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Riparian Assessment Report

Proposed Caravan Park Development at 313 Magpie Lane, Galambine NSW

Prepared for: ADW Johnson

AEP Ref: 3282

Revision: 00

December 2023

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Document Control

Document Name	Riparian Assessment Report for Proposed Caravan Park Development at 313 Magpie Lane, Galambine NSW
Project Number	3282
Client Name	ADW Johnson
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Revision

Revision	Date	Author	Reviewed	Approved
00	25/07/2023	Kara Dunn	Frances O'Brien	Simon Purcell

Distribution

Revision	Date	Name	Organisation
00	25/07/2023	Craig Bateman	ADW Johnson

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1.0 Introduction

Anderson Environment & Planning was commissioned by ADW Johnson (the client) to undertake a Riparian Assessment Report (RAR) to inform a proposed Caravan Park Development at 313 Magpie Lane, Galambine (refer **Figure 1)**.

For the purposes of referencing, this document should be referred to as:

> Anderson Environment & Planning (2023). *Riparian Assessment Report for 313 Magpie Lane, NSW*. Unpublished report for ADW Johnson.

2.0 Site Particulars

Table 1 – Site Details

Detail	Comments
Client	ADW Johnson
Address	313 Magpie Lane, Galambine, NSW
Title(s)	Lot 1, DP 1003242 & DP 174385 (refer **Figure 1**).
Study Area	The Study Area comprises the entirety of Lot 1 DP 1003242 & DP 174385 The Study Area, comprising the parent lot, is approx. 73.58ha. The Subject Site (i.e., the proposed development footprint) is approx. 55.23ha, including Vegetated Riparian Zone and landscaped areas with native plantings.
Subject Site	The site contains some highly disturbed remnant native vegetation, and planted native and non-native vegetation, with mixed native and non-native paddock comprising the majority of the lot. Three hydrolines cross the lot, two (2) 1st Order and one (1) 2nd Order streams, although ground-truthing has not found evidence of the two 1st Order hydrolines. The site is located in a rural area, surrounded by sites of similar condition and usage.
LGA	Mid-Western Regional Council
Zoning	RU4 - Primary Production Small Lots
Current Land Use	The site is currently used as grazing land for cattle and horses. There is a single building, fences and several dams on site.
Surrounding Land Use	The surrounding lands are rural properties, predominantly with maintained pastures and grazing livestock.
State Vegetation	The following PCTs have been mapped present within the Study Area (DPE 2022); • PCT 277 – *Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion;* and • PCT 281 - *Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion.*
Proposed Development	The proposed development is for a Caravan Park.
Riparian Areas	There are two (2) mapped 1st order and one (1) 2nd order streams within the Study Area (refer **Figure 3**). These three (3) mapped watercourses are feeder tributaries of Pig and Whistle Creek. It is noted, that the mapped 2nd order stream located in the southern portion of the lot, will not be assessed as the current development plans allow for this area to be retained. Top of Bank ground-truthing and LiDAR assessment, and required VRZs will be included in this assessment (refer **Figure 7**).

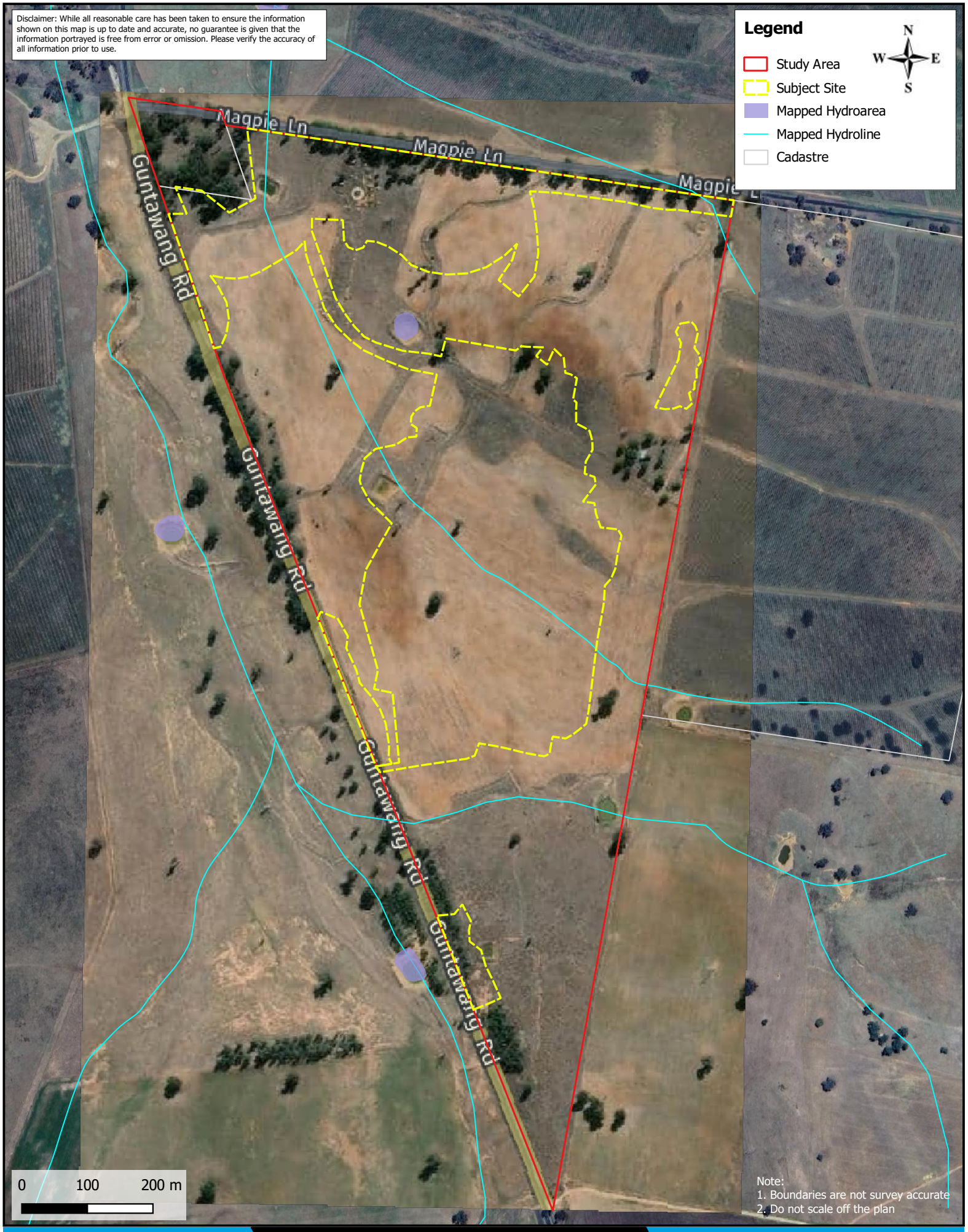

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Figure 1 - Site Location

Date: December 2023

Location: 313 Magpie Lane, Galambine, NSW

Client: ADW Johnson

AEP ref: 3282


Screen buffer planting
Refer to dwg 240401- DA -LA102
Fire fighting water storage treatment supply
Existing mechanical shed
Existing dam to be retained
Existing stream
Reduced VRZ / Revised IPZ
VRZ
Top of bank
VRZ Proposed revegetation zone (VMP) development and management of zone to VMP
Screen buffer planting
Refer to dwg 240401- DA -LA102
MAGPIE LANE
GUNTAWANG ROAD
APZ
Signage
Turfed lined storm water basin
Refer to engineers details
Existing dam to be retained
Turfed lined storm water basin
Refer to engineers details
Waste water pump station
Signage
Signage
Screen buffer planting
Refer to dwg 240401- DA -LA102
Screen buffer planting within APZ
Refer to dwg 240401 DA -LA102
Signage
Signage
1 Main entrance from Magpie Lane. Comprising of signage entrance and specimen trees with understory planting, Species and spacing to suit BPB 2019 guidance,
2 Roundabout feature to be tree planting with shrub understory providing a visual aid to enhance sense of arrival.
3 Touring Park office and amenities with layby providing arrival node for users of touring park.
4 Touring Park streets lined with turfed verges and small canopy native trees
5 Recreation space including seating areas, shade structure, amenities building wash facilities and BBQ.
6 Grassed recreational informal space including seat furniture and shade trees
7 Tree lined road with shrub understory planting provided strong visual emphasis on approaching the residential development.
8 Tree lined residential streets with shrub understory. Trees species will define main collector road and secondary collector roads
9 Community Centre 1 and external space to architects' detail
10 Community Centre 2 and external space to architects' detail
11 Office & Activities and external space to architects' detail
12 Grassed recreational informal space including seat furniture and shade trees
13 Existing trees to be retained
14 Proposed buffer screen planting - Tree quantities shown indicatively

3.0 Methodology

Field surveys for determining the status of waterfront land occurring within the Subject Site have been prepared and performed as per the Natural Resources Access Regulator (2020) Waterfront Land Tool. The tool identifies waterfront land based on three key factors:

- The presence of defined bed and banks;
- Evidence of flow and geomorphic features (whether water is present or not); and
- The presence of aquatic/riparian vegetation.

3.1 Information Sources

Information and spatial data provided within this RAR has been compiled from various sources including:

- Department of Planning, Industry and Environment (2020), Natural Resources Access Regulator Waterfront Land Tool;
- Aerial Photograph Interpretation (API) of the site using the latest NSW Spatial Services (SIX Maps) imagery (July 2023) and surrounding locality;
- NSW Government (2018) Determining Stream Order Fact Sheet;
- Water Management (General) Regulation 2018 Hydroline spatial data, accessed July 2023;
- Regional Vegetation Mapping assessed utilising State Vegetation Types Map 2022; and
- Collective knowledge gained from previous ecological survey and assessment in the area over the past 30 years.

3.2 Desktop Assessment

The following desktop analysis was conducted for the Subject Site:

- State vegetation mapping accessed via the SEED Portal (July 2023), was utilised to identify vegetation communities occurring within the Subject Site (**Figure 2**);
- Stream orders were determined using the Strahler Order system via both API and Water Management (General) Regulation 2018 Hydroline spatial data 1.0 (**Figure 3**);
- Literature review of stream ordering assessment and field assessment criteria to determine accuracy of mapped hydrolines;
- Assignment of segment identification numbers to potential watercourses (Segment ID) (**Figure 4**); and
- Investigations for streams outside of the Subject Site will consist of roadside visual inspections and further desktop analysis.

3.3 Field Survey

Field surveys were completed on 13-14 July 2023, within Lot 1 DP 174385. The mapped hydrolines within the Study Area were assessed in order to determine the presence of one or more of the following features: defined bed and banks; evidence of flow and geomorphic features (whether water is present or not); and the presence of aquatic/riparian vegetation within the tributaries.

Survey Points were assessed at various locations along each identified Segment ID.

General observations outside of the subject site were undertaken to assess the hydrolines in the broader locality (refer **Figure 5** for survey effort).

The following data was collected to ground-truth desktop level assessments:

- Assessing each mapped hydroline to determine if defined bed and banks (including locating high bank) are present;
- Identifying what type of watercourse is present (in accordance with NRAR Guide – Watercourse types);
- Determine and notate watercourse features;
- Determine presence of any Lakes or Wetlands; and
- Determine and notate any changes in vegetation communities.

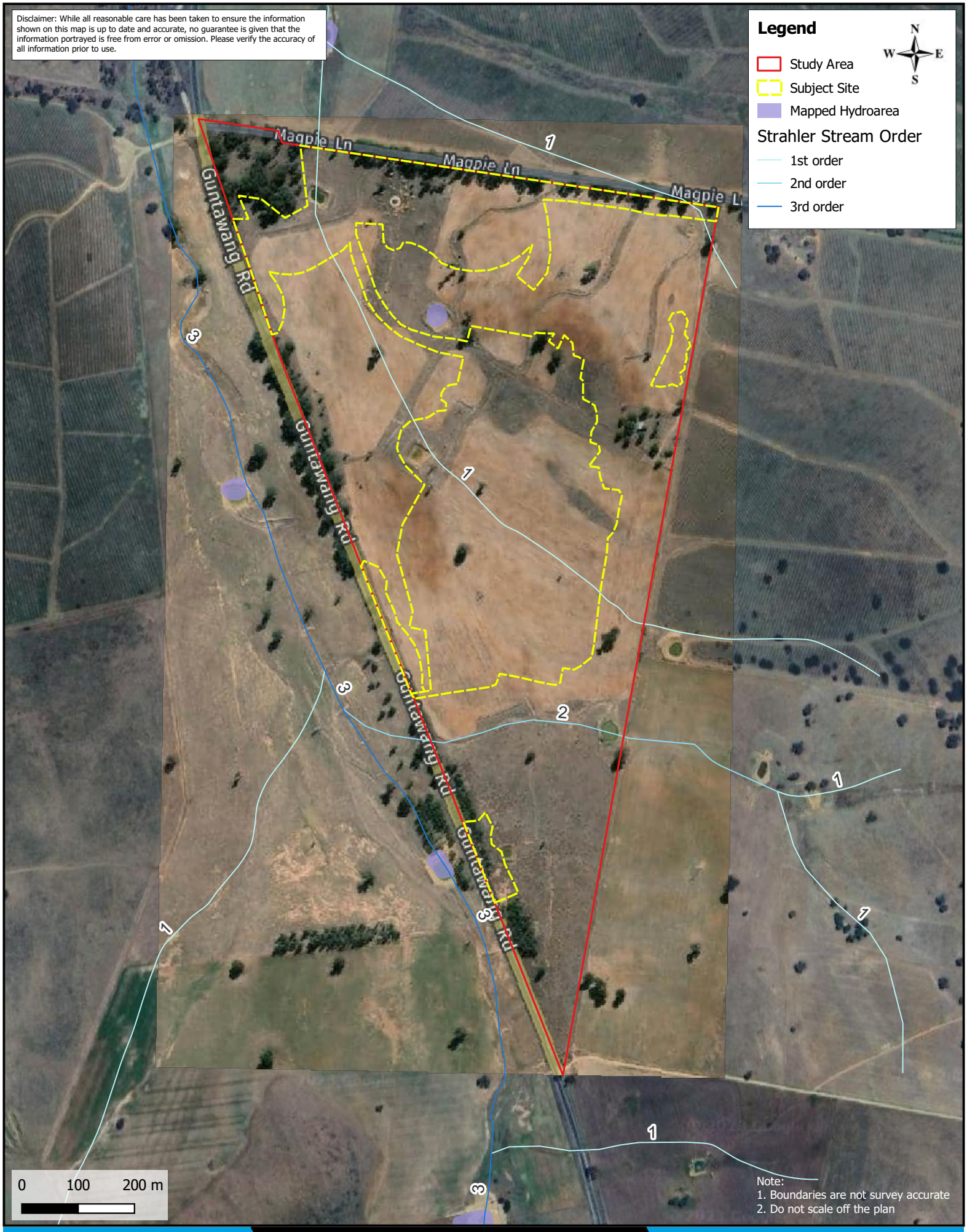

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Figure 3 - Desktop Stream Order

Date: December 2023

Location: 313 Magpie Lane, Galambine, NSW

Client: ADW Johnson

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4.0 Riparian Assessment Results

Fieldwork was conducted in July 2023 to ground-truth the stream order of the watercourses within the Subject Site and in the surrounding locality as is mapped in the New South Wales Hydroline Data Set. Desktop investigations determined that two (2) 1st order and one (1) 2nd order streams occur within the Study Area.

The 2nd order stream was not included within the watercourse assessment, as it is located south of the proposed development, however, Top of Bank ground-truthing and LiDAR assessment, and a 20m meter VRZ were assessed and are included in **Figure 7**.

Site investigations to ground-truth the two (2) 1st order watercourses identified some variation from the mapped hydrolines and stream order, as such two (2) segments were identified and four (4) survey points were investigated (refer to **Tables 2-4**, and **Figures 4** and **5**).

Table 2 – Assignment of survey identification numbers to potential watercourses

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figure
Preparation			
Prepare map allocating survey identification numbers	Yes	A desktop assessment indicated that the site contains three (3) mapped hydrolines with varying features. A explained above, two (2) segments were identified for individual targeted assessments.	4

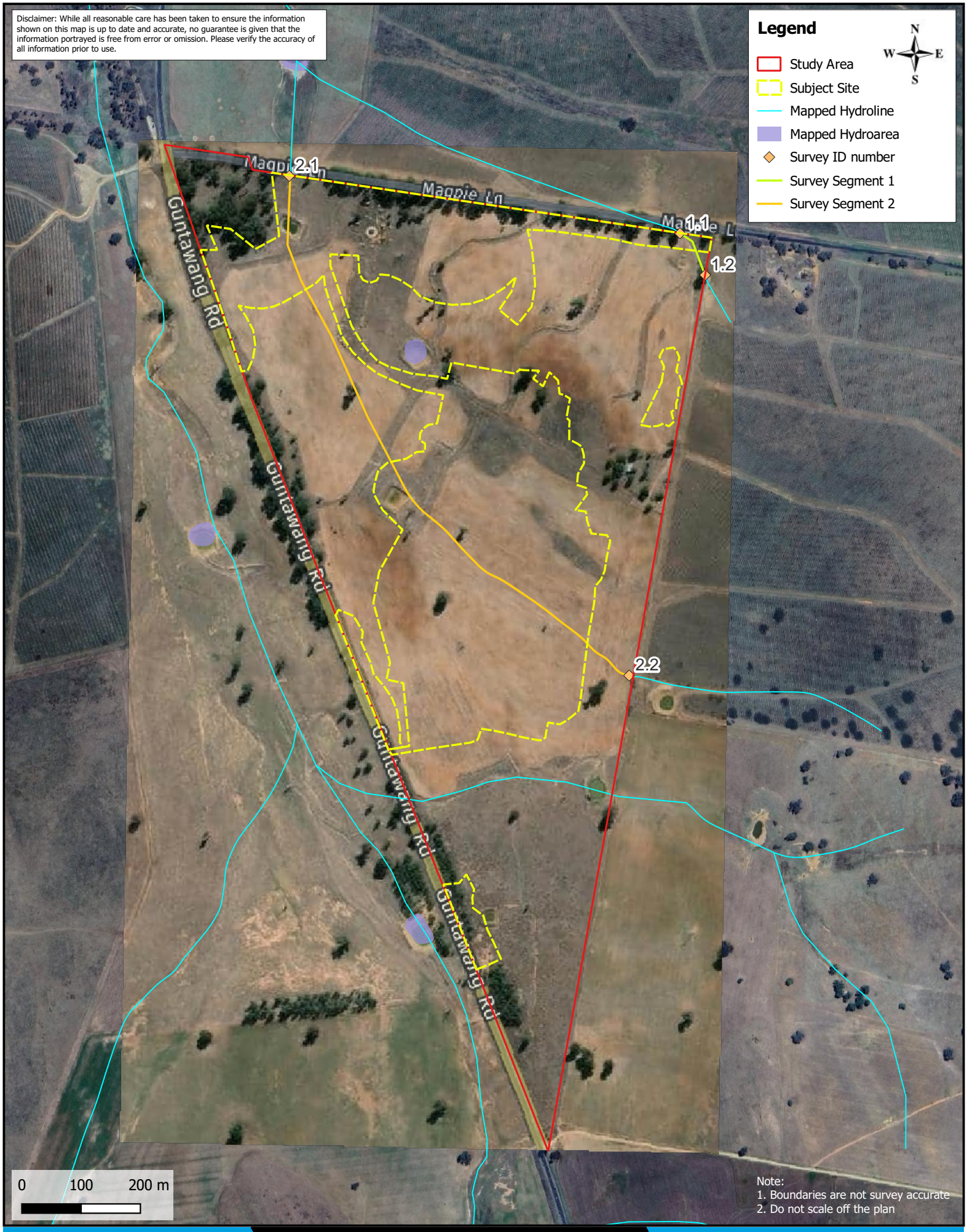

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Figure 4 - Survey Identification Number

Date: December 2023

Location: 313 Magpie Lane, Galambine, NSW

Client: ADW Johnson

AEP ref: 3282

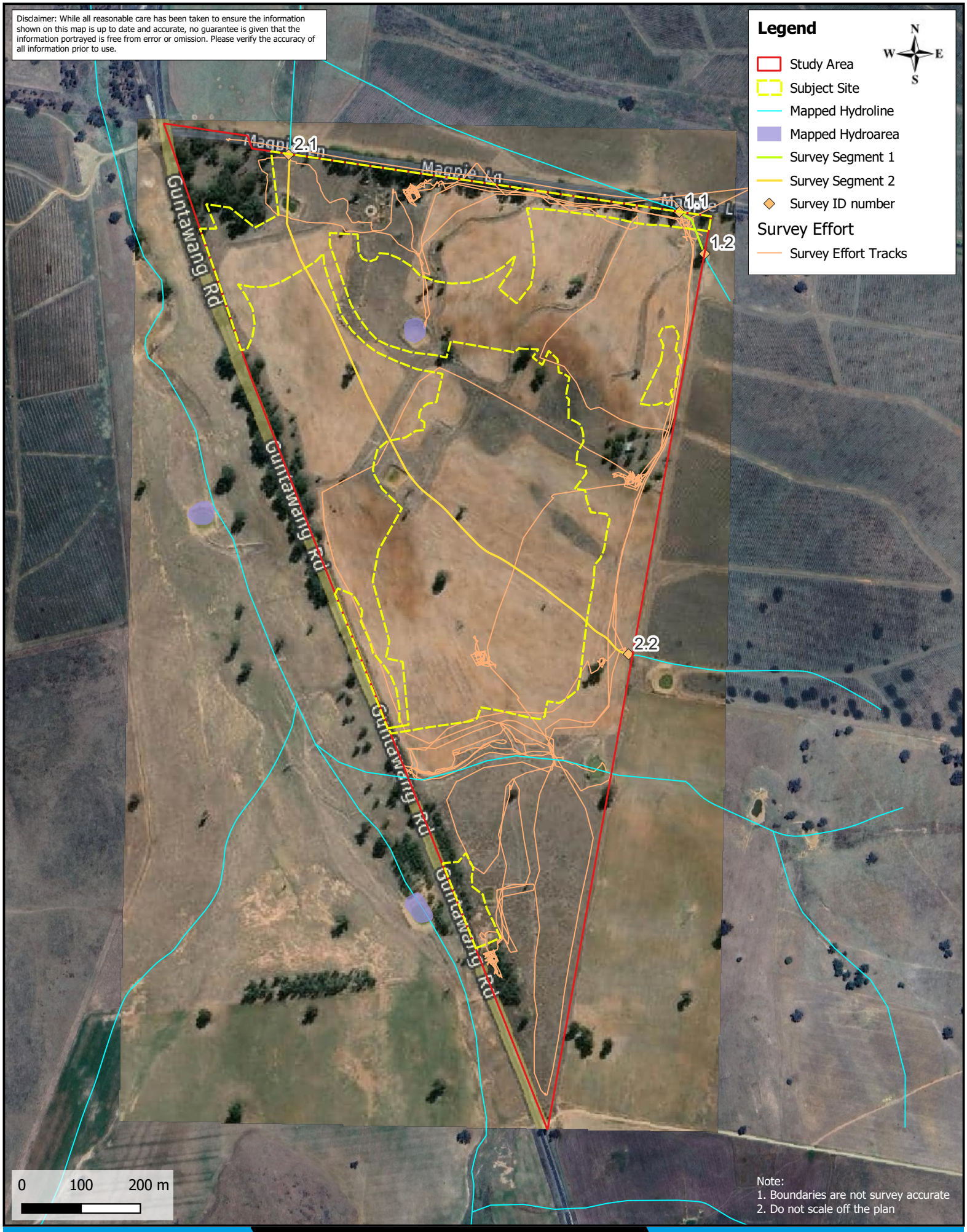

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Figure 5 - Survey Effort

Date: December 2023

Location: 313 Magpie Lane, Galambine, NSW

Client: ADW Johnson

AEP ref: 3282

Table 3 – Segment ID 1 Riparian Assessment

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figure
Desktop Assessment – Survey Point 1.1			
Is your property located on a watercourse, lake or estuary within the shaded area in any of the NRAR waterfront land maps? (Appendix 1- NRAR Guidelines, 2020)	No	No, the nearest mapped shaded waterfront land is Lake Macquarie approximately 205km to the south-east of the Subject Site.	-
Is your property within the shaded area on the NRAR Map—Western land map local government area? (Appendix 2- NRAR Guidelines, 2020)	Yes	Yes. The site location is Mid-Western Regional LGA, which is included in the Western Land map.	-
Is there a watercourse visible on your property?	Yes	Yes, as per the desktop assessment there are three (3) mapped hydro-lines within the Study Area.	3
Is there a lake or wetland on your property or within 40 metres of the proposed work? (Appendix 3 - NRAR Guidelines, 2020—Lakes and Wetlands)	No	No wetlands or lakes are located within the Study Area.	-
Using the Determining Stream Order fact sheet (Appendix 4 - NRAR Guidelines, 2020) and the NSW Hydro Line Spatial Data Map, what is the stream order of your watercourse?	1	Based on the desktop assessment, Segment ID 1 is mapped as a 1st order hydroline.	3
Field Assessment – Survey Point 1.1			
Defined Bed and Banks (Yes / No)	No	No defined bed and bank present.	6
Type of Watercourse: Type 1, Type 2, Type 3a, Type 3b, Type 3c, Type 4, Type 5, Type 6, Type 7, None (Refer Appendix 5 - NRAR Guidelines, 2020)	None	No features of a watercourse.	-
Watercourse Feature Present (Pool, Riffle, Erosion and Deposition, None)	No	No water present at the time of survey.	-
Lakes or Wetlands (Appendix 3 - NRAR Guidelines, 2020)	No	None mapped occurring on site.	-
Vegetation Present to Indicate Wetlands (Appendix 7 - NRAR Guidelines, 2020)	No	Vegetation consisted of wet and dry sclerophyll and grassland.	-
High Bank (Appendix 8 - NRAR Guidelines, 2020)	No	No identifiable high bank present.	7
Ground-truthed Waterfront Land present?	No	The inspection shows no defined bed and bank, or any watercourse features described in Appendix 6 of the Waterfront Land Tool. The 1st order stream as mapped was not observed and does not constitute waterfront land.	5, 6
Ground-truthed Numbering to Determine VRZ	N/A	No stream present.	-
Controlled Activity Approval Required (Y / N)	No	-	-

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figure
Vegetated Riparian Zone Required (m)	N/A	No stream present.	-
Comments	The mapped 1st order stream is not present within the Subject Site.		

Plate 1: Survey Point 1.1 facing south.

Plate 2: Survey Point 1.1 facing north-west.

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figures
Desktop Assessment – Survey Point 1.2			
Is your property located on a watercourse, lake or estuary within the shaded area in any of the NRAR waterfront land maps? (Appendix 1- NRAR Guidelines, 2020)	No	No, the nearest mapped shaded waterfront land is Lake Macquarie approximately 205km to the south-east of the Subject Site.	-
Is your property within the shaded area on the NRAR Map—Western land map local government area? (Appendix 2- NRAR Guidelines, 2020)	Yes	Yes. The site location is Mid-Western Regional LGA, which is included in the Western Land map.	-
Is there a watercourse visible on your property?	Yes	Yes, as per the desktop assessment there are three (3) mapped hydro-lines within the Study Area.	3
Is there a lake or wetland on your property or within 40 metres of the proposed work? (Appendix 3 - NRAR Guidelines, 2020—Lakes and Wetlands)	No	No wetlands or lakes are located within the Study Area.	-
Using the Determining Stream Order fact sheet (Appendix 4 - NRAR Guidelines, 2020) and the NSW Hydro	1	Based on the desktop assessment, Segment ID 1 is mapped as a 1st order hydroline.	3

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figure
Line Spatial Data Map, what is the stream order of your watercourse?			
Field Assessment – Survey Point 1.2			
Defined Bed and Banks (Yes / No)	No	No defined bed and bank present.	6
Type of Watercourse: Type 1, Type 2, Type 3a, Type 3b, Type 3c, Type 4, Type 5, Type 6, Type 7, None (Refer Appendix 5 - NRAR Guidelines, 2020)	None	No features of a watercourse.	-
Watercourse Feature Present (Pool, Riffle, Erosion and Deposition, None)	No	No water present at the time of survey.	-
Lakes or Wetlands (Appendix 3 - NRAR Guidelines, 2020)	No	None mapped occurring on site.	-
Vegetation Present to Indicate Wetlands (Appendix 7 - NRAR Guidelines, 2020)	No	Vegetation consisted of wet and dry sclerophyll and grassland.	-
High Bank (Appendix 8 - NRAR Guidelines, 2020)	No	No identifiable high bank present.	7
Ground-truthed Waterfront Land present?	No	The inspection shows no defined bed and bank, or any watercourse features described in Appendix 6 of the Waterfront Land Tool. The 1st order stream as mapped was not observed and does not constitute waterfront land.	5, 6
Ground-truthed Numbering to Determine VRZ	N/A	No stream present.	-
Controlled Activity Approval Required (Y / N)	No	-	-
Vegetated Riparian Zone Required (m)	N/A	No stream present.	-
Comments	The mapped 1st order stream is not present within the Subject Site.		

Plate 3: Survey Point 1.1 facing south.

Plate 4: Survey Point 1.1 facing north-west.

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figure
			

Table 4 – Segment ID 2 Riparian Assessment

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figures
Desktop Assessment – Survey Point 2.1			
Is your property located on a watercourse, lake or estuary within the shaded area in any of the NRAR waterfront land maps (Appendix 1- NRAR Guidelines, 2020)	No	No, the nearest mapped shaded waterfront land is Lake Macquarie approximately 205km to the south-east of the Subject Site.	-
Is your property within the shaded area on the NRAR Map—Western land map local government area? (Appendix 2- NRAR Guidelines, 2020)	Yes	Yes. The site location is Mid-Western Regional LGA, which is included in the Western Land map.	-
Is there a watercourse visible on your property?	Yes	Yes, as per the desktop assessment there are three (3) mapped hydro-lines within the Study Area.	3
Is there a lake or wetland on your property or within 40 metres of the proposed work? (Appendix 3- NRAR - NRAR Guidelines, 2020) —Lakes and wetlands)	No	No wetlands or lakes are located within the Study Area.	-
Using the Determining Stream Order fact sheet (Appendix 4 - NRAR Guidelines, 2020) and the NSW Hydro Line Spatial Data Map, what is the stream order of your watercourse?	1	Based on the desktop assessment, Segment ID 2 is mapped as a 1st order hydroline.	3
Field Assessment – Survey Point 2.1			
Define Bed and Banks (Yes / No)	No	No defined bed and bank present.	6
Type of Watercourse: Type 1, Type 2, Type 3a, Type 3b, Type 3c, Type 4, Type 5, Type 6, Type 7, None (Appendix 5 - NRAR Guidelines, 2020)	None	No features of a watercourse.	-
Watercourse Feature Present (Pool, Riffle, Erosion and Deposition, None)	No	No water present at the time of survey.	-
Lakes or Wetlands (Appendix 3 - NRAR Guidelines, 2020)	No	None mapped occurring on site.	-
Vegetation Present to indicate Wetlands (Appendix 7 - NRAR Guidelines, 2020)	No	Vegetation consisted of wet and dry sclerophyll and grassland.	-
High Bank (Appendix 8 - NRAR Guidelines, 2020)	No	No identifiable high bank present.	7
Ground-truthed Waterfront Land present?	No	The inspection shows no defined bed and bank, or any watercourse features described in Appendix 6 of the Waterfront Land Tool. The 1st order stream as mapped was not observed and does not constitute waterfront land.	5, 6, 7
Ground-truthed Numbering to Determine VRZ	N/A	No stream present.	6
Controlled Activity Approval Required (Y / N)	No	-	-

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figures
Vegetated Riparian Zone Required (m)	N/A	No stream present.	7
Comments	The mapped 1st order stream is not present within the Subject Site.		

Plate 5: Survey Point 2.1 facing south.

Plate 6: Survey Point 2.1 facing north.

Desktop Assessment – Survey Point 2.2			
Is your property located on a watercourse, lake or estuary within the shaded area in any of the NRAR waterfront land maps (Appendix 1- NRAR Guidelines, 2020)	No	No, the nearest mapped shaded waterfront land is Lake Macquarie approximately 205km to the south-east of the Subject Site.	-
Is your property within the shaded area on the NRAR Map—Western land map local government area? (Appendix 2- NRAR Guidelines, 2020)	Yes	Yes. The site location is Mid-Western Regional LGA, which is included in the Western Land map.	-
Is there a watercourse visible on your property?	Yes	Yes, as per the desktop assessment there are three (3) mapped hydro-lines within the Study Area.	3
Is there a lake or wetland on your property or within 40 metres of the proposed work? (Appendix 3- NRAR - NRAR Guidelines, 2020) —Lakes and wetlands)	No	No wetlands or lakes are located within the Study Area.	-

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figures
Using the Determining Stream Order fact sheet (Appendix 4 - NRAR Guidelines, 2020) and the NSW Hydro Line Spatial Data Map, what is the stream order of your watercourse?	1	Based on the desktop assessment, Segment ID 2 is mapped as a 1st order hydroline.	3
Field Assessment – Survey Point 2.2			
Define Bed and Banks (Yes / No)	No	No defined bed and bank present.	6
Type of Watercourse: Type 1, Type 2, Type 3a, Type 3b, Type 3c, Type 4, Type 5, Type 6, Type 7, None (Appendix 5 - NRAR Guidelines, 2020)	None	No features of a watercourse.	-
Watercourse Feature Present (Pool, Riffle, Erosion and Deposition, None)	No	No water present at the time of survey.	-
Lakes or Wetlands (Appendix 3 - NRAR Guidelines, 2020)	No	None mapped occurring on site.	-
Vegetation Present to indicate Wetlands (Appendix 7 - NRAR Guidelines, 2020)	No	Vegetation consisted of wet and dry sclerophyll and grassland.	-
High Bank (Appendix 8 - NRAR Guidelines, 2020)	No	No identifiable high bank present.	7
Ground-truthed Waterfront Land present?	No	The inspection shows no defined bed and bank, or any watercourse features described in Appendix 6 of the Waterfront Land Tool. The 1st order stream as mapped was not observed and does not constitute waterfront land.	5, 6, 7
Ground-truthed Numbering to Determine VRZ	N/A	No stream present.	6
Controlled Activity Approval Required (Y / N)	No	-	-
Vegetated Riparian Zone Required (m)	N/A	No stream present.	7
Comments	The mapped 1st order stream is not present within the Subject Site.		

Task – Waterland Tool (2020)	Assessment	Comments (provide evidence)	Figures

Plate 5: Survey Point 2.2 facing north.

Plate 6: Survey Point 2.2 facing west.

Additional photos were taken along the mapped hydroline location to demonstrate lack of presence on-ground:

Above: Looking south-west.

Below: Example of vegetation along the mapped hydroline. No evidence of a watercourse is present.

5.0 Summary of Investigations

Desktop surveys indicated the presence of two (2) 1st order and one (1) 2nd order hydrolines across the Study Area. However, field surveys identified a lack of watercourse features in Segment ID 1 and 2. These segments represent a convergence of overland flow from surrounding flat paddocks and pastural land. As a result, the mapped Segment ID 1 and 2 do not occur, and there will be no impacts by the proposed development.

Upon desktop investigation, the 2nd order stream in the southern portion of the site was assumed present and was not assessed using the waterfront land tool, as this stream is located south of the proposed development area. To ensure a thorough assessment, the Top of Bank was ground-truthed during field investigations in order to determine accurate Vegetated Riparian Zones (VRZ) area for this stream, thus ensuring the proposed development does not pose an impact on this watercourse (refer **Figure 7**). A 20m VRZ is required from top of bank, covering approx. 1.58ha. The VRZ is to be managed under a Vegetation Management Plan (VMP).

The DPE (Water) administers the WM Act and is required to assess activities carried out on waterfront land. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 meters of the highest bank of the river, lake or estuary. Certain activities within this land are defined as a 'controlled activity' and requires approval from the Office of Water. The Proposed Development will encroach on the 2nd order stream 40m waterfront land buffer; thus, it a Controlled Activity Approval (CAA) is required. **Table 5** outlines the works and requirements within identified stream orders for reference purposes only.

Table 5 - Riparian Corridor Matrix

Type	VRZ width (each side of WC)	Total RC width	Cycleways and pathways	Detention basins		Stormwater outlet structures and essential services	Stream realignment	Road crossings		
				Only within 50% outer VRZ	Online			Any	Culvert	Bridge
1st order	10m	20m + channel width	Yes	Yes	Yes	Yes	Yes	Yes	-	-
2nd order	**20m**	**40m + channel width**	**Yes**	**Yes**	**Yes**	**Yes**	**-**	**Yes**	**-**	**-**
3rd order	30m	60m + channel width	Yes	Yes	-	Yes	-	-	Yes	Yes
4th order or greater	40m	80m + channel width	Yes	Yes	-	Yes	-	-	Yes	Yes

Note: Where a watercourse (WC) does not exhibit the features of a defined channel with bed and banks, the NRAR may determine that the watercourse is not waterfront land for the purpose of the WM Act.

5.1 VRZ offset

The proposed development will involve encroachment within the VRZ of an unnamed 2nd order stream. It is noted that encroachment can only occur in the outer 50% of the VRZ.

As a requirement of a controlled activity approval, encroachment into the VRZ requires that the area of encroachment be offset at a ratio of 1:1 along the stream within the Study Area. The offset area will also be required to be managed under a Vegetation Management Plan (VMP) to manage and improve the VRZ.

The results of the assessment above indicate the impacted 2nd order stream occurs in managed paddocks consisting of predominately exotic pasture grasses and degraded by the presence of cattle. It offers low value to the surrounding ecosystem and local biodiversity. Additionally, water management infrastructure such as culverts and stormwater drainage are proposed to ensure any available water remains within the catchment.

It is considered the proposed development will offer an opportunity to increase biodiversity by implementing management practices associated with VMP lands. Management actions applied in the VMP lands offer significant potential gains for low to moderate effort relative to the high intensity, low yield effort required to restore the VRZ of the impacted 2nd order stream.

The lands proposed for management under this VMP offer significant opportunity to improve local and connected biodiversity by:

- Removing weeds and weed seeds from the seedbank and preventing their dispersal;
- Increasing the number of endemic native species that will contribute to the seedbanks, and increase dispersal of native seeds within the locality;
- Implementing biosecurity management practices in perpetuity in line with *Biosecurity Act 2015*;
- Rehabilitation targets set out under the VMP for vegetation integrity are in line with established benchmarks for the Plant Community Types (PCTs) identified within the Study Area; and
- Identify and remove any NSW Priority Weeds through established monitoring points in perpetuity.

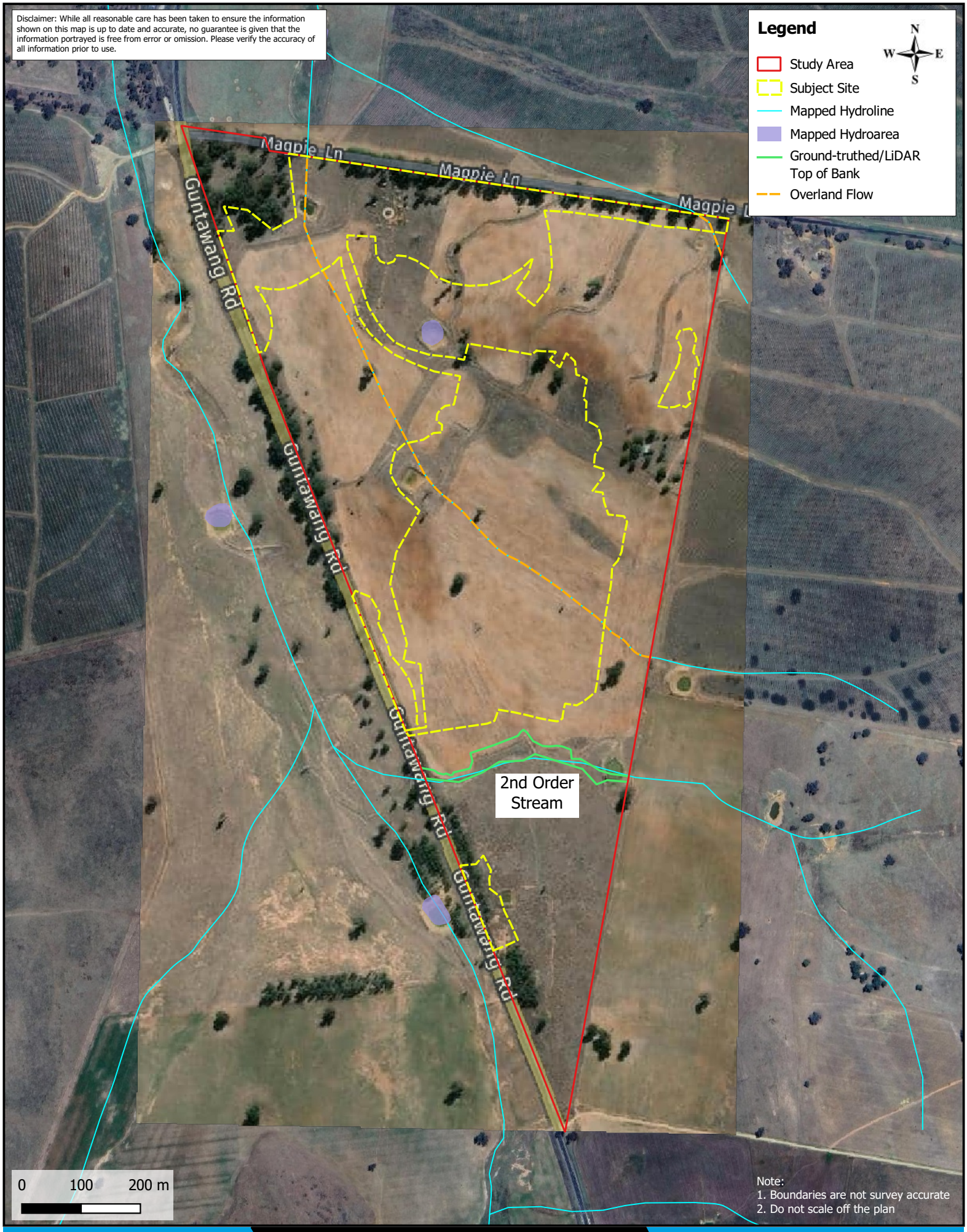

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Figure 6 - Ground-truthed STream Order

Date: December 2023

Location: 313 Magpie Lane, Galambine, NSW

Client: ADW Johnson

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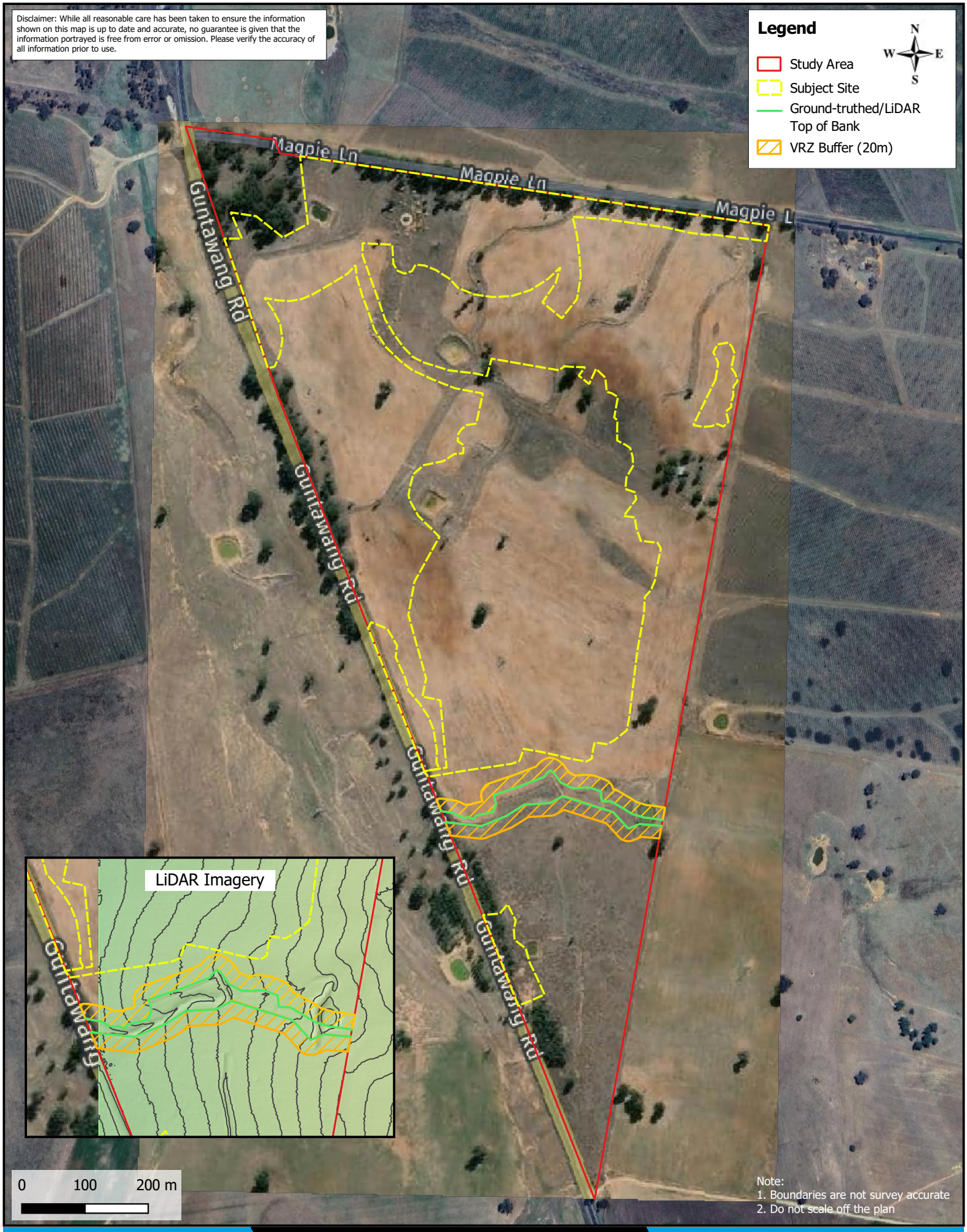

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Figure 7 - Top of Bank and VRZ

Date: December 2023

Location: 313 Magpie Lane, Galambine, NSW

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6.0 Conclusion

No watercourses were identified at the location of Segment IDs 1 and 2, located within the Study Area. For this reason, the proposed development will not be impacting upon watercourses within these locations.

The 2nd order stream in the southern portion of the Study Area is assumed present and will require a 20m VRZ (approx. 1.58ha) either side of the high bank. A CAA is required as proposed works will occur within 40m of waterfront land (of the 2nd order stream).

7.0 References

Department of Planning, Industry and Environment (2020) *Natural Resources Access Regulator Waterfront Land Tool* https://www.dpie.nsw.gov.au/nrar/how-to-apply/controlled-activities/tools accessed July 2023.

Department of Primary Industries Office of Water (2018) *Guideline for Riparian Corridors on Waterfront* Lands, https://www.industry.nsw.gov.au/__data/assets/pdf_file/0003/160464/licensing_approvals_controlled_activities_riparian_corridors.pdf, accessed July 2023.

NSW Government (2018) *Determining Stream Order Fact Sheet*; https://www.industry.nsw.gov.au/__data/assets/pdf_file/0020/172091/Determining-Strahler-stream-order-fact-sheet.pdf accessed July 2023.

NSW Government (2021) *Water Management (General) Regulation 2018 Hydroline spatial data,* https://trade.maps.arcgis.com/apps/webappviewer/index.html?id=07b967fd0bdc4b0099fc5be45b6d1392 accessed July 2023.

NSW Government (2022) *SEED Portal Geocortex Viewer*. Accessed July 2023.

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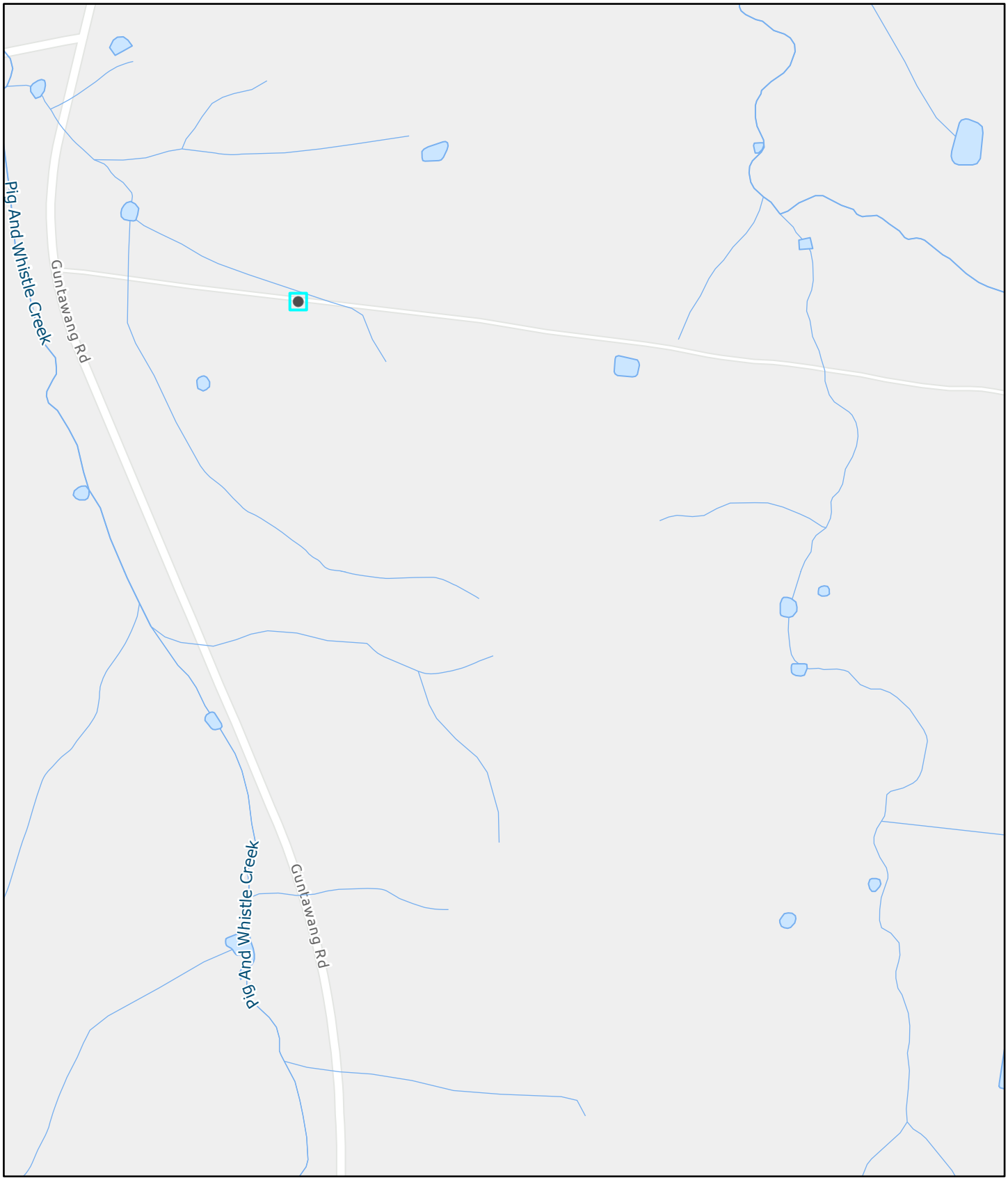
Appendix A – NRAR Hydroline Spatial Data

2018 Hydroline spatial data 1.0 - 313 Magpie Lane, Galambine



12/12/2023, 17:11:43

1:18,056

0 0.13 0.25 0.5 mi

0 0.2 0.4 0.8 km

Esri Community Maps Contributors, Esri, HERE, Garmin, Foursquare, METI/ NASA, USGS

Water Management (General) Regulation
NSW Department of Industry | Lands and Water | Water

Appendix B – Author CVs

Frances O'Brien

Curriculum Vitae

Frances is a Senior Ecologist and Lead Botanist with Anderson Environment and Planning, being an Accredited Assessor with over 12 years-experience in environmental impact assessment, environmental education, conservation land management, bush regeneration, wildlife rescue and rehabilitation, environmental sustainability, and environmental law.

Qualifications

- Biodiversity Accredited Assessor Scheme no. 20013
- Master of Environmental Law (University of Sydney NSW)
- Graduate Diploma of Legal Practice (Australian National University ACT)
- Bachelor of Environment (Climate Science) with Bachelor of Laws (Macquarie University NSW)

Further Education & Training

- NSW Driver's Licence
- First Aid in Remote Situations (HLTAID005)
- General Construction Induction Card (White Card)
- Advanced Plant Identification (University of New South Wales NSW)

Fields of Competence

- Biodiversity Assessment Method application
- Plant identification
- PCT determination
- Environmental legislation interpretation
- GIS

Relevant Employment History

2021 – Present	**Senior Ecologist (Lead Botanist)** Anderson Environment & Planning, Newcastle
2021	**Senior Scientist – Ecology** Ecology Team, Sustainability, Ecology and Climate Change Division, SMEC, Newcastle
2018 - 2021	**Ecologist/Senior Ecologist** Anderson Environment & Planning, Newcastle
2014 - 2017	**Environmental Officer** Projects Team, Seventh-day Adventist Aged Care, Greater Sydney, Wahroonga

Professional Affiliations / Memberships

- Ecological Consultants Association of NSW member
- Australian Plants Society NSW member
- Australian Association of Bush Regenerators NSW member
- Hunter Intrepid Landcare – Group Coordinator (past)
- Wahroonga Waterways Landcare - Group Coordinator (past)
- Lane Cove National Park Bushcare volunteer (past)
- Ku-ring-gai Municipal Council Bushcare volunteer (past)

Kara Dunn

Curriculum Vitae

Kara works with AEP in the role of Ecologist. She Graduated with a Bachelor of Science Majoring in Zoology in 2022, through the University of New England. Her background experience in invertebrate, avian and fauna related field work, is utilised in an array of applications in her current role.

Qualifications

- Bachelor of Science Majoring in Zoology, University of New England, 2022

Further Education & Training

- NSW Driver's Licence: Car (Class "C"). Experienced 4WD operator
- NSW Construction White Card
- First Aid (2022)

Fields of Competence

- Field assessment including: targeted fauna surveys, Koala Spot Assessment Technique (SAT) surveys, pitfall traps, light traps, sweep net sampling, camera traps and nest box inspections.
- Growing proficiency in botanical surveys, assessment of sites using Biodiversity Assessment Method (BAM) and tree surveys
- Experience in operating 4x4 vehicles
- Freshwater quality surveys and sampling
- Aquatic invertebrate surveys, involving sampling, analysis and identification

Relevant Employment History

2022 – Present

Ecologist
Anderson Environment & Planning, Newcastle

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, bushfire, planning services, advices, strategy and representation. Expanding knowledge of field survey methodology, report writing and data manipulation.

2020 - 2021

Intern
UNE Project investigating the differences aquatic assemblages between upland lagoons and farms dams in the New England region of NSW

STEVIE KAY
Curriculum Vitae

Stevie works with AEP in the role of Ecologist. Whilst studying at the University of Newcastle he conducted ecological field studies as a requirement of his degree courses. Working for NSW Department of Primary Industries (NSW DPI) at Port Stephens Fisheries Institute he gained further experience in ecological field surveys as a field technician and project officer. He has experience in targeted fauna and flora surveys, Koala Spot Assessment Technique (SAT) surveys and tree surveys.

Qualifications

- Bachelor of Science (Marine Science), University of Newcastle (2003)

Further Education & Training

- Senior First Aid
- Class C NSW Drivers Licence
- Work at Heights
- 4WD Safe Driving
- Construction White Card

Fields of Competence

- Aquatic vegetation and fish survey
- Terrestrial fauna survey, including koala SAT surveys and spotlighting

Relevant Employment History

Feb 2020 – Current	**Ecologist**
	Anderson Environment & Planning, Newcastle
Nov 2016 – May 2017	**Observer**
	NSW DPI Fisheries
Jan 2002 – Feb 2009	**Technician/Project Officer**
	NSW DPI Fisheries
Sept 2010 – Feb 2020	**Facilitator**
	Pinnacle Team Events

Relevant Volunteer Experience

- Bush Regeneration Volunteer, Hunter Indigenous Plants
- Permaculture Design, various locations

SIMON PURCELL
Curriculum Vitae

Simon works with AEP in the role of Senior Ecologist. Simon has over 7 years of professional experience managing projects in the fields of terrestrial ecology, mining and mine rehabilitation and environmental management.

Qualifications

- Bachelor of Applied Science, Major Wildlife Science, University of Queensland Gatton 2013
- Certificate III in Animal Care and Management, Companion Animal Services (2008)

Further Education & Training

- NSW Class C Driver's Licence

Fields of Competence

- Terrestrial Ecology field survey, covering terrestrial flora and fauna
- Project Management

Relevant Employment History

2020 (November) -present **Senior Ecologist**
Anderson Environment & Planning, Newcastle

- Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, mining industry, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation.

2018-2019 **Team Leader / Ecologist**
Ecotone Flora Fauna Consultants, Weipa, QLD

- Conducted client liaison meetings, providing ecological advice and recommendations for flora, fauna and land management, complying with Queensland state and Commonwealth environmental legislation.
- Wrote proposal and executed surveys for Prefeasibility studies and EIS on Western Cape York for multi-national mining company complying with Commonwealth environmental legislation.
- Negotiated increases to budget and survey requirements with the client in relation to ongoing changes and project requirements
- Led high level discussions with the client to provide new services.
- Developed wide scale camera monitoring program to assess presence /absence of EVNT fauna within the survey site.
- Complex logistical planning for remote work
- Co-developed and implemented new safety system within the business

- Mentored project managers through training, and leadership guidance to ensure quality and standards of business were met
- Managed human relation matters within the business
- Digitally transformed infield data collection through roll out of ArcGIS Collector, leading to the reduction in the use of paper in the field.

2014-2018 **Team Leader / Ecologist**
Ecotone Flora Fauna Consultants, Weipa, QLD

- Lead project manager (6 years) for all aspects of mine / drill preclearing environmental surveys across three different mine sites and exploratory sites, including during the construction phase of a new mine in the Weipa region.
- Project managed and participated in numerous annual EVNT projects that led to cultural and process practices changing within a multinational mining company.
- Played a critical role in maintaining client and stakeholder relationships and built stability with onsite leadership to further grow business opportunities.
- Maintained client confidentiality on sensitive and impactful projects.
- Ensured all projects complied with Queensland state and Commonwealth environmental legislation and clients Environmental Authority.
- Assisted in the development of growth and innovation projects such as cloud-based document storage solution to support multi-site users.

2013-2014 **Field Technician / Ecologist**
Ecotone Flora Fauna Consultants, Weipa, QLD

- Pre-clear flora and fauna mining and drilling programs
- Baseline fauna surveys of future mining areas
- Sensitive vegetation ground truthing
- EVNT flora and fauna surveys
- Seed Processing (storing, drying management of inventory)
- Mixing of seed in preparation for annual rehabilitation season

2010-2012 **Mine Operator and Trainer**
Rio Tinto, Weipa, QLD

- Acted as Crew Leader to manage 30 mine operators, production targets and minimising environmental impacts
- Skilled Caterpillar 992G, 993K & Komatsu WA900 Loader and 776D, 777F and 785C Caterpillar haul truck operator
- Crew Trainer/Assessor - completed five certificate IV modules to Training and Assessing.

2009 - 2010 **Parks and Garden Maintainer**
Spotless Group, Weipa, QLD

- Attained six competencies towards Certificate III Forest Growing and Management.
- Maintained local green spaces and houses.

2009-2009 **Vet Nurse**
Tableland Veterinary Service, Weipa, QLD

- Prepared surgery for surgeries including use of autoclave to sterilise implements
- Administered sedation via injections in the muscle and intravenously
- Prepared and monitored animals before, during and after surgeries
- Monitored animal and anaesthetic during surgery focussing on breath rate, colour of gum and pupil movements
- Took blood samples from veins and prepared samples of foreign bodies for analysis
- Successfully directed and carried out on-call emergency cases with vet assistance over the phone

2003 – 2009 **Manager**
The Pet Centre, Sydney, NSW

2001 – 2003 **Sales Assistant**
The Pet Centre, Sydney, NSW

- Implemented standard procedures for staff to follow
- Focussed on achieving a high level of OHS standards within the store
- Responsible for daily takings up to five thousand dollars per day
- Accountable for people management including rosters, recruitment and managing employee issues
- Responsible for management of store inventory
- Developed skills in handling a range of domestic animals
- Maintained animal's health and welfare in store and complied with state laws and regulations
- Analysed store's and customer's aquarium water quality
- Developed sound knowledge of animals including their origin, identification and general requirements

Relevant Volunteer Experience

2012 **Fauna Spotter / Field Assistant**
Humble Bee Films

- Volunteered as a fauna spotter/field assistant with Dr Brad Purcell and Humble Bee Films in a ten day research camp, during the production of the natural history documentary "Dingo".

2012 **Volunteer Ecological Field Assistant**
Rio Tinto, Weipa, QLD

- Participated in an ethno-botanical workshop with Rio Tinto Alcan Land and Rehabilitation team.
- Participated as a field technician during pre-mining survey work. The work included assessing flora and the land formations to identify buffer zones for natural drainage systems and sensitive areas in the Andoom mine site Weipa.

2012 **Fauna Technician**
Brad Purcell PhD,
Greater Blue Mountains World Heritage Area

- Field technician for Brad Purcell during his doctoral research project on dingoes in the Greater Blue Mountains World Heritage Area. Developed skills in use of VHF radio tracking to retrieve collars, triangulation method to determine positioning of dingoes or deployed collars and traversing bushland.