



ARTC

**APRIL 2020 ADDENDUM TO
THE INLAND RAIL – NARRABRI
TO NORTH STAR BIODIVERSITY
ASSESSMENT REPORT**

FINAL

May 2020



APRIL 2020 ADDENDUM TO THE INLAND RAIL – NARRABRI TO NORTH STAR BIODIVERSITY ASSESSMENT REPORT

FINAL

Prepared by
Umwelt Environmental & Social Consultants
on behalf of
Australian Rail Track Corporation

Project Director: Allison Riley
Project Manager: Ryan Parsons
Report No. 3607/R14
Date: May 2020



Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au



This report was prepared using
Umwelt's ISO 9001 certified
Quality Management System.

Disclaimer

This document has been prepared for the sole use of the authorised recipient and this document may not be used, copied or reproduced in whole or part for any purpose other than that for which it was supplied by Umwelt (Australia) Pty Ltd (Umwelt). No other party should rely on this document without the prior written consent of Umwelt.

Umwelt undertakes no duty, nor accepts any responsibility, to any third party who may rely upon or use this document. Umwelt assumes no liability to a third party for any inaccuracies in or omissions to that information. Where this document indicates that information has been provided by third parties, Umwelt has made no independent verification of this information except as expressly stated.

©Umwelt (Australia) Pty Ltd

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Allison Riley	5/4/2020	Allison Riley	5/4/2020
V2	Allison Riley	22/5/2020	Allison Riley	22/5/2020

Table of Contents

1.0	Background	1
2.0	Vegetation Map Updates	4
2.1	Desktop Assessment	4
2.2	Field surveys	4
2.3	Revised Vegetation mapping	5
3.0	Species Credit Updates	6
3.1	Revised Database Searches	6
3.2	Candidate Threatened Flora and Fauna Species	6
3.3	Field Surveys	25
3.4	Land Access	26
3.5	Revised Species Credit Requirements	28
3.5.1	Koala Habitat	29
4.0	Ecosystem Credit Updates	31
5.0	Updated Impacts on Matters of National Environmental Significance	41
6.0	Recommended Mitigation Measures	43
7.0	References	44

Tables

Table 1.1	Addendum Report Requirements According to Correspondence from DPIE	1
Table 3.1	Species-credit Species with the Potential to Occur	7
Table 3.2	Monthly Rainfall Total for Moree Airport (Bureau of Meteorology 2020)	25
Table 3.3	Summary of Vegetation Zones with No Access during the Summer 2020 Surveys Compared to the Total Area of the Revised Development Footprint	26
Table 3.4	Number of Individuals or Area of Habitat for Species Credit Species according to the Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint	28
Table 3.5	Species Credits Generated according to the Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint	29
Table 3.6	Vegetation Zones/Plant Community Types Identified as Koala Habitat	30
Table 4.1	Vegetation Zone Area according to Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint	32

Table 4.2	Ecosystem Credits Generated in Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint	39
Table 5.1	Impacts of the Proposal on MNES	41

Appendices

Appendix A	Revised Vegetation Map Figures
Appendix B	Revised Final Credit Reports

1.0 Background

Subsequent to public exhibition of the EIS for the Narrabri to North Star proposal, ARTC has undertaken further investigations and design refinement of the Inland Rail Project. A Revised Development Footprint has been developed taking into account learnings from Parkes to Narromine section in terms of construction requirements. The Revised Development Footprint is defined as:

- Revised Development Footprint (approximately 2,436 hectares) - In developing the preferred infrastructure design ARTC has considered learnings from the Parkes to Narromine project, and expanded the potential construction footprint beyond the originally assessed proposal site and additional assessment areas defined in the EIS, to allow for ancillary works including fence relocations, signalling upgrades, utilities relocation and the provision of a rail maintenance access road. The inclusion of these additional areas has increased the potential construction footprint for the preferred infrastructure compared with the proposal footprint presented in the EIS. The revised development footprint is equivalent to the construction footprint for the preferred infrastructure. The Revised Development Footprint for the preferred infrastructure was provided by ARTC on 28 August 2019.

The original Development Footprint assessed by Umwelt within the Biodiversity Assessment Report (Umwelt, October 2017) and Addendum to Biodiversity Assessment Report (Umwelt, October 2018) is defined as:

- Development Footprint (approximately 1,563 hectares) – The Development Footprint was defined as the total construction impact zone which incorporates both permanent and temporary disturbance. In the Environmental Impact Statement (EIS) this was equivalent to the proposal site plus additional assessment areas (refer to section 2.2.2 of the EIS).

The 'Additional Disturbance Area' represents approximately 1,053 hectares of previously unsurveyed areas adjacent to the original Development Footprint. Umwelt have undertaken additional ecology surveys in accordance with the Framework for Biodiversity Assessment (FBA) and to meet Department of Planning, Industry and Environment (DPIE) requirements for the Additional Disturbance Area. Revised biodiversity credit requirements have been calculated based on the outcomes of these additional ecology surveys.

As detailed in initial correspondence (15/01/2020) and formal correspondence (21/01/2020) from the DPIE, the required works to be documented in an addendum report are detailed in **Table 1.1** below. References to the relevant sections of this addendum report are also included for each of the requirements.

Table 1.1 Addendum Report Requirements According to Correspondence from DPIE

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

Initial Correspondence (15/01/20)	Formal Correspondence (21/01/2020)	Where Addressed in this Addendum Report
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 Revised Development Footprint, 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.	Amend 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 <i>Environmental Protection and Biodiversity Conservation Act 1999</i> .	N/A	Section 5.0 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 B Updated Final Credit Reports Four BBAM credit calculator assessments submitted to the BCD Spatial files (including Revised Development Footprint, 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

2.0 Vegetation Map Updates

The Revised Development Footprint is approximately 2,436 hectares. This represents an increase of approximately 1,053 hectares which was not previously been surveyed or assessed compared to the original assessment presented in the BAR (Umwelt 2017). 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

Umwelt initially completed a desktop assessment to map the likely Biometric Vegetation Types (BVTs)/Plant Community Types (PCTs) and condition types within the Additional Disturbance Area portion of the Revised Development Footprint (Umwelt 2019). The following steps were undertaken as part of this desktop assessment:

- Aerial photography interpretation (API) using the latest aerial photographs provided by ARTC and Nearmap imagery.
- Review of the latest regional vegetation mapping (OEH 2015)
- Review of survey data within the original Development Footprint
- Edge matching vegetation zones within the Additional Disturbance Area to the original 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

Following the desktop assessment field surveys were completed by Umwelt Ecologists/Botanists Ryan Parsons (accredited BBAM, FBA and BAM Assessor) and Philippa Fagan (accredited BAM Assessor), over the following survey periods:

- 25 to 28 February 2020
- 2 to 5 March 2020 and
- 17 to 19 March 2020.

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

- A total of 287 Rapid vegetation assessment points were sampled to ground-truth vegetation mapping, including confirmation of BVTs/PCTs) and condition type.
- A number of threatened ecological communities (TECs) listed under both the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (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 was considered that condition thresholds may have been impacted by the recent prolonged drought conditions, and a conservative approach was applied. Note that *Poplar Box Grassy Woodland on Alluvial Plains* endangered ecological community (EEC) under the EPBC Act was recently listed on 4 July 2019, however as discussed with Department of the Environment and Energy (DAWE – meeting on 9 March 2020) this EEC has not been considered as part of this addendum report given that the original referral for the project predates the EEC listing.

Private property access was a key constraint to the field surveys, and where access was not possible Umwelt completed ‘over the fence’ inspections for the purposes of verifying vegetation zones. For portions of the Additional Disturbance Area where access was not possible, Umwelt have assumed presence (by habitat area) of the threatened grass species, Belson’s panic (*Homopholis belsonii*) and finger panic grass (*Digitaria porrecta*), based on the PCTs these species have previously been recorded in within the Revised Development Footprint and the associated PCTs as listed in the Threatened Biodiversity Data Collection. Habitat for the other two species-credit species (Koala and creeping tick-trefoil) has been assumed present based on suitable habitat in line with the remainder of the Revised Development Footprint.

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 threatened ecological communities (TECs). No new vegetation types were detected, and therefore no additional floristic plots were required.

It is noted that several minor updates to the vegetation mapping in the original Development Footprint were made based on new survey data and updated aerial photography (e.g. recent cropping expansion, edge matching).

3.0 Species Credit Updates

The following sections provide details on the methods used to assess and survey (where relevant) for species-credit species, comprising revised database searches, assessment of candidate species-credit species, field surveys and updates to species credit requirements.

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 kilometres) to the Additional Disturbance Area. This also accounted for any new listings under the BC Act or EPBC Act. Database searches undertaken include:

- DPIE BioNet Atlas of NSW Wildlife database (DPIE 2020)
 - New record of winged peppercress (*Lepidium monoplacoides*) in October 2017 approximately 8 kilometres to the south-east of the Revised Development Footprint. All surveys to date did not record this species which is detectable between November to February.
- Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (DAWE 2020)
 - One additional species was predicted to occur, being the Australasian bittern (*Botaurus poiciloptilus*). Given that there are no nearby (within 10 kilometres) records of the Revised Development Footprint and this species was not recorded as part of the detailed fauna surveys conducted as part of the Biodiversity Assessment Report (Umwelt, October 2017), no further assessment of this species is made in this addendum report as it is considered unlikely to occur within the Revised Development Footprint.

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 original 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 Revised Development Footprint, including consideration of the revised database searches.

Table 3.1 Species-credit Species with the Potential to Occur

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 <i>Thesium australe</i> (Vulnerable under the TSC and EPBC Acts)	x	✓	x	x	x	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 50 kilometres to the east of the Additional Disturbance Area (DPIE 2020). 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 <i>Homopholis belsonii</i> (Endangered under the TSC Act and vulnerable under the EPBC Act)	✓	✓	✓	✓	✓	Yes	Belson's panic was recorded within the Additional Disturbance Area during the surveys undertaken for this assessment. A total of 255 individuals have been recorded in the Revised Development Footprint, including a further 182 individuals in the Additional Disturbance Area. 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).

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		
Bluegrass <i>Dichanthium setosum</i> (Vulnerable under the TSC and EPBC Acts)	✓	✓	✓	x	✓	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.
creeping tick-trefoil <i>Desmodium campylocaulon</i> (Endangered under the TSC Act)	x	x	✓	✓	✓	Yes	Creeping tick-trefoil was recorded within the Additional Disturbance Area during the surveys undertaken for this assessment. Greater than 500 individuals were recorded within and immediately adjacent to the Additional Disturbance Area in naturally occurring native grasslands (refer to Section 3.4).
<i>Cyperus conicus</i> (Endangered under the TSC Act)	x	x	✓	x	✓	No	<i>Cyperus conicus</i> 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 20 km from the Additional Disturbance Area (DPIE 2020). This species is unlikely to occur in the

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		
							Additional Disturbance Area and is not likely to be impacted by the proposal.
finger panic grass <i>Digitaria porrecta</i> (Endangered under the TSC Act)	✓	✓	✓	✓	✓	Yes	Finger panic grass was recorded within the Additional Disturbance Area during the surveys undertaken for this assessment. A total of 66 individuals have been recorded in the Revised Development Footprint, including a further 39 individuals in the Additional Disturbance Area. 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 <i>Diuris tricolor</i> (Vulnerable under the TSC Act)	x	x	x	x	✓	No	Pine donkey orchid was not recorded within the original Development Footprint 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. A record made in 1993 occurs in the Pilliga conservation reserves approximately 50km south-west of the Additional Disturbance Area (DPIE 2020). Additionally, the pine donkey orchid is not predicted to occur in the majority of the IBRA subregions the Revised Development Footprint is

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		
							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 Revised Development Footprint crosses the North Basalts IBRA Subregion in the Border Rivers/Gwydir CMA is approximately 50 km to the south-east near Warialda, recorded in 1992 (DPIE 2020). Apart from the 28 year old record near Warialda, the Revised Development Footprint is generally outside the pine donkey orchid's known distribution (DPIE 2020). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
native milkwort <i>Polygala linariifolia</i> (Endangered under the TSC Act)	✓	✓	✓	x	x	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 disturbed and in low condition. Populations are known to occur in the Pilliga conservation reserves approximately 30km south of the Additional Disturbance Area

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		
							and east of Narrabri and Moree (DPIE 2020). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
scant Pomaderris <i>Pomaderris queenslandica</i> (Endangered under the TSC Act)	x	✓	x	x	✓	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 30km south of the Additional Disturbance Area east of Narrabri (DPIE 2020). 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 <i>Swainsona murrayana</i> (Vulnerable under the TSC and EPBC Acts)	✓	✓	✓	✓	x	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 25 to 28 February 2020, 2 to 5

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		
							<p>March 2020 and 17 to 19 March 2020. It is noted that the early March 2020 surveys are just outside the optimum survey period for this species, however given the rainfall that coincided with this survey period following drought conditions (refer to Section 3.3 for further rainfall discussion), it is considered that this 2020 survey period was optimal to survey for this species. Additionally, of the records in the region surrounding the Revised Development Footprint, months which this species has been recorded include April, May, June, July, September and October (DPIE 2020). As such, the 2020 surveys fall within detection periods this species has been recorded in the region. Further, the habitats within the Additional Disturbance Area are generally disturbed and in low condition. One old record made in 1968 of this species occurs within the Additional Disturbance Area at approximately 638 km post near Gurley. Despite searching this location during September 2014 and February 2020, this species was not found. This record also has a very low accuracy (within 10 kilometres). The closest recent record of the species occurs near the rail corridor</p>

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		
							10km south of Moree (DPIE 2020). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
spiny peppercress <i>Lepidium aschersonii</i> (Vulnerable under the TSC 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 (DPIE 2020). A population is also known from Brigalow SCA and Brigalow Park Nature Reserve 15km southwest of Narrabri (DPIE 2020). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Ooline <i>Cadellia pentastylis</i> (Vulnerable under the TSC and EPBC Acts)	×	×	✓	×	×	No	Ooline 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. Many records occurring near the Additional Disturbance Area are over 30 years old (DPIE 2020). The closest recent records of the species occur near Mount Kaputar National Park (DPIE 2020). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
<i>Tylophora linearis</i> (Vulnerable under the TSC Act and Endangered under the EPBC Act)	x	x	✓	x	x	No	<i>Tylophora linearis</i> 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 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 (DPIE 2020). 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		
Winged peppercress (<i>Lepidium monoplocoides</i>)	x	x	x	x	x	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 25 to 28 February 2020, 2 to 5 March 2020 and 17 to 19 March 2020. It is noted that the early March 2020 surveys are just outside the optimum survey period for this species, however given the rainfall that coincided with this survey period following drought conditions (refer to Section 3.3 for further rainfall discussion), it is considered that this 2020 survey period was optimal to survey for this seasonal species which is associated with waterlogged sites. The habitats within the Additional Disturbance Area are generally disturbed and in low condition 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

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		
							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 Revised Development Footprint and is not likely to be impacted by the proposal.
pale imperial hairstreak <i>Jalmenus eubulus</i> (Critically endangered under the TSC Act)	x	x	✓	x	x	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 Revised Development Footprint near North Star (DPIE 2020). 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 <i>Anomalopus mackayi</i>	x	x	✓	✓	✓	No	Five-clawed worm-skink was not recorded within the original Development Footprint despite targeted fauna 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		
(Endangered under the TSC Act and vulnerable under the EPBC Act)							requirements for this species. The closest record of the species occurs around Bellata less than 1km to the west of the Development Site (DPIE 2020). No known populations of five-clawed worm-skink 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.
pale-headed snake <i>Hoplocephalus bitorquatus</i> (Vulnerable under the TSC 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 (DPIE 2020). 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.

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		
Dunmall's snake <i>Furina dunmalli</i> (Vulnerable under the EPBC Act)	x	x	✓	x	x	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 Revised Development Footprint (DPIE 2020). 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.
black-breasted buzzard <i>Hamirostra melanosternon</i> (Vulnerable under the TSC Act)	x	✓	x	x	x	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 (DPIE 2020). 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.

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-necked stork <i>Ephippiorhynchus asiaticus</i> (Endangered under the TSC Act)	x	✓	✓	✓	✓	No	Black-necked stork 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 near Moree along the Mehi River (DPIE 2020). 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 not be impacted by the proposal.
grey falcon <i>Falco hypoleucus</i> (Endangered under the TSC Act)	x	✓	x	✓	x	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 (DPIE 2020). 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		
flock bronzewing <i>Phaps histrionic</i> (Endangered under the TSC Act)	x	x	x	✓	x	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 Revised Development Footprint near Collarenebri (DPIE 2020). This species is not likely to occur in the Additional Disturbance Area and is not likely to be impacted by the proposal.
Koala <i>Phascolarctos cinereus</i> (Vulnerable under the TSC and EPBC Acts)	✓	✓	✓	✓	✓	Yes	The Koala was recorded within the original Development Footprint during the surveys undertaken for this 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 .

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		
rufous bettong <i>Aepyprymnus rufescens</i> (Vulnerable under the TSC 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 Revised Development Footprint within Pilliga SCA (DPIE 2020). 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 <i>Cercartetus nanus</i> (Vulnerable under the TSC 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 Revised Development Footprint within Pilliga East State Forest (DPIE 2020). 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.

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		
squirrel glider <i>Petaurus norfolcensis</i> (Vulnerable under the TSC 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 Revised Development Footprint within Bobbiwaa National Park (DPIE 2020). 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.
black-striped wallaby <i>Macropus dorsalis</i> (Endangered under the TSC 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 Revised Development Footprint within Bullala State Forest (DPIE 2020). 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.

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		
grey-headed flying-fox <i>Pteropus poliocephalus</i> (Vulnerable under the TSC and EPBC Acts) (breeding habitat only)	x	x	x	x	x	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 Meehi River (DPIE 2020). 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 <i>Mormopterus eleryi</i> (Endangered under the TSC Act)	x	x	✓	x	✓	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 Revised Development Footprint within Dhinna Dhinawan National Park (DPIE 2020). 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		
large-eared pied bat <i>Chalinolobus dwyeri</i> (Vulnerable under the TSC 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 Revised Development Footprint near Narrabri within Mount Kaputar National Park (DPIE 2020). 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 undertaken over 11 days and three survey periods in the Additional Disturbance Area, comprising:

- 25 to 28 February 2020
- 2 to 5 March 2020 and
- 17 to 19 March 2020.

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 along numerous walking meandering transects, including on private property where access was granted. Where detected, threatened flora species were counted and recorded using a handheld GPS unit.

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.

Despite the current drought conditions being experienced across large portions of the NSW, in the months leading up to the Summer 2020 surveys substantial rainfall occurred between Narrabri and North Star.

Table 3.2 details the monthly rainfall total at the Moree Airport from October 2019 to March 2020. This meant that the threatened grass species previously recorded within the original Development Footprint were readily detectable during surveys.

Table 3.2 Monthly Rainfall Total for Moree Airport (Bureau of Meteorology 2020)

Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020
7.2 mm	26.7 mm	8.4 mm	51.2 mm	95.0 mm	99.4 mm

Three species-credit species were recorded in the Additional Disturbance Area during the surveys undertaken for this assessment, including:

- Belson's panic (*Homopholis belsonii*)
- creeping tick-trefoil (*Desmodium campylocaulon*)
- finger panic grass (*Digitaria porrecta*)

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 original Disturbance Area.

Summer 2020 survey data has been provided to the BCD for their review.

3.4 Land Access

As part of the Summer 2020 surveys of the Additional Disturbance Area, land access was not available on a number of properties. **Table 3.3** below details the area of each vegetation zone within these properties that contain native vegetation and potential threatened species habitat. Note that the majority of this native vegetation and potential threatened species habitat 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 Revised 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 Revised Development Footprint is 11.55 per cent, demonstrating a high level of survey effort conducted across the Revised Development Footprint over several years and multiple seasons 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 Revised Development Footprint are present in the properties that were not accessed during the summer 2020 surveys.

Table 3.3 Summary of Vegetation Zones with No Access during the Summer 2020 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)*	Total Area of Revised Development Footprint (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	2.35	17.94	13%
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	5.47	17.31	32%
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	0.20	1.74	11%
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	32.04	432.07	7%
Zone 5 - PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good	24.03	143.95	17%

Vegetation Zone, PCT ID (BVT IDs) and PCT Name	Condition Class	No Access Area (ha)*	Total Area of Revised Development Footprint (ha)	No Access Compared to Total Area
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	35.16	249.85	14%
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	0.51	n/a
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	0.83	11.82	7%
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	0.60	9.50	6%
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	2.19	5.72	38%
Cleared/Non-native vegetation	-	261.80	1545.68	n/a
Total		364.67	2,436.09	n/a

3.5 Revised Species Credit Requirements

Table 3.4 below details the proposed impacts to applicable species credit species and **Table 3.5** details the species credit requirements according to the original Biodiversity Assessment Report (BAR) (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint. Given the favourable Summer 2020 survey conditions for detecting threatened grass species, including finger panic grass (*Digitaria porrecta*) and Belsons panic (*Homopholis belsonii*), the calculation of credits for these species is based on the number of individuals as opposed to the previous assumed presence of habitat presented in the December 2019 Desktop Assessment by Umwelt (2019). The exception being where access was not available to the Additional Disturbance Area, in these areas assumed presence by habitat area for finger panic grass (*Digitaria porrecta*) and Belsons panic (*Homopholis belsonii*) has been applied. Assumed presence for these two species is based on a combination of the PCTs these species have been recorded in within the Revised Development Footprint as well as the PCTs these species are associated with according to the Threatened Biodiversity Data Collection. Note that the species credits calculated for finger panic grass (*Digitaria porrecta*) and Belsons 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.

Subsequent to the results of the Summer 2020 surveys, the Additional Disturbance Area generates a total of 20,683 species credits. This represents a substantial reduction in the number of species credits determined by the assumed presence of habitat method in the December 2019 Desktop Assessment (Umwelt 2019). Refer to **Appendix B** for Revised Final Credit Reports.

Table 3.4 Number of Individuals or Area of Habitat for Species Credit Species according to the Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint

Common Name (scientific name)	BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint
Koala	62.77 ha	94.84 ha	173.79 ha	175.25 ha
finger panic grass (<i>Digitaria porrecta</i>)	28 individuals	28 individuals	906 ha* (associated with zones 1, 2, 3, 4, 5, 6)	66 Individuals (27 in 2015/2016 39 in 2020) 99.25 ha (associated with zones 1, 2, 3, 4, 5, 6)
creeping tick-trefoil (<i>Desmodium campsylocaulon</i>)	237 ha	280 ha	497 ha	432.07 ha

Common Name (scientific name)	BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint
Belsons panic (<i>Homopholis belsonii</i>)	73 individuals	73 individuals	913 ha* (associated with zones 1, 2, 4, 5, 6, 7,9)	255 individuals (73 in 2016 182 in 2020) 99.65 ha (associated with zones 1, 2, 4, 5, 6, 7, 9)

*Revised calculations based on area of habitat in the absence of targeted surveys.

Table 3.5 Species Credits Generated according to the Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint

Common Name (scientific name)	BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint
Koala	1,632	2,466	4,519	4,556
finger panic grass (<i>Digitaria porrecta</i>)	364	364	11,778*	858 (by individuals) 1,287 (by area - ha)
creeping tick-trefoil (<i>Desmodium capylocaulon</i>)	2,607	3,080	5,467	4,752
Belsons panic (<i>Homopholis belsonii</i>)	1,898	1,898	23,738*	6,630 (by individuals) 2,600 (by area - ha)
Total	6,501	7,808	45,502	20,683

*Revised calculations based on area of habitat in the absence of targeted surveys.

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 Additional Disturbance Area includes areas with koala feed and refuge trees, as documented in **Table 3.6**.

Table 3.6 Vegetation Zones/Plant Community Types Identified as Koala Habitat

Vegetation Zone	PCT ID (BVT ID) and PCT Name <i>Condition Class</i>	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 <i>Moderate to Good</i>	17.31
3	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion <i>Moderate to Good</i>	1.74
4	PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion <i>Moderate to Good Natural Grassland</i>	0.08 (scattered trees)
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW <i>Moderate to Good</i>	143.95
6	PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW <i>Moderate to Good Derived Native Grassland</i>	0.35 (scattered trees)
8	PCT78 (BR196, NA193) River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion <i>Moderate to Good</i>	11.82
Total		175.25

4.0 Ecosystem Credit Updates

Table 4.1 below details the proposed impacts to vegetation zones and **Table 4.2** details the ecosystem credit requirements according to the original Biodiversity Assessment Report (BAR) (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint. Overall, 40,639 ecosystem credits are required for the Revised Development Footprint, which through the refinement of the vegetation mapping is slightly less than the December 2019 Desktop Assessment of the Revised Development Footprint (Umwelt 2019). The latest ecosystem credit requirements are also approximately double the number determined in the previous BAR Addendum Report (Umwelt 2018).

Table 4.1 also demonstrates that the minimum number of plots required by the FBA (OEH 2014) are satisfied, exceeded in most cases, for all vegetation zones. No new vegetation zones were recorded as part of the 2020 summer surveys, as a result no additional plots were completed as part of this survey event.

Table 4.1 Vegetation Zone Area according to Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised 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	Area in Development Footprint (ha)				No. Plots Required (OEH 2014)	Plots Completed in 2016
				BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint		
1	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Moderate to Good	17.94 ha of <i>Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions</i> EEC listed under the BC Act to be impacted 9.16 ha of <i>Weeping Myall Woodlands</i> 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	7.26	19.10	17.94	3	6

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	Area in Development Footprint (ha)				No. Plots Required (OEH 2014)	Plots Completed in 2016
				BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint		
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	17.21 ha of <i>Brigalow</i> within the <i>Brigalow Belt South</i> , <i>Nandewar</i> and <i>Darling Riverine Plains Bioregions</i> EEC listed under the BC Act to be impacted (note that a small 0.1 ha patch of vegetation zone 2 is not considered to conform to the EEC given the heavily disturbed condition) 16.13 ha of <i>Brigalow</i> (<i>Acacia harpophylla</i> dominant and codominant) EEC listed under the EPBC Act (the remaining portion of zone 2 does not meet the minimum patch size (0.5 ha) or condition thresholds according to the EPBC listing criteria)	4.75	4.85	19.23	17.31	3	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	Area in Development Footprint (ha)				No. Plots Required (OEI 2014)	Plots Completed in 2016
				BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint		
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 ha of <i>Coolabah - Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penneplain and Mulga Lands Bioregions</i> EEC listed under the BC Act to be impacted 1.74 ha of <i>Coolabah – Black Box Woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregion</i> EEC under the EPBC Act to be impacted	1.19	1.19	1.74	1.74	1	2

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	Area in Development Footprint (ha)				No. Plots Required (OEI 2014)	Plots Completed in 2016
				BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint		
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 432.07 ha of <i>Natural Grassland on Basalt and Fine-textured Alluvial Plains of Northern NSW and Southern QLD</i> CEEC listed under the EPBC Act	268.64	279.94	497.10	432.07	7	15
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good	Not listed under the BC Act This vegetation zone (or portions of) is likely to conform to the <i>Poplar Box Grassy Woodland on Alluvial Plains</i> EEC under the EPBC Act which was recently listed on 4 July 2019.	71.95	73.21	140.38	143.95	6	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	Area in Development Footprint (ha)				No. Plots Required (OEH 2014)	Plots Completed in 2016
				BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint		
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 <i>Poplar Box Grassy Woodland on Alluvial Plains</i> EEC under the EPBC Act which was recently listed on 4 July 2019.	108.20	111.65	228.11	249.85	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	0.51 ha of <i>Carbeen Open Forest community in the Darling Riverine Plains and Brigalow Belt South Bioregions</i> EEC listed under the BC Act to be impacted Not listed the EPBC Act	0.04	0.04	0.51	0.51	1	1

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	Area in Development Footprint (ha)				No. Plots Required (OEH 2014)	Plots Completed in 2016
				BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint		
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	14.91	11.75	11.82	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	4.13	8.16	9.50	3	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	Area in Development Footprint (ha)				No. Plots Required (OEH 2014)	Plots Completed in 2016
				BAR (Umwelt 2017)	BAR Addendum (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint		
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	Not listed	2.59	2.59	5.66	5.72	3	3
	Cleared/Non-native vegetation	-	-	1,080.44	1063.48	1503.74	1,545.68	0	3
Total				1,563.25	1,563.25	2,435.48*	2,436.09	36	54

*note: due to rounding there is a minor difference between the December 2019 desktop assessment and the current assessment total development footprint area.

Table 4.2 Ecosystem Credits Generated in Biodiversity Assessment Report (Umwelt 2017), BAR Addendum Report (Umwelt 2018), December 2019 Desktop Assessment of Revised Development Footprint (Umwelt 2019) and Current Assessment of Revised Development Footprint

Veg Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Ecosystem Credits Generated			
			BAR (Umwelt 2017)	BAR Addendum Report (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint
1	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	Moderate to Good	254	365	959	900
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	343	1,358	1,223
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	63	93	93
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	13,025	23,128	20,102
5	PCT56 (BR186, NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good	3,386	4,501	8,631	8,851
6	PCT56 (BR186; NA182) Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	Moderate to Good_DNG	2,917	3,706	7,573	8,294

Veg Zone	PCT ID (BVT IDs) and PCT Name	Condition Class	Ecosystem Credits Generated			
			BAR (Umwelt 2017)	BAR Addendum Report (Umwelt 2018)	Revised Development Footprint (December 2019 Desktop Assessment)	Current Assessment of Revised Development Footprint
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	2	23	23
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	689	545	549
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	153	304	354
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	113	247	250
	Cleared/Non-native vegetation	-	0	0	0	0
Total			18,826	22,960	42,861	40,639

5.0 Updated Impacts on Matters of National Environmental Significance

Table 5.1 outlines the revised impact of the Proposal on Matters of National Environmental Significance listed under the EPBC Act. As discussed in the BAR, as the Commonwealth listings are different to the NSW listings, in some cases not all of a NSW PCT will meet the EPBC Act listing criteria. For this reason, the area of a particular PCT that is impacted may not match the area of an EPBC listed community of which it forms part. Only part (9.16 ha) of the total area mapped as PCT27 (17.94 ha) meets the listing criteria for the *Weeping Myall Woodlands EEC* under the EPBC Act as the remaining patches of this vegetation are below the minimum patch size of 0.5 hectare. Additionally, several patches of PCT35 (1.18 ha) do not meet the minimum patch size (0.5 ha) or condition thresholds (understorey dominated by exotic perennial plants) for the *Brigalow (Acacia harpophylla dominant and co-dominant EEC* according to the EPBC listing criteria.

Table 5.1 Impacts of the Proposal on MNES

EPBC Act Listed MNES	Corresponding Plant Community Type in the Development Footprint	Area (ha)/Individuals Impacted in the Development Footprint
<i>Weeping Myall Woodlands EEC</i>	PCT27 (BR233, NA219) Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion <i>Moderate to Good</i>	17.94 ha (9.16ha = EPBC Act EEC)
<i>Brigalow (Acacia harpophylla dominant and co-dominant) EEC</i>	PCT35 (BR120, NA117) Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from Pilliga Scrub to Goondiwindi, Brigalow Belt South Bioregion <i>Moderate to Good</i>	17.31 ha (16.13 ha = EPBC Act EEC)
<i>Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions EEC</i>	PCT39 (BR130, NA129) Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion <i>Moderate to Good</i>	1.74 ha
<i>Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland CEEC</i>	PCT52 (BR191, NA187) Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion <i>Moderate to Good_Natural Grassland</i>	432.07 ha
Total EPBC Act Listed Ecological Communities		459.10
Belsons panic (<i>Homopholis belsonii</i>) – vulnerable	-	255 individuals / 99.65 ha habitat (no access areas)
Total Belsons panic (<i>Homopholis belsonii</i>) Individuals/area of habitat (no access areas)		255 individuals/ 99.65 ha habitat (no access areas)

EPBC Act Listed MNES	Corresponding Plant Community Type in the Development Footprint	Area (ha)/Individuals Impacted in the Development Footprint
koala (<i>Phascolarctos cinereus</i>) – vulnerable 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	0.08 (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	0.35 (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	17.31
	PCT-39/BVT-BR130, NA129/Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion/Moderate - Good	1.74
	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	11.82
	PCT-56/BVT-BR186, NA182/Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW/Moderate – Good	143.95
Total Koala habitat (including refuge habitat)		175.25

6.0 Recommended Mitigation Measures

Further to the mitigation measures detailed in Section 4.2 of the Biodiversity Assessment Report (Umwelt 2017), the following mitigation measures are recommended:

- Further detailed design to consider native vegetation and significant ecological entities, including threatened ecological communities and threatened species habitat, to avoid and minimise ecological impacts where possible.
- The assumed presence of the threatened grass species, finger panic grass (*Digitaria porrecta*) and Belsons panic (*Homopholis belsonii*), on properties without access during the 2020 surveys of the Additional Disturbance Area, where possible, will be surveyed for these species prior to construction to refine credit requirements. If this is not possible the species credits in these areas will be based on the conservative assumed presence by habitat area.

7.0 References

Bureau of Meteorology (2020) Climate Data Online.

http://www.bom.gov.au/jsp/ncc/cdio/wData/wdata?p_nccObsCode=136&p_display_type=dailyDataFile&p_stn_num=053115&p_startYear=

Crowther, M. S., Lunney, D., Lemon, J., Stalenberg, E., Wheeler, R., Madani, G., Ross, K. A., Ellis, M. (2014) Climate-mediated Habitat Selection in an Arboreal Folivore. *Ecography*, **37**: 336-343.

Department of Environment and Climate Change (DECC) (2008) Approved Recovery Plan for the Koala (*Phascolarctos cinereus*), November 2008.

Department of Agriculture, Water and the Environment (DAWE) (2020). Protected Matters Search Tool [online] accessed at: <http://environment.gov.au/epbc/protected-matters-search-tool> accessed March 2020.

Department of Planning, Industry and Environment (DPIE) (2020). DPIE BioNet Atlas of NSW Wildlife database [online] accessed at: <https://www.environment.nsw.gov.au/threatenedSpeciesApp/> accessed March 2020.

Office of Environment and Heritage (OEH) (2014) Framework for Biodiversity Assessment – NSW Biodiversity Offsets Policy for Major proposals, September 2014

Office of Environment and Heritage (OEH) (2015) Border Rivers Gwydir/Namoi Regional Native Vegetation Mapping. NSW Office of Environment and Heritage, Sydney, Australia.

Umwelt (Australia) Pty Limited (Umwelt) (2017) Inland Rail – Narrabri to North Star Biodiversity Assessment Report. Report prepared on behalf of Australian Rail Track Corporation (ARTC), October 2017.

Umwelt (Australia) Pty Limited (Umwelt) (2018) Addendum to the Inland Rail – Narrabri to North Star Biodiversity Assessment Report. Report prepared on behalf of Australian Rail Track Corporation (ARTC), October 2018.

Umwelt (Australia) Pty Limited (Umwelt) (2019) Briefing Note – Revised Biodiversity Credit Requirements for Narrabri to North Star Section of the Inland Rail Project. Report prepared on behalf of Australian Rail Track Corporation (ARTC), December 2019.



APPENDIX A

Revised Vegetation Map Figures

Vegetation Legend












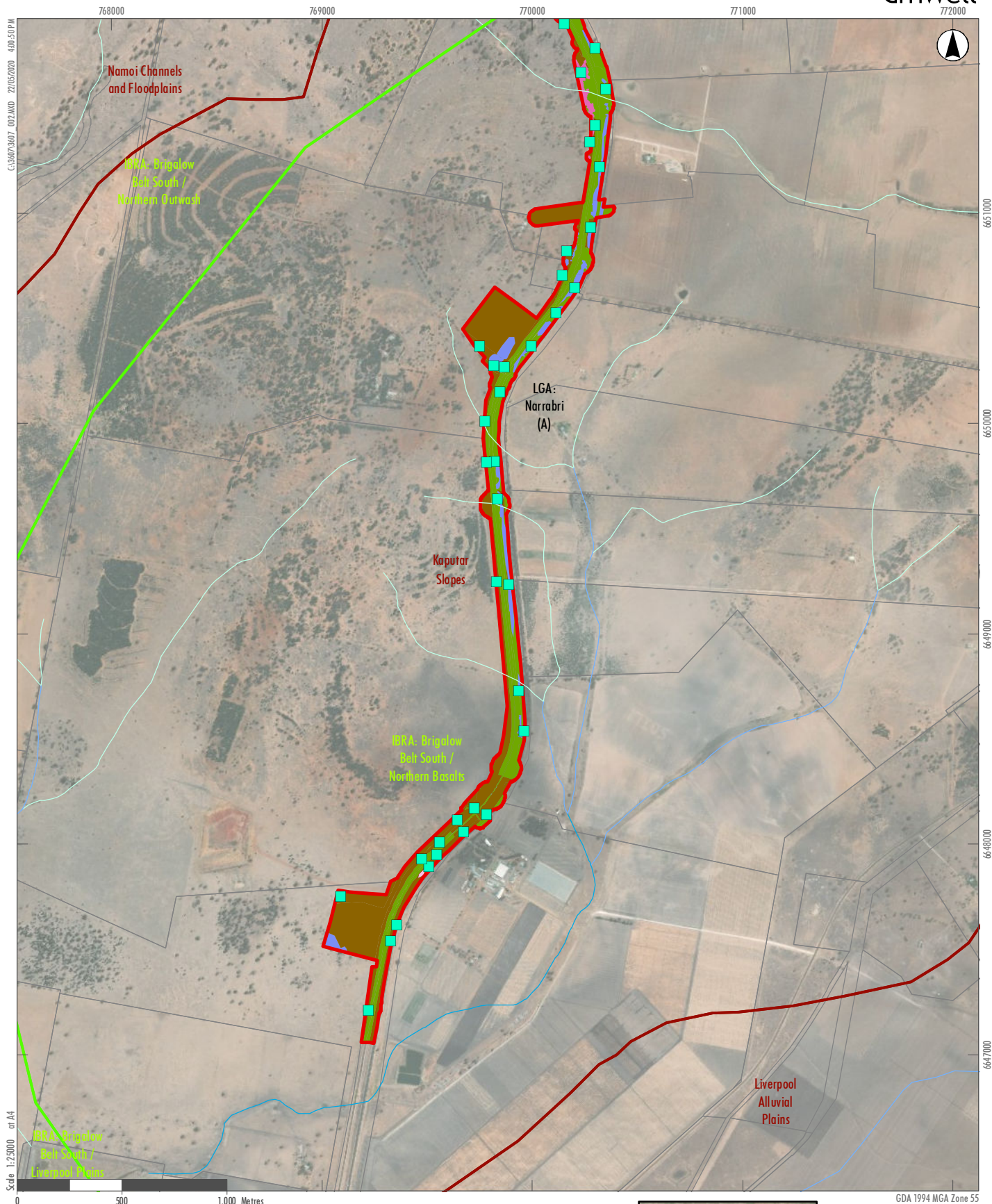
-  Cleared/Non-native Vegetation
-  Zone 1 - PCT-27 BVT-BR233, NA219-Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion-Moderate - Good
-  Zone 2 - PCT-35 BVT-BR120, NA117-Brigalow - Belah open forest / woodland on alluvial often gilgaied clay from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

FIGURE A0

Vegetation Legend

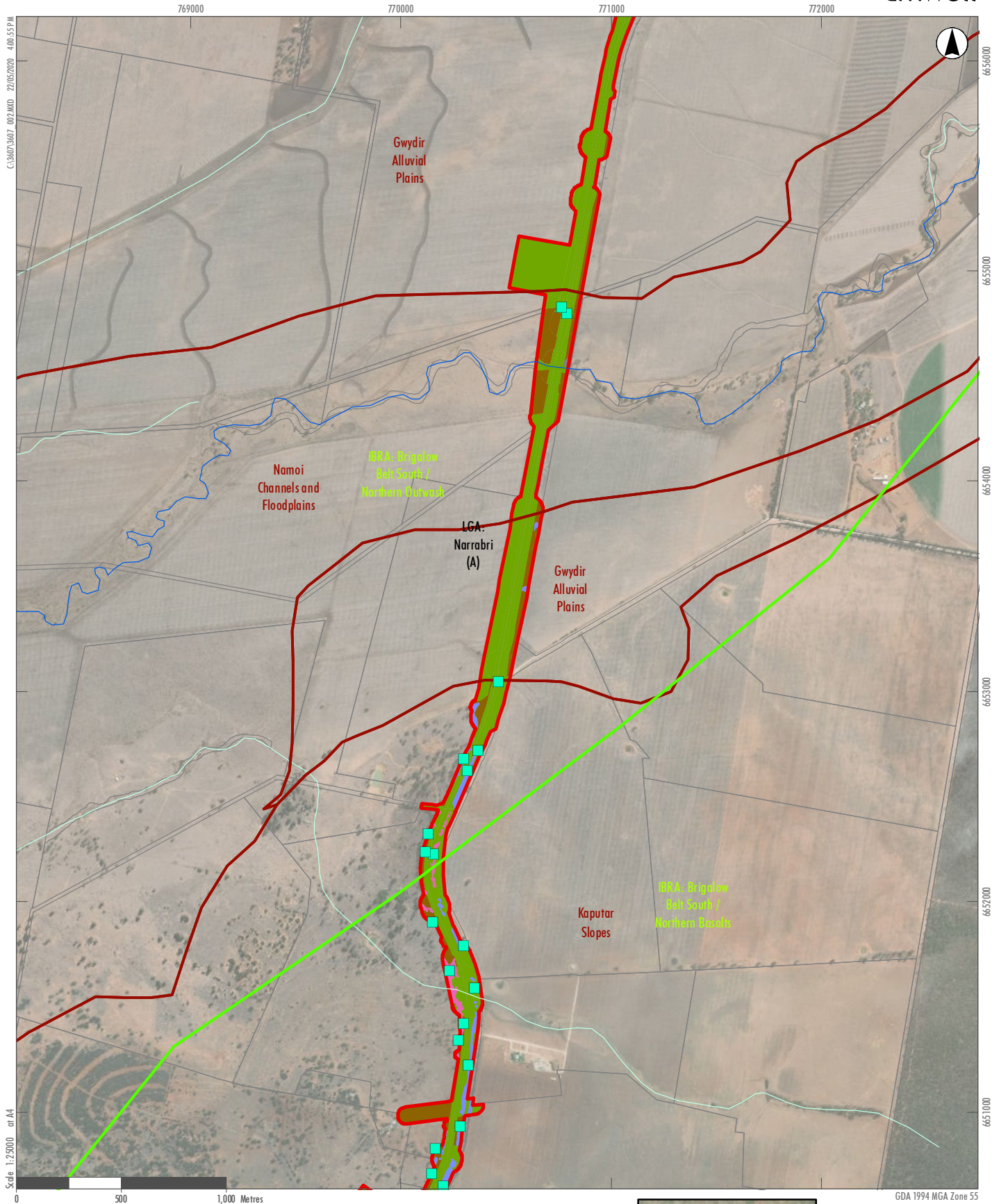


- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
 - 3rd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 5
 - Zone 6
 - Zone 9
 - Zone 10



FIGURE A1
Vegetation Map



Legend

- ▬ Revised Development Footprint
- ▬ IBRA Regions and Subregion Area
- ▬ Mitchell Landscape Area
- ▬ Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- ▬ 1st Order
 - ▬ 4th Order

- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 5
 - Zone 6
 - Zone 8
 - Zone 10

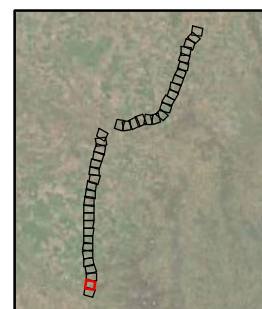


FIGURE A2
Vegetation Map

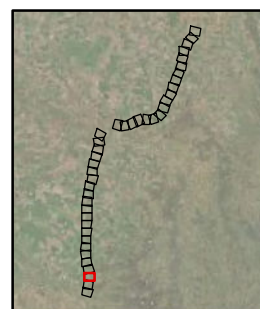
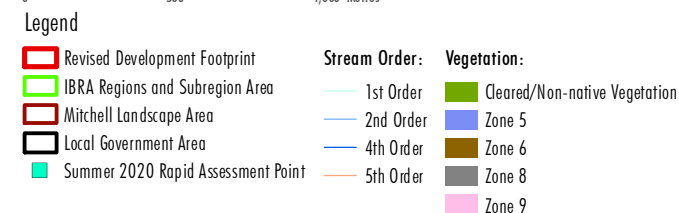
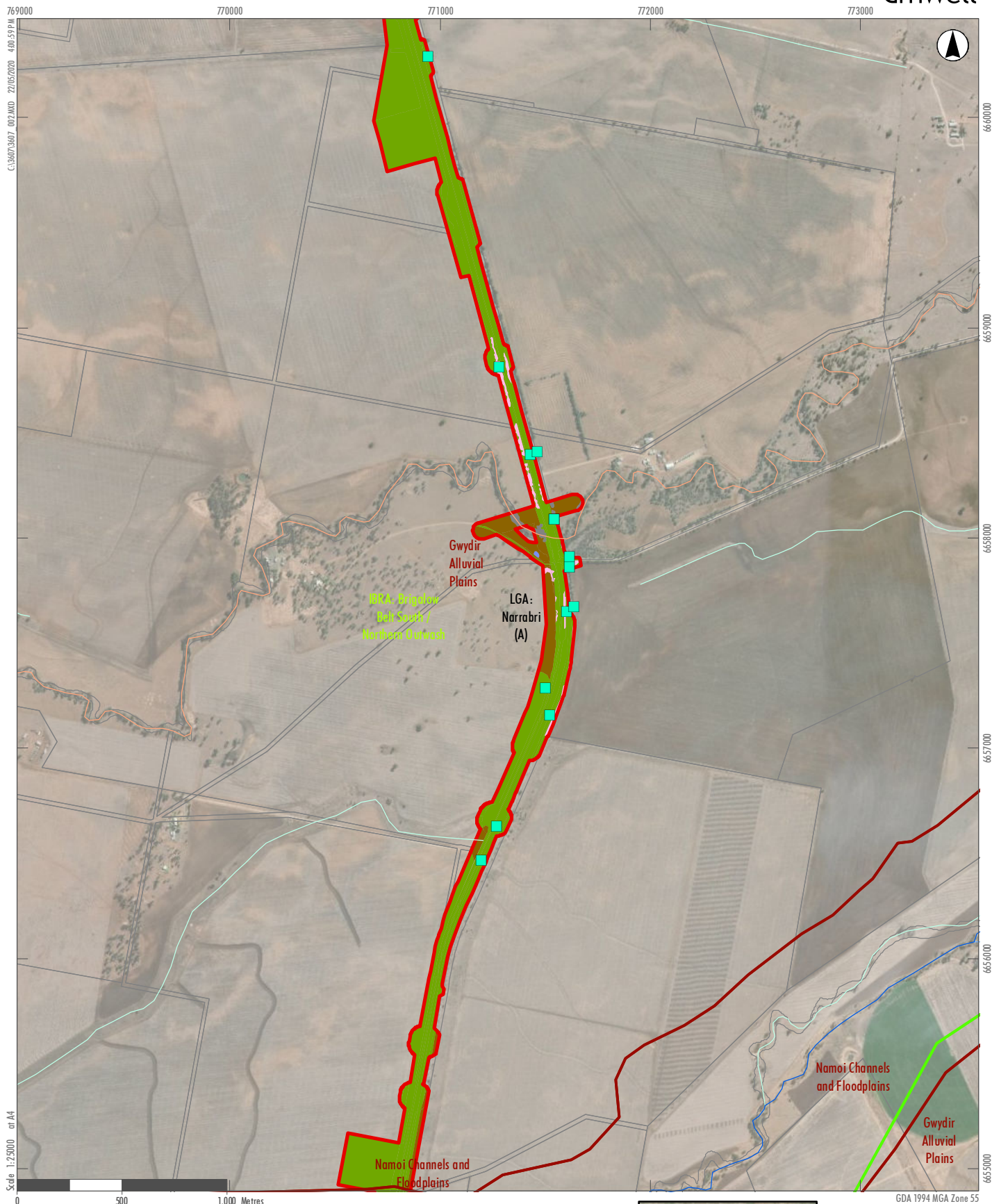
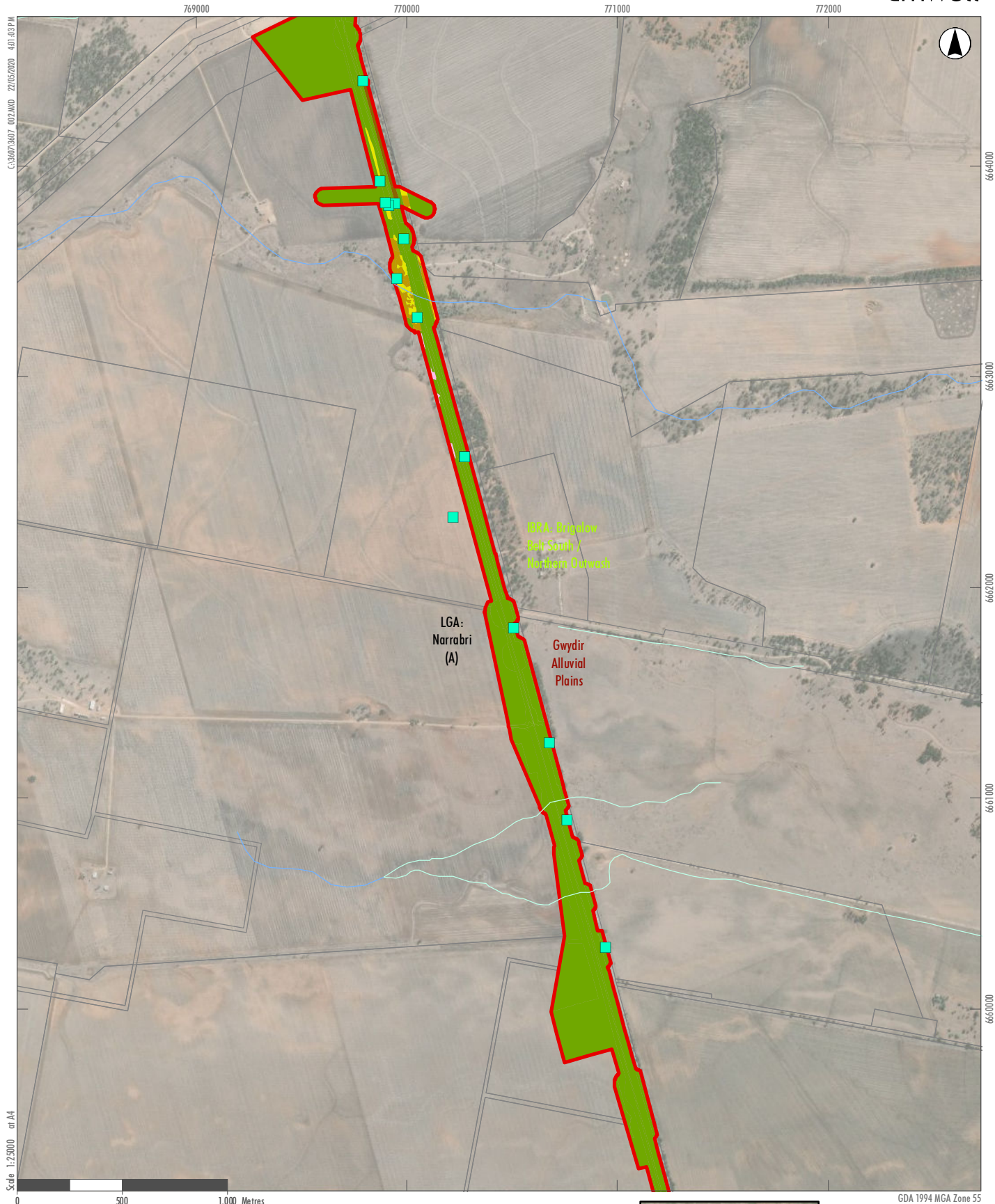


FIGURE A3
Vegetation Map



Legend

- | | | | |
|--|------------------------------------|--|-------------------------------|
| | Revised Development Footprint | | Cleared/Non-native Vegetation |
| | IBRA Regions and Subregion Area | | Zone 1 |
| | Mitchell Landscape Area | | Zone 4 |
| | Local Government Area | | Zone 6 |
| | Summer 2020 Rapid Assessment Point | | Zone 9 |
- Stream Order:
- 1st Order
 - 2nd Order

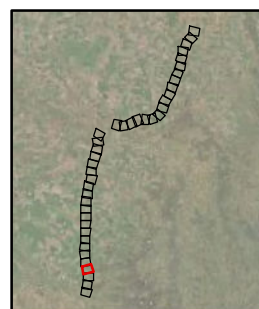
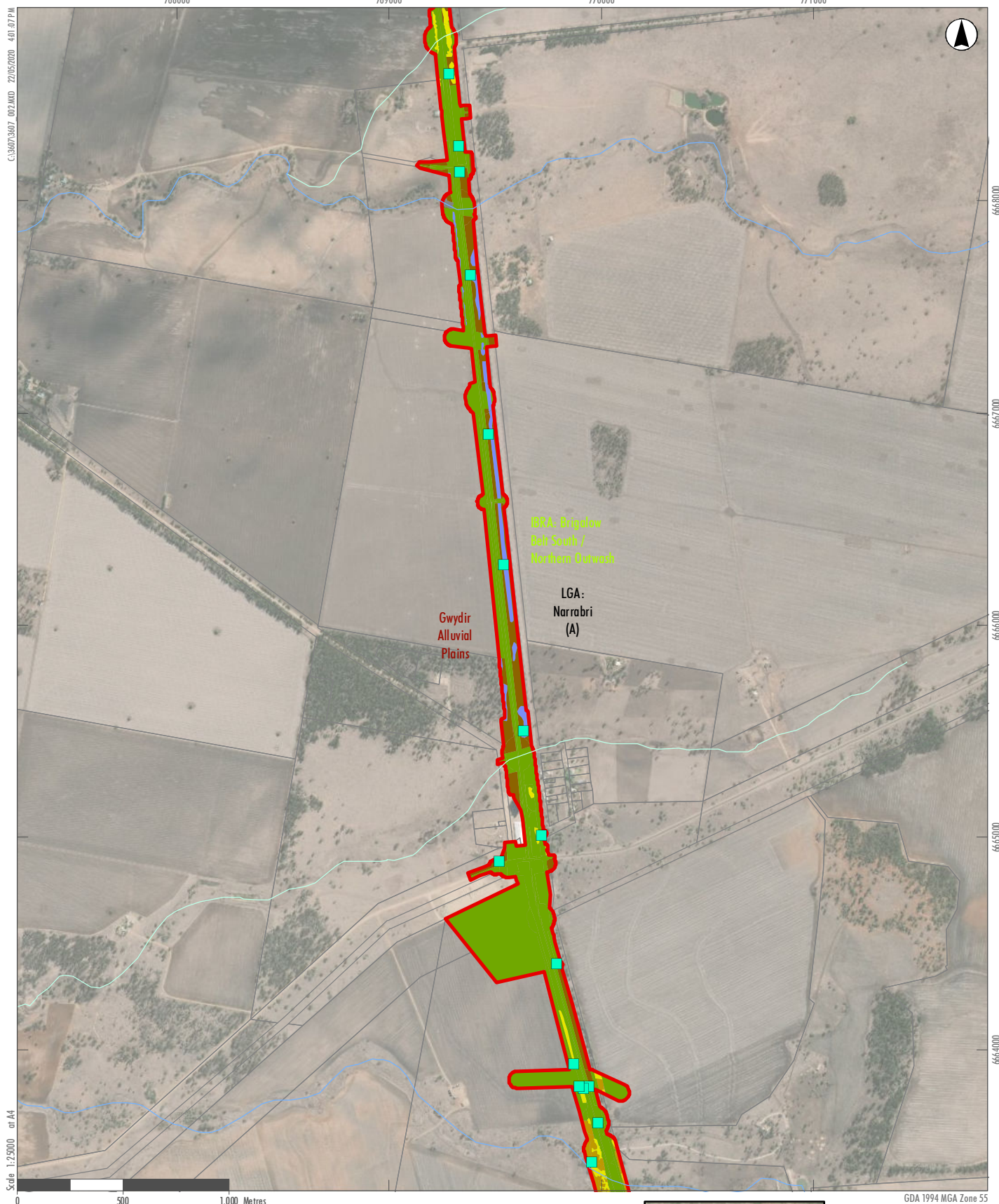


FIGURE A4
Vegetation Map

C:\3607\3607_002.MXD 22/05/2020 4:01:07 PM



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- | Stream Order: | Vegetation: |
|---|---|
| 1st Order | Cleared/Non-native Vegetation |
| 2nd Order | Zone 1 |
| | Zone 4 |
| | Zone 5 |
| | Zone 6 |
| | Zone 8 |

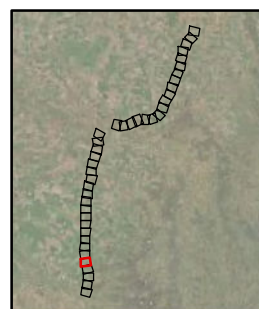
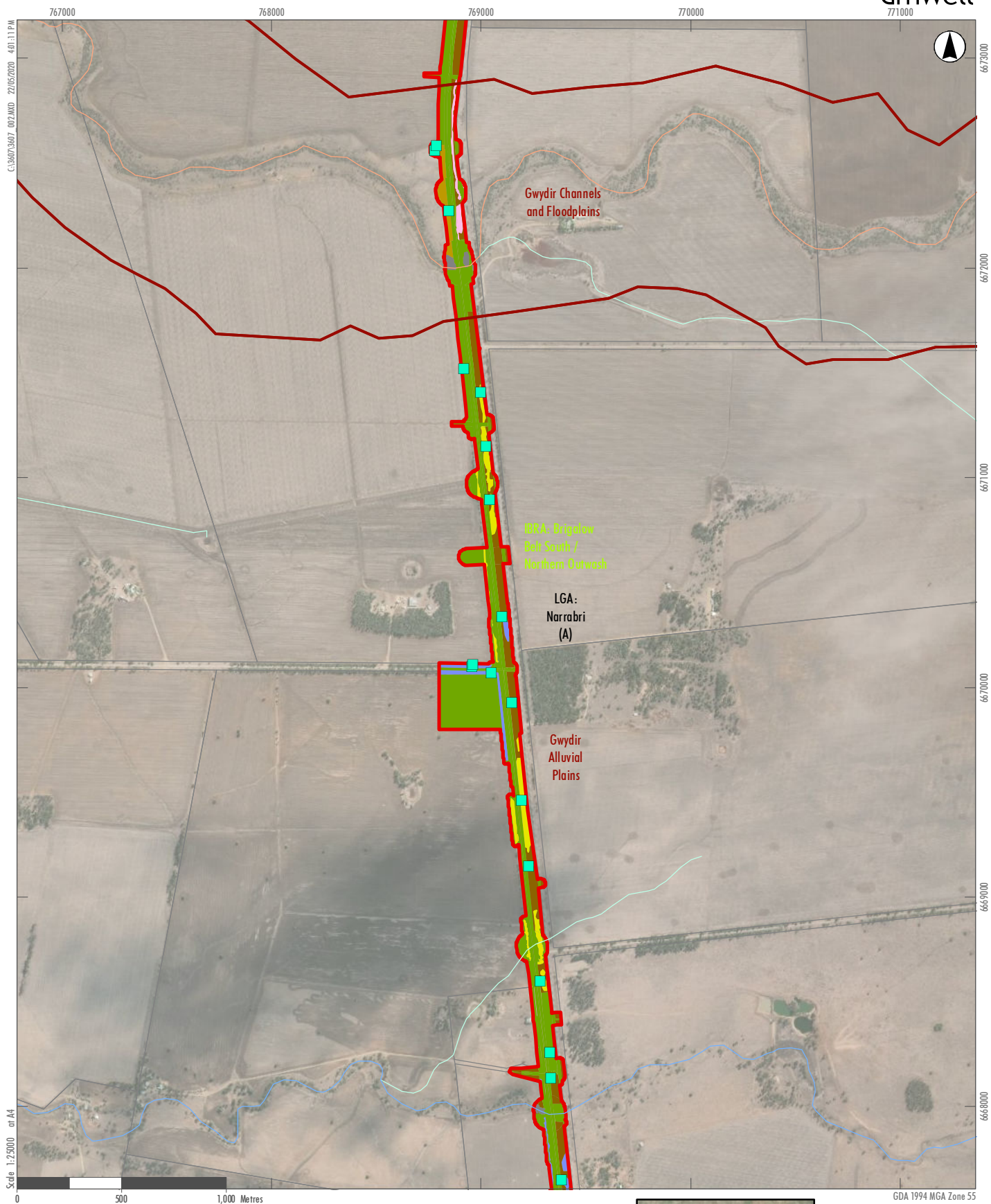


FIGURE A5
Vegetation Map



Legend

- Revised Development Footprint
- IBRA Regions and Subregion Area
- Mitchell Landscape Area
- Local Government Area
- Summer 2020 Rapid Assessment Point

- 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

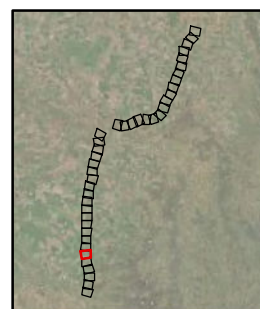


FIGURE A6
Vegetation Map



Legend

- | | | |
|---|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 2nd Order | Zone 4 |
| Local Government Area | — 3rd Order | Zone 5 |
| ■ Summer 2020 Rapid Assessment Point | — 5th Order | Zone 6 |
| | | Zone 8 |
| | | Zone 9 |

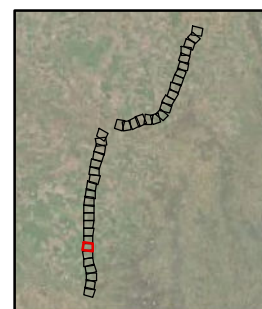


FIGURE A7
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- | Stream Order: | Vegetation: |
|--|---|
| — 1st Order | Cleared/Non-native Vegetation |
| — 2nd Order | Zone 4 |
| — 3rd Order | Zone 6 |

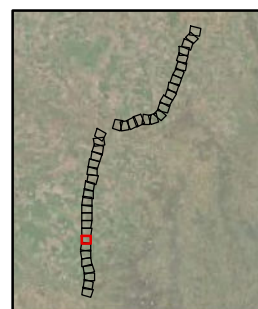
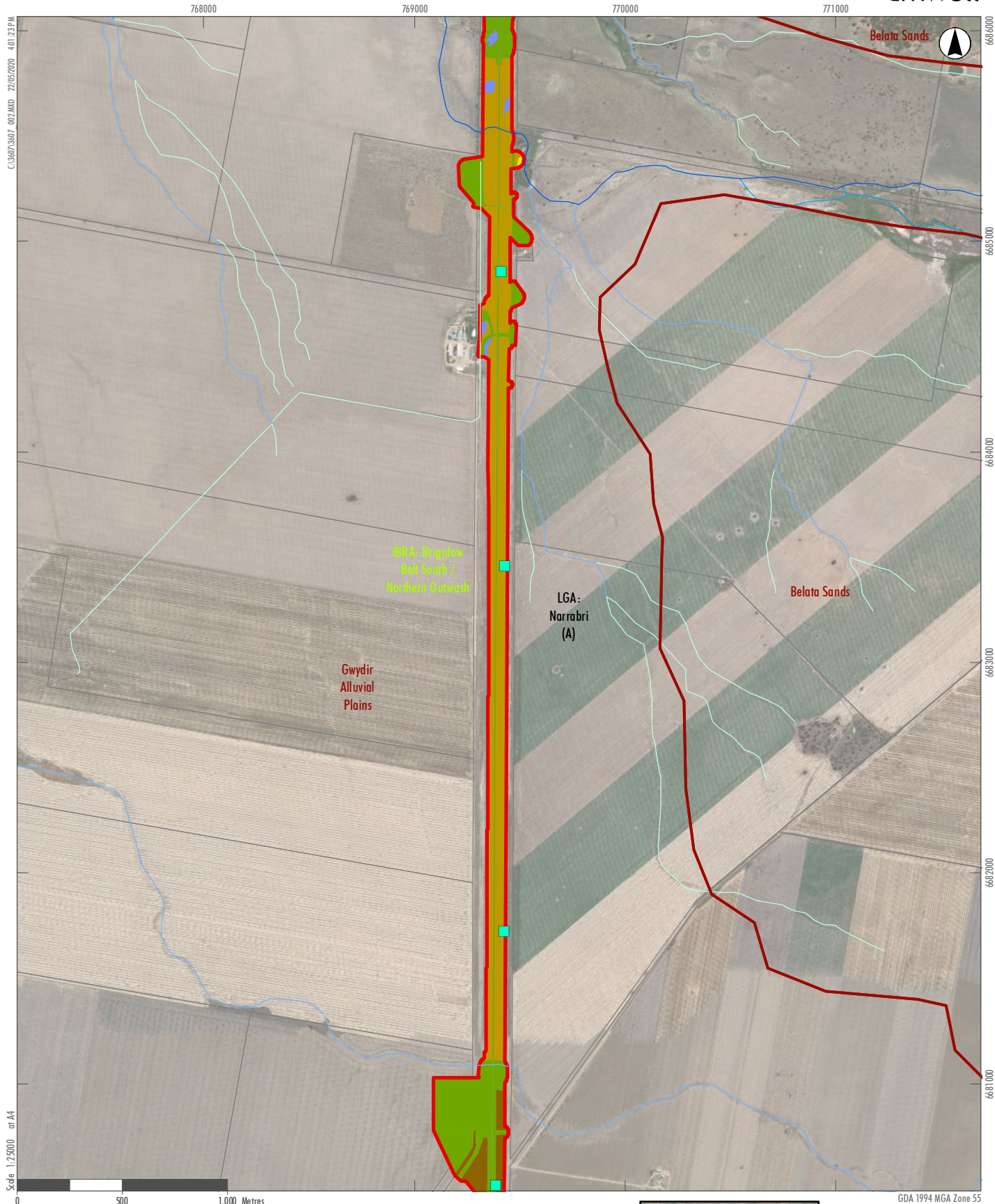


FIGURE A8
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point
- Stream Order:**
- 1st Order
 - 2nd Order
 - 3rd Order
 - 4th Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 1
 - Zone 4
 - Zone 5
 - Zone 6

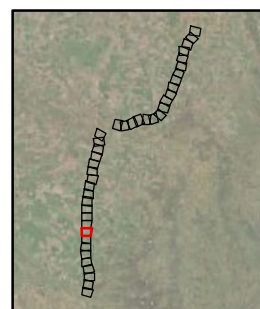
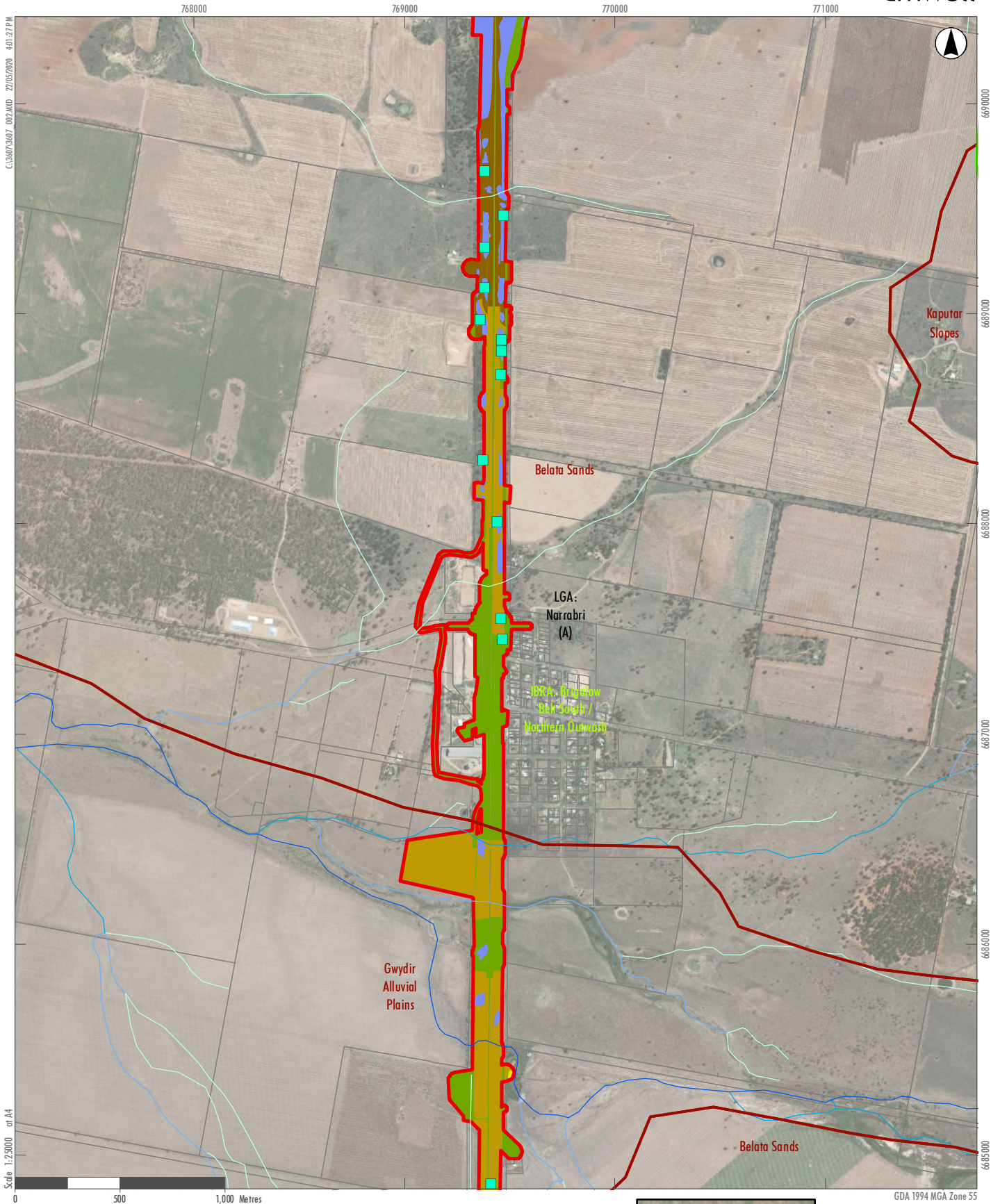


FIGURE A9
Vegetation Map



Legend

- | | | |
|---|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 2nd Order | Zone 1 |
| Local Government Area | — 3rd Order | Zone 4 |
| ■ Summer 2020 Rapid Assessment Point | — 4th Order | Zone 5 |
| | | Zone 6 |

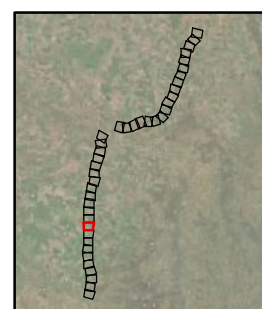
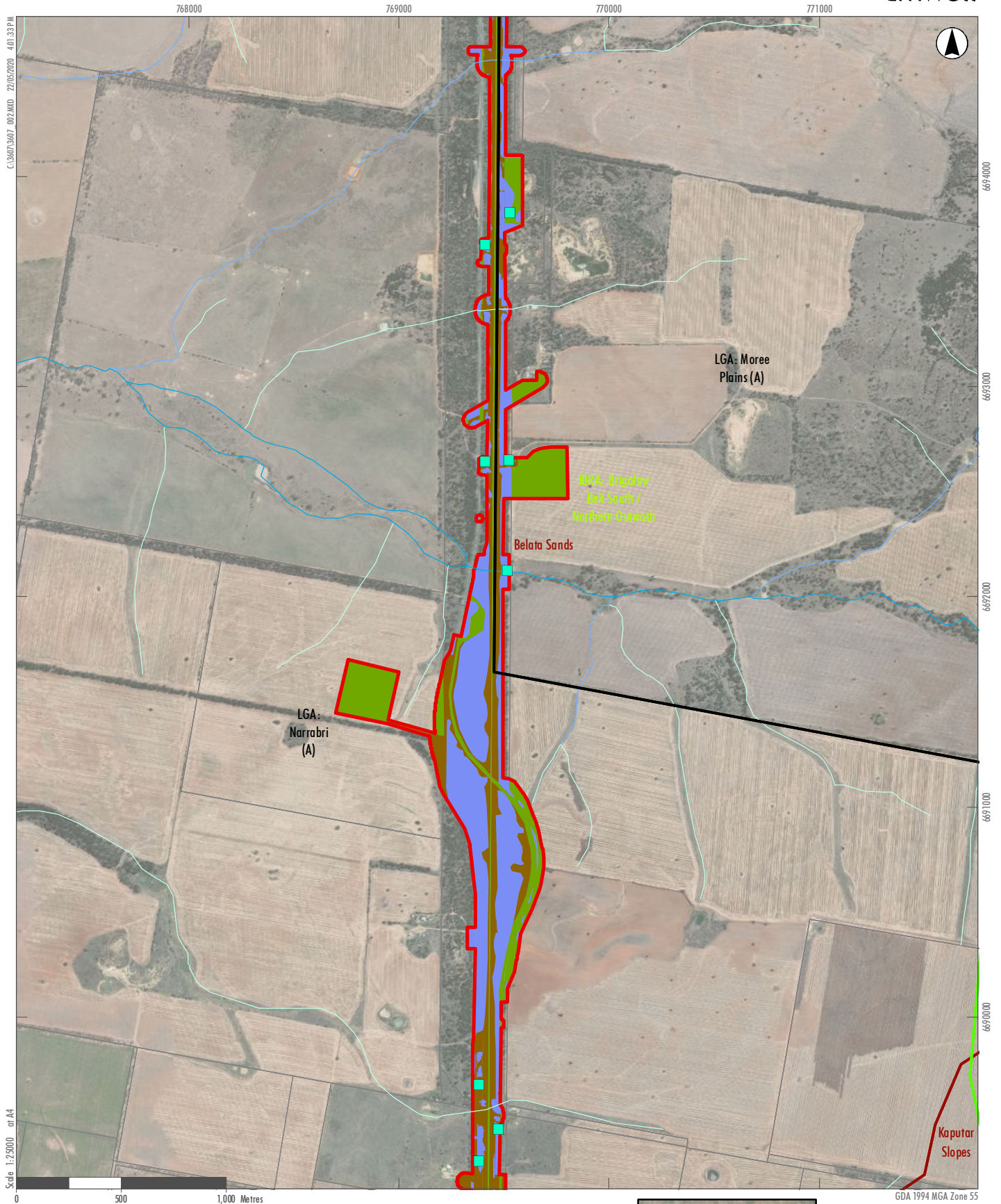


FIGURE A10
Vegetation Map

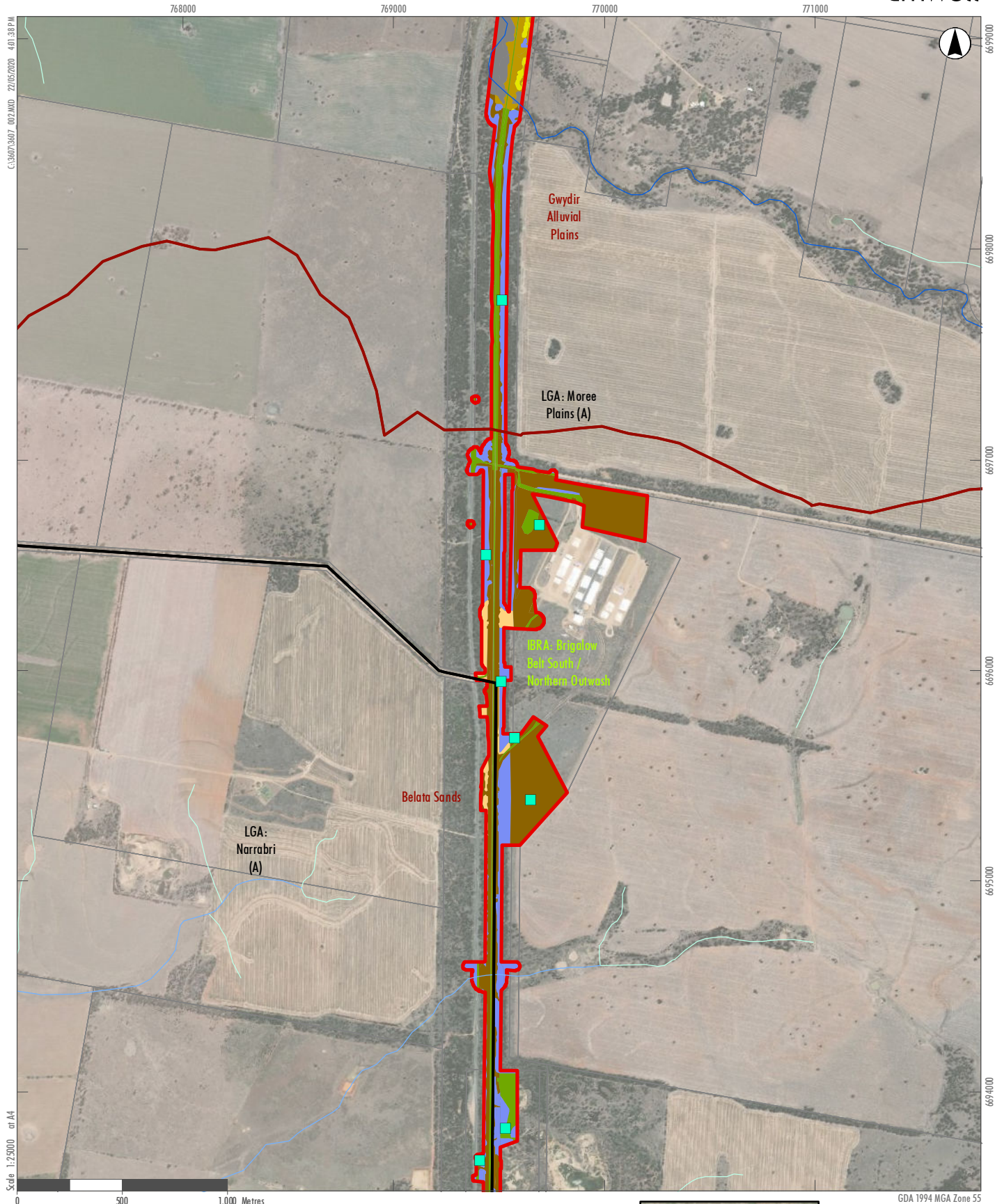


- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
 - 3rd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 5
 - Zone 6



FIGURE A11
Vegetation Map



Legend

- Revised Development Footprint
- IBRA Regions and Subregion Area
- Mitchell Landscape Area
- Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
 - 4th Order

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

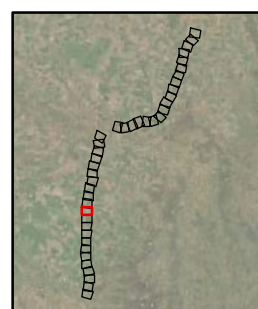
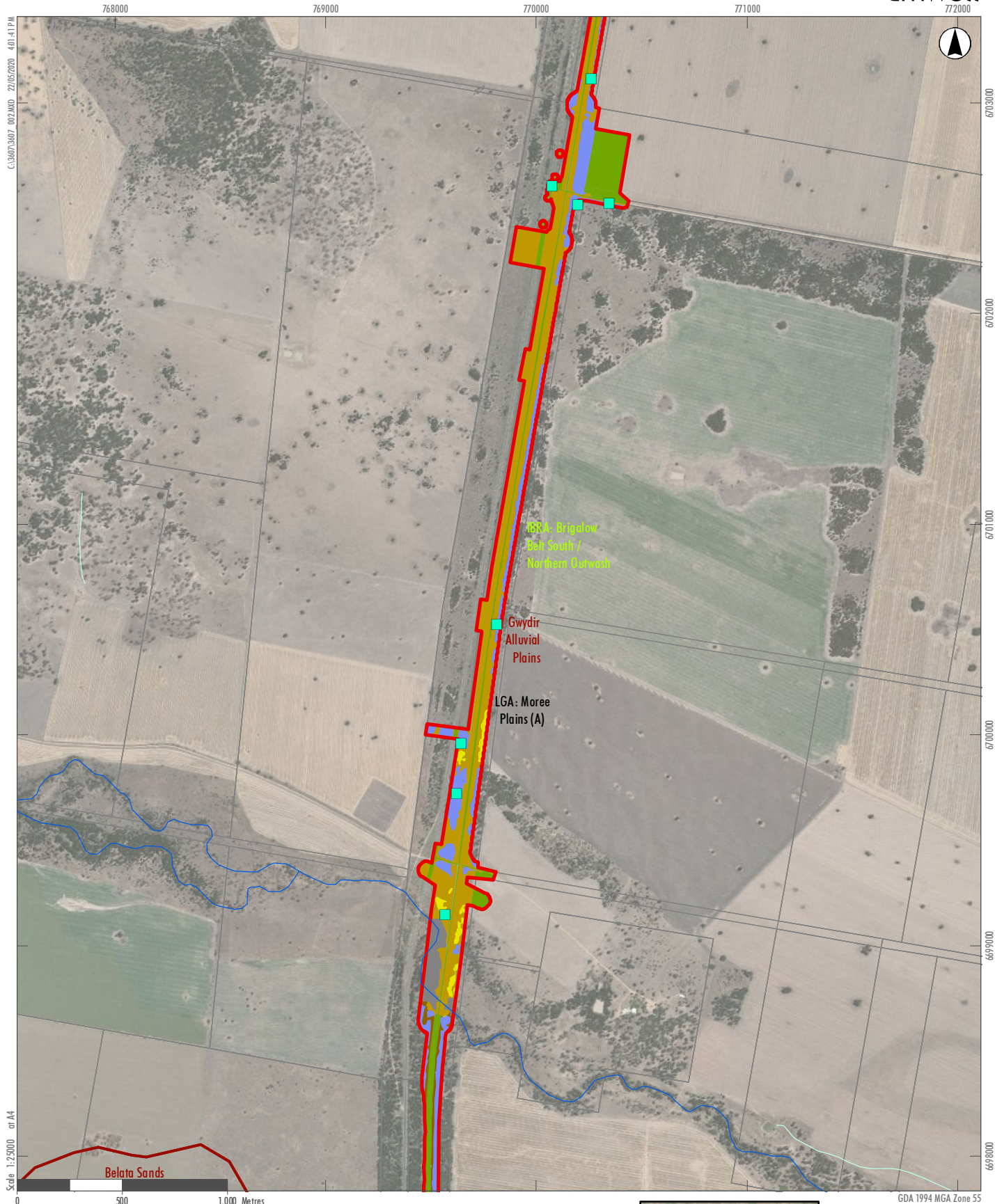


FIGURE A12
Vegetation Map



Legend

- | | | |
|---|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 4th Order | Zone 1 |
| Local Government Area | | Zone 4 |
| ■ Summer 2020 Rapid Assessment Point | | Zone 5 |
| | | Zone 6 |
| | | Zone 8 |

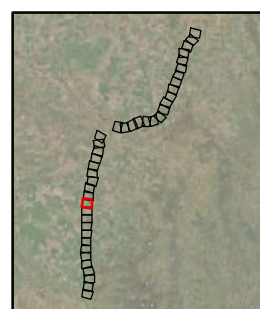


FIGURE A13
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 1
 - Zone 4
 - Zone 5

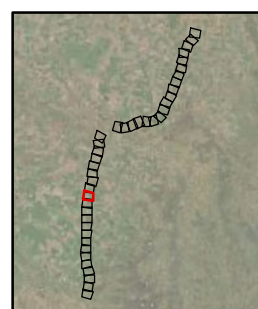


FIGURE A14
Vegetation Map



Legend

- Revised Development Footprint
- IBRA Regions and Subregion Area
- Mitchell Landscape Area
- Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order

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

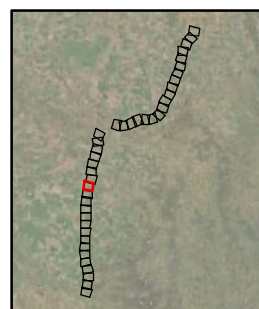
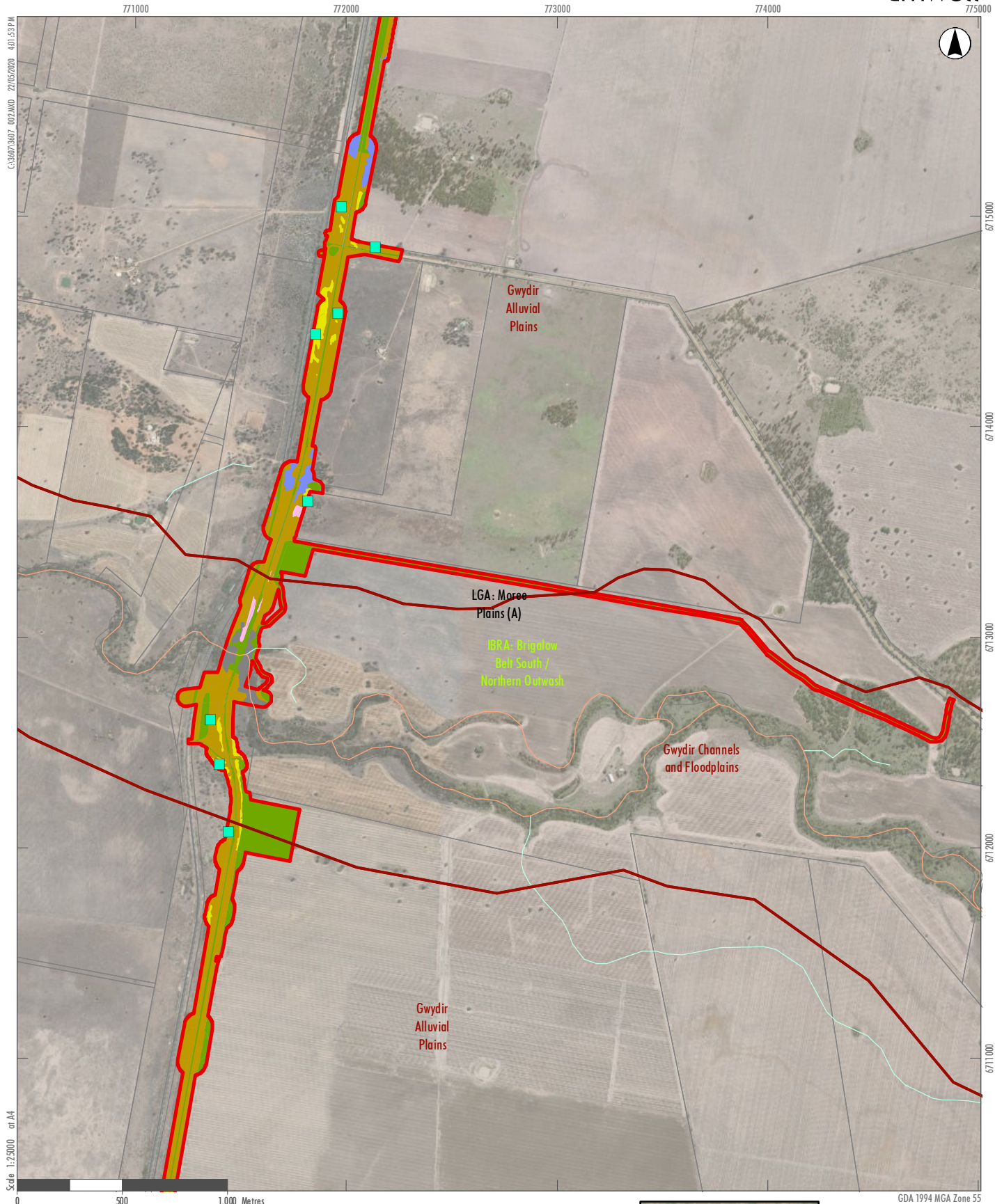


FIGURE A15
Vegetation Map



Legend

- | | | |
|--|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 5th Order | Zone 1 |
| Local Government Area | | Zone 4 |
| Summer 2020 Rapid Assessment Point | | Zone 5 |
| | | Zone 7 |
| | | Zone 8 |
| | | Zone 9 |

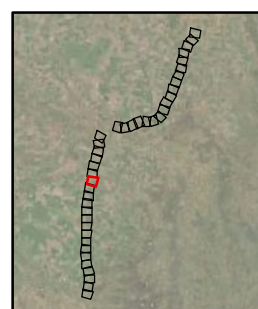
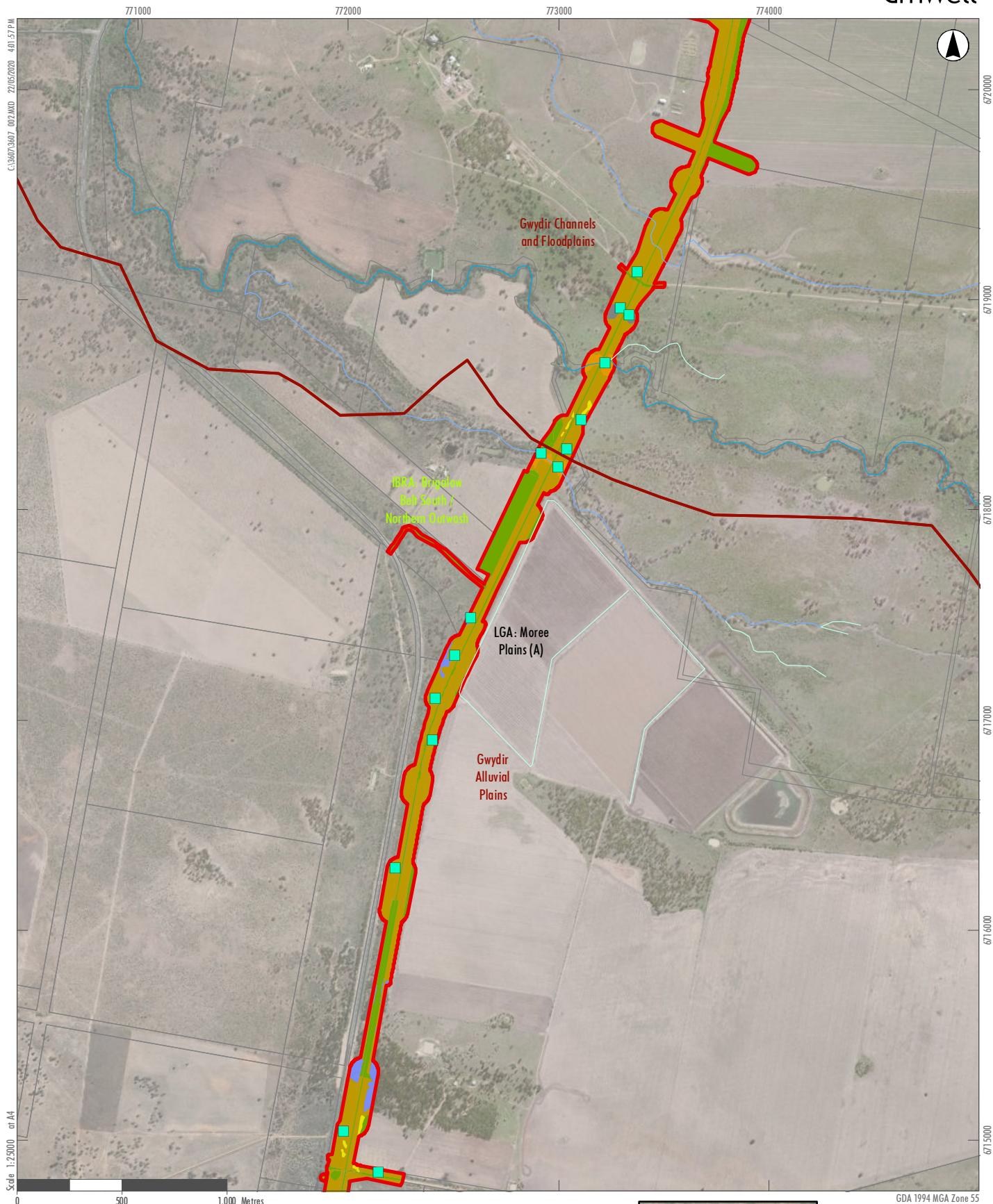


FIGURE A16
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- | Stream Order: | Vegetation: |
|---|--|
| — 1st Order | Cleared/Non-native Vegetation |
| — 2nd Order | Zone 1 |
| — 3rd Order | Zone 3 |
| | Zone 4 |
| | Zone 5 |
| | Zone 8 |

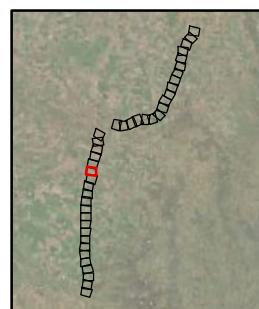
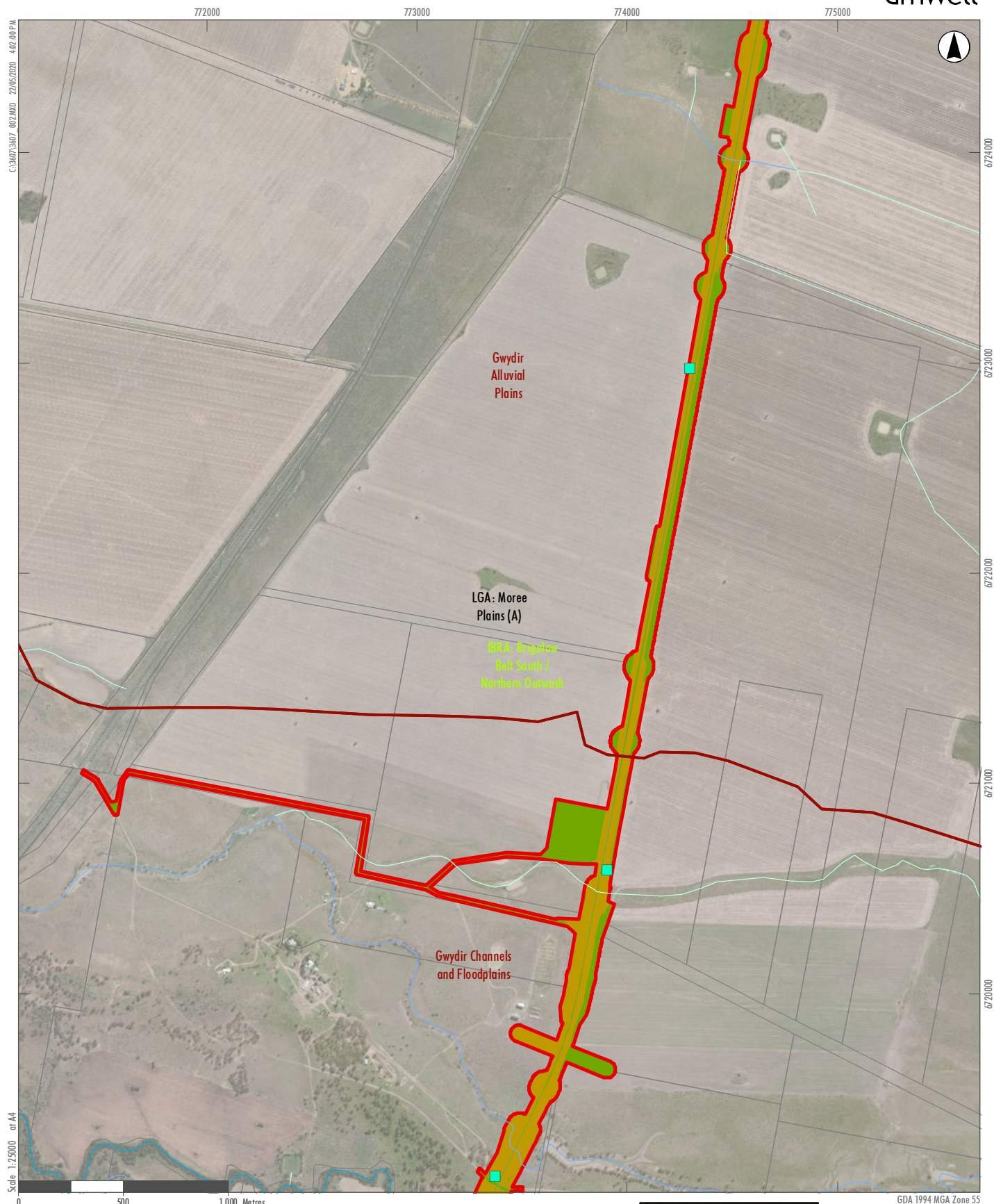


FIGURE A17
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
 - 3rd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 4

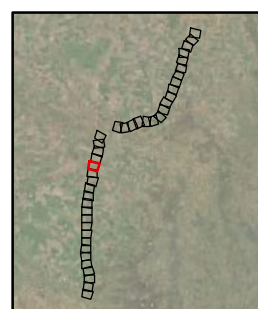


FIGURE A18
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 4

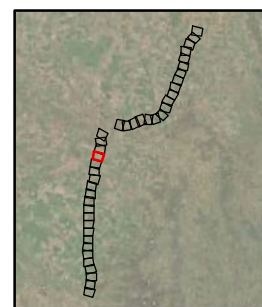
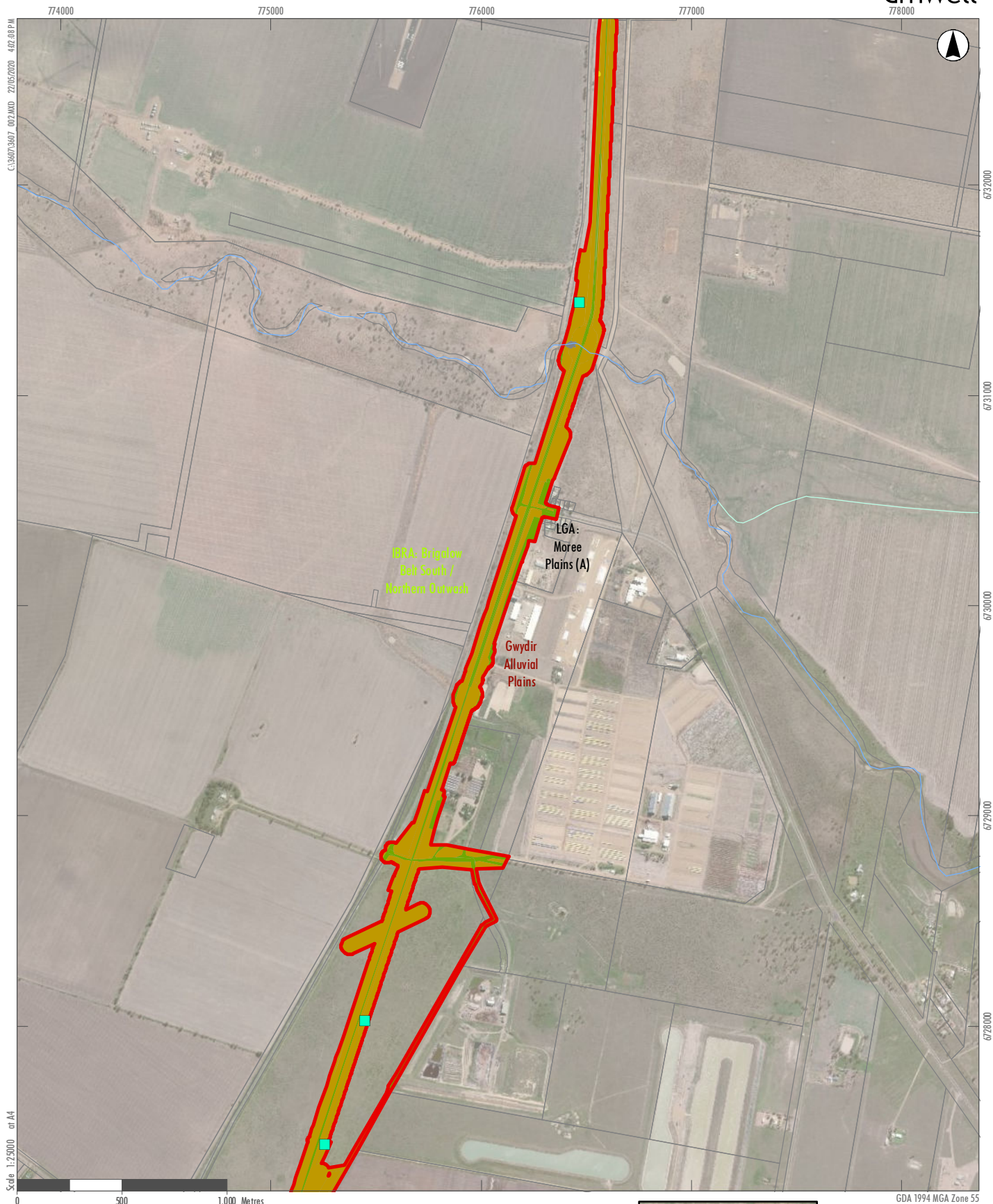


FIGURE A19
Vegetation Map



Legend

- Revised Development Footprint
- IBRA Regions and Subregion Area
- Mitchell Landscape Area
- Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order

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

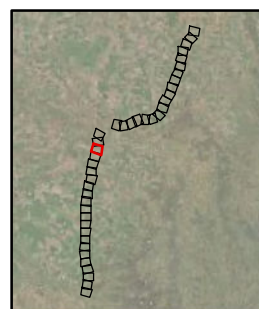
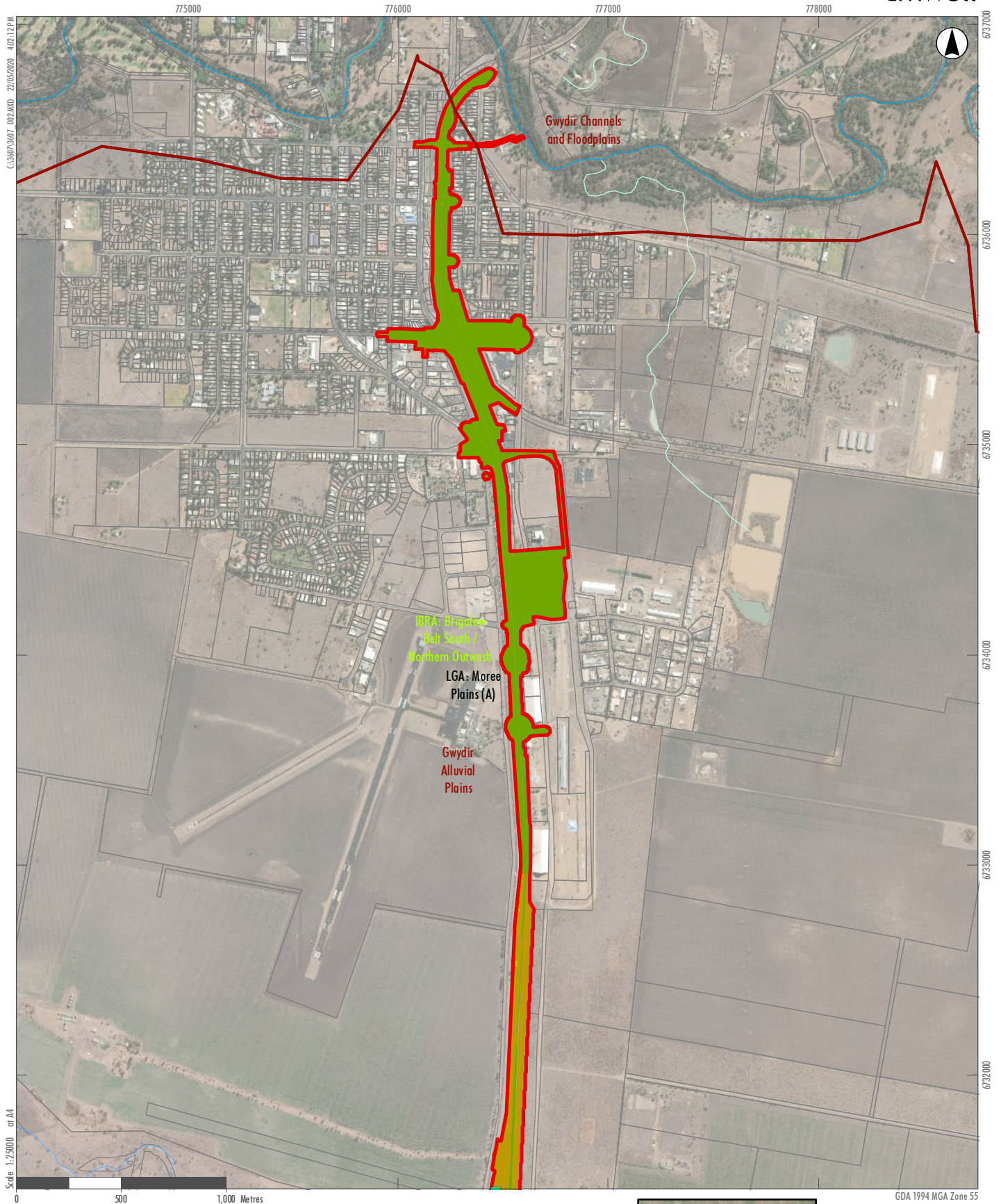


FIGURE A20
Vegetation Map



Legend

- ▬ Revised Development Footprint
- ▬ IBRA Regions and Subregion Area
- ▬ Mitchell Landscape Area
- ▬ Local Government Area
- ▬ Summer 2020 Rapid Assessment Point

- Stream Order:**
- ▬ 1st Order
 - ▬ 2nd Order
 - ▬ 3rd Order

- Vegetation:**
- ▬ Cleared/Non-native Vegetation
 - ▬ Zone 1
 - ▬ Zone 4
 - ▬ Zone 8

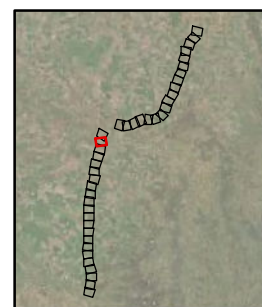
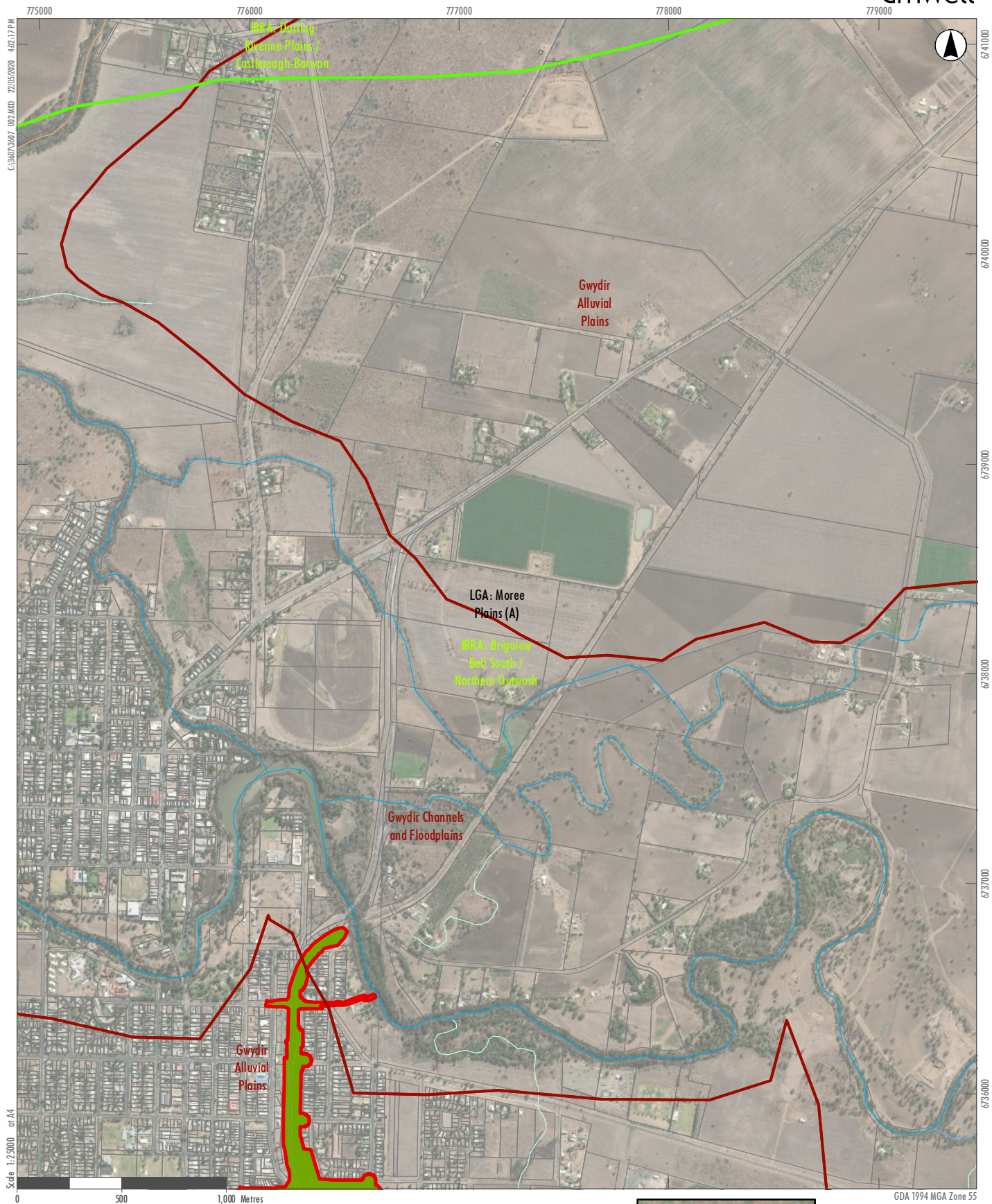


FIGURE A21
Vegetation Map



Legend

- | | | |
|---|--|--|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 2nd Order | Zone 8 |
| Local Government Area | — 3rd Order | |
| | — 5th Order | |



FIGURE A22
Vegetation Map



Legend

- | | | | |
|--|------------------------------------|----------------------|-------------------------------|
| | Revised Development Footprint | Stream Order: | Vegetation: |
| | IBRA Regions and Subregion Area | | 1st Order |
| | Mitchell Landscape Area | | 5th Order |
| | Local Government Area | | Cleared/Non-native Vegetation |
| | Summer 2020 Rapid Assessment Point | | Zone 6 |
| | | | Zone 7 |

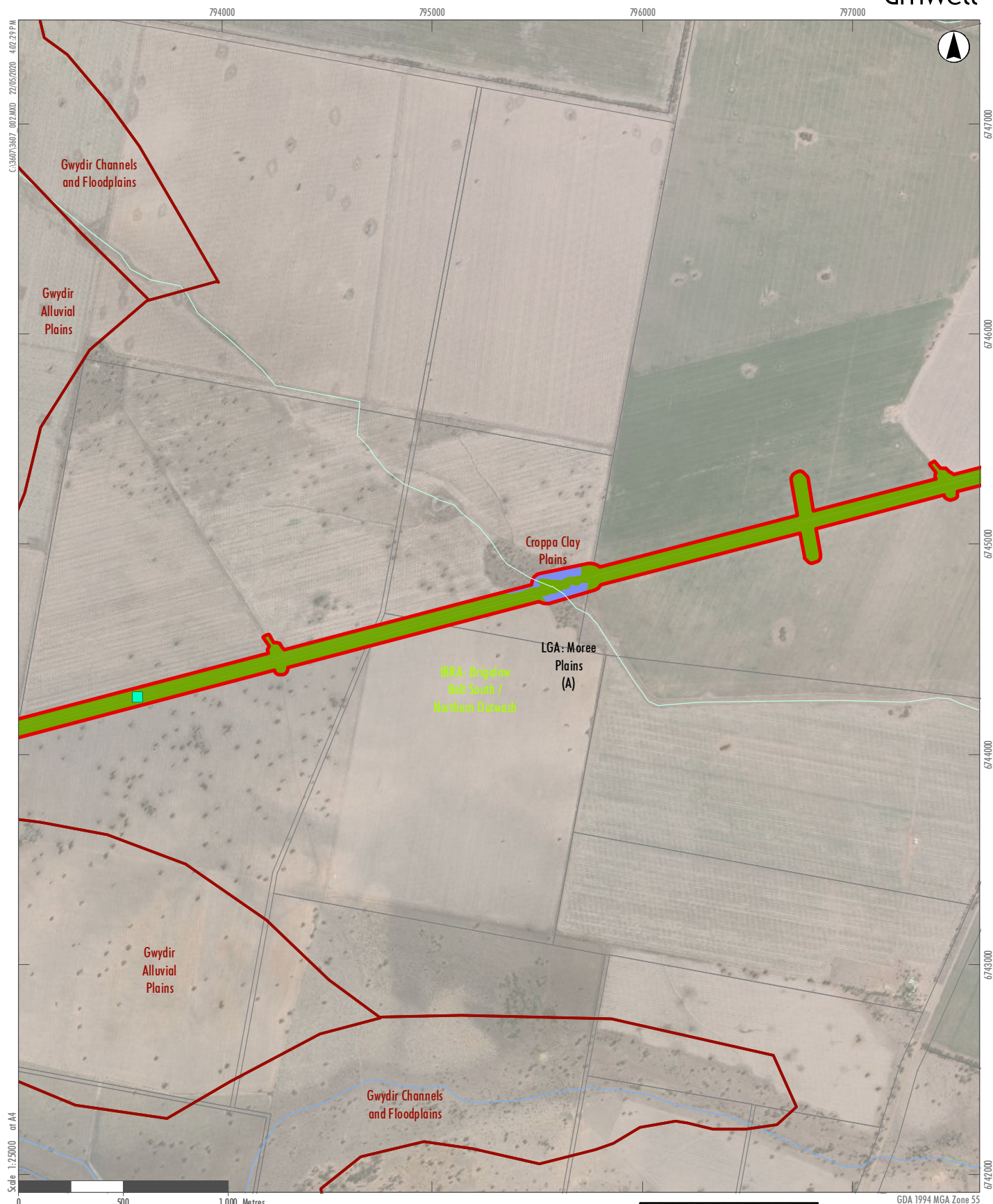


FIGURE A23
Vegetation Map



FIGURE A24

Vegetation Map



- Scale 1:25000 at A4
- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 5

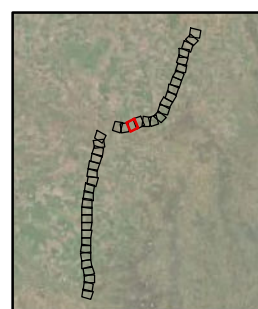
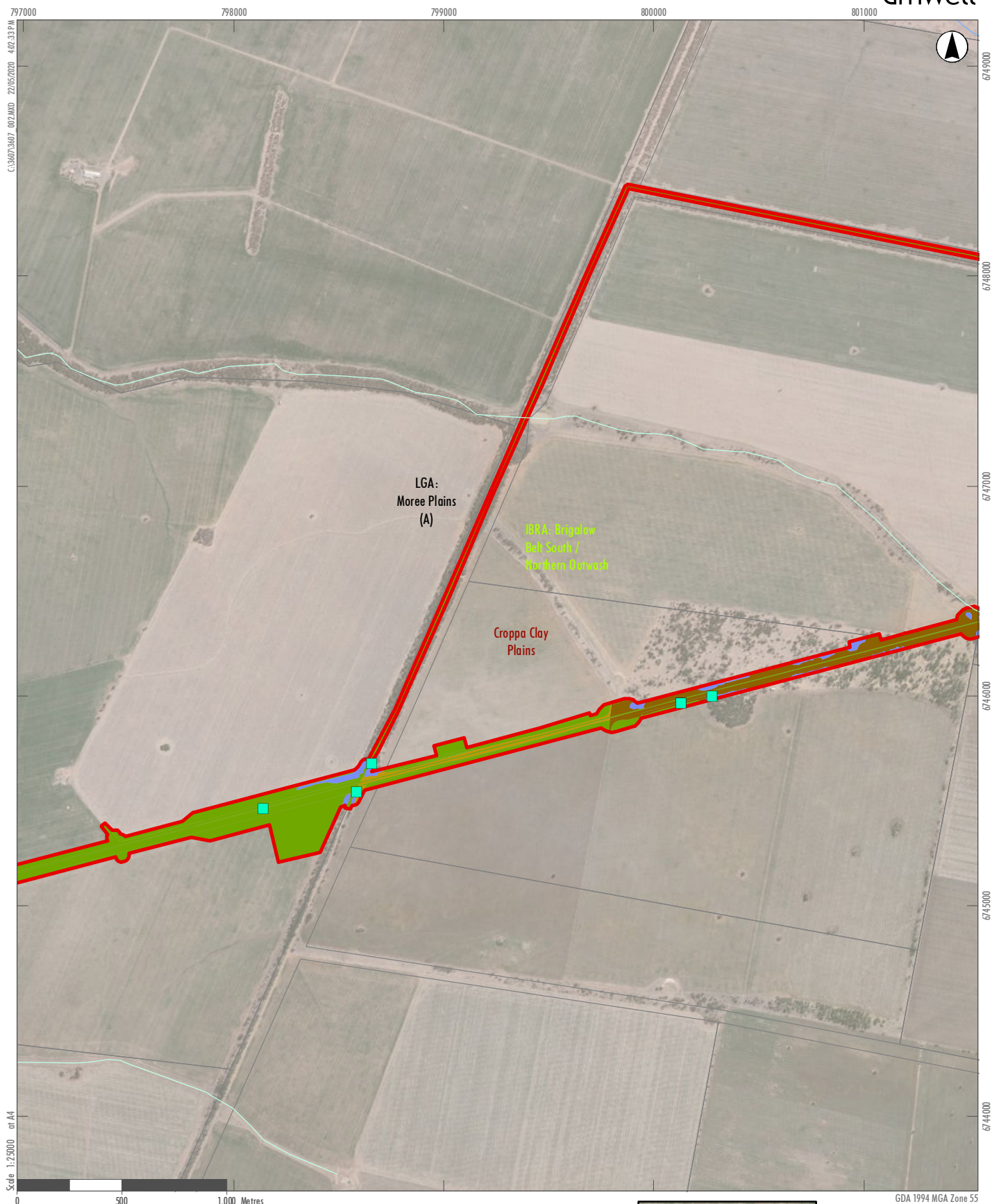


FIGURE A25
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 4
 - Zone 5
 - Zone 6

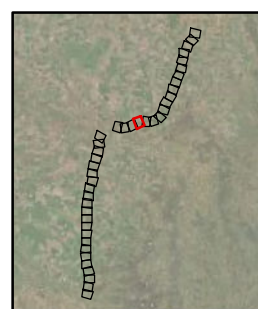


FIGURE A26
Vegetation Map



- Legend**
- Revised Development Footprint
 - IBRA Regions and Subregion Area
 - Mitchell Landscape Area
 - Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order
- Vegetation:**
- Cleared/Non-native Vegetation
 - Zone 2
 - Zone 5
 - Zone 6

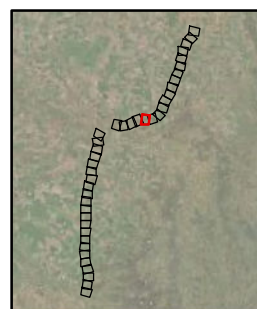


FIGURE A27
Vegetation Map



Legend

- Revised Development Footprint
- IBRA Regions and Subregion Area
- Mitchell Landscape Area
- Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- 1st Order
 - 2nd Order

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

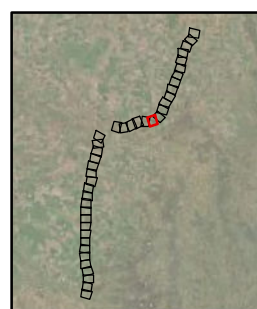


FIGURE A28
Vegetation Map



Legend

- | | | |
|---|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 2nd Order | Zone 2 |
| Local Government Area | | Zone 6 |
| ■ Summer 2020 Rapid Assessment Point | | Zone 9 |

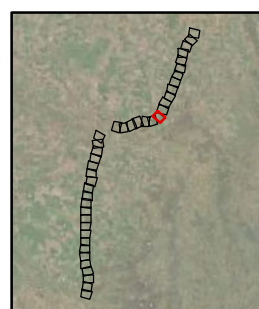


FIGURE A29
Vegetation Map



- Legend**
- ▬ Revised Development Footprint
 - ▬ IBRA Regions and Subregion Area
 - ▬ Mitchell Landscape Area
 - ▬ Local Government Area
 - Summer 2020 Rapid Assessment Point
 - Stream Order:**
 - ▬ 1st Order
 - ▬ 2nd Order
 - ▬ 4th Order
 - ▬ 5th Order
 - Vegetation:**
 - ▬ Cleared/Non-native Vegetation
 - ▬ Zone 2
 - ▬ Zone 5
 - ▬ Zone 6
 - ▬ Zone 9

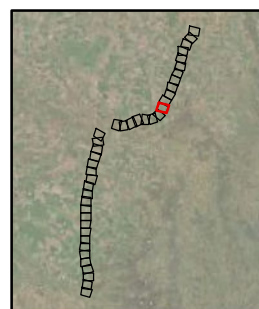
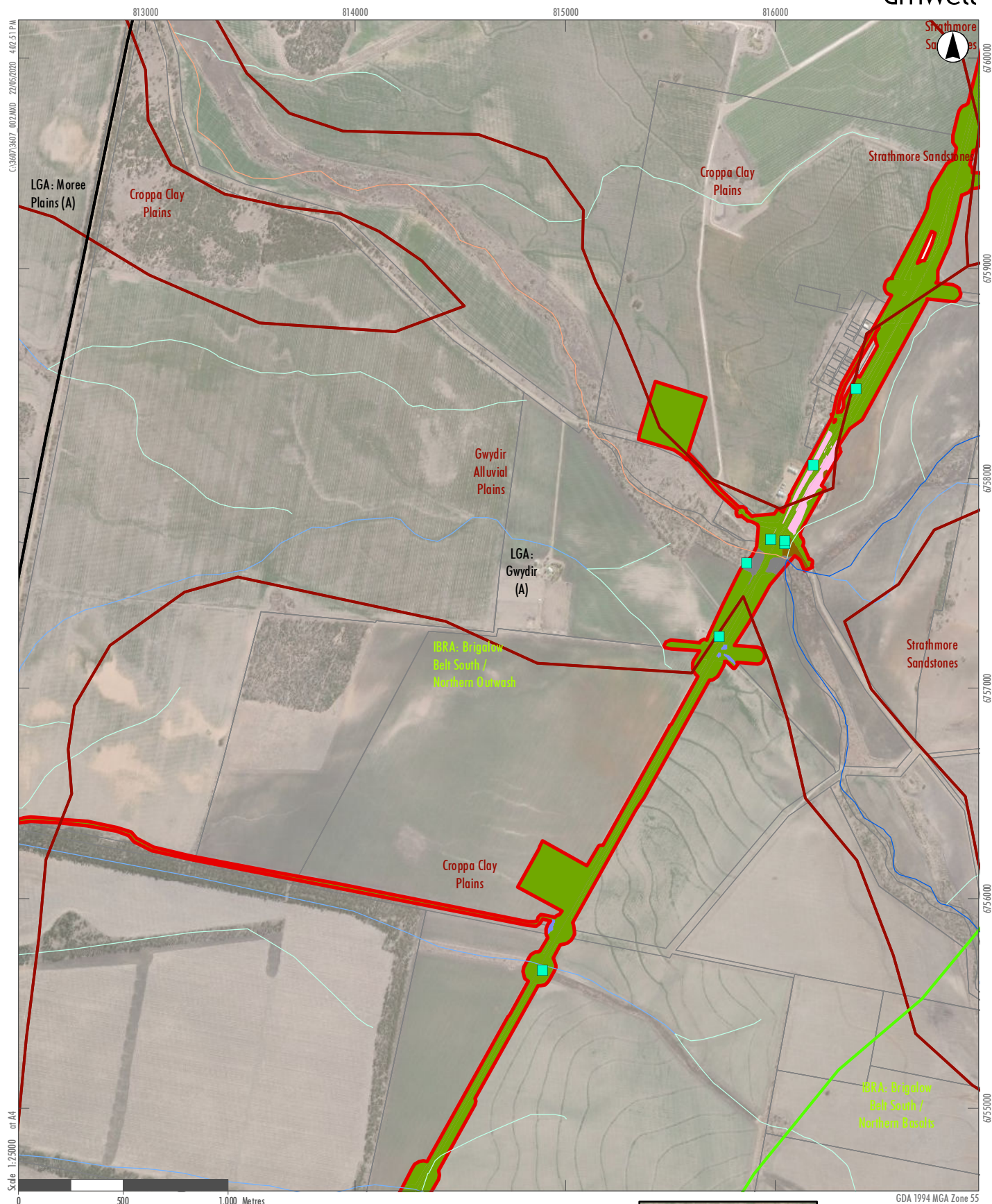


FIGURE A30
Vegetation Map



Legend

- | | | |
|---|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 2nd Order | Zone 5 |
| Local Government Area | — 4th Order | Zone 6 |
| ■ Summer 2020 Rapid Assessment Point | — 5th Order | Zone 8 |
| | | Zone 9 |

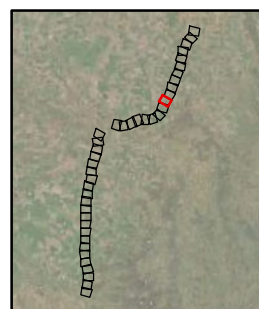
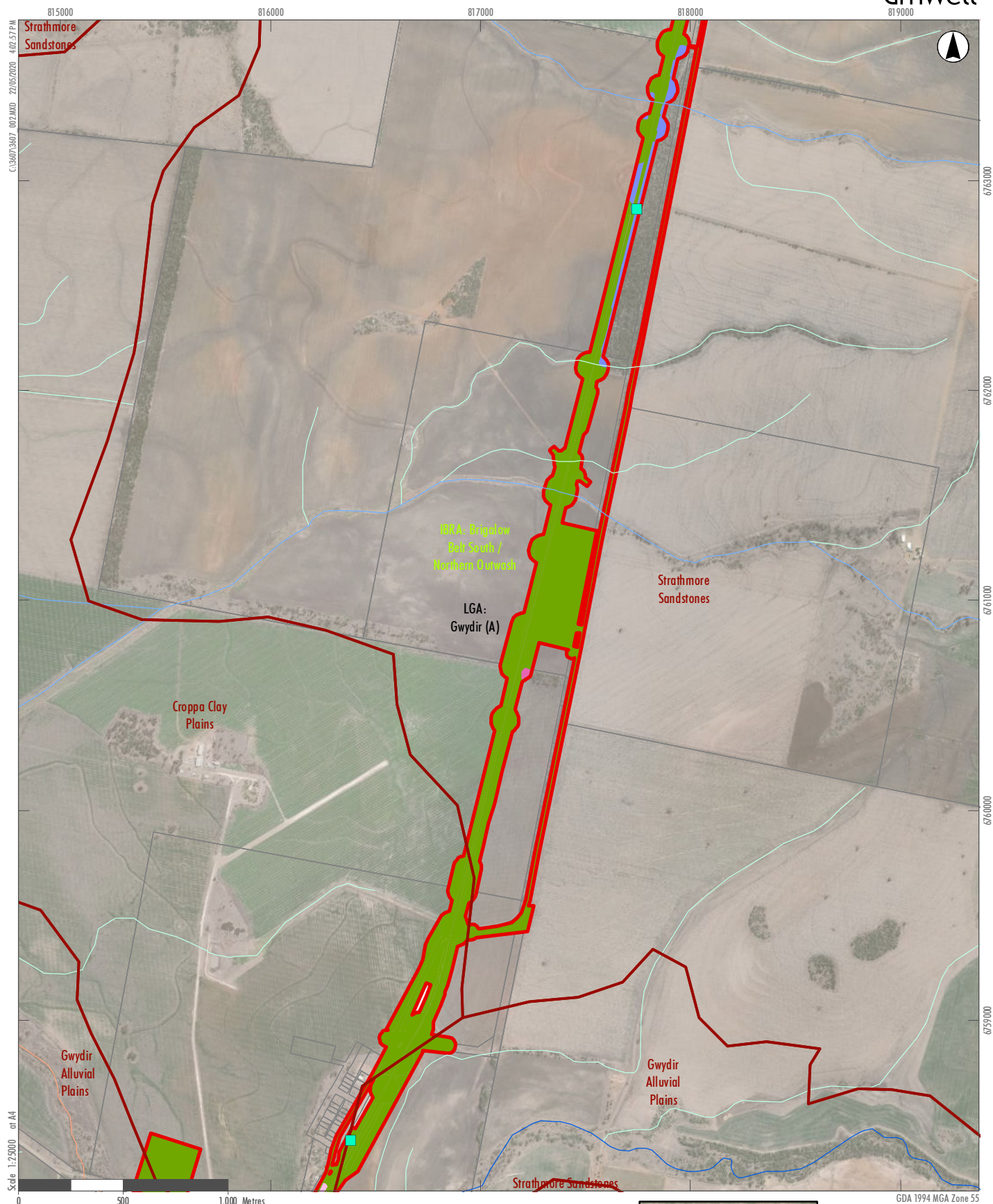











FIGURE A31
Vegetation Map



Legend

- | | | | | | |
|--|------------------------------------|---|---------------------------------|---|-------------------------------|
|  | Revised Development Footprint |  | IBRA Regions and Subregion Area |  | Cleared/Non-native Vegetation |
|  | Mitchell Landscape Area |  | Zone 5 |  | Zone 9 |
|  | Local Government Area |  | Zone 10 | | |
|  | Summer 2020 Rapid Assessment Point | | | | |
- Stream Order:
- 1st Order
 - 2nd Order
 - 4th Order
 - 5th Order

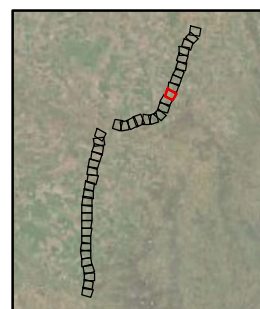
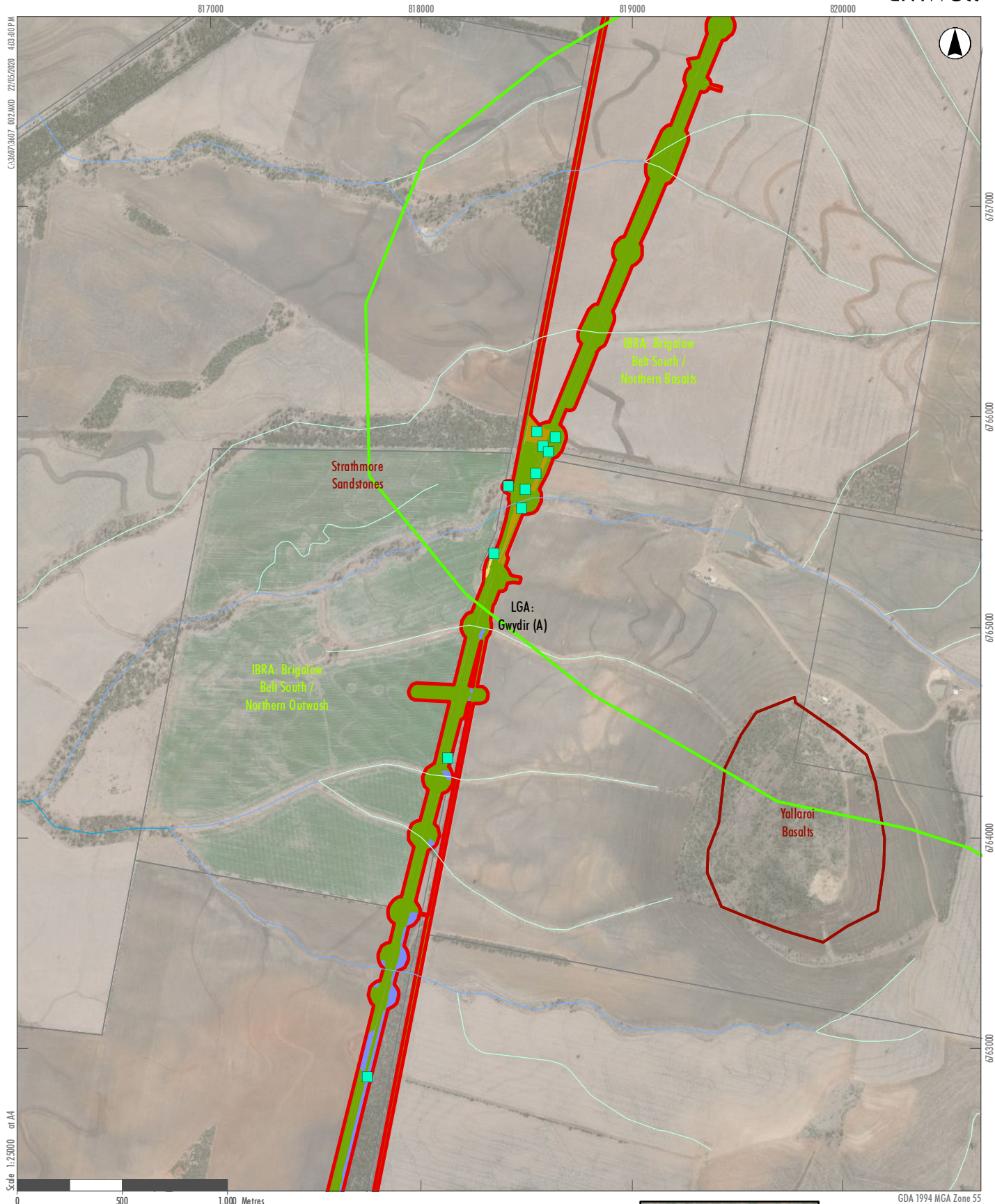


FIGURE A32
Vegetation Map



- Legend**
- ▬ Revised Development Footprint
 - ▬ IBRA Regions and Subregion Area
 - ▬ Mitchell Landscape Area
 - ▬ Local Government Area
 - Summer 2020 Rapid Assessment Point

- Stream Order:**
- ▬ 1st Order
 - ▬ 2nd Order
 - ▬ 3rd Order
- Vegetation:**
- ▬ Cleared/Non-native Vegetation
 - ▬ Zone 2
 - ▬ Zone 4
 - ▬ Zone 5

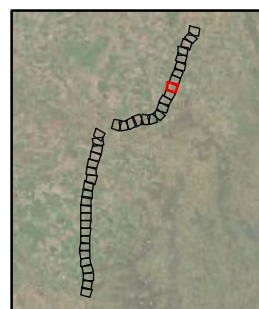
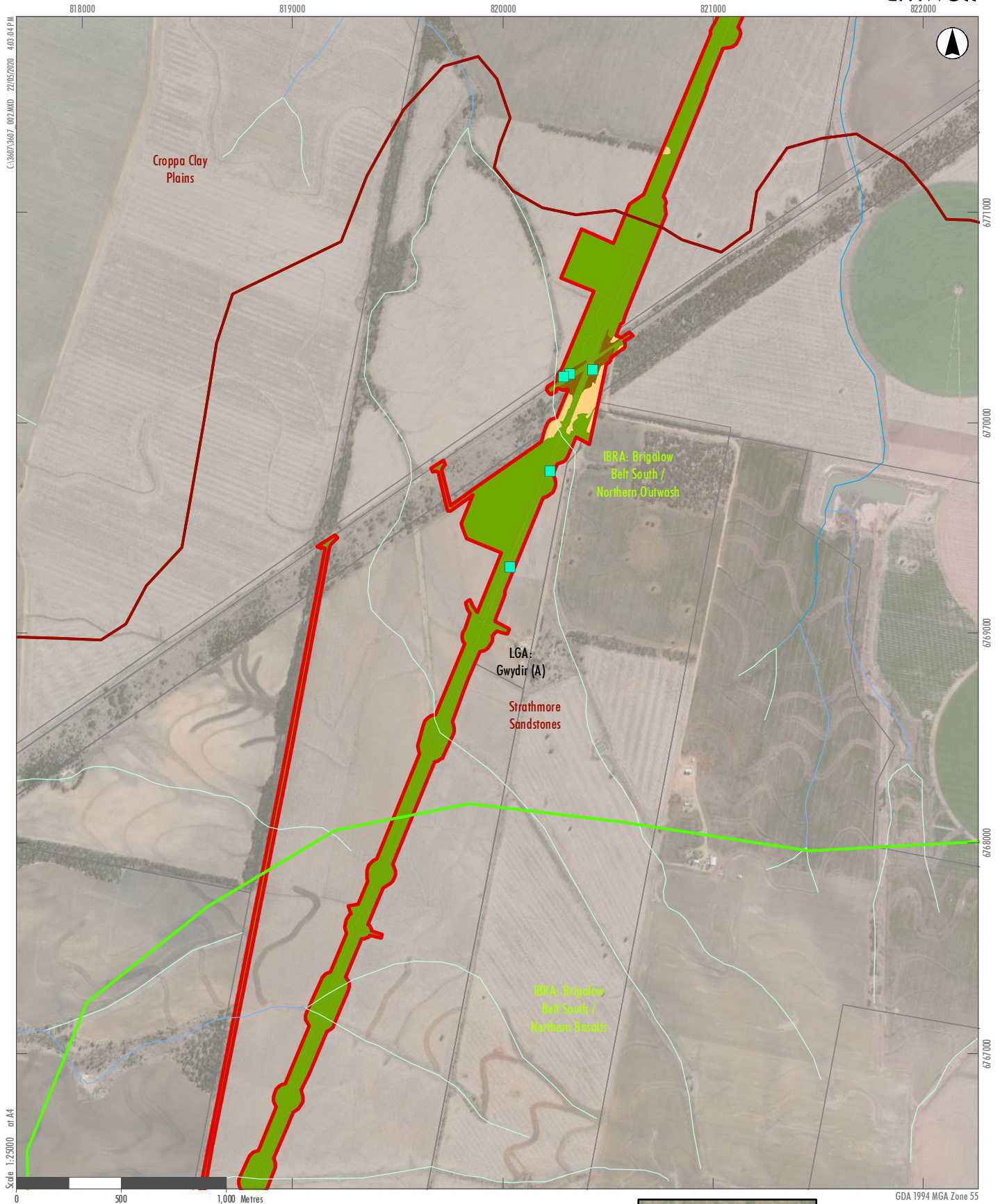













FIGURE A33
Vegetation Map



Legend

- | | | |
|---|---|---|
|  Revised Development Footprint | Stream Order: | Vegetation: |
|  IBRA Regions and Subregion Area |  1st Order |  Cleared/Non-native Vegetation |
|  Mitchell Landscape Area |  2nd Order |  Zone 2 |
|  Local Government Area |  3rd Order |  Zone 6 |
|  Summer 2020 Rapid Assessment Point | | |

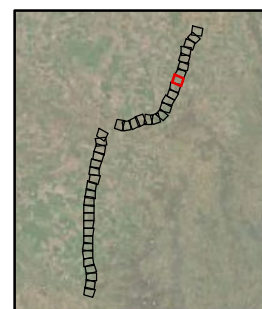


FIGURE A34
Vegetation Map

C:\36073607_002.MXD 22/05/2020 4:03:09 PM



Legend

- | | | |
|---|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 2nd Order | Zone 1 |
| Local Government Area | — 3rd Order | Zone 2 |
| ■ Summer 2020 Rapid Assessment Point | — 5th Order | Zone 4 |
| | | Zone 5 |
| | | Zone 6 |
| | | Zone 8 |

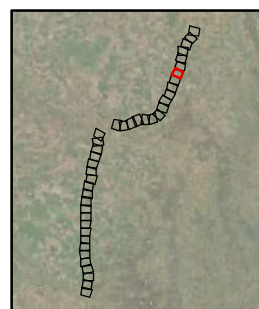
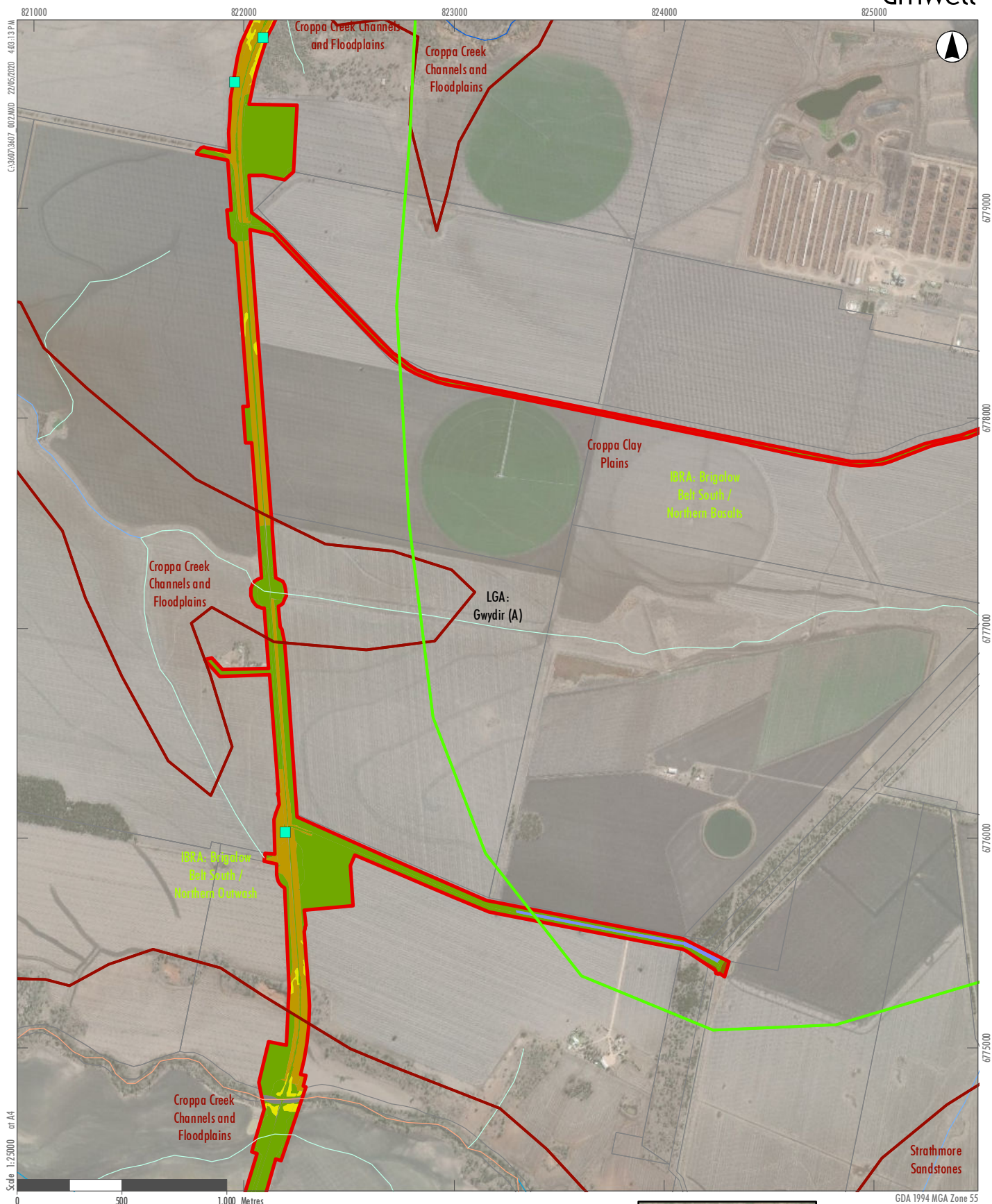


FIGURE A35
Vegetation Map



Legend

- | | | |
|---|--|---|
| Revised Development Footprint | Stream Order: | Vegetation: |
| IBRA Regions and Subregion Area | — 1st Order | Cleared/Non-native Vegetation |
| Mitchell Landscape Area | — 2nd Order | Zone 1 |
| Local Government Area | — 3rd Order | Zone 4 |
| ■ Summer 2020 Rapid Assessment Point | — 4th Order | Zone 5 |
| | — 5th Order | Zone 6 |
| | | Zone 8 |

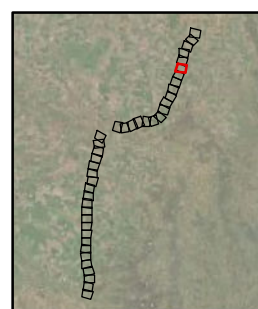
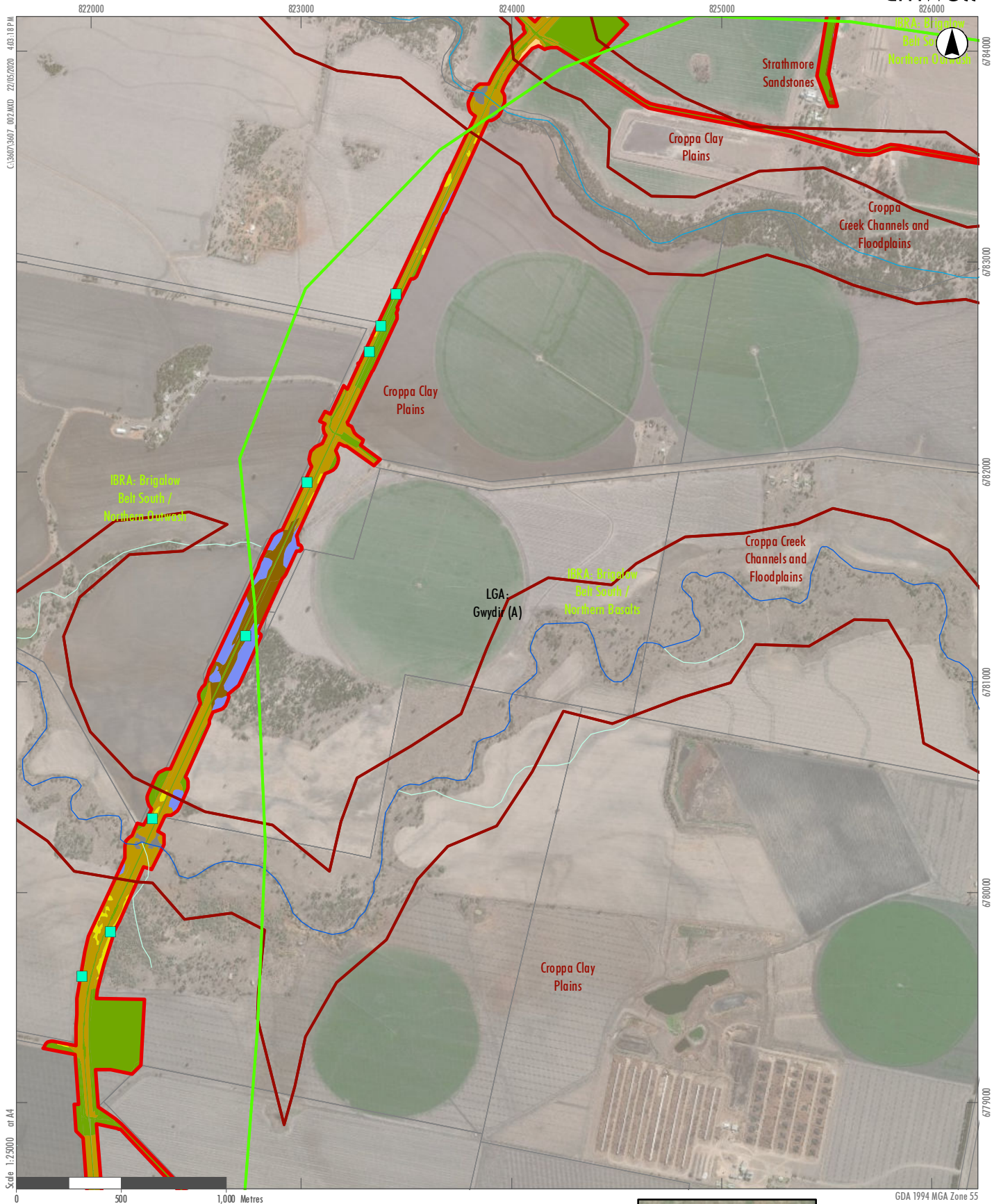


FIGURE A36
Vegetation Map



Legend

- ▬ Revised Development Footprint
- ▬ IBRA Regions and Subregion Area
- ▬ Mitchell Landscape Area
- ▬ Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- ▬ 1st Order
 - ▬ 3rd Order
 - ▬ 4th Order

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

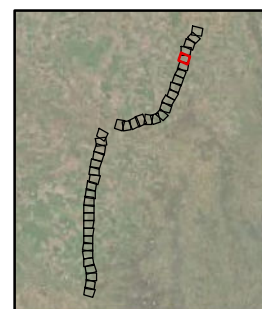
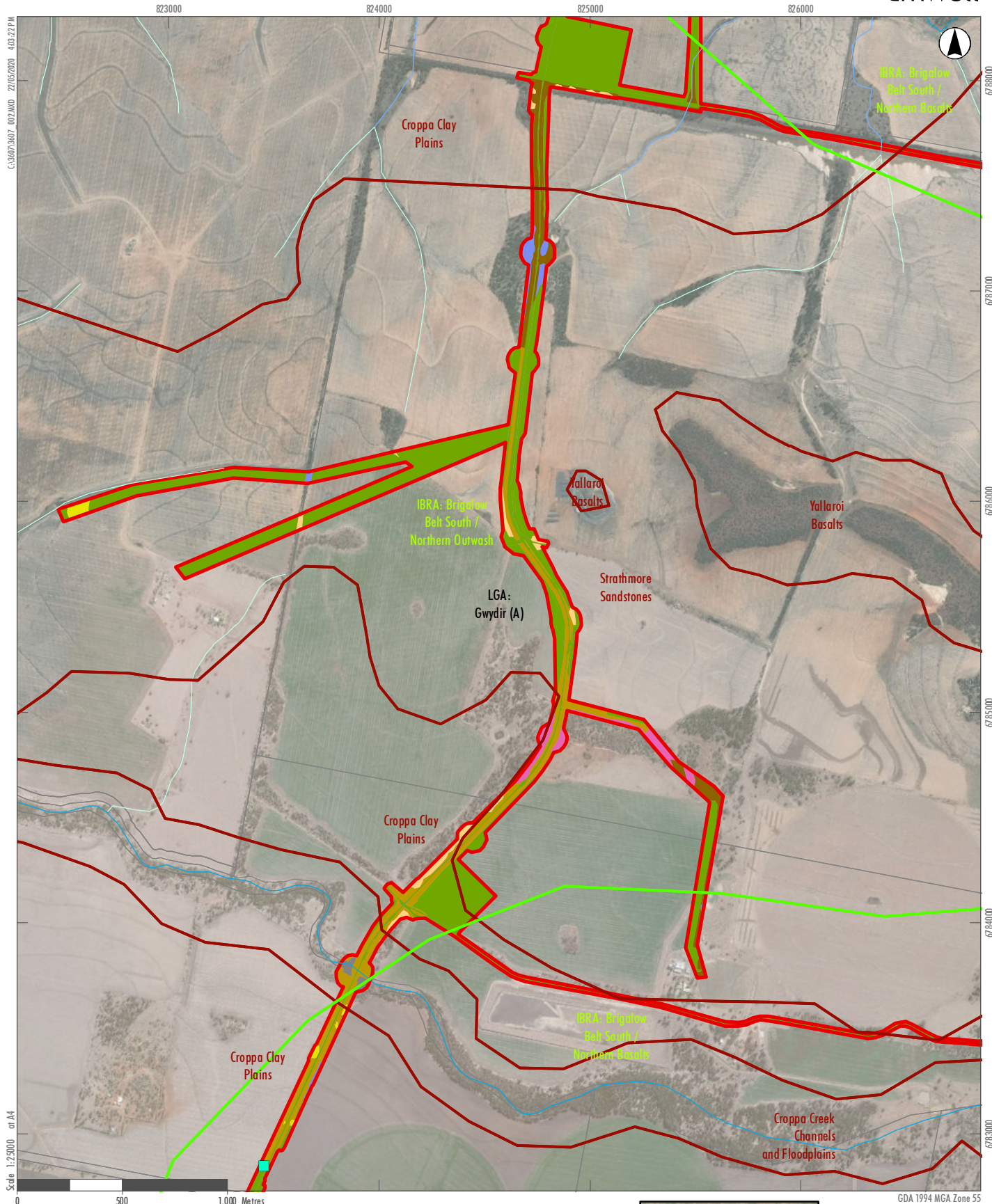


FIGURE A37
Vegetation Map



Legend

- Revised Development Footprint
- IBRA Regions and Subregion Area
- Mitchell Landscape Area
- Local Government Area
- Summer 2020 Rapid Assessment Point

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

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

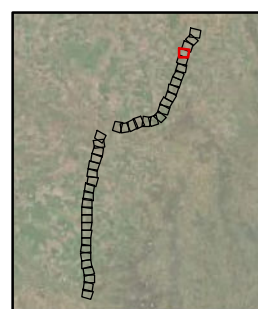


FIGURE A38
Vegetation Map



Legend

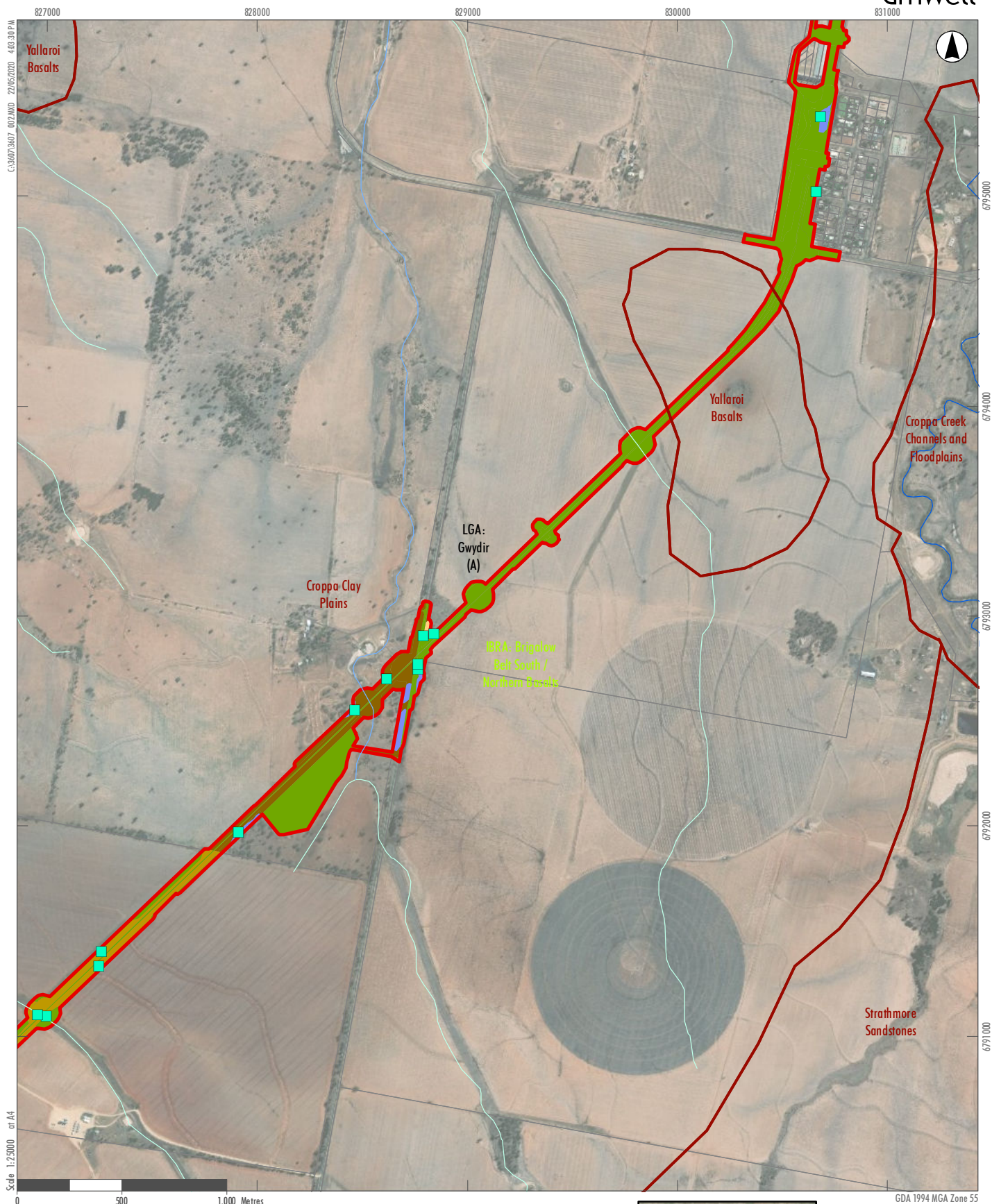
- ▬ Revised Development Footprint
- ▬ IBRA Regions and Subregion Area
- ▬ Mitchell Landscape Area
- ▬ Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- ▬ 1st Order
 - ▬ 2nd Order
 - ▬ 3rd Order

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



FIGURE A39
Vegetation Map



Legend

- ▬ Revised Development Footprint
- ▬ IBRA Regions and Subregion Area
- ▬ Mitchell Landscape Area
- ▬ Local Government Area
- Summer 2020 Rapid Assessment Point

- Stream Order:**
- ▬ 1st Order
 - ▬ 2nd Order
 - ▬ 4th Order

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

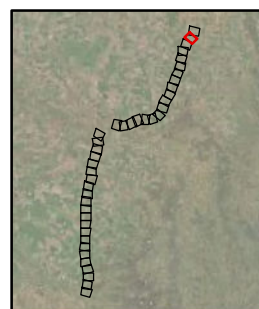
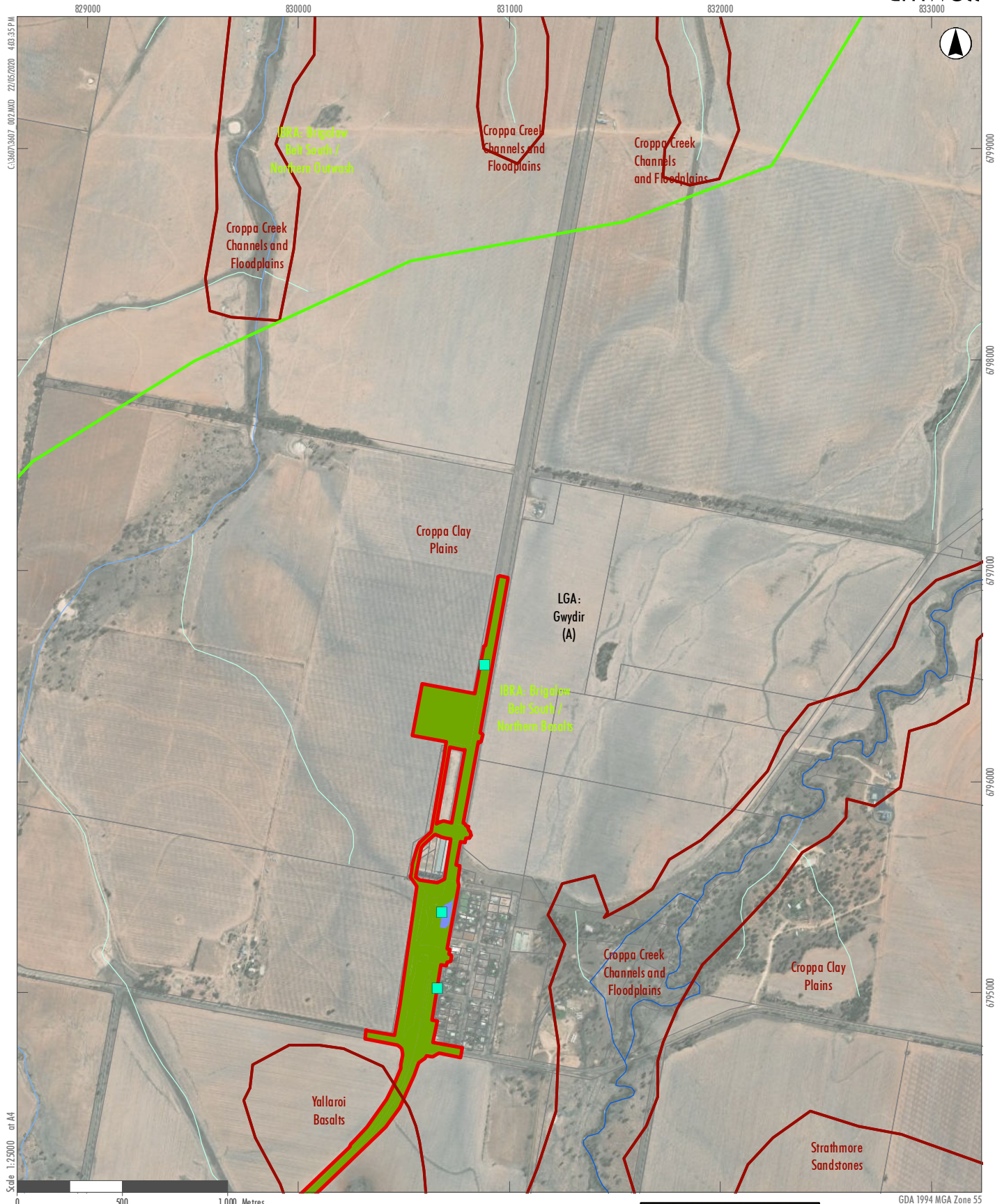


FIGURE A40
Vegetation Map



Legend

- ▬ Revised Development Footprint
- ▬ IBRA Regions and Subregion Area
- ▬ Mitchell Landscape Area
- ▬ Local Government Area
- Summer 2020 Rapid Assessment Point

- | Stream Order: | Vegetation: |
|--|--|
| ▬ 1st Order | ■ Cleared/Non-native Vegetation |
| ▬ 2nd Order | ■ Zone 5 |
| ▬ 4th Order | |

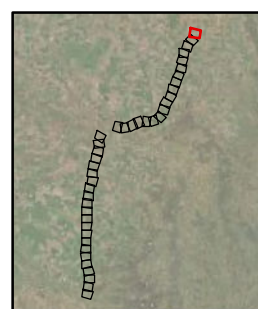
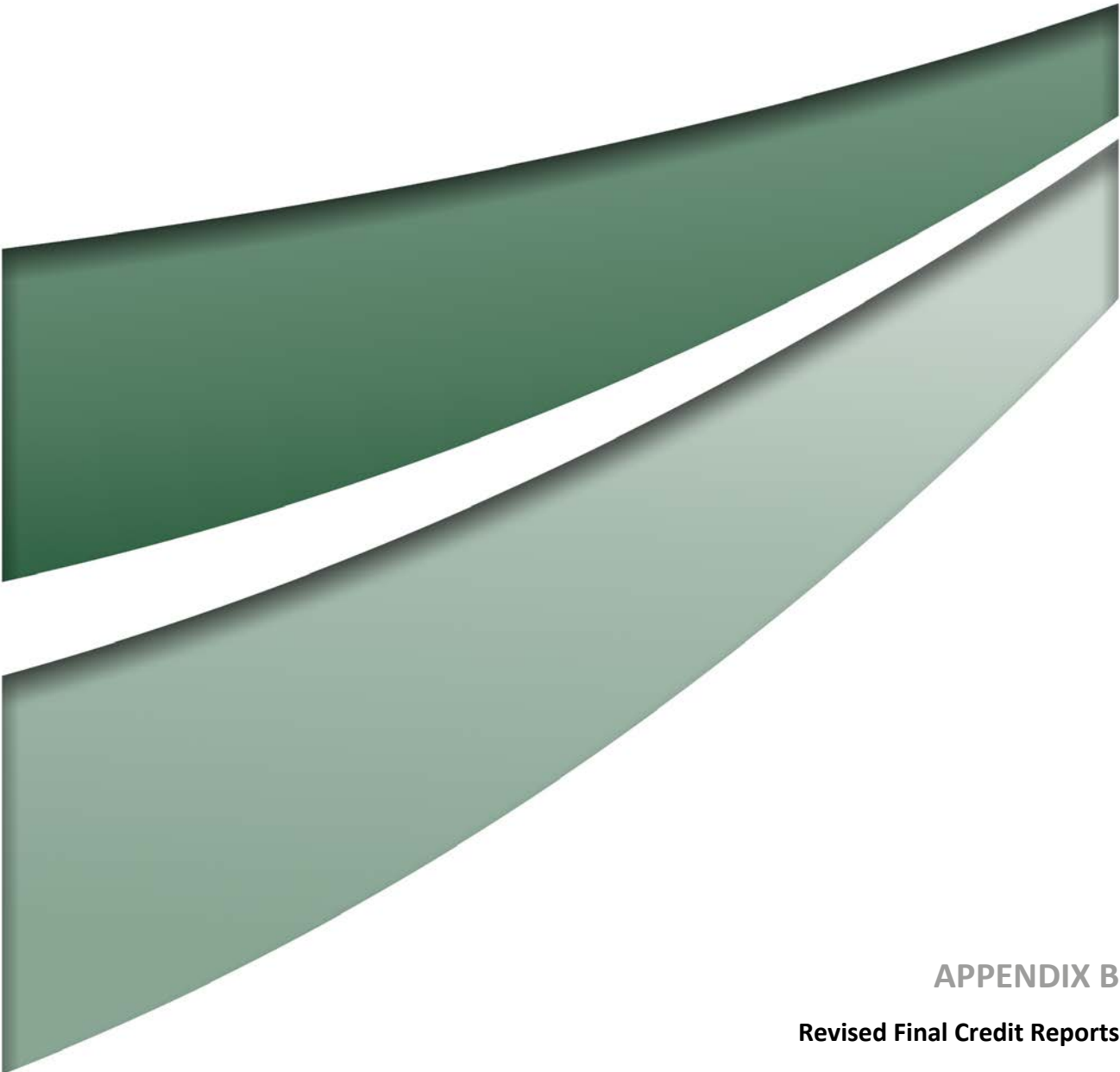


FIGURE A41
Vegetation Map



APPENDIX B

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: 22/05/2020

Time: 12:29:21PM

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	0.49	35.00
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	20.60	867.00
Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	24.23	1,127.00
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	0.19	9.00
Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	0.57	29.00
Total	46.08	2,067

Credit profiles

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

Number of ecosystem credits created	867
IBRA sub-region	Northern Basalts - Border Rivers/Gwydir

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

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	35
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	29
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

1,127

IBRA sub-region

Northern Basalts - Border Rivers/Gwydir

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

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	9
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	99.00	1,287
Belson's Panic	Homopholis belsonii	100.00	2,600

Biodiversity credit report



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

Date of report: 22/05/2020

Time: 12:28:05PM

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	16.82	1,188.04
Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion	0.51	23.00
Coobah - Western Rosewood low open tall shrubland or woodland mainly on outwash areas in the Brigalow Belt South Bioregion.	6.93	262.00
Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	1.74	93.00
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	317.55	14,224.35
Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains Bioregion	407.84	18,975.00
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	10.72	497.00
Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	3.67	160.00
Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion	17.37	870.98
Total	783.15	36,293

Credit profiles

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

Number of ecosystem credits created

14,224

IBRA sub-region

Northern Outwash

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

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 created160

IBRA sub-regionNorthern 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 - Wialda region, Brigalow Belt South Bioregion, (BR346)

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)

Northern Outwash

and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

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	1,188
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	93
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	871
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. Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion, (BR127)

Number of ecosystem credits created23

IBRA sub-regionNorthern Outwash

Offset options - Plant Community types	Offset options - IBRA sub-regions
Carbeen - White Cypress Pine - River Red Gum - bloodwood tall woodland on sandy loam alluvial and eolian soils in the northern Brigalow Belt South Bioregion and Darling Riverine Plains Bioregion, (BR127) Silver-leaved Ironbark - White Cypress Pine - Rough-barked Apple woodland on alluvial terraces in central-north NSW, (BR208)	Northern Outwash and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

7. 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	262
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

8. 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	18,975
IBRA sub-region	Northern Outwash

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

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

Number of ecosystem credits created497

IBRA sub-regionNorthern 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	255.00	6,630
Finger Panic Grass	Digitaria porrecta	66.00	858
Creeping Tick-trefoil	Desmodium campylocaulon	432.00	4,752
Koala	Phascolarctos cinereus	175.25	4,556

Biodiversity credit report



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

Date of report: 22/05/2020

Time: 12:26:48PM

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.	2.42	87.00
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	18.31	646.00
River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion	0.92	43.00
Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	0.54	24.00
Total	22.19	800

Credit profiles

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

Number of ecosystem credits created	646
IBRA sub-region	Liverpool Plains (Part B)

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

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 created24

IBRA sub-regionLiverpool 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 - Wialda 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)

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,

Liverpool Plains (Part B)

and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

(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 created87

IBRA sub-regionLiverpool 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	43
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: 22/05/2020

Time: 12:24:39PM

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.	0.14	5.00
Poplar Box - Belah woodland on clay-loam soils on alluvial plains of north-central NSW	37.35	1,408.00
Silver-leaved Ironbark - White Cypress Pine - box dry shrub grass woodland of the Pilliga Scrub - Warialda region, Brigalow Belt South Bioregion	1.51	66.00
Total	39.00	1,479

Credit profiles

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

Number of ecosystem credits created	1,408
IBRA sub-region	Northern Basalts - Namoi

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

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 created66

IBRA sub-regionNorthern 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)

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,

Northern Basalts - Namoi

and any IBRA subregion that adjoins the IBRA subregion in which the development occurs

(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 created5

IBRA sub-regionNorthern 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

