

Yiribana Logistics Estate

Riparian Lands Assessment

GPT Group

30 April 2021

Final



Report No. 19200RP3

The preparation of this report has been in accordance with the brief provided by the Client and has relied upon the data and results collected at or under the times and conditions specified in the report. All findings, conclusions or commendations contained within the report are based only on the aforementioned circumstances. The report has been prepared for use by the Client and no responsibility for its use by other parties is accepted by Cumberland Ecology.

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Glossary

Term / Abbreviation	Definition
AHD	Australian Height Datum
BAM	Biodiversity Assessment Method
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BC Regulation	NSW <i>Biodiversity Conservation Regulation 2017</i>
BCT	Biodiversity Conservation Trust
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
CBD	Central Business District
DAWE	Commonwealth Department of Agriculture, Water and the Environment
EEC	Endangered Ecological Community
EES	Environment, Energy and Science Group
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
NRAR	National Resources Access Regulator
NSW	New South Wales
MNES	Matters of National Environmental Significance
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
the Project	Proposed development of the Mamre Road Precinct, Kemps Creek
SEPP	State Environmental Planning Policy
SSD	State Significant Development
Subject land	The land proposed as a development site (see Figure 2)
TEC	Threatened Ecological Community
WM Act	NSW <i>Water Management Act 2000</i>

1. Introduction

Cumberland Ecology was commissioned by GPT Group Pty Ltd (GPT) to prepare a Riparian Lands Assessment to support an Environmental Impact Statement (EIS) being prepared for the proposed development of the Yiribana Logistics Estate located at Mamre Road, Kemps Creek (the 'project'). The project involves the removal of vegetation to allow for the construction of five warehouses and associated infrastructure, the realignment and modification of a watercourse and the removal of three farm dams. The area of land proposed to be developed (the development site footprint) is hereafter referred to as 'the subject land' and is shown on **Figure 1**. This Riparian Lands Assessment will form part of the EIS to support an application for a State Significant Development (SSD) under Part 4, Division 4.7 of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act).

The subject land was recently rezoned in June 2020 under the *State Environmental Planning Policy (Western Sydney Employment Area) 2009* (SEPP WSEA), whereby much of the land has been zoned IN1 General Industrial, with the creek line that intersects the subject land and patches of native vegetation zoned E2 Environmental Conservation (see **Figure 1**). The purpose of the E2 zone is to establish a suitable biodiversity corridor that provides floristic and habitat connectivity between Ropes Creek to the east of the subject land and South Creek to the west.

Consultation is currently underway with the NSW Natural Resource Access Regulator (NRAR) and the NSW Department of Planning, Industry and Environment (DPIE) to re-align the E2 zone within the centre of the subject land to better service the industrial land zoning whilst ensuring a suitable biodiversity corridor is established across the subject land and into adjoining lands.

1.1. Purpose

The purpose of this Riparian Lands Assessment is to provide an assessment of the riparian ecology within the E2 corridor as well as other riparian habitats within the subject land consisting of the three farm dams. The report identifies the potential impacts of the proposed development and associated realignment of the E2 zone on riparian lands and provides recommendations to mitigate those impacts.

1.1.1. Location

The subject land is located along Mamre Road, Kemps Creek, and comprises Lots 59-60 DP 259135 within the Western Sydney Employment Area, approximately 40 km west of the Sydney Central Business District (CBD) and 12 km southeast of the Penrith CBD. It is also located within the Western Sydney Aerotropolis, approximately 6 km northeast of the Aerotropolis Core Precinct. The subject land is located within the Penrith Local Government Area (LGA) and covers an area of approximately 33.35 ha. Although located near the Western Sydney Growth Centres, the subject land is not bio certified under the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*.

The subject land falls within land mapped under the Draft Cumberland Plain Conservation Plan (CPCP) and has been identified for future biodiversity certification. However, as the CPCP is still in draft stages, it does not currently apply to the project.

A map of the subject land and the E2 zone is presented in **Figure 1**.

1.1.2. The Project

The project comprises the development of the subject land and includes the following:

- Demolition of existing dwellings;
- Removal of all vegetation;
- Dewatering of existing dams;
- Bulk earthworks;
- Re-alignment of existing watercourse and riparian zone;
- Construction of five warehouses and associated access roads; and
- Associated landscaping.

Of relevance to this Riparian Lands Assessment, several large water detention basins will be created to manage stormwater runoff as part of the development.

The layout of the project is shown in **Figure 2**.

1.1.3. Description of the Subject Land and Riparian Lands

1.1.3.1. General Description

The subject land predominantly comprises farming properties primarily used for livestock grazing. Other land uses within the subject land comprise private roads, residences, dams and creeks.

The subject land has been heavily modified for agricultural uses with the majority of native vegetation cleared and the vegetation now consists primarily of exotic grassland. Some areas within the subject land have been historically subject to pasture improvement, with areas of heavy grazing dominated by exotic pasture species.

Native vegetation occurring within the subject land occurs as scattered patches and consists of planted and remnant native vegetation. Two Plant Community Types (PCT's) have been identified within the subject land, PCT 850 and PCT 1800, each occurring in two condition states. The PCT's within the subject land align with two threatened ecological communities (TECs) listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). BC Act, including Cumberland Plain Woodland CEEC and Swamp Oak Floodplain Forest EEC. The remainder of the subject land comprises exotic vegetation, farm dams and previously cleared land.

1.1.3.2. Hydrology

The subject land occurs within the Sydney water catchment and Hawkesbury-Nepean sub-catchment and contains one unnamed 2nd order watercourse (as per the Strahler System of ordering watercourses) in the E2 zone (see **Figure 1**). Within the subject land, the watercourse currently shows no bank structure and consists primarily of a drainage depression with evidence of overland flow from the dam at the eastern side of the subject land downstream to the dam on the adjacent lot, west of the subject land.

The subject land contains three farm dams, one large dam in the E2 zone, a smaller dam to the south-west, as well as a medium sized dam in the north-west corner (see **Figure 1**). The large farm dam within the E2 zone is filled from the watercourse, and the overflow runs into the western most dam.

The location of the watercourse and dams in the subject land are shown in **Figure 1**.

2. Legislative Context

This chapter includes a summary of the legislation that is applicable to this Riparian Lands Assessment. This includes the following:

- *Environmental Planning and Assessment Act 1979*;
- *Fisheries Management Act 1994*;
- *Water Management Act 2000*;
- *State Environmental Planning Policy (Western Sydney Employment Area) 2009*; and
- *Cumberland Plain Conservation Plan*

These are considered below in subsequent sections.

2.1. Environmental Planning and Assessment Act 1979

The NSW *Environment Planning and Assessment Act 1979* (EP&A Act) is the overarching planning legislation in NSW and provides for the creation of planning instruments that guide land use. The EP&A Act also provides for the consideration of the environment and biodiversity values, including threatened species, communities, habitat and processes as listed under the BC Act and *Fisheries Management Act 1994* (FM Act).

2.2. Fisheries Management Act 1994

The 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 watercourse.

In accordance with Part 4, Division 1.7, Section 4.41 (b) of the EP&A Act, applications for separate permits under Sections 201, 205 or 219 of the FM Act are not required for SSD.

2.3. Water Management Act 2000

Controlled activities carried out in, on, or under waterfront land are regulated by the Water Management Act 2000 (WM Act) and require approval by the Natural Resources Access Regulator (NRAR) who defines 'waterfront land' as the land 40 m from the highest bank of a river, lake or estuary.

The WM Act defines a river as:

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

NRAR's *Guidelines for Controlled Activities on waterfront land—Riparian corridors* (NRAR 2018) outlines the need for a Vegetated Riparian Zone (VRZ) adjacent to the channel to provide a transition zone between the terrestrial environment and watercourse. NRAR recommends a VRZ width based on watercourse order as classified under the Strahler System of ordering watercourses. The watercourse on the subject land is a 1st order stream and according to the Guidelines a total 40 m riparian buffer (20 m either side of the channel) is required.

The watercourse within the subject land has been assessed by NRAR and determined that it is not considered to be waterfront land as defined by the WM Act. Accordingly, a 40 m riparian buffer is not required under the WM Act. A 25 m buffer is proposed to be established on the re-aligned E2 conservation zone as outlined in **Chapter 6**. The reconstruction of a post development channel and establishment of a riparian corridor is supported by NRAR. They have indicated that realignment should not include 90-degree sharp meanders and that the alignment should mimic natural stream design. Realignment is to minimise impact to remnant vegetation areas upstream of the site and NRAR requires details of the realignment on up and down stream sites prior to signing off on final realignment.

Consultation with NRAR has confirmed that the development is to be assessed through the SSD process and therefore it is exempt from the need to obtain a Controlled Activity Approval from NRAR.

2.4. State Environmental Planning Policy (Western Sydney Employment Area) 2009

Under the SEPP WSEA, a portion of the subject land is zoned as E2 (**Figure 1**). The objectives of the E2 zone are:

- *To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values.*
- *To prevent development that could destroy, damage or otherwise have an adverse effect on those values.*

The following development may be carried out within the E2 zone with consent:

Artificial waterbodies; Environmental facilities; Environmental protection works; Flood mitigation works; Roads.

It is proposed to relocate the E2 zone and associated watercourse to the north of the existing E2 zone (see **Figure 4**).

2.5. Cumberland Plain Conservation Plan

The subject land is located within the planned area for the Cumberland Plain Conservation Plan (CPCP). The CPCP is a conservation plan that is being developed for Western Sydney to help meet the future needs of the community while protecting threatened ecological communities and threatened flora and fauna species listed under the BC Act and the EPBC Act. The CPCP is being developed to meet requirements for strategic biodiversity certification under the BC Act and strategic assessment under the EPBC Act. It will facilitate the biodiversity approvals required to deliver four nominated areas for development in Western Sydney and supporting major transport infrastructure. The subject land is located within the area identified as the Western Sydney Aerotropolis.

The draft CPCP Spatial Viewer has identified the majority of the subject land as 'Certified – Urban Capable Land' with the exception of the E2 – Environmental Conservation corridor which has been identified as 'Non-Certified Land – Avoided for Other Purposes'. Future development on land mapped as Certified Urban Capable Land does not require further site by site biodiversity assessment; however, the draft CPCP does not alter the proposed environmental conservation zoning within non-certified land (DPIE 2020).

3. Methods

This section provides details of the methods used in the preparation of this Riparian Lands Assessment. Detailed ecological assessments have been undertaken in the subject land to support the proposed development including a Biodiversity Development Assessment Report (BDAR) and a Vegetation Management Plan (VMP). This section details those assessments specific to the riparian lands in the subject land. Please refer to the BDAR (Cumberland Ecology 2021a) and VMP (Cumberland Ecology 2021b) for further details of the methods used in other terrestrial flora and fauna surveys undertaken in the subject land.

3.1. Desktop Assessment

A review of the NSW Government Spatial Information Exchange Maps (NSW Government Spatial Services, 2019) as well as DPIE's Environmental Planning layers was undertaken to determine the vegetation communities mapped within the subject land as well as the location of the watercourse and its stream order. Additionally, the following documents were also reviewed for information relevant to this assessment:

- Natural Resources Access Regulator's (NRAR) Guidelines for Controlled Activities on waterfront land – Riparian corridors (NRAR 2018)
- GPT Industrial Estate Concept Plan (GPT Group);
- Mamre Road Precinct Planning Waterway Assessment (CT ENVIRONMENTAL 2020); and
- Planning Secretary's Environmental Assessment Requirements (SEARs) for GPT Industrial Estate;

Please refer to the BDAR (Cumberland Ecology 2021a) for further details of detailed ecological desktop assessment including database analysis and literature review that has been conducted for the subject land.

3.2. Site Inspection

Site inspections were undertaken on 25 June 2020 and 9 March 2021 by Bryan Furchert (Botanist) and Matthew Freeman (Ecologist) from Cumberland Ecology. The site inspections involved a random meander survey within the subject land to identify and map vegetation communities and assess the condition of the mapped E2 zone. Notes were taken at multiple locations within the subject land and locations were recorded using a hand-held Global Positioning System (GPS). Survey locations are shown on **Figure 3**.

During the site inspection an assessment of riparian vegetation was conducted for the watercourse in the subject land. This assessment considered native vegetation cover, connectivity and quality, bed and bank stability and habitat diversity. An assessment of the aquatic habitat within the watercourse was completed, which examined the quality of aquatic habitats, including vegetation structure and regeneration, weed infestation, woody debris, fish habitat, patch size and connectivity potential.

Please refer to the BDAR (Cumberland Ecology 2021a) for further details of the comprehensive terrestrial flora and fauna surveys that have been conducted on the subject land.

4. Existing Environmental Conditions

4.1. Un-named Watercourse

The subject land contains one unnamed 2nd order watercourse flowing from west to east in the western part of the subject land (**Figure 1**). As identified, previous consultation with the NRAR have confirmed that the watercourse within the subject land does not meet the definition of waterfront land under the WM Act.

The watercourse is an ephemeral stream that is mostly dry, but that contains water following rainfall, and serves as a flow path into the largest dam in the subject land. It is currently highly degraded and has been heavily modified for agricultural uses with the majority of native vegetation cleared and now consists primarily of exotic grassland and lacks a defined bed and bank structure (see **Photographs 1 and 2**). No riparian vegetation is present along the watercourse and as a result contains low biodiversity value and does not serve as a suitable biodiversity corridor in its current form. There is potential for some aquatic species to utilise it periodically during periods of flow, but this is likely to be highly limited due to the absence of riparian vegetation, or even fringing vegetation such as reeds and rushes. Stock have had access to the stream for many years and trampling and grazing have contributed to its current highly degraded condition.

Photograph 1 View of the watercourse looking downstream from the large dam in the subject land.



Photograph 2 View of the watercourse looking upstream from the small farm dam in the southern portion of the subject land



4.2. Farm Dams

The subject land contains three farm dams (see **Figure 1**). The largest dam contains little to no fringing or emergent aquatic/semi-aquatic vegetation and is surrounded predominantly by exotic grassland vegetation (see **Photograph 3**). The watercourse flows into this dam from the east and continues to the west. The two smaller farm dams do contain some fringing and emergent vegetation including *Typha orientalis* (Broadleaf Cumbungi) and *Cycnogeton microtuberosum* (see **Photograph 4** and **5**).

These dams are likely to provide habitat for a range of aquatic species that commonly occur in farm dams such as waterbirds, fish, amphibians and crustaceans. They may also provide foraging habitat for the Southern Myotis (*Myotis macropus*), a microchiropteran bat species listed as Vulnerable under the BC Act that forages over waterways for fish and insects. Although it is the largest dam, due to the lack of fringing vegetation, the larger dam is unlikely to provide substantial habitat for native species that rely on habitat structure such as reeds and rushes such as amphibians and nesting birds.

Photograph 3 Large farm dam within the subject land



Photograph 4 Small farm dam within the north-western corner of the subject land



Photograph 5 Small farm dam in the south-eastern corner of the subject land



5. Impact Assessment

5.1. Impacts to the Un-named Watercourse

As previously identified, the watercourse in the subject land is highly degraded and provides minimal aquatic habitat value. In its current state it lacks a defined bed and bank structure and is not considered to meet the definition of waterfront land under the WM Act. No riparian vegetation is present and its habitat value is minimal.

According to the proposed development, the entire section of the watercourse and associated E2 zone within the subject land will be realigned and an approximately 25m wide biodiversity corridor established. The realignment will connect to the current location of the E2 zone in the east and then meet up with the E2 zone proposed to be realigned on the adjacent property (Lot 58 DP259135) (see **Figure 4**). The biodiversity corridor will include a reconstructed watercourse with a defined bank and channel that mimics natural stream design as well as a vegetated riparian corridor that provides floristic and habitat connectivity across the subject land.

Changing the alignment of the E2 zone is not considered to increase the impacts on biodiversity. The land proposed for the channel realignment is zoned IN1 and contains exotic grassland with some scattered paddock trees. The proposed realignment will require clearance of vegetation and earthworks to create a defined creek bank and channel and also allow for landscaping and planting of native riparian vegetation. Such works would also be required if the current alignment was adopted. The proposed realignment has been designed in accordance with recommendations from NRAR to provide a naturalised, meandering environment, avoiding sharp turns within the E2 zone. The proposed realignment is not considered likely to result in any additional impacts on the biodiversity values of the subject land.

Furthermore, replanting of native vegetation is proposed to be undertaken within the E2 zone along the reconstructed watercourse to establish a biodiversity corridor providing floristic and habitat connectivity across the subject land. Revegetation will be conducted with species characteristic of locally occurring vegetation communities to establish a suitable riparian corridor that will improve aquatic habitat availability and connectivity across the subject land. It is considered that the realignment and reconstruction of the watercourse and associated riparian corridor will significantly improve the quality and function of the watercourse in the long term relative to current conditions.

Despite the benefits of the re-alignment of the watercourse, development elsewhere in the subject land may have potential to impact on the re-aligned watercourse. The removal of vegetation throughout the subject land will result in alterations to drainage pathways and will alter flows as a result. The construction of the roads and other hardstand areas on what was previously vegetated land have the potential to alter surface hydrological conditions and can potentially increase the volume and velocity of flows as well as impacting the water quality. This may include erosion and sedimentation of the watercourse due to construction activities and vegetation removal. The placement of drainage outlets also has the potential to change flows and create scour risk in high-flow areas at discharge points.

The project has been designed to account for this through the implementation of new storm water management measures, including directing flows towards bioretention basins for treatment of water prior to further discharge into the re-aligned watercourse. The re-aligned watercourse as well as the proposed drainage

outlets will be designed with adequate scour protection measures to slow the flow and reduce erosion and scour.

5.2. Impacts to Farm Dams

The project requires the dewatering and decommission of the three farm dams present in the subject land. This will result in the reduction aquatic habitat available for aquatic species commonly associated with farm dams such as waterbirds, fish, amphibians and crustaceans. In particular this may include some marginal habitat for the Southern Myotis (*Myotis macropus*). This species typically requires waterbodies of at least 3 m in diameter within 200 m of vegetation containing hollow-bearing trees or other suitable roosting habitat features. The watercourse within the subject land is ephemeral and would be unlikely to offer consistent foraging habitat for the species. However, the three farm dams, within the subject land would be more likely to provide consistent foraging habitat for the species.

The farm dams represent relatively lower quality foraging habitat for the Southern Myotis as they are surrounded by cleared land and preferred roosting habitat in mature trees adjacent to the dams is not present. Numerous similar farm dams occur in the surrounding areas that will remain and a very large area of much higher quality habitat is present around Prospect Reservoir, approximately 8 km to the north-east. Additional habitat will also be created within the subject land with the construction of large water detention basins and enhancement of the watercourse and associated riparian vegetation within the subject land.

6. Mitigation Measures

Due to the highly degraded nature of the riparian lands in the subject land, the realignment of the E2 zone and the reconstruction of the watercourse are not considered likely to be of importance to biodiversity. However, the SEARs issued for the project require the preparation of a VMP, which will outline how the creek systems and patches of native vegetation within the re-aligned E2 zoned area are to be revegetated and managed in perpetuity. A VMP has been prepared for the project (Cumberland Ecology 2021b) and will be implemented to minimise the impacts associated with the project and to guide the proposed restoration and management of the re-aligned watercourse and biodiversity corridor.

The re-aligned watercourse will be recreated, with the banks and the stream channel stabilised with rock to form a gently sloping bank profile. Rocks will be placed to recreate the natural appearance of a creek-bed with sufficient space between rocks for planting with riparian/aquatic plant species. The watercourse channel will also incorporate instream woody debris to create instream aquatic habitat, have a range of different surfaces along the bed and banks of the channel to create different geomorphic features such as pools and riffles during high flow events.

Furthermore, revegetation will be conducted with species characteristic of locally occurring vegetation communities along the watercourse to establish a suitable riparian corridor that will improve habitat connectivity across the subject land. The biodiversity corridor will consist of vegetation that is broadly representative of the locally occurring native vegetation communities, including the threatened ecological communities (TECs) Cumberland Plain Woodland, River-Flat Eucalypt Forest, Swamp Oak Floodplain Forest and Freshwater Wetlands, which are all listed under the BC Act. Furthermore, Cumberland Plain Woodland and Swamp Oak Floodplain Forest are also listed as TEC's under the Commonwealth EPBC Act. Revegetation will include the planting of canopy, shrub and ground cover species throughout the biodiversity corridor, including aquatic species within the watercourse.

In order to mitigate the removal of the farm dams, a Dam Dewatering Plan will be prepared as specified in the VMP. This plan will include provision for staged dewatering under ecologist supervision to enable the relocation of aquatic species recorded from the dams. The loss of aquatic habitat will also be compensated for by the creation of large detention basins in the subject land. These will be expected to provide habitat for terrestrial and aquatic species in the long term. Specifications of the Dam Dewatering Plan are provided in the VMP (Cumberland Ecology 2021b).

The project has been designed using water sensitive urban design to maintain or improve quality of discharge into creeks and drainage lines. Erosion and sediment control measures will be implemented throughout the construction periods in order to minimise potential impacts to the existing hydrological processes of the subject land. A Sediment and Erosion Control Plan will be prepared in accordance with *The Blue Book – Managing Urban Stormwater: Soils and Construction* (Landcom, 2004) and implemented prior to works, with the aim of achieving an outcome of 'no visible turbid plumes migrating through the waterway'. The Plan must include, as a minimum, the locations and type of erosion and sediment controls to be erected within and adjacent to the existing waterway and the new vegetated channel.

As outlined previously, development elsewhere in the subject land may also have potential to impact on the watercourse through alterations to drainage pathways and increased flows. Mitigation measures have been prepared to minimise these impacts through the implementation of new storm water management measures

including directing flows towards bioretention basins for treatment of water prior to further discharge into the watercourse. The re-aligned watercourse as well as the proposed drainage outlets will be designed with adequate scour protection measures to slow the flow and provide erosion and scour protection.

7. Conclusion

This Riparian Lands Assessment has provided an assessment of the impact to riparian lands in the subject land as a result of the project. Riparian lands within the subject land comprise a 2nd order watercourse and three farm dams.

The project will result in the relocation and reconstruction of the existing watercourse and moving the mapped E2 zone to the north whilst also reducing the width of the E2 zone to 25 m. As confirmed by NRAR, the watercourse is not considered to be waterfront land as defined by the WM Act, and therefore a 40 m riparian buffer is not required. The project will also result in the removal of the three farm dams within the subject land.

The watercourse is highly degraded and in its current form does not contain any riparian vegetation and is surrounded by exotic grassland. Accordingly, the biodiversity values of the watercourse are minimal. The project will result in the reconstruction of the watercourse with a defined bed and bank structure in the E2 zone and the establishment and maintenance of a 25 m riparian zone according to the specifications presented in the VMP. It is considered that the hydrological outcomes within the subject land will improve in the long term through the design and establishment of the new watercourse and associated biodiversity corridor.

The farm dams provide some aquatic habitat for native species including wetland birds, amphibians and fish, and may provide some marginal habitat for the Southern Myotis. These dams are unlikely to provide important habitat for aquatic species however as they are small, and much larger areas of aquatic habitat occur in surrounding areas and in nearby Prospect Reservoir. A Dam Dewatering Plan will be prepared to minimise impacts to fauna species during dewatering, and the minor loss of habitat will be compensated for by the creation of large detention basins in the subject land.

The project has been designed using water sensitive urban design to maintain or improve quality of discharge into creeks and drainage lines. A Sediment and Erosion Control Plan will be prepared in order to minimise potential impacts to the existing hydrological processes of the subject land.

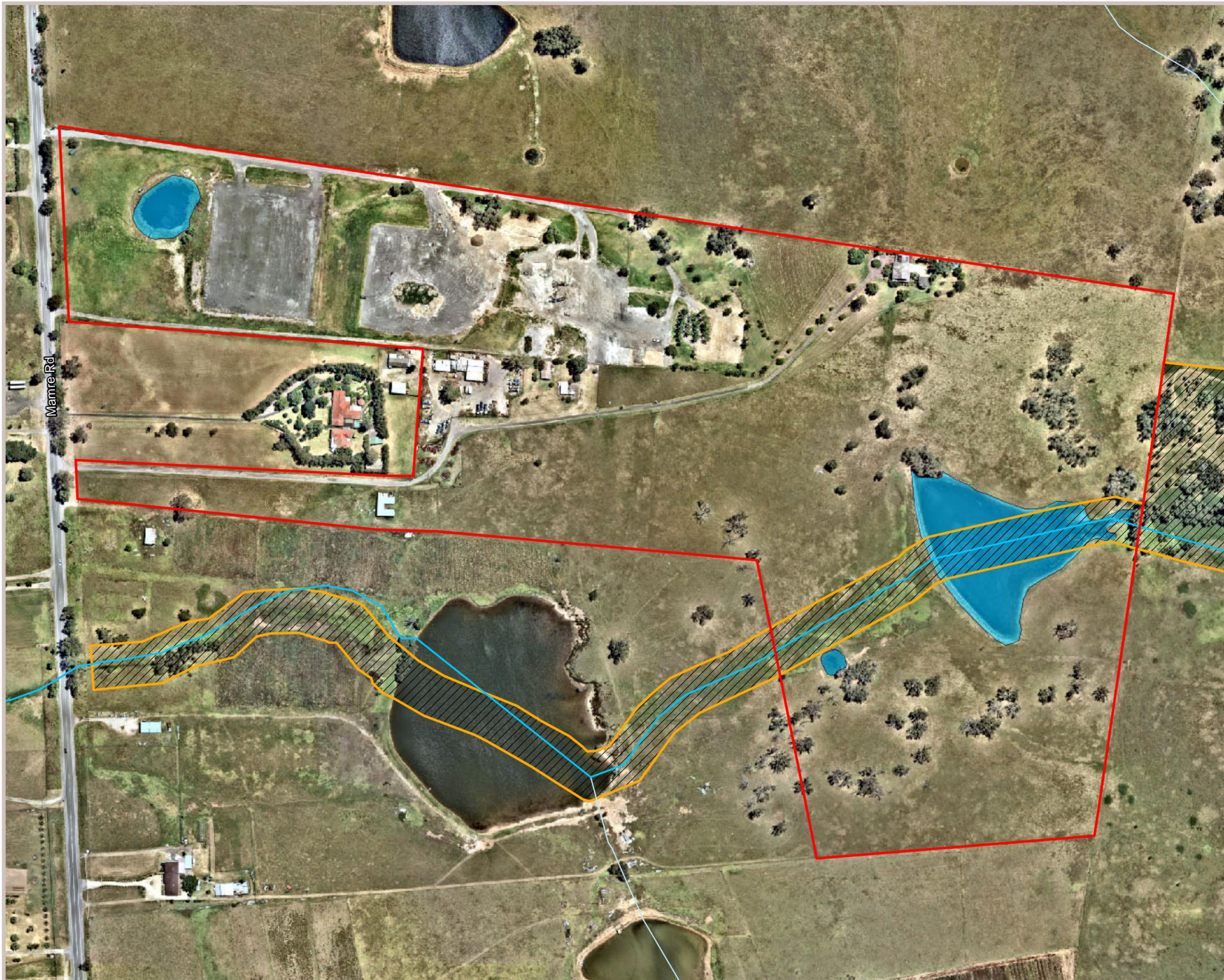
Accordingly, the impacts to the riparian lands in the subject land are not considered to be significant and it is likely that biodiversity and hydrological outcomes associated with the riparian lands within the subject land will improve in the long term.

8. References

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- NRAR. 2018. Guidelines for controlled activities on waterfront land — Riparian corridors. Natural Resources Access Regulator.

FIGURES





- Legend**
- Subject Land
 - E2 Zoning
 - Dams
- Watercourse**
- 1st order
 - 2nd order

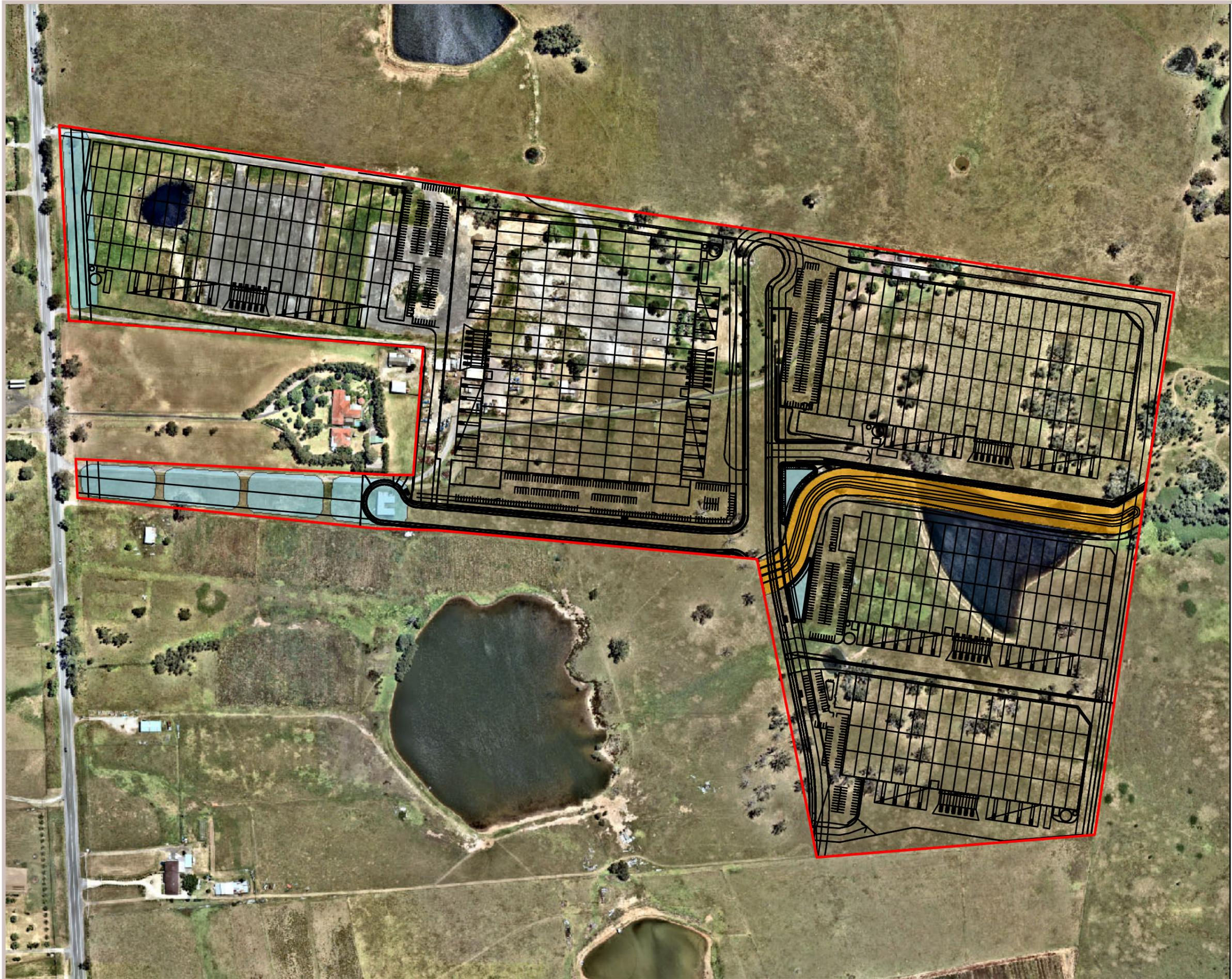
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 Finance and Services



Coordinate System: MGA Zone 56 (GDA 94)



Figure 1. The subject land and E2 zone



Legend

- Subject Land
- Project Layout
- Realigned E2 Zone
- Retention Basin

Image Source:
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Coordinate System: MGA Zone 56 (GDA 94)

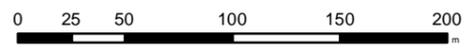


Figure 2. Layout of the project

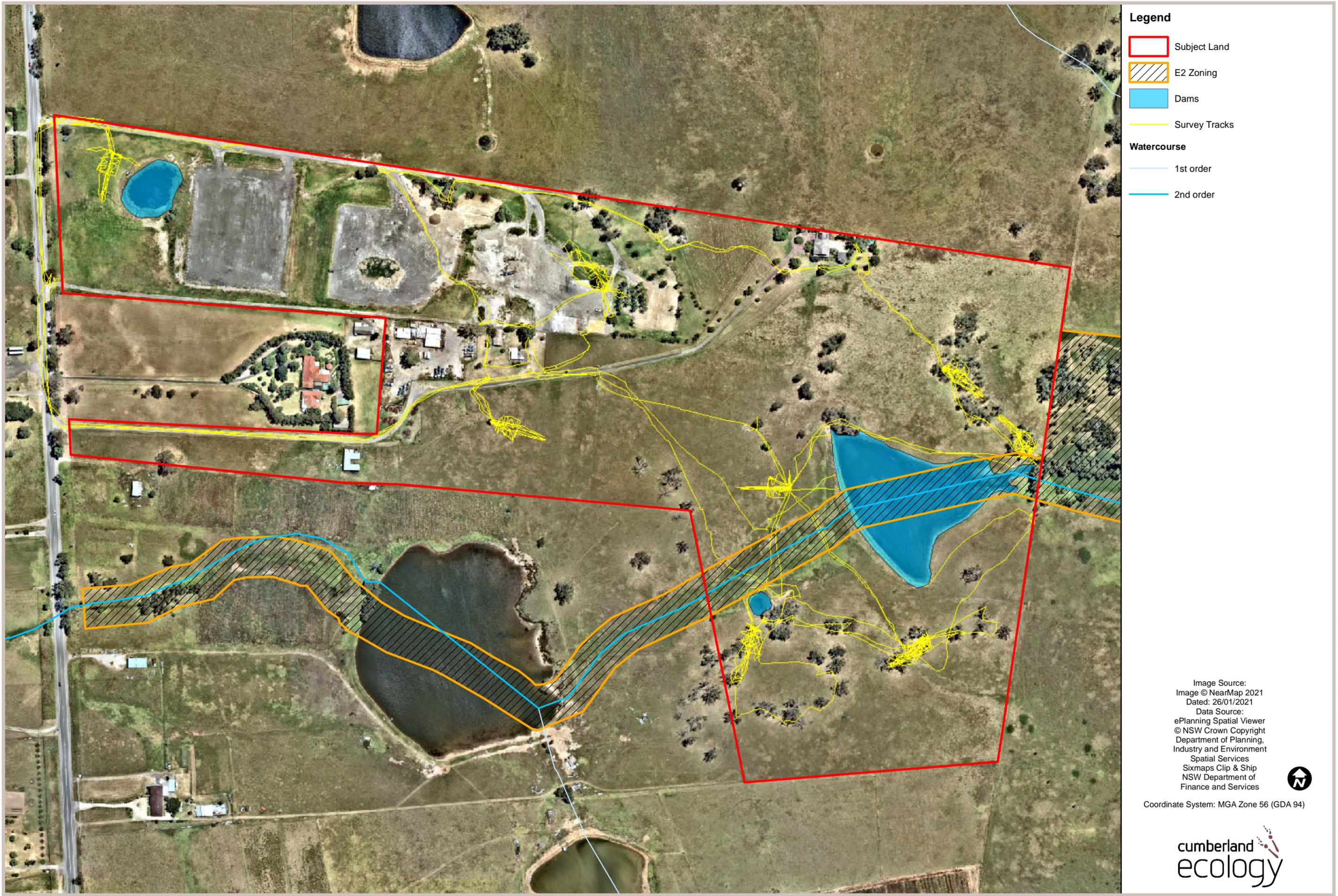


Figure 3. Survey locations within the subject land



Legend

- Subject Land
- Re-aligned E2 Zone
- Re-aligned Watercourse

Image Source:
 Image © NearMap 2021
 Dated: 26/01/2021
 Data Source:
 SBA Architects (2021)
 Spatial Services
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 NSW Department of
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Coordinate System: MGA Zone 56 (GDA 94)



Figure 4. Proposed re-aligned E2 Zone and Watercourse