253-267 Aldington Road, Kemps Creek - Riparian Constraints Assessment

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Abbreviations

Abbreviation	Description
CAA	Controlled Activity Approval
DCP	Development Control Plan
DPI	Department of Primary Industries
ELA	Eco Logical Australia Pty Ltd
FM Act	*Fisheries Management Act 1994*
KFH	Key Fish Habitat
LEP	Local Environmental Plan
LGA	Local Government Area
NRAR	Natural Resources Access Regulator
VRZ	Vegetated Riparian Zone
WM Act	*Water Management Act 2000*

1. Introduction

Eco Logical Australia (ELA) was engaged by Root Partnerships on behalf of Icon Oceania to provide an assessment of the riparian land and waterway values at 253-267 Aldington Road, Kemps Creek (Lot 9, DP253503) (the study area) (Figure 1). The purpose of this assessment was to determine if the mapped watercourse within the study area met the definition of a 'river' in accordance with the *Water Management Act 2000* (WM Act) and to compare riparian and waterway values to the zoning within the *State Environmental Planning Policy (Western Sydney Employment Area) Amendment 2020* and the Mamre Road Precinct Draft Development Control Plan 2020 (Figure 4, Figure 3).

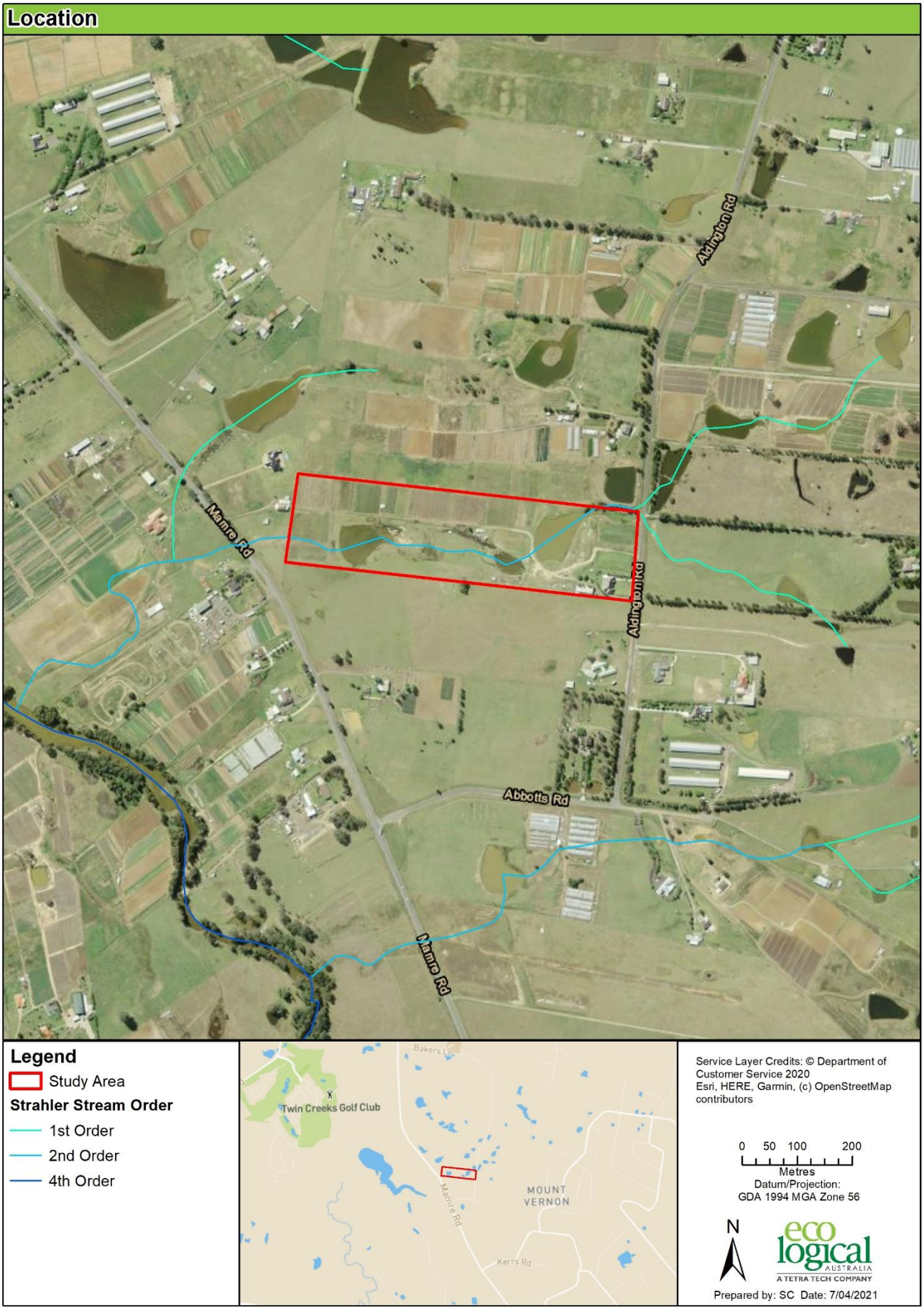

Figure 1: Location of study area

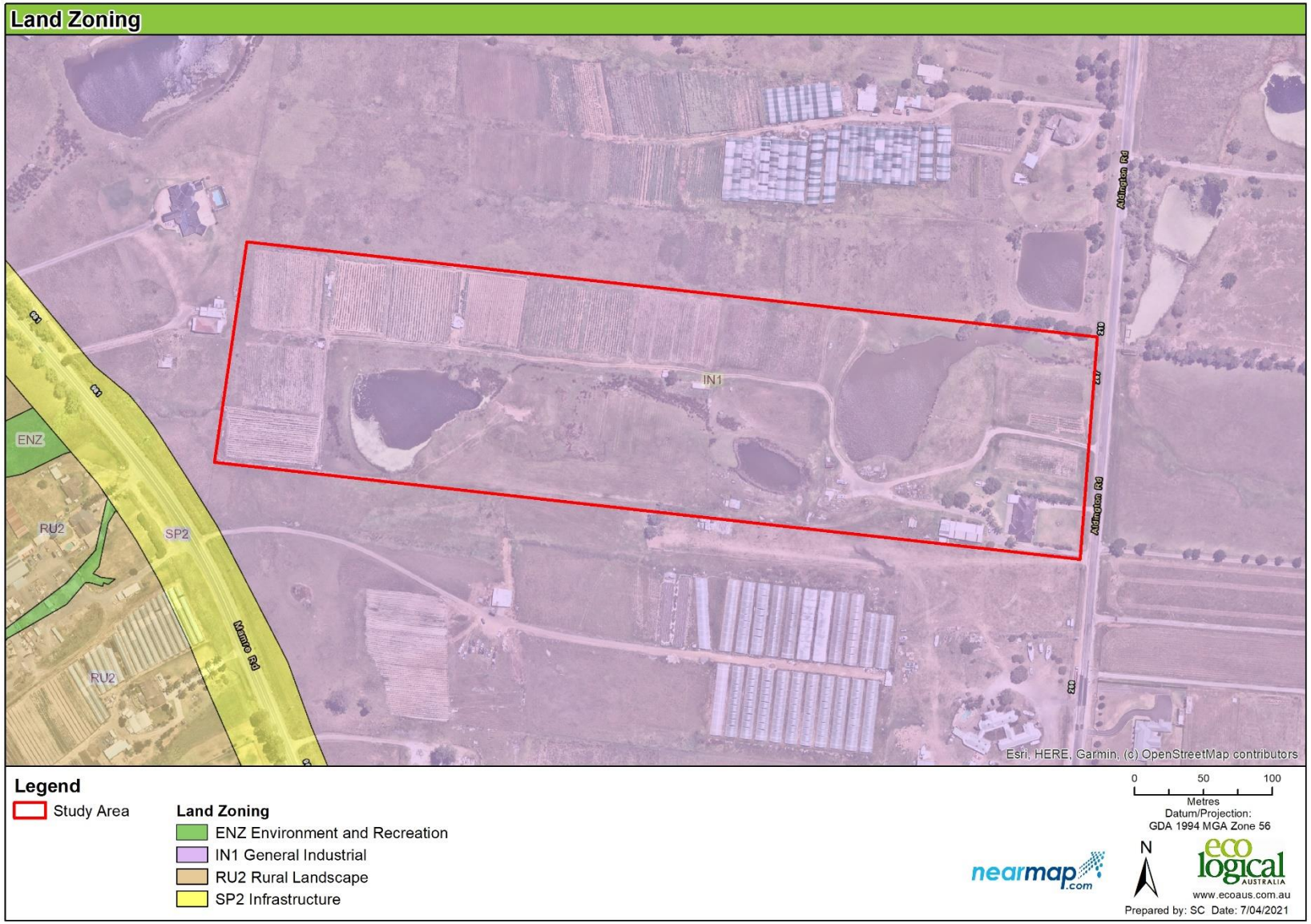

Figure 2: Land Zoning of the study area

2. Legislative Context

The table below provides an overview of legislation that is typically relevant at a Development Application stage. Further information is also provided in the Appendix.

Table 1: Legislative context

Name	Relevance to the project
Fisheries Management Act 1994	The *Fisheries Management Act 1994* (FM Act) governs the management of fish and their habitat in NSW. The objects of the FM Act are to conserve fish stocks and key fish habitats (KFH), 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. DPI Fisheries have not mapped the watercourse within the subject lot as KFH and second order streams are not considered KFH by DPI Fisheries, therefore no permits under Part 7 of the FM Act would be required for any works within the creekline.
Water Management Act 2000	The WM Act aims to provide for the sustainable and integrated management of the state's water for the benefit for both present and future generations. If a local development is proposed on 'waterfront land' (within 40 m of the top of bank), it is considered a Controlled Activity and requires a Controlled Activity Approval (CAA) under section 91 of the WM Act. The development should be undertaken in accordance with the '*Guidelines for riparian corridors on waterfront land*' (NRAR, 2018). The WM Act defines a river 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.
Draft Mamre Road Precinct Development Control Plan (November 2020)	Clause 2.5 of the Draft DCP outlines development objectives and development controls for Riparian Land within the precinct. The DCP Figures (see below) show an 'Indicative riparian buffer' running east-west through the site. Table 4 of the DCP lists the required riparian corridor widths however the watercourse running through the site (known as Unnamed Trib Kemps Creek 2 in the supporting study) is not listed in the Table 4A note to the table indicates that the relevant 2nd and 3rd order streams have been zoned E2 Environmental Conservation under the WSEA SEPP. The Indicative Riparian Corridor on the site is no zoned E2. It is not clear whether the Figure or the Table takes precedence. The DCP outlines the following controls: ***Mapped Riparian Corridors (Field-Validated)*** 1. *Within a riparian corridor, as indicatively identified in Figure 2 and Figure 3:* • *All existing native vegetation is to be retained and rehabilitated, except where clearing is required for essential infrastructure such as roads.* • *Native vegetation is to be conserved and managed in accordance with the controls below.* ***Avoiding Modifications to Natural Waterbodies*** 2. *There should be no modifications to a natural (or historic) waterbody in its dimensions, depth or bank height unless the approval of Natural Resources and Assessment Regulator is obtained, including the enhancement of the ecological outcomes of the watercourse, hydrological benefits and ensure the long-term geomorphic stability of the watercourse.*

Name	Relevance to the project
	3. *Watercourses should not be modified to maximise flood conveyance unless there are no other means to avoid damage to existing dwellings or infrastructure that cannot be relocated.* 4. *Natural hydrological processes are to be maintained where possible, including natural vegetation and the flow regimes to maintain creek line stability and the health of terrestrial and aquatic plant communities.* 5. *Existing flows of surface and ground water should not be altered through construction of channelled flows or the redirection or interruption of flows.* ***Protection and Enhancement of Riparian Corridors*** 6. *Waterways of Strahler Order 2 and higher will be maintained in a natural state, including the maintenance and restoration of riparian area and habitat such as fallen debris.* 7. *Where a development is associated with or will affect a waterway of Strahler Order 2 or higher, rehabilitation will occur to return that waterway to a natural state.* 8. *Waterway crossings such as bridges are to be maintained to retain ecological connectivity and water quality.* 9. *Road crossings across a waterway of Strahler Order 2 or higher are to be designed to minimise impacts to vegetated riparian area and species movements in accordance with NSW Department of Primary Industries requirements to maintain fish passage.* 10. *Development within a riparian corridor should be avoided where possible to retain its ecological processes. Where development is unavoidable within the riparian areas, it will be demonstrated in the development application that potential impacts on water quality, aquatic habitat, and riparian vegetation will be negligible or offset in accordance with the vegetated riparian zone and offsetting requirements as specified Natural Resources Access Regulator (NRAR) Guidelines for Controlled activities on waterfront land - riparian corridors.* 11. *All riparian corridors should comprise a vegetated riparian zone along each side of the watercourse/channel.* 12. *The vegetated riparian zone should retain or be vegetated with fully structured native vegetation (trees, shrubs and groundcover species).* 13. *In relation to activities within the vegetated riparian zone, such as cycleways and paths, detention basins, stormwater management devices and essential services, compliance is required with the 'riparian corridor matrix' in the NRAR controlled activities on waterfront land – Riparian corridors (May 2018).* 14. *The number of vehicular and pedestrian watercourse crossings should be minimised and designed in accordance with the NRAR Guidelines to allow for riparian connectivity and flows.* 15. *Private and public fencing should be located on the perimeter of the riparian corridor and avoid intersecting across watercourse channels or riparian corridors.* 16. *A managed buffer zone outside the vegetated riparian zone should be provided (where possible), to provide an additional buffer between development and the vegetated riparian zone. Land uses within the managed buffer zone could include roads, paths, playgrounds and stormwater management devices.* 17. *Bushfire asset protection zones should be located outside the vegetated riparian zones.* 18. *Appropriate widths for vegetated riparian zones are dependent on the Order of Stream in accordance with the Strahler methodology. The width should be measured from the top of the highest bank on both sides of the stream/watercourse, excluding any managed buffer zone, and shall comply with the requirements outlined in Table 4. Riparian corridors will be assessed by Council and NRAR on merit.* 19. *Enhancement of riparian corridors should, where possible:* • *Mimic natural hydrological regimes for watercourse treatments;* • *Replicate the natural watercourse through creation of a meandering channel, rather than straight channels;*

Name	Relevance to the project
	• *Simulate natural roughness having regard to riparian requirements and flow velocities to sustain vegetation groupings. A watercourse's shape, smoothness of its channel and amount of vegetation in the channel all affect the 'roughness' of that watercourse and the speed of water conveyed in the channel;* • *Minimise ongoing maintenance requirements through channel design;* • *Establish a functional riparian zone and natural channel section;* • *Maintain or create a full assemblage of vegetation with likely natural obstructions;* • *Minimise likely damage to channel banks and vegetation from storm flow through channel design; and* • *Ensure that the channel has the capacity for appropriate flood flows having regard to the steepness of the catchment; channel modifications and future liability for landowners, Council and government agencies.* *20. Where a development proposal would significantly affect Key Fish Habitat and/or threatened fish (as defined under the Fisheries Management Act 1994), applicants must include an aquatic ecological environmental assessment in accordance with the Fisheries Management Act 1994.* *21. Water holding structures (e.g. farm dams) that are more than 0.1 ha in area or more than 3 ML in volume within 3 km of the approach boundary to Western Sydney Airport are to be avoided to ensure there is no attraction for water-favouring fowl.* ***Development Adjacent Riparian Corridors*** *22. Development adjacent riparian corridors is to be managed in accordance with the controls in Section 4 and the controls below.* *23. Retain areas of the proteaceae shrubs for the Eastern Pygmy Possum Cercartetus nanus along or adjacent to riparian areas to improve and maintain habitat connectivity* *24. Where a development adjoins riparian corridors, Council may require bank stabilisation works, measures to minimise pollution and sedimentation. Reference should be made to the requirements of the Fisheries Management Act 1994.* **25.** *Where industrial land immediately abuts a riparian corridor, development shall be located and designed to achieve a satisfactory interface with the riparian corridor. Consideration must be given to issues such as surveillance of the riparian corridor, built form and design, landscaping, opportunity for public interfaces, where appropriate, and protection from bushfire threat.*
Mamre Road Precinct Rezoning: Waterway Assessment (CTEnvironmental (2020)	This study was used to support the rezoning and subsequent Draft DCP for Mamre Road. The subject site is described as 'Unnamed Trib Kemps Creek 2. The report described the reach of watercourse on the site as: *The lower section of this waterway which was proposed for E2 and RE1 zoning in the Exhibited Draft Mamre Road Precinct Zoning (DPIE 2020) in the draft was field validated as 2nd order however this section is significantly modified and at the time of inspection was a series of farm dams linked by a drainage channel and diverted from the original flow path (Figure 10). The channel had a heavy infestation of the invasive weed, Juncus acutus (Figure 8).* *The original flow path of this waterway, likely to have been a broad, swampy depression which meandered through the centre of the area shown in Figure 8, has been significantly modified to become a market garden and pig paddock and has been deeply furrowed to allow crop irrigation (Figure 9).* *Field inspection of this watercourse validated that the mapped lower section was significantly modified to be a series of farm dams linked by a diversion channel. It was concluded that due to the lack of vegetation along the upper section of the headwater watercourses and significant modification to a drainage channel of the lower section, the watercourse had minimal ecological value.* Figure 10 shows that the only channel on site is an excavated drainage channel.

Name	Relevance to the project
Draft Cumberland Plain Conservation Plan (2020)	The draft CPCP classifies the entire site at Urban Capable (see **Figure 5** below). The nearest land proposed Non-certified – Western Sydney Aerotropolis or Non-certified – Avoided for Other Purposes is downstream of the site.

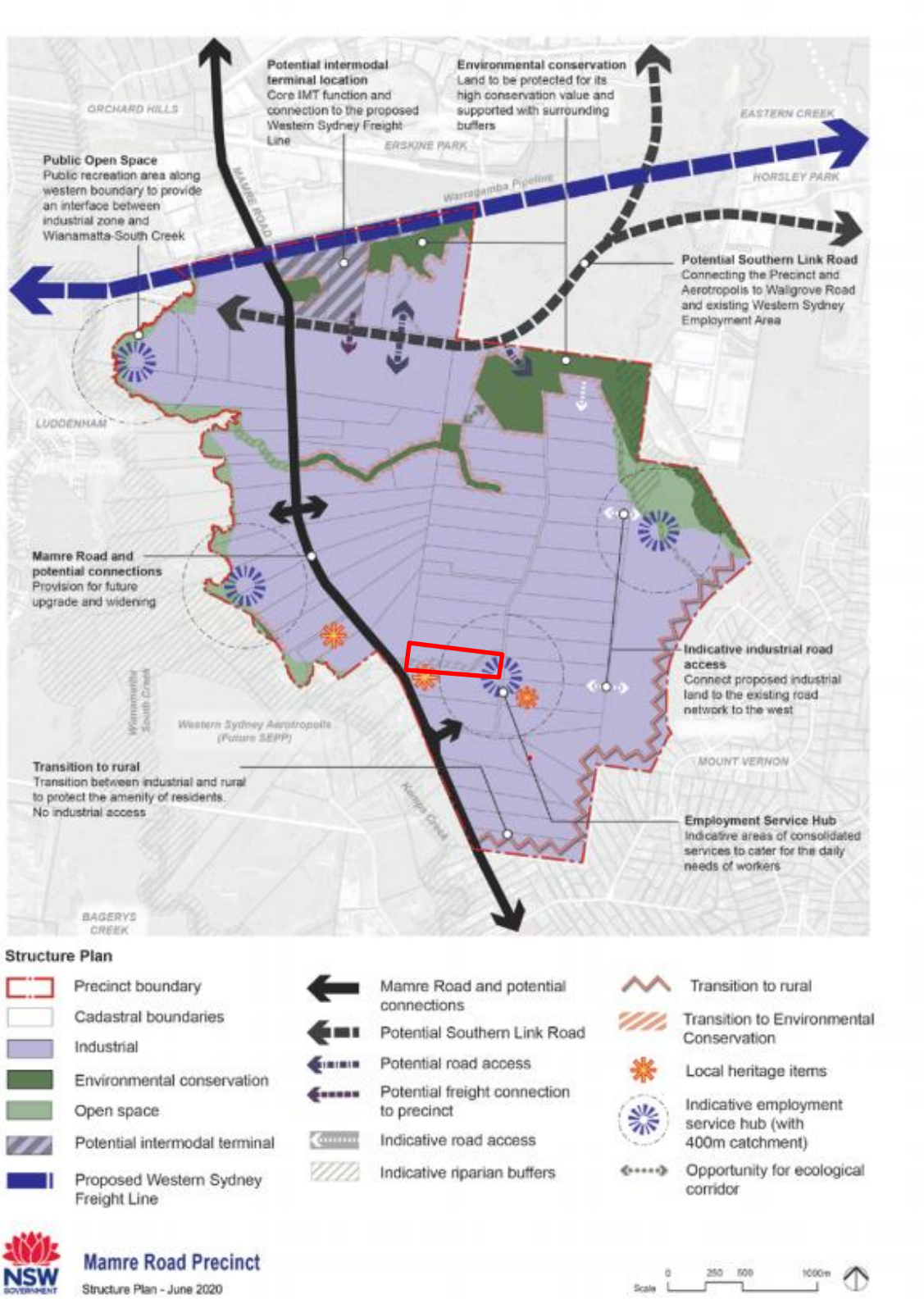

Figure 3: Mamre Road Precinct Structure Plan (from Draft Development Control Plan – NSW Government 2020)

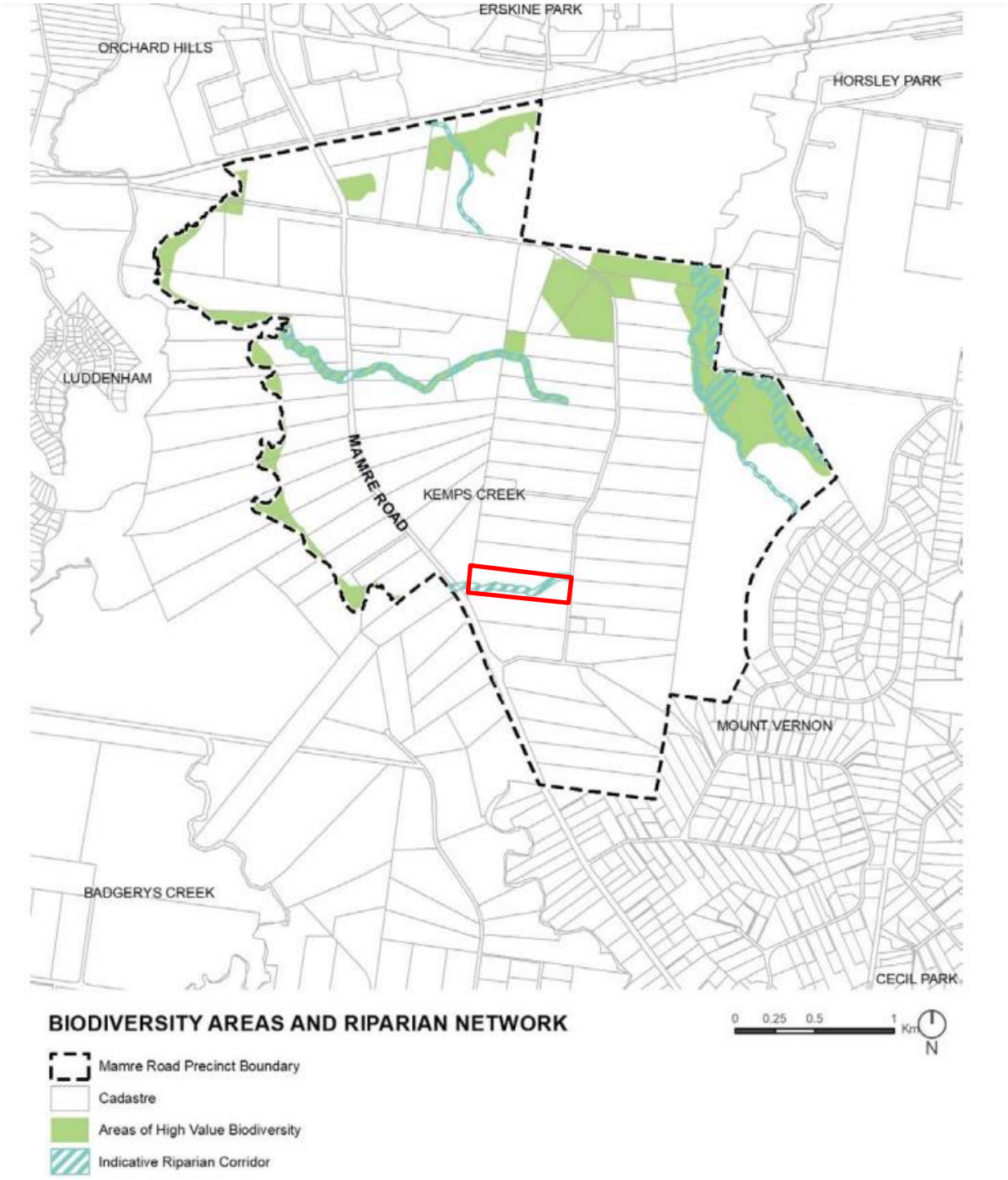

Figure 4: Mamre Road Precinct Biodiversity areas and Riparian Network (from Draft Development Control Plan – NSW Government 2020)

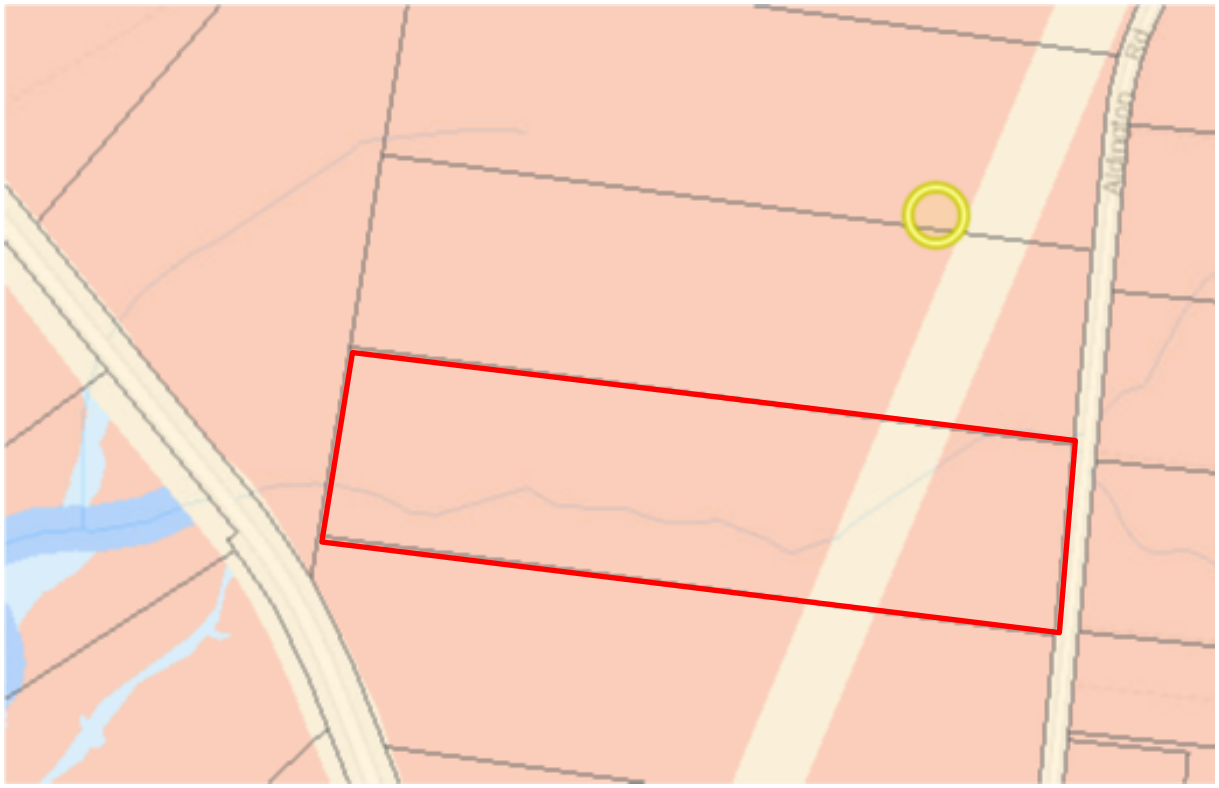

Figure 5 Extract from draft Cumberland Plain Conservation Plan - Exhibition Viewer

3. Methodology

A field survey for this assessment was conducted by aquatic ecologist Claire Wheeler and environmental planner Roshan Kalugalage on the 26th of March 2021. The survey was undertaken following a substantial rainfall event. Within the previous seven days, 285mm recorded at the nearby Erskine Park Reservoir site (station number 67066; BOM, 2021). This extensive rainfall is likely to result in substantially more water flowing through the site than would normally be the case.

The site inspection was conducted to:

- determine if the watercourse marked on the 1:25,000 topographical map met the definition of a 'river' under the WM Act
- identify areas of potential aquatic habitat in the watercourse and farm dams identified in the study area.

4. Results

DPI mapping showed an unnamed second order watercourse within the study area, which travels in a westerly direction and is fed by two first order watercourses that are located to the northeast of the study area (Figure 1). These watercourses are tributaries of Kemps Creek within the Hawkesbury Nepean catchment. A map of the validated watercourse within the study area is located in Figure 6.

The site inspection largely concurs with the assessment made by CTEnvironmental (2020) as described in Table 2 above.

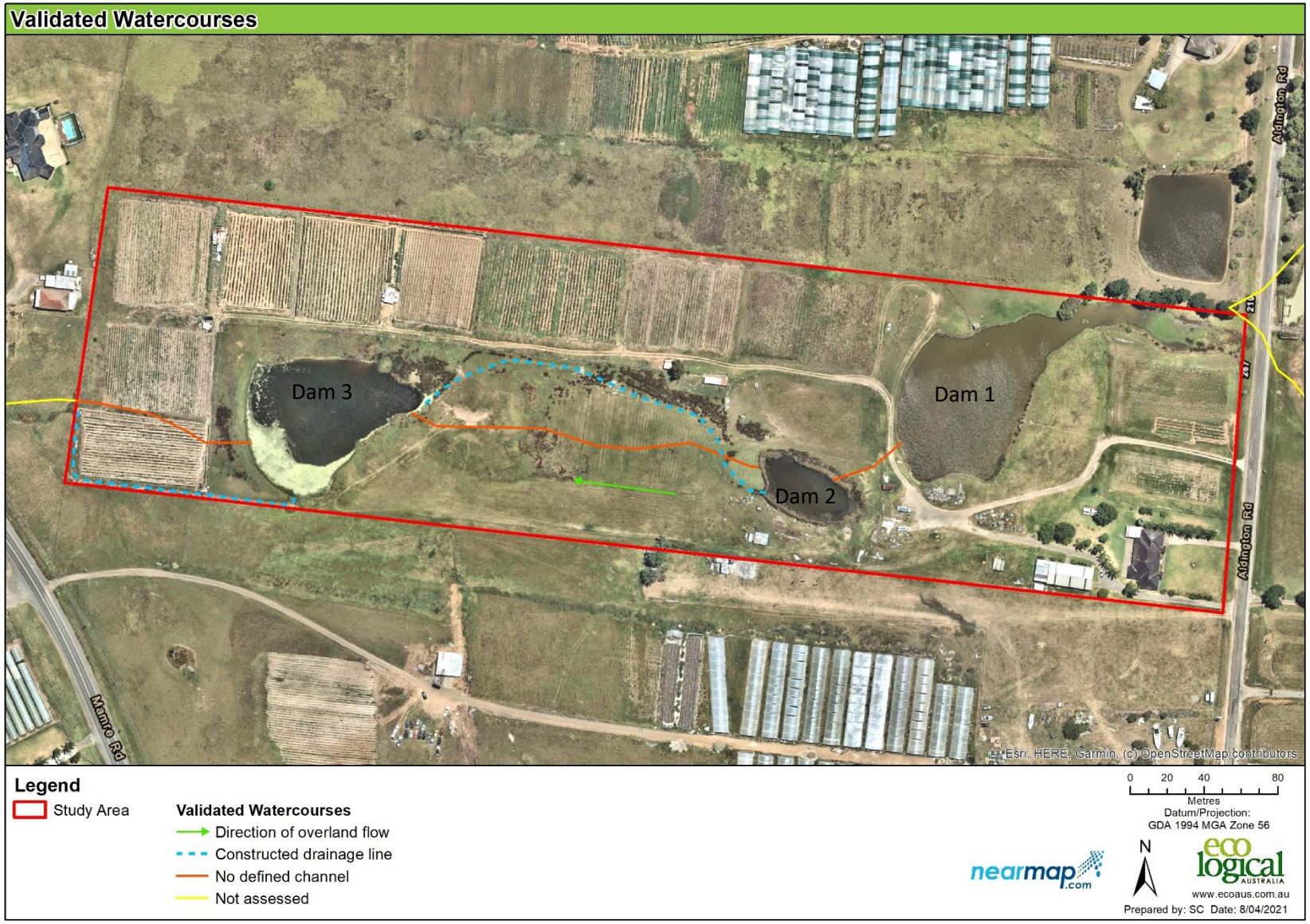

Figure 6: ELA field validation

The mapped watercourse entered the north eastern end of the study area under Aldington Road via concrete pipes (Figure 7). A dense patch of *Typha orientalis* was located within the site immediately downstream of these pipes (Figure 8). This fed into a large elongated dam (Dam 1), which at its downstream extent was not connected to Dam 2 by a defined channel. No bed and banks were observed in the location of the mapped watercourse between the first and second dams on the property (Figure 9 and Figure 10).

Similarly between dams 2 and 3, no defined channel was observed (Figure 11 and Figure 12) where the mapped watercourse was located. There was significant overland flow across this area due to previous heavy rain. A constructed drainage line of sorts had been created in some sections between Dams 2 and 3 however this did not contain defined bed or banks for most of its length and therefore the dashed line shown in the figure above is an estimate of flow path.

Figure 7: North eastern extent of study area, looking upstream

Figure 8: North eastern extent of study area, looking downstream

Figure 9: Downstream of dam 1, looking upstream

Figure 10: Downstream of dam 1, looking downstream.

Figure 11: No defined channel between dams 2 and 3, looking upstream

Figure 12: No defined channel between dams 2 and 3, looking downstream

Below the third dam, no defined channel was observed in the location of the mapped watercourse (Figure 13 and Figure 14). This area had been heavily modified for the creation of market gardens. An irrigation channel had been created on the southern side of dam 3 that followed the southern boundary fenceline. At the location of the mapped watercourse at the western extent of the site, there was no defined channel within the study area (Figure 15 and Figure 16). Downstream of the site, a dense *Typha orientalis* patch was observed.

Figure 13: Below dam 3, looking upstream

Figure 14: Below dam 3, looking downstream

Figure 15: Western extent of the site, looking upstream

Figure 16: Western extent of the site, looking downstream

Table 2: Dams within study area

Dam number*	Description	Aquatic fauna observed	Aquatic flora observed	Representative photo
1	Large dam located along the upstream extent of mapped watercourse through the site. The upstream section of the dam was narrow and fed by stormwater pipes under Aldington Road.	Immediately downstream of the dam were hundreds of Gambusia that appeared to have been washed out of the overflowing dam during previous heavy rain.	*Lemna disperma* (Duckweed), *Typha orientalis, Potamogeton sulcatus*	
2	Large dam located approximately 40 m downstream of Dam 1. The dam was surrounded by dense macrophytes.	No aquatic fauna observed.	Emergent macrophytes including *Typha orientalis* and *Juncus acutus.*	

Dam number*	Description	Aquatic fauna observed	Aquatic flora observed	Representative photo
3	No defined spillway but evidence of overflow after recent rain. Standing dead trees in the middle of the dam provided good habitat for birds.	Black Swans, Purple Swamphen, Eurasian Coot, Cormorant.	*Typha orientalis, Juncus acutus, Lemna disperma* (Duckweed)	

*dams are numbered in order along creek: upstream to downstream

5. Conclusion

The draft DCP figures 2 and 3 show an 'Indicative Riparian Corridor' on the site, however the rationale for this is not clear. The CTEnvironmental (2020) assessment of the site concluded that the 'watercourse' (i.e. general drainage line) has little ecological value. Eco Logical Australia concurs with that assessment. There was no evidence of a defined natural watercourse channel in the locatin shown on Figures 2 and 3 through the central portion of the site. There was no aquatic habitat other than in the farm dams, which were highly modified.

The site is zoned IN1 General Industrial and does not contain E2 Environmental Conservation zoned land. In other parts of the Mamre Road precinct the E2 zone was used to clearly identify riparian corridors that were to be protected. There is no mention of Unnamed Trib Kemps Creek 2 in Table 4 in the draft DCP and the draft Cumberland Plain Conservation Plan did not identify a biodiversity or riparian outcome on site.

Figures 2 and 3 of the draft DCP therefore appear to be inconsistent with the on-site assessment and broader planning documents. There seems little evidence for the need to protect a watercourse other than Figures 2 and 3. ELA therefore recommends that the proponent consult with the Department of Planning, Industry and Environment and the Natural Resources Access Regulator to confirm the intention of the DCP on this site and whether the 'Indicative Riparian Corridor' is necessary. The key question is whether the DCP intends that a new watercourse and riparian corridor be created on the site or whether the Figures 2 and 3 do not reflect the planning intent of the WSEA SEPP.

6. References

Bureau of Meteorology (2021). *Erskine Park Reservoir Daily Rainfall*. Available from http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_num=067066

CTEnvironmental (2020). *Mamre Road Precinct Rezoning: Waterway Assessment - Kemps Creek and Mount Vernon*. Prepared for Sydney Water.

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NRAR (2018). *Guidelines for controlled activities on waterfront land: Riparian corridors*. Available from https://www.industry.nsw.gov.au/__data/assets/pdf_file/0004/156865/NRAR-Guidelines-for-controlled-activities-on-waterfront-land-Riparian-corridors.pdf

Appendix A Planning and Legislative Requirements

Water Management Act 2000

Development on waterfront land (i.e. land within 40 m of a watercourse or waterbody) requires a CAA under the WM Act 2000. To guide land use planning and decisions on watercourses and their riparian zones, NRAR published *Guidelines for Controlled Activities on Waterfront Land* (2018). These guidelines are generally used in conjunction with a ground-truthing riparian assessment. The guidelines essentially set out the preferred outcome that NRAR seeks. They are however only a guideline, and development that is inconsistent with the guideline can be approved, however it would require much greater justification and have a strong merits argument.

The guidelines outline the need for a 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 17). NRAR recommends a VRZ width based on watercourse order as classified under the Strahler System of ordering watercourses and using Hydroline Spatial Data which is published on the department's website (Table 3).

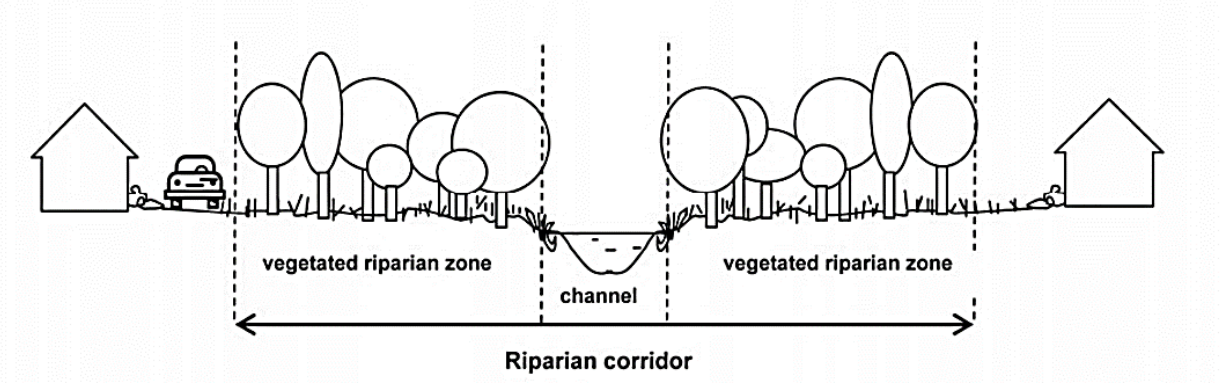

Figure 17: Vegetated Riparian Zone and watercourse channel comprising the riparian corridor (NRAR, 2018).

Table 3: Recommended riparian corridor widths relative to Strahler Order (NRAR, 2018).

Watercourse type	VRZ width (each side of watercourse)	Total riparian corridor width
1st order	10 m	20 m + channel width
2nd order	20 m	40 m + channel width
3rd order	30 m	60 m + channel width
4th order and greater	40 m	80 m + channel width

Non-riparian uses can be authorised by NRAR within the outer 50% of the VRZ (Table 4), as long 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 18).

Table 4: 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
1st	10m	•	•	•	•	•	•	•		
2nd	20m	•	•	•	•	•		•		
3rd	30m	•	•	•		•			•	•
4th +	40m	•	•	•		•			•	•

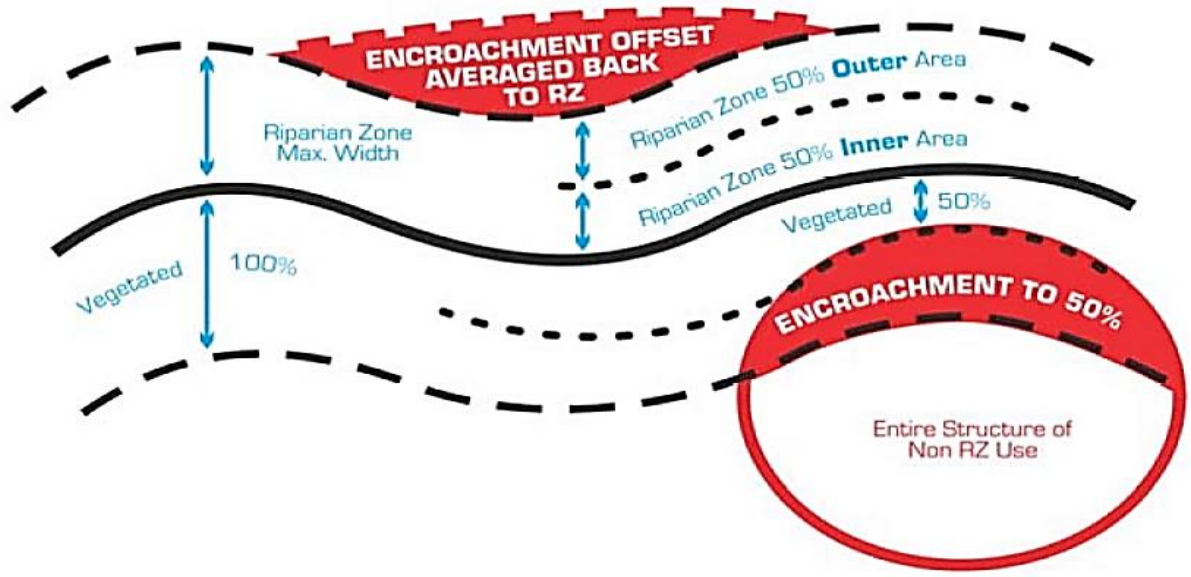

Figure 18: Riparian 'averaging rule' for offsetting encroachment into the outer 50% of the VRZ (NRAR 2018).

Table 3 indicates that for a 2nd order watercourse, NRAR requires a VRZ of 20 m from the top of bank. Note however that Penrith Council DCP has a section called 'lifting the bar' where they recommend a 40 m buffer from the top of bank (see Table 1 in this report).

The removal of the dams within the study area may be subject to conditions of consent from Penrith Council, such as the preparation of a dam de-watering plan, to ensure impacts to downstream environments are minimised. Consultation with Penrith Council would be recommended in order to determine what conditions would need to be satisfied prior to the decommissioning or modification of this dam.

Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) provides for the protection, conservation, and recovery of threatened species defined under the Act. It also makes provision for the management of threats to threatened species, populations, and ecological communities defined under the Act, as well as the protection of fish and fish habitat in general. In particular, the FM Act has mechanisms for the protection

of marine vegetation (mangroves, saltmarsh, seagrass and seaweeds) on public water, land and foreshores, as well as the dredging, reclamation or obstruction of fish passage on or adjacent to Key Fish Habitat. This includes direct and indirect impacts, whether temporary or permanent.

No Key Fish Habitat was mapped on the site and no threatened or protected species listed under FM Act are known to occur within the vicinity of the site.

Therefore, a permit under the FM Act would not be required.

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