversity Credits to Approved Credits to be Retired
E25 - The Proponent must provide a minimum of 4556 species credits to offset impacts to the koala.	Not applicable to this addendum report.
E26 - The offset credits required by Condition E25 must be sourced where practicable, from: (a) The same IBRA subregion as the impacted site, or (b) The adjoining IBRA subregions within the same IBRA region as identified in (a).	Not applicable to this addendum report.

Table 1.3 Recent Correspondence from BCD

BCD Comment	Where Addressed in this Addendum Report
Cover letter - Condition E23 of the Infrastructure Approval requires that the proponent reduces the area of koala habitat impacted by the project by at least 25 percent. In addition, condition E24 requires that the proponent must submit a report demonstrating how impacts to the plant community types identified in Table E4 have been reduced. It is not clear whether the BAR Addendum is addressing these requirements or not.	**Section 3.5.1** demonstrates how impacts to koala habitat have been reduced by greater than 25% **Section 4.0** demonstrates how impacts to Plant Community Types (PCTs) have been reduced **Section 5.0** demonstrates the reduction of impacts to both koala and PCTs in the form of biodiversity credits
Recommendation 1.1 - Provide evidence that all construction and ancillary activities completed to date have been contained within the IFC CIZ.	ARTC has provided evidence separate to this report demonstrating that, for completed Stage 2 works, construction and ancillary activities were undertaken within the IFC CIZ. Construction in the remaining stages are ongoing within the IFC CIZ.
Recommendation 1.2 - Provide evidence that the alleged clearing event at CH640630 between Gurley and Tycannah on 22 August 2021 has been included within the IFC CIZ.	ARTC has provided evidence separate to this report demonstrating the clearing event was within the IFC CIZ.
Recommendation 2.1 - The Planning and Assessment Group will confirm the most appropriate assessment method to determine impacts to biodiversity in the Additional Disturbance Area.	Noted.
Recommendation 3.1 - The Department of Agriculture, Water and Environment will provide advice on whether the assessment of the Additional Disturbance Area in the BAR Addendum is consistent with the referral made under the EPBC Act.	Noted.
Recommendation 4.1 - Incorporate updates made to the Biodiversity Management Plan for the Five-clawed Worm-skink into the BAR Addendum if other amendments to the document are being made.	**Section 3.5.2** includes the latest updates to the Biodiversity Management Plan (Revision 3, 6 December 2022) for the Five-clawed Worm-skink.
Recommendation 5.1 - Provide further justification as to why the existing fauna surveys for species credit species are sufficient and explain how they meet current survey requirements.	**Section 3.2** includes details for each species requiring assessment under the FBA. Further to this, further details are provided on the incremental increase of the Additional Disturbance Area.

BCD Comment	Where Addressed in this Addendum Report
Recommendation 6.1 - Update the additional disturbance area figures for the species credit species in Table 3.5 to reflect the figures entered in the BBAM-C.	All areas of impact (including **Table 3.5**) have been updated as part of this addendum report.

1.2 Summary of Impacts on Vegetation Communities and Species Credit Species

A summary of the impacts on vegetation communities and species credits species between the approved SPIR CIZ and the current IFC CIZ (focus of this addendum report) is provided in **Table 1.4** and **Table 1.5** below. These tables demonstrate the following key biodiversity consent conditions have been satisfied:

- *E17 - The Proponent must minimise impacts to plant community types and not exceed the total areas impacted as identified in Table E1.*
    - Overall 44 percent reduction in the ecosystem credits
    - Overall 62 percent reduction in species credits
- *E23 - The Proponent must reduce the area of koala habitat, identified in Table E4, that is impacted by the CSSI by at least 25%, or as otherwise agreed by the Planning Secretary.*
    - Overall 58 percent reduction in koala habitat and species credits

Table 1.4 Comparison of Vegetation Community Impacts and Ecosystem Credit Requirements between the Approved SPIR CIZ and Current IFC CIZ

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Approved SPIR CIZ (ha)	Approved SPIR Ecosystem Credits	Current IFC CIZ (ha)	Current IFC CIZ Ecosystem Credits
1	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Moderate to Good	17.94	900	9.40	472
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	17.31	1,223	6.48	458
3	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains	Moderate to Good	1.74	93	0.91	48

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Approved SPIR CIZ (ha)	Approved SPIR Ecosystem Credits	Current IFC CIZ (ha)	Current IFC CIZ Ecosystem Credits
	mainly in the Darling Riverine Plains Bioregion					
4	PCT52 (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	432.07	20,102	290.67	13,523
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good	143.95	8,851	61.38	3,773
6	PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good Derived Native Grassland	249.85	8,294	125.64	4,172
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	Moderate to Good	0.51	23	0	0
8	PCT78 (BR196, NA193) River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Moderate to Good	11.82	549	5.32	246
9	PCT135 (BR284, NA271) Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Moderate to Good	9.50	354	4.80	178
10	PCT413 (BR346, NA348) Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland	Moderate to Good	5.72	250	1.87	75

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Approved SPIR CIZ (ha)	Approved SPIR Ecosystem Credits	Current IFC CIZ (ha)	Current IFC CIZ Ecosystem Credits
	of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion					
-	Cleared/Non-native vegetation	-	1,545.68	0	727.88	0
Total			**2,436.09**	**40,639**	**1234.36**	**22,945**

Table 1.5 Comparison of Species Credit Requirements between the Approved SPIR CIZ and Current IFC CIZ

Common Name (scientific name)	Approved SPIR CIZ (Umwelt 2020) Habitat (ha)	Approved SPIR CIZ Species Credits	Current IFC CIZ Habitat (ha)	Current IFC CIZ Species Credits
Koala	175.25 ha	4,556	74.28 ha	1,931
finger panic grass (*Digitaria porrecta*)	66 Individuals (27 in 2015/2016 39 in 2020) 99.25# ha (associated with zones 1, 2, 3, 4, 5, 6)	858 (by individuals) 1,287 (by area - ha)	62 Individuals (25 in 2015/2016, 37 in 2020) 19.15 ha (associated with zones 1, 2, 3, 4, 5, 6)	806 (by individuals) 260 (by area- ha)
creeping tick-trefoil (*Desmodium campylocaulon*)	432.07 ha (associated with zone 4)	4,752	290.67 ha (associated with zone 4)	3,201
Belson's panic (*Homopholis belsonii*)	255 individuals (73 in 2016 182 in 2020) 99.65# ha (associated with zones 1, 2, 4, 5, 6, 7, 9)	6,630 (by individuals) 2,600 (by area - ha)	53 Individuals (4 in 2016, 19 in 2020, 30 in 2021) 13.33 ha (associated with zones 1, 2, 4, 5, 6)	1,378 (by individuals) 364 (by area - ha)
Total	-	**20,683**	-	**7,940**

Further detail is provided in the below report on the assessment of vegetation communities and species credit species.

2.0 Vegetation Map Updates

The IFC CIZ Development Footprint is approximately 1234.36 ha. Of this, approximately 36.35 ha falls outside the SPIR CIZ Development Footprint and was not previously been surveyed or assessed compared to the original assessment presented in the BAR (Umwelt 2017) or the July 2020 Addendum Report (Umwelt 2020). The following sections provide details on the methods used to update the vegetation mapping, comprising an initial desktop assessment, field surveys and post-field survey vegetation mapping updates.

2.1 Desktop Assessment

Prior to field surveys, a desktop assessment of the likely BioMetric Vegetation Types (BVTs)/Plant Community Types (PCTs) and condition classes was carried out across the Additional Disturbance Area of the IFC CIZ. The desktop assessment included the following tasks:

- aerial photography interpretation (API) using the latest aerial photographs provided by ARTC in 2019, Nearmap imagery (dated May 2016) and Esri World Imagery (ArcGIS Map Service – accessed December 2021 and May 2022)
- review of the latest regional vegetation mapping (OEH 2015)
- review of survey data within the original Development Footprint and SPIR CIZ Development Footprint
- edge matching vegetation zones within the Additional Disturbance Area to the SPIR CIZ Development Footprint.

A conservative approach was adopted for mapping potential native grassland given the challenges identifying them from the methods described above. These areas were verified through field surveys described below.

2.2 Field Surveys

Field surveys were carried out over seven days in February and four days in April 2021 by three Umwelt ecologists (Shaun Corry – Accredited BBAM/FBA and BAM Assessor, Rachel Musgrave – Accredited BBAM/FBA and BAM Assessor, and Joel Callaghan – Ecologist).

To confirm and further refine the vegetation mapping, the following survey strategy was undertaken by Umwelt in the Additional Disturbance Area:

- A total of 47 rapid vegetation assessment points were sampled within or adjacent to the Additional Disturbance Area to ground-truth vegetation mapping, including confirmation of BVTs/PCTs) and condition type. Note that since these surveys the Additional Disturbance Area has been amended and not all 47 rapid vegetation points relate to the current Additional Disturbance Area. Some of these rapid assessments are also located in previously inaccessible areas of the approved SPIR CIZ.
- A number of threatened ecological communities (TECs) listed under both the NSW BC Act and the Commonwealth EPBC Act are present along the Additional Disturbance Area. Umwelt completed rapid vegetation assessments to verify the presence of these TECs in accordance with key diagnostic features

and conditions thresholds as listed in the relevant conservation advice for each TEC. It should be noted that *Poplar Box Grassy Woodland on Alluvial Plains* endangered ecological community (EEC) under the EPBC Act was listed in 2019, however in line with previous discussion with DAWE (meeting on 9 March 2020) this EEC has not been considered as part of this addendum report given that the referral for the project predates the EEC listing.

A summary of the field surveys carried out for this assessment are detailed in **Table 2.1.**

Table 2.1 Summary of Vegetation Survey and Assessment Carried for 2021 Addendum Report

Date	Personnel	Field surveys carried out
16-18 February 2021	Shaun Corry	Rapid vegetation assessment points and TEC mapping
22-25 February 2021	Rachel Musgrave and Joel Callaghan	Rapid vegetation assessment points and TEC mapping
6-9 April 2021	Joel Callaghan	Rapid vegetation assessment points and TEC mapping

2.3 Revised Vegetation Mapping

Upon completion of field surveys, the vegetation mapping for the Additional Disturbance Area was updated where necessary according to the rapid vegetation assessment points. This includes updates to BVTs/PCTs, vegetation zones (broad similar condition types) and TECs. No new vegetation types were detected, and therefore no additional floristic plots were required.

Subsequent to field surveys, a revised IFC CIZ Development Footprint was issued which increased the Additional Disturbance Area from that assessed in February and April 2021. A key component of this increased Additional Disturbance Area is the establishment of additional sight lines, which account for approximately 30% of the Additional Disturbance Area. Project timeframe constraints precluded further field verification across the increased Additional Disturbance Area, thus these areas were assessed via desktop assessment. A conservative approach was adopted for mapping native vegetation (particularly native grassland) and assumed presence of species credit habitat has been applied.

The desktop assessment involved review of aerial imagery, regional broadscale mapping (OEH 2015), and vegetation mapping prepared by Umwelt for the project. PCTs and associated condition classes were allocated to unmapped polygons based on their proximity and connectivity to ground-truthed vegetation zones and similarity to surrounding vegetation zones based on aerial photographs. Consideration was also given to surrounding environmental factors and conditions such as proximity to creeklines, soil type, likely edaphic conditions.

Again, a conservative approach was adopted for mapping potential native grassland given the challenges identifying them from the methods described above. The revised vegetation mapping can be found in **Appendix A**.

3.0 Species Credit Updates

3.1 Revised Database Searches

Revised database searches were completed to account for any new records of threatened species recorded within or adjacent (within 10 km) to the Additional Disturbance Area. This also accounted for any new listings under the BC Act or EPBC Act. Database searches undertaken include:

- DPE BioNet Atlas of NSW Wildlife database (DPE 2022)
- Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (DAWE 2022).

3.2 Candidate Threatened Flora and Fauna Species

A preliminary list of species-credit flora and fauna species with potential to occur was generated during the literature review for the Development Footprint within the Biodiversity Assessment Report (Umwelt, October 2017), and these were also considered for the Additional Disturbance Area.

Table 3.1 identifies the species-credit species that were determined to potentially occur in the IFC CIZ Development Footprint, including consideration of the revised database searches.

Existing fauna surveys are considered adequate to inform the fauna habitat present with the Additional Disturbance Area. The Additional Disturbance Area covers an area of approximately 36.35 ha consisting of:

- 27.82 ha of Cleared/Non-native vegetation (a large portion comprising cropped paddocks)
- 5.91 ha of natural and derived native grassland
- 2.62 ha of native woodland vegetation.

The Additional Disturbance Area represents approximately 3% of the total area of the IFC CIZ and 1.5% of the total area of the SPIR Development Footprint.

The Additional Disturbance Area comprises 166 separate polygons spread over the entire extent of the project footprint. A total of 106 polygons (approximately 64%) making up the Additional Disturbance Area are small polygons less than 0.04 ha in size (less than the size of a 20 x 20 m plot). These cover a total area of 0.53 ha of which 64% (0.34 ha) is Cleared/Non-native vegetation.

Approximately 7% of the Additional Disturbance Area consists of eleven polygons >1 ha in size. These cover a total area of 22.36 ha of which 90% (20.14 ha) is Cleared/Non-native vegetation.

Approximately 29% of the Additional Disturbance Area comprises 49 polygons between 0.05 and 0.9 ha in size. These cover an area of 13.63 ha, of which:

- 7.52 ha consists of Cleared/Non-native vegetation
- 4.33 ha consists of natural or derived native grasslands

- 1.78 ha consists of woodland vegetation.

All 166 polygons making up the Additional Disturbance Area are contiguous with areas within the IFC CIZ that were assessed as part of the SPIR CIZ Development Footprint. The majority of these polygons exist as narrow ‘slivers’ of area which were assessed via desktop assessment rather than via field verification.

The small size of the polygons which make up the Additional Disturbance Area, as well as the disjunct nature of the additional disturbance across the entire project extent make additional surveys for fauna species credit species impractical. The polygons are of a size which would make detectability within these areas low, without surveys occurring over a greater area. Expanding the survey area would result in additional surveys being completed within areas of the SPIR CIZ Development Footprint already assessed within the EIS.

Table 3.1 Species-credit Species with the Potential to Occur within the IFC CIZ Development Footprint

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
Austral toadflax ***Thesium australe*** **(Vulnerable under the BC and EPBC Acts)**	×	✓	×	×	×	No	Austral toadflax was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Additional Disturbance Area are generally disturbed and in low condition. The nearest record of this species occurs over 25 km to the east of the Additional Disturbance Area (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Belson's panic ***Homopholis belsonii*** **(Endangered under the BC Act and vulnerable under the EPBC Act)**	✓	✓	✓	✓	✓	Yes	No Belson's panic was recorded within the Additional Disturbance Area during the surveys undertaken for this assessment. A total of 53 individuals have been recorded in the IFC CIZ Development Footprint. Additionally, this species has been assumed present (by habitat area) on properties where access was not available to survey the Additional Disturbance Area (refer to **Section 3.4**).
Bluegrass ***Dichanthium setosum*** **(Vulnerable under the BC and EPBC Acts)**	✓	✓	×	×	×	No	Bluegrass was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Additional Disturbance Area are disturbed, and the species is not expected to occur and is not likely to be impacted by the proposal.

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
Creeping tick-trefoil ***Desmodium campylocaulon*** **(Endangered under the BC Act)**	×	×	✓	✓	✓	Yes	No creeping tick-trefoil was recorded within the Additional Disturbance Area during the surveys undertaken for this assessment. Greater than 2,254 individuals have been recorded within the IFC CIZ Development Footprint in naturally occurring native grasslands.
Cyperus conicus **(Endangered under the BC Act)**	×	×	✓	×	✓	No	*Cyperus conicus* was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Development Site are disturbed. The closest record of the species occurs northwest of Narrabri approximately 10 km from the Additional Disturbance Area (DPE 2022). This species is unlikely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Finger panic grass ***Digitaria porrecta*** **(Endangered under the BC Act)**	✓	✓	✓	✓	✓	Yes	No Finger panic grass was recorded within the Additional Disturbance Area during the surveys undertaken for this assessment. A total of 62 individuals have been recorded in the IFC CIZ Development Footprint during previous surveys. Additionally, this species has been assumed present (by habitat area) on properties where access was not available to survey the Additional Disturbance Area (refer to **Section 3.4**).
Pine donkey orchid ***Diuris tricolor***	×	×	×	×	✓	No	Pine donkey orchid was not recorded within the original Development Footprint despite thorough

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
(Vulnerable under the BC Act)							vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Additional Disturbance Area are generally disturbed and in low condition. A record made in 1993 occurs in the Pilliga conservation reserves approximately 50 km south-west of the Additional Disturbance Area (DPE 2022). Additionally, the pine donkey orchid is not predicted to occur in the majority of the IBRA subregions the IFC CIZ Development Footprint is associated with according to the BioBanking credit calculator. This species is only predicted to occur in North Basalts IBRA Subregion in the Border Rivers/Gwydir CMA. The nearest record to where the IFC CIZ Development Footprint crosses the North Basalts IBRA Subregion in the Border Rivers/Gwydir CMA is approximately 40 km to the south-east near Warialda, recorded in 1992 (DPE 2020). Apart from the 28 year old record near Warialda, the IFC CIZ Development Footprint is generally outside the pine donkey orchid's known distribution (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Native milkwort *Polygala linariifolia* (Endangered under the BC Act)	✓	✓	✓	×	×	No	Native milkwort was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Additional Disturbance Area are generally

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
							disturbed and in low condition. Populations are known to occur in the Pilliga conservation reserves approximately 30 km south of the Additional Disturbance Area and east of Narrabri and Moree (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Scant Pomaderris ***Pomaderris queenslandica*** **(Endangered under the BC Act)**	×	✓	×	×	✓	No	Scant Pomaderris was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Additional Disturbance Area are generally disturbed and in low condition. Populations are known to occur in the Pilliga conservation reserves approximately 20 km south of the Additional Disturbance Area east of Narrabri (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to not be impacted by the proposal.
Slender darling pea ***Swainsona murrayana*** **(Vulnerable under the BC and EPBC Acts)**	✓	✓	✓	✓	×	No	Slender darling pea was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. According to the BioBanking credit calculator optimal survey periods for this species are from September to February. Umwelt completed surveys on 16 to 18 February 2021, 22 to 25 February 2021 and 6 to 9 April 2021. Of the records in the region surrounding the IFC

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
							CIZ Development Footprint, months which this species has been recorded include April, May, June, July, September and October (DPE 2022), As such, the additional April 2021 surveys fall within detection periods this species has been recorded in the region. Further, the habitats within the Additional Disturbance Area are generally disturbed. The closest recent record of the species occurs near the rail corridor 10km south of Moree (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Spiny peppercress *Lepidium aschersonii* (Vulnerable under the BC and EPBC Acts)	✓	✓	✓	×	✓	No	Spiny peppercress was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Additional Disturbance Area are generally disturbed and in low condition. The closest recent record of the species occurs approximately 10km to the east of the Additional Disturbance Area in Bobbiwaa State Forest (DPE 2022). A population is also known from Brigalow SCA and Brigalow Park Nature Reserve 15km southwest of Narrabri (DPE 2020). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Ooline *Cadellia pentastylis*	×	×	✓	×	×	No	Ooline was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
(Vulnerable under the BC and EPBC Acts)							requirements for this species. The habitats within the Additional Disturbance Area are generally disturbed and in low condition. Many records occurring near the Additional Disturbance Area are over 30 years old (DPE 2022). The closest recent records of the species occur near Mount Kaputar National Park (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Tylophora linearis **(Vulnerable under the BC Act and Endangered under the EPBC Act)**	×	×	✓	×	×	No	*Tylophora linearis* was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. The habitats within the Additional Disturbance Area are generally disturbed due to surrounding agricultural practices and disturbance from the rail corridor. Populations are known to occur in the Pilliga conservation reserves approximately 30km south of the Additional Disturbance Area (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Winged peppercress (*Lepidium monoplocoides*) (Endangered under the BC and EPBC Acts)	×	×	×	×	×	No	Winged peppercress was not recorded within the Additional Disturbance Area despite thorough vegetation surveys undertaken in accordance with the seasonal requirements for this species. According to the BioBanking credit calculator optimal survey periods for this species are from November to February. Umwelt completed surveys on 16 to 18

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
							February 2021, 22 to 25 February 2021 and 6 to 9 April 2021. The habitats within the Additional Disturbance Area are generally disturbed due to surrounding agricultural practices and disturbance from the rail corridor. A recent record of Winged peppercress in October 2017 occurs approximately 8 kilometres to the south-east of the Revised Development Footprint in the Pilliga Outwash CMA subregion. All surveys to date did not record this species which is detectable November to February. This species is not likely to occur in the IFC CIZ Development Footprint and is not likely to be impacted by the proposal.
Pale imperial hairstreak ***Jalmenus eubulus*** **(Critically endangered under the BC Act)**	×	×	✓	×	×	No	Pale imperial hairstreak was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. Although there were occasional wooded areas within the Additional Disturbance Area, these habitats were isolated and fragmented by agricultural lands. The closest most recent record of the species occurs approximately 10 km to the northwest of the IFC CIZ Development Footprint near North Star (DPE 2022). No known populations of pale imperial hairstreak occur within the Additional Disturbance Area, and it is considered that the species is not likely to be impacted as a result of the proposal.
Five-clawed worm-skink	×	×	✓	✓	✓	Yes	Five-clawed worm-skink was not recorded within the original Development Footprint despite targeted fauna

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
Anomalopus mackayi **(Endangered under the BC Act and vulnerable under the EPBC Act)**							surveys undertaken in accordance with the seasonal requirements for this species. The closest verified record of the species occurs around Bellata less than 1km to the west of the Development Site (DPE 2022). The species has been recorded by spotter-catcher contractors within the IFC CIZ Development Footprint during preclearance surveys. Details of this unexpected find can be found within **Section 3.5.2.**
Pale-headed snake ***Hoplocephalus bitorquatus*** **(Vulnerable under the BC Act)**	✓	✓	✓	✓	✓	No	Pale-headed snake was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. Although there are occasional wooded areas within the Additional Disturbance Area, these habitats were isolated and fragmented by agricultural lands. The closest record of the species occurs in the Moree township less than 1km from the Development Site (DPE 2022). No known populations occur within the Additional Disturbance Area, and it is considered that the species is not likely to be impacted as a result of the proposal.
Dunmall's snake ***Furina dunmalli*** **(Vulnerable under the EPBC Act)**	×	×	✓	×	×	No	Dunmall's snake was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs 50km to the northeast of the IFC CIZ Development Footprint (DPE 2022). No known populations occur within the Additional Disturbance

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
							Area, and it is considered that the species is not likely to be impacted as a result of the proposal.
Black-breasted buzzard ***Hamirostra melanosternon*** **(Vulnerable under the BC Act)**	×	✓	×	×	×	No	Black-breasted buzzard was not recorded within the original Development Footprint despite thorough fauna surveys being undertaken. The closest records of the species occur approximately 27 km west of Moree and approximately 15 east of Narrabri (DPE 2022). Both records are reasonably old, being recorded in 1986 and 1983, respectively. No known populations occur within the Additional Disturbance Area, and it is considered that the species will is not likely to impacted as a result of the proposal.
Black-necked stork ***Ephippiorhynchus asiaticus*** **(Endangered under the BC Act)**	×	✓	✓	✓	✓	No	Black-necked stork was not recorded within the SPIR CIZ Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs near Moree along the Mehi River (DPE 2022). The Additional Disturbance Area does not intersect any floodplain wetlands that are required habitat for the species. This species is not likely to occur in the Additional Disturbance Area and will is not likely to impacted by the proposal.
Grey falcon ***Falco hypoleucos*** **(Endangered under the BC Act)**	×	✓	×	✓	×	No	Grey falcon was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs approximately 80 km to the west of the Development Site near Gwydir Wetlands SCA (DPE

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
							2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Flock bronzewing ***Phaps histrionica*** **(Endangered under the BC Act)**	×	×	×	✓	×	No	Flock bronzewing was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs approximately 90 km to the west of the IFC CIZ Development Footprint near Collarenebri (DPE 2022). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Koala ***Phascolarctos cinereus*** **(Endangered under the BC and EPBC Acts)**	✓	✓	✓	✓	✓	Yes	The Koala was recorded within the SPIR CIZ Development Footprint during the surveys undertaken for the original EIS assessment. The Additional Disturbance Area contains three known food tree species for this species (according to Appendix 2 of the Approved Recovery Plan (DECC 2008)) for the Western Slopes and Plains Koala Management Area. The Additional Disturbance Area provides assumed habitat for the species. Further information is provided in **Section 3.4.**
Rufous bettong ***Aepyprymnus rufescens*** **(Vulnerable under the BC Act)**	✓	✓	×	×	×	No	Rufous bettong was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs approximately 50 km to the southwest of the IFC CIZ Development Footprint

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
							within Pilliga SCA (DPE 2022). Most records of the species occur to the east of the Great Dividing Range. This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Eastern pygmy-possum ***Cercartetus nanus*** **(Vulnerable under the BC Act)**	✓	✓	×	×	×	No	Eastern pygmy-possum was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs approximately 25km to the south of the IFC CIZ Development Footprint within Pilliga East State Forest (DPE 2022). Most records of the species occur to the east of the Great Dividing Range. This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Squirrel glider ***Petaurus norfolcensis*** **(Vulnerable under the BC Act)**	✓	✓	×	×	✓	No	Squirrel glider was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs approximately 10 km to the east of the IFC CIZ Development Footprint within Bobbiwaa National Park (DPE 2022). Other populations in the locality appear to be restricted to conservation areas. This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
Black-striped wallaby ***Macropus dorsalis*** **(Endangered under the BC Act)**	×	✓	×	×	×	No	Black-striped wallaby was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest recent record of the species occurs approximately 10 km to the east of the IFC CIZ Development Footprint within Bullala State Forest (DPE 2022). Other known populations in the locality appear to be restricted to conservation areas. This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Grey-headed flying-fox ***Pteropus poliocephalus*** **(Vulnerable under the BC and EPBC Acts) (breeding habitat only)**	×	×	✓	×	✓	No	Grey-headed flying-fox was recorded on one occasion within the original Development Footprint. The nearest known roost camp site of the grey-headed flying-fox to the Revised Disturbance Area is at Moree Township on the Mehi River (DPE 2022). No breeding habitat (camp sites) occurs within the Additional Disturbance Area and breeding habitat is not likely to be impacted by the proposal.
Bristle-faced free-tailed bat ***Setirostris eleryi*** **(Endangered under the BC Act)**	×	×	✓	×	✓	No	Bristle-faced free-tailed bat was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs approximately 40 km to the east of the northern-most portion of the IFC CIZ Development Footprint within Dthinna Dthinnawan National Park (DPE 2022). Other populations in the locality appear to be restricted to conservation areas.

Species Name	Location by Assessment and CMA/IBRA Subregion					Impacted by the proposal	Justification
	Assessment 1 Namoi CMA Northern Basalts IBRA Subregion	**Assessment 2** Namoi CMA Northern Outwash IBRA Subregion	**Assessment 3** Border Rivers/Gwydir CMA Northern Outwash IBRA Subregion	**Assessment 4** Border Rivers/Gwydir CMA Castlereagh-Barwon IBRA Subregion	**Assessment 5** Border Rivers/Gwydir CMA Northern Basalts IBRA Subregion		
							This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Large-eared pied bat *Chalinolobus dwyeri* (Vulnerable under the BC and EPBC Acts) (Breeding habitat)	✓	✓	×	×	×	No	Large-eared pied bat was not recorded within the original Development Footprint despite thorough fauna surveys undertaken in accordance with the seasonal requirements for this species. The closest record of the species occurs approximately 30 km to the east of the IFC CIZ Development Footprint near Narrabri within Mount Kaputar National Park (DPE 2022). Populations in the locality appear to be restricted to conservation areas. This species is not likely to occur in the Additional Disturbance Area and breeding habitat is not likely to be impacted by the proposal.

3.3 Field Surveys

Species-credit flora surveys and species- credit fauna habitat assessments were carried out over 7 days in February and four days in April 2021 by three Umwelt ecologists (Shaun Corry – accredited BBAM/FBA and BAM assessor, Rachel Musgrave – accredited BBAM/FBA and BAM assessor, and Joel Callaghan – Ecologist).

Targeted surveys were undertaken for the flora species listed in **Table 3.1** and included targeted on-ground searches in suitable habitat throughout the Additional Disturbance Area. Searches for these species were undertaken in suitable habitat, including on private property where access was granted. Targeted surveys consisted of parallel field traverses in line with *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020). Where detected, threatened flora species were counted and recorded using ESRI ArcCollector via GPS on a mobile device.

Surveys for threatened fauna species were limited to habitat assessments, given the considerable amount of fauna surveys completed to date in the same or similar habitat types. Assumed presence mapping of the koala was confirmed as part of the vegetation surveys.

In addition, parallel field traverses and counts of the number of individuals of finger panic grass (*Digitaria porrecta*) and Belson's panic (*Homopholis belsonii*) were carried out within areas of suitable habitat where the species had been previously assumed present by Umwelt (2020) due to access constraints. Parallel field traverses carried out in April targeted Belson's panic (*Homopholis belsonii*) only, as surveys fell outside the prescribed survey period for finger panic grass (*Digitaria porrecta*) (January and February).

A summary of the field surveys carried out for this assessment are detailed in **Table 3.2**.

Table 3.2 Summary of Targeted Threatened Species Surveys Carried for 2021 Addendum Report

Date	Personnel	Field surveys carried out
16-18 February 2021	Shaun Corry	Targeted threatened flora species surveys and threatened fauna habitat assessment Targeted surveys for finger panic grass (*Digitaria porrecta*) and Belson's panic (*Homopholis belsonii*) within areas of assumed presence.
22-25 February 2021	Rachel Musgrave and Joel Callaghan	Targeted threatened flora species surveys and threatened fauna habitat assessment Targeted surveys for finger panic grass (*Digitaria porrecta*) and Belson's panic (*Homopholis belsonii*) within areas of assumed presence.
6-9 April 2021	Joel Callaghan	Targeted threatened flora species surveys and threatened fauna habitat assessment Targeted surveys for Belson's panic (*Homopholis belsonii*) within areas of assumed presence.

La Niña conditions across NSW during spring and summer 2020-2021 resulted in substantial rainfall occurring between Narrabri and North Star within the months leading up to the Summer 2021 surveys. **Table 3.3** details the monthly rainfall total at the Moree Airport from October 2020 to April 2021. This meant that the threatened grass species previously recorded within the SPIR CIZ Development Footprint were readily detectable during surveys.

Table 3.3 Monthly Rainfall Total in 2021 and Average All Years for Moree Airport (Bureau of Meteorology 2021)

Measure	October 2020	November 2020	December 2021	January 2021	February 2021	March 2021	April 2021
Total	65.6 mm	0.2 mm	139.8 mm	71.4 mm	58.0 mm	263.4 mm	18.6 mm
Average (all years)	45.6 mm	73.7 mm	67.2 mm	79.1 mm	67.3 mm	62.8 mm	22.7 mm

Two species-credit species were recorded in the IFC CIZ Development Footprint during the surveys as part of the Summer 2021 surveys, including:

- Belson's panic (*Homopholis belsonii*)
- creeping tick-trefoil (*Desmodium campylocaulon*).

Additionally, assumed habitat for the koala (*Phascolarctos cinereus*) has been mapped as part of the Additional Disturbance Area, due to the presence of this species in the SPIR CIZ Development Footprint.

3.4 Land Access

As part of the Summer 2021 surveys of the Additional Disturbance Area and areas of assumed presence for Belson's panic (*Homopholis belsonii*) and finger panic grass (*Digitaria porrecta*), land access was not available on a number of properties. The area of each vegetation zone containing native vegetation and potential threatened species habitat is detailed in **Table 3.4** below. The location of the inaccessible properties during the Summer 2021 surveys are shown on in **Appendix B**.

The majority of the native vegetation and potential threatened species habitat within inaccessible properties largely consists of fragmented patches located immediately adjacent to surveyed areas and is in the same condition type. Over-the-fence inspections were undertaken to confirm PCTs, condition types and broad habitat types present. Species-credit species which have previously been recorded in the IFC CIZ Development Footprint and are likely to occur on land have been assumed present, including Belson's panic (*Homopholis belsonii*), creeping tick-trefoil (*Desmodium campylocaulon*), finger panic grass (*Digitaria porrecta*) and koala (*Phascolarctos cinereus*).

Overall, the proportion of native vegetation within the Additional Disturbance Area not accessed when compared to the total in the IFC CIZ Development Footprint is three percent, demonstrating a high level of survey effort conducted across the IFC CIZ Development Footprint over several years and multiple seasons (including above average summer rainfall) meeting the seasonal requirements of all potential threatened flora and fauna species. As such it is considered unlikely that any additional threatened species-credit species other than the species previously recorded in the remainder of the IFC CIZ Development Footprint are present in the properties that were not accessed during the summer 2021 surveys.

Table 3.4 Summary of Vegetation Zones with No Access during the Summer 2021 Surveys Compared to the Total Area of the Revised Development Footprint

Vegetation Zone, PCT ID (BVT IDs) and PCT Name	Condition Class	No Access Area (ha)	Current IFC CIZ (ha)	No Access Compared to Total Area (%)
Zone 1 - PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Moderate to Good	1.04	9.40	11.08
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	1.26	6.48	19.46
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	0.01	0.91	0.82
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	Moderate to Good Natural Grassland	6.00	290.67	2.06
Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good	0.65	61.38	1.05
Zone 6 - PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good Derived Native Grassland	4.48	125.64	3.56
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	Moderate to Good	0.00	0.01	0.00
Zone 8 - PCT78 (BR196, NA193) River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Moderate to Good	0.09	5.32	1.77
Zone 9 - PCT135 (BR284, NA271) Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Moderate to Good	0.07	4.80	1.56
Zone 10 - PCT413 (BR346, NA348) Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	Moderate to Good	0.04	1.87	2.03
Cleared/Non-native vegetation	-	32.41	727.88	4.45
Total		**46.06**	**1234.36**	**3.73**

3.5 Revised Species Credit Requirements

The impacts associated with N2NS on species credit species recorded within the IFC CIZ Development Footprint are detailed in **Table 3.5** below. The area of impact within the IFC CIZ Development Footprint

represented by the Additional Disturbance Area is also included in **Table 3.5** below. Of the 36.35 ha of Additional Disturbance Area, the following areas of habitat for each of the species credit species is present:

- Koala - 1.9 ha
- finger panic grass (*Digitaria porrecta*) - 7.76 ha
- creeping tick-trefoil (*Desmodium campylocaulon*) - 2.32 ha
- Belson's panic (*Homopholis belsonii*) - 7.0 ha.

The number of credits required to offset these impacts are detailed in **Table 3.6** below. Both tables provide detail with regard to impacts and credit obligations from EIS, approved SPIR CIZ and present IFC CIZ as described within:

- Biodiversity Assessment Report (BAR) (Umwelt 2017)
- July 2020 Addendum FBA Biodiversity Assessment Report (Umwelt 2020)
    - This report represents the approved SPIR CIZ boundary.

The credit obligation for finger panic grass (*Digitaria porrecta*) and Belson's panic (*Homopholis belsonii*), has been calculated in two ways:

- The number of individuals recorded within the IFC CIZ Development Footprint.
- The area of assumed presence based on suitable habitat where access was not available to the IFC CIZ Development Footprint, either during the Summer 2021 surveys or previous surveys. Assumed presence for these two species is based on a combination of the PCTs these species have been recorded in within the IFC CIZ Development Footprint as well as the PCTs these species are associated with according to the Threatened Biodiversity Data Collection (TBDC).

It should be noted that the species credits calculated for finger panic grass (*Digitaria porrecta*) and Belson's panic (*Homopholis belsonii*) are split between two BioBanking credit calculator assessments. The species credits by individuals for these two threatened grass species has been calculated in the Border Rivers/Gwydir CMA/Northern Outwash IBRA subregion Biobanking credit calculator proposal and the species credits by habitat area (no access) has been calculated in the Border Rivers/Gwydir CMA/Northern Basalts IBRA subregion Biobanking credit calculator proposal.

Further details on the assessment of koala habitat are presented in **Section 3.5.1** below and habitat mapping figures are provided in **Appendix C**. Overall, the koala habitat has been reduced by approximately 58% as part of the IFC CIZ Development Footprint (74.28 ha of koala habitat impacted) when compared to the approved SPIR CIZ Development Footprint (175.25 ha of koala habitat impacted). As a result, condition E23 has been satisfied as detailed in the DPE Conditions of Approval of Inland Rail – Narrabri to North Star Phase 1 (SSI 7474 – 13 August 2020).

Impacts to five-clawed worm-skink (*Anomalopus mackayi*) and implications for N2NS's credit obligation are discussed in detail within **Section 3.5.2** below.

The IFC CIZ Development Footprint generates a total of 7,940 species credits. This represents a substantial reduction in the number of species credits determined by approved Submissions and Preferred

Infrastructure Report (SPIR) CIZ (Umwelt, 2020). The revised Final Credit Reports can be found within **Appendix D**.

Table 3.5 Number of Individuals or Area of Habitat for Species Credit Species according to the Biodiversity Assessment Report (Umwelt 2017), July 2020 Addendum (Umwelt 2020) and current IFC CIZ Development Footprint

Common Name (scientific name)	BAR (Umwelt 2017)	BAR Addendum (Umwelt 2020) (Approved SPIR CIZ)	Current IFC CIZ Development Footprint (Additional Disturbance Area)
Koala	62.77 ha	175.25 ha	IFC CIZ 74.28 ha Additional Disturbance Area 1.9 ha
finger panic grass (*Digitaria porrecta*)	28 individuals	66 Individuals (27 in 2015/2016 39 in 2020) 99.25# ha (associated with zones 1, 2, 3, 4, 5, 6)	IFC CIZ 62 Individuals (25 in 2015/2016, 37 in 2020) 19.15# ha (associated with zones 1, 2, 3, 4, 5, 6) Additional Disturbance Area 7.76 ha 3 individuals recorded
creeping tick-trefoil (*Desmodium campylocaulon*)	237 ha (associated with zone 4)	432.07 ha (associated with zone 4)	IFC CIZ 290.67 ha (associated with zone 4) Additional Disturbance Area 2.32 ha
Belson's panic (*Homopholis belsonii*)	73 individuals	255 individuals (73 in 2016 182 in 2020) 99.65# ha (associated with zones 1, 2, 4, 5, 6, 7, 9)	IFC CIZ 53 Individuals (4 in 2016, 19 in 2020, 30 in 2021) 13.33# ha (associated with zones 1, 2, 4, 5, 6) Additional Disturbance Area 7.0 ha No individuals recorded

#Habitat recorded for these species are based on the assumed presence in relevant vegetation zones/areas that could not be accessed and surveyed during the summer 2020 and summer 2021 surveys

Table 3.6 Species Credits Generated according to the Biodiversity Assessment Report (Umwelt 2017), July 2020 BAR Addendum (Umwelt 2020) and current IFC CIZ Development Footprint

Common Name (scientific name)	BAR (Umwelt 2017)	BAR Addendum (Umwelt 2020) (Approved SPIR CIZ)	Current IFC CIZ Development Footprint
Koala	1,632	4,556	1,931
finger panic grass (*Digitaria porrecta*)	364	858 (by individuals) 1,287 (by area - ha)	806 (by individuals) 260 (by area - ha)
creeping tick-trefoil (*Desmodium campylocaulon*)	2,607	4,752	3,201
Belson's panic (*Homopholis belsonii*)	1,898	6,630 (by individuals) 2,600 (by area - ha)	1,378 (by individuals) 364 (by area - ha)
Total	**6,501**	**20,683**	**7,940**

3.5.1 Koala Habitat

The original koala mapping presented in the BAR (Umwelt 2017) was based on koala primary and secondary feed trees as defined for the relevant Western Slopes and Plains Koala Management Area according to Appendix 2 of the Approved Recovery Plan (DECC 2008). Since this assessment was completed, BCD provided new information on the importance of refugia habitat for koalas during times of extreme heat as presented in the research paper by Crowther *et al*. (2014) for the Gunnedah district of NSW. Specifically, this research paper highlights the importance of belah (*Casuarina cristata*) trees during periods of extreme heat. Based on this information, the revised koala habitat mapping within the IFC CIZ Development Footprint includes areas with koala feed and refuge trees, as documented in **Table 3.7**. **Appendix C** provides revised koala habitat mapping figures.

Table 3.7 Vegetation Zones/Plant Community Types Identified as Koala Habitat

Vegetation Zone	PCT ID (BVT ID) and PCT Name Condition Class	Approved SPIR CIZ Area (ha) (Umwelt 2020)	Current IRC CIZ Area (ha)
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*	17.31	6.48
3	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion *Moderate to Good*	1.74	0.91
4	PCT52 (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*	0.08	0.07

Vegetation Zone	PCT ID (BVT ID) and PCT Name Condition Class	Approved SPIR CIZ Area (ha) (Umwelt 2020)	Current IRC CIZ Area (ha)
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW *Moderate to Good*	143.95	61.38
6	PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW *Moderate to Good Derived Native Grassland*	0.35	0.12
8	PCT78 (BR196, NA193) River Red Gum riparian tall woodland/open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion *Moderate to Good*	11.82	5.32
	Total	**175.25**	**74.28**

3.5.2 Five-Clawed Worm-Skink

3.5.2.1 Potential Unexpected Find of Five-Clawed Worm-Skink

During pre-clearing surveys on 5 July 2021 within the Stage 3 section of N2NS, a spotter-catcher contractor recorded a species of skink at chainage 741.225 within 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 (Moderate – Good Natural Grassland). Through consultation with DPE and DAWE, a clearing procedure for the five-clawed worm-skink was agreed on following the requirements of the unexpected finds procedure as detailed in the approved Construction Biodiversity Management Subplan – N2NS (Trans4m 2022). Following this clearance procedure, an additional 247 individuals have been recorded during pre-clearing and post-clearing works between chainage 603 to 630 and 735 to 744 to date. Of these, 87 individuals have been recorded as dead as a result of the clearing works, 116 individuals relocated and 44 recorded as dropped tails.

Five-clawed worm-skinks are listed as endangered under the BC Act and vulnerable under the EPBC Act. Five-clawed worm-skink was identified as a candidate species credit species within the Biodiversity Assessment Report (BAR) (Umwelt 2017) prepared for the EIS. Targeted surveys were carried out for five-clawed worm-skink at all fauna survey locations except Site 8. Due to the size of Site 9, three separate reptile searches were conducted within the site boundary at approximately KP 619 kilometres, 626.5 km and 629 km. Five-clawed worm-skinks were not recorded within the original Development Footprint during the surveys informing the BAR (Umwelt 2017).

The 247 individuals have been recorded to date (based on register dated 10 May 2022) from stripped habitat within the IFC CIZ Development Footprint comprising the following breakdown:

- Non-native vegetation/exotic grassland – 69 individuals.
- 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 – 3 individuals.

- 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 – 156 individuals.

- 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 – 16 individuals.

- 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.

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.

As required by the Construction Biodiversity Management Subplan – N2NS (BMP) (Trans4m 2022), a Test of Significance under the BC Act and an Assessment of Significance under the EPBC Act was carried out by Umwelt (2021b). These tests conclude that the N2NS section of the Inland Rail Project is likely to have a significant impact on this species under both the BC Act and the EPBC Act. These tests are based on the IFC CIZ boundary as documented in the October 2021 Addendum to the Inland Rail – Narrabri to North Star (Umwelt 2021c) which is a slightly smaller in area, however this difference in area is not considered to materially influence the outcomes of these tests.

Measures implemented to mitigate impacts to the species as agreed with DPE and outlined in the BMP Revision 3 include:

- Site induction - all construction personnel will be subject to a five-clawed worm-skink induction.

- Pre-clearance surveys between:

    - Stage 1: Chainage 603.00 to 625.000

    - Stage 3: Chainage 735.000 to 754.250

- Requirement for establishment of a register and collection of detailed data on any future records of five-clawed worm-skink, including GPS coordinates of capture and relocation sites, date and time capture, description of microhabitats, validation photos and measurement of specimens.

- Detection protocol (Appendix I of the BMP) – works to be ceased in the vicinity, temporary exclusion zone established, project ecologist notified to capture and relocate individuals, and immediate notification of Environmental Manager.

- Reporting - Should the detection of a five-clawed worm-skink be validated, Trans4m Rail will cease all works in the vicinity of the find and follow the detection protocol as detailed in Appendix I of the BMP. Regular updates are provided to DPE and DAWE, with notification within 48 hours of ARTC becoming

aware of a five-clawed work-skink encounter, or as otherwise agreed at the time with the respective departments.

Following additional consultation with agencies, the following preclearance methodology proposed by T4MR on 22 October 2021 and detailed in the Construction Biodiversity Management Subplan – N2NS (BMP) (Trans4m 2022) is being implemented:

- Prior to slashing, spotter-catcher undertaking diurnal pre-clearing surveys 0.5 hr/ha to undertake targeted habitat searches such as under logs and shelter sites. Targeted habitat searches have proven to be more successful than searching the long grass on site.
- Spotter-catcher following the slasher.
- Undertake grubbing with two spotter-catchers per machine.
- Extending timeframe between slashing and topsoil stripping (7 days).
- Establishment of artificial habitat (e.g., woody debris, hay bales) and installation barrier fencing into the soil at between the IFC CIZ and the relocation sites.
- Provision of alternative refuge habitat adjacent to the work area to encourage the five-clawed worm-skinks to utilise these areas. Habitat enhancement would include the placement of hay bales at 100 m intervals on freehold and public land within the construction boundary.
- Habitat enhancement within the rail corridor implemented during landscaping works and include the placement of woody debris such as logs, sleepers or mulched woody vegetation piles at 10m intervals within the revegetated rail corridor at confirmed five-clawed worm-skink habitat areas.
- Installation of skink barrier fence (i.e., trenched in silt fence) at adjacent relocation sites where potential habitat occurs outside of the IFC CIZ Development Footprint.
- Dusk surveys prior to works and flag off area subject to nocturnal surveys each day. Topsoil stripping is not to exceed beyond surveyed area.
- Early five-clawed work-skink salvage survey starting at sunrise to cover areas to be grubbed.
- Topsoil ripping when soils are dry/hard with a spotter catcher undertaking salvage surveys prior to topsoil stripping. Topsoil stripping with two spotter-catchers per machine.
- Removing cut grass after slashing and before topsoil stripping and placing cut grass in windrows in refuge habitat areas.

In addition to the aforementioned mitigation measures currently being implemented for the project, Umwelt (2021b) recommended the installation of hay bales into clearing areas prior to disturbance to capture and relocate individuals prior to clearing works.

A species management plan (SMP) has been prepared and is under review by BCD at the time this report was prepared. Mitigation measures outlined in the BMP were reviewed and refined for consideration during future works were deemed relevant.

3.5.2.2 Offset Requirements

In 2016, the NSW *Threatened Species Conservation Act 1995* (TSC Act) was repealed and replaced with the BC Act, which commenced 25 August 2017. The inception of the BC Act changed the assessment requirements for State Significant Infrastructure (SSI) projects in NSW with biodiversity impact assessment needing to meet the requirements of the Biodiversity Offset Scheme (BOS) via the application of the Biodiversity Assessment Method (BAM). As such, the BAM replaced the FBA as the assessment method for SSI projects. Projects which had commenced work prior to the change in legislation could continue to apply the provisions of the TSC Act and the FBA through transitional arrangements provided for under Biodiversity Conservation Regulation 2017.

The transition from FBA to BAM has also resulted in differences between the two credit types. FBA credits are not directly related to BAM credits, as they are calculated using different ecological data inputs and use different equations. As a result, one FBA credit does not equal one BAM credit. To account for this difference, FBA credits are required to be converted to BAM credits. This is completed through DPE via an application for reasonable equivalence.

Having commenced prior to 25 August 2017, N2NS was assessed under the transitional arrangement provisions detailed within the Biodiversity Conservation Regulation 2017. As such, N2NS was assessed in accordance with the FBA.

Under the FBA, five-clawed worm-skink was considered to be a 'species credit species' and therefore required targeted threatened species surveys as part of the assessment. As detailed above, targeted surveys for the species were carried out as part of the field surveys informing the BAR (Umwelt 2017) supporting the EIS.

Subsequent updates to assessment requirements under the BC Act, as part of the Biodiversity Assessment Method (BAM), has resulted in five-clawed worm-skink being reclassified to 'ecosystem credit species'. As such, targeted threatened species surveys are no longer required for this species as part of a BAM assessment.

The TBDC for five-clawed worm-skink notes that:

> *"The species is allocated to the ecosystem credit class because, whilst we cannot confidently predict its presence based on vegetation type, we cannot confidently detect it using conventional survey methods (targeted survey is unlikely to provide reliable results, as per EPBC SPRAT). Note that the species is listed as data-deficient in SoS because of the lack of suitable sites available for conservation management, this is not a consideration under the BOS (the proponent/BCT will have to locate and secure offset sites). There is sufficient knowledge about the species to manage at a stewardship site."*

Under the BAM, impacts to five-clawed worm-skink would be offset when credits for its associated PCTs are retired, and separate species credit for this species would not be required.

As detailed in **Section 3.5.2.1** above, five-clawed worm-skink is associated with six PCTs within the IFC CIZ Development Footprint as detailed within **Table 3.8**. It is noted that some records of the five-clawed work-skink made during post-clearing works have also been made in areas mapped as cleared/non-native vegetation. Umwelt (2021b) includes the potential areas of cleared/non-native vegetation in proximity to

associated native vegetation communities which may comprise suitable habitat, noting that the quoted area is likely to be an overestimate and further refinement could be made.

Table 3.8 Vegetation Zones/Plant Community Types Identified Associated with Five-clawed Worm-skink

Vegetation Zone	PCT ID (BVT ID) and PCT Name Condition Class	Area (ha) Current IFC CIZ
1	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion *Moderate to Good*	9.40
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*	6.48
3	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion *Moderate to Good*	0.91
4	PCT52 (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*	290.67
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW *Moderate to Good*	61.38
6	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW *Derived Native Grasslands*	125.64
	Total	**494.48**

Given the change in credit status (from species credit species to ecosystem credit species) for five-clawed worm-skink since the inception of the BC Act, the calculation of offset credit for five-clawed worm-skink have not been carried out as part of this Addendum FBA. Any credit obligations for the species generated as part of the Addendum FBA as result of the unexpected find would need to be converted from FBA credits to BAM credits as part of the application of reasonable equivalence in order to be offset. However, as the species is now an ecosystem credit species, species credits for five-clawed worm-skink do not exist under the BAM. Thus, any conversion from FBA credits would result in zero BAM species credits being required following the reasonable equivalency conversion. Under the BAM this species is offset through the ecosystem credits.

Notwithstanding, given the significant impact the proposal is likely to have on the species, Umwelt (2021b) recommends that the offset strategy also consider known habitat for this species.

4.0 Ecosystem Credit Updates

The impacts associated with N2NS on ecosystem credits recorded within the IFC CIZ Development Footprint are detailed in **Table 4.1** below. The area of impact within the IFC CIZ Development Footprint represented by the Additional Disturbance Area is also included in **Table 4.1** below. Of the 36.35 ha of Additional Disturbance Area, approximately 8.53 ha (23 %) comprises native vegetation.

The number of credits required to offset these impacts are detailed in **Table 4.2** below. Both tables provide detail with regard to impacts and credit obligations from the EIS to present as described within:

- Biodiversity Assessment Report (BAR) (Umwelt 2017)
- July 2020 Addendum FBA Biodiversity Assessment Report (Umwelt 2020):
    - Represents the approved SPIR CIZ.

A total of 22,945 ecosystem credits are required to offset the impacts associated within the IFC CIZ. This is approximately a 44% reduction in the previous credit calculation completed for the approved Submissions and Preferred Infrastructure Report (SPIR) CIZ (Umwelt, 2020).

Table 4.1 Vegetation Zone Area according to Biodiversity Assessment Report (Umwelt 2017), July 2020 Addendum BAR (Umwelt 2020)and current IFC CIZ Development Footprint

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Extent of BC Act and EPBC Act listed communities associated with each vegetation zone within the Revised Development Footprint	BAR (Umwelt 2017) (ha)	BAR Addendum (Umwelt 2020) – Approved SPIR CIZ (ha)	Current IFC CIZ (Additional Disturbance Area) (ha)	No. Plots Required (OEH 2014)	Plots Completed in 2016
1	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Moderate to Good	9.40 ha of Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions EEC listed under the BC Act to be impacted 4.44 ha of Weeping Myall Woodlands EEC listed under the EPBC Act (all remaining patches of zone 1 do not meet the minimum patch size of 0.5ha according to the EPBC listing criteria)	6.95	17.94	9.40 (0.68)	3	6
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	6.48 ha of Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions EEC listed under the BC Act to be impacted. 6.48 ha of Brigalow (Acacia harpophylla dominant and codominant) EEC listed under the EPBC Act	4.75	17.31	6.48 (0.84)	3	3
3	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	Moderate to Good	0.91 ha of Coolibah - Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions EEC listed under the BC Act to be impacted 0.91 ha of Coolibah – Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregion EEC under the EPBC Act to be impacted	1.19	1.74	0.91 (0)	1	2
4	PCT52 (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	Not listed under the BC Act 290.67 ha of Natural Grassland on Basalt and Fine-textured Alluvial Plains of Northern NSW and Southern QLD CEEC listed under the EPBC Act	268.64	432.07	290.67 (2.32)	7	15
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam	Moderate to Good	Not listed under the BC Act This vegetation zone (or portions of) is likely to conform to the Poplar Box Grassy Woodland on Alluvial Plains EEC under	71.95	143.95	61.38 (1.05)	5	7

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Extent of BC Act and EPBC Act listed communities associated with each vegetation zone within the Revised Development Footprint	BAR (Umwelt 2017) (ha)	BAR Addendum (Umwelt 2020) – Approved SPIR CIZ (ha)	Current IFC CIZ (Additional Disturbance Area) (ha)	No. Plots Required (OEH 2014)	Plots Completed in 2016
	soils on alluvial plains of north-central NSW		the EPBC Act which was listed on 4 July 2019.					
6	PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good Derived Native Grassland	Not listed under the BC Act Portions of this vegetation zone (between woodland patches) are likely to conform to the Poplar Box Grassy Woodland on Alluvial Plains EEC under the EPBC Act which was listed on 4 July 2019.	108.20	249.85	125.64 (3.60)	6	7
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	Moderate to Good	Not applicable to the current IFC CIZ Development Footprint	0.04	0.51	0 (0)	0	1
8	PCT78 (BR196, NA193) River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Moderate to Good	Not listed	14.70	11.82	5.32 (0)	3	4
9	PCT135 (BR284, NA271) Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Moderate to Good	Not listed	3.79	9.50	4.80 (0)	3	3
10	PCT413 (BR346, NA348) Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass	Moderate to Good	Not listed	2.59	5.72	1.87 (0.04)	1	3

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Extent of BC Act and EPBC Act listed communities associated with each vegetation zone within the Revised Development Footprint	BAR (Umwelt 2017) (ha)	BAR Addendum (Umwelt 2020) – Approved SPIR CIZ (ha)	Current IFC CIZ (Additional Disturbance Area) (ha)	No. Plots Required (OEH 2014)	Plots Completed in 2016
	woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion							
-	Cleared/Non-native vegetation	-	-	1,080.44	1,545.68	727.88 (27.99)	0	3
Total				**1,563.25**	**2,436.09**	**1234.36 (36.35)**	**32**	**54**

Table 4.2 Ecosystem Credits Generated in Biodiversity Assessment Report (Umwelt 2017), July 2020 Addendum BAR (Umwelt 2020) and current IFC CIZ Development Footprint

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	BAR (Umwelt 2017) Ecosystem Credits	BAR Addendum (Umwelt 2020) – Approved SPIR CIZ Ecosystem Credits	Current IFC CIZ Development Footprint Ecosystem Credits
1	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Moderate to Good	254	900	472
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	250	1,223	458
3	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	Moderate to Good	63	93	48
4	PCT52 (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	11,046	20,102	13,523
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good	3,386	8,851	3,773
6	PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good Derived Native Grassland	2,917	8,294	4,172
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	Moderate to Good	2	23	0
8	PCT78 (BR196, NA193) River Red Gum riparian tall woodland/open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Moderate to Good	675	549	246
9	PCT135 (BR284, NA271) Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Moderate to Good	133	354	178
10	PCT413 (BR346, NA348) Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	Moderate to Good	100	250	75
-	Cleared/Non-native vegetation		0	0	0
Total			**18,826**	**40,639**	**22,945**

5.0 Comparison of Revised Biodiversity Credits to Approved Credits to be Retired

Overall the IFC CIZ Development Footprint results in approximately a 44 percent reduction in the ecosystem credits when compared to the approved SPIR CIZ Development Footprint (BAR Addendum – Umwelt 2020). **Table 5.1** details the percent reduction in ecosystem credits associated with each vegetation zone.

Overall the IFC CIZ Development Footprint also results in approximately a 62 percent reduction in the species credits when compared to the approved SPIR CIZ Development Footprint (BAR Addendum – Umwelt 2020). **Table 5.2** details the percent reduction in species credits for applicable threatened species.

The overall biodiversity credit requirements for the IFC CIZ Development Footprint are considerably less than those approved as part of the SPIR CIZ Development Footprint as detailed in the DPE Conditions of Approval of Inland Rail – Narrabri to North Star Phase 1 (SSI 7474 - 13 August 2020).

It is noted that approximately 36.35 ha of the IFC CIZ Development Footprint falls outside the approved SPIR CIZ Development. Of this area approximately 8.53 ha (23 %) comprises native vegetation, with the majority comprising cropped and cleared areas. Field surveys and desktop assessments (where access was not granted) confirmed that no new PCTs, vegetation zones, threatened ecological communities or threatened species are likely to occur in this Additional Disturbance Area. As demonstrated in **Table 5.1** and **Table 5.2** the overall biodiversity credit requirements associated with the IFC CIZ Development Footprint are well below the approved biodiversity credits to be retired as detailed in the DPE Conditions of Approval of Inland Rail – Narrabri to North Star Phase 1 (SSI 7474 - 13 August 2020). This is the result of a substantial reduction in impacts associated with the IFC CIZ when compared to the approved SPIR CIZ. These credits are calculated using the FBA which is a similar biometric biodiversity assessment approach to the current Biodiversity Assessment Method (BAM), both of which require the assessment of vegetation condition through plot surveys, the requirement for targeted species surveys and generation of ecosystem and species credits.

Table 5.1 Comparison of Revised Ecosystem Credits to Approved Credits to be Retired

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Approved Ecosystem Credits to be Retired (SPIR CIZ BAR Addendum – Umwelt 2020)	Current IFC CIZ Development Footprint	Percent Reduction in Credits
1	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Moderate to Good	900	472	48%

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Approved Ecosystem Credits to be Retired (SPIR CIZ BAR Addendum – Umwelt 2020)	Current IFC CIZ Development Footprint	Percent Reduction in Credits
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	1,223	458	63%
3	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	Moderate to Good	93	48	48%
4	PCT52 (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	20,102	13,523	33%
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good	8,851	3,773	57%
6	PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good Derived Native Grassland	8,294	4,172	50%
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	Moderate to Good	23	0	100%

Vegetation Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Approved Ecosystem Credits to be Retired (SPIR CIZ BAR Addendum – Umwelt 2020)	Current IFC CIZ Development Footprint	Percent Reduction in Credits
8	PCT78 (BR196, NA193) River Red Gum riparian tall woodland/open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	Moderate to Good	549	246	55%
9	PCT135 (BR284, NA271) Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion	Moderate to Good	354	178	50%
10	PCT413 (BR346, NA348) Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	Moderate to Good	250	75	70%
		Total	**40,639**	**22,945**	**44%**

Table 5.2 Comparison of Revised Species Credits to Approved Credits to be Retired

Common Name (scientific name)	Approved Species Credits to be Retired (SPIR CIZ BAR Addendum – Umwelt 2020)	Current IFC CIZ Development Footprint	Percent Reduction in Credits
Koala	4,556	1,931	58%
finger panic grass (*Digitaria porrecta*)	858 (by individuals) 1,287 (by area - ha)	806 (by individuals) 260 (by area - ha)	50%
creeping tick-trefoil (*Desmodium campylocaulon*)	4,752	3,201	32%
Belson's panic (*Homopholis belsonii*)	6,630 (by individuals) 2,600 (by area - ha)	1,378 (by individuals) 364 (by area - ha)	81%
Total	**20,683**	**7,940**	**62%**

6.0 Updated Impacts on Matters of National Environmental Significance

6.1 Impacts to Matters of National Environmental Significance

Table 6.1 outlines the revised impact of the Proposal on Matters of National Environmental Significance listed under the EPBC Act. As discussed in **Section 3.5.2,** five-clawed worm-skink (*Anomalopus mackayi*) was subsequently found within the IFC CIZ Development Footprint, following pre-clearing surveys. Known and potential habitat for this species is listed in **Table 6.1** and will be offset through PCTs (ecosystem credits).

Table 6.1 Impacts of the Proposal on MNES

EPBC Act Listed MNES	Corresponding Plant Community Type a potential in the Development Footprint	Area (ha)/Individuals Impacted in the Development Footprint (Additional Disturbance Area)
Weeping Myall Woodlands EEC	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion *Moderate to Good*	4.44 (0.19)
Brigalow (Acacia harpophylla dominant and co-dominant) EEC	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*	6.48 (0.84)
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions EEC	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion *Moderate to Good*	0.91 (0.00)
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland CEEC	PCT52 (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*	290.67 (2.32)
Total EPBC Act Listed Ecological Communities		**302.5 (3.35)**

EPBC Act Listed MNES	Corresponding Plant Community Type a potential in the Development Footprint	Area (ha)/Individuals Impacted in the Development Footprint (Additional Disturbance Area)
Belson's panic (*Homopholis belsonii*) – vulnerable	-	53 Individuals/13.33 ha (no access areas) (0 individuals/7.0 ha (no access areas))
Total Belson's panic (*Homopholis belsonii*) Individuals/area of habitat (no access areas)		**53 Individuals/13.33 ha (no access areas) (0 individuals/7.0 ha (no access areas))**
Five-clawed worm-skink (*Anomalopus mackayi*) – vulnerable	-	494.48 ha habitat
Total Five-clawed worm-skink (*Anomalopus mackayi*) area of habitat		**494.48 ha habitat**
koala (*Phascolarctos cinereus*) – Endangered (listed and assessed as vulnerable when the referral for the project was prepared) Vegetation containing koala feed trees, vegetation types (as per the TSPD) and advice from OEH on refuge habitat during times of extreme heat	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	0.07 (0.00) (scattered trees)
	PCT-56 BVT-BR186, NA182-Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW-Derived Native Grasslands	0.12 (0.00) (scattered trees)
	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 - Good	6.48 (0.84)
	PCT-39/BVT-BR130, NA129/Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion/Moderate - Good	0.91 (0.00)
	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	5.32 (0.01)
	PCT-56/BVT-BR186, NA182/Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW/Moderate – Good	61.38 (1.05)
Total Koala habitat (including refuge habitat)		**74.28 (1.90)**

6.2 Significance of Expected Impacts

Under the EPBC Act, the approval of the Commonwealth Minister for the Environment is required for any action that may have a significant impact on matters of national environmental significance (MNES). These matters are:

- listed threatened species and communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- the Great Barrier Reef Marine Park
- World Heritage properties
- National Heritage places
- nuclear actions, and
- a water resource, in relation to coal seam gas development and large coal mining development.

Prior to EIS submission, a Referral to the Commonwealth Environment Minister was prepared and included assessments of significance for applicable MNES in accordance with the *Significant Impact Guidelines 1.1* (DoE 2013). Assessments of significance were undertaken for the following MNES:

- Natural grasslands on basalt and fine-textured alluvial plains of northern NSW and southern Queensland CEEC
- Brigalow (*Acacia harpophylla* dominant and co-dominant) EEC
- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions EEC
- Weeping Myall Woodland EEC
- Belson's panic (*Homopholis belsonii*)
- koala (*Phascolarctos cinereus*) (combined population of Qld, NSW and the ACT)
- grey-headed flying-fox (*Pteropus poliocephalus*) and
- south-eastern long-eared bat (*Nyctophilus corbeni*).

The N2NS section of the Inland Rail Project (the Action) was deemed to comprise a 'Controlled Action' by DAWE on 20 September 2016, due to the potential for significant impacts on the following matters protected under the EPBC Act:

- listed threatened species and communities (18 and 18A).

DAWE considered that the proposed action was likely to have a significant impact on MNES, including but not limited to:

- the removal of 268 ha of the critically endangered Natural Grassland on Basalt and Fine-textured Alluvial Plains of Northern New South Wales and Southern Queensland reducing an already greatly reduced ecological community and increasing the fragmentation of an important population
- the removal of 159 ha of foraging habitat for the vulnerable Koala (*Phascolarctos cinereus*) combined populations of Qld, NSW and the ACT.

DAWE also determined that the action could be assessed in accordance with the Bilateral agreement made under section 45 of the EPBC Act. Supplementary SEARs were issued on 8 November 2016 and a detailed response to each of the matters raised is provided in the Assessment of Commonwealth Matters report, (Umwelt 2017).

The IFC CIZ Development Footprint constitutes a significant reduction in the expected area of impact compared to the approved SPIR CIZ Development Footprint (BAR Addendum – Umwelt 2020), even when accounting for the 36.35 ha of additional impacts associated with the Additional Disturbance Area. A comparison of the SPIR CIZ Development Footprint and IFC CIZ Development Footprint for threatened species and threatened ecological communities can be found within **Table 3.5**, **Table 3.6**, **Table 3.7**, and **Table 4.1**.

One additional MNES, five-clawed worm-skink, has been recorded within the IFC CIZ Development Footprint following project approval, 247 individuals have been recorded during pre-clearing and post-clearing works between chainage 603 to 630 and 736 to 744. Of these, 87 individuals have been recorded as dead as a result of the clearing works, 116 individuals relocated and 44 recorded as dropped tails. An Assessment of Significance was carried out in accordance with *Significant Impact Guidelines 1.1* (DoE 2013) in December 2021. The assessment concluded that the N2NS section of the Inland Rail Project is likely to have significant impact on this species under the EPBC Act (Umwelt 2021b). The Assessment of Significance carried out for the N2NS section of the Inland Rail Project is in **Appendix E**.

7.0 Recommended Mitigation Measures

Since the SPIR CIZ Development Footprint ARTC have undertaken detailed design and reduced the Development Footprint (IFC CIZ) by approximately 44 percent. Any opportunities to further avoid and minimise ecological impacts is recommended. Section 4.2 of the Biodiversity Assessment Report (Umwelt 2017) includes a range of other recommended mitigation measures. As summarised in **Section 3.5.2** of this report and detailed in the approved Construction Biodiversity Management Subplan – N2NS (Trans4m 2022) there are specific mitigation measures for the five-clawed worm-skink.

8.0 Credit Requirement

ARTC commits to the retirement of biodiversity credits in accordance with the FBA. Should the biodiversity credits be required to be converted to reasonably equivalent biodiversity credits under the BC Act, ARTC will apply the like-for-like or variation rules under the BC Act to meet the relevant biodiversity credit obligations. Variations rules would not apply to any Matters of National Environmental Significance (MNES) listed under the EPBC Act.

9.0 References

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Trans4m (2022) Construction Biodiversity Management Subplan – N2NS. Revision 3, 6 December 2022.

APPENDIX A

Revised Vegetation Map Figures

Vegetation Legend

- 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 gilgaied 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 - Moderate - Good - 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 - Moderate - Good - Derived Native Grassland
- 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

FIGURE A0

Vegetation Map

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 5
- Zone 6

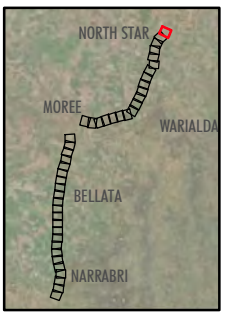


FIGURE A1

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 4
- Zone 5
- Zone 6

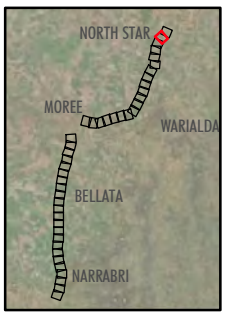


FIGURE A2

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 4
- Zone 5
- Zone 6

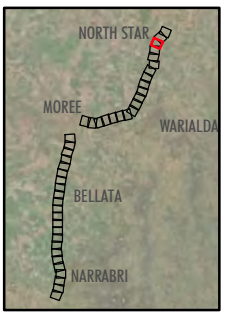


FIGURE A3

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 2
- Zone 4
- Zone 5
- Zone 6
- Zone 8
- Zone 10

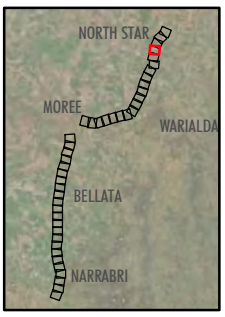


FIGURE A4

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order
- 4th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 5
- Zone 6
- Zone 8

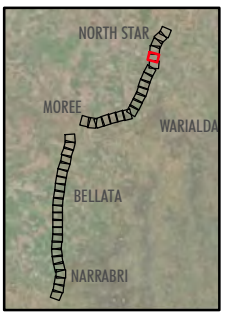


FIGURE A5

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 2
- Zone 4
- Zone 5
- Zone 6
- Zone 8

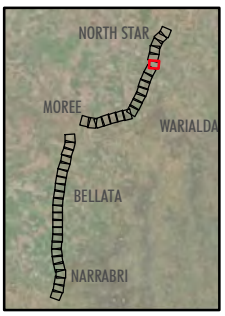


FIGURE A6

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 2
- Zone 4
- Zone 5
- Zone 6
- Zone 8

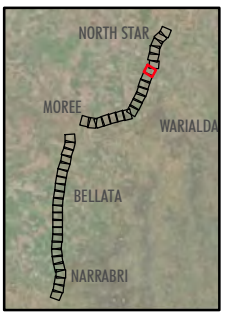
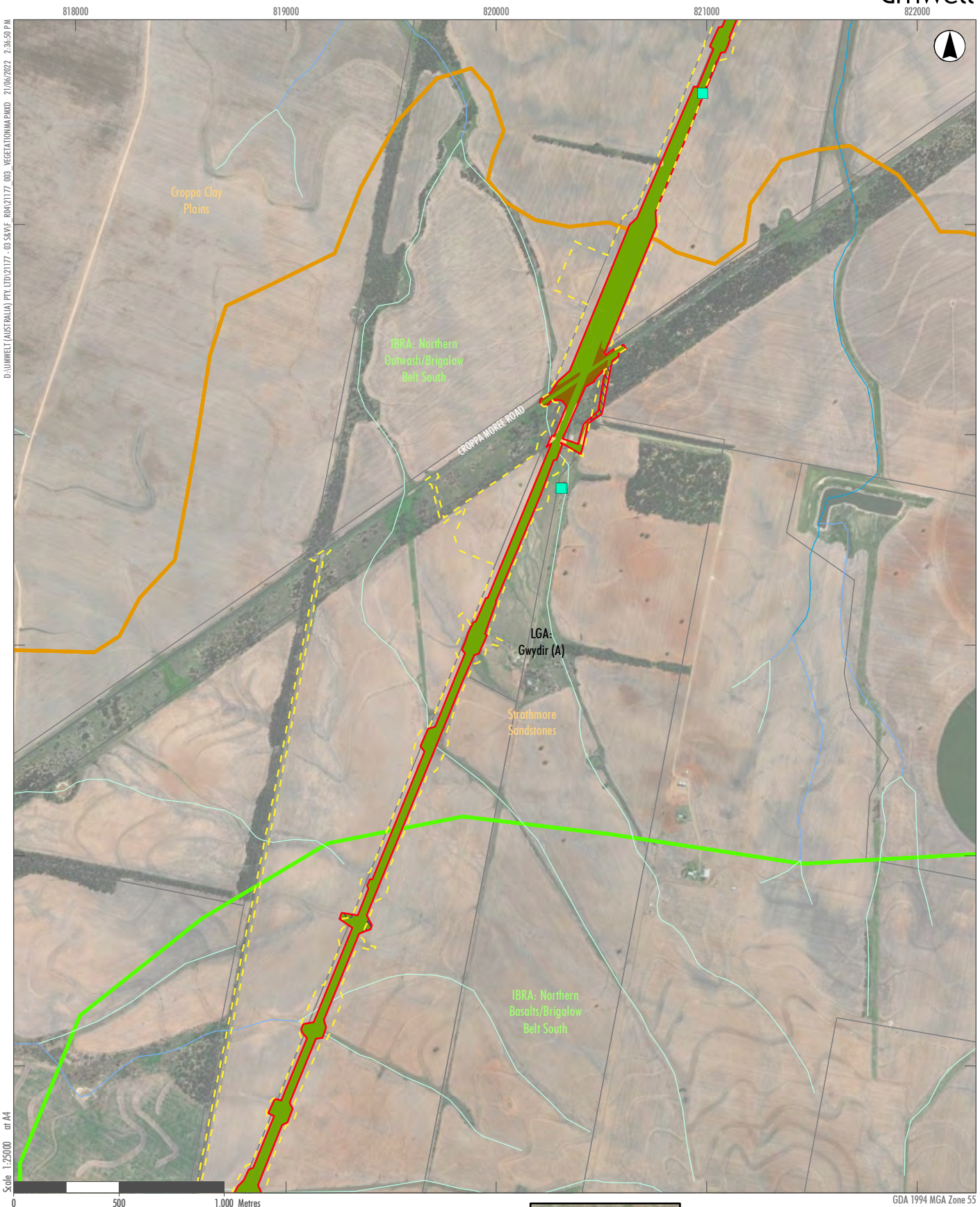


FIGURE A7

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 6

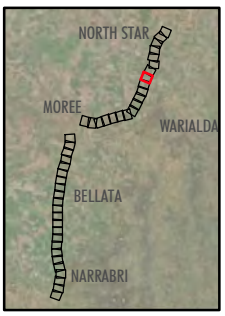
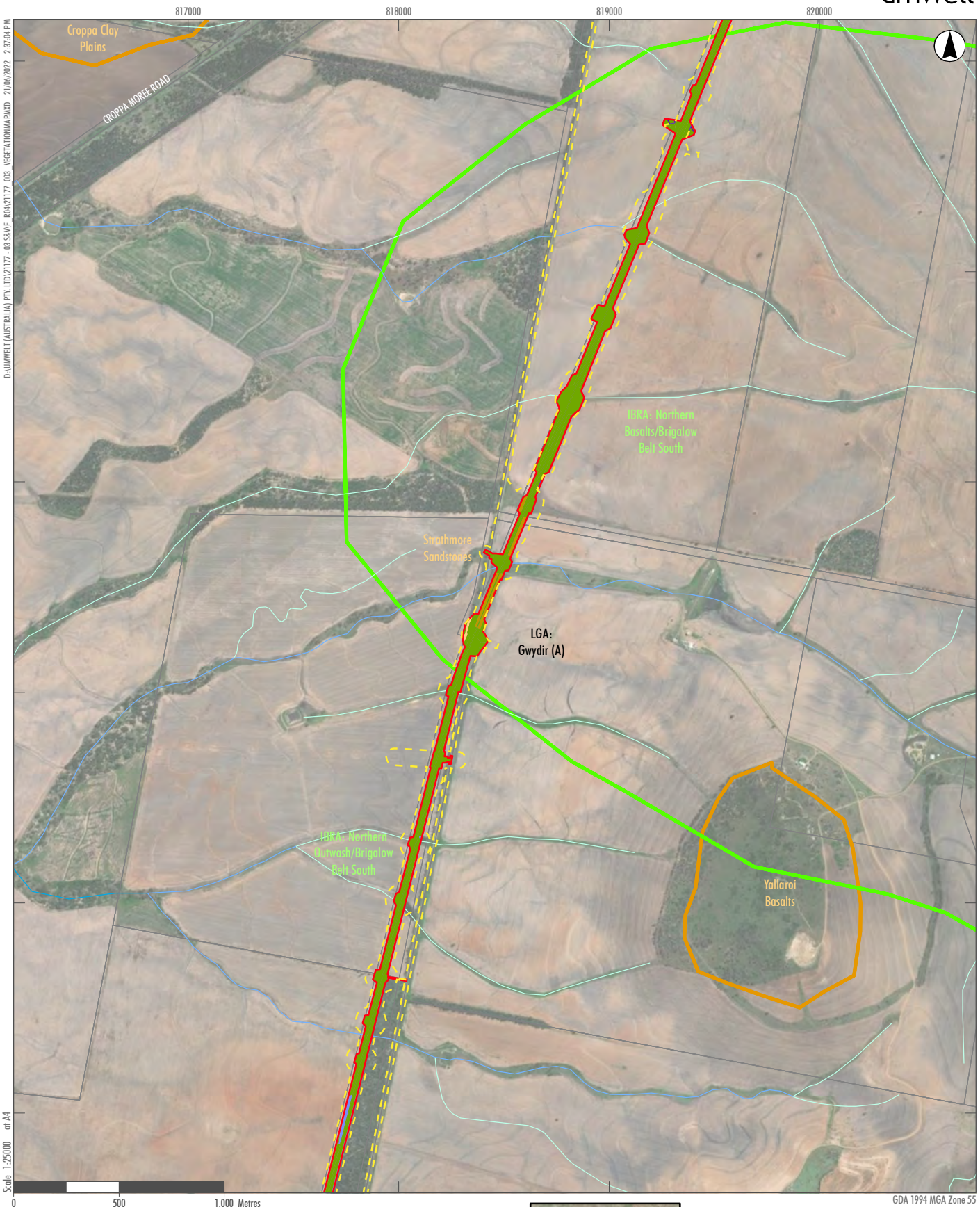


FIGURE A8

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 4
- Zone 5

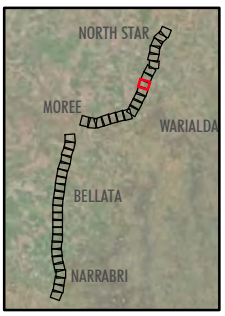


FIGURE A9

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 5
- Zone 10

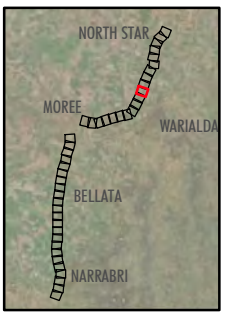


FIGURE A10

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 5
- Zone 6
- Zone 8
- Zone 9

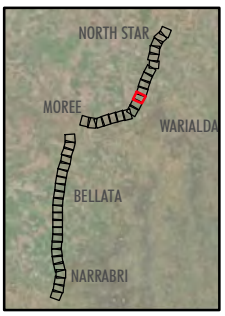


FIGURE A11

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 5
- Zone 6
- Zone 9

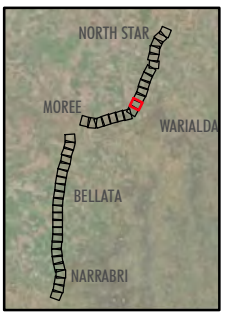


FIGURE A12

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 5
- Zone 6
- Zone 9

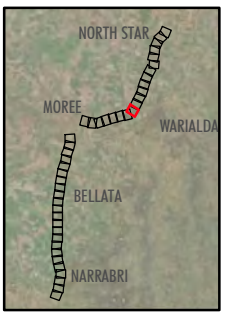


FIGURE A13

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2

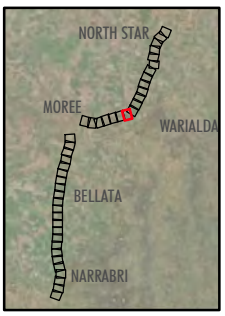


FIGURE A14

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 5
- Zone 6

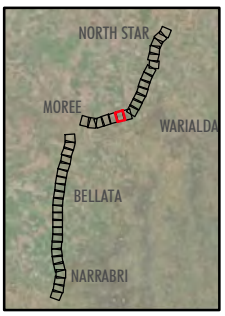


FIGURE A15

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4
- Zone 5
- Zone 6

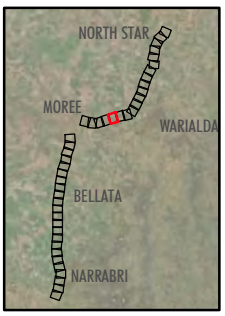


FIGURE A16

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4
- Zone 5

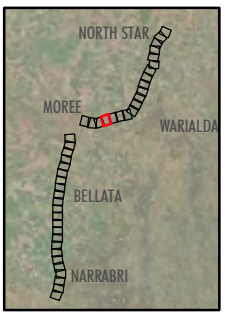


FIGURE A17

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4

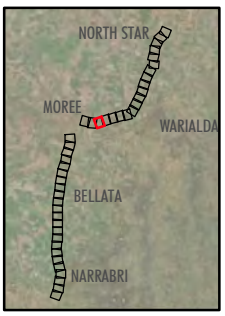


FIGURE A18

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4

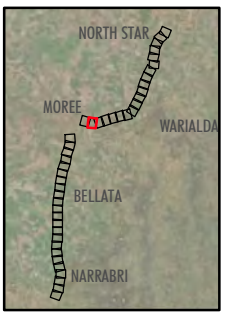


FIGURE A19

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation

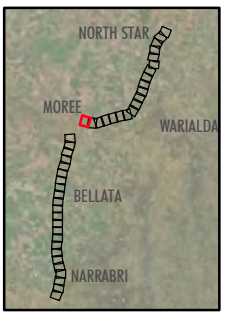
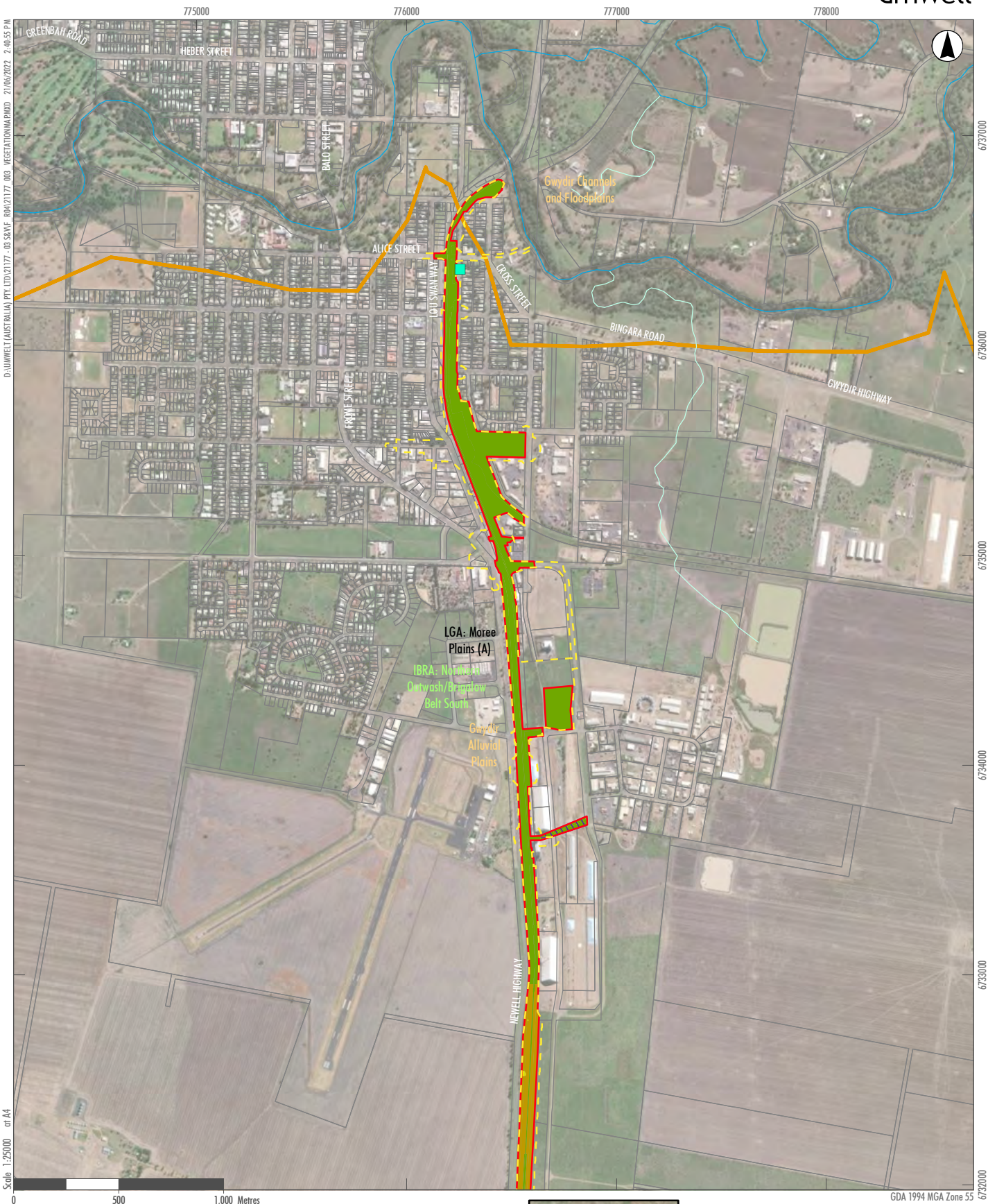


FIGURE A20

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4

FIGURE A21

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 8

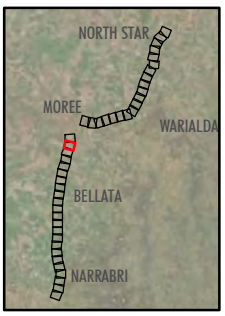


FIGURE A22

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4

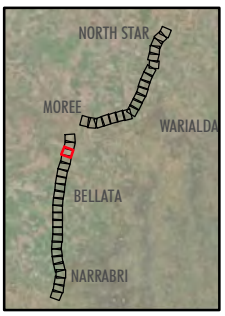


FIGURE A23

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4

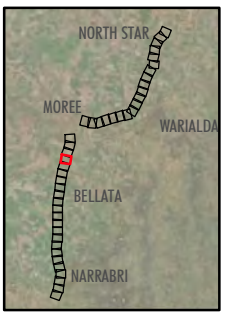


FIGURE A24

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 3
- Zone 4
- Zone 5
- Zone 8

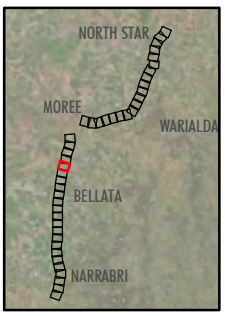


FIGURE A25

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 5
- Zone 7
- Zone 8
- Zone 9

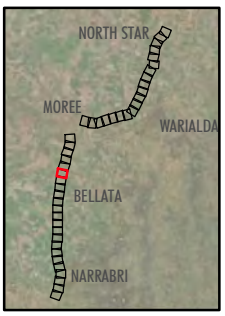


FIGURE A26

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 5
- Zone 8
- Zone 9

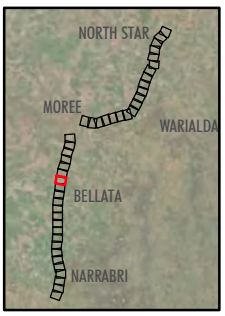


FIGURE A27

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 5

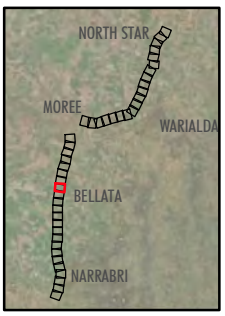


FIGURE A28

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 5

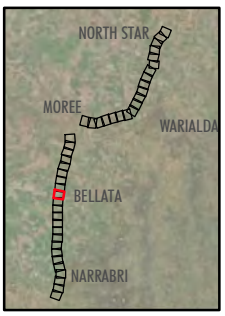
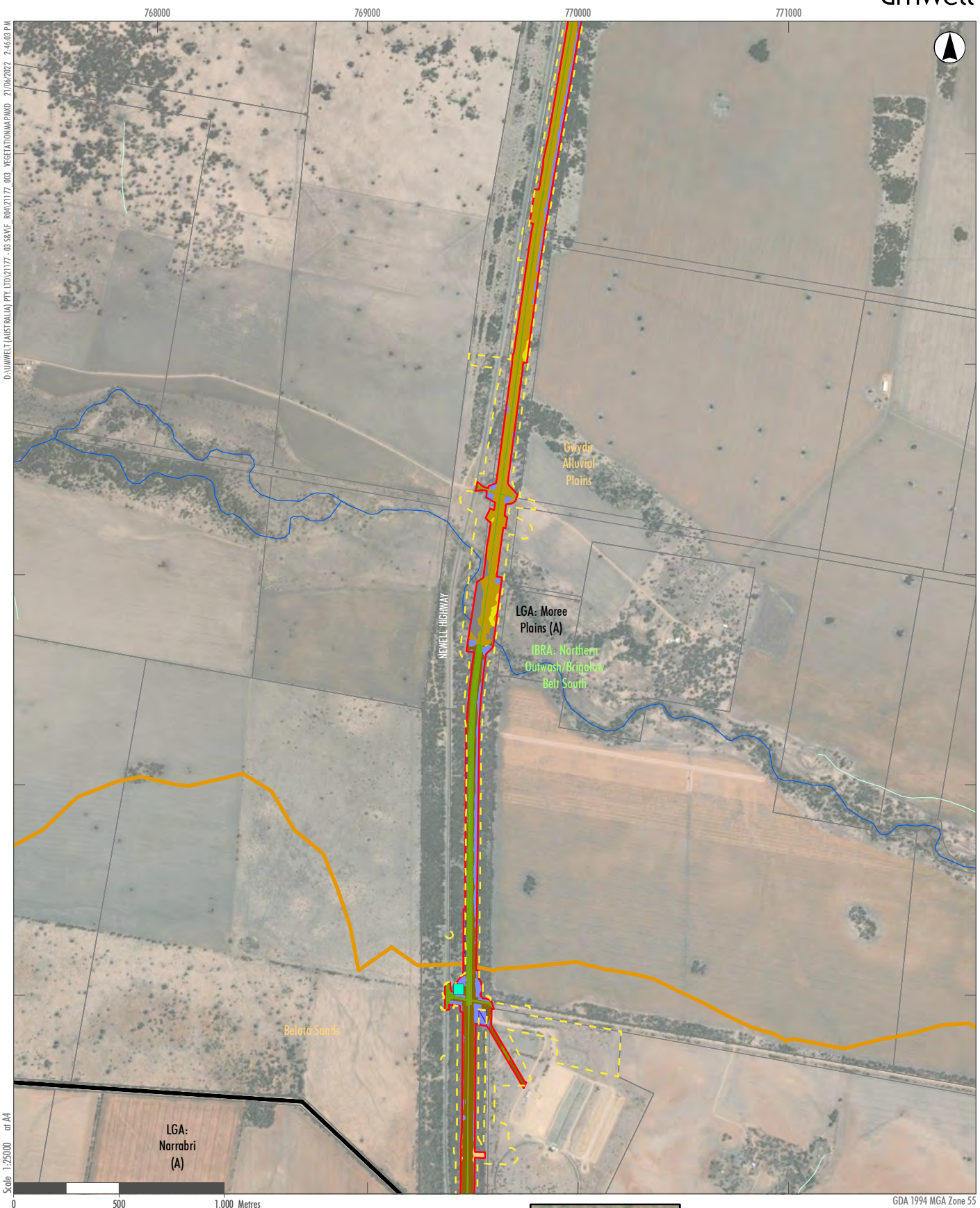


FIGURE A29

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 4th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 2
- Zone 4
- Zone 5
- Zone 6
- Zone 8

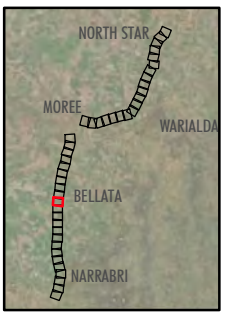
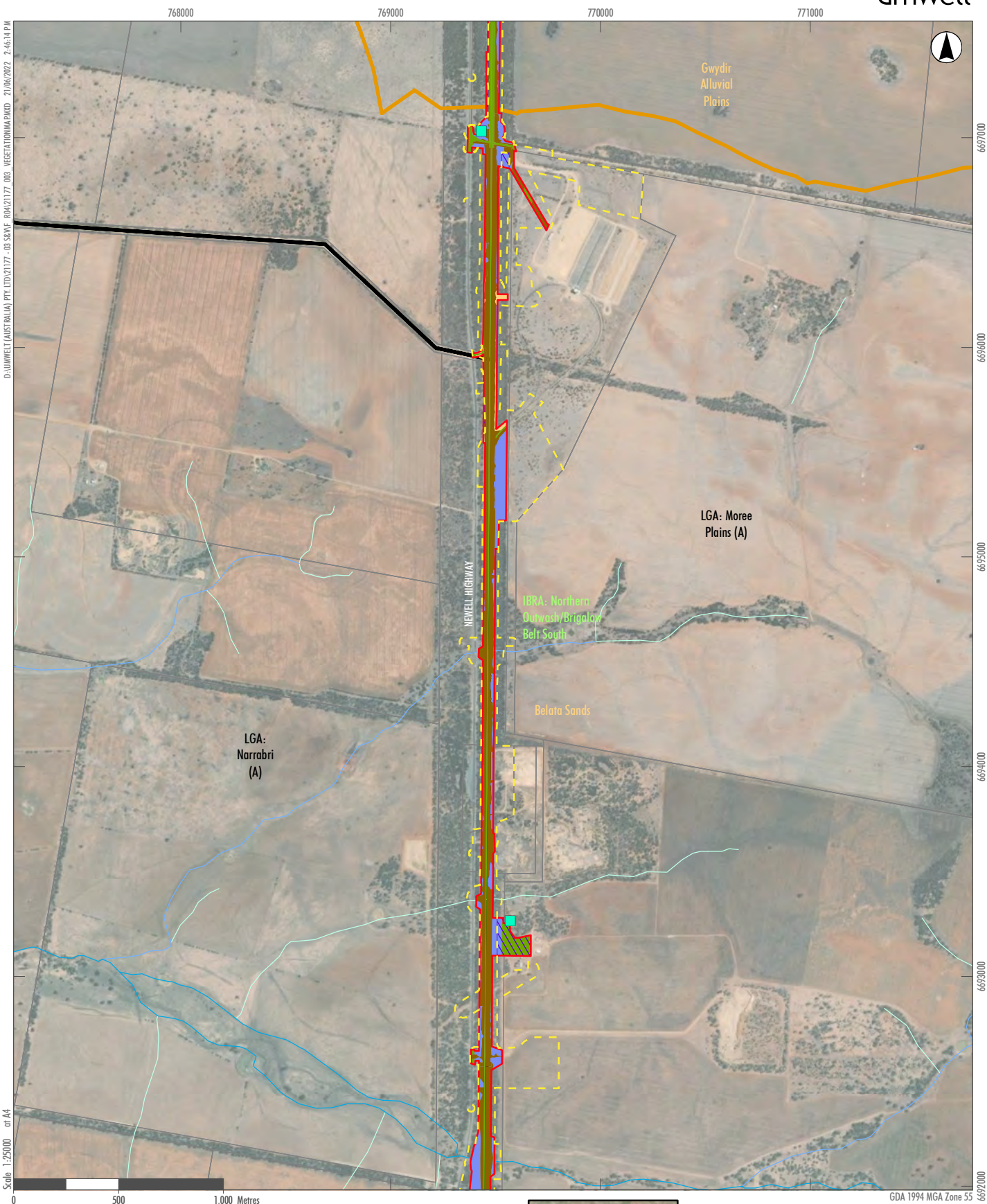


FIGURE A30

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 2
- Zone 5
- Zone 6

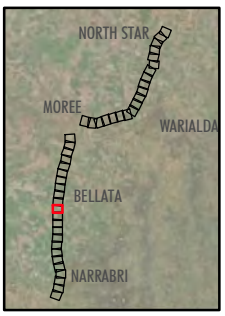
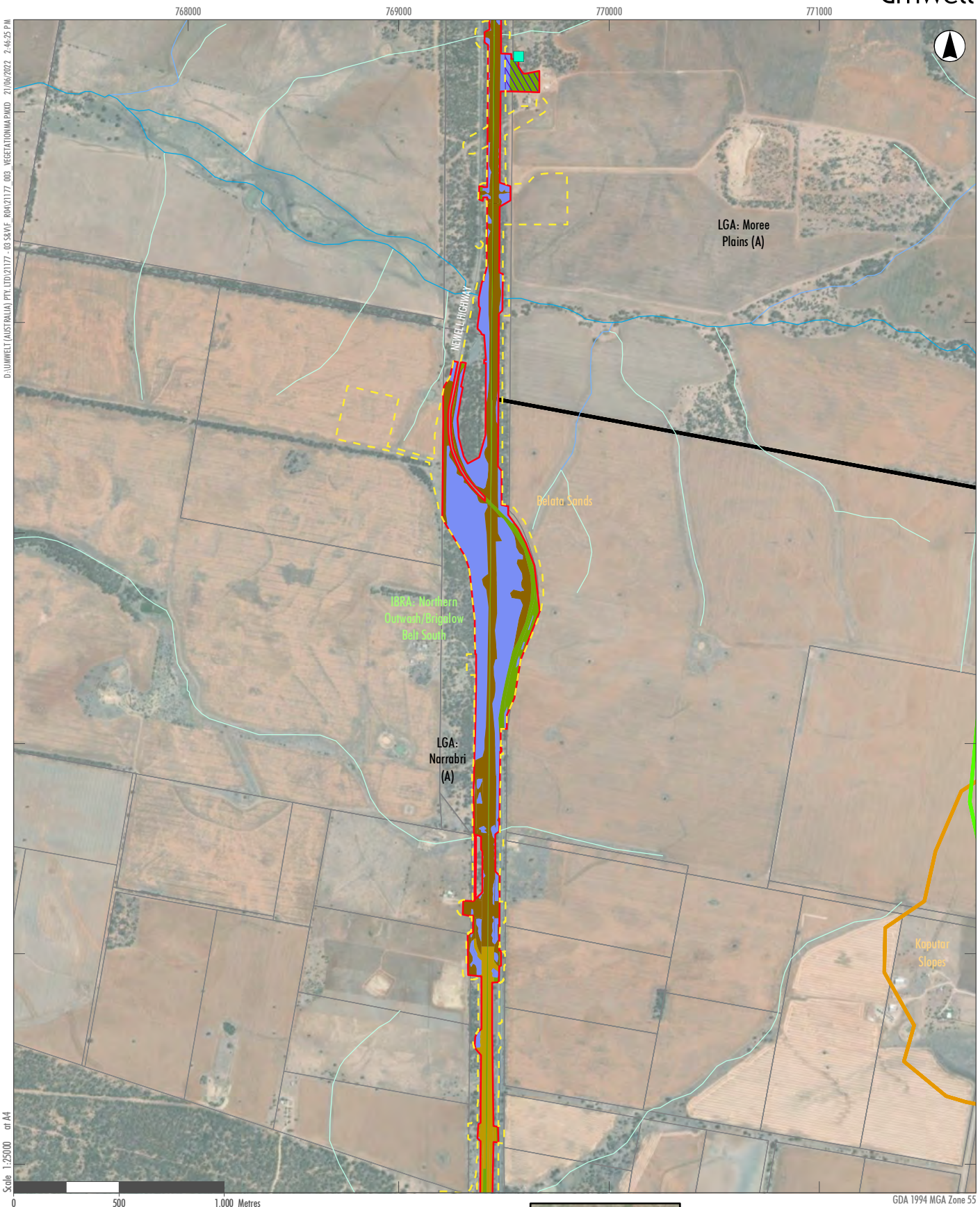


FIGURE A31

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4
- Zone 5
- Zone 6

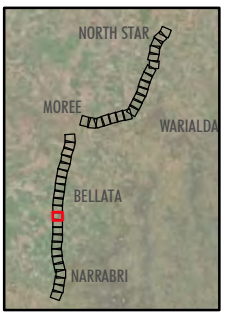
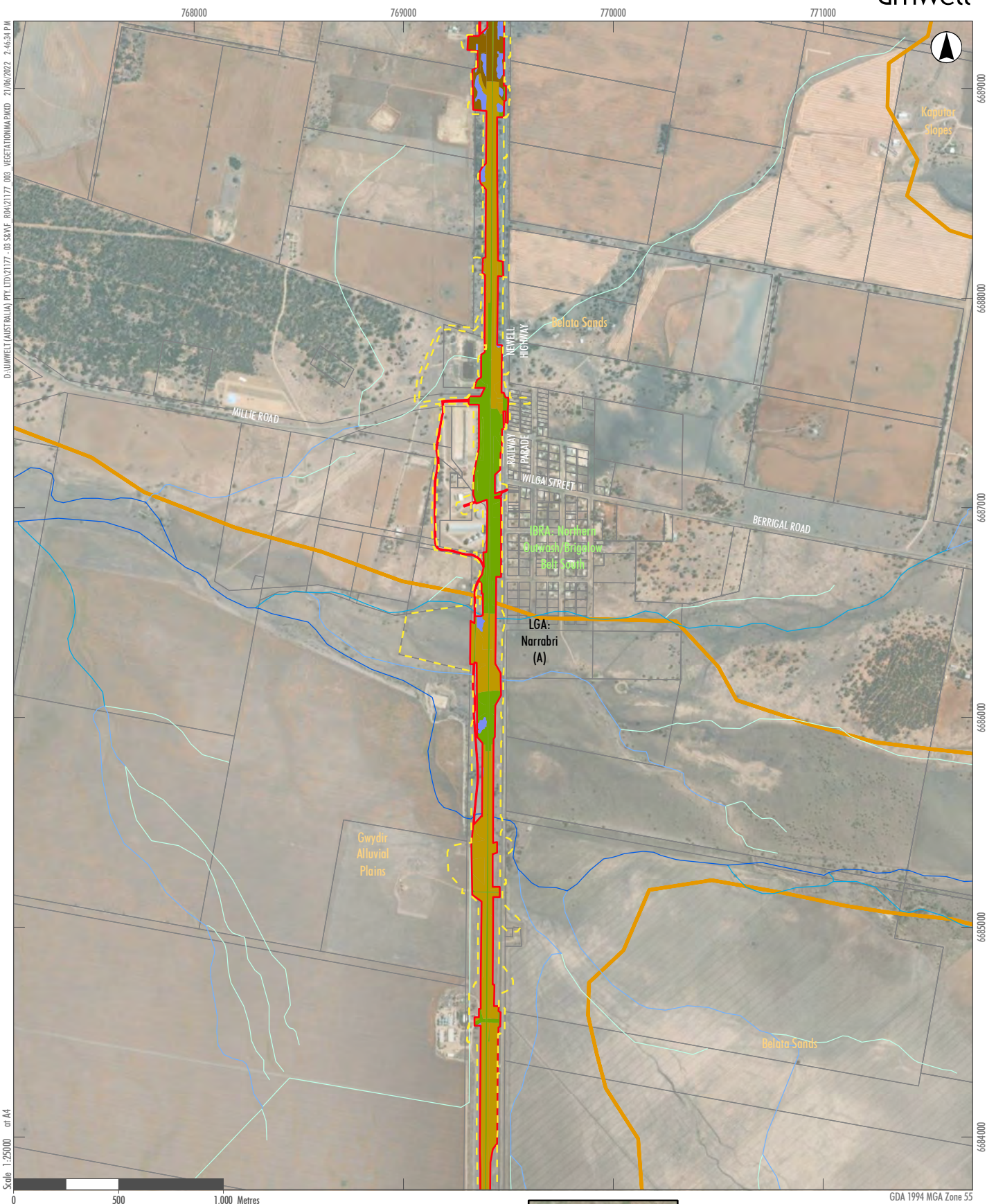


FIGURE A32

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4
- Zone 5
- Zone 6

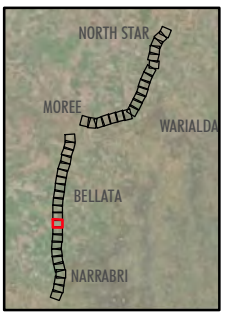
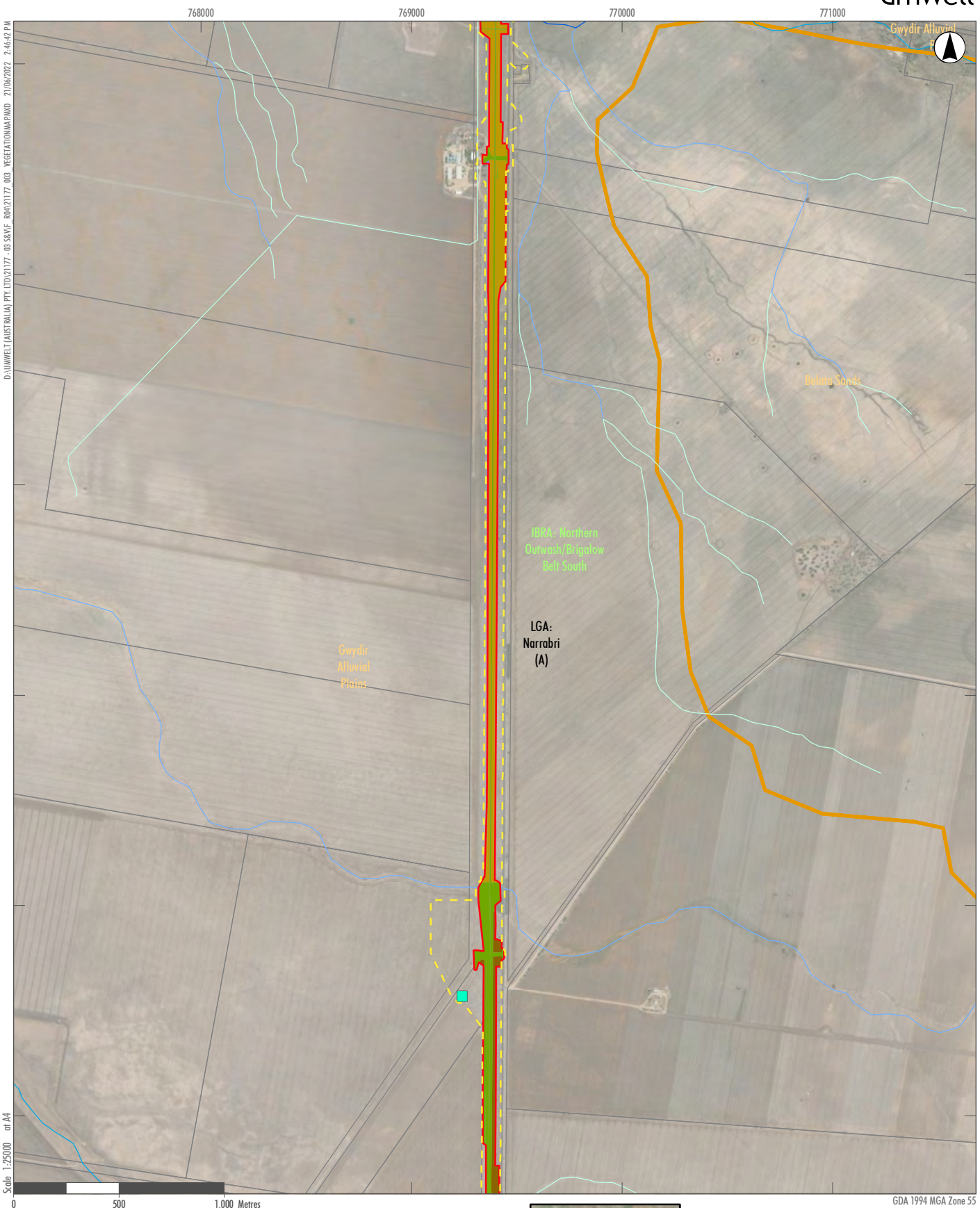


FIGURE A33

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4
- Zone 5
- Zone 6

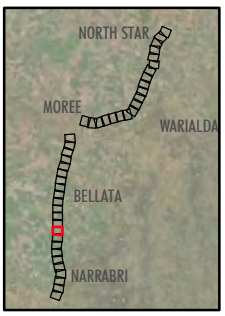


FIGURE A34

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 6
- Zone 9

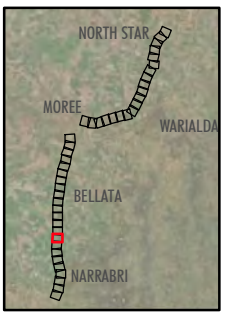
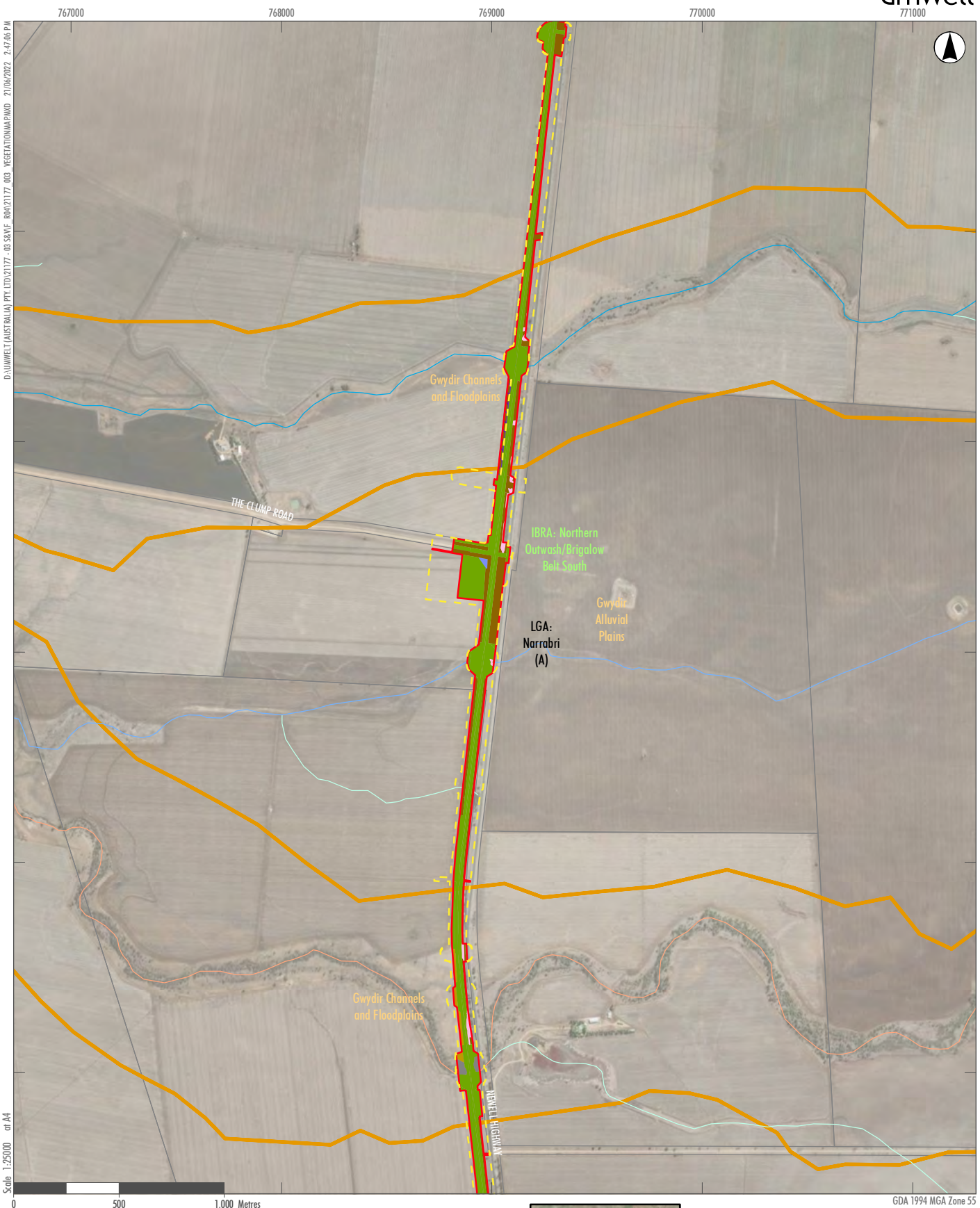


FIGURE A35

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 4
- Zone 5
- Zone 6
- Zone 8
- Zone 9

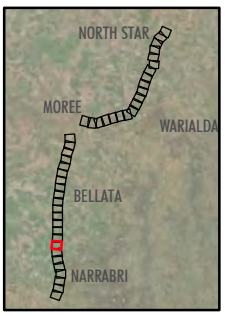


FIGURE A36

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 5
- Zone 6
- Zone 8
- Zone 9

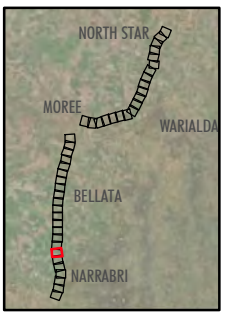


FIGURE A37

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

D:\UMWELT (AUSTRALIA) PTY. LTD\21177 - 03 S&WF_R04\21177_003_VEGETATIONMAP.MXD 21/06/2022 2:47:33 PM

Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 5
- Zone 6
- Zone 8

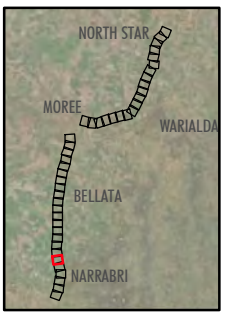


FIGURE A38

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 1
- Zone 4
- Zone 6
- Zone 9

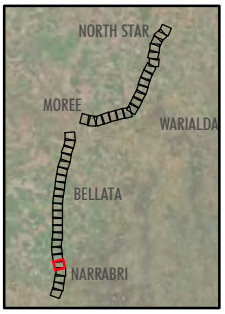


FIGURE A39

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 6
- Zone 8
- Zone 9

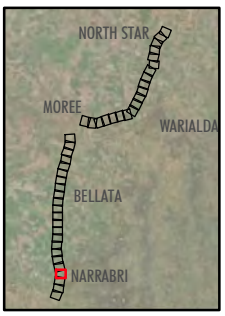


FIGURE A40

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

D:\UMWELT (AUSTRALIA) PTY LTD\21177 - 03 S&WF_R04\21177_003_VEGETATIONMAP.MXD 21/06/2022 2:48:28 PM

Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 4th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 5
- Zone 6
- Zone 10

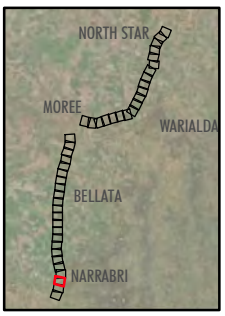


FIGURE A41

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 5
- Zone 6
- Zone 9
- Zone 10

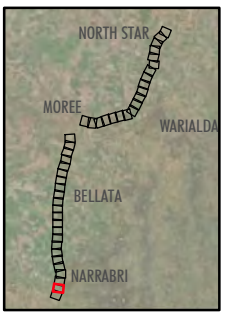


FIGURE A42

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Vegetation:

- Cleared/Non-native Vegetation
- Zone 5
- Zone 6
- Zone 9

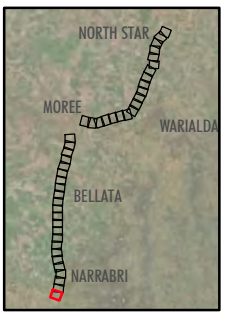
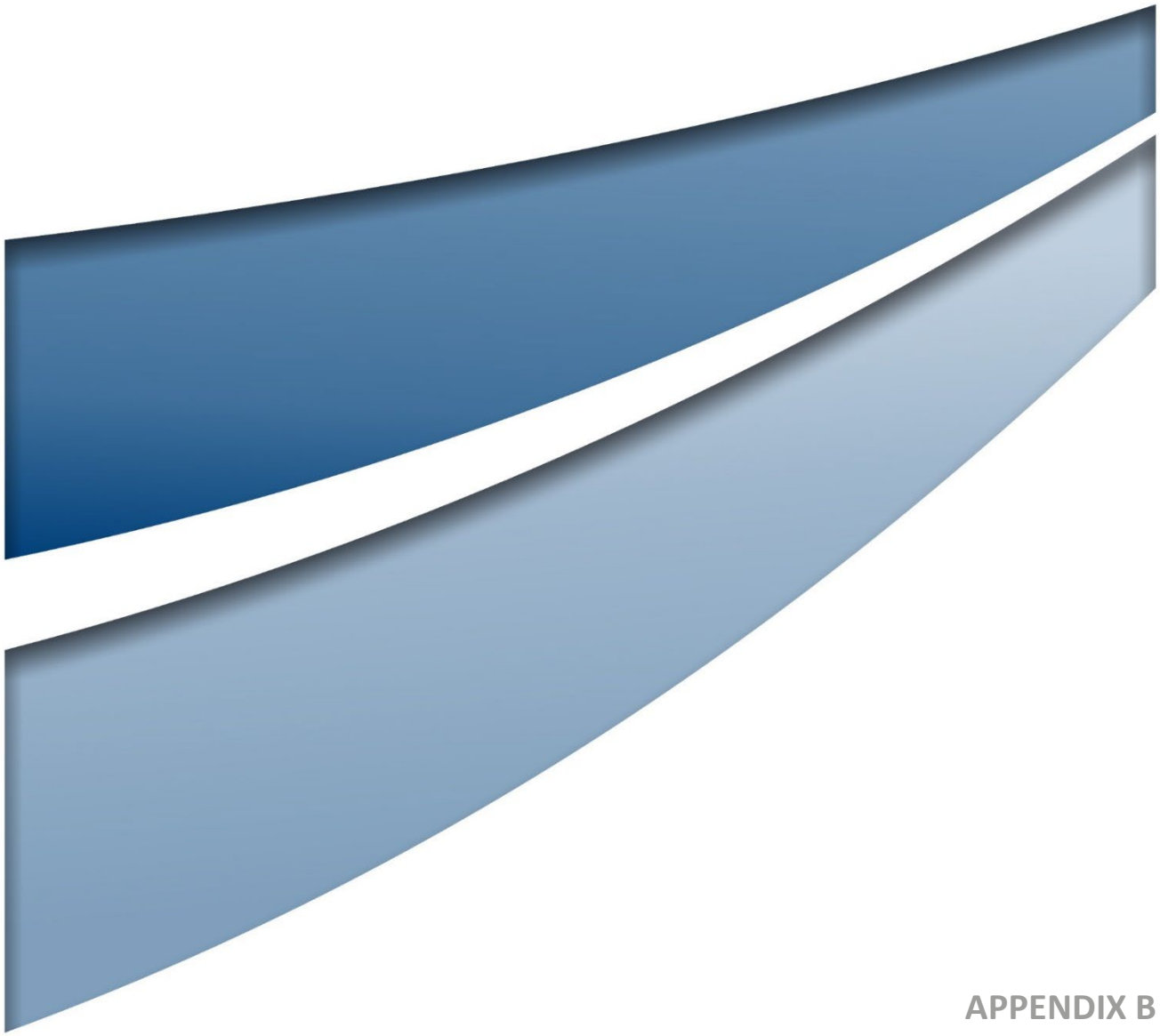


FIGURE A43

Vegetation Map

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



APPENDIX B

Native Vegetation and Potential Threatened Species Habitat Present on Properties Not Accessed During 2021 Surveys

Vegetation Legend

- 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 gilgaied 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 - Moderate - Good - 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 - Moderate - Good - Derived Native Grassland
- 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

FIGURE B0

Vegetation Map
No Access

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2
- Zone 6

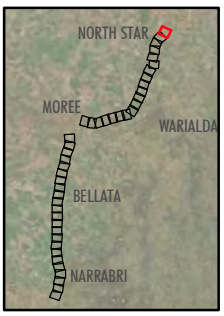


FIGURE B1

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2
- Zone 4
- Zone 5
- Zone 6

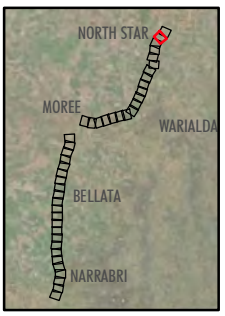


FIGURE B2

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

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Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2
- Zone 4
- Zone 5
- Zone 6

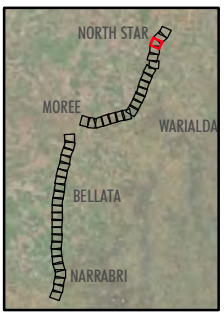


FIGURE B3

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 2
- Zone 4
- Zone 5
- Zone 6
- Zone 8

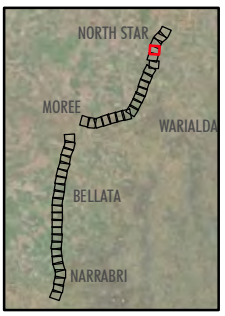
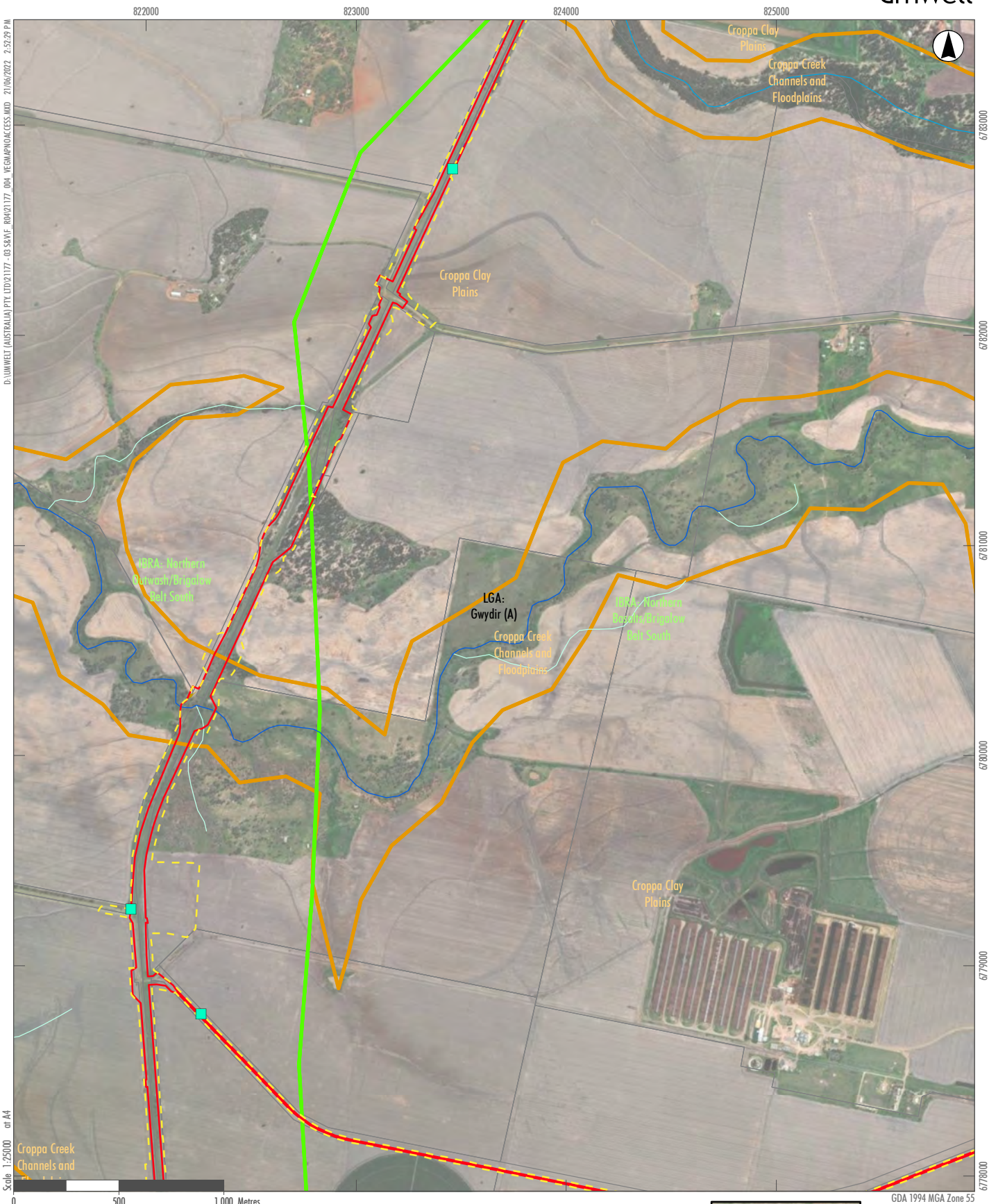


FIGURE B4

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



D:\UMWELT (AUSTRALIA) PTY LTD\21177 - 03 SKVF_R04\21177_004_VEGMAPNOACCESS.MXD 21/06/2022 2:52:29 PM

Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order
- 4th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 4
- Zone 5
- Zone 6
- Zone 8

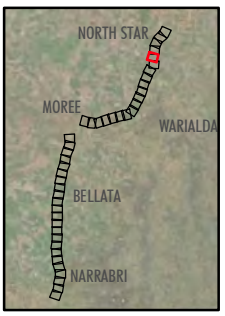
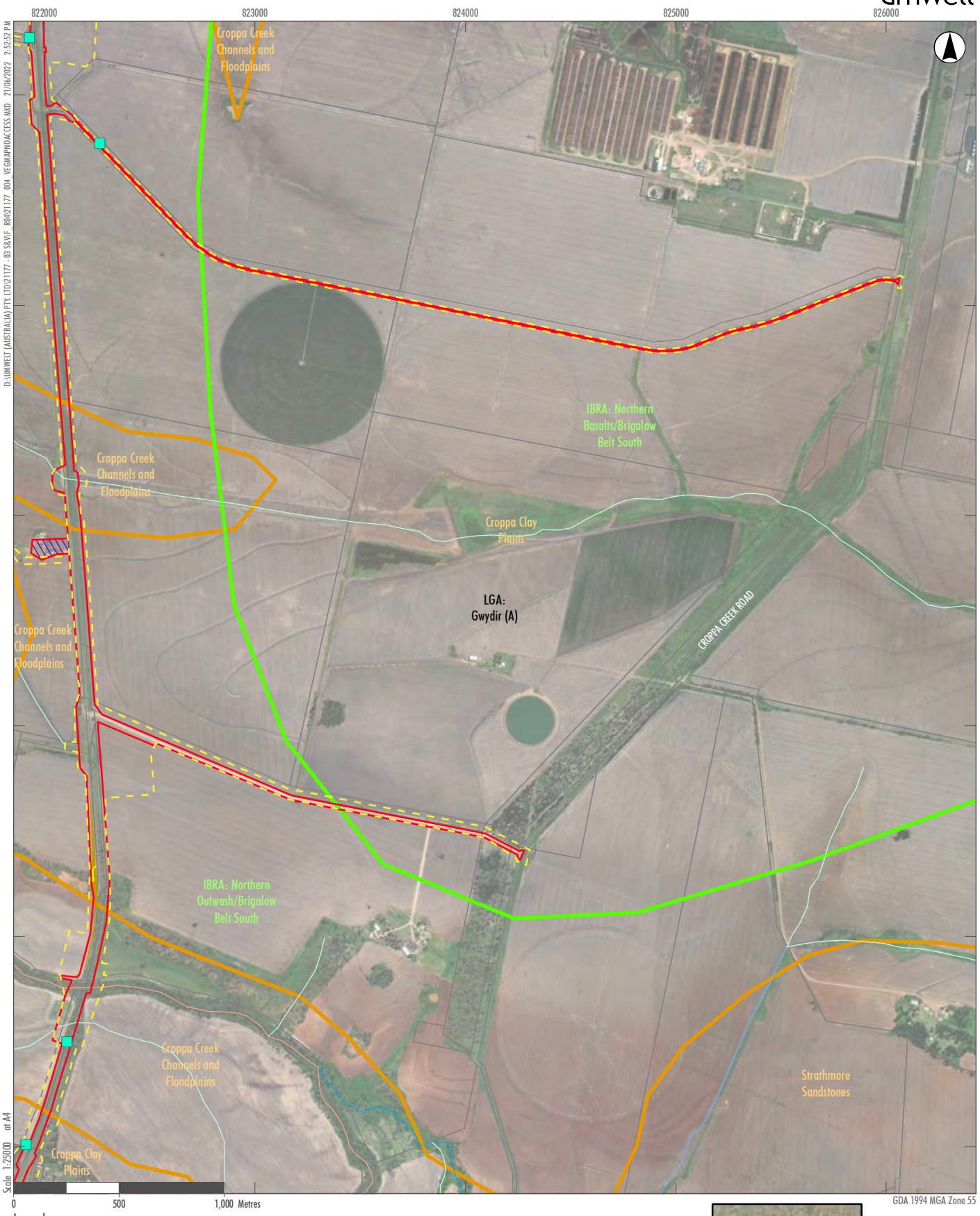


FIGURE B5

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 4
- Zone 5
- Zone 6

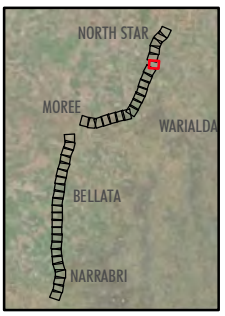


FIGURE B6

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 2
- Zone 4
- Zone 6

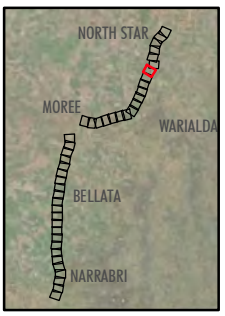
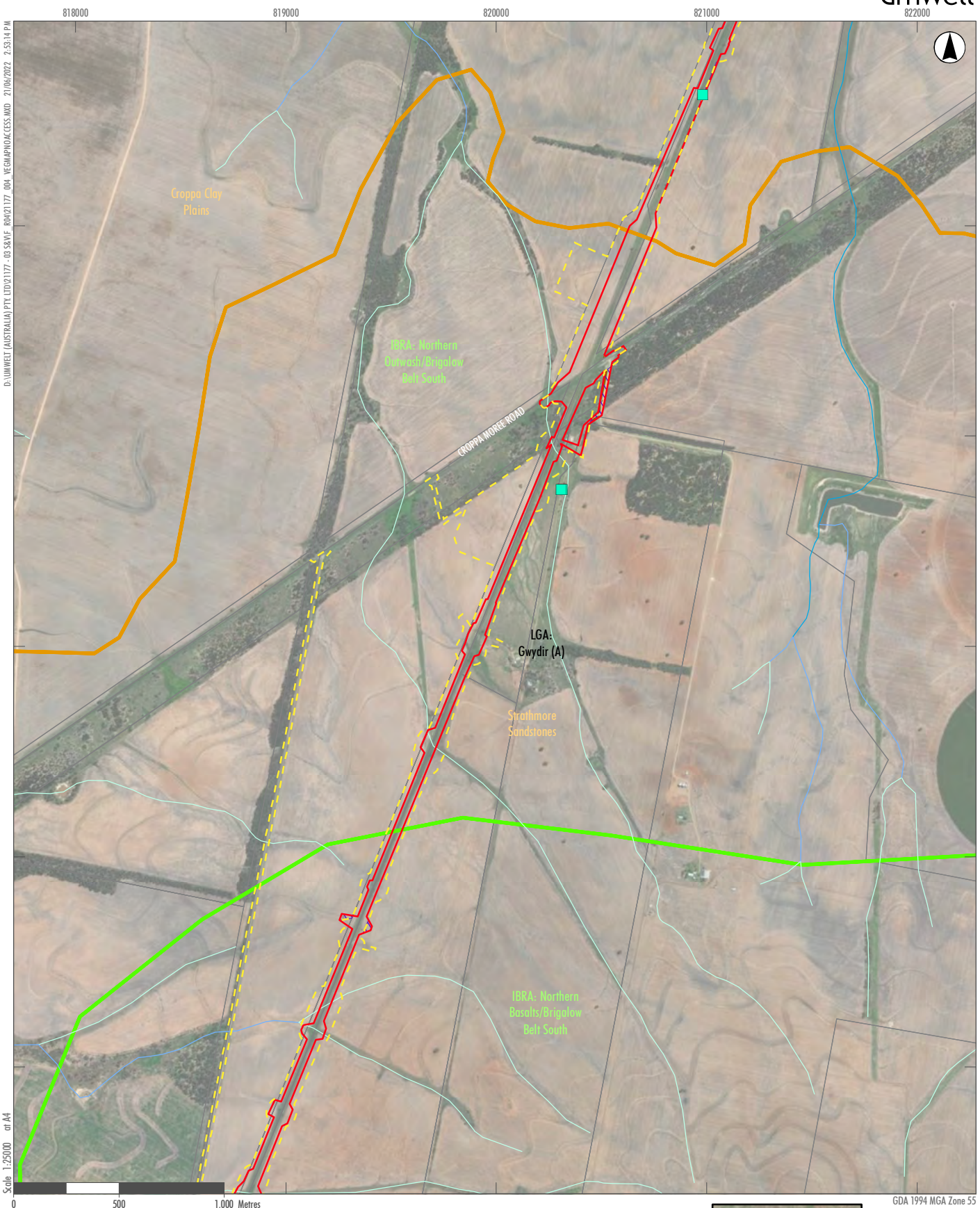


FIGURE B7

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2
- Zone 6

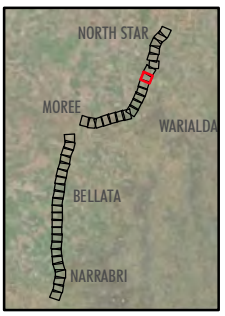
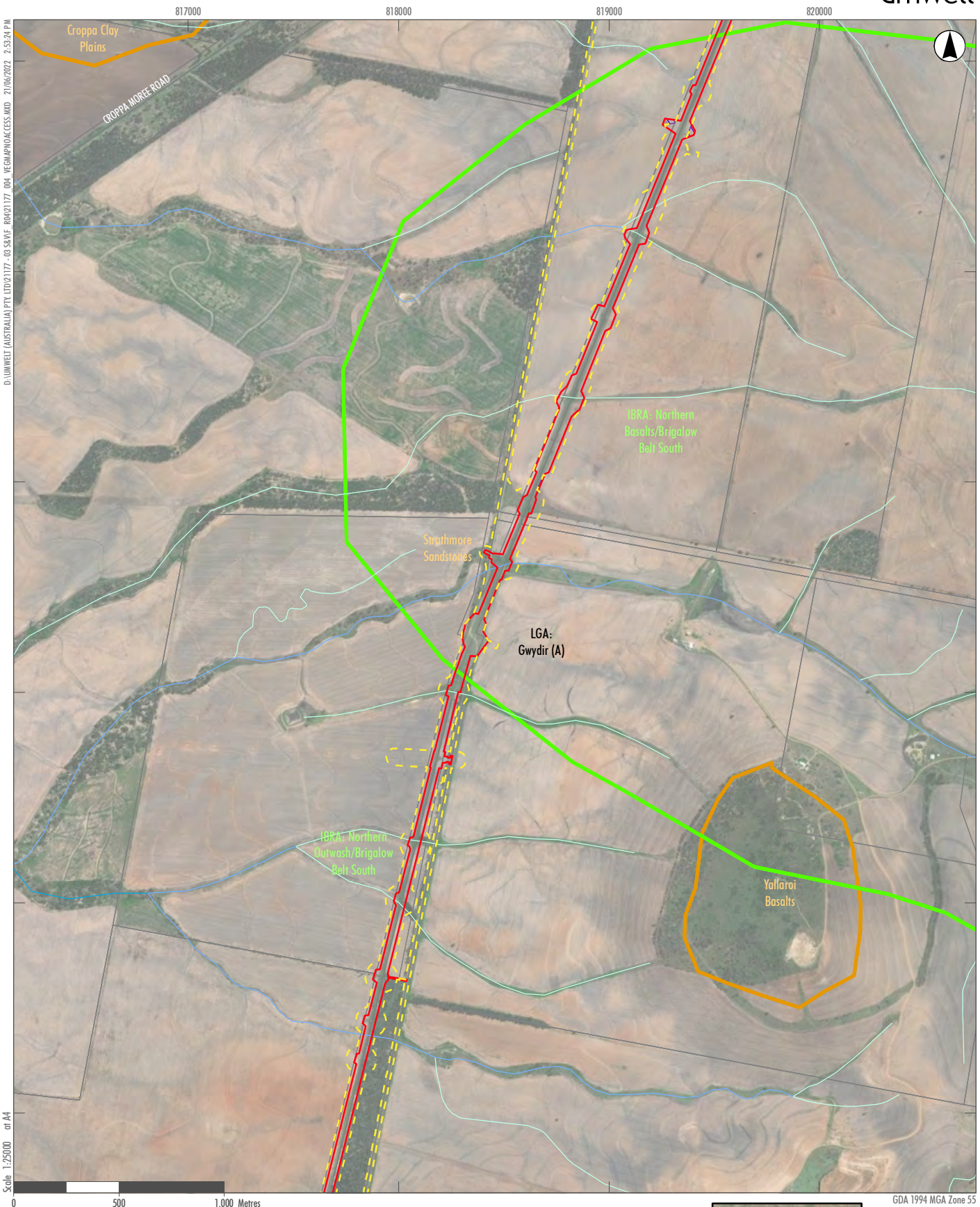


FIGURE B8

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2
- Zone 5

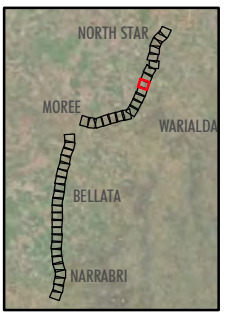


FIGURE B9

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 5

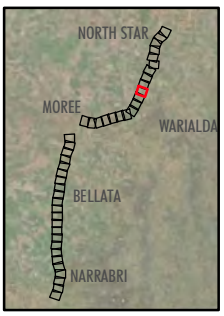


FIGURE B10

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

FIGURE B11

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2
- Zone 5
- Zone 6

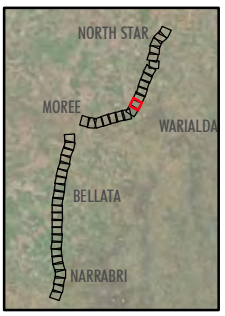
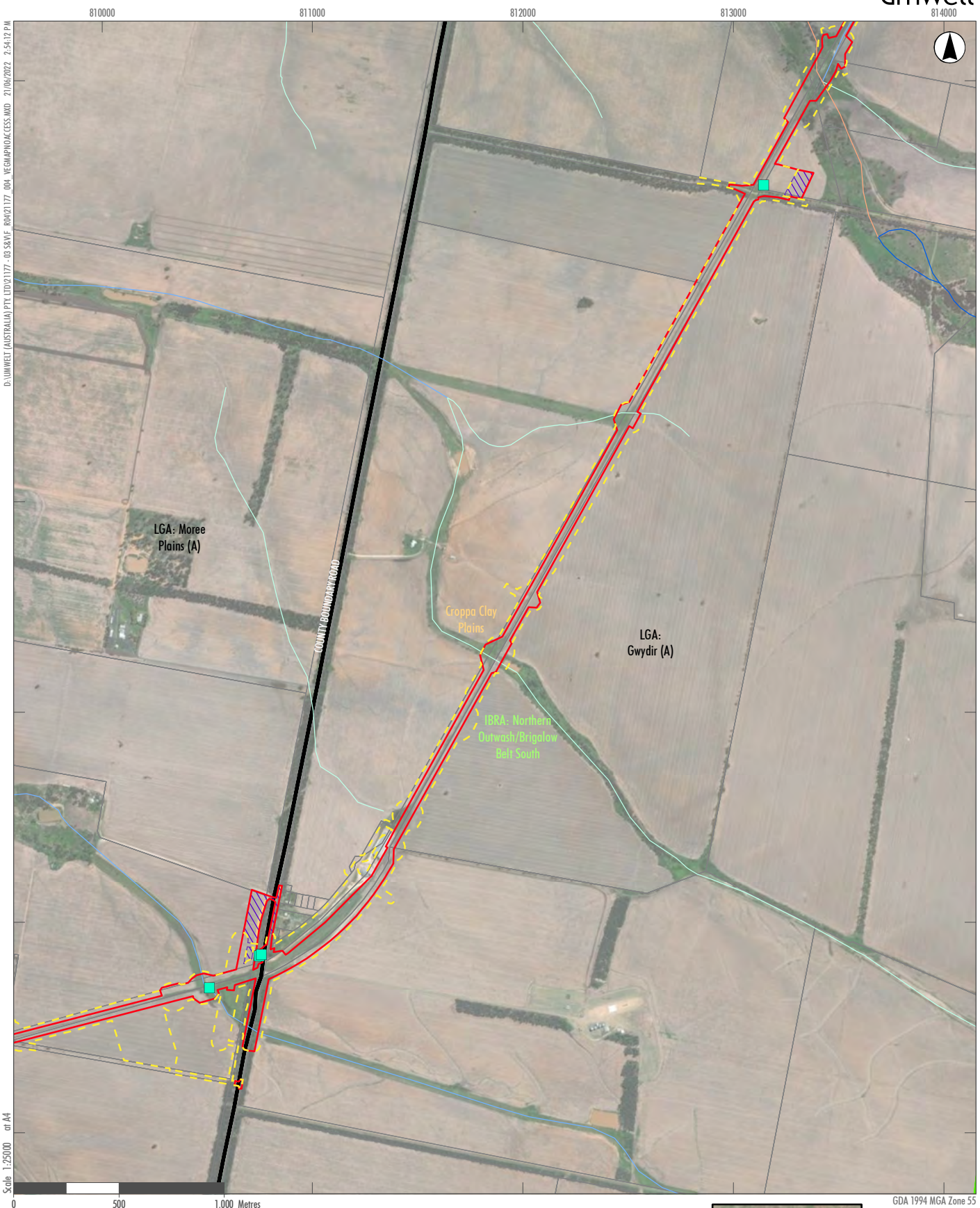


FIGURE B12

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2
- Zone 5
- Zone 6

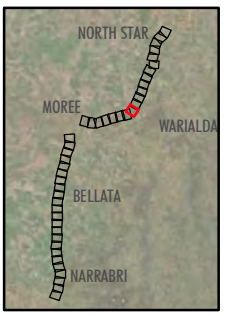


FIGURE B13

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 2

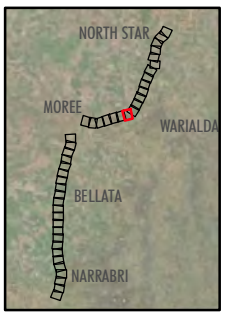


FIGURE B14

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

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Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:
- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:
- Zone 5
- Zone 6

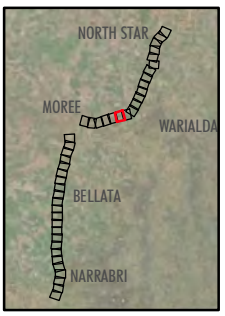

FIGURE B15

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 6

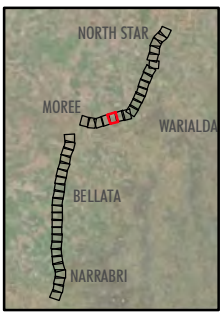

FIGURE B16

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 5

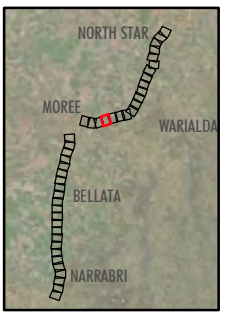

FIGURE B17

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

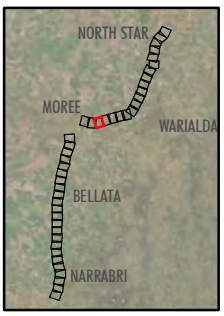

FIGURE B18

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

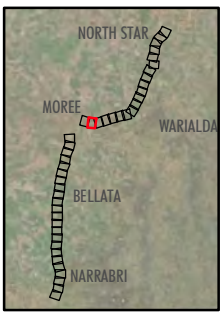

FIGURE B19

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 5th order

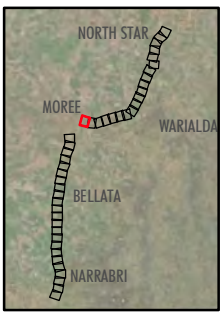

FIGURE B20

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order

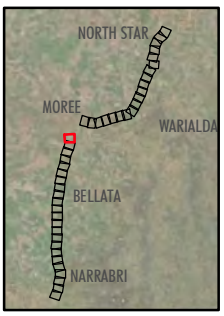

FIGURE B21

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

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Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 4

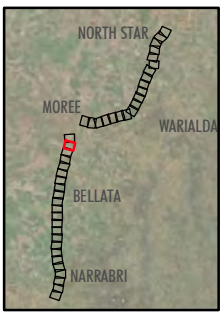


FIGURE B22

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 4

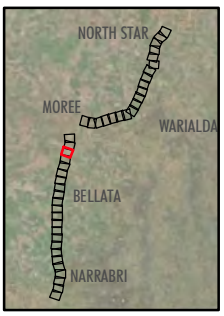


FIGURE B23

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 4

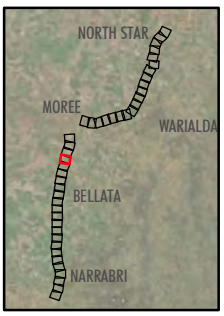


FIGURE B24

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 3
- Zone 4

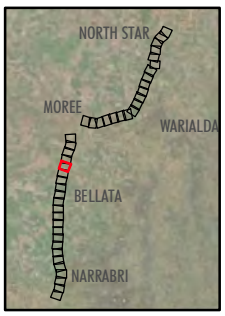


FIGURE B25

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 4
- Zone 5

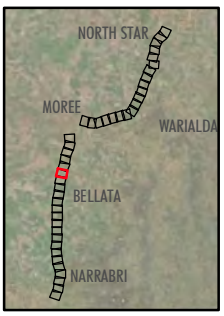
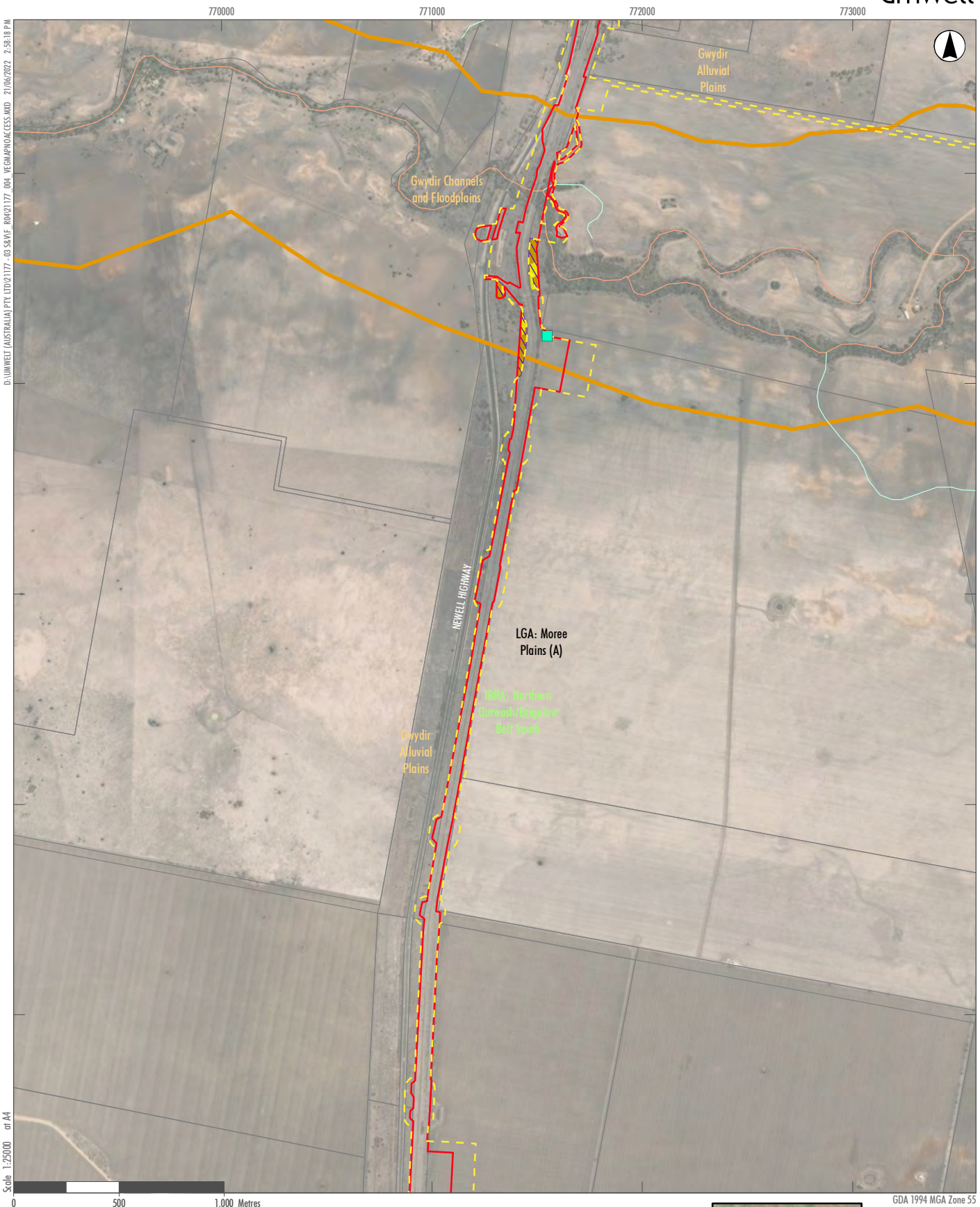


FIGURE B26

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:
- 1st order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:
- Zone 1
- Zone 4

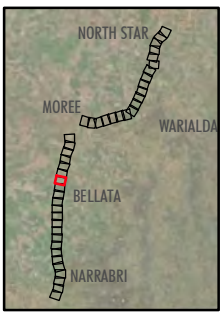


FIGURE B27

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 4

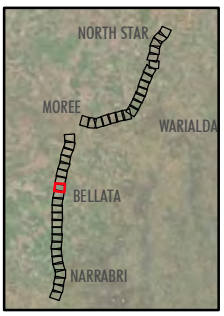


FIGURE B28

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

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Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 4

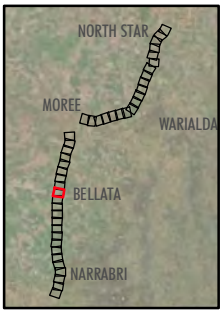
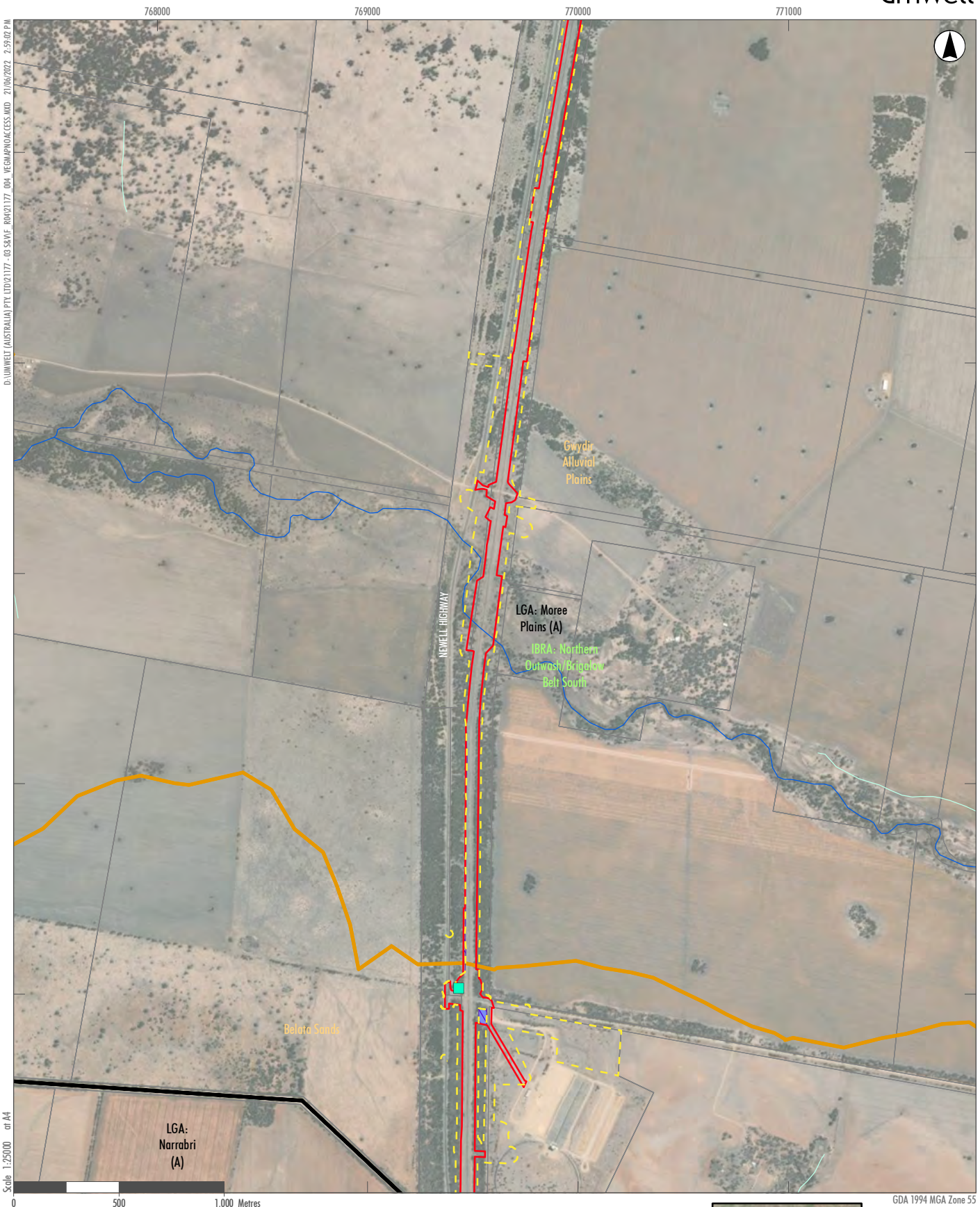


FIGURE B29

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 4th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 5
- Zone 6

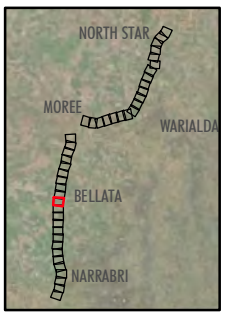
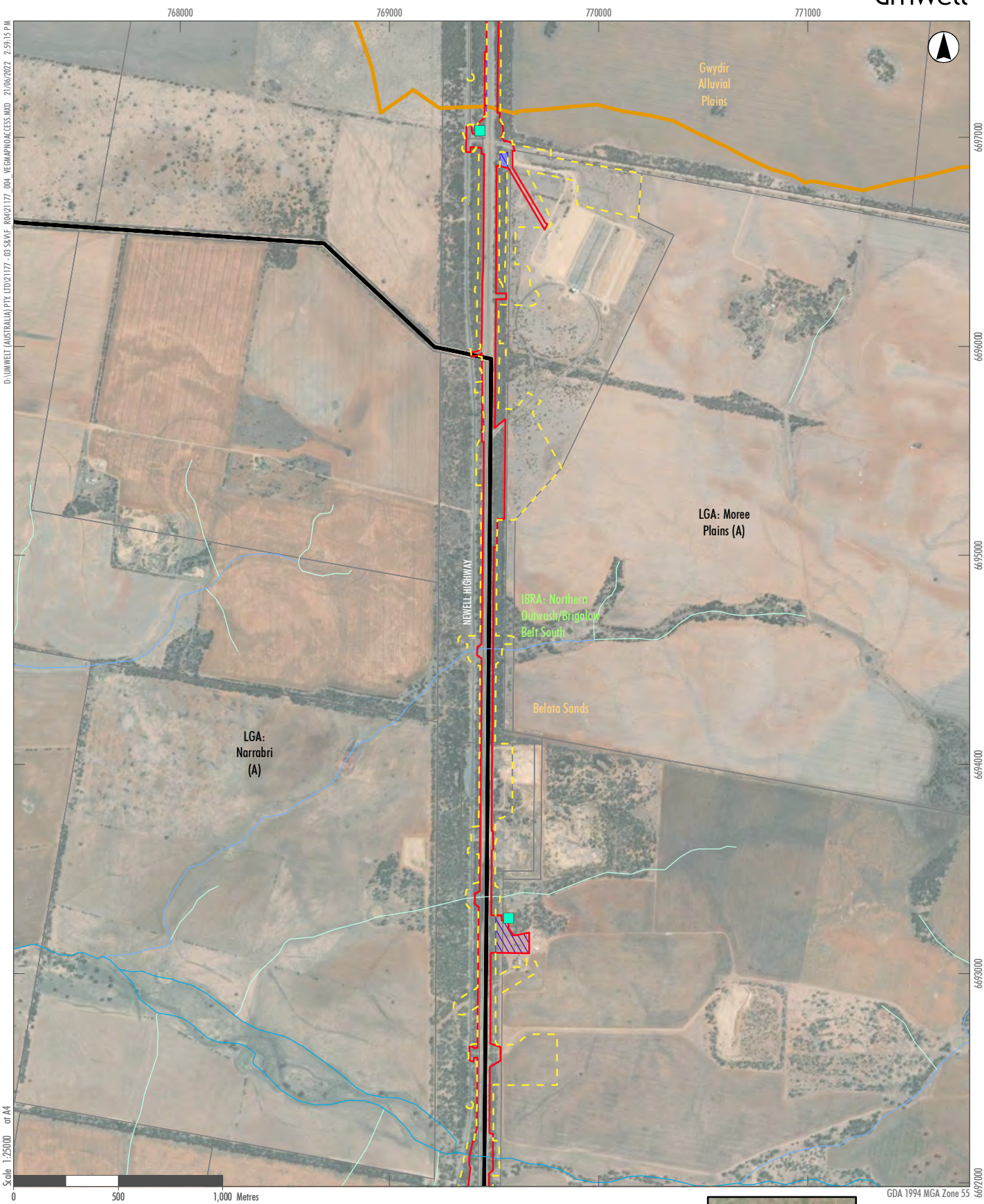


FIGURE B30

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:
- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:
- Zone 5
- Zone 6

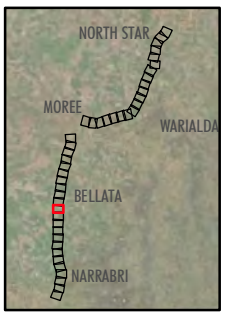
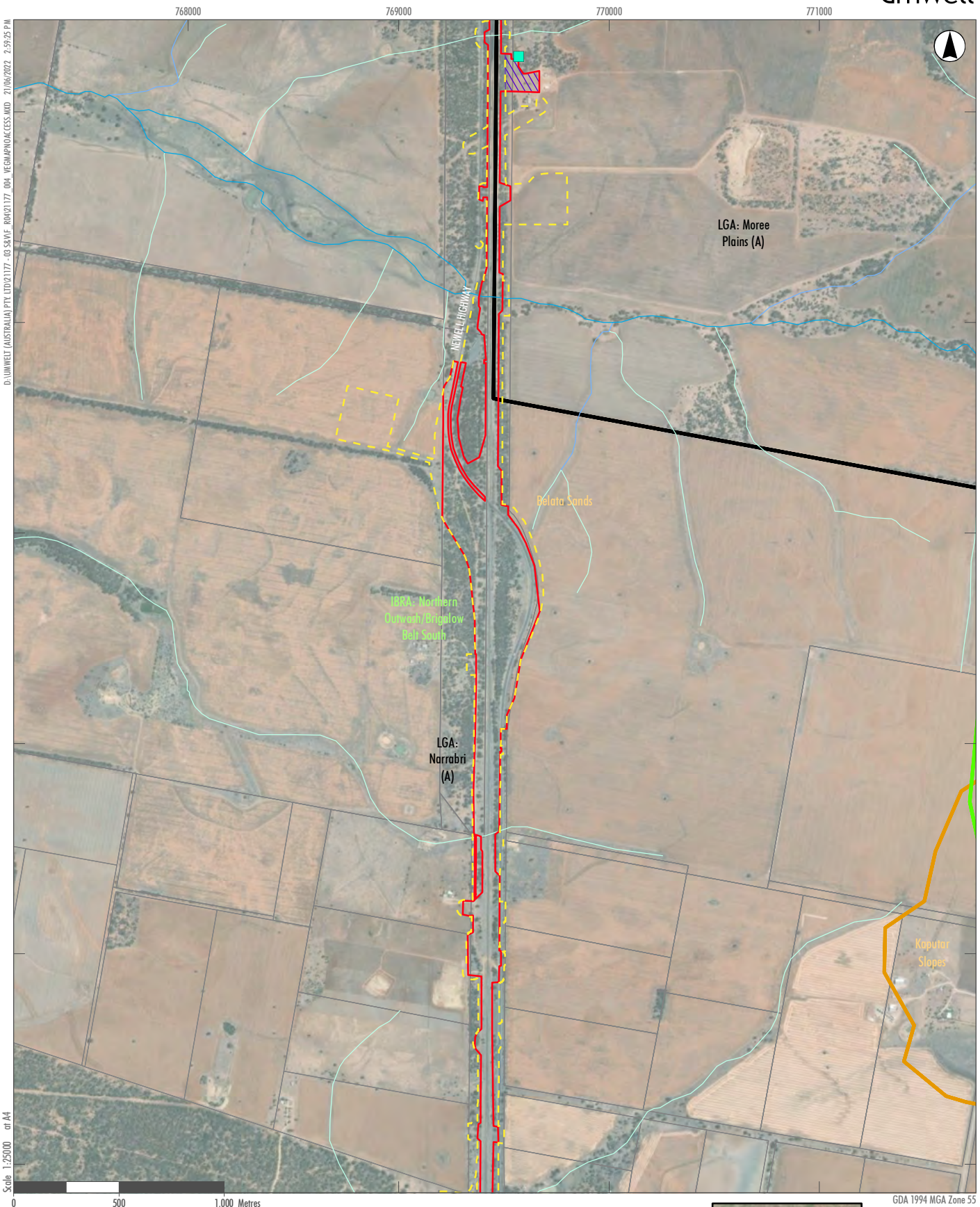


FIGURE B31

Vegetation Map
No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 5

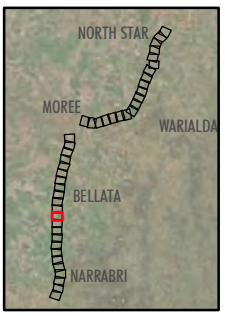


FIGURE B32

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 4

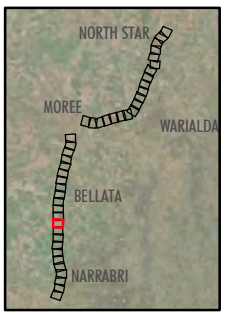


FIGURE B33

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 6

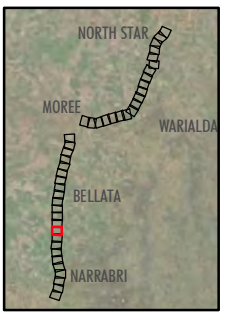


FIGURE B34

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 6

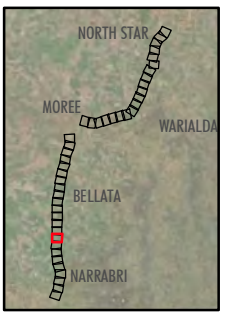


FIGURE B35

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 6

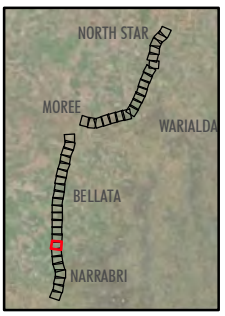


FIGURE B36

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 6
- Zone 8

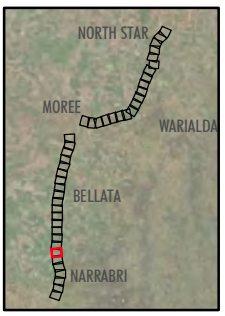


FIGURE B37

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

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Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 4
- Zone 6
- Zone 8

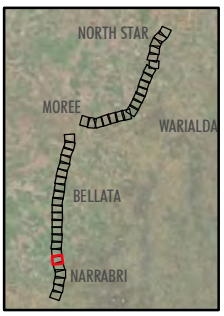


FIGURE B38

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 1
- Zone 4

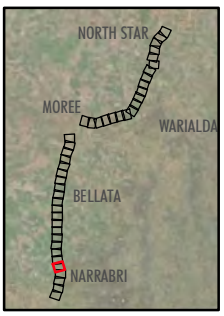
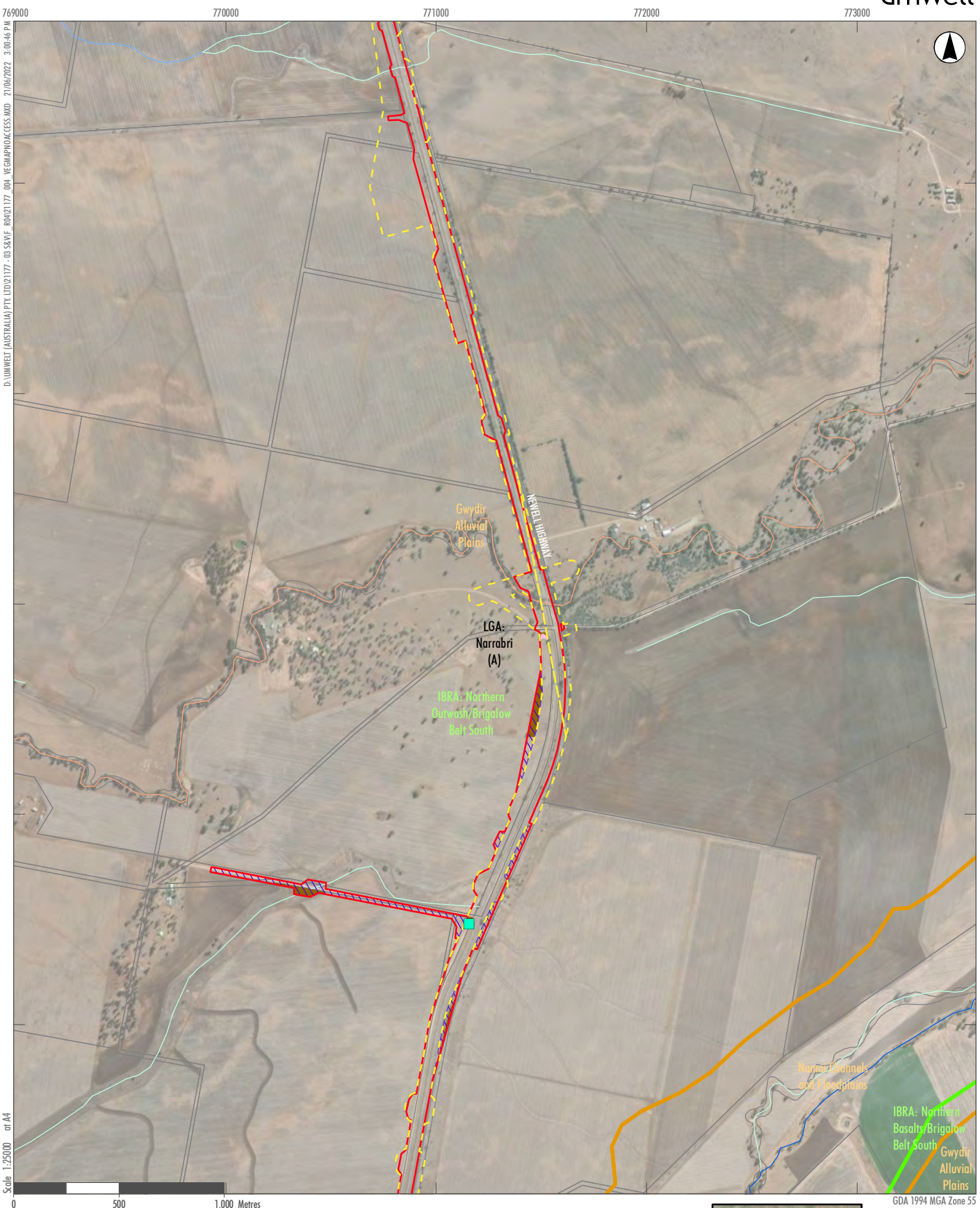


FIGURE B39

Vegetation Map
No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 6
- Zone 9

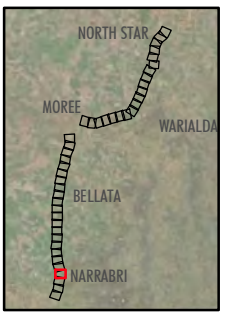
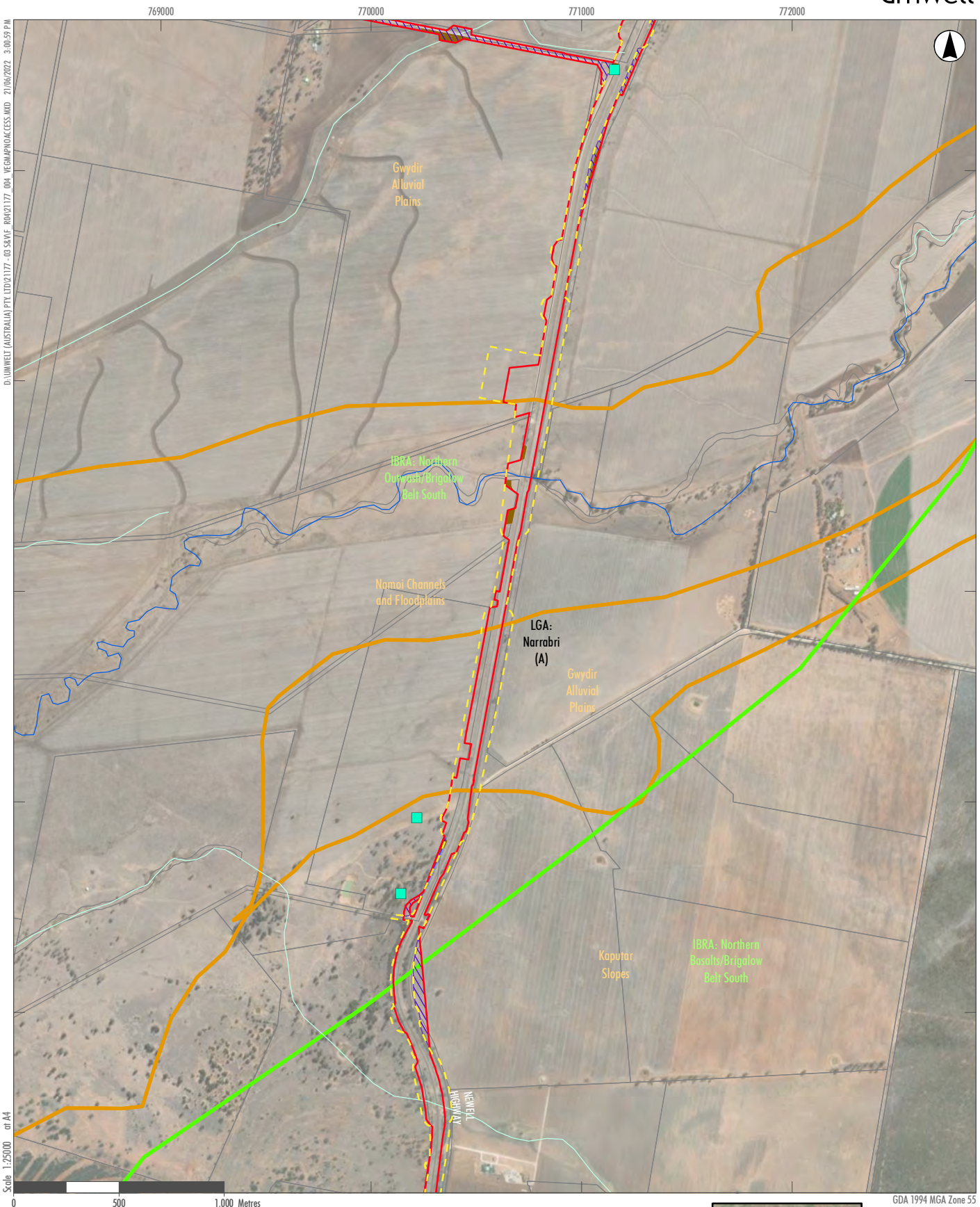


FIGURE B40

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



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Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 4th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 5
- Zone 6
- Zone 10

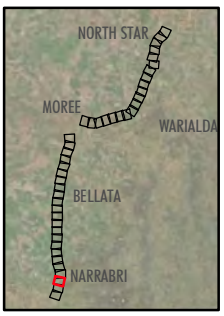
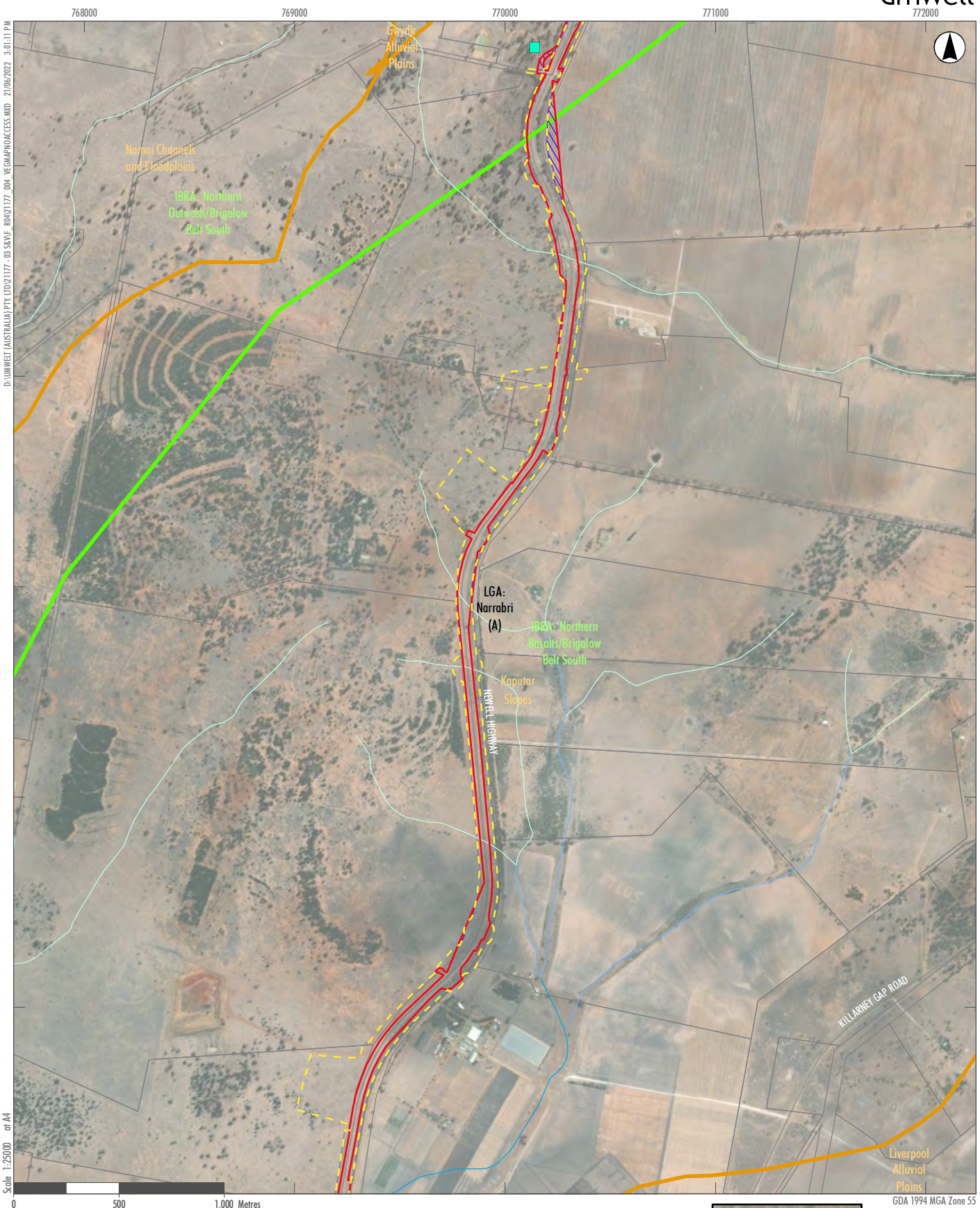


FIGURE B41

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- 2021 Rapid Assessment Point
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 5
- Zone 6
- Zone 10

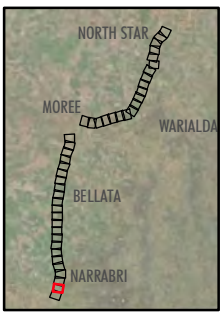


FIGURE B42

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

Native Vegetation in the IFC CIZ Development Footprint not Accessed During the 2021 Surveys:

- Zone 6

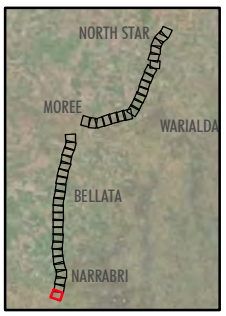
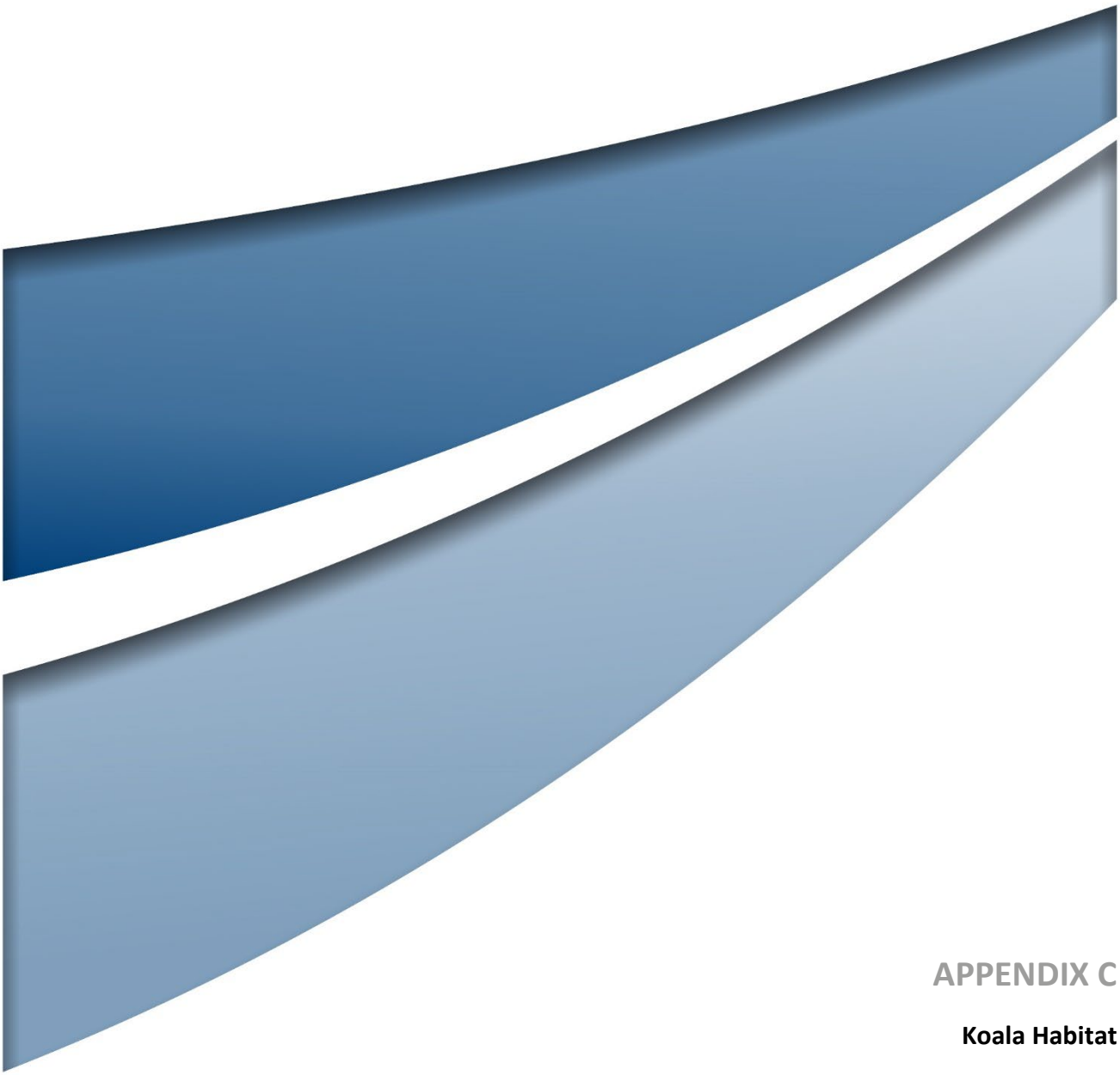


FIGURE B43

Vegetation Map No Access

Note: For full vegetation legend, refer to legend page Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



APPENDIX C

Koala Habitat

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order

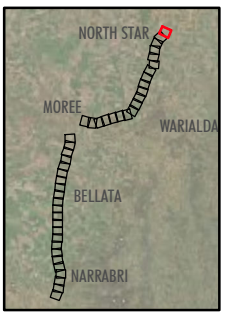


FIGURE C1

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

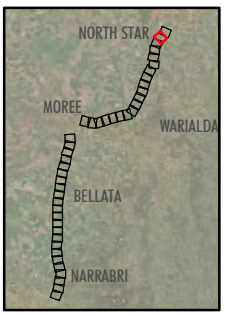


FIGURE C2

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

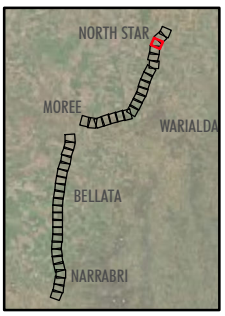


FIGURE C3

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order

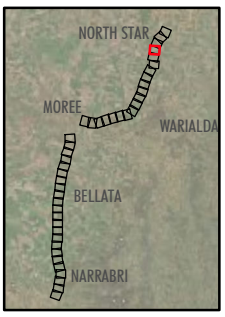


FIGURE C4

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order
- 4th order

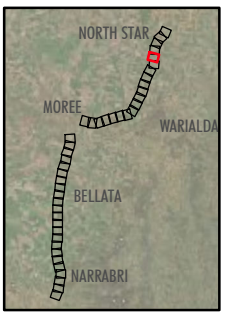


FIGURE C5

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

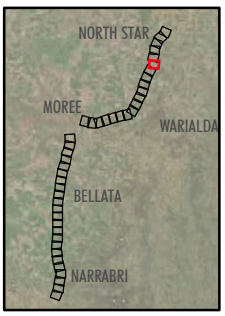


FIGURE C6

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

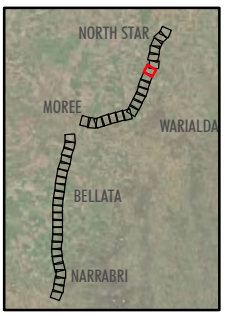
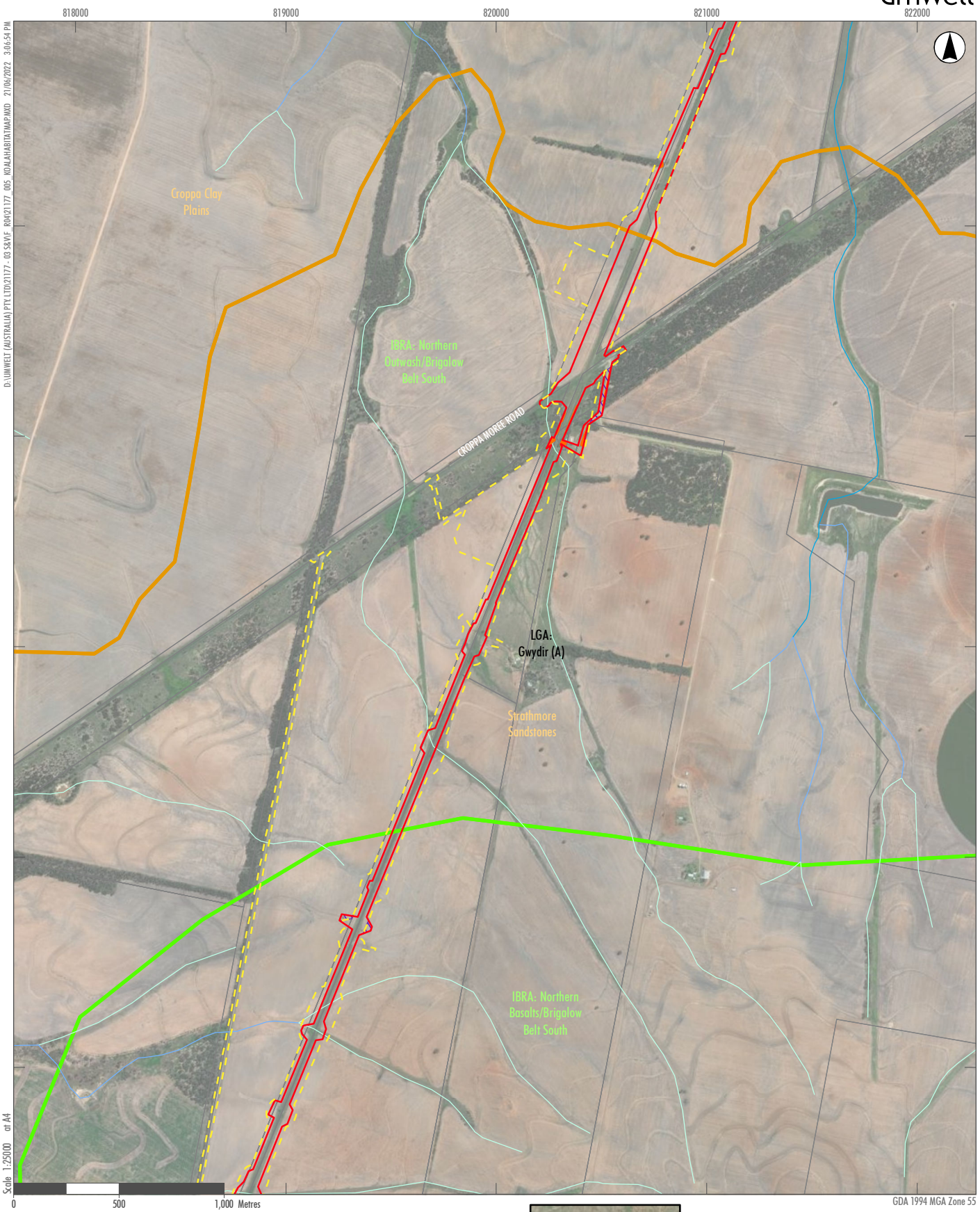


FIGURE C7

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

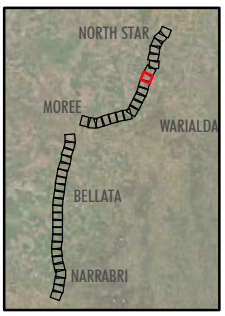
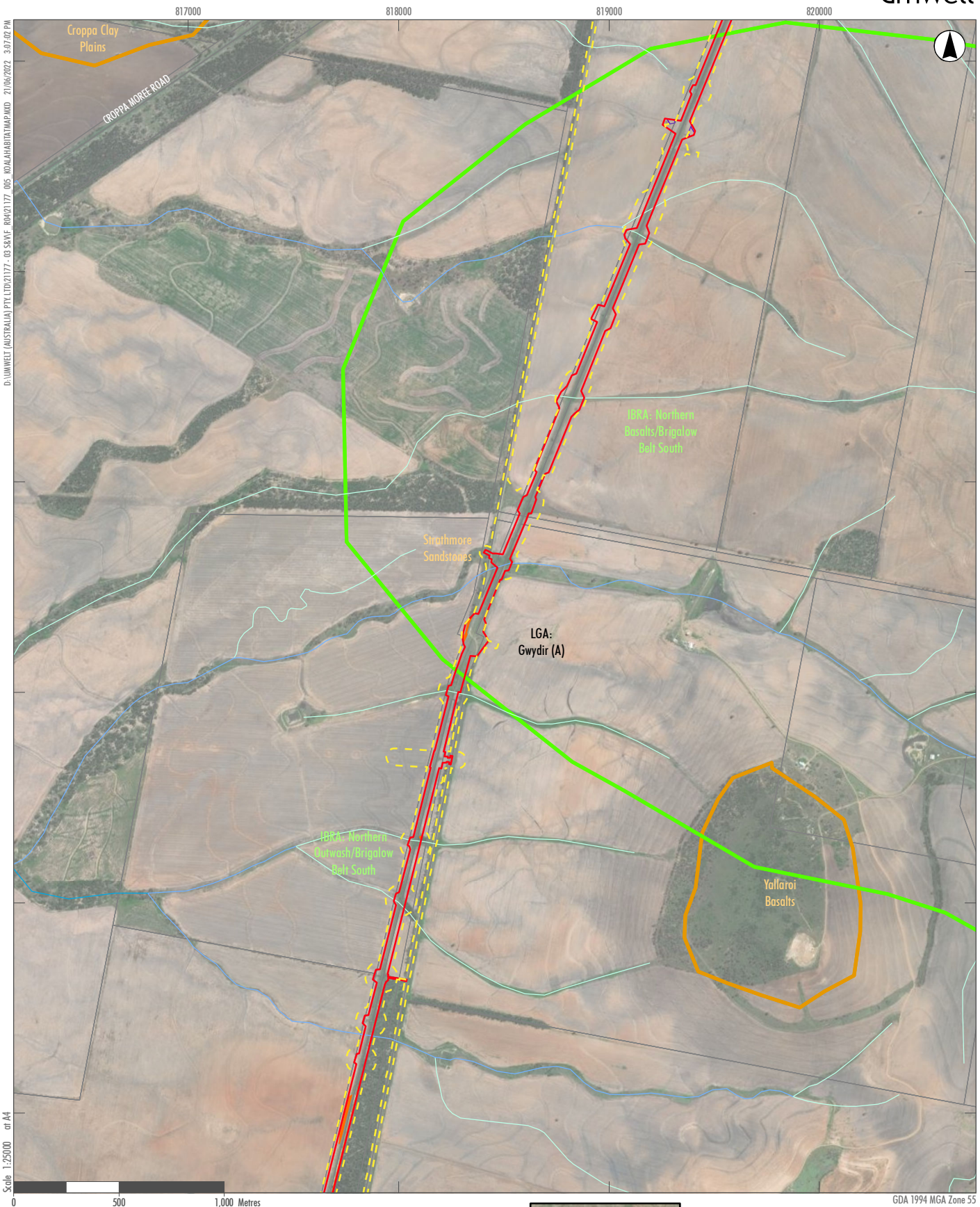


FIGURE C8

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

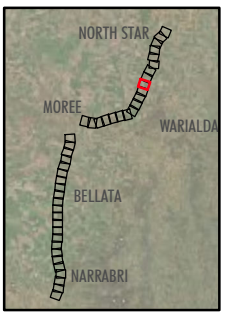


FIGURE C9

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

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Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

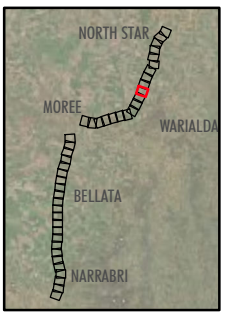


FIGURE C10

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

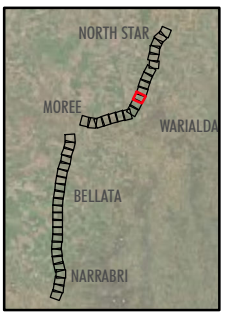


FIGURE C11

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

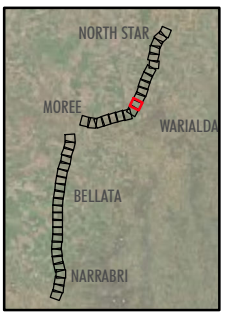


FIGURE C12

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

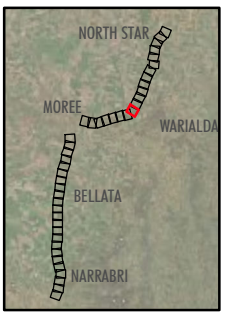


FIGURE C13

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

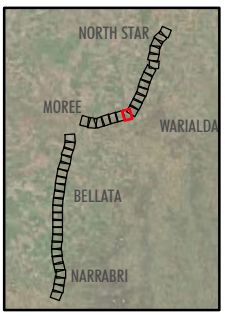


FIGURE C14

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

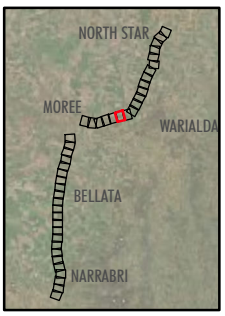


FIGURE C15

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

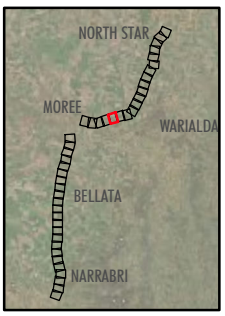
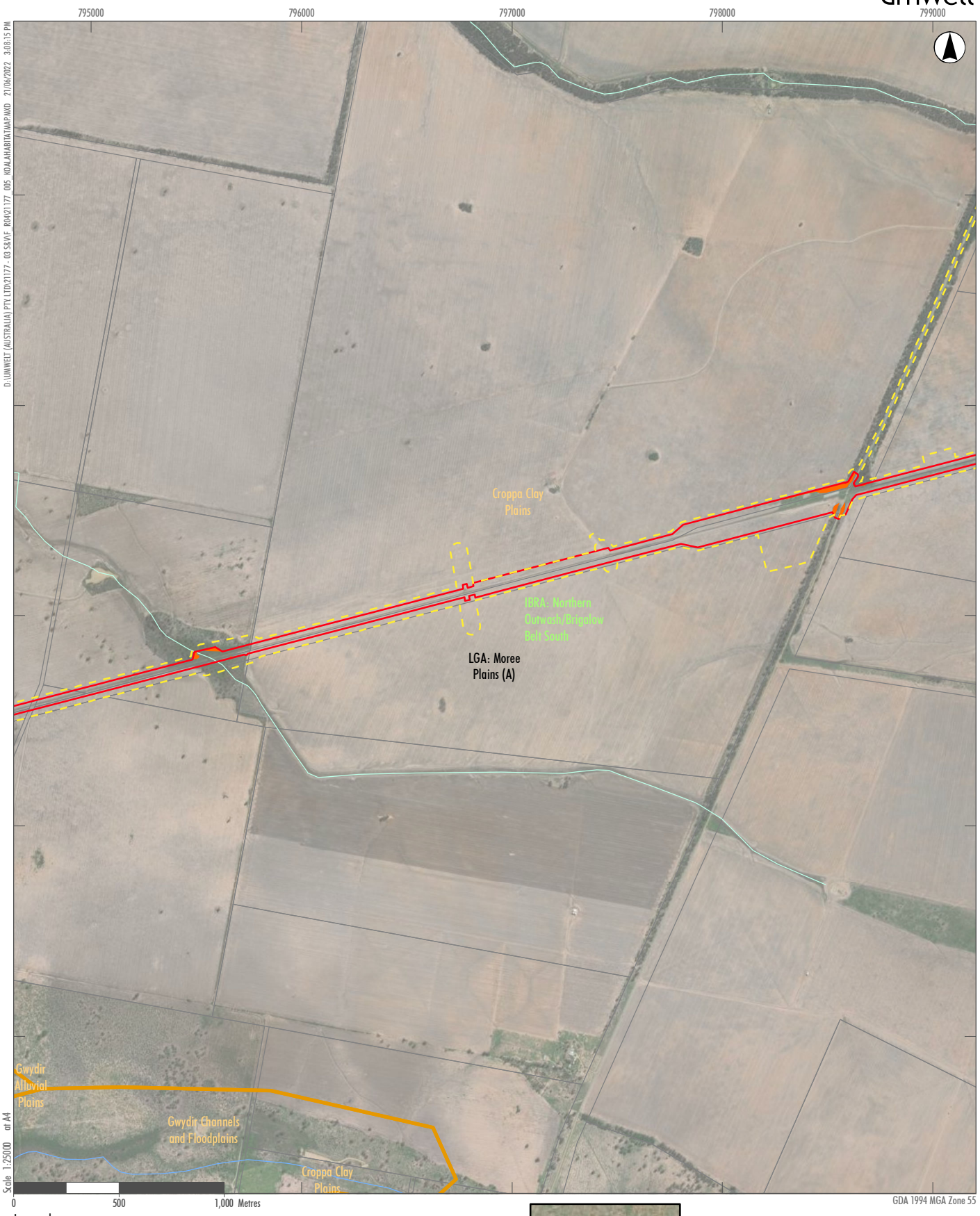


FIGURE C16

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

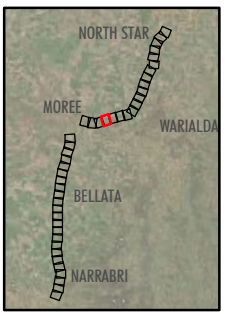


FIGURE C17

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

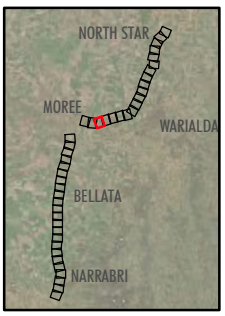


FIGURE C18

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

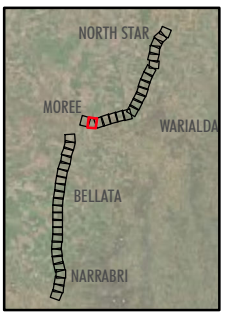


FIGURE C19

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 5th order

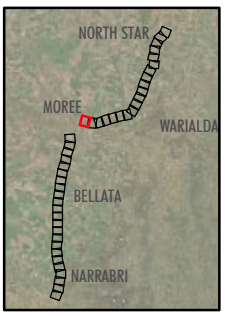
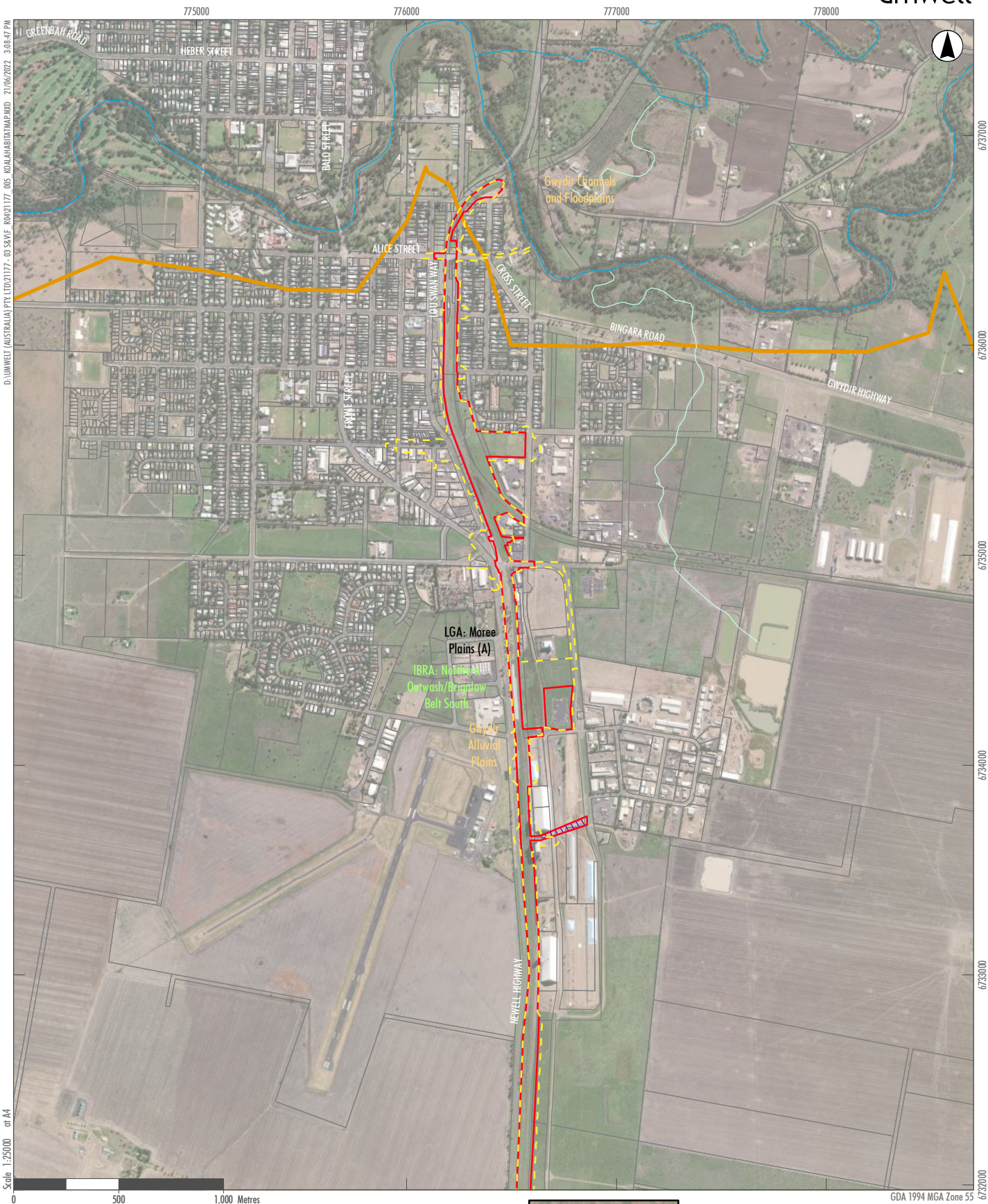


FIGURE C20

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 3rd order

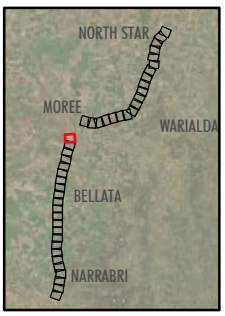


FIGURE C21

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

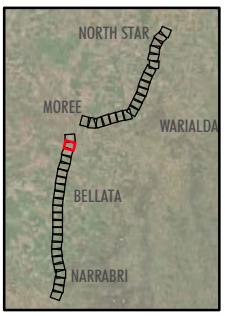


FIGURE C22

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

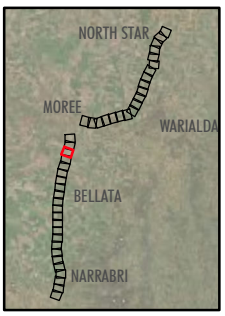


FIGURE C23

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

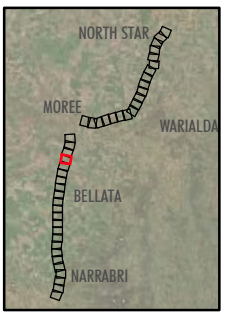


FIGURE C24

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

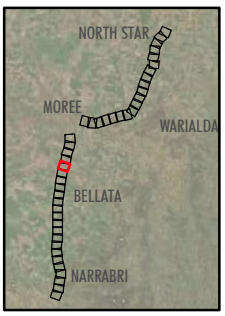


FIGURE C25

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 5th order

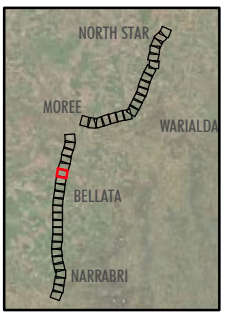
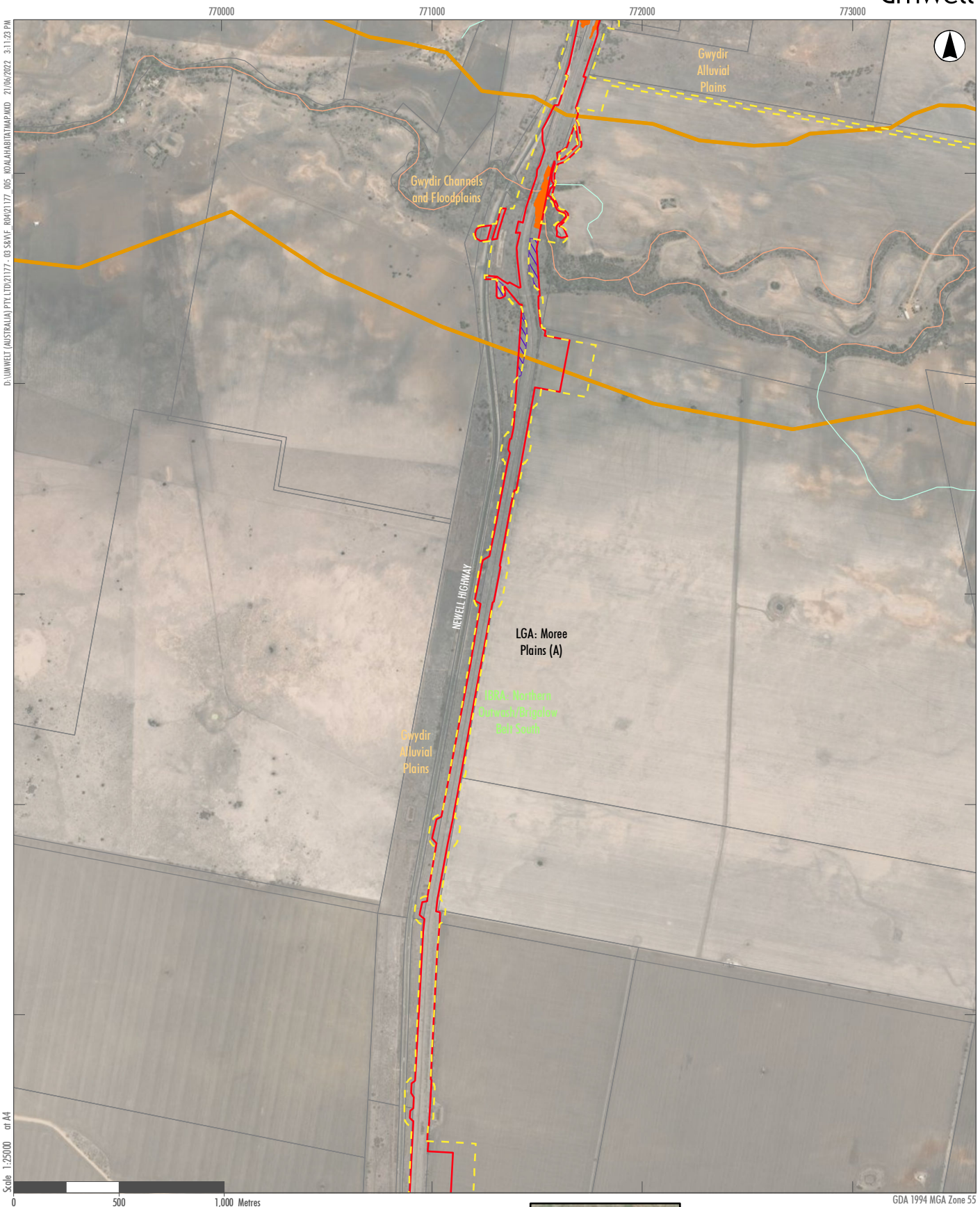


FIGURE C26

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 5th order

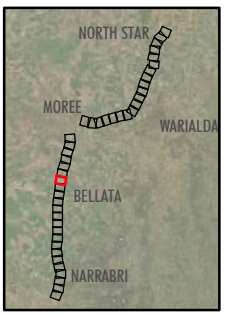


FIGURE C27

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

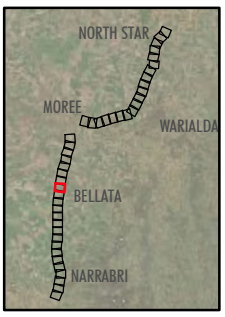


FIGURE C28

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

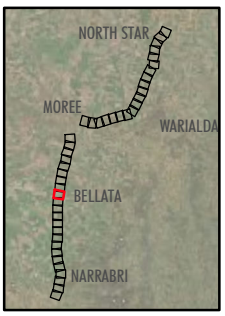


FIGURE C29

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 4th order

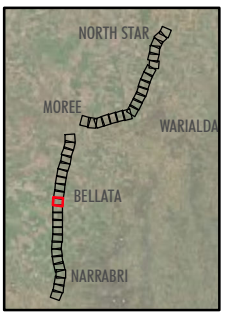
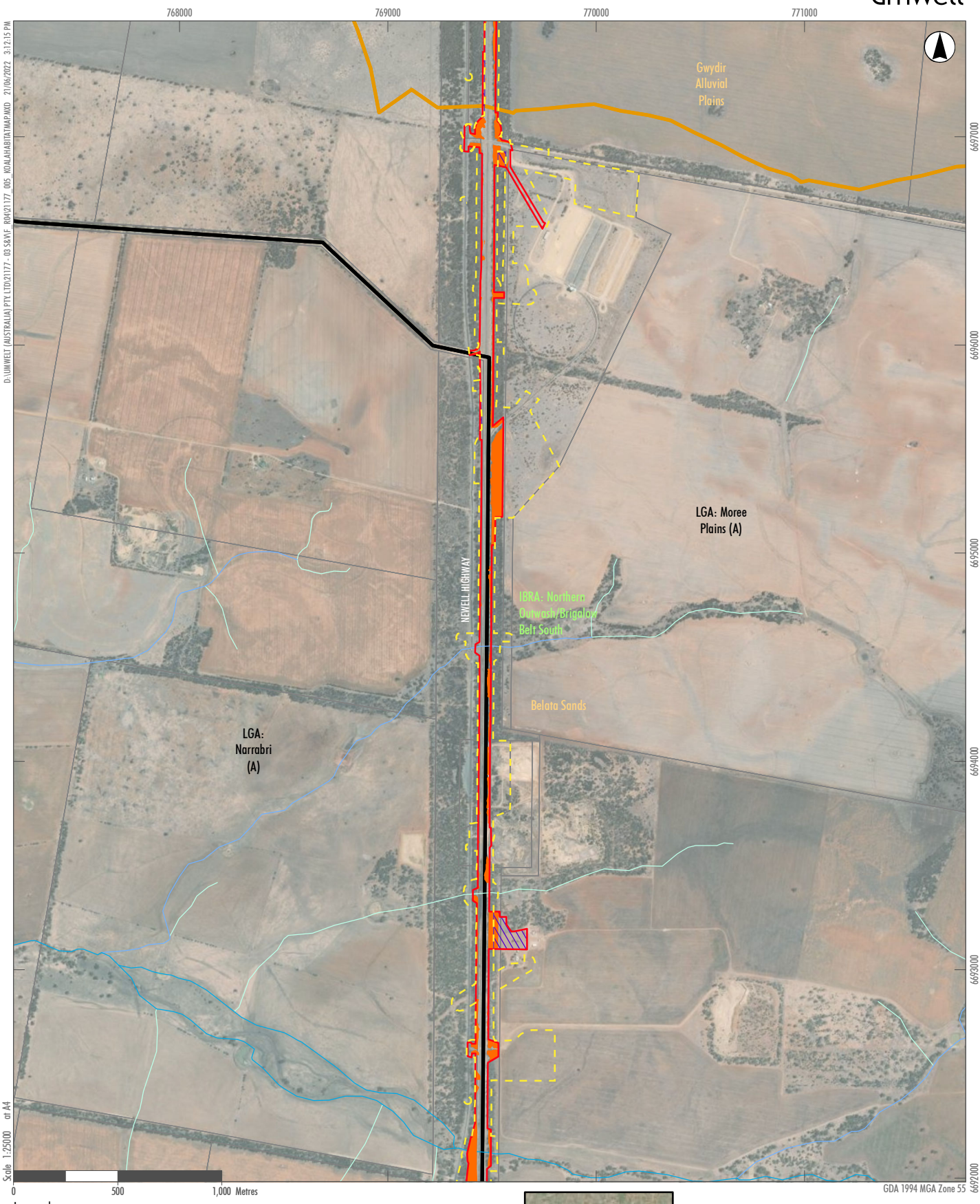


FIGURE C30

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

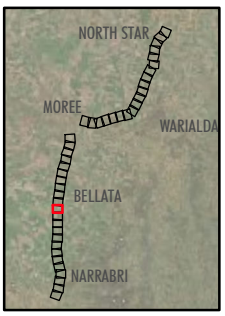
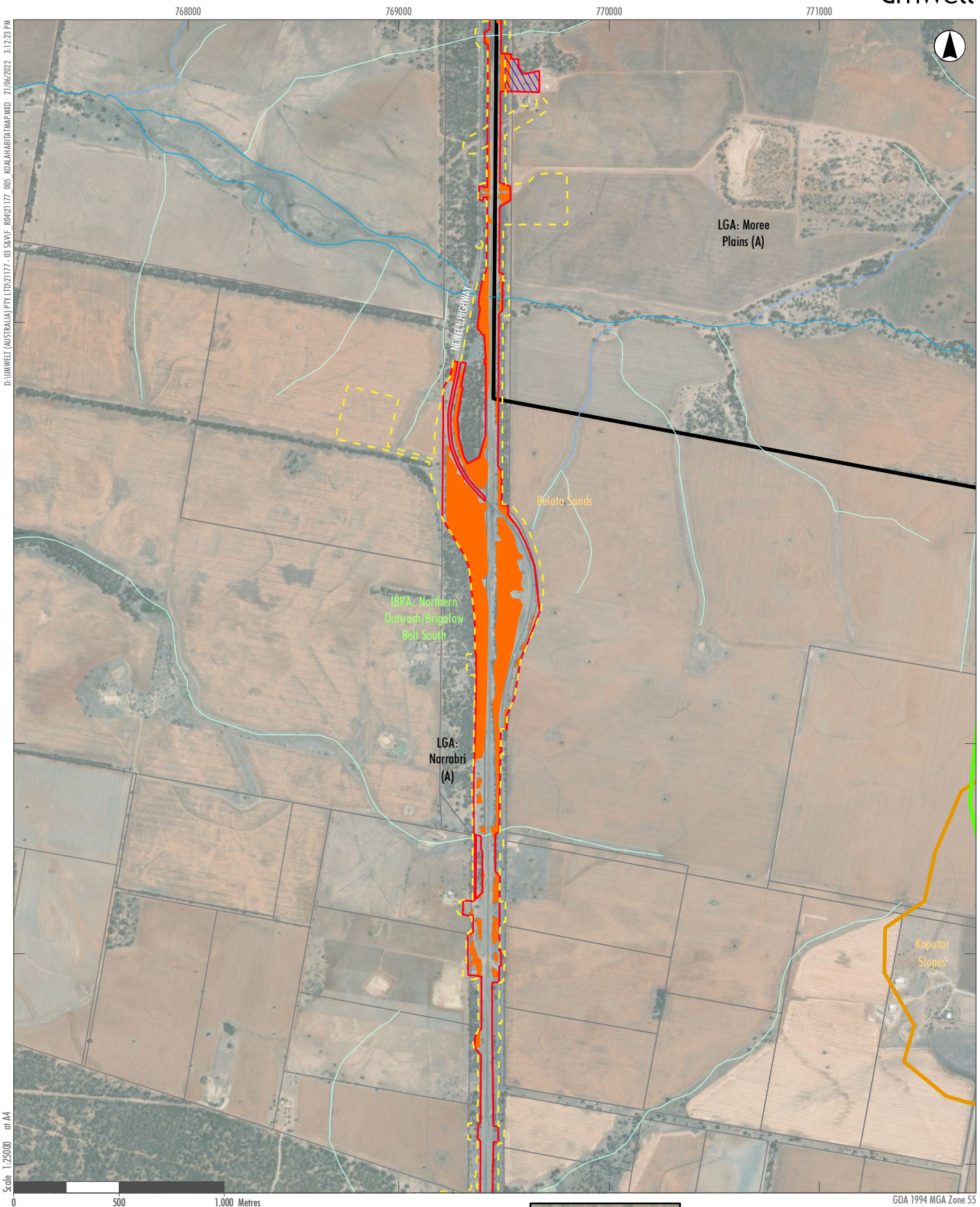


FIGURE C31

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

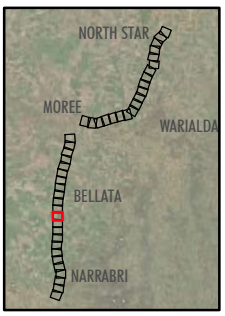
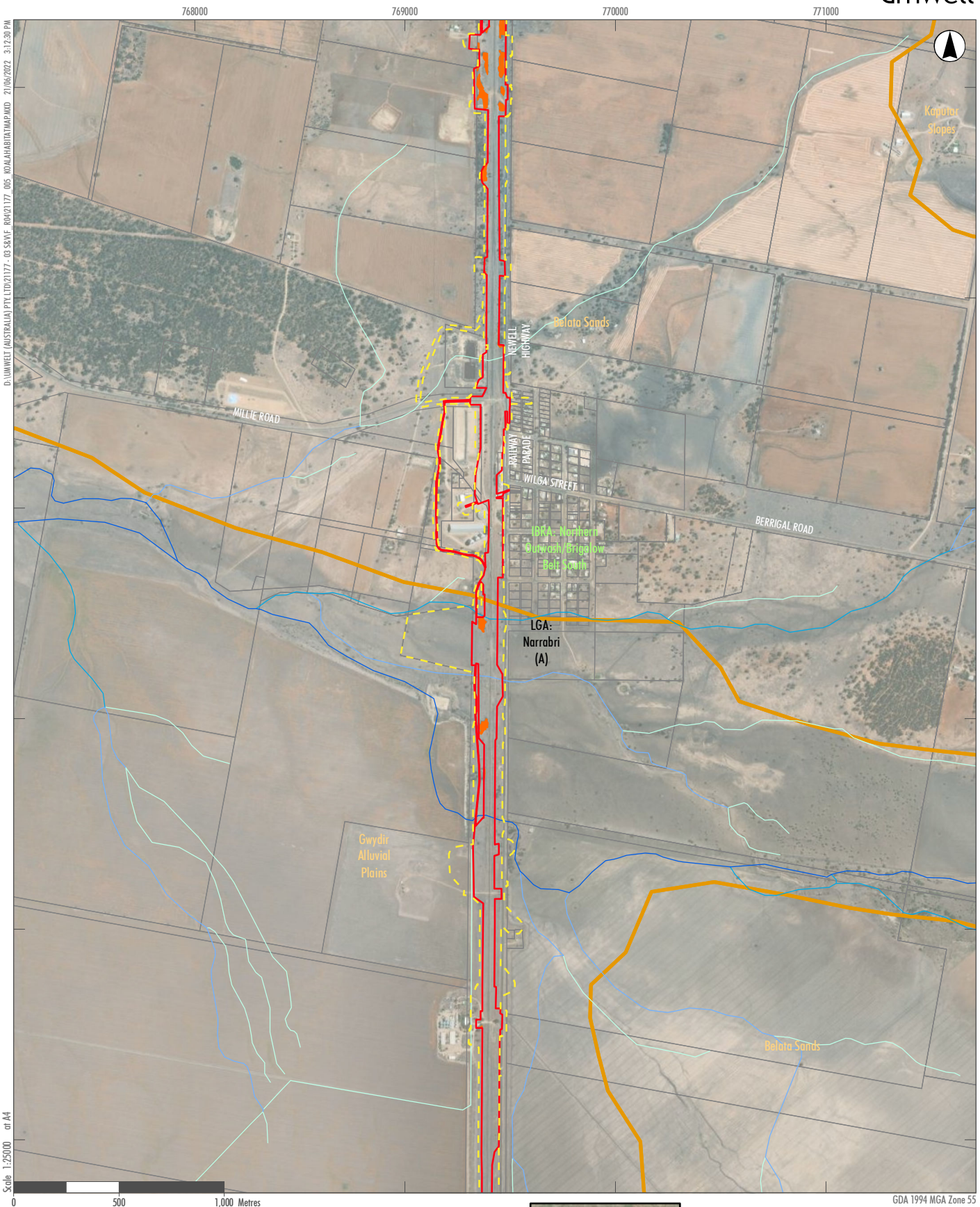


FIGURE C32

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order

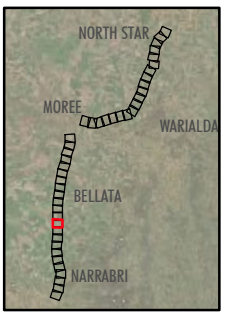


FIGURE C33

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order

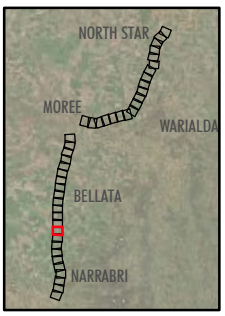


FIGURE C34

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

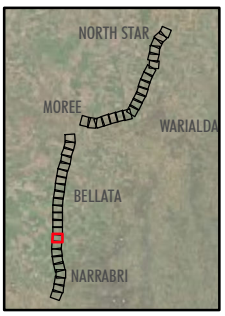


FIGURE C35

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 5th order

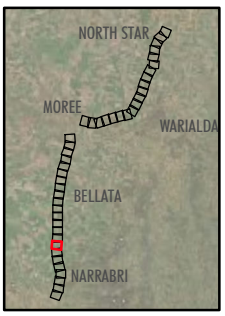


FIGURE C36

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 5th order

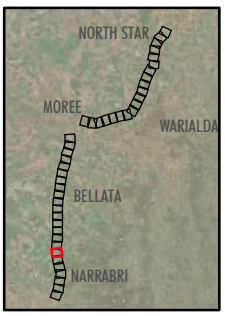


FIGURE C37

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

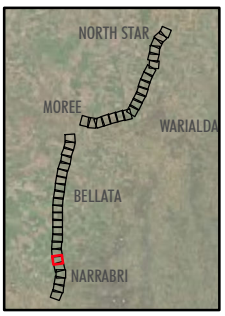


FIGURE C38

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order

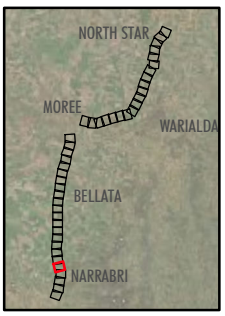
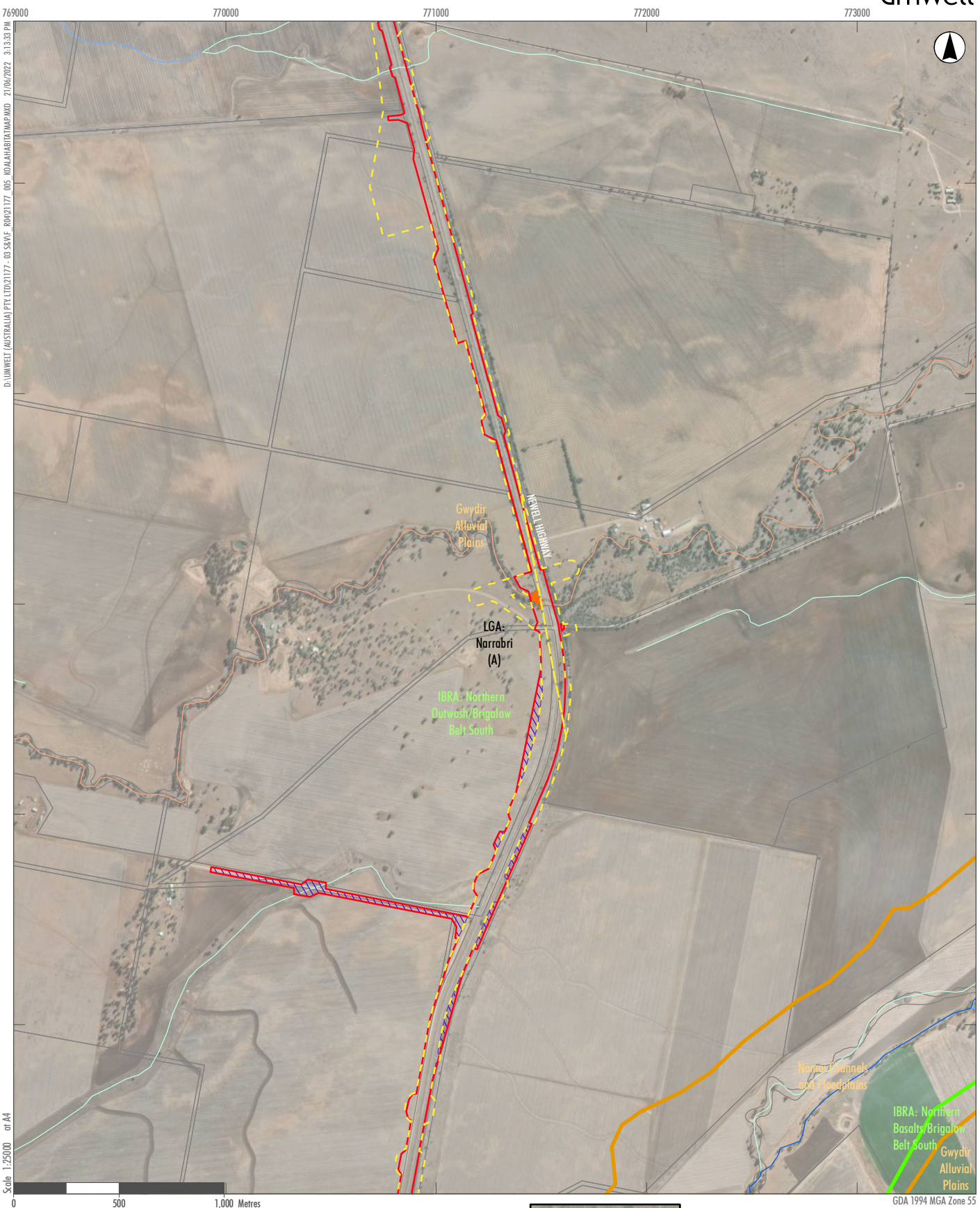


FIGURE C39

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 4th order
- 5th order

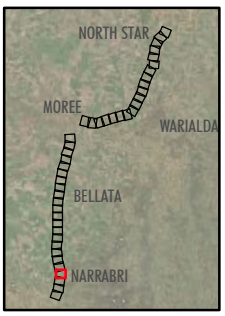
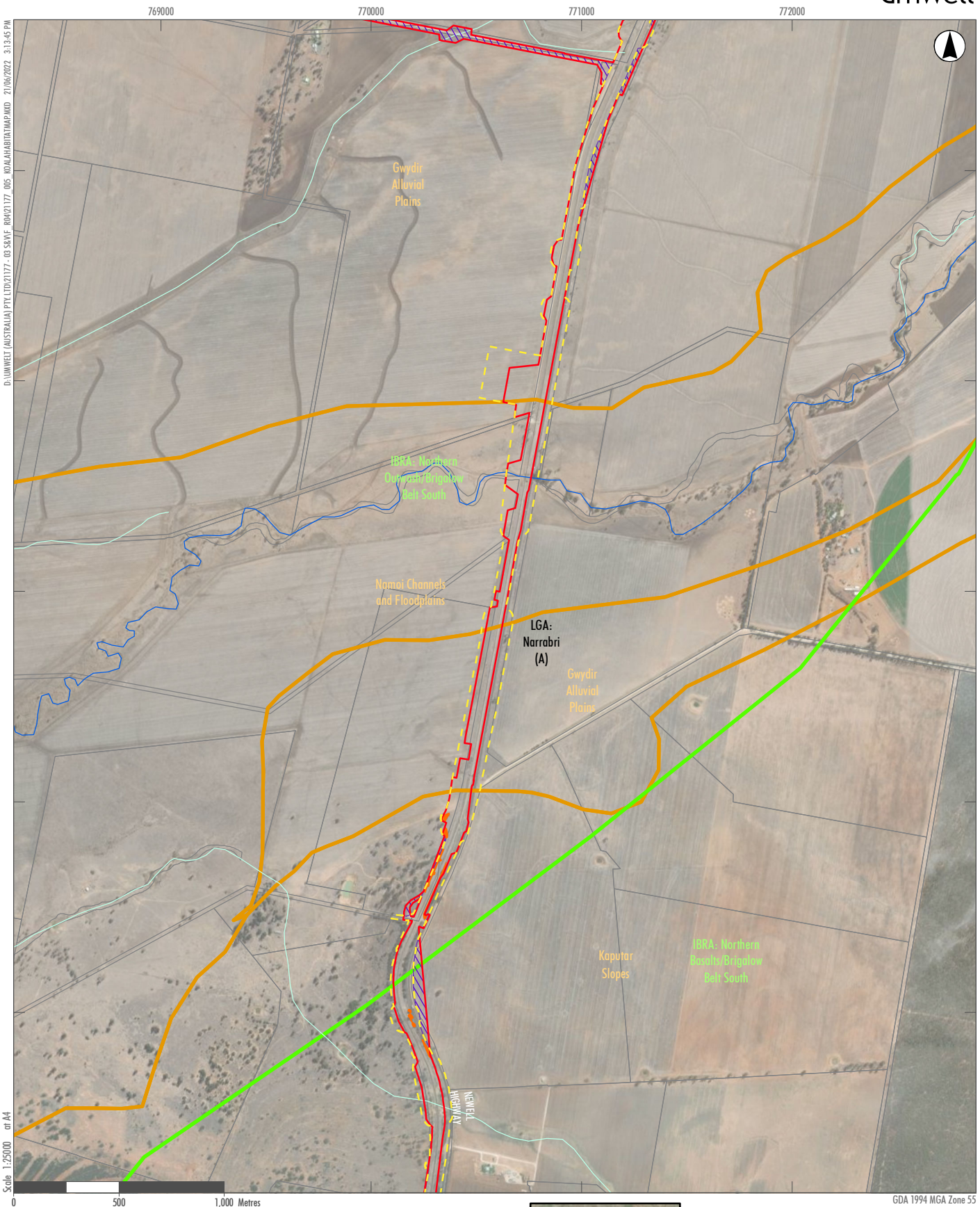


FIGURE C40

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



D:\UMWELT (AUSTRALIA) PTY LTD\21177 - 03 S&WF_R04\21177_005_KOALAHABITATMAP.MXD 21/06/2022 3:13:45 PM

Scale 1:25000 at A4

Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

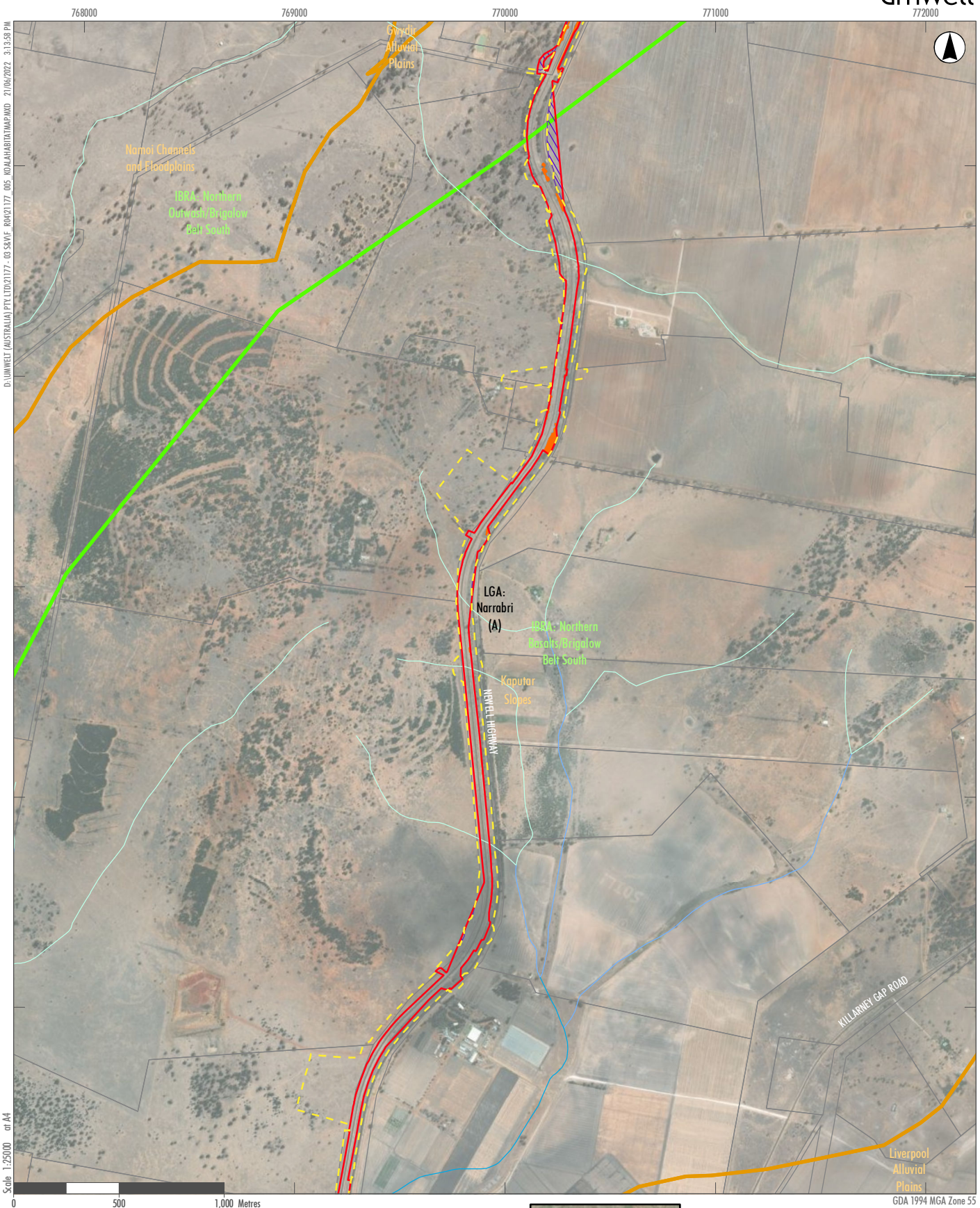
Stream Order:

- 1st order
- 4th order

FIGURE C41

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order

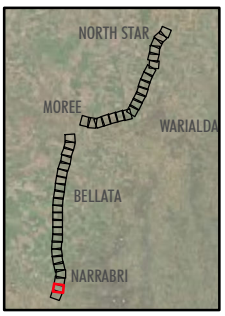
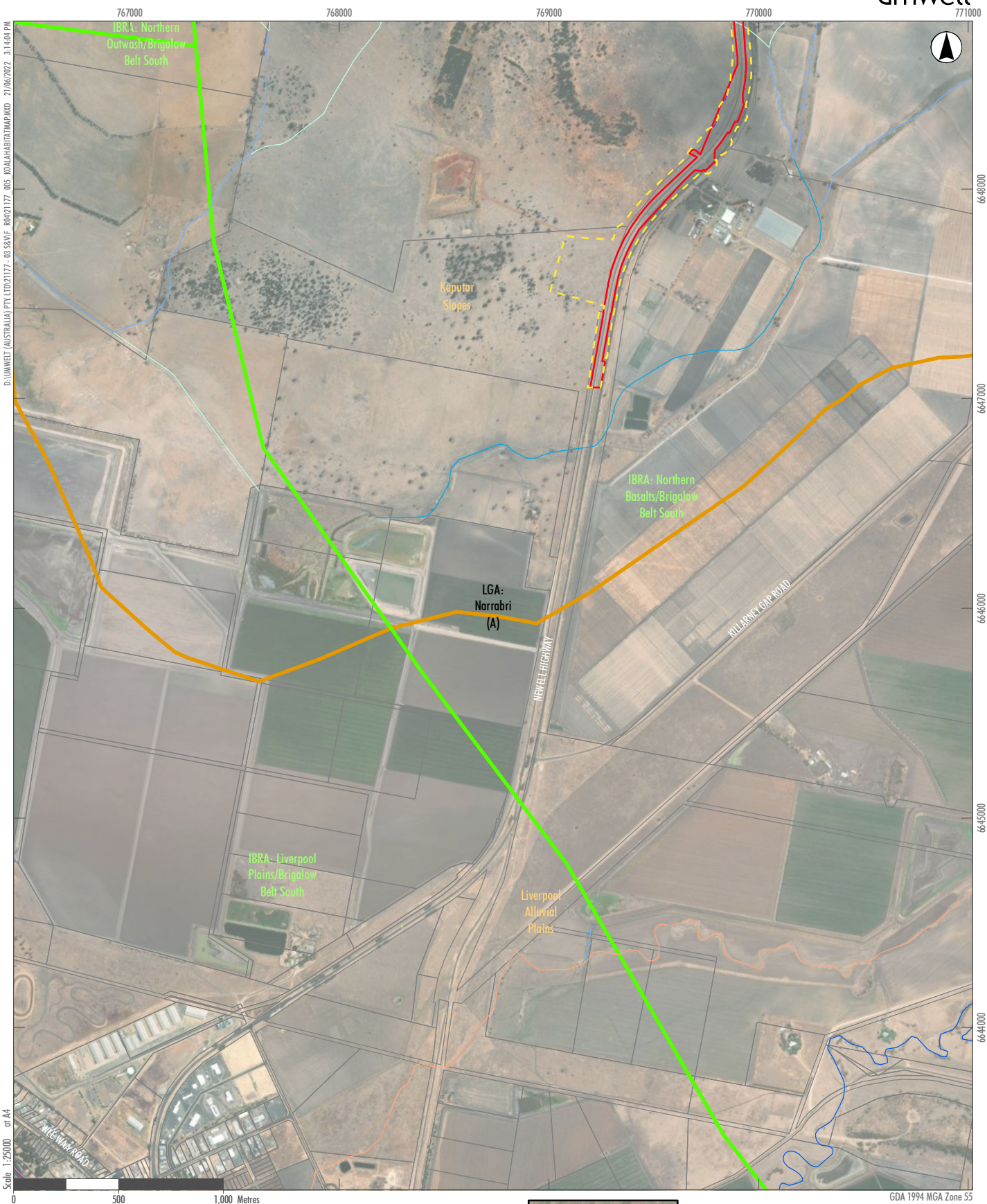


FIGURE C42

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



Legend

- SPIR CIZ
- IFC CIZ Development Footprint
- Additional Disturbance Area
- Koala Habitat
- IBRA regions and Subregion Areas
- Mitchell Landscape Area
- Local Government Area

Stream Order:

- 1st order
- 2nd order
- 3rd order
- 4th order
- 5th order
- 6th order

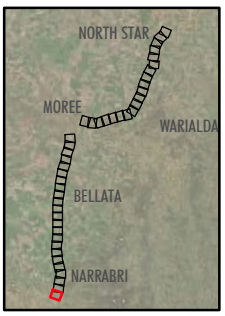
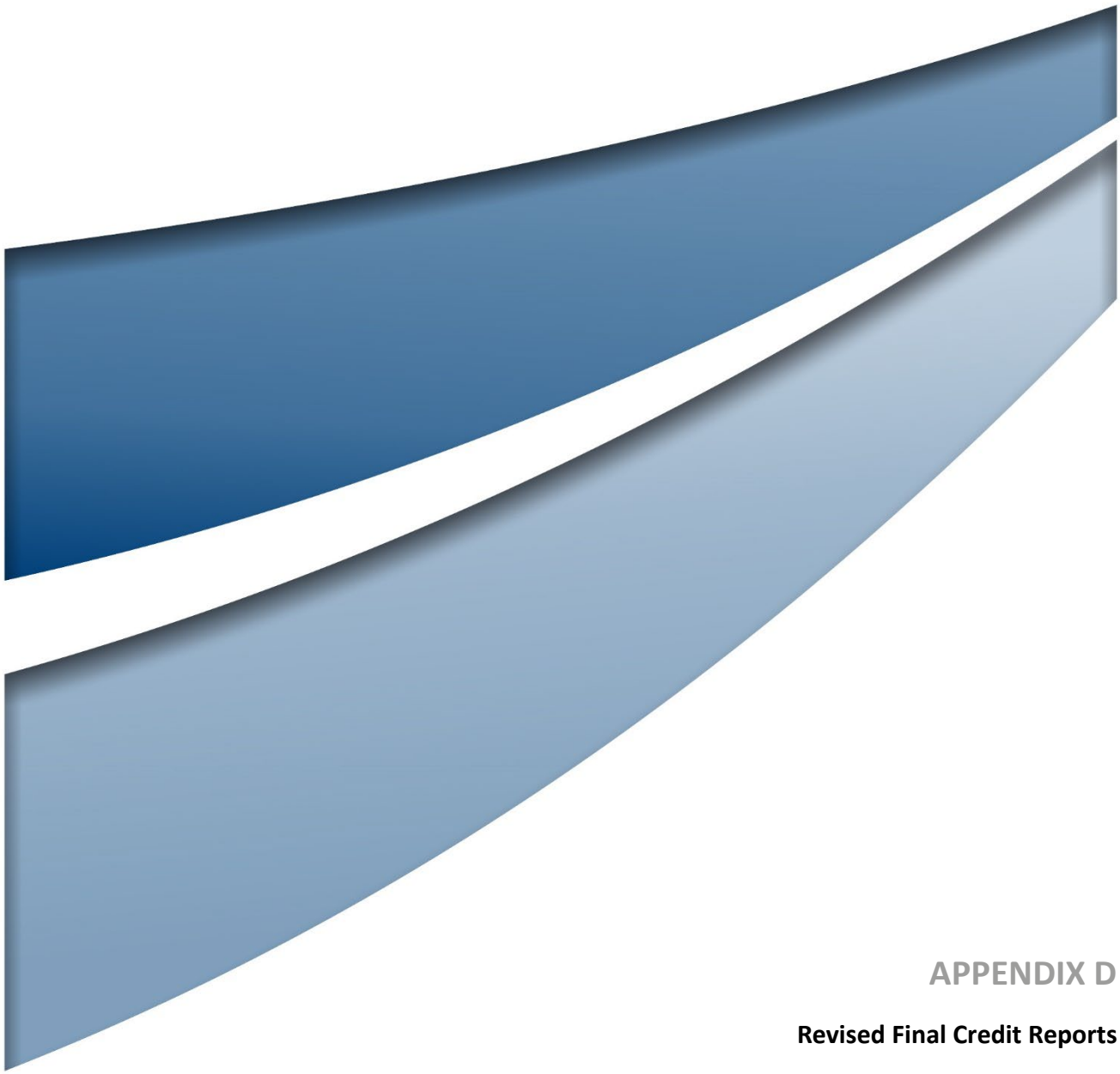


FIGURE C43

Koala Habitat Map

Image Source: ESRI (2021) Data source: Data Source: ARTC (2016), (OEH 2016), Umwelt (2022)



APPENDIX D

Revised Final Credit Reports

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 8/06/2022 Time: 10:25:10AM Calculator version: v4.0

Major Project details

Proposal ID:	0113/2016/3684MP
Proposal name:	NNS Assessment Area 1 Namoi CMA/Northern Basalts IBRA Subregion
Proposal address:	na Narrabri NSW 2309
Proponent name:	Australian Rail and Track Corporation
Proponent address:	Level 12, 40 Creek Street Brisbane QLD 4000
Proponent phone:	(07) 3364 8900
Assessor name:	Ryan Parsons
Assessor address:	75 York Street TERALBA NSW 2284
Assessor phone:	02 4950 5322
Assessor accreditation:	0113

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion.	0.91	33.00
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	7.23	272.00
Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	0.07	3.00
Total	8.21	308

Credit profiles

1. Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (NA182)

Number of ecosystem credits created	272
IBRA sub-region	Northern Basalts - Namoi

Offset options - Plant Community types	Offset options - IBRA sub-regions
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (NA182) Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion, (NA146) Carbeen +/- Coolabah grassy woodland on floodplain clay loam soil on north-western NSW floodplains, mainly Darling Riverine Plain Bioregion, (NA268)	Northern Basalts - Namoi and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion, (NA348)

Number of ecosystem credits created	3
IBRA sub-region	Northern Basalts - Namoi

Offset options - Plant Community types	Offset options - IBRA sub-regions

Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion, (NA348)	Northern Basalts - Namoi and any IBRA subregion that adjoins the IBRA subregion in which the development occurs
Narrow-leaved Ironbark grassy woodland of the Brigalow Belt South bioregion, (NA164)	
Silvertop Stringybark - Orange Gum shrubby open forest of the central parts of the Nandewar Bioregion, (NA206)	
White Box - Red Stringybark shrubby woodlands on basalt slopes of the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA222)	
White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA225)	
White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion, (NA232)	
Semi-mesic woodland on basalt hills of the dry subtropical climate zone, north western slopes of NSW, (NA242)	
Rough-barked Apple - Yellow Box grass/shrub footslope open forest, Brigalow Belt South Bioregion, (NA343)	
Warrumbungle trachyte hillcrest Tumbledown Red Gum - Black Cypress Pine - White Bloodwood shrubby woodland, (NA382)	
White Box shrubby woodland of the western Liverpool Range, Warrumbungle Range and south-west Pilliga forests, Brigalow Belt South Bioregion, (NA402)	
Narrow-leaved Ironbark - White Cypress pine woodland on slopes and flats in the Coonabarabran - Pilliga Scrub regions, (NA317)	
White Box - Black Cypress Pine shrubby hill woodland in the east Pilliga - Mendooran - Gulgong regions, mainly Brigalow Belt South Bioregion, (NA392)	
White Cypress Pine - Poplar Box - Silver-leaved Ironbark viney shrub woodland of the Brigalow Belt South Bioregion, (NA407)	
White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion, (NA397)	
Black Cypress Pine - White Box - Tumbledown Gum shrubby open forest / woodland mainly in the Mt Kaputar region, Nandewar Bioregion, (NA250)	
Mugga Ironbark - stringybark shrubby open forest of the far southern Nandewar Bioregion and New England Tableland Bioregion, (NA305)	
Rough-barked Apple - White Box - Rusty Fig shrubby open forest in the Kaputar area of Brigalow Belt South and Nandewar Bioregions, (NA341)	
Tumbledown Red Gum - White Cypress Pine - Caley's Ironbark shrubby open forest of the Nandewar Bioregion and western New England Tableland Bioregion, (NA376)	
White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tableland Bioregion, (NA393)	
White Cypress Pine - Silver-leaved Ironbark - Caley's Ironbark open forest of the central Nandewar Bioregion and western New England Tableland Bioregion, (NA408)	

White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion, (NA398) White Box shrubby open forest on hills mainly in the Nandewar Bioregion, (NA401) Silver-leaved Ironbark - White Cypress Pine shrubby open forest of Brigalow Belt South Bioregion and Nandewar Bioregion, (NA349) White Box - cypress pine - Silver-leaved Ironbark shrub grass open forest / woodland of the northern Brigalow Belt South Bioregion and Nandewar Bioregion, (NA396) Silver-leaved Ironbark - White Box - White Cypress Pine viney scrub woodland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA347)	

3. Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion., (NA271)

Number of ecosystem credits created	33
IBRA sub-region	Northern Basalts - Namoi

Offset options - Plant Community types	Offset options - IBRA sub-regions
Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion., (NA271)	Northern Basalts - Namoi and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 8/06/2022 Time: 10:26:14AM Calculator version: v4.0

Major Project details

Proposal ID:	0113/2016/3685MP
Proposal name:	NNS Assessment Area 2 - Namoi CMA/Northern Outwash IBRA Subregion
Proposal address:	na Narrabri NSW 2309
Proponent name:	Australian Rail and Track Corporation
Proponent address:	Level 12, 40 Creek Street Brisbane QLD 4000
Proponent phone:	(07) 3364 8900
Assessor name:	Ryan Parsons
Assessor address:	75 York Street TERALBA NSW 2284
Assessor phone:	02 4950 5322
Assessor accreditation:	0113

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion.	1.46	52.00
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	9.02	322.00
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	0.27	13.00
Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	0.41	18.00
Total	11.16	405

Credit profiles

1. Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (NA182)

Number of ecosystem credits created	322
IBRA sub-region	Liverpool Plains (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (NA182) Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion, (NA146) Carbeen +/- Coolabah grassy woodland on floodplain clay loam soil on north-western NSW floodplains, mainly Darling Riverine Plain Bioregion, (NA268)	Liverpool Plains (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion, (NA348)

Number of ecosystem credits created	18
IBRA sub-region	Liverpool Plains (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions

Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion, (NA348) Narrow-leaved Ironbark grassy woodland of the Brigalow Belt South bioregion, (NA164) Silvertop Stringybark - Orange Gum shrubby open forest of the central parts of the Nandewar Bioregion, (NA206) White Box - Red Stringybark shrubby woodlands on basalt slopes of the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA222) White Box - White Cypress Pine shrubby open forest of the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA225) White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion, (NA232) Semi-mesic woodland on basalt hills of the dry subtropical climate zone, north western slopes of NSW, (NA242) Rough-barked Apple - Yellow Box grass/shrub footslope open forest, Brigalow Belt South Bioregion, (NA343) Warrumbungle trachyte hillcrest Tumbledown Red Gum - Black Cypress Pine - White Bloodwood shrubby woodland, (NA382) White Box shrubby woodland of the western Liverpool Range, Warrumbungle Range and south-west Pilliga forests, Brigalow Belt South Bioregion, (NA402) Narrow-leaved Ironbark - White Cypress pine woodland on slopes and flats in the Coonabarabran - Pilliga Scrub regions, (NA317) White Box - Black Cypress Pine shrubby hill woodland in the east Pilliga - Mendooran - Gulgong regions, mainly Brigalow Belt South Bioregion, (NA392) White Cypress Pine - Poplar Box - Silver-leaved Ironbark viney shrub woodland of the Brigalow Belt South Bioregion, (NA407) White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion, (NA397) Black Cypress Pine - White Box - Tumbledown Gum shrubby open forest / woodland mainly in the Mt Kaputar region, Nandewar Bioregion, (NA250) Mugga Ironbark - stringybark shrubby open forest of the far southern Nandewar Bioregion and New England Tableland Bioregion, (NA305) Rough-barked Apple - White Box - Rusty Fig shrubby open forest in the Kaputar area of Brigalow Belt South and Nandewar Bioregions, (NA341) Tumbledown Red Gum - White Cypress Pine - Caley's Ironbark shrubby open forest of the Nandewar Bioregion and western New England Tableland Bioregion, (NA376) White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tableland Bioregion, (NA393) White Cypress Pine - Silver-leaved Ironbark - Caley's Ironbark open forest of the central Nandewar Bioregion and western New England Tableland Bioregion, (NA408)	Liverpool Plains (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion, (NA398) White Box shrubby open forest on hills mainly in the Nandewar Bioregion, (NA401) Silver-leaved Ironbark - White Cypress Pine shrubby open forest of Brigalow Belt South Bioregion and Nandewar Bioregion, (NA349) White Box - cypress pine - Silver-leaved Ironbark shrub grass open forest / woodland of the northern Brigalow Belt South Bioregion and Nandewar Bioregion, (NA396) Silver-leaved Ironbark - White Box - White Cypress Pine viney scrub woodland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA347)	

3. Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion., (NA271)

Number of ecosystem credits created	52
IBRA sub-region	Liverpool Plains (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion., (NA271)	Liverpool Plains (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA193)

Number of ecosystem credits created	13
IBRA sub-region	Liverpool Plains (Part B)

Offset options - Plant Community types	Offset options - IBRA sub-regions
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (NA193)	Liverpool Plains (Part B) and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 8/06/2022 Time: 10:27:12AM Calculator version: v4.0

Major Project details

Proposal ID:	0113/2016/3626MP
Proposal name:	NNS Assessment Area 3 - Border Rivers Gwydir CMA/Northern Outwash IBRA SR
Proposal address:	na Narrabri NSW 2309
Proponent name:	Australian Rail and Track Corporation
Proponent address:	Level 12, 40 Creek Street Brisbane QLD 4000
Proponent phone:	na
Assessor name:	Ryan Parsons
Assessor address:	75 York Street TERALBA NSW 2284
Assessor phone:	02 4950 5322
Assessor accreditation:	0113

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	6.33	447.10
Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion.	3.27	123.00
Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	0.91	48.49
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	158.12	6,869.00
Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	273.38	12,719.00
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	4.97	230.20
Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	0.55	24.00
Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	9.16	459.31
Total	456.69	20,920

Credit profiles

1. Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (BR186)

Number of ecosystem credits created	6,869
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (BR186) Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion, (BR150) Carbeen +/- Coolabah grassy woodland on floodplain clay loam soil on north-western NSW floodplains, mainly Darling Riverine Plain Bioregion, (BR282)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion, (BR346)

Number of ecosystem credits created	24
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions

Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion, (BR346)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs
Grey Box - Rough-barked Apple shrub/grass open forest of northern parts of the Nandewar Bioregion and New England Tableland Bioregion, (BR146)	
Silvertop Stringybark - Orange Gum shrubby open forest of the central parts of the Nandewar Bioregion, (BR211)	
White Box - Red Stringybark shrubby woodlands on basalt slopes of the Nandewar Bioregion and Brigalow Belt South Bioregion, (BR236)	
White Box - White Cypress Pine shrub grass hills woodland in the Brigalow Belt South Bioregion and Nandewar Bioregion, (BR239)	
White Cypress Pine - White Box - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion, (BR246)	
Semi-mesic woodland on basalt hills of the dry subtropical climate zone, north western slopes of NSW, (BR257)	
White Cypress Pine - Silver-leaved Ironbark - Wilga shrub grass woodland of the Narrabri-Yetman region, Brigalow Belt South Bioregion, (BR395)	
White Cypress Pine - Poplar Box - Silver-leaved Ironbark viney shrub woodland of the Brigalow Belt South Bioregion, (BR393)	
Black Cypress Pine - White Box - Tumbledown Gum shrubby open forest / woodland mainly in the Mt Kaputar region, Nandewar Bioregion, (BR268)	
Grey Box shrubby open forest of northern parts of the Nandewar Bioregion and New England Tableland Bioregion, (BR297)	
Mugga Ironbark - Black Cypress Pine shrubby open forest mainly in the Nandewar Bioregion and northern Brigalow Belt South Bioregion, (BR310)	
Rough-barked Apple - White Box - Rusty Fig shrubby open forest in the Kaputar area of Brigalow Belt South and Nandewar Bioregions, (BR336)	
Silver-leaved Ironbark - Black Cypress Pine +/- White Box shrubby open forest mainly in the northern Nandewar Bioregion, (BR343)	
Tumbledown Red Gum - White Cypress Pine - Caley's Ironbark shrubby open forest of the Nandewar Bioregion and western New England Tableland Bioregion, (BR372)	
White Box - Silvertop Stringybark +/- White Cypress Pine grass shrub open forest of the southern Nandewar Bioregion and New England Tableland Bioregion, (BR386)	
White Cypress Pine - Silver-leaved Ironbark - Caley's Ironbark open forest of the central Nandewar Bioregion and western New England Tableland Bioregion, (BR394)	
White Box - White Cypress Pine shrubby hills open forest mainly in the Nandewar Bioregion, (BR390)	
White Box shrubby open forest on hills mainly in the Nandewar Bioregion, (BR392)	
Silver-leaved Ironbark - White Cypress Pine shrubby open forest of Brigalow Belt South Bioregion and Nandewar Bioregion, (BR349)	
Silver-leaved Ironbark - White Cypress Pine - tea tree shrubby woodland mainly in the northern Nandewar Bioregion, (BR347)	

Tumbledown Red Gum - White Cypress Pine - Silver-leaved Ironbark shrubby woodland mainly in the northern Nandewar Bioregion, (BR374) White Box - cypress pine - Silver-leaved Ironbark shrub grass open forest / woodland of the northern Brigalow Belt South Bioregion and Nandewar Bioregion, (BR385) Silver-leaved Ironbark - White Box - White Cypress Pine viney scrub woodland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (BR345)	

3. Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion, (BR120)

Number of ecosystem credits created	447
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion, (BR120)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion, (BR130)

Number of ecosystem credits created	48
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion, (BR130) Belah woodland on alluvial plains and low rises in the central NSW wheatbelt to Pilliga and Liverpool Plains regions., (BR102)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

5. Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, (BR233)

Number of ecosystem credits created	459
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, (BR233)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

6. Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion., (BR284)

Number of ecosystem credits created	123
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion., (BR284)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

7. Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion, (BR191)

Number of ecosystem credits created	12,719
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion, (BR191) Mitchell Grass grassland - chenopod low open shrubland on floodplains in the semi-arid (hot) and arid zones, (BR157) Native Millet - Cup Grass grassland of the Darling Riverine Plains Bioregion, (BR167) Rats Tail Couch sod grassland wetland of inland floodplains, (BR192) Partly derived Windmill Grass - copperburr alluvial plains shrubby grassland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, (BR251)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

8. River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (BR196)

Number of ecosystem credits created	230
IBRA sub-region	Northern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (BR196)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Belson's Panic	Homopholis belsonii	53.00	1,378
Finger Panic Grass	Digitaria porrecta	62.00	806
Creeping Tick-trefoil	Desmodium campylocaulon	291.00	3,201
Koala	Phascolarctos cinereus	74.28	1,931

Biodiversity credit report

This report identifies the number and type of biodiversity credits required for a major project.

Date of report: 8/06/2022 Time: 10:27:53AM Calculator version: v4.0

Major Project details

Proposal ID:	0113/2016/3676MP
Proposal name:	NNS Assessment Area 5 - Border Rivers Gwydir CMA/Northern Basalts IBRA SR
Proposal address:	na Narrabri NSW 2309
Proponent name:	Australian Rail and Track Corporation
Proponent address:	Level 12, 40 Creek Street Brisbane QLD 4000
Proponent phone:	(07) 3364 8900
Assessor name:	Ryan Parsons
Assessor address:	75 York Street TERALBA NSW 2284
Assessor phone:	02 4950 5322
Assessor accreditation:	0113

Summary of ecosystem credits required

Plant Community type	Area (ha)	Credits created
Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion	0.16	11.30
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	12.65	482.00
Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	17.29	804.00
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	0.07	3.00
Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	0.25	13.00
Total	30.42	1,313

Credit profiles

1. Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (BR186)

Number of ecosystem credits created	482
IBRA sub-region	Northern Basalts - Border Rivers/Gwydir

Offset options - Plant Community types	Offset options - IBRA sub-regions
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW, (BR186) Western Grey Box - cypress pine shrub grass shrub tall woodland in the Brigalow Belt South Bioregion, (BR150) Carbeen +/- Coolabah grassy woodland on floodplain clay loam soil on north-western NSW floodplains, mainly Darling Riverine Plain Bioregion, (BR282)	Northern Basalts - Border Rivers/Gwydir and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

2. Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion, (BR120)

Number of ecosystem credits created	11
IBRA sub-region	Northern Basalts - Border Rivers/Gwydir

Offset options - Plant Community types	Offset options - IBRA sub-regions
Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion, (BR120)	Northern Basalts - Border Rivers/Gwydir and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

3. Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, (BR233)

Number of ecosystem credits created	13
IBRA sub-region	Northern Basalts - Border Rivers/Gwydir

Offset options - Plant Community types	Offset options - IBRA sub-regions
Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, (BR233)	Northern Basalts - Border Rivers/Gwydir and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

4. Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion, (BR191)

Number of ecosystem credits created	804
IBRA sub-region	Northern Basalts - Border Rivers/Gwydir

Offset options - Plant Community types	Offset options - IBRA sub-regions
Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion, (BR191) Mitchell Grass grassland - chenopod low open shrubland on floodplains in the semi-arid (hot) and arid zones, (BR157) Native Millet - Cup Grass grassland of the Darling Riverine Plains Bioregion, (BR167) Rats Tail Couch sod grassland wetland of inland floodplains, (BR192) Partly derived Windmill Grass - copperburr alluvial plains shrubby grassland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion, (BR251)	Northern Basalts - Border Rivers/Gwydir and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

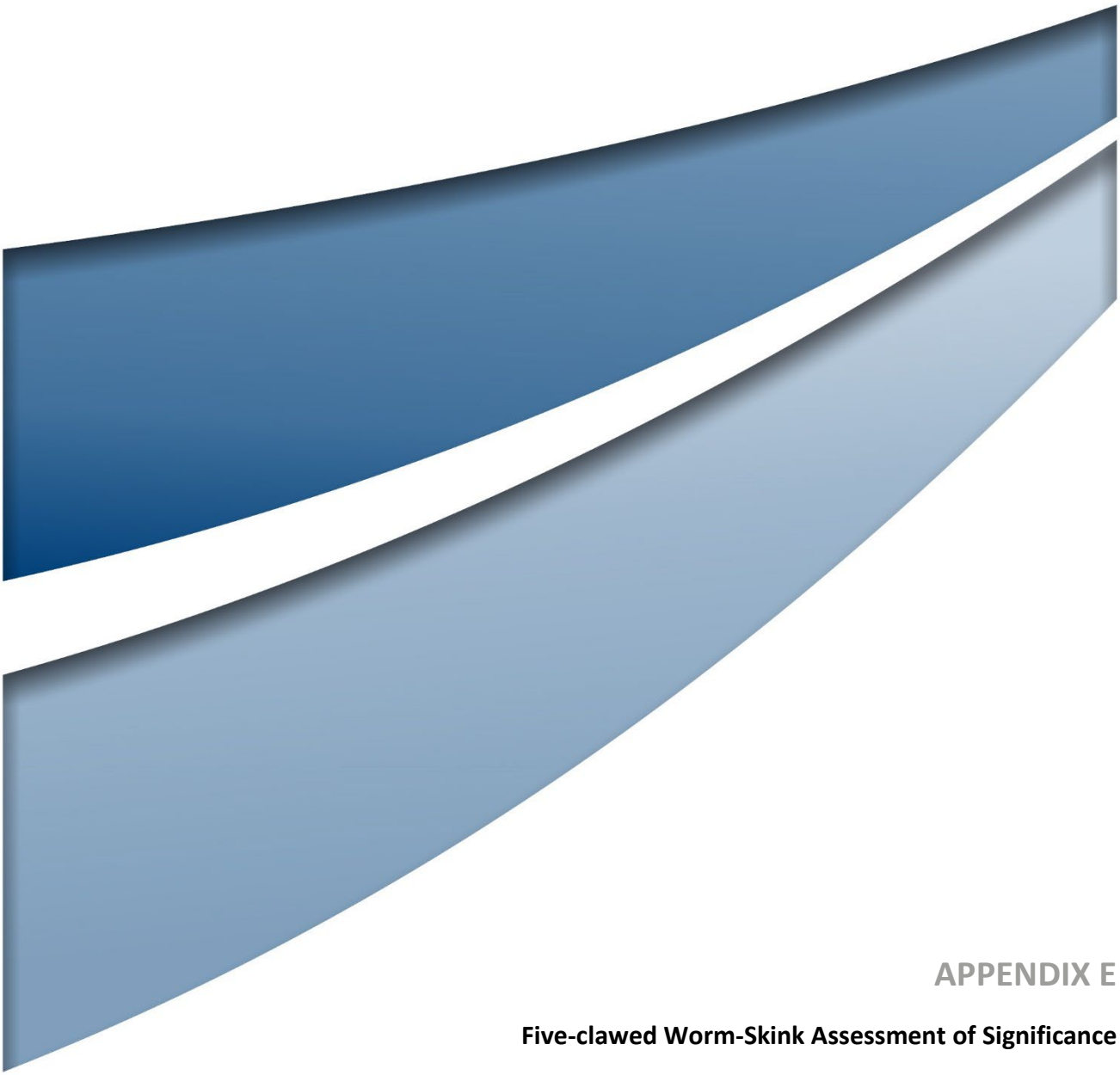
5. River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (BR196)

Number of ecosystem credits created	3
IBRA sub-region	Northern Basalts - Border Rivers/Gwydir

Offset options - Plant Community types	Offset options - IBRA sub-regions
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion, (BR196)	Northern Basalts - Border Rivers/Gwydir and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

Summary of species credits required

Common name	Scientific name	Extent of impact Ha or individuals	Number of species credits created
Finger Panic Grass	Digitaria porrecta	20.00	260
Belson's Panic	Homopholis belsonii	14.00	364



APPENDIX E

Five-clawed Worm-Skink Assessment of Significance

Inspired People.
Dedicated Team.
Quality Outcomes.

Our Ref: 21177_RP_RM_116122021

16 December 2021

Grant Brown
Senior Environment Advisor N2NS SP1
ARTC – Inland Rail

GBrown2@ARTC.com.au

Dear Grant

RE: Five-clawed Worm-Skink - Test of Significance under the NSW *Biodiversity Conservation Act 2016* and Assessment of Significance under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

Umwelt has been requested to undertake a test of significance as set out in section 7.3 of the NSW *Biodiversity Conservation Act 2016* (BC Act) and assessment of significance pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the five-clawed worm-skink (*Anomalopus mackayi*) for the Narrabri to North Star (N2NS) section of the Inland Rail project.

During pre-clearing surveys on 5 July 2021 within the Stage 3 section of N2NS, a spotter-catcher contractor recorded a potential five-clawed worm-skink at chainage 741.225 within 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 (GeoLink 2021). Through consultation with the NSW Department of Planning, Industry and the Environment (DPIE) and the Commonwealth Department of Agriculture, Water and the Environment (DAWE), a clearing procedure for the five-clawed worm-skink 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 116 individuals have been recorded during pre-clearing and post-clearing works between chainage 736 and 742. Of these, 55 individuals have been recorded as dead as a result of the clearing works, 43 individuals relocated and 18 recorded as dropped tails.

As per the Biodiversity Management Sub-Plan, a test of significance for the five-clawed worm-skink following the unexpected find within the Issued for Construction (IFC) Construction Impact Zone (CIZ). **Attachment 1** below contains a test of significance under the BC Act for the five-clawed worm-skink. **Attachment 2** contains the assessment of significance under the EPBC Act. These tests conclude that the N2NS section of the Inland Rail Project is likely to have significant impact on this species under both the BC Act and the EPBC Act.

Umwelt (Australia) Pty Limited

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Further to the mitigation measures currently being implemented for the project, Umwelt recommends the installation of hay bales into clearing areas prior to disturbance to capture and relocate individuals prior to clearing works.

In terms of offsetting the impacts to this species, under the FBA, the five-clawed worm-skink was considered to be a 'species credit species' and required species credits to offset the impacts. Subsequent updates to assessment requirements under the BC Act, as part of the Biodiversity Assessment Method (BAM), has resulted in five-clawed worm-skink being reclassified to 'ecosystem credit species'. As such, impacts to five-clawed worm-skink would be offset when credits for its associated Plant Community Types (PCTs) are retired as part of ecosystem credits.

The Threatened Biodiversity Data Collection (TBDC) for five-clawed worm-skink notes that:

"The species is allocated to the ecosystem credit class because, whilst we cannot confidently predict its presence based on vegetation type, we cannot confidently detect it using conventional survey methods (targeted survey is unlikely to provide reliable results, as per EPBC SPRAT). Note that the species is listed as data-deficient in SoS because of the lack of suitable sites available for conservation management, this is not a consideration under the BOS (the proponent/BCT will have to locate and secure offset sites). There is sufficient knowledge about the species to manage at a stewardship site."

Umwelt recommends that the offset strategy consider known habitat for this species.

We trust this information meets with your current requirements. Please do not hesitate to contact the undersigned on 1300 793 267 should you require clarification or further information.

Yours sincerely

Ryan Parsons
Principal Ecologist - Botanist

Attachment 1

Five-clawed Worm-skink (*Anomalopus mackayi*) (endangered BC Act)

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).

Response
(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

Response

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 north-central 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 north-central 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

Not applicable to a threatened species.

Response
(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 consider 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

Response

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.

Response

(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.

Attachment 2

Five-clawed Worm-skink (*Anomalopus mackayi*) (vulnerable EPBC Act)

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.

A 'population of the species' is defined under the EPBC Act as 'an occurrence of the species in a particular area' (DoE 2013). 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 (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).

Response
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)

Response

- 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 north-central 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 north-central 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

Response

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 consider 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 as foraging, breeding, roosting, or dispersal

Response
• 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.

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