



Warrah Ridge: Waterways Constraints Assessment

Prepared for PSA Consulting Pty Ltd

DOCUMENT TRACKING

Project Name	Warrah Ridge: Waterways Constraints Assessment
Project Number	20SYD-16318
Project Manager	Alex Gorey
Prepared by	Emily Messer
Reviewed by	Claire Wheeler and Miles Yeates
Approved by	Peter Hancock
Status	Final
Version Number	v2
Last saved on	11 September 2021

This report should be cited as 'Eco Logical Australia 2021. *Warrah Ridge: Waterways Constraints Assessment*. Prepared for PSA Consulting Pty Ltd.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from PSA Consulting Pty Ltd.

Disclaimer

This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and PSA Consulting Pty Ltd. The scope of services was defined in consultation with PSA Consulting Pty Ltd, by time and budgetary constraints imposed by the client, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.

Template 2.8.1

Contents

1. Introduction	1
2. Legislative context	3
2.1 Environmental Planning and Assessment Act 1979 and Regulation 2000	3
2.2 Water Management Act 2000 (WM Act)	4
2.3 Fisheries Management Act 1994	6
2.4 Liverpool Plains Local Environmental Plan 2010 and Development Control Plan 2014.....	7
3. Methods	8
3.1 Literature and data reviews	8
3.2 Desktop analysis	8
3.3 Field survey.....	8
5. Results	11
5.1 Desktop results	11
5.1.1 Wetlands	11
5.1.2 Groundwater dependent ecosystems	11
5.1.3 Watercourses	11
5.2 Field-validated results.....	11
6. Discussion	17
Appendix A Watercourse results	18

List of Figures

Figure 1: Context and location	2
Figure 2: Vegetated Riparian Zone and watercourse channel comprising the riparian corridor (NRAR, 2018)	5
Figure 3: Riparian ‘averaging rule’ for offsetting encroachment into the outer 50% of the VRZ (NRAR 2018)	6
Figure 4: Desktop constraints	9
Figure 5: Areas targeted during the field survey.....	10
Figure 6: Field-validated watercourses (overview)	13
Figure 7: Field-validated watercourses (northern portion of site)	14
Figure 8: Field-validated watercourses (southern portion of site)	15
Figure 9: Highly constrained areas.....	16

List of Tables

Table 1: Recommended riparian corridor widths relative to Strahler Order (NRAR 2018)	5
Table 2: Riparian corridor (RC) matrix of permissible use (NRAR 2018)	6

1. Introduction

ELA was engaged by PSA Consulting Pty Ltd to conduct a constraints assessment for a subset of land at Warrah Ridge in the Liverpool Plains (Figure 1). It is understood the assessment will assist in the identification of potential sites for the development of poultry farms. An initial desktop constraints assessment has been completed by 28 South Environmental in June 2020. The results identified the following threatened ecological communities and threatened species habitat, identified as Commonwealth Matters of National Significance and NSW Matters of State Environmental Significance respectively, as likely to occur on site:

- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland (Natural grasslands on basalt and fine-textured alluvial plains)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box Gum Woodland)
- Core Koala Habitat (as mapped by the *State Environmental Planning Policy (Koala Habitat Protection) 2019* (Koala Habitat Protection SEPP)).

The constraints from an aquatic perspective regarding waterways, wetlands and groundwater-dependent ecosystems were not assessed. This report outlines the aquatic constraints from desktop analysis and field validation of portions of the site.

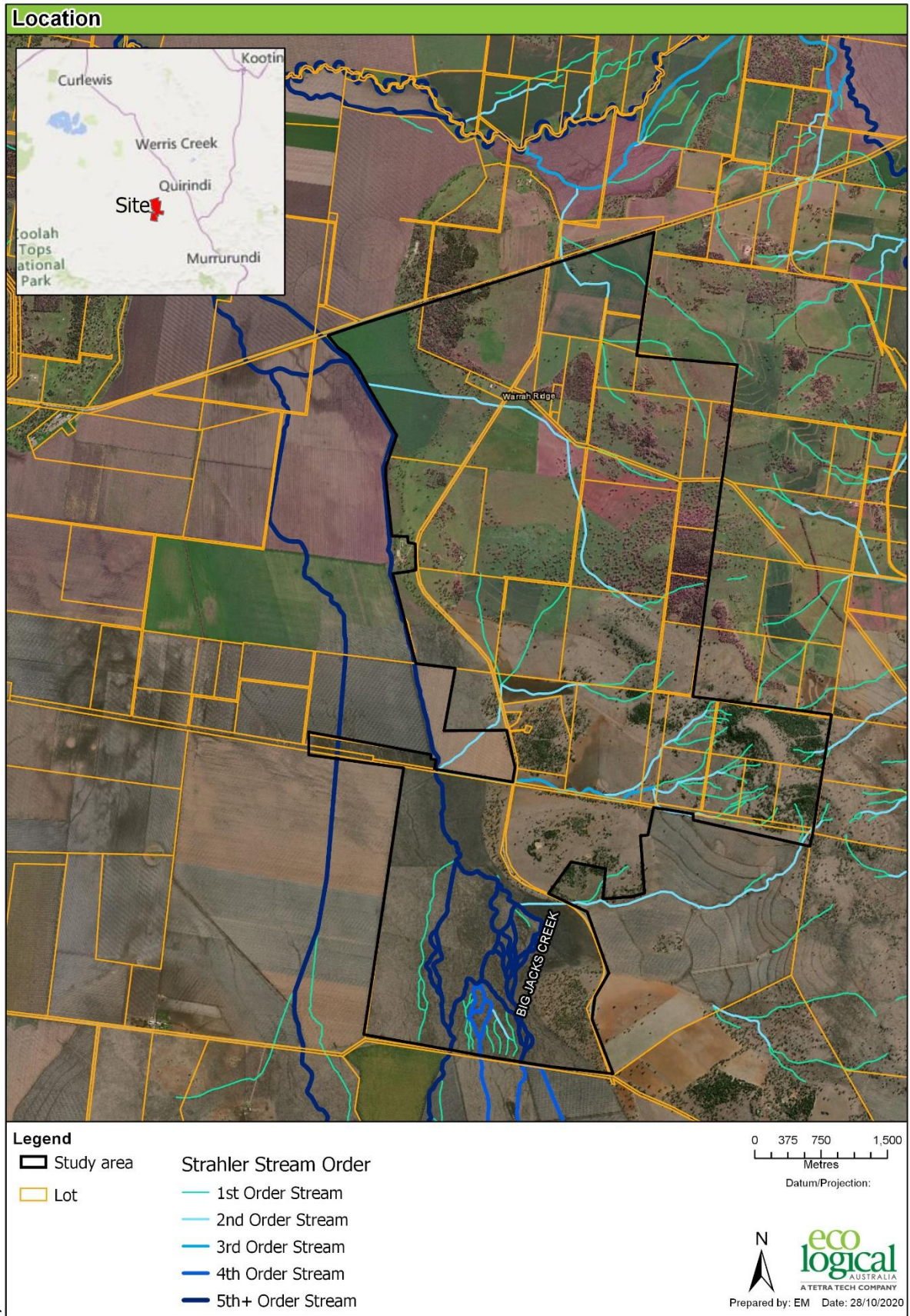


Figure 1: Context and location

2. Legislative context

The specific riparian and aquatic regulatory requirements and policies were reviewed to determine their application to the site. These included:

- NSW *Environmental Planning and Assessment Act 1979*
- NSW *Fisheries Management Act 1994* and Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update; Fairfull, 2013)
- NSW *Water Management Act 2000* and Guidelines for controlled activities on waterfront land – Riparian corridors (NRAR, 2018)
- Liverpool Plains Local Environmental Plan 2011
- Liverpool Plains Development Control Plan 2012.

2.1 Environmental Planning and Assessment Act 1979 and Regulation 2000

Under the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), Schedule 3 clause 21 (4) is considered ‘designated development’ if ‘*Poultry farms for the commercial production of birds (such as domestic fowls, turkeys, ducks, geese, game birds and emus), whether as meat birds, layers for egg production or breeders and whether as free-range or shedded birds:*

- a. *that accommodate more than 250,000 birds, or*
- b. *that are located—*
 - i *within 100 metres of a natural waterbody or wetland, or*
 - ii *within a drinking water catchment, or*
 - iii *within 500 metres of another poultry farm, or*
 - iv *within 500 metres of a residential zone or 150 metres of a dwelling not associated with the development and, in the opinion of the consent authority, having regard to topography and local meteorological conditions, are likely to significantly affect the amenity of the neighbourhood by reason of noise, odour, dust, lights, traffic or waste’.*

If works are considered ‘designated development’ an Environmental Impact Statement (EIS) would be triggered under the *Environmental Planning and Assessment Act 1979*.

Part 4 of Schedule 3 outlines the definitions of waterbody and wetland, which are as follows:

waterbody means—

a natural waterbody, including—

- i a lake or lagoon either naturally formed or artificially modified, or
 - ii a river or stream, whether perennial or intermittent, flowing in a natural channel with an established bed or in a natural channel artificially modifying the course of the stream, or
 - iii tidal waters including any bay, estuary or inlet, or
- b. an artificial waterbody, including any constructed waterway, canal, inlet, bay, channel, dam, pond or lake, but does not include a dry detention basin or other stormwater management construction that is only intended to hold water intermittently.

2. wetland means—

- a. natural wetland including marshes, mangroves, backwaters, billabongs, swamps, sedgelands, wet meadows or wet heathlands that form a shallow waterbody (up to 2 metres in depth) when inundated cyclically, intermittently or permanently with fresh, brackish or salt water, and where the inundation determines the type and productivity of the soils and the plant and animal communities, or
- b. artificial wetland, including marshes, swamps, wet meadows, sedgelands or wet heathlands that form a shallow water body (up to 2 metres in depth) when inundated cyclically, intermittently or permanently with water, and are constructed and vegetated with wetland plant communities.

Under Part 5 of Schedule 3 the 100 metres distance from a waterbody is to be measured as the shortest distance between:

- a. the top of the high bank, if present or
- b. If no high bank is present, then
 - i The mean high-water mark in tidal waters or,
 - ii The mean water level in non-tidal waters

and the boundary of the development site. The distance from a wetland is to be measured as the shortest distance between:

- a. the top of the high bank, if present, or
- b. if no high bank is present, then the edge of vegetation communities dominated by wetland species,

and the boundary of the development site.

2.2 Water Management Act 2000 (WM Act)

The main objective of the WM Act is to manage NSW water in a sustainable and integrated manner that will benefit current generations without compromising future generations' ability to meet their needs. The WM Act is administered by the Natural Resources Access Regulator (NRAR) and establishes an approval regime (controlled activity approval) for activities within waterfront land, defined as the land 40 m from the highest bank of a river, lake or estuary. Any works within waterfront land would require a controlled activity from NRAR and should follow the appropriate guidelines. River is defined under the WM Act as:

- a. *any watercourse, whether perennial or intermittent and whether comprising a natural channel or a natural channel artificially improved, and*
- b. *any tributary, branch or other watercourse into or from which a watercourse referred to in paragraph (a) flows, and*
- c. *anything declared by the regulations to be a river.*

whether or not it also forms part of a lake or estuary, but does not include anything declared by the regulations not to be a river.

NRAR's *Guidelines for Controlled Activities on waterfront land—Riparian corridors* (NRAR 2018) outlines that where a watercourse does not exhibit the features of a defined channel, with bed and banks, NRAR may determine that the watercourse is not waterfront land for the purposes of the WM Act. If a watercourse has defined bed and banks, NRAR outlines the need for a Vegetated Riparian Zone (VRZ)

adjacent to the channel to provide a transition zone between the terrestrial environment and watercourse. This vegetated zone helps maintain and improve the ecological functions of a watercourse whilst providing habitat for terrestrial flora and fauna. The VRZ plus the channel (bed and banks of the watercourse to the highest bank) constitute the 'riparian corridor' (Figure 2). To be consistent with the guidelines, VRZ widths should be based on watercourse order as classified under the Strahler System of ordering watercourses applied to the Hydroline Spatial Data published on the department's website (Table 1).

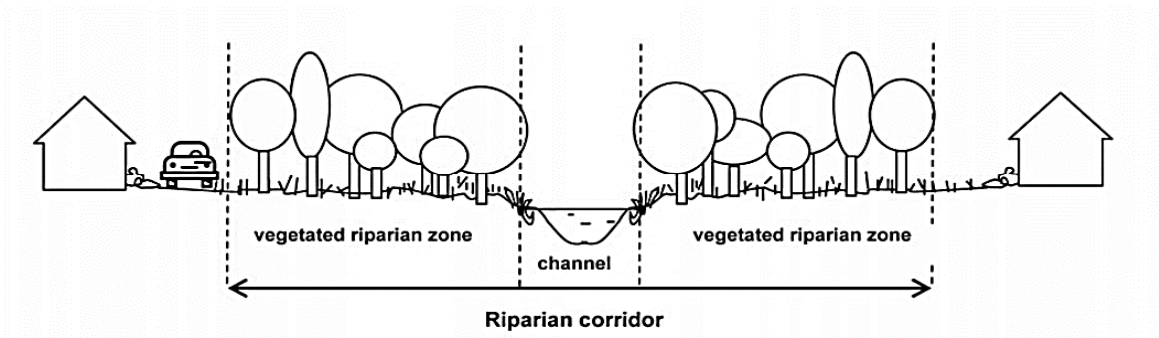


Figure 2: Vegetated Riparian Zone and watercourse channel comprising the riparian corridor (NRAR, 2018)

Table 1: Recommended riparian corridor widths relative to Strahler Order (NRAR 2018)

Watercourse type	VRZ width (each side of watercourse)	Total riparian corridor width
1 st order	10 m	20 m + channel width
2 nd order	20 m	40 m + channel width
3 rd order	30 m	60 m + channel width
4 th order and greater (includes estuaries, wetlands and any parts of rivers influenced by tidal waters)	40 m	80 m + channel width

Certain works are permissible within the riparian zone (Table 2). Non-riparian uses are consistent with NRAR’s guidelines in the outer 50% of the VRZ as long as compensation (1:1 offset) is achieved within the site. The outer VRZ that is impacted must be offset elsewhere on site using the ‘averaging rule’ (Figure 3).

Table 2: Riparian corridor (RC) matrix of permissible use (NRAR 2018)

Stream order	Vegetated Riparian Zone (VRZ)	RC off-setting for non RC uses	Cycleways and paths	Detention basins		Stormwater outlet structures and essential services	Stream realignment	Road crossings		
				Only within 50% outer VRZ	Online			Any	Culvert	Bridge
1 st	10m	•	•	•	•	•	•	•		
2 nd	20m	•	•	•	•	•	•	•		
3 rd	30m	•	•	•		•			•	•
4 th +	40m	•	•	•		•			•	•

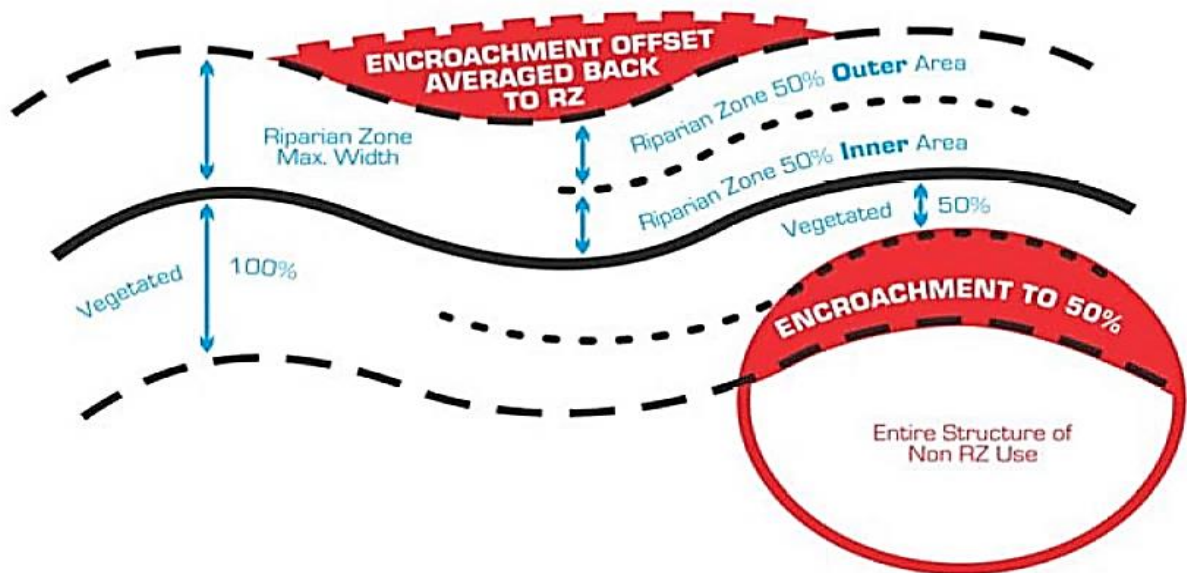


Figure 3: Riparian 'averaging rule' for offsetting encroachment into the outer 50% of the VRZ (NRAR 2018)

2.3 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) governs the management of fish and their habitat in NSW. The objectives of the FM Act are to conserve fish stocks and key fish habitats, conserve threatened species, populations and ecological communities of fish and marine vegetation and to promote ecologically sustainable development. The FM Act also regulates activities involving dredging and/or reclamation of aquatic habitats, obstruction of fish passage, harming marine vegetation and use of explosives within a waterway.

The *Policy and guidelines for fish habitat conservation and management* (Fairfull, 2013; herein referred to as the 'Policy') is a supplementary document that outlines the requirements and obligations under the FM Act and the *Fisheries Management (General) Regulation 2010* and was developed to maintain and enhance fish habitat and assist in the protection of threatened species. The Policy defines key fish habitat (KFH) and guidance for assigning a classification of waterways for fish passage, which informs the types of infrastructure suitable for the creek line. It also guides sensitivity ratings of the KFH types present, which determines the potential disturbance and offsetting required for development. Creeks

with a Strahler of third order and above or that provide threatened species habitat are generally considered KFH. Indirect harm should be avoided in KFH and permits to dredge and/or reclaim under Part 7 of the FM Act would be required, if works directly harm KFH.

2.4 Liverpool Plains Local Environmental Plan 2010 and Development Control Plan 2014

The land is zoned RU1 – Primary Production, which has the objectives to:

- Encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- Encourage diversity in primary industry enterprises and systems appropriate for the area.
- Minimise the fragmentation and alienation of resource lands.
- Minimise conflict between land uses within this zone and land uses within adjoining zones.

In this zone, building identification signs, environmental protection work, extensive agriculture, farm buildings, forestry, home-based childcare, home occupations, roads, sewerage systems, water supply systems are permitted without consent.

The DCP does not specifically address watercourses and riparian lands in regard to development. However, its general principles for land use buffers to reduce land use conflicts have been applied using 100 m as required as part of the EP&A Regulation.

2.5 Use of terms in this report

Under the EP&A Regulation, a natural waterbody includes a 'river or stream', flowing in a natural channel with an established bed or in natural channel artificially modifying the course of the stream. Under the WM Act, a river is 'a watercourse comprising a natural channel or a natural channel artificially improved and any tributary, branch or other watercourse into or from which a watercourse flows'.

The term 'river' is used throughout this report as a generic term to encompass both definitions outlined above. Where a channel had bed and banks, it was determined to meet the definition of a 'river' under both the EP&A Regulation and WM Act. Where there was no bed or banks present, the term 'not a river' has been used.

Furthermore, the EP&A Regulation defines the terms waterbody and wetland. A natural waterbody encompasses, a lake or lagoon, river or stream and tidal waters. As there were no lakes, lagoons or tidal waters assessed as part of this assessment, the term 'river' is synonymous with that of 'waterbody', and has been applied in a consistent manner as per the description above.

An artificial waterbody includes any constructed waterway, canal, inlet, bay, channel, dam, pond or lake. Due to the absence of constructed features except dams, the use of the term artificial waterbody refers to offline and online dams, only.

3. Methods

3.1 Literature and data reviews

The following literature and data sources were reviewed to inform the desktop assessment:

- Bureau of Meteorology's Groundwater Dependent Ecosystem (GDE) Atlas
- Australian Ramsar Wetland data
- NSW Wetlands dataset
- Aerial mapping (SIXMaps and GoogleEarth)
- Water Management (General) Regulation 2018 hydroline spatial data 1.0
- Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update) (Fairfull 2013)
- Guidelines for controlled activities on waterfront land – Riparian corridors (NRAR 2018)
- Environmental Planning Advice: Proposed Poultry Farms at Warrah Ridge Farm (28 South Environmental 2020).

3.2 Desktop analysis

The Strahler stream order classification was extracted from DPI's Hydroline Spatial Data. Only watercourses identified on the DPI Hydroline Spatial Dataset were considered for this assessment. Watercourses, wetlands, flood-affected land (extracted from client's preliminary mapping) and GDEs were mapped to define areas of high constraints for the development (Figure 4). The GDEs were assessed in terms of their potential for groundwater interaction.

Using a combination of aerial imagery (NSW Imagery and GoogleEarth) and 1 m contours, watercourses that were unlikely to have a bed, bank and geomorphic processes were mapped. First and second-order watercourses that were outside flood-affected land were the primary focus of the assessment, as it may be possible to remove these as constraints to the development following field-validation if they do not meet the definition of a watercourse under either the WM Act or EP&A Regulation. The 100 m buffer was then applied to watercourses that were deemed likely to have a bed and banks, and therefore meet the definition of a river. Areas within the 100 m buffer were considered the most highly constrained from an aquatic perspective, as they would trigger an EIS as part of the development approval.

3.3 Field survey

Following the desktop review, watercourses that were deemed unlikely to meet the definition of a river, as shown in Figure 5, were field-validated by two aquatic ecologists on 7 October 2020. Each watercourse was examined for bed, banks and geomorphic processes. Photographs were taken and if the watercourse met the definition of a river, a brief habitat assessment was conducted.

Each watercourse that met the definition of a river was assigned a 100 m buffer from the centre line. Online dams were included as part of the river with the hydroline mapped through the dam to mimic a natural channel.

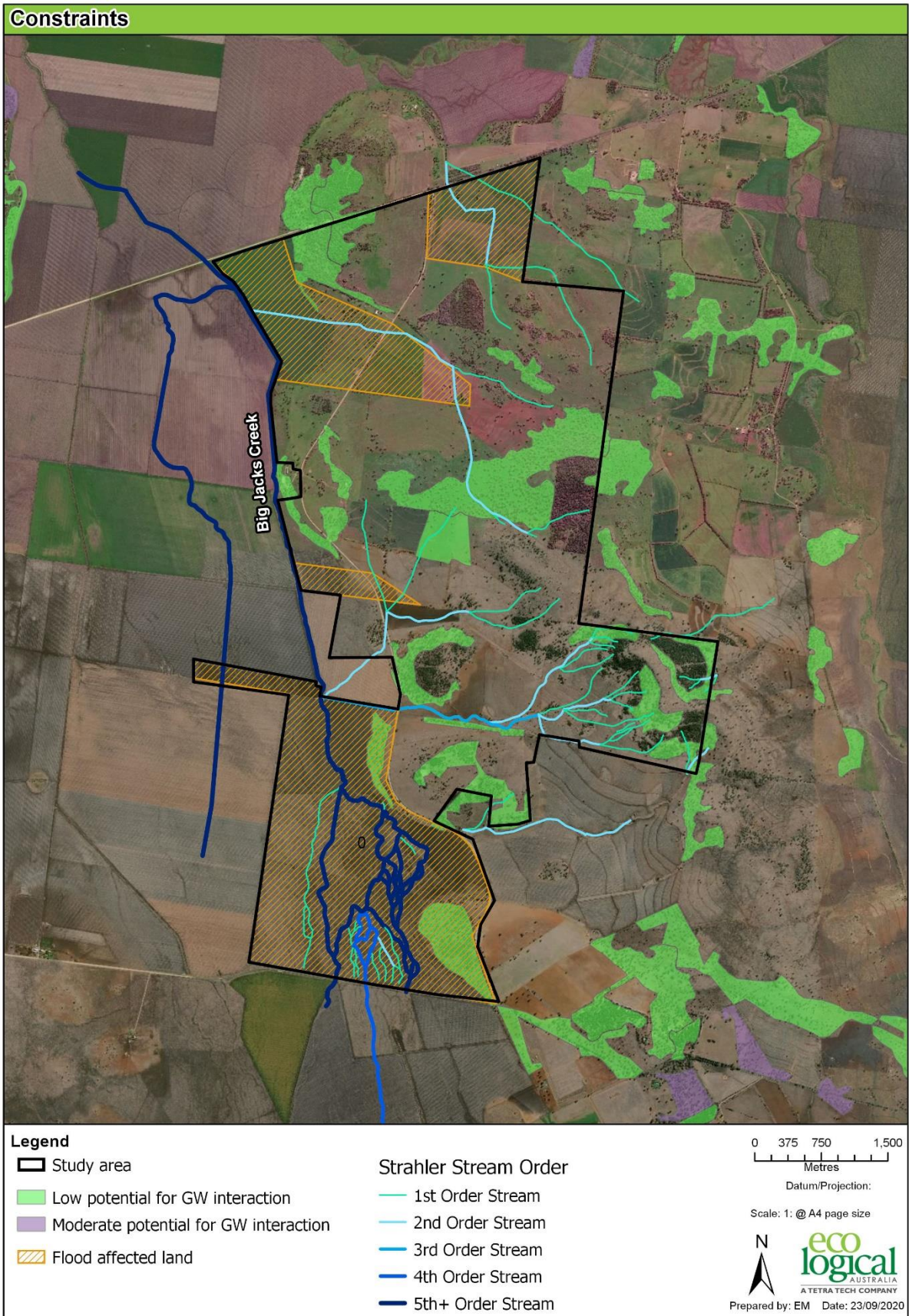


Figure 4: Desktop constraints

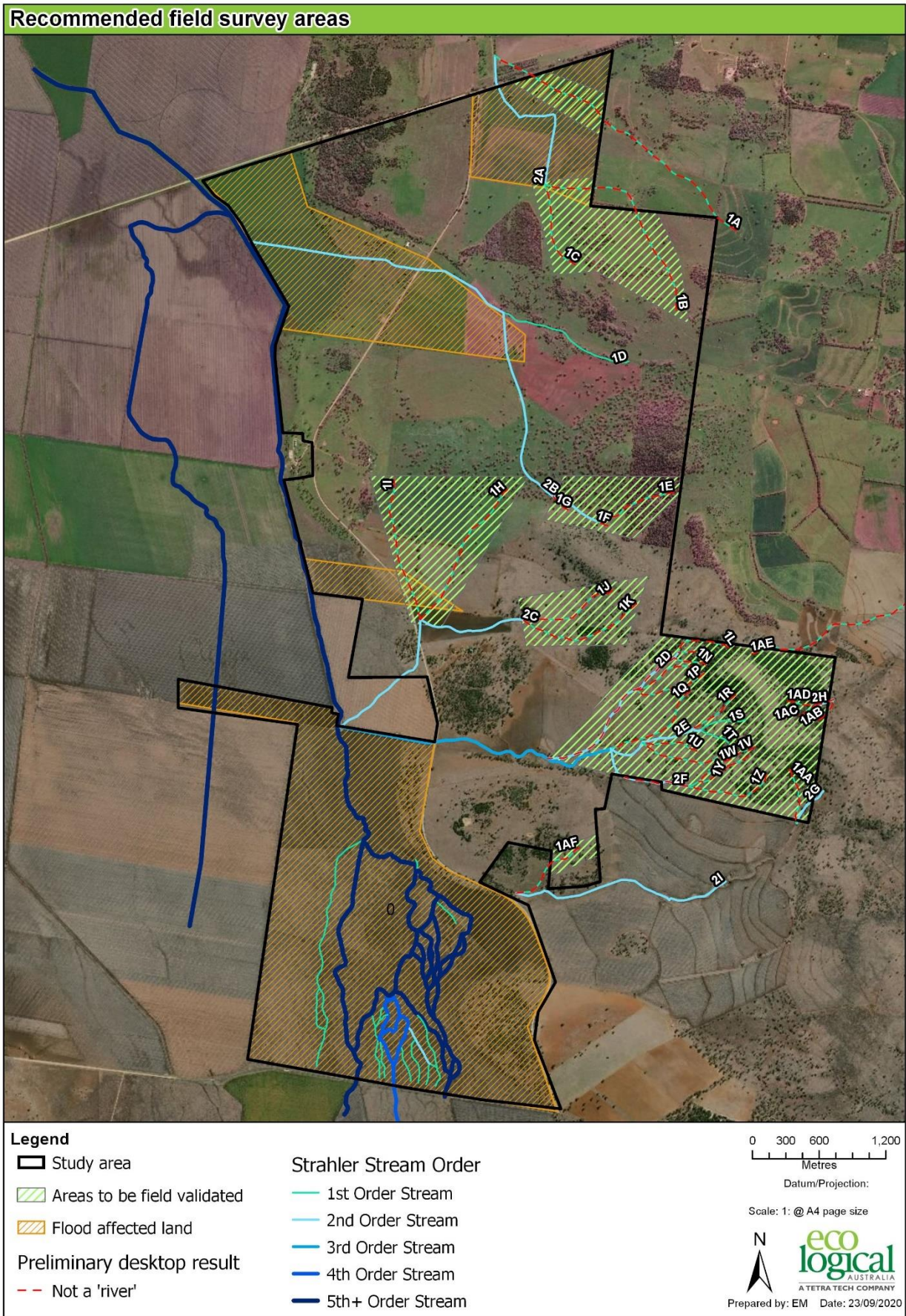


Figure 5: Areas targeted during the field survey

5. Results

5.1 Desktop results

5.1.1 Wetlands

There were no national or state significant wetlands mapped on or near the site, nor did any area of the site meet the definition of a natural or artificial wetland under the EP&A Regulation.

5.1.2 Groundwater dependent ecosystems

There are GDEs mapped within the study area. However, these have a low potential for groundwater interaction. The vegetation species present in the study area which have a potential for groundwater dependence are:

- *Eucalyptus albens*
- *Eucalyptus melliodora*.

These appear to be present as scattered paddock trees or in patches. ELA's terrestrial ecologists assessed the vegetation communities present as part of the terrestrial constraints assessment and confirmed that *E. albens* was present on the higher elevation vegetation communities and *E. melliodora* was present on the flat areas adjacent to Big Jacks Creek. The risk to GDEs is considered low, as the vegetation types have a low potential for groundwater interaction. To reduce the risk further, hard surfaces that would impact the perviousness of surface water into the ground should be placed in already cleared areas.

5.1.3 Watercourses

The areas deemed most highly constrained for development were those in the flood-prone areas, and the floodplain area to the south of the site with a network of streams surrounding Big Jacks Creek, a sixth-order creek that flows north along the site boundary.

After desktop examination, the first and second-order creeks mapped in Figure 5 were assessed as may not having a bed, bank or geomorphic process as they appeared from aerial imagery and contours to be low points in the landscape only, showing no differentiation between the creek and the adjacent landscape. These areas were highlighted and targeted in the field-validation (Section 5.2).

The third-order Strahler watercourses and above are considered KFH on the site. Big Jacks Creek is considered Type 1 (highly sensitive KFH) as it is modelled habitat for the threatened species *Mogurnda adspersa* (Purple-spotted Gudgeon) and *Tandanus tandanus* (Eel-tailed Catfish). There are no records of Purple-spotted Gudgeon within 10 km of Warrah Ridge. There is one record of Eel-tailed Catfish in Quirindi Creek in 2016. The third-order watercourse that begins at the confluence of 2E and 2F is considered Type 3 (minimally sensitive KFH) as although it is hydrologically connected to Big Jacks Creek, it is ephemeral and is unlikely to support aquatic vegetation or provide permanent fish habitat.

5.2 Field-validated results

Both WM Act and EP&A Regulation requirements have been considered for this site, as they have different set back requirements. The riparian buffers have only been applied to those areas that met

the definition of a river, with defined bed, banks and geomorphic processes. The status of watercourses that did not meet the definition of river require the concurrence from the regulatory authorities. The 'start' of a river was the most upstream area with a defined channel. Where a watercourse was found to meet the definition of a river upstream, this classification was continued through the downstream extent even if a channel was no longer evident.

The field-validated 'rivers' are mapped in Figure 6, Figure 7 and Figure 8. The 100 m buffer was applied to watercourses that had a channel, had a channel present in an upstream reach or that was not field-validated and was larger than a second-order watercourse, and are therefore considered likely to meet the definition of a 'river' (Figure 9).

Areas outside these buffers are considered the least constrained to development from an aquatic perspective. Photographs and brief descriptions for each photo point are provided in Appendix A. The site was highly modified, with agricultural practices impacting the surveyed waterways. Extensive contouring had modified the natural flow of waterways by either channelling along the contour and then into a dam or by stopping the flow altogether. All creeks surveyed were ephemeral and would provide temporary habitat for fish and wader birds during times of flow only. However, there was potential frog habitat in the sedges and rushes present in some of the watercourses.

There were multiple farm dams present on the property, some of which were online forming part of the channel and others which were offline. These were considered artificial waterbodies as they had been constructed with a dam wall to catch and store water as it drained from the catchment. As such, no buffer was applied to these waterbodies, as the proposed works are considered 'designated development' under Schedule 3 of the EP&A Regulation if they are located with 100 m of a natural waterbody only (Section 2.1).

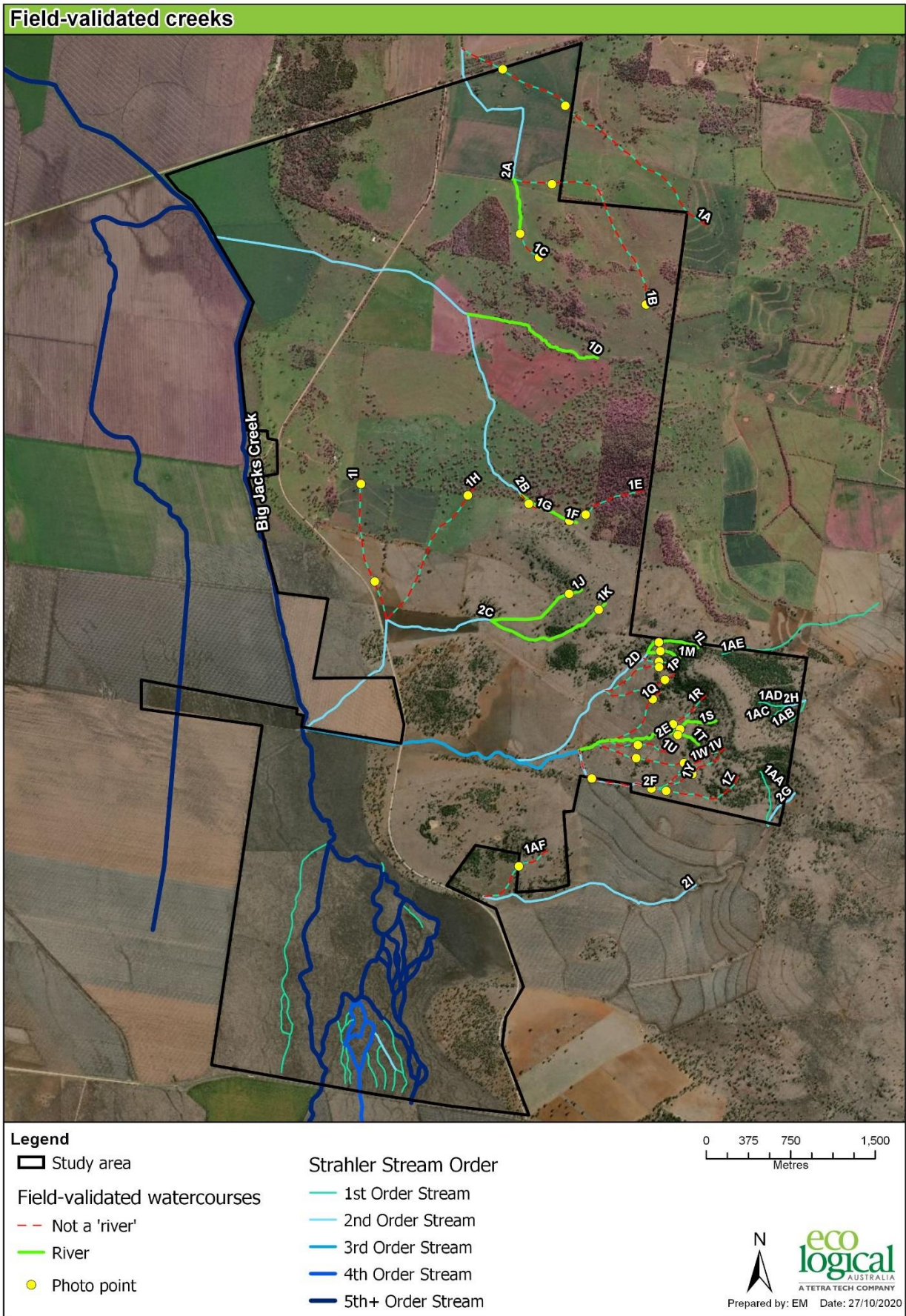


Figure 6: Field-validated watercourses (overview)

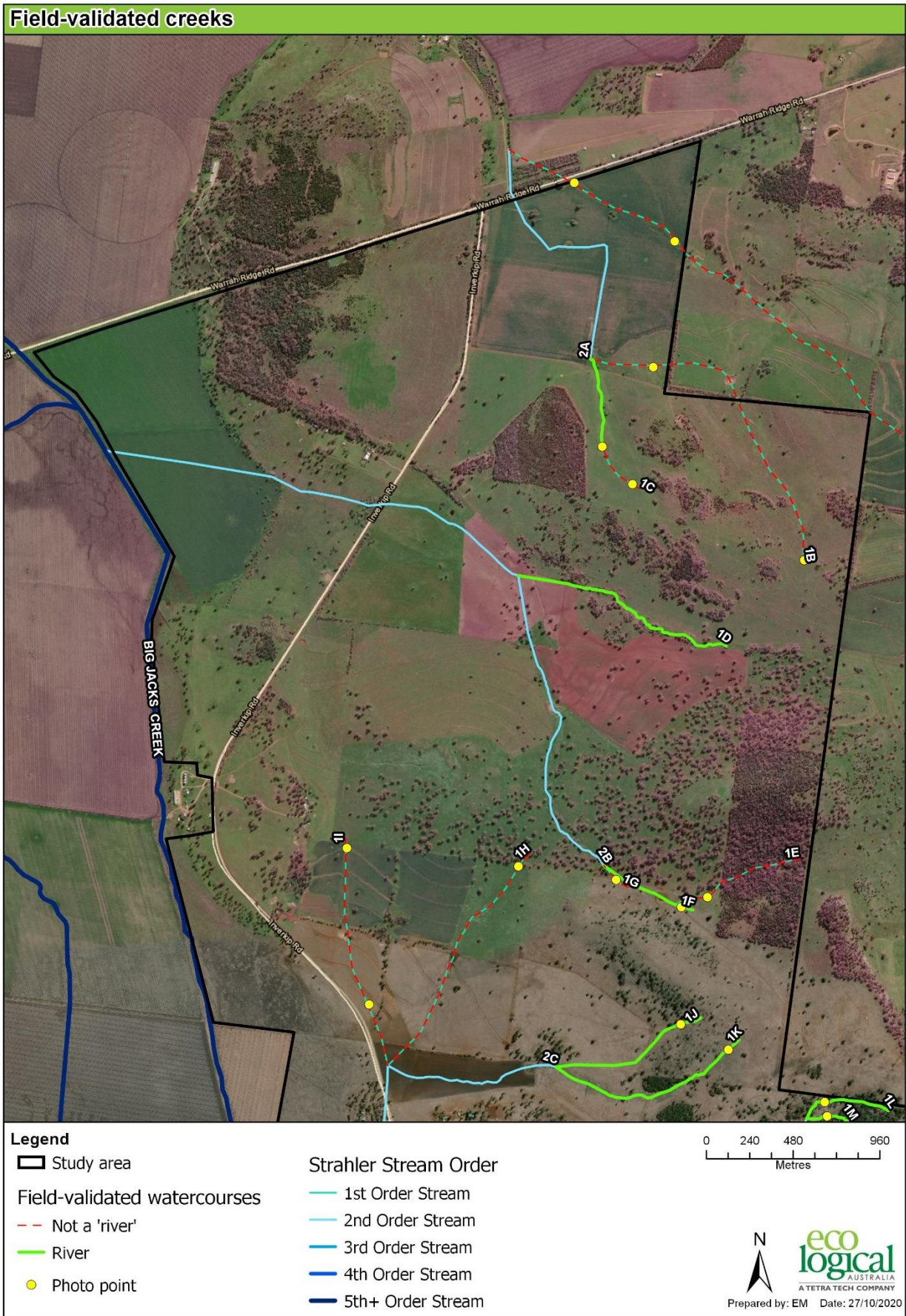


Figure 7: Field-validated watercourses (northern portion of site)

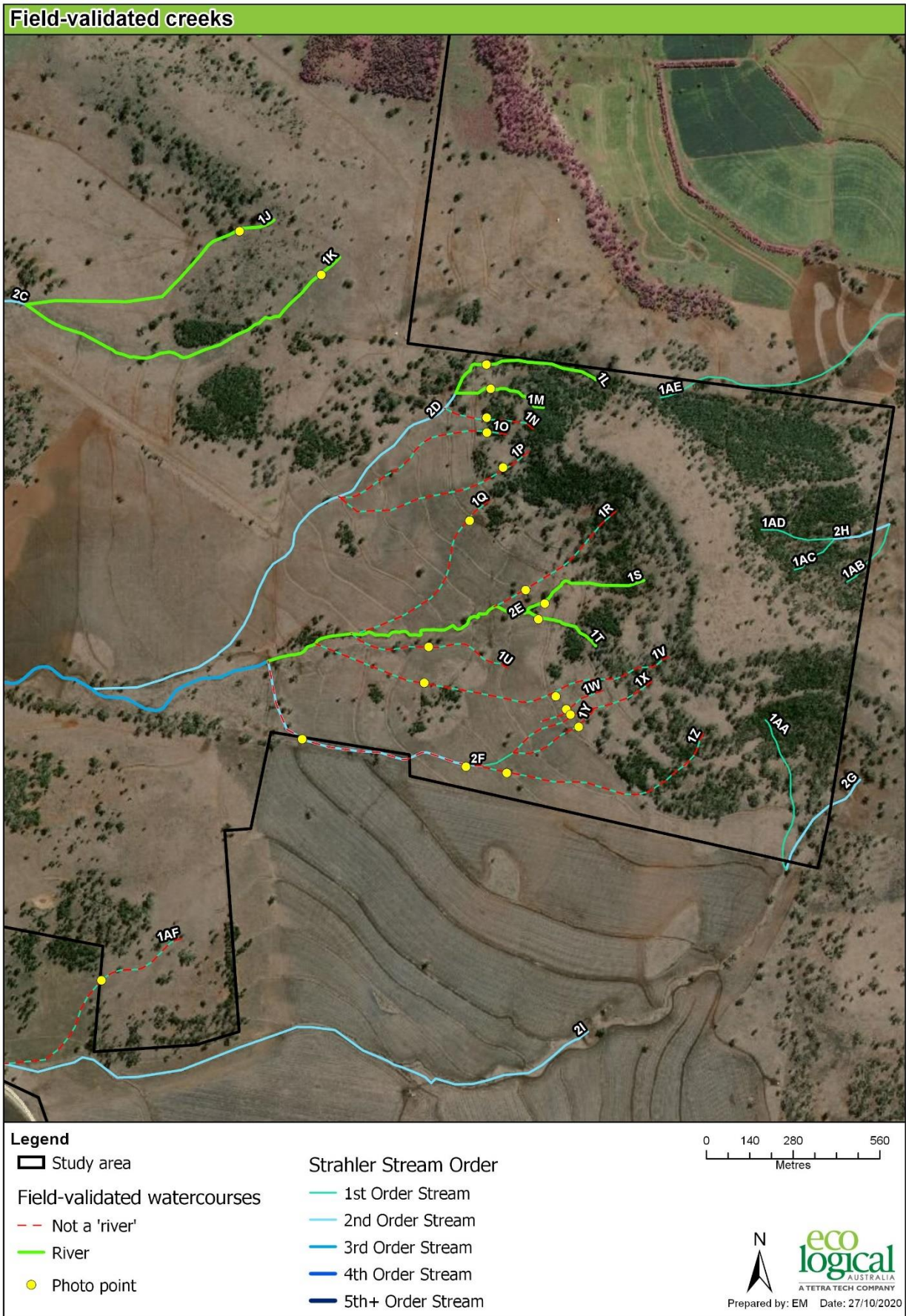


Figure 8: Field-validated watercourses (southern portion of site)

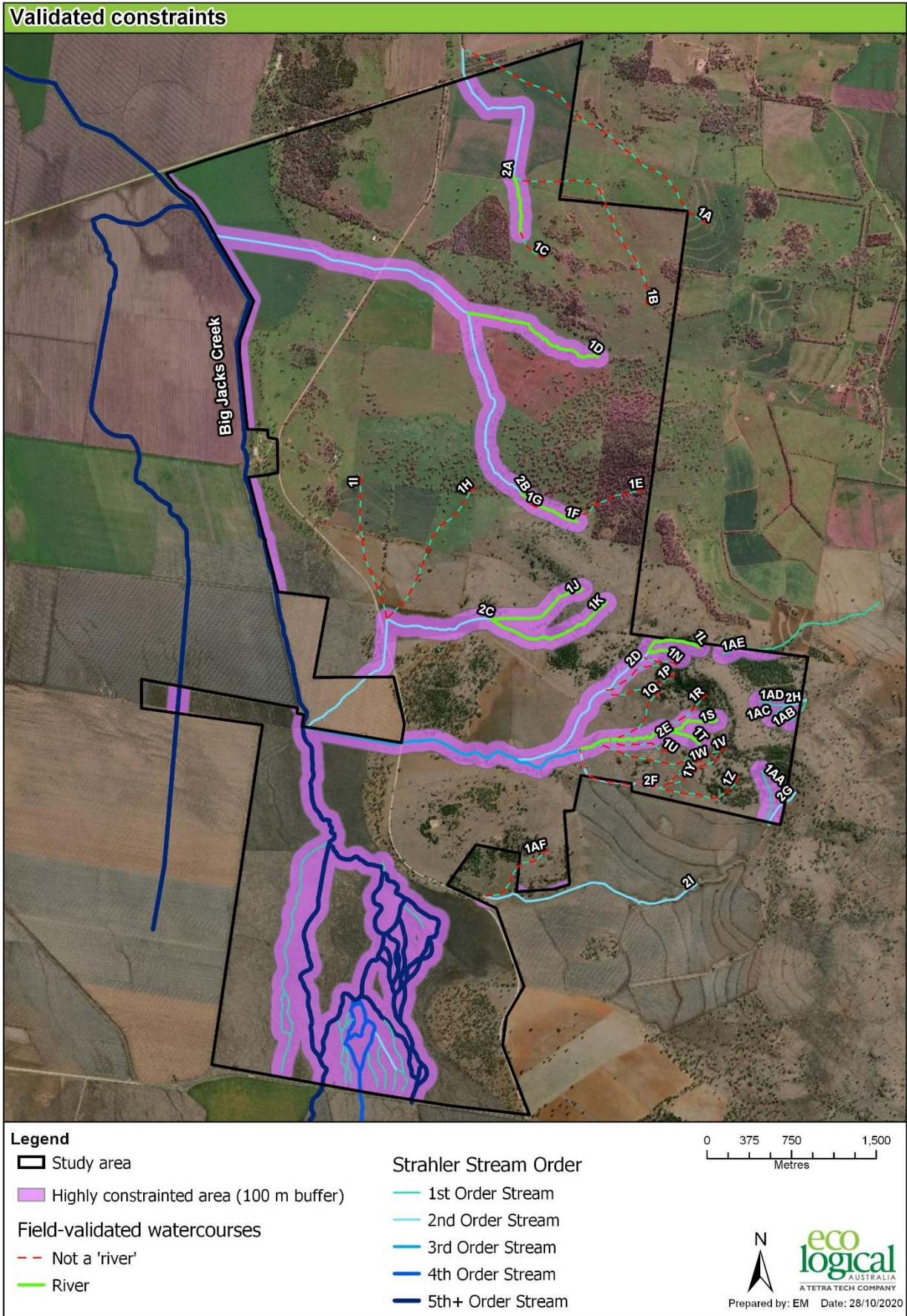


Figure 9: Highly constrained areas

6. Discussion





As there were no wetlands mapped or identified as part of the field survey, they are not considered a constraint to proposed development of the site. Dams on site have been considered artificial waterbodies under the EP&A Regulation, as they have been constructed as part of the agricultural use of the land. All dams inspected had man-made dam walls and were constructed at the end of contours where they would capture and store water from the catchment. As both online and offline dams are considered artificial, the 100 m buffer has not been applied. Under the WM Act, dams are generally considered a low constraint as NRAR generally supports their removal.

The GDEs mapped onsite were determined to be present in the form of *E. albens* and *E. melliodora* both of which are native trees. Areas of native vegetation are generally considered highly constrained to proposed development. However, the risk to GDEs is considered low as both species have a low potential for groundwater interaction. Hard surfaces, e.g. roads, sheds and parking areas, should be placed on existing cleared areas so the increase in impervious surfaces is minimised.


Multiple first-order creeks did not meet the definition of a 'river', as there were no defined bed, banks or evidence of geomorphic processes. Consultation with regulators should be undertaken to confirm the removal of these watercourses as constraints to the site. All other surveyed creeks had defined bed and banks. Therefore, if a poultry farm is proposed within 100 m of a natural waterbody (lake or lagoon, river or stream and tidal waters), the proposed works would be considered 'designated development', triggering an EIS as part of the approval process. Additionally, if any works are proposed within 40 m of a waterway (i.e. waterfront land) a *Controlled Activity Approval (CAA)* would be required under the WM Act through integrated development. Conditions of a CAA would outline the need for a VMP to restore the riparian zone along the 'rivers' to a functional native community.






Appendix A Watercourse results



*If there are multiple photo points, photo point 1 is the upstream extent and photo point 2 is downstream. See Figure 6 through Figure 8 for photo point locations.







Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1A	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1A	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	2		







Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1B	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1B	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	2		
1C	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		





Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1C	River	Poor condition – Watercourse is a narrow depression approximately 4 m wide. Area would act as a floodplain soak during rain.	2		
1E	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1F	River	Ephemeral watercourse with small (1 m) clearly defined channel. Flows into dam.	1		






Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1G	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1H	River	Ephemeral watercourse with bed and banks clearly defined. Mature Greybox present along banks. Channel becomes vague downstream of fence, where vegetation was dominated by Thistles and Canola.	1		
1I	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		



Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1I	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	2		
1J	River	Moderate condition – Ephemeral broad v-shaped channel approximately 3 m deep. Scattered mature Eucalyptus form the riparian vegetation.	1		
1K	River	Moderate condition – Ephemeral watercourse, 3 m wide and 40 cm deep. Basalt lined the channel.	1		





Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1L	River	Moderate condition – Clearly defined u-shaped channel, 3 m deep with a gravel / cobble base. Native riparian corridor.	1		
1M	River	Poor condition – Small broad ephemeral watercourse. 50 cm deep and 2 m wide. Upstream the riparian corridor was mature native vegetation, downstream the channel was poorly defined, and difficult to distinguish.	1		
1N	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		

Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1O	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1P	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1Q	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		

Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1R	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1S	River	Moderate condition – Clearly defined u-shaped channel. Ephemeral only. Upstream the riparian corridor was mature native vegetation. Downstream, scattered paddock trees lined the bank.	1		
1T	River	Moderate condition - Clearly defined u-shaped channel, which formed a 2 m deep gully. Ephemeral only. Upstream riparian vegetation was moderately dense native trees, whereas downstream lacked midstorey and canopy cover.	1		

Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1U	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1V	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1W	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		

Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1Y	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1X	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
1Z	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		

Watercourse	Result	Comment	Photo point*	Facing upstream	Facing downstream
1AF	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
2F	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	1		
2F	Not a river	Lacked a bed, bank or geomorphic processes. No distinction from surrounding paddock.	2	