Attachment 13 to Item 3.1.1.

Riparian Assessment Report

Date of meeting: 21 November 2024
Location: Audio-visual link
Time: 10am

ESEA

Environmental Services & Education Australia

Redbank Expansion Area (Kemsley Park)

Riparian Assessment

22 July 2024

Version 2.1

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Client	Redbank Communities
Client Project Manager	Mark Regent
ESEA Project Manager	Clayton Woods
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22 July 2024

Mark Regent
Project Director
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76 Arthur Philip Drive
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Dear Mark

Redbank Expansion Area (Kemsley Park) Riparian Assessment

This riparian assessment has been prepared by Environmental Services & Education Australia (ESEA) on behalf of Redbank Communities in support of a planning proposal for rezoning and subdivision works at the Redbank Expansion Area (Kemsley Park) under Part 4 of the *Environmental Planning and Assessment Act 1979*.

The report includes an assessment of all drainage lines within the Redbank Expansion Area (Kemsley Park) in accordance with the *Water Management Act 2000* (WM Act) and *Fisheries Management Act 1994* (FM Act) and investigates the required provisions related to construction within, and management of, riparian areas.

This report includes information on the categorisation of drainage lines within the subject site, relevant legislative requirements, and recommendations on appropriate impact avoidance and mitigation measures for those riparian corridors impacted by the proposed development.

Yours sincerely

[redacted]

Clayton Woods
Director - Environmental Services & Education PTY LTD
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CONTENTS

1 INTRODUCTION

1.1 Background

The Redbank Expansion Area (Kemsley Park) is a 34 ha parcel of land described as Lot 260 DP1237271 (Figure 1-1). It is also identified as 322 Grose Vale Road, Grose Vale NSW 2753. The subject site is in the Hawkesbury City Council local government area (LGA) and Hawkesbury City Council (Council) is the approval authority.

The subject site is located approximately 55 km northwest of Sydney CBD, 12 km northwest of Windsor town centre, 2.5 km northwest of the Hawkesbury River, and 2 km west of North Richmond town centre. The site occurs adjacent to the 180 ha Redbank North Richmond residential estate, which upon completion, is expected to provide approximately 1,400 dwellings for an estimated 3,900 residents.

The Redbank Expansion Area (Kemsley Park) features an undulating landform and a network of feeder drains and gullies leading to several man-made dams (Figure 1-3). The site was historically utilised as grazing paddock for cattle and comprises part of the curtilage of the former Yobarnie Keyline Farm, which is listed on the State Heritage Register. The farm was one of the two properties in which the Keyline system was first developed by P.A Yeomans. The Keyline system refers to a system of soil improvement, erosion control, water storage, cultivation and irrigation on undulating topography which has since been adopted by farmers worldwide. The elements from the Keyline system can be physically seen through the remnant dams and the interconnected feeder and irrigation drains across the subject site.

1.2 Proposed Development

The current rezoning planning proposal for the Redbank Expansion Area (Kemsley Park) seeks Hawkesbury City Council's consent for land rezoning to R2 – Low Density Residential, R5 – Large Lot Residential and several RE1 – Public Recreation zoned open space areas. The rezoning will support a future development application for Torrens Title subdivision of the site into approximately 300-350 residential lots. Future development will include the construction of new roads and associated civil infrastructure (Figure 1-2), as well as the following works:

- Removal of approximately 7.72 ha of native vegetation;
- Cut and fill bulk earthworks, including the infilling of declassified Streams J, K, M, N and O;
- Civil works including lot benching, creation of inter-allotment drainage and construction of retaining walls;
- Torrens Title subdivision creating approximately 300-350 residential lots, and several RE1 – Public Recreation zoned open space areas;
- Construction of local roads extending from the approved road network;
- Extension of utility services; and
- Landscaping and public domain works.

The proposed works will result in the removal of several declassified channels (identified as Streams J, K, M, N and O) from within the Redbank Expansion Area (Kemsley Park). Some works will occur within 40 m of the upper bounds of the classified section of Stream O, which occurs within the

adjacent Redbank site to the north (Figure 1-4). Works in this area require referral to the NSW Office of Water in accordance with Section 91 of the *Water Management Act 2000*.

1.3 Objective

This Riparian Assessment has been prepared by Environmental Services & Education Australia Pty Ltd (ESEA) on behalf of Redbank Communities in support of a planning proposal under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The purpose of this assessment is to provide the following information on the study area:

- Confirm the application of legislation and current policy relating to the management of drainage lines throughout the site;
- Identify watercourses on the site that fit the definition of protected waters for the purposes of the *Water Management Act 2000* (WMA);
- Determine potential impacts to riparian areas, as relevant under the *Water Management Act 2000* and *Hawkesbury Development Control Plan 2002;*
- Determine potential aquatic impacts, as relevant under the *Fisheries Management Act 1994* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999; and,*
- Outline measures to mitigate potential impacts to any riparian and aquatic habitat during the construction and operation of the proposed development.

Biodiversity Impacts for non-riparian areas within the Redbank Expansion Area (Kemsley Park) are addressed in a separate BDAR report prepared by ESEA (2024).

1.4 Scope

The waterways that are the subject of this report, as defined in the Minutes of Meeting between DWE and Buildev NSW (MR) Pty Ltd (Figure 1-4), include:

- The upper bound of Steam O (which is classified only downstream to the northeast of the common boundary with the adjacent Redbank site).

As per meetings onsite with the Department of Water & Energy on 02 February 2009, and as summarised above, Streams J, K, M, and N are to be declassified as DWE streams. Following ground truthing conducted in 2009, Stream O was put forward as a DWE Category 2 stream, which is accepted by DWE. The upper band of Stream O occurs at the northeast of the common boundary with the adjacent Redbank site.

ESEA understands that the streams to be extinguished (Streams J, K, M, N and O) within the Redbank Expansion Area (Kemsley Park) were previously agreed to in consultation with the former Department of Water and Energy (DWE) and that the agreement remains current following ongoing subdivisions of open space and urban lots already approved and in various stages of registration and occupation (Figure 1-5).

Notwithstanding this approval, ESEA understands it is Redbank's intention to extend the 'look and feel' of existing corridors downstream of dams and at the upper band of Stream O, albeit with a reduced cross-section to provide both trunk drainage, connectivity, and useability between the Redbank Expansion Area (Kemsley Park) and the adjacent Redbank site (Figure 1-5).

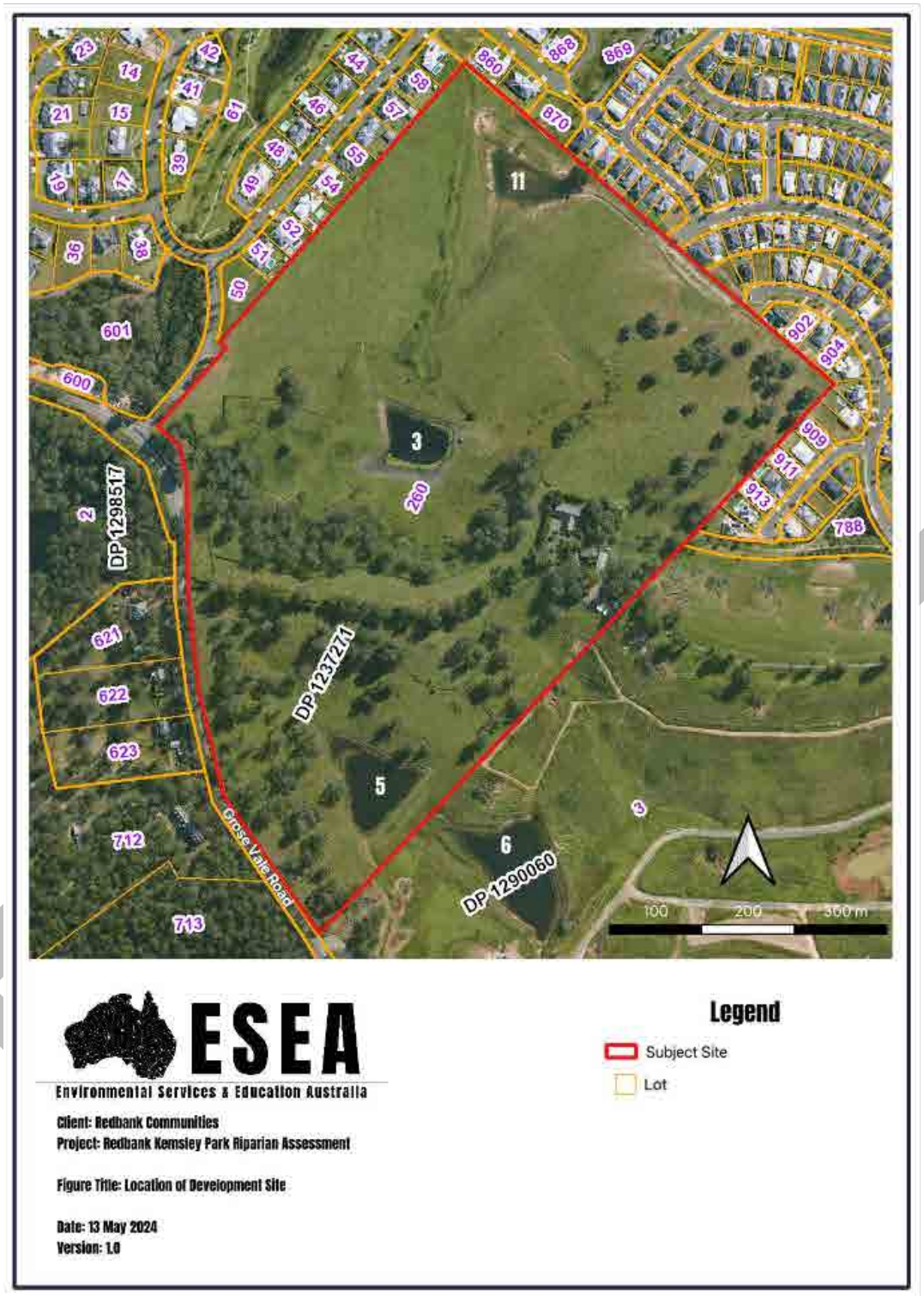

Figure 1-1 Location of the development site

Figure 1-2 Proposed development

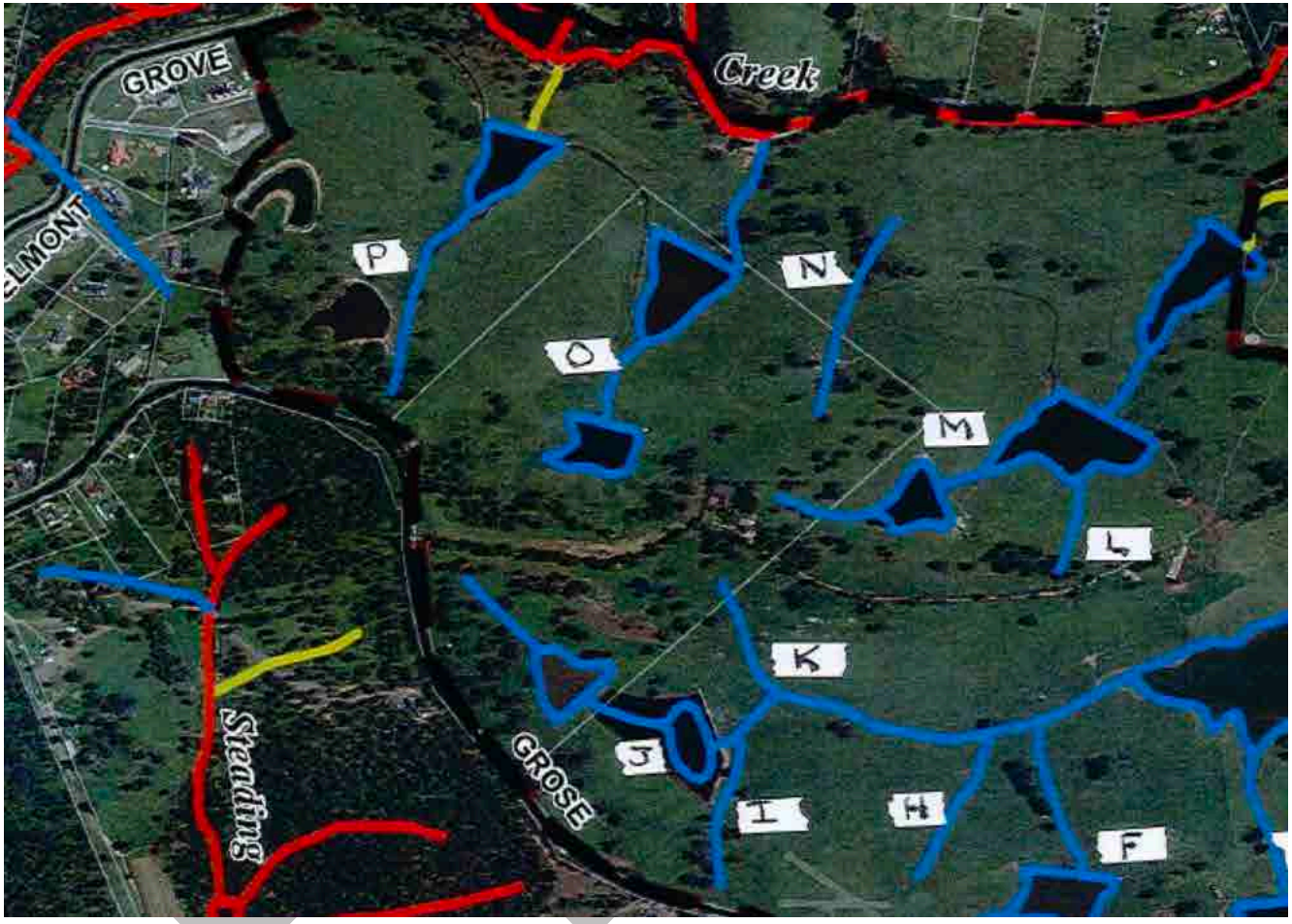

Figure 1-3 Labelled corridors within Redbank study area (Source: 'Ref B' from Minutes of Meeting between DWE and Buildev NSW (MR) Pty Ltd)

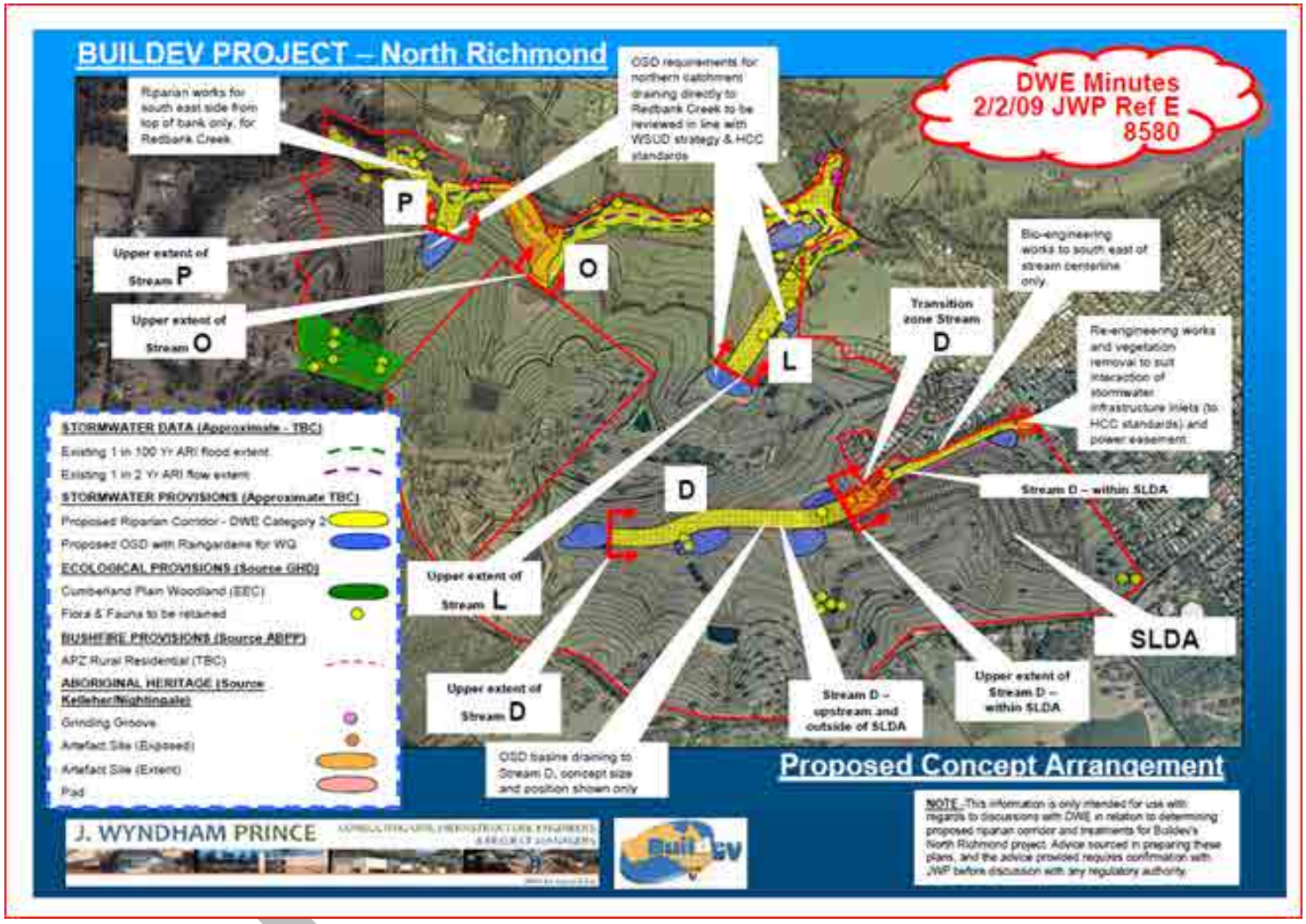

Figure 1-4 2009 DWE meeting minutes

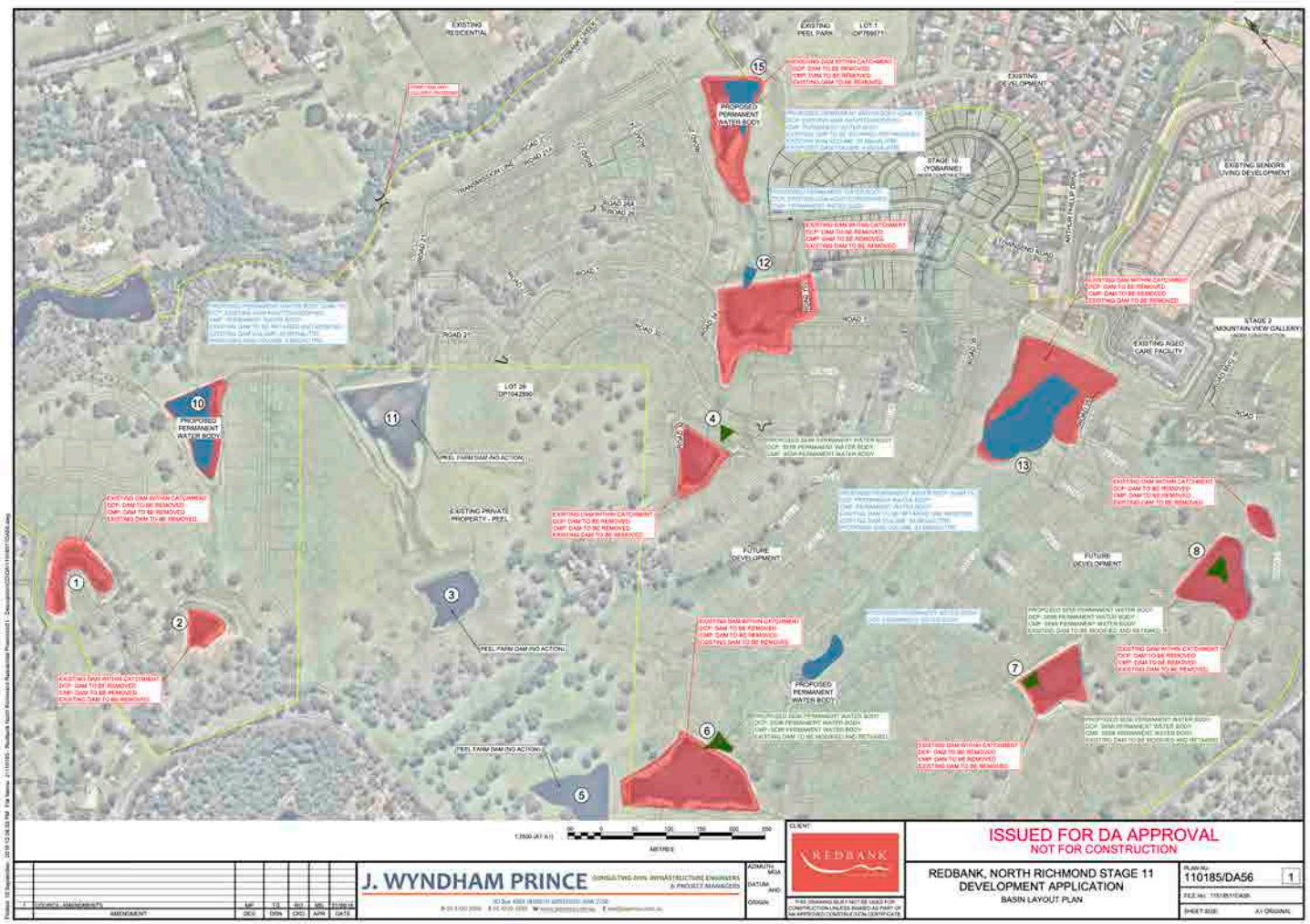

Figure 1-5 Redbank North Richmond basin layout plan

2 RELEVANT LEGISLATION

Legislation and policy relevant to the proposed works are outlined below:

2.1 Water Management Act 2000

The objectives of the *Water Management Act 2000* (WM Act) are to provide for the sustainable and integrated management of the water sources of the state for the benefit of both present and future generations and, in particular, ecologically sustainable development.

Under the WM Act, a Controlled Activity Approval (CAA) from DPE Water / Natural Resources Access Regulator (NRAR) is required for activities that are carried out in, on, or under waterfront land, i.e. within 40 m of a waterway.

Under the WMA, a controlled activity means:

- The erection of a building or the carrying out of a work (within the meaning of the *Environmental Planning and Assessment Act 1979*), or
- The removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
- The deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- The carrying out of any other activity that affects the quantity or flow of water in a water source.

Waterfront land in the context of the proposed development is defined as:

- The bed of any river, together with any land lying between the bed of the river and a line drawn parallel to, and the prescribed distance inland of, the highest bank of the river.

Parts of the proposed development will be located within 40 m of the upper bounds of the classified section of Stream O and therefore is required to obtain a Controlled Activity Approval.

2.2 Fisheries Management Act 1994

The *Fisheries Management Act 1994* (FM Act) governs the management of fish and their habitat in NSW. The Act identifies threatened aquatic species, populations, and ecological communities, and requires an Assessment of Significance if they are present within the subject site. Where significant impacts to any of these features are considered likely to occur, this triggers the need for a Species Impact Statement.

The FM Act also regulates the provision of permits required in relation to the harm of protected marine vegetation, dredging, and reclamation or obstruction of fish passage on or adjacent to Key Fish Habitat (KFH).

DPI Fisheries has not mapped any areas within the subject site as KFH. In addition, first order drainage lines (all mapped drainage lines within the subject site) are not considered KFH by DPI Fisheries. No threatened fish species are expected to occur within the subject site or in adjoining reaches. As such, no further assessment or permits under the FM Act are required.

2.3 Environmental Protection and Biodiversity Conservation Act 1999

Under the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Commonwealth approval is required for certain actions which have, or may have, or are likely to have a significant impact on a Matters of National Environmental Significance (MNES). These matters are listed as:

- the world heritage values of a declared World Heritage property,
- the ecological character of a declared Ramsar wetland,
- a threatened species or endangered community listed under the Act,
- a migratory species listed under the Act, or
- the environment in a Commonwealth marine area or on Commonwealth Land.

A person must not, without approval under the Act, take an action that has, or will have, or is likely to have, a significant impact on an MNES.

When approving developments, determining authorities should consider whether to allow actions that could significantly affect MNES. Commonwealth assessment is required for proposed activities if they are considered likely to affect any MNES. If the assessment concludes there is a significant impact, then it will become a controlled action under the EPBC Act, and the proposal must be referred to the Commonwealth. Approval from the relevant Federal Minister is required for any actions that may have a significant impact on MNES, except in circumstances that are set out in the EPBC Act.

Approval from the Commonwealth Federal Minister is in addition to any approvals under NSW legislation unless the proposal sits under the NSW and Australian Governments' bilateral agreement established under the EPBC Act. The bilateral agreement accredits certain NSW assessment processes which allows the Australian Government Minister for the Environment to rely on NSW environmental impact assessment processes to assess actions under the EPBC Act.

Our desktop assessment shows that no Wetlands of International Importance, Marine Parks, or Commonwealth Marine Areas occur within 10 km of the subject site.

A Protected Matters Search under the EPBC Act identified two species of fish with the potential to occur within 10 km of the subject site. This includes *Macquaria australasica* (Macquarie Perch) and *Prototroctes maraena* (Australian Grayling). There is no suitable habitat for these species within the subject site. Therefore, further assessment or a referral under the EPBC Act is not required with respect to impacts on threatened fish species.

2.4 Hawkesbury Development Control Plan 2023

The location of the subject site means that it is currently outside of the bounds of the 'Redbank at North Richmond' development, as defined within Chapter 8 of the Hawkesbury DCP. The DCP will be amended to incorporate the Redbank Expansion Area (Kemsley Park) site. In keeping with the character of the overall Redbank development, the principles and objectives of this chapter will be consistently applied.

Section 8.3.5 addresses water management within the subdivision. The objectives of this chapter are:

- To ensure no net increase in discharge to Redbank Creek;
- To improve waterway health, slow the conveyance of water across the site, improve the quality and regulate the quantity of stormwater discharge into Redbank Creek through Water Sensitive Urban Design (WSUD) initiatives;
- To provide a water management network that integrates with the broader objectives of the open space network;
- To retain, modify and adapt existing Yeomans' Keyline elements, in particular waterbodies and the Keyline, as focal points for the open space network;
- To use water as a key landscape feature and incorporate the key elements of Yeomans' Keyline elements within the water management network; and,
- To retain a quantifiable amount of stormwater prior to discharge to Redbank Creek.

The proposed works will increase discharges into Redbank Creek in the north, but will not result in any increases in discharge in the south, as the proposed drainage network is already operational in the greater Redbank development downstream. This existing network will be extended into the Redbank Expansion Area (Kemsley Park) under the same Council-agreed strategy.

Direct discharge from the north catchment is required to avoid local and regional flow/flood occurrence and to restrict discharge via OSD in the south. In both cases, these arrangements protect the existing North Richmond township and the conveyance capability of Redbank Creek.

Water Sensitive Urban Design (WSUD) initiatives are proposed, which include works to stabilise and revegetate the corridor above Stream O, and Dam 11, which are proposed for interpretation and retention. These existing features will form part of an RE1 - Public Recreation zoned open space network to interface with both interpreted dams and corridors downstream within the greater Redbank development.

3 PREVIOUS WATERCOURSE ASSESSMENTS

3.1 Redbank Rezoning Riparian Assessment (GHD 2013)

GHD (2013) showed that a number of drainage lines traverse the combined site of the Redbank Expansion Area (Kemsley Park) and the greater Redbank development, all connecting with multiple dams. The Redbank Expansion Area (Kemsley Park) can be divided into two greater catchments, separated by a central right catchment. The greater southern and northern catchments both possess 2 and 3 sub-catchments within each respectively, as shown in Figure 3-1.

Catchment No. 2 – occurs marginally within the subject site. It drains in a northeast direction via one dam (Dam 5) into the adjacent Redbank site. Catchment 2 eventually discharges into Redbank Creek approximately 2 km downstream of the subject site.

Catchment No. 3 – occurs marginally within the subject site and drains in a northeast direction via a series of three previously developed dams within the adjacent Redbank site into Redbank Creek.

Catchment No. 4 – is the most significant catchment within the subject site. It drains in a northward direction towards Redbank Creek via a series of two dams (Dams 3 and 11).

The former NSW Office of Water (now NRAR) were consulted in 2009 regarding the status of watercourses within the site under the WM Act. The NSW Office of Water attended the site in 2009 and agreed that watercourses J, K, M, N and O within the Redbank Expansion Area (Kemsley Park) did not meet the definition of a river under the WM Act and therefore could be removed as constraints to future development. There are no remaining streams within the Redbank Expansion Area (Kemsley Park) (Figure 3-2). Only the upper bound of Stream O, existing directly downstream from the northern property boundary must be considered as a classified riparian area.

This agreement with the NSW Office of Water has since been consolidated and delivered across multiple stages with the progressive approval of the adjacent Redbank North Richmond development, with the most recent being the Redbank 'Southern Valley' development applications.

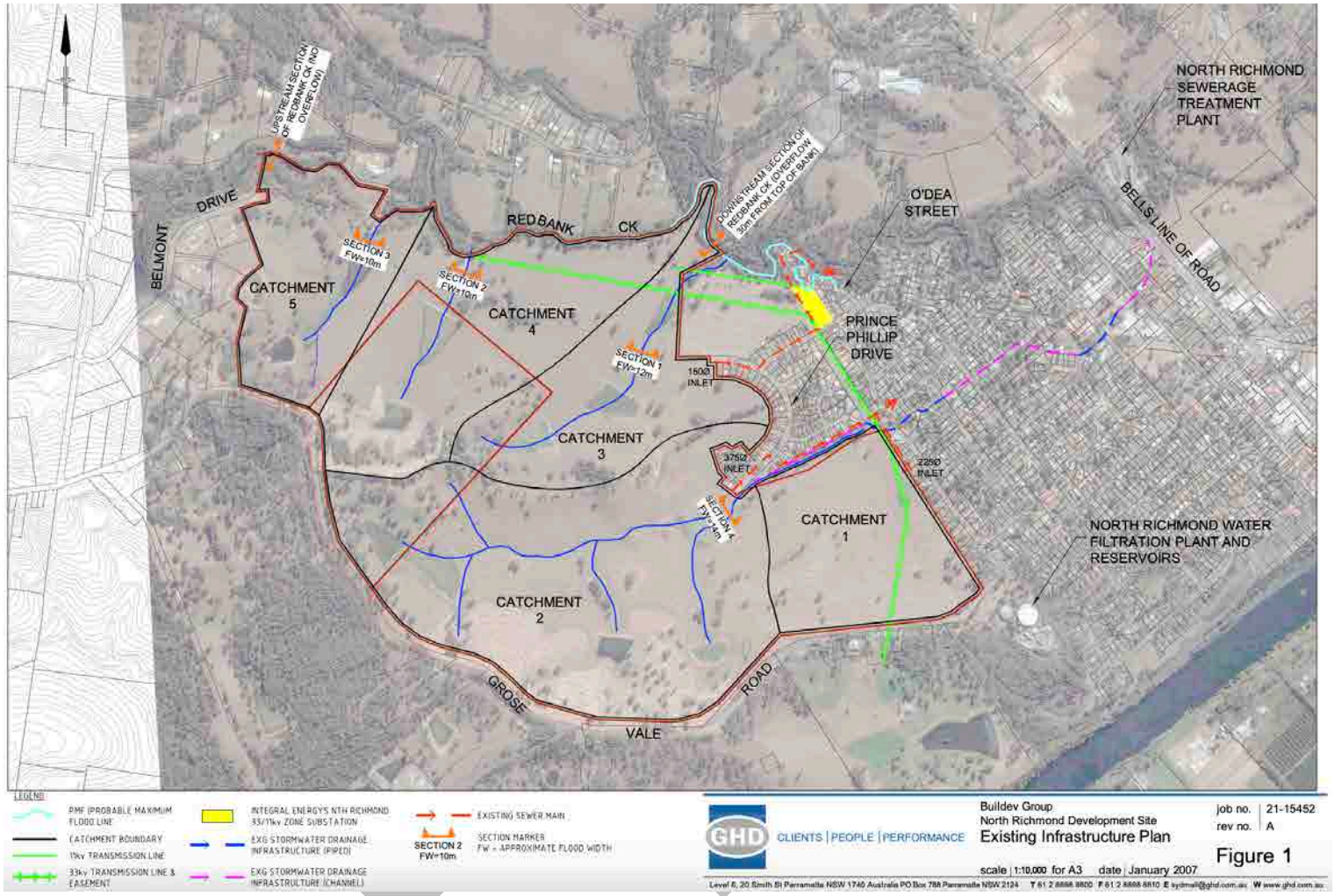

Figure 3-1 Existing GHD (2013) catchment mapping – pre-DWE approval

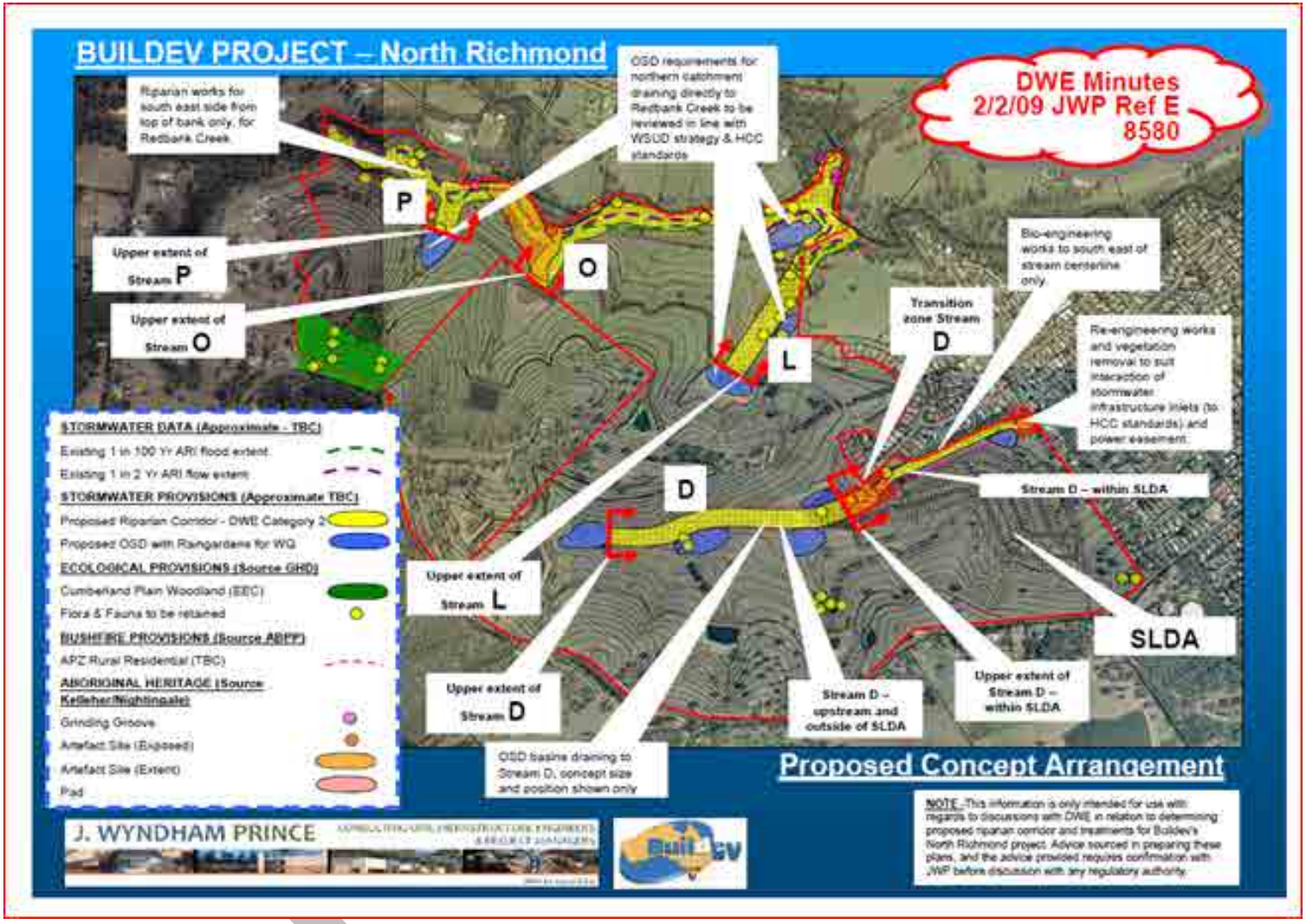

Figure 3-2 2009 DWE meeting minutes

4 DESKTOP RESEARCH AND ANALYSIS

ESEA has reviewed background information and data and undertaken searches of relevant online databases and mapping of the study area. Search tools used included:

- Water Management (General) Regulation 2018 Hydroline Spatial Data (NSW Water)
- Key Fish Habitat Mapping (NSW DPI);
- Protected Matters Search Tool (DCCEEW); and,
- NSW Bionet Atlas and NSW Seed Portal (NSW OEH)

4.1 Hydro-Line Spatial Data

Hydro-Line spatial data contains mapped information about watercourses and waterbodies in NSW. It is based on the Spatial Services (Department of Finance, Services & Innovation) NSW Hydro-Line dataset.

The purpose of the Hydro-Line spatial data is to determine the Strahler stream order of a stream. This information can also help identify whether a watercourse is exempt from requiring a water licence or approval under the *Water Management (General) Regulation 2018*.

The Hydro Line Spatial data identifies three dams within the subject site, and five first-order drainage lines (Figure 4-1). As outlined in Section 3, all drainage lines have been declassified following consultation with the NSW Office of Water in 2009.

Following the declassification of Steams J, K, M, N and O, no licence or approval under the *Water Management (General) Regulation 2018* is required for works around these areas. Stream O directly downstream remains classified as a Category 2 Stream. As such, a Controlled Activity Approval is required for any works undertaken within 40 m of this drainage line at its most upstream extent at the northern property boundary.

4.2 Waterways and Key Fish Habitat

One of the objectives of the FM Act is to conserve key fish habitats. To achieve the objectives of the FM Act, DPI-Fisheries has identified 'Key Fish Habitats' – those aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally, and the survival and recovery of threatened aquatic species. Key Fish Habitat Mapping has been produced to provide guidance on the whereabouts of all Key Fish Habitat areas in NSW.

No Key Fish Habitat is mapped as occurring within, or in proximity to, the subject site.

4.3 Matters of National Significance

The Commonwealth Government Department of Climate Change, Energy, the Environment and Water's Protected Matters Search Tool, summarises the matters of national environmental significance that may occur in, or may relate to, the subject site (Appendix B).

Analysis of the Protected Matters Search Tool indicated that there are 7 listed threatened ecological communities, 47 listed threatened species, and 14 listed migratory species previously recorded within 10 km of the subject site.

No World Heritage Properties, National Heritage Places, Protected Marine Areas, or Wetlands of international importance occur within 10km of the site.

The search identified two species of fish, *Macquaria australasica* (Macquarie Perch) and *Prototroctes maraena* (Australian Grayling) with the potential to be found within 10 km of the subject site. However, there is no suitable habitat on site for these species within the immediate subject site. Therefore, further assessment or a referral under the EPBC Act is not required with respect to impacts on threatened fish species.

4.4 NSW Bionet Atlas and NSW Seed Portal

A search of the NSW Bionet Atlas and NSW Seed Portal was conducted for records of threatened species using the NSW BioNet database. 1306 records of 67 species were found within 10 km of the subject site within the previous 10 years (Appendix A). Analysis of the results indicates that no threatened fish species have been previously recorded in close proximity to the subject site.

No threatened fish species and aquatic flora species are considered to have a high likelihood of occurrence within the subject site. This is largely due to a limited amount of potential habitat present, and the degraded nature of the subject site.

Figure 4-1 Hydro line spatial data

5 FIELD ASSESSMENT

5.1 Methodology

An assessment of the site was undertaken on Tuesday 30th April and Friday 31 May 2024 by ecologist, Clayton Woods (BSc Hons, Ecology and Environmental Science, 1st Class, University of Edinburgh).

The site inspection was conducted to assess the condition of the mapped channels, determine key characteristics of the channels, including plant species presence, and identify areas of potential aquatic habitat in the areas to be retained. The survey comprised a walkthrough of all mapped channels within the site.

6 RESULTS

6.1 Riparian and Aquatic Condition

The declassified drainage lines present within the subject site, identified as J, K, M, N and O tend to be characterised by a poorly defined and very thin channel of approximately 2 - 15 m in all instances (Figure 6-2 - Figure 6-5).

Whilst these possess species characteristic of water-logged soils, they do not possess any permanent freshwater/wetland plant species. They also possess a higher abundance of introduced weedy grassland species that have spread down from drier ridgetops and grazing paddock areas. Species present within these drainage lines include *Paspalum dilatatum* (Dallis Grass) and weed species such as *Lantana camara* (Lantana), *Verbena bonariensis* (Purpletop), *Senecio madagascariensis* (Fireweed), *Plantago lanceolata* (Ribwort Plantain), *Conyza bonariensis* (Fleabane) and *Rumex crispus* (Curly Dock).

A previously declassified section of Stream O runs distinctly between Dam 3 and Dam 11 (Figure 6-1). Beyond Dam 11, Stream O transitions into a developed urban area which is part of the existing Redbank site, where it passes between Yabby Place and Belmont Grove. Here, previously classified Stream O is confined within a stabilised drainage channel that has been subject to revegetation works. It eventually flows into Redbank Creek. At the time of the survey, the entirety of the riparian channel was dry, except for within Dam 3 & 11, likely due to limited recent rain.

A spillway for overflowing water from Dam 3 was observed. From this point, the vegetation present was characterised by the following species; *Juncus effusus* (Soft Rush), *Plantago lanceolata* (Plantain ribwort), *Paspalum dilatatum* (Dallis Grass), *Persicaria decipiens* (Slender Knotweed), *Solanum sisymbriifolium* (Sticky Nightshade), *Senecio madagascariensis* (Fireweed), *Lantana camara* (Lantana), *Trifolium repens* (White Clover), *Dittrichia graveolens* (Stinkwort), *Erigeron sumatrensis* (Fleabane), *Sida rhombifolia* (Arrow-leaf Sida), *Verbena bonariensis* (Purpletop), *Sporobolus indicus* (Smut Grass), and *Rumex crispus* (Curly Dock). The area is dominated by introduced grasses and weed species. The existing corridor downstream of Dam 3 is thin, being approximately 30 m across at its thinnest point below Dam 3, and 100 m across at its widest extent, just above Dam 11.

Within Dam 3 and 11, the following aquatic species were noted: *Marsilea mutica* (Large-leaved Nardoo), *Eleocharis sphacelate* (Tall Spikerush), *Hydrocotyle ranunculoides* (Floating Pennywort), *Persicaria decipiens* (Slender Knotweed), *Juncus effusus* (Soft Rush), *Juncus usitatus* (Common Rush), *Schoenus calostachyus* (Bogrush), and *Nymphaea sp.* (Water Lily).

Figure 6-1 Declassified section of Stream O, between Dam 3 and 11

Figure 6-2 Declassified Stream N (running from right to left across the image)

Figure 6-3 Declassified Stream M

Figure 6-4 Declassified Stream J

Figure 6-5 Declassified Stream K

6.2 Dams

Dam Number	Description	Aquatic fauna observed	Aquatic flora observed	Figure Reference
Dam 5	Approximately 0.62 ha. Located near the head of declassified Stream J and on the south eastern boundary of the subject site.	Australian Wood Ducks and Purple Swamphens observed.	*Marsilea mutica* (Large-leaved Nardoo), *Eleocharis sphacelate* (Tall Spikerush), *Hydrocotyle ranunculoides* (Floating Pennywort), *Persicaria decipiens* (Slender Knotweed), *Juncus effusus* (Soft Rush), *Juncus usitatus* (Common Rush), *Schoenus calostachyus* (Bogrush), and *Nymphaea sp* (Water Lily).	Figure 6-6
Dam 3	Approximately 0.67 ha. Located at the head of Stream O and in the centre of the subject site.	Australian Wood Ducks observed.	*Marsilea mutica* (Large-leaved Nardoo), *Eleocharis sphacelate* (Tall Spikerush), *Hydrocotyle ranunculoides* (Floating Pennywort), *Persicaria decipiens* (Slender Knotweed), *Juncus effusus* (Soft Rush), *Juncus usitatus* (Common Rush), *Schoenus calostachyus* (Bogrush), and *Nymphaea sp* (Water Lily).	Figure 6-7
Dam 11	Smaller dam (approximately 0.45 ha). Located downstream of Dam Y, along Stream O. This dam occurs on the northern site boundary.	Australian Wood Ducks observed.	*Marsilea mutica* (Large-leaved Nardoo), *Eleocharis sphacelate* (Tall Spikerush), *Hydrocotyle ranunculoides* (Floating Pennywort), *Persicaria decipiens* (Slender Knotweed), *Juncus effusus* (Soft Rush), *Juncus usitatus* (Common Rush), *Schoenus calostachyus* (Bogrush), and *Nymphaea sp* (Water Lily).	Figure 6-8

Figure 6-6 Dam 5, at the southeast of the subject site, with declassified Stream J visible to the right

Figure 6-7 Dam 3, at the centre of the subject site

Figure 6-8 Dam 11, at the northern boundary of the subject site, with declassified sections of Stream O visible to the left

6.3 Threatened Aquatic Species

The EPBC Act lists potential habitat for *Macquaria australasica* (Macquarie Perch) and *Prototroctes maraena* (Australian Grayling). These freshwater fish are also listed as threatened under the FM Act. Decommissioned Streams J, K, M, N and O do not provide habitat for any threatened aquatic flora or fauna species as they do not have regular continuous flowing water. The channels are generally in a waterlogged non-flowing condition.

DPI Fisheries model the nearest population of Macquarie Perch as being in the lower Grose and Nepean Rivers, typically where well-vegetated protected bushland occurs. The channels within the subject site are an open, poorly formed channel, separated from these rivers by a series of dams. It is therefore unlikely these species occur in or adjacent to the site.

One other species listed under the FM Act that has an overlapping distribution is *Archaeophya adamsi* (Adam's Emerald Dragonfly). It is one of Australia's rarest dragonflies, and has been found in narrow, shaded riffle zones with moss and abundant riparian vegetation (often closed canopy) in small to moderate-sized creeks with gravel or sandy bottoms. There are no records nearby and no suitable habitat along any of the mapped streams within the subject site.

7 POTENTIAL IMPACTS

7.1 Direct Impacts

It is Redbank's intention to extend the 'look and feel' of existing corridors downstream of dams and at the upper band of Stream O, within an RE1 – Public Recreation zoned open space area. Water Sensitive Urban Design (WSUD) initiatives are proposed, which include works to stabilise and revegetate the corridor above Stream O, and Dam 11, which are proposed for interpretation and retention. These existing features will form part of an RE1 - Public Recreation zoned open space network to interface with both interpreted dams and corridors downstream within the greater Redbank development.

The creation of 'look and feel' corridors will allow for a 1.8 ha vegetated corridor to be established within the site. This corridor will allow for the protection of biodiversity values and fauna habitat.

The corridors will also serve as a heritage feature and therefore may be vegetated in accordance with the landscape treatment described in section 8.3.6 of the DCP controls that apply to Redbank (Figure 8.20 in the DCP), noting that the objectives of this section do not explicitly apply to the Redbank Expansion Area (Kemsley Park). However, in keeping with the character of the overall Redbank North Richmond development, where appropriate, the principles and objectives of this chapter should be consistently applied.

7.1.1 Native Vegetation Removal

Proposed works will not involve the removal of any native canopy trees or midstratum vegetation. It is not considered likely that any works within the existing corridors downstream of dams and at the upper band of Stream O will result in serious destabilisation of the bank and a serious erosion risk.

The proposed works have the potential to exacerbate the spread of invasive weeds throughout the site and surrounding areas. As such, appropriate weed management methods have been recommended in Section 8. Works will be conducted to remove introduced weed species from the riparian area and replace these with permanent native riparian species.

7.1.2 Impacts on Mapped Watercourses

The proposed works have the potential to disturb and destabilise soil within the proposed development site, potentially causing erosion of channels and affecting water quality. To manage this, erosion and sediment control measures should be installed during the works and maintained until the site is stabilised. Erosion and sediment control measures are recommended in Section 8.

8 RECOMMENDATIONS

The proposed development must aim, as far as reasonable, to avoid, minimise, and mitigate any impacts on biodiversity. Following this hierarchy, the following recommendations apply to the proposed development:

8.1 Environmentally Sensitive Construction

The 'look and feel' of existing corridors downstream of dams and at the upper band of Stream O should be continued through the Redbank Expansion Area (Kemsley Park), albeit with a reduced cross-section to provide both trunk drainage, connectivity, and useability between the Redbank Expansion Area (Kemsley Park) and the greater Redbank North Richmond development area.

As far as possible, the existing corridors should be kept consistent with their existing alignment – the corridor centreline and existing bank location should remain consistent, except where bank and channel instability need to be re-engineered.

Water Sensitive Urban Design (WSUD) initiatives should be incorporated, which include works to stabilise and revegetate the corridor above Stream O, and Dam 11, which are proposed for interpretation and retention. These existing features will form part of an RE1 - Public Recreation zoned open space network to interface with both interpreted dams and corridors downstream within the greater Redbank development.

8.2 Erosion and Sediment Control

A Construction Environmental Management Plan (CEMP) should be prepared to address measures to be adopted to minimise impacts on the environment as a result of the construction works, including the type and location of sediment and erosion controls. In addition, a Sediment and Erosion Control Plan is to be prepared in accordance with The Blue Book – *Managing Urban Stormwater: Soils and Construction* (Landcom 2004) and implemented prior to works.

The presence of erosion control measures will ensure that overland flow throughout the site is minimised during any periods of rain, minimising soil erosion and sediment deposition.

Dam corridors should be stabilised with scour protection such as jute mesh. In highly erodible areas, constructing earth banks (catch drains) at intervals of less than 80 metres might be necessary to reduce erosion hazards further. These erosion and sediment control measures must be installed prior to works commencing and should be maintained for the duration of works and until the site is stabilised.

When the removal of topsoil is required, this should only occur when the soil is moist to prevent dust blow. This will also prevent the decline of soil structure. Mulch sourced from the chipping of non-invasive vegetation cleared from within the site may be used across all bare areas to provide a quick ground cover to prevent erosion and dust blow.

Erosion controls should be inspected regularly (daily during workdays) and after rainfall. Any damaged control features must be fixed immediately, and accumulated sediment should be regularly removed from the sediment controls and incorporated suitably into fill or topsoil material on the site,

unless there is contamination or waste. Spoil stockpiles should be wetted regularly to reduce opportunities for wind-assisted sedimentation.

Erosion and sediment controls must remain in place until after the works are completed.

8.3 Weed Management

Weed control should be undertaken using a staged approach incorporating three levels of treatment:

- Primary weed clearance; followed by
- Secondary treatment or follow-up; and finally
- Maintenance weeding.

Primary weed clearance refers to the initial treatment of a weed infestation. All occurrences of priority weed species should be removed from within the riparian zone of Stream O, and all RE1- Public Recreation zoned open space. Priority weeds should be removed using best management practices (including appropriate controls to prevent impacts on threatened species) prior to the removal of native vegetation and subsequent construction works. All weed propagules should be bagged and removed offsite and disposed of at a designated green waste facility.

Secondary treatment or follow-up works refer to the intensive weeding of areas that have already received primary weeding - removing the largest flush of second-generation weeds that may have germinated from the soil seed bank and those that were not successfully killed during primary weeding.

Once an area has been restored and preventive measures to stop weed recruitment on site have been implemented, the maintenance weeding phase can begin. Weeds will inevitably re-establish due to dispersal and via growth from the soil seed bank. As such, regular maintenance work will be required. Weed monitoring and removal should be conducted on a monthly basis to ensure competition with native plants is minimised.

Target weeding aims to remove a single species or class of weeds to stop the species' lifecycle and prevent further recruitment of the species on site. Target weeding for particularly problematic weed species should be undertaken concurrently with the staged approach of primary, secondary, and maintenance weeding.

NSW DPI Water's (2012) guidelines for vegetation management plans require a target of a maximum of five percent weed cover following the maintenance period.

8.4 Native Species Replanting

Native vegetation replanting should act to restore the presence of species endemic to the locality and provide visual amenity to the riparian area and RE1 – Public Recreation zoned open space areas. All plants should be sourced from local native plant nurseries. Where plants are not available, seed could be collected from the local area in accordance with seed collection guidelines and propagated on-site before transplanting into prepared areas.

The planting of deciduous trees within 40 m of the watercourse, or in areas where excessive leaf drop cannot be contained from stormwater runoff should be minimised. Seasonal leaf drop can have detrimental effects on the aquatic ecology, such as decreased dissolved oxygen due to leaf decomposition, and irregular food sources for detritivores (e.g. some waterbugs) that support the food web.

Exotic and pasture grasses surrounding the planting areas should be removed or controlled to limit competition by these grasses with the regeneration plantings.

NRAR guidelines (2012) for vegetation management plans require a target of 80% survival rate for planted species following the maintenance period. Supplementary planting and reseeding should be undertaken as necessary to achieve this.

8.5 Hazardous Chemicals and Waste Management

Chemicals that are labelled as 'harmful to marine life' or 'Class 9 Environmentally hazardous' must not be used as part of the proposed activities. Appropriate spill kits for any chemicals used should be present onsite for the duration of works, and all chemicals (e.g. fuel, oil) used for construction purposes must be stored away from the riparian zone. Chemicals should be stored in appropriate bunding/storage systems.

Dedicated refuelling areas are to be established outside of the riparian area and away from other drainage and swales. These areas are to be bunded to ensure any spills do not enter the riparian areas or creek.

9 CONCLUSIONS

A Riparian Assessment has been prepared by Environmental Services & Education Australia as supporting documentation to the rezoning planning proposal and future development application for residential subdivision at the Redbank Expansion Area (Kemsley Park).

The current rezoning planning proposal for the Redbank Expansion Area (Kemsley Park) seeks Hawkesbury City Council's consent for land rezoning to R2 – Low Density Residential, R5 – Large Lot Residential and several RE1 – Public Recreation zoned open space areas. The rezoning will support a future development application for Torrens Title subdivision of the site into approximately 300-350 residential lots. Future development will include the construction of new roads and associated civil infrastructure

It is Redbank's intention to extend the 'look and feel' of existing corridors downstream of dams and at the upper band of Stream O, albeit with a reduced cross-section to provide both trunk drainage, connectivity, and useability between the Redbank Expansion Area (Kemsley Park) and the greater Redbank North Richmond development area.

Water Sensitive Urban Design (WSUD) initiatives are proposed, which include works to stabilise and revegetate the corridor above Stream O, and Dam 11, which are proposed for interpretation and retention. These existing features will form part of an RE1 - Public Recreation zoned open space network to interface with both interpreted dams and corridors downstream within the greater Redbank development.

The proposed works will increase discharges into Redbank Creek in the north, but will not result in any increases in discharge in the south, as the proposed drainage network is already operational in the greater Redbank development downstream. This existing network will be extended into the Redbank Expansion Area (Kemsley Park) under the same Council-agreed strategy.

Direct discharge from the north catchment is required to avoid local and regional flow/flood occurrence, and restricted discharge via OSD in the south, in both cases to protect the existing North Richmond township and the conveyance capability of Redbank Creek.

As per meetings onsite with the Department of Water & Energy on 02 February 2009, Streams J, K, M, N and O within the Redbank Expansion Area (Kemsley Park) are declassified as DWE streams. There are no remaining streams within the Redbank Expansion Area (Kemsley Park). Only the upper bound of Stream O, existing directly downstream from the northern property boundary must be considered as a classified riparian area.

ESEA understands that the stream to be extinguished (Streams J, K, M, N and O) within the Redbank Expansion Area (Kemsley Park) were previously agreed to in consultation with the former Department of Water and Energy (DWE) This agreement with the NSW Office of Water has been consolidated and delivered upon across multiple stages with the progressive approval of the adjacent Redbank North Richmond development - the most recent being the Redbank 'Southern Valley' development applications.

No licence or approval under the *Water Management (General) Regulation 2018* is required for works around Steams J, K, M, N. Stream O directly downstream remains classified as a Category 2 Stream. As such, a Controlled Activity Approval is required for any works undertaken within 40 m of this drainage line at its most upstream extent at the northern property boundary.

No threatened fish or aquatic flora species are expected to occur within the subject site and, as such, no further assessment is required.

10 REFERENCES

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APPENDIX A – DWE CONSULTATION

MINUTES OF MEETING

Project: Nth Richmond
Client: Buildev NSW (MR) Pty Ltd, NRJV Pty Ltd

PURPOSE: *Meeting onsite with Department of Water & Energy to ascertain interest and requirements under the Water Management Act 2000 for the proposed North Richmond development including Stage 1a – Seniors Living DA.*
Seniors Living DA (Part Lot 27 DP 1042890)
Nth Richmond Development (Part Lot 27 DP 1042890,)

TIME:	*10am – 12pm*	**OUR REF:**	*8580 DWE Minutes 020209*
DATE:	*02 February 2009*	**JOB NO:**	*8580*

ATTENDEES:	*Greg Brady (GB)*	*Department of Water & Energy*
	Mark Regent (MR)	*BUILDEV / NRJV*
	Peter Strudwick (PS)	*URBIS*
	Wayne Young (WY)	*JWP*
	Andrew Flaherty (AF)	*JWP*
	Daniel Wiliams (DW)	*GHD*
APOLOGIES:		
DISTRIBUTION:		
	As above	

ITEM	DESCRIPTION	ACTION
1.0	**Background**	
1.1	The onsite meeting has been arranged with DWE to resolve queries raised by the 'STOP THE CLOCK' (STC) letter, submitted in response to Hawkesbury City Council (HCC) referral of the Seniors Living DA (SLDA) proposal, to and by DWE. A copy of the letter is attached (Ref A).	Note
1.2	In addition, as per the STC letter, the remainder of the land parcel (Overall Development) is to be ground truthed collectively to plan for a wholistic approach to statutory watercourses (or DWE streams) across the entire site.	
1.3	With reference to the STC letter and the four dot points on page 1, attached Ref C and D provide the requested information, and were used as supporting information for the onsite meeting (2/02/09).	
	ONSITE MEETING	
2.0	**Seniors Living DA (SLDA)**	
2.1	The SLDA, is located towards the north east corner of Lot 27, DP 1042890 and is bound to the south and west by RL 40m AHD.	Note
2.2	As per the DWE reference map (attached Ref B) there are three zones (A,B,C) marked as potential DWE Category 3 streams towards the south east of the site.	Note
2.3	As per the DWE reference map (attached Ref B) there is no DWE category stream classification for the drainage channel to the northern boundary of the site (D).	Note

2.4	**Discharge to Hawkesbury City Council (HCC) stormwater infrastructure**	
2.41	If any zones are deemed suitable for classification as a DWE stream then any increased vegetation to suit the requirements for a riparian corridor would cease at the western boundary of the existing power transmission easement. Shown as PTE1 on Ref B1.	DWE decision
2.42	If any zones are deemed suitable for classification as a DWE stream then any increased vegetation to suit the requirements for a riparian corridor would not continue from the eastern boundary of the existing power transmission easement, shown as PTE2 on Ref B1, due to the proximity of HCC stormwater infrastructure and subsequent ceasing of any stream path.	DWE decision
2.43	It is possible that due to any development and/or stream works upstream, re-engineering and vegetation removal in the transition to all three inlet points to HCC infrastructure will be required in consultation with HCC.	DWE advice
2.5	**DWE Streams A,B,C and previously unclassified D (See Ref B)**	
2.51	Following ground truthing of Streams A,B and C, these are to be ***declassified*** as DWE streams	DWE decision
2.52	Following ground truthing of unclassified D, this is to be ***classified*** as a DWE stream – Category 2, upstream of the existing power transmission easement only (see 2.4).	DWE decision
2.53	Proposed alignment of Stream D (DWE Cat 2) as per proposed DA is suitable, and the gradual reduction of a full VBZ (10m) down to a 0m (zero) wide VBZ, 60m from the current end of road seal at the southern end of Arthur Phillip Drive (attached Ref Cfor SLDA only and Ref E in relation to overall development) is also acceptable.	DWE decision
2.54	It is granted that due to the proximity of the existing residential development along the southern side of Arthur Phillip Drive and Grainger Place that any re-engineering of the stream will occur southwards from the exisiting northern bank alignment. Standard revegation will occur on the south side of the stream only, with a transition zone as required to upstream of the SLDA (See Ref E).	DWE decision
2.55	For the crossing (Ref B) box culverts with a buried invert is an acceptable method of construction.	DWE decision
2.56	It is acknowledged that bio-engineering of Stream D (DWE Cat 2) may be required to convey the flows from the catchment upstream, to be consistent with DWE's desired vegetation outcomes and HCC flood safety requirements. In the first instance, Stream D needs to be designed taking into account current channel profile and roughness, along with desired channel capacity to convey stormwater flow to the three HCC inlet headwalls.	DWE agrees, JWP to undertake design
2.57	As part of the bio-engineering of Stream D (DWE Cat 2), the watercourse may need to be regraded to address the the adjacent dwellings to the north side of the end of Arthur Phillip Drive currently set below the current channel invert.	DWE agrees, JWP to undertake design
2.58	Delineation of top of bank for core riparian (CRZ) and vegetated buffer zone (VBZ) for Stream D (DWE Cat 2), is acceptable to commence from the 1 in 2 yr ARI flow level (similar to Ref D) within the proposed stream re-configuration.	DWE agrees, JWP to undertake design
2.59	Location of proposed water quality infrastructure such as raingardens within the APZ and only inside the VBZ as noted in point 2.53 is acceptable (See Ref C). Location of on site detention basins offstream and outside of the VBZ to Stream D (DWE Cat 2) is also acceptable.	DWE agrees, JWP to undertake design

3.0	**Overall Development**	
3.1	The Overall Development comprises the remainder of part Lot 27, DP 1042890 above RL 40m AHD, as well as , Lot 82 DP 752041, and Lot 2 DP 120679)	Note
3.2	The intention to remove the majority of existing onsite dams with all being constructed with significant fill batters on their downstream batter is seen as an acceptable approach to the site in its current state. No objection from DWE.	Note
3.3	Redbank Creek, which runs along the northern boundary of the site is to be classified as DWE Category 1 stream, with the corresponding CRZ and VBZ to be applied with similar zone rationalisation as per Stream D along the northern boundary of the SLDA also suitable. Similar to Stream D, as Redbank Creek straddles the common property boundary to existing rural residences, vegetation of the CRZ and VBZ can only be applied to the south side of Redbank Creek.	DWE agrees
3.4	Existing power transmission easement (which has existing overhead transmission line – 3 pole type) and currently runs beside and across Redbank Creek, is proposed to be shifted to within the VBZ adjacent the Redbank Creek alignment.	To be addressed at time of VMP with relevant stage DA..
3.5	**DWE Streams E,F,G,H,I,J,K,L,M,N,O,P determined from orthophoto (See Ref B)**	
3.51	Stream D from the SLDA is assumed to continue upstream to the proposed online OSD basin near the common boundary to Peel's land, running SE to NE from Grose Vale Rd (see Ref E).	DWE agrees
3.52	As per the DWE map (attached Ref B) there are twelve zones (E,F,G,H,I,J,K,L,M,N,O,P) marked as DWE Category 3 streams towards the south east of the site.	Note
3.53	Following ground truthing of Streams E, F, G, H, I, J, K, M, N, they are to be *declassified* as DWE streams	Note
3.54	Following ground truthing of L,O,P, these streams have been put forward as DWE Category 2 streams (Ref E), which is accepted by DWE.	DWE agrees
3.55	Online basins for OSD at the head of DWE categorised streams and offline for those flows entering the channel mid-stream are suitable as shown (Ref E) are suitable.	DWE agrees
4.0	**General Guidelines**	
4.1	To varying degrees the following general guidelines were discussed and have been added as reference to attain meeting attendees concurrence going forward -	
4.11	Keep existing profile if possible – creek centreline, existing bank location etc except where bank and channel instability need to be re-engineered.	Note
4.12	Hydraullic modelling required to determine additional treatment measures (for erosion protection etc) if required.	Note
4.13	Cycleways, services etc may be able to be located within the vegetated buffer zone, subject to DWE acceptance.	Note

4.14	Stormwater is to be treated for water quality prior to any discharge to a categorised stream.	Note
4.15	Vegetation management plan and stream restoration plan will eventually be required by DWE with the 3A Permit Application.	Note
4.16	Preferrable for the urban design to incorporate perimeter roads located on edge of buffer ie. DWE prefer lots fronting onto riparian corridor to avoid rubbish dumping impacts on riparian corridor and to provide increased passive surveillance from houses.	Note
4.17	Outlets from raingardens etc can be typical rock protected headwalls.	Note
5.0	**Next Steps**	
5.1	Following approval of minutes, two documents to be prepared: • one which addresses the referall currently on STOP THE CLOCK for the SLDA, covering specifically points 1.0 to 2.59 contained within the minutes, and forwarded to HCC via Urbis, with input from GHD (flora and fauna) and JWP (hydrology, hydraulics, civil design). • and the other which addresses the overall development site.	Urbis / GHD/ JWP Timing TBA
5.2	Onsite Meeting close 12:15pm	Note
6.0	**Post Meeting**	
6.1	**In this instance, we propose this current set of minutes reviewed and agreed by all attendees would serve as the second correspondence listed in 5.1, that is the overall development site.**	To be reviewed and agreed - ALL

NSW Government
Department of Water & Energy

DWE MINUTES 2/2/09 JWP REF A 9580

Contact: Greg Brady
Phone: 02 9895 7441
Fax:
Email: greg.brady@dnr.nsw.gov.au

The General Manager
Hawkesbury City Council
PO Box 146
Windsor NSW 2756

Attention: Greg Hall

Our ref: 10 ERM2008/1562
File No: 9050834
Your Ref: DA0852/08

15 December 2008

Dear Sir

Re: STOP THE CLOCK on proposed development – Aged Care Facility - Community Facility at 108 GROSE VALE ROAD NORTH RICHMOND

The Department has placed a 'Stop-the-Clock' on the above Integrated Development application received by this office on 28/11/2008. An initial review of the material provided indicates that additional information relating to General Terms of Approval is needed in order to complete the assessment. Under the Environment Planning and Assessment Regulation 2000, (as amended), (the Regulation), any request for further information made within 25 days of receipt is not considered in calculating the period prescribed by Clause 70 for notifying the General Terms of Approval.

The Department has no objections to the use of the land as an Aged Care Facility.

The detail of the documents supplied makes it impossible to determine if pre DA requirements in relation to the northern watercourse have been achieved. Therefore the following needs to be supplied to facilitate assessment:

- A plan showing the location of the northern watercourse, showing the top of banks, and boundary of the site.
- A plan showing the 20m riparian setback (emulating the original native vegetation community of the site, each side of the watercourse (depending upon current location of the watercourse).
- A plan showing the location of the detention basin and associated works (such as outlets, access points etc), relative to the riparian setback. Note the detention basin will be required to be outside the riparian setback.
- A concept plan showing the location of all works within 40m of the northern watercourse, including rain gardens, paths, roads, recreation areas etc. Note that these works are not to be within the riparian setbacks, except for agrees-upon crossings.

There appear to be three watercourses on the area of proposed development footprint. Only the northern watercourse was discussed in relation to setbacks off the watercourse. The applicant needs to demonstrate to the satisfaction of the Department, the status of these other watercourses, which are shown as blue lines on the Kurrajong 1:25,000 topographic map. One of these watercourses is identified as the eastern catchment. If the watercourses are rivers then the applicant needs to discuss with the Department the treatment of these watercourses. Also to prevent future delays for other projects on the whole of the land all the other watercourses on the

site should be identified. It is suggested that an inspection of the site with the Department to identify all watercourses occur.

The clock will stop as of the date of this letter and resume on the date when the requested information has been supplied.

Clause 67 of the Regulation allows the Department to specify a reasonable period within which the information requested must be provided. In this case, the Department considers **90 days** from the date of this letter as a reasonable period of time within which the requested information must be provided. The Regulation also provides that failure by the applicant, to provide the requested information within the specified period, is to be taken by the Department to mean the information will not be provided. This may result in the Department refusing to grant General Terms of Approval.

The applicant should notify the Department of their intent to provide the requested information or to arrange for a suitable period to supply this information.

Please direct any questions or correspondence to Greg Brady, greg.brady@dnr.nsw.gov.au.

Yours sincerely

Greg Brady

Water Management Division
Licensing South

DWE MINUTES
2/2/09 JWP
REF B
8580

N

0 0.5 1

km

North Richmond

STREAM CLASSIFICATION

CATEGORY 1:
40 METRES WIDE CORE RIPARIAN ZONE (MEASURED FROM TOP OF BANK)
+ 10 METRE BUFFER EITHER SIDE OF THE WATERCOURSE

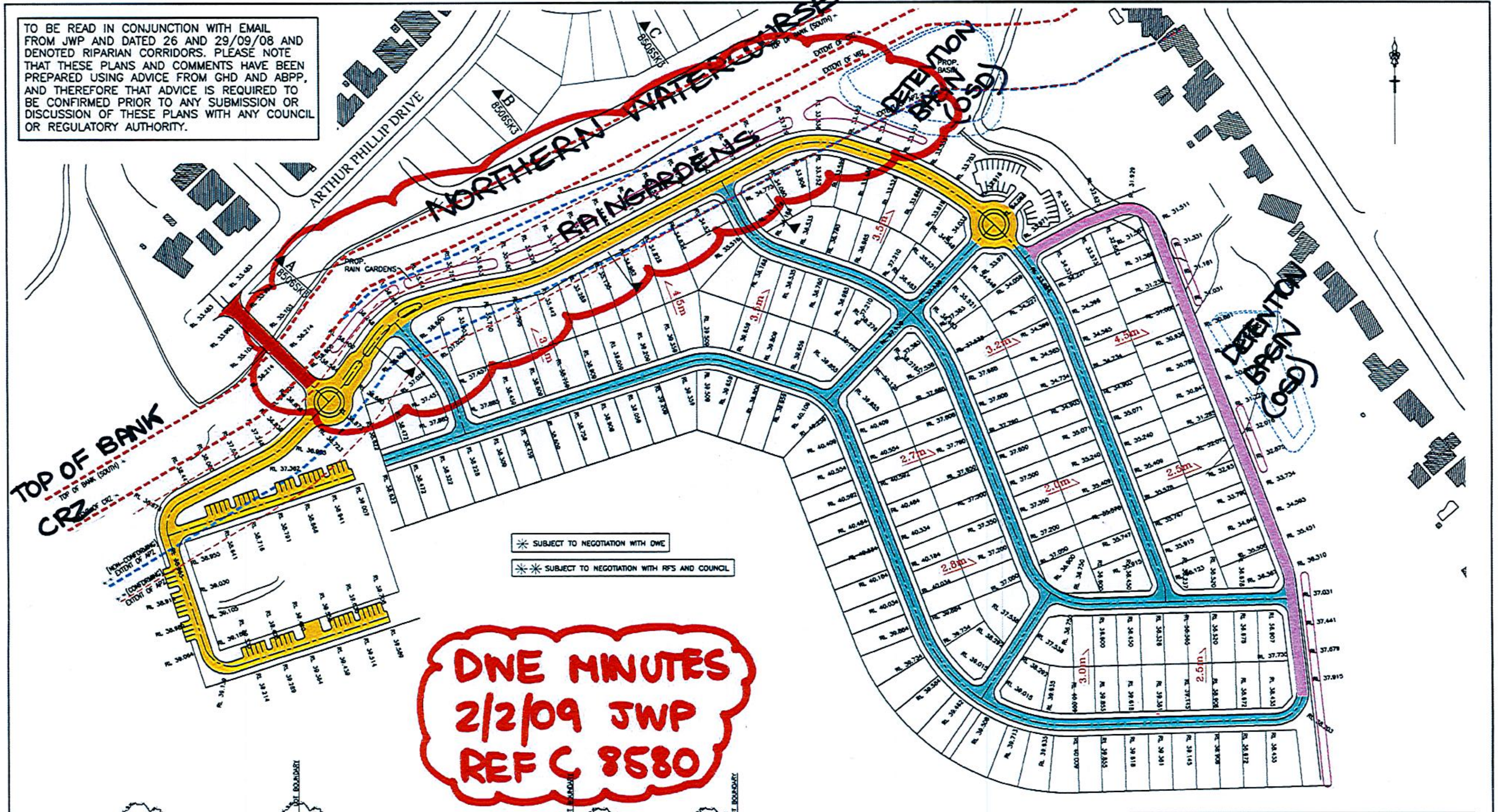
CATEGORY 2:
20 METRES WIDE CORE RIPARIAN ZONE (MEASURED FROM TOP OF BANK)
+ 10 METRE BUFFER EITHER SIDE OF THE WATERCOURSE

CATEGORY 3:
10 METRES WIDE CORE RIPARIAN ZONE (MEASURED FROM TOP OF BANK)

V:\DWE TECH SUPPORT REQUEST\Stream Classification\North Richmond\North Richmond_Stream Classification.mxd


NORTHERN WATERCOURSE
PTE 2
PTE 1
SLDA
N
APPROXIMATE EASEMENT BDY
DWE MINUTES
2/2/09 JWP
REF B1
8580

TO BE READ IN CONJUNCTION WITH EMAIL FROM JWP AND DATED 26 AND 29/09/08 AND DENOTED RIPARIAN CORRIDORS. PLEASE NOTE THAT THESE PLANS AND COMMENTS HAVE BEEN PREPARED USING ADVICE FROM GHD AND ABPP, AND THEREFORE THAT ADVICE IS REQUIRED TO BE CONFIRMED PRIOR TO ANY SUBMISSION OR DISCUSSION OF THESE PLANS WITH ANY COUNCIL OR REGULATORY AUTHORITY.



NOTE– APZ, RIPARIAN AND BUFFER ZONES ARE INDICATIVE ONLY FINAL LOCATION STILL TO BE DETERMINED

TYPICAL SECTION
NTS

TYPICAL SECTION
NTS

SUGGESTED ROAD HIERARCHY

- (red) 3m FOOTPATH – 8m CARRIAGEWAY – 2 WAY CROSSFALL
- (yellow) 3m FOOTPATH – 8m CARRIAGEWAY – 1 WAY CROSSFALL
- (blue) 3m FOOTPATH – 6m CARRIAGEWAY – INVERTED CROSSFALL "V"
- (pink) 3m FOOTPATH – 6m CARRIAGEWAY – 1 WAY CROSSFALL

1:1000 (AT A1) — 20 10 0 10 20 30 40 50 60 70 80 90 100 METRES

ADVANCE COPY ONLY
NOT FOR CONSTRUCTION

ISSUE	AMENDMENT	DATE
F		
E	SECTIONS AMENDMENTS FOLLOWING APZ ADVICE	29-9-08
D	APZ LOCATION AMENDED	18-9-08
C	SECTION MARKS MOVED, DPZ NOTE ADDED	17-9-08
B	APZ ADDED	15-9-08
A	ISSUED TO CLIENT	28/8/08

J. Wyndham Prince Pty. Ltd.
CONSULTING CIVIL ENGINEERS & PROJECT MANAGERS
A.B.N. 67002 318 621
P.O. BOX 4366 PENRITH WESTFIELD. 2750
DX 8032 PENRITH
EMAIL: jwp@jwprince.com.au
PH: (02) 4732 3366
FAX: (02) 4721 7638

DESIGNED ML	DATUM: A.H.D.	SCALES: 1:1000	CLIENT: BUILDEV DEVELOPMENTS
DRAWN ML	ORIGIN:		
CHECKED			

THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS PART OF AN APPROVED CONSTRUCTION CERTIFICATE.

NORTH RICHMOND SENIORS HOUSING
PRELIMINARY ROAD BOUNDARY LEVELS

PLAN No. 8506/SK2 E
FILE No. 8506SK2
SHEET 1 OF 1 SHEETS

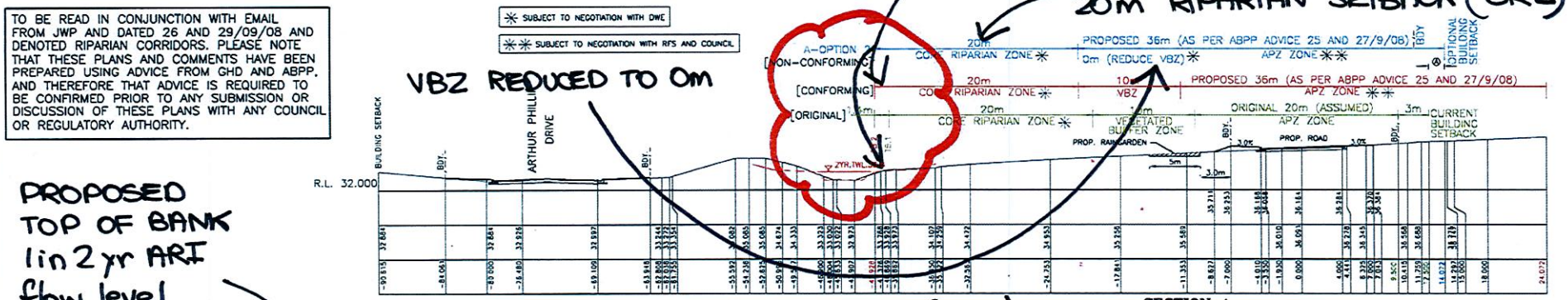
PROPOSED TOP OF BANK 1in 2yr ARI flow level

20m RIPARIAN SETBACK (CRZ)

TO BE READ IN CONJUNCTION WITH EMAIL FROM JWP AND DATED 26 AND 29/09/08 AND DENOTED RIPARIAN CORRIDORS. PLEASE NOTE THAT THESE PLANS AND COMMENTS HAVE BEEN PREPARED USING ADVICE FROM GHD AND ABPP. AND THEREFORE THAT ADVICE IS REQUIRED TO BE CONFIRMED PRIOR TO ANY SUBMISSION OR DISCUSSION OF THESE PLANS WITH ANY COUNCIL OR REGULATORY AUTHORITY.

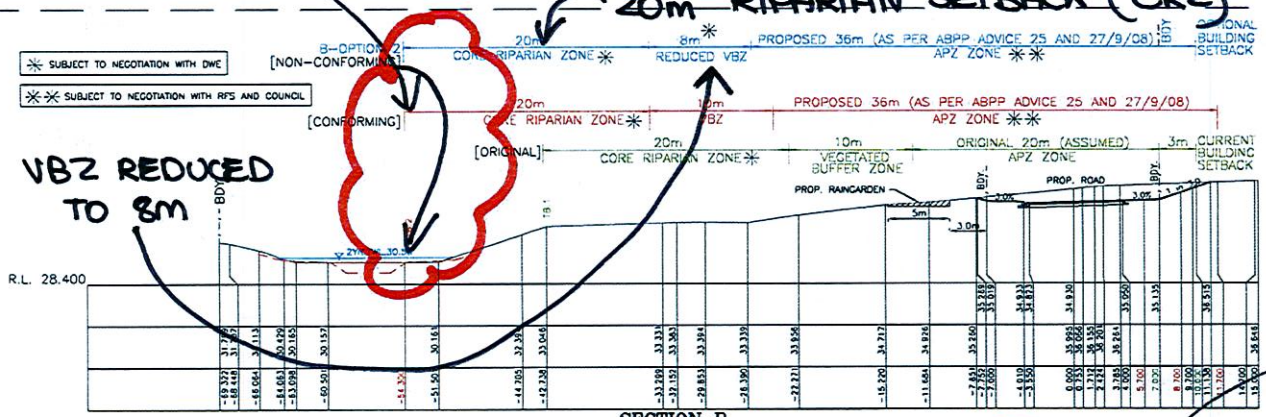
VBZ REDUCED TO 0m

PROPOSED TOP OF BANK 1in 2yr ARI flow level



SECTION A

20m RIPARIAN SETBACK (CRZ)



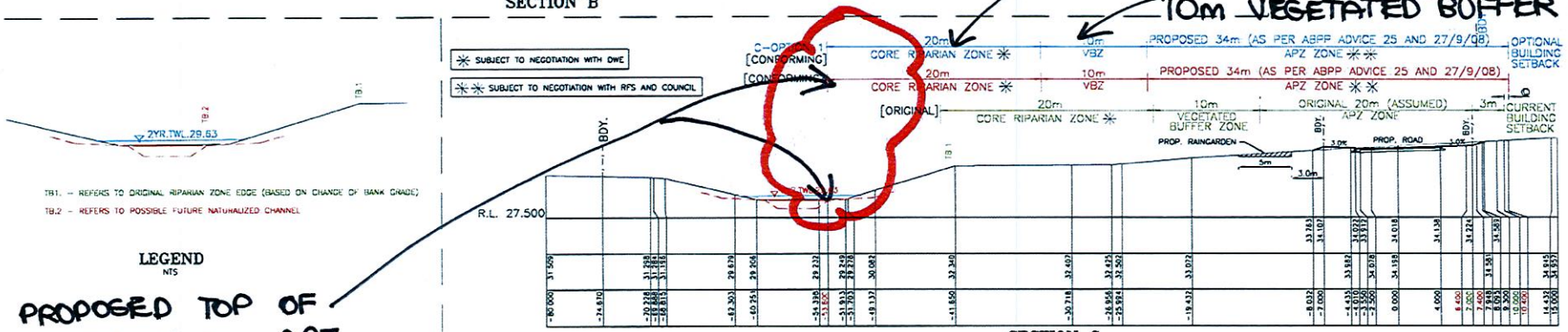
VBZ REDUCED TO 8m

SECTION B

DWE MINUTES 2/2/09 JWP REF D 8580

20m RIPARIAN SETBACK (CRZ)

10m VEGETATED BUFFER (VBZ)



SECTION C

TB1. – REFERS TO ORIGINAL RIPARIAN ZONE EDGE (BASED ON CHANGE OF BANK GRADE)

TB2 – REFERS TO POSSIBLE FUTURE NATURALIZED CHANNEL

LEGEND
NTS

PROPOSED TOP OF BANK, 1in 2yr ARI flow level

Ⓐ ENCROACHMENT OF 1.6m ON ORIGINAL (GREEN) ALLOWANCES.

© ENCROACHMENT OF 0.4m ON ORIGINAL (GREEN) ALLOWANCES.

1:200 (AT A1) 4 2 0 4 8 12 16 20 METRES

ADVANCE COPY ONLY
NOT FOR CONSTRUCTION

ISSUE	AMENDMENT	DATE
F	SECTIONS AMENDMENTS FOLLOWING APZ ADVICE	29-9-08
D	SECTIONS AMENDED	26-9-08
C	TB2 REMOVED	18-9-08
B	SECTIONS AMENDED	17-9-08
A	FIRST ISSUE	16-9-08

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DESIGNED: ML
DRAWN: ML
CHECKED:
DATUM: A.H.D.
ORIGIN:
SCALES: H.1:200 V.1:200
CLIENT: BUILDEV

THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION UNLESS SIGNED AS PART OF AN APPROVED CONSTRUCTION CERTIFICATE.

NORTH RICHMOND SENIORS HOUSING

PRELIMINARY

PLAN No. 8506/SK3 E
FILE No. 8506SK3
SHEET OF SHEETS

APPENDIX B LIKELIHOOD OF OCCURRENCE

Likelihood	Criteria
High	It is highly likely that a species inhabits the study area and is dependant on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent from the study area.

Class	Family	Scientific Name	Common Name	NSW status	Comm. status	Records	Description	Likelihood of occurrence
Amphibia	Myobatrachidae	*Pseudophryne australis*	Red-crowned Toadlet	V,P		5	Occurs in open forests, mostly on Hawkesbury and Narrabeen Sandstones. Inhabits periodically wet drainage lines below sandstone ridges that often have shale lenses or cappings. Shelters under rocks and amongst masses of dense vegetation or thick piles of leaf litter. Breeding congregations occur in dense vegetation and debris beside ephemeral creeks and gutters. Red-crowned Toadlets have not been recorded breeding in waters that are even mildly polluted or with a pH outside the range 5.5 to 6.5.	None
Amphibia	Hylidae	*Litoria aurea*	Green and Golden Bell Frog	E1,P	V	1	Inhabits marshes, dams and stream-sides, particularly those containing bullrushes or spikerushes. Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	None

							Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species is active by day and usually breeds in summer when conditions are warm and wet.	
Aves	Apodidae	*Apus pacificus*	Fork-tailed Swift	P	C,J,K	1	In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. These are widespread but scattered further west of the line joining Bourke and Dareton. Sightings have been recorded at Milparinka, the Bulloo River and Thurloo Downs	Low
Aves	Apodidae	*Hirundapus caudacutus*	White-throated Needletail	V,P	V,C,J,K	1	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps.	Low
Aves	Accipitridae	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	V,P		4	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Nests are large structures built from sticks and lined with leaves or grass.	Low
Aves	Accipitridae	*Hieraaetus morphnoides*	Little Eagle	V,P		1	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	Low

Aves	Accipitridae	^^*Lophoictinia isura*	Square-tailed Kite	V,P,3		7	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. Appears to occupy large hunting ranges of more than 100 km^2.	Low
Aves	Falconidae	*Falco subniger*	Black Falcon	V,P		1	The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. It roosts in trees at night and often on power poles by day.	Low
Aves	Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	P	C,J,K	2	Found along all coastlines of Australia and in many areas inland, the Common Sandpiper is widespread in small numbers. The population when in Australia is concentrated in northern and western Australia.	None
Aves	Scolopacidae	*Gallinago hardwickii*	Latham's Snipe	P	J,K	87	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity.	None
Aves	Laridae	*Onychoprion fuscata*	Sooty Tern	V,P		1	Large flocks can be seen soaring, skimming and dipping but seldom plunging in off shore waters. Breeds in large colonies in sand or coral scrapes on offshore islands and cays including Lord Howe and Norfolk Islands.	None
Aves	Cacatuidae	^^*Callocephalon fimbriatum*	Gang-gang Cockatoo	E1,P,3	E	5	In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands,particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. May also occur in sub-alpine Snow Gum (Eucalyptus pauciflora) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts.	Low

Aves	Cacatuidae	^*Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V,P,2	V	6	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak and Forest Sheoak are important foods. Dependent on large hollow-bearing eucalypts for nest sites.	Low
Aves	Psittacidae	*Glossopsitta pusilla*	Little Lorikeet	V,P		4	Forages primarily in the canopy of open Eucalypt forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species.	Low
Aves	Psittacidae	*Lathamus discolor*	Swift Parrot	E1,P	CE	8	Migrates to the Australian south-east mainland between February and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany, Spotted Gum, Red Bloodwood, Forest Red Gum, Mugga Ironbark, and White Box.	Moderate
Aves	Strigidae	^^*Ninox connivens*	Barking Owl	V,P,3		2	Barking Owls are found in open woodlands and the edges of forests, often adjacent to farmland. They are less likely to use the interior of forested habitat. They are usually found in habitats that are dominated by eucalytpus species, particularly red gum, and, in the tropics, paperbark species. They prefer woodlands and forests with a high density of large trees and particularly sites with hollows that are used by the owls as well as their prey. Roost sites are often located near waterways or wetlands.	Low
Aves	Strigidae	^^*Ninox strenua*	Powerful Owl	V,P,3		9	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats.	Low
Aves	Tytonidae	^^*Tyto novaehollandiae*	Masked Owl	V,P,3		1	Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.	Low
Aves	Climacteridae	*Climacteris picumnus victoriae*	Brown Treecreeper (eastern subspecies)	V,P	V	2	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey,	Low

							sometimes with one or more shrub species; also found in mallee and River Red Gum (Eucalyptus camaldulensis) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding.	
Aves	Acanthizidae	*Chthonicola sagittata*	Speckled Warbler	V,P		2	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.	Low
Aves	Meliphagidae	*^Anthochaera phrygia*	Regent Honeyeater	E4A,P,2	CE	3	The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	Low
Aves	Meliphagidae	*Epthianura albifrons*	White-fronted Chat	V,P		2	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground. Have been observed breeding from late July through to early March, with 'open-cup' nests built in low vegetation. Nests in the Sydney region have also been seen in low isolated mangroves. Nests are usually built about 23 cm above the ground (but have been found up to 2.5 m above the ground).	Low
Aves	Meliphagidae	*Grantiella picta*	Painted Honeyeater	V,P	V	1	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests.	Low

							A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema. Insects and nectar from mistletoe or eucalypts are occasionally eaten.	
Aves	Meliphagidae	*Melithreptus gularis gularis*	Black-chinned Honeyeater (eastern subspecies)	V,P		1	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (Eucalyptus sideroxylon), White Box (E. albens), Inland Grey Box (E. microcarpa), Yellow Box (E. melliodora), Blakely's Red Gum (E. blakelyi) and Forest Red Gum (E. tereticornis). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees.	Low
Aves	Neosittidae	*Daphoenositta chrysoptera*	Varied Sittella	V,P		6	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	Low
Aves	Artamidae	*Artamus cyanopterus cyanopterus*	Dusky Woodswallow	V,P		7	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest.	Moderate
Aves	Petroicidae	*Petroica boodang*	Scarlet Robin	V,P		2	The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. This species lives in both mature and regrowth vegetation. It occasionally occurs in mallee or wet forest communities, or in wetlands and tea-tree swamps. The Scarlet Robin is primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. In autumn and winter many Scarlet Robins live in open grassy woodlands, and grasslands or grazed paddocks with scattered trees. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions; this species is occasionally found up to 1000 metres in altitude.	Low
Aves	Petroicidae	*Petroica phoenicea*	Flame Robin	V,P		20	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.	Low

							Occasionally occurs in temperate rainforest, and also in herbfields, heathlands, shrublands and sedgelands at high altitudes. In winter, birds migrate to drier more open habitats in the lowlands (i.e. valleys below the ranges, and to the western slopes and plains). Often occurs in recently burnt areas; however, habitat becomes unsuitable as vegetation closes up following regeneration. In winter lives in dry forests, open woodlands and in pastures and native grasslands, with or without scattered trees. In winter, occasionally seen in heathland or other shrublands in coastal areas.	
Mammalia	Dasyuridae	*Dasyurus maculatus*	Spotted-tailed Quoll	V,P	E	11	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites.	Low
Mammalia	Phascolarctidae	*Phascolarctos cinereus*	Koala	E1,P	E	130	Inhabits eucalypt forests and woodlands. Favoured food trees are the Grey Gum, Scribbly Gum, Swamp Mahogany and Snappy Gum.	Low
Mammalia	Petauridae	*Petaurus australis*	Yellow-bellied Glider	V,P	V	3	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south.	Low
Mammalia	Petauridae	*Petaurus norfolcensis*	Squirrel Glider	V,P		14	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	Low
Mammalia	Pteropodidae	*Pteropus poliocephalus*	Grey-headed Flying-fox	V,P	V	55	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Low

Mammalia	Emballonuridae	*Saccolaimus flaviventris*	Yellow-bellied Sheathtail-bat	V,P		5	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Moderate
Mammalia	Molossidae	*Micronomus norfolkensis*	Eastern Coastal Free-tailed Bat	V,P		35	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	Moderate
Mammalia	Vespertilionidae	*Chalinolobus dwyeri*	Large-eared Pied Bat	V,P	E	6	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin, frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies.	Moderate
Mammalia	Vespertilionidae	*Falsistrellus tasmaniensis*	Eastern False Pipistrelle	V,P		9	Prefers moist habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings.	Moderate
Mammalia	Vespertilionidae	*Myotis macropus*	Southern Myotis	V,P		18	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	High
Mammalia	Vespertilionidae	*Scoteanax rueppellii*	Greater Broad-nosed Bat	V,P		12	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Although this species usually roosts in tree hollows, it has also been found in buildings. Open woodland habitat and dry open forest suits the direct flight of this species as it searches for beetles and other large, slow-flying insects; this species has been known to eat other bat species.	Moderate
Mammalia	Miniopteridae	*Miniopterus australis*	Little Bent-winged Bat	V,P		7	Inhabits moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for	Moderate

							small insects beneath the canopy of densely vegetated habitats.	
Mammalia	Miniopteridae	*Miniopterus orianae oceanensis*	Large Bent-winged Bat	V,P		30	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	Moderate
Gastropoda	Camaenidae	*Meridolum corneovirens*	Cumberland Plain Land Snail	E1		50	Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities.	Moderate
Gastropoda	Camaenidae	*Pommerhelix duralensis*	Dural Land Snail	E1	E	1	The species has a strong affinity for communities in the interface region between shale-derived and sandstone-derived soils, with forested habitats that have good native cover and woody debris. It favours sheltering under rocks or inside curled-up bark. It does not burrow nor climb. The species has also been observed resting in exposed areas, such as on exposed rock or leaf litter, however it will also shelter beneath leaves, rocks and light woody debris.	Low
Flora	Apocynaceae	*Cynanchum elegans*	White-flowered Wax Plant	E1	E	4	The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest; Coastal Tea-tree Leptospermum laevigatum – Coastal Banksia Banksia integrifolia subsp. integrifolia coastal scrub; Forest Red Gum Eucalyptus tereticornis aligned open forest and woodland; Spotted Gum Corymbia maculata aligned open forest and woodland; and Bracelet Honeymyrtle Melaleuca armillaris scrub to open scrub.	None
Flora	Apocynaceae	*Marsdenia viridiflora subsp. viridiflora*	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	E2		2	Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. Grows in vine thickets and open shale woodland.	Low
Flora	Casuarinaceae	*Allocasuarina glareicola*		E1	E	14	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla and	None

							Melaleuca decora. Common associated understorey species include Melaleuca nodosa, Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongata, Acacia brownei, Themeda australis and Xanthorrhoea minor.	
Flora	Dilleniaceae	*Hibbertia fumana*		E4A		12	Species is known to occur in a long intergrade between Castlereagh Scribbly Gum Woodland and Castlereagh Ironbark Forest. Also recently found associated with aeolian sand deposits. Species has been found to occur in a variety of structural habitats including open areas, disturbed sites and also within thick ground cover dominated by a heavy cover of sedges, rushes and grasses. Has the potential to occur in similar intergrade alluvial habitats rich in sands and laterite in other parts of western Sydney.	Low
Flora	Dilleniaceae	*Hibbertia sp. Bankstown*		E4A	CE	16	This species is endemic to New South Wales and is currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs, in the Bankstown local government area.	None
Flora	Elaeocarpaceae	*Tetratheca glandulosa*		V		1	Associated with shale-sandstone transition habitat where shale-cappings occur over sandstone, with associated soil landscapes such as Lucas Heights, Gymea, Lambert and Faulconbridge. Topographically, the plant occupies ridgetops, upper-slopes and to a lesser extent mid-slope sandstone benches. Soils are generally shallow, consisting of a yellow, clayey/sandy loam. Stony lateritic fragments are also common in the soil profile on many of these ridgetops.	Low
Flora	Ericaceae	*Leucopogon exolasius*	Woronora Beard-heath	V	V	1	Woronora Beard-heath is found along the upper Georges River area and in Heathcote National Park.	Low
Flora	Ericaceae	*Leucopogon fletcheri subsp. fletcheri*		E1		1	Occurs in dry eucalypt woodland or in shrubland on clayey lateritic soils, generally on flat to gently sloping terrain along ridges and spurs.	Low
Flora	Fabaceae (Faboideae)	*Dillwynia tenuifolia*		V		198	In western Sydney, may be locally abundant particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays. May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	Moderate
Flora	Fabaceae (Faboideae)	*Pultenaea parviflora*		E1	V	13	May be locally abundant, particularly within scrubby/dry heath areas within Castlereagh Ironbark Forest and Shale Gravel Transition Forest on tertiary alluvium or laterised clays.	Low

							May also be common in transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland. Eucalyptus fibrosa is usually the dominant canopy species. Eucalyptus globoidea, E. longifolia, E. parramattensis, E. sclerophylla and E. sideroxylon may also be present or co-dominant, with Melaleuca decora frequently forming a secondary canopy layer.	
Flora	Fabaceae (Mimosoideae)	*Acacia bynoeana*	Bynoe's Wattle	E1	V	6	Bynoe's wattle is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. The species is currently known from about 30 locations, with the size of the populations at most locations being very small (1-5 plants). It has recently been found in the Colymea and Parma Creek areas west of Nowra.	None
Flora	Fabaceae (Mimosoideae)	*Acacia flocktoniae*	Flockton Wattle	V	V	1	The Flockton Wattle is found only in the Southern Blue Mountains (at Mt Victoria, Megalong Valley and Yerranderie).	None
Flora	Fabaceae (Mimosoideae)	*Acacia pubescens*	Downy Wattle	V	V	3	Occurs on alluviums, shales and at the intergrade between shales and sandstones. The soils are characteristically gravely soils, often with ironstone. Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	None
Flora	Myrtaceae	*Eucalyptus benthamii*	Camden White Gum	E4A	V	4	Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Recruitment of juveniles appears to be most successful on bare silt deposits in rivers and streams. The recorded elevation range for the species is from 30m ASL at Bents Basin to 750m ASL in the Kedumba population. Most of the individuals are around 60 to 300m ASL. Occurs in open forest. Associated species at the Bents Basin site include Eucalyptus elata, E. bauerina, E. amplifolia, E. deanei and Angophora subvelutina. Understorey species include Bursaria spinosa, Pteridium esculentum and a wide variety of agricultural weeds. The Kedumba Valley site lists E. crebra, E. deanei, E. punctata, Leptospermum flavescens, Acacia filicifolia and Pteridium esculentum among its associated species.	None
Flora	Myrtaceae	*Micromyrtus minutiflora*		E1	V	41	Grows in Castlereagh Scribbly Gum Woodland, Ironbark Forest, Shale/Gravel Transition Forest, open forest on tertiary alluvium and consolidated river sediments.	Low

Flora	Myrtaceae	*Rhodamnia rubescens*	Scrub Turpentine	E4A	CE	6	Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	None
Flora	Myrtaceae	*Syzygium paniculatum*	Magenta Lilly Pilly	E1	V	2	On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities.	None
Flora	Proteaceae	*Grevillea juniperina subsp. juniperina*	Juniper-leaved Grevillea	V		3	Grows on reddish clay to sandy soils derived from Wianamatta Shale and Tertiary alluvium (often with shale influence), typically containing lateritic gravels. Recorded from Cumberland Plain Woodland, Castlereagh Ironbark Woodland, Castlereagh Scribbly Gum Woodland and Shale/Gravel Transition Forest.	Low
Flora	Proteaceae	*Persoonia nutans*	Nodding Geebung	E1,P	E	392	Northern populations are confined to aeolian and alluvial sediments and occur in a range of sclerophyll forest and woodland vegetation communities, with the majority of individuals occurring within Agnes Banks Woodland or Castlereagh Scribbly Gum Woodland and some in Cooks River / Castlereagh Ironbark Forests. Southern populations also occupy tertiary alluvium, but extend onto shale sandstone transition communities and into Cooks River / Castlereagh Ironbark Forest.	Moderate
Flora	Rutaceae	*Zieria involucrata*		E1	V	1	Occurs primarily on Hawkesbury sandstone. Also occurs on Narrabeen Group sandstone and on Quaternary alluvium. Found primarily in sheltered forests on mid- to lower slopes and valleys, e.g. in or adjacent to gullies which support sheltered forest, although some populations extend upslope into drier vegetation. Also known from at least two atypical ridgetop locations. The canopy typically includes Syncarpia glomulifera subsp. glomulifera (Turpentine), Angophora costata (Smooth-barked Apple), Eucalyptus agglomerata (Blue-leaved Stringybark) and Allocasuarina torulosa (Forest Oak).	Low
Flora	Thymelaeaceae	*Pimelea curviflora var. curviflora*		V	V	1	Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowalnd Grassy Woodland habitat at Albion Park on the Illawaraa coastal plain.	Low
Flora	Thymelaeaceae	*Pimelea spicata*	Spiked Rice-flower	E1	E	2	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils.	Low

							On the Cumberland Plain sites it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark. The co-occurring species in the Cumberland Plain sites are grey box (Eucalyptus moluccana), forest red gum (E. tereticornis) and narrow-leaved ironbark (E. crebra). Blackthorn (Bursaria spinosa) is often present at sites (and may be important in protection from grazing) and kangaroo grass (Themeda australis) is usually present in the groundcover (also indicative of a less intense grazing history).	

APPENDIX C - PROTECTED MATTERS SEARCH

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 14-May-2024

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	47
Listed Migratory Species:	14

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	5
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion	Endangered	Community may occur within area
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	Critically Endangered	Community may occur within area
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	Critically Endangered	Community likely to occur within area
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community likely to occur within area
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	Critically Endangered	Community likely to occur within area
Western Sydney Dry Rainforest and Moist Woodland on Shale	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text
BIRD		
Anthochaera phrygia		
Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area

Scientific Name	Threatened Category	Presence Text
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat likely to occur within area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat likely to occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor		
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Melanodryas cucullata cucullata		
South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely to occur within area
Neophema chrysostoma		
Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area
Pycnoptilus floccosus		
Pilotbird [525]	Vulnerable	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Stagonopleura guttata		
Diamond Firetail [59398]	Vulnerable	Species or species habitat likely to occur within area
FISH		
Macquaria australasica		
Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
FROG		
Heleioporus australiacus		
Giant Burrowing Frog [1973]	Vulnerable	Species or species habitat likely to occur within area
Litoria aurea		
Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
MAMMAL		

Scientific Name	Threatened Category	Presence Text
Chalinolobus dwyeri		
Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat likely to occur within area
Petauroides volans		
Greater Glider (southern and central) [254]	Endangered	Species or species habitat may occur within area
Petaurus australis australis		
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata		
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area
Pseudomys novaehollandiae		
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus		
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
PLANT		
Acacia bynoeana		
Bynoe's Wattle, Tiny Wattle [8575]	Vulnerable	Species or species habitat may occur within area
Allocasuarina glareicola		
[21932]	Endangered	Species or species habitat likely to occur within area
Cynanchum elegans		
White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area

Scientific Name	Threatened Category	Presence Text
Haloragis exalata subsp. exalata Wingless Raspwort, Square Raspwort [24636]	Vulnerable	Species or species habitat may occur within area
Melaleuca deanei Deane's Melaleuca [5818]	Vulnerable	Species or species habitat may occur within area
Persicaria elatior Knotweed, Tall Knotweed [5831]	Vulnerable	Species or species habitat may occur within area
Persoonia nutans Nodding Geebung [18119]	Endangered	Species or species habitat likely to occur within area
Pimelea spicata Spiked Rice-flower [20834]	Endangered	Species or species habitat likely to occur within area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat may occur within area
Pterostylis saxicola Sydney Plains Greenhood [64537]	Endangered	Species or species habitat may occur within area
Rhizanthella slateri Eastern Underground Orchid [11768]	Endangered	Species or species habitat may occur within area
Rhodamnia rubescens Scrub Turpentine, Brown Malletwood [15763]	Critically Endangered	Species or species habitat likely to occur within area
Syzygium paniculatum Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry [20307]	Vulnerable	Species or species habitat may occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area
REPTILE		

Scientific Name	Threatened Category	Presence Text
Aprasia parapulchella		
Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may occur within area
Hoplocephalus bungaroides		
Broad-headed Snake [1182]	Endangered	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus		
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat likely to occur within area
Symposiachrus trivirgatus as Monarcha trivirgatus		
Spectacled Monarch [83946]		Species or species habitat may occur within area
Migratory Wetlands Species		

Scientific Name	Threatened Category	Presence Text
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Scientific Name	Threatened Category	Presence Text
Bird		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area overfly marine area

Scientific Name	Threatened Category	Presence Text
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area overfly marine area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area
Symposiachrus trivirgatus as Monarcha trivirgatus Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area

Extra Information

EPBC Act Referrals			[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status
Warragamba Dam Raising Project	2017/7940		Completed

Title of referral	Reference	Referral Outcome	Assessment Status
Not controlled action			
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed
Subdivision of Lot 24 DP 751649 and Lot 111 DP 1039639, Old Bells Line of Road,	2003/1139	Not Controlled Action	Completed
Not controlled action (particular manner)			
Replacement of flows with recycled water	2006/3050	Not Controlled Action (Particular Manner)	Post-Approval
Referral decision			
18744 Redbank Southern Valley Residential Subdivision	2021/9129	Referral Decision	Referral Publication

Bioregional Assessments		[Resource Information]
SubRegion	BioRegion	Website
Sydney	Sydney Basin	BA website

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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