The 'National Recovery Plan for the Regent Parrot (eastern subspecies) *Polytelis anthopeplus monarchoides'* (Baker-Gabb and Hurley 2011) lists a range of threatening processes including disturbance around nesting colonies; clearing and degradation of mallee woodland; loss of habitat – loss of flyways; timber harvesting of River Red Gums; altered hydrological regimes; fires; competition for nest hollows; competition from invasive plants; human-caused mortality; take from the wild; and predation. Key Threatening Processes listed under the EPBC Act which could impact Regent Parrot include land clearance, and aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners (*Manorina melanocephala*). Of these key threats, land clearing and disturbance around nesting colonies appears to be the greatest potential threat from the proposed construction works.

Similar previous construction activities for the Hattah TLM project were carried out in close proximity to known Regent Parrot breeding colonies with no long term impacts to the breeding activity (GHD 2017, GHD 2018). Based on current and previous assessment of Regent Parrot habitat in the proposed Construction Footprints and surrounding areas, it is reasonable to suggest that disturbance to known nesting colonies is highly unlikely.

The Regent Parrot recovery plan (Baker-Gabb and Hurley 2011) includes the protection measure "the use of environmental water to initially rescue River Red-gum from drought was first undertaken in Victoria in 2002". The recovery plan then mentions that this continued under The Living Murray (TLM) project with important breeding sites for Regent Parrot such as Hattah Lakes being listed as one of six 'icon' sites and targeted for the construction of water regulation structures to provide a more natural watering regime to these wetland ecosystems. The VMFRP project has similar objectives to TLM and will aim to maintain the condition of River Red-gum habitats and broader floodplain and wetland habitats which are likely to further assist with the recovery of the Regent Parrot. It is also worth noting that potential Regent Parrot breeding habitat is present within the Inundation Area, and that this breeding habitat (large old River Red-gums) is likely to have its condition improved, and therefore future breeding habitat for Regent Parrot sustained by environmental watering. The Regent Parrot is likely to benefit from broadly improved habitat condition following environmental water, and environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.

Operation of the Lindsay Island project however has the potential to greatly improve a number of key threats such as restored hydrological regimes; reduced nest competition (in long term through sustained and rejuvenated River Red-gum populations), and reduction in the numbers of over-abundant Noisy Miners through the establishment and maintenance of a healthy mid-story shrub layer.

Growling Grass Frog (*Litoria raniformis*) (Vulnerable)

The Growling Grass Frog is widespread throughout Victoria and is also known to occur along the Murray River and major creeks including the Lindsay River, Mullaroo and Little Mullaroo Creeks. This species has 25 previous records within the study area, and was recorded once during 2012 surveys at the Toupnein Creek containment bank (Berr_D) (GHD 2013).

The presence of suitable habitat and the ability of this species to recolonise areas suggest that it has the potential to occur at any of the wet sites on the Lindsay River or Murray River, or major creeks including the Mullaroo and Lindsay South Creeks, and localised impacts are possible, including threatening processes such as loss and degradation of habitat; barriers to movement; disease; and predation. Key Threatening Processes listed under the EPBC Act include infection of amphibians with chytrid fungus resulting in chytridiomycosis. Any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from Construction Footprints must be planned considering these aquatic fauna. A construction specific aquatic fauna management plan should be developed as part of a CEMP for all works around waterways, and make consideration of these impacts and threatening processes, with amphibian handling protocols to avoid spread of chytrid fungus a critical aspect of any fauna salvage plan.

The Growling Grass Frog is considered likely to benefit greatly from expanded habitat during planned inundations, and improved habitat condition following environmental water, and a reintroduction of more suitable ecological watering regimes is likely to facilitate this. Growling Grass Frog response to environmental watering has been shown to occur at locations such as Toupnein Creek floodplain inundation (GHD 2013).

Painted Honeyeater (*Grantiella picta*) (Vulnerable)

The Painted Honeyeater (*Grantiella picta*) is considered to have potential to utilise habitats within the proposed Construction Footprints and Inundation Area. This species has not been previously recorded within 10 km of the Construction Footprints or Inundation Areas, but may occasionally forage in these woodland areas. The proposed works at the Construction Footprints are however not likely to significantly impact any areas of important habitat to this extremely mobile nomadic species, which forages widely over large areas in pursuit of mistletoe and flowering eucalypts.

A potential Key Threatening Process listed under the EPBC Act which could impact Painted Honeyeater is the aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners. Operation of the Lindsay Island project however has the potential to reduce this threat, through the establishment and maintenance of a healthy mid-story shrub layer following restored hydrological regimes.

Painted Honeyeater is considered likely to greatly benefit from planned inundations, particularly through the recruitment of preferred habitat for foraging and refuges for traveling through the landscape.

South-eastern Long-eared Bat (*Nyctophilus corbeni)* (Vulnerable)

The South-eastern Long-eared Bat is a slow flying agile bat, utilising the understorey to hunt non-flying (volant) prey - especially caterpillars and beetles - and will even hunt on the ground. It inhabits a variety of tree vegetation types, including mallee, Buloke (*Allocasuarina luehmannii*) and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation. It roosts in tree hollows, crevices, and under loose bark (OEH 2012). Like most species of insectivorous bats in Victoria it roosts within tree hollows during the day (Lumsden 1994). Within Victoria, research indicates that the South-eastern Long-eared Bat roosts in mallee eucalypts in areas of long-unburnt mallee vegetation. Some roosting occurs under bark and in fissures/cracks of Belah trees (Lumsden et al, 2008; Threatened Species Scientific Committee 2015a)

The species is more abundant where vegetation has a distinct canopy and a dense cluttered understorey layer (Churchill 1998), likely to enable it to forage for non-volant species. It has a scattered distribution in Victoria known from only four geographic locations all from the north-west of the state: Mopoke Tanks, Hattah, Yarrock and Bullock Creek. Victorian records are from *E. gracilis mallee*, Buloke and Black Box woodlands (Lumsden 1994). The species has been recorded twice in 1999 approximately 30-40 km east of the Project Area[18] in NSW near Moorna. In Victoria the nearest known records are in the southern part of the Murray-Sunset National Park (approximately 86 km to the south east; 1962) and in Hattah State Forest, approximately 106 km to the south east most recently in 2008). Targeted bat trapping surveys in 2018/19 (GHD 2019) on Lindsay Island also failed to detect this species.

In the unlikely occurrence of this species in the Construction Footprint, impacts as a result of vegetation removal and potential habitat loss will be localised, and therefore resultant impacts to the species are expected to be negligible. However, broader mitigation measures for hollow-dependent species as outlined in Section 11 will also apply to threatened bats including South-eastern Long-eared Bat, including pre-clearance surveys and hollow-bearing tree management in the unlikely event that a South-eastern Long-eared Bats were detected. There is potential for microbats to benefit from environmental water, with recent studies showing an increase in abundance and diversity due to an increase in insect productivity, particularly in arid environments (Threlfall *et al.* 2012 and Leigh *et al.* 2010).

Australasian Bittern (*Botaurus poiciloptilus*) (Endangered)

The Australasian Bittern occurs in terrestrial freshwater wetlands and, rarely, estuarine habitats (Marchant and Higgins 2004). It favors wetlands with tall, dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water (Marchant and Higgins 2004). The species favors permanent freshwater habitats, particularly those dominated by sedges, rushes and/or reeds (e.g. *Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus*) or Cutting Grass (*Gahnia*) growing over muddy or peaty substrate (Marchant & Higgins 1990; within DoE 2020a).

[18] Australian Living Atlas, https://www.ala.org.au/, accessed 10/06/2020

In Victoria the species is recorded mostly in the southern coastal areas and in the Murray River region of central northern Victoria (Jaensch 2005, as cited in DSEWPaC 2011). The ebird database (accessed 11/6/20) identifies three main hotspots for this species in Victoria: along the south coast between Port Fairy and Portland, around Port Phillip Bay between Geelong and Carrum Downs and along the Murray River between Swan Hill and Yarrawonga. Whilst there are no records within 40 km on the VBA or Atlas of NSW, in the vicinity of the Construction Footprints there are three records in the ebird database: Chowilla Game Reserve, South Australia, approximately 14 km to the north west, 2005; Martins Bend near Berri South Australia approximately 45 km to the south west, 2017; and Lake Cullulerraine Recreation Reserve, Victoria approximately 38 km south east, 2018. Each of these records are of a single individual. Whilst there are sporadic records in the area there is a distinct paucity of records for an area so heavily surveyed.

Limited data are available about breeding requirements for this species, but available data indicates that the Australasian Bittern breeds in relatively deep, densely vegetated freshwater swamps and pools, building its nests in deep cover over shallow water (Marchant & Higgins 1990; within DoE 2020a). In rush land, it may avoid breeding in the densest areas (Marchant & Higgins 1990; within DoE 2020a); alternatively, this may simply reflect the location of the few nests that have been found in wetlands that are difficult to access (Jaensch 2005, as cited in DoE 2020a).

The likelihood of this species using the Construction Footprints more than an occasional visitor is considered low given the bulk of the Construction Footprint lacks the required habitat features for this species (tall, dense aquatic vegetation) and is comprised predominately of woodland, shrubland and Lignum swamp (**Table 13**). There is a low probability that this species may use the proposed inundation areas given their very specific habitat requirements.

Australian Painted Snipe (*Rostratula australis*) (Endangered)

The Australian Painted Snipe is a rare, nomadic bird species that may turn up at any suitable wetland across Australia, when conditions are favourable. This species is widespread but rare throughout most of eastern Australia.

The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum (*Duma*) or canegrass or sometimes Tea-tree (*Melaleuca*). The Australian Painted Snipe sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (Marchant & Higgins 1993 within DoE 2020b).

The species is reported to have been mainly recorded in the Murray-Darling region however in Victoria and NSW, known records (VBA, Atlas of NSW and ebird) indicate this to be more accurate for the region east of Swan Hill (DoE 2020b).

In the vicinity of the Project Area there are very few records. The ebird database shows a vast area largely unoccupied by the species for 250 km or more in every direction with the exception of a single record at Merbein Common near Mildura from 2011. Despite absence of records in the ebird database, there are a handful of other records in the area (west of Morkalla approximately 20 km south from 1973, south of Red Cliffs approximately 93 km east from 1910 and east of Wentworth approximately 66 km east from 2011) it is reflective of the rarity of this species in the region.

The likelihood of this species using the Construction Footprints as more than an occasional visitor is considered low given the bulk of the Construction Footprint lacks the required habitat features for this species (tall, dense aquatic vegetation) and is comprised predominately of woodland, shrubland and Lignum swamp (**Table 13**). There is a low probability that this species may use the proposed inundation areas given their specific habitat requirements.

Curlew Sandpiper (*Calidris ferruginea*) (Critically Endangered)

The Curlew Sandpiper is a migratory species that breeds outside of Australia. The non-breeding population is estimated at 115,000 individuals (Garnett et al 2010). In Australia the Curlew Sandpiper primarily occurs in sand flats, estuaries, brackish lagoons saltmarshes, and less often inland Australia (Garnett et al 2010, DoE 2015b). Non-breeding individuals may remain in Australian during the breeding period (DoE 2015b). Throughout its Victorian distribution the Curlew Sandpiper was once commonly seen through inlets and coastal bays, and sporadically in inland wetlands (DoE 2015b). Preferred foraging habitat includes shallows areas of intertidal mudflats and proximate shallow water.

In the vicinity of the area of investigation there are very few records. According to ALA, there is one record of this species (undated) directly north of the area of investigation, in NSW. The second closest record for this species occurs in South Australia, approximately 35 km west of the Area of Investigation.

The likelihood of this species using the Construction Footprints as more than an occasional visitor is considered low, at the Construction Footprint lacks the required habitat features for this species (such as estuaries and brackish lagoons) and is comprised predominately of woodland, shrubland and Lignum swamp (**Table 13**). There is a low probability that this species may use the proposed inundation areas given their specific habitat requirements.

It is currently considered unlikely that the species currently persists in the Lindsay area regularly, and that environmental watering of this floodplain could provide habitat suitable for recolonization. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands for visitation (Seran BL&A 2018).

Eastern Curlew (*Numenius madagascariensis*) (Critically Endangered)

The Eastern Curlew is a migratory species that breeds outside of Australia. The Eastern Curlew breeds in Russia and north-eastern China, and during the non-breeding period some birds migrate to southern Korea and China, albeit most migrate to north, east and south-east Australia. The non-breeding population is estimated at 28,000 individuals (Garnett et al 2010). In Australia the Eastern Curlew primarily inhabits estuaries, mangroves and intertidal flats, primarily throughout coastal areas within every state (Garnett et al 2010, DoE 2015a). Eastern Curlews are rarely recorded inland of Australia.

There are not records of this species within the construction footprint on the VBA, and has been identified from the Study Area from PMST modelled predicted distribution. The nearest ALA record of this species occurs from approximately 40 km south (undated). The second closest record in over 60 km east, from 1961 The Eastern Curlew has been considered unlikely to occur within the Area of Investigation, and the proposed Construction Footprints are in predominantly dry areas and will not impact known areas considered high quality habitat for this species. Thus, the project will not impact this species or its preferred habitat within the area. This species is considered likely to have long-term benefits from expanded habitat during, and improved habitat condition following environmental water within inundation areas.

In the vicinity of the area of investigation there are very few records, with none within 10 km of the construction footprint or Inundation Area, and the nearest VBA record from approximately 40 km south. The second closest record in over 60 km east, from 1961.

Aquatic fauna

Murray Cod (*Maccullochella peelii peelii*) (Vulnerable) and Silver Perch (*Bidyanus bidyanus*) (Critically Endangered)

Two EPBC Act listed fish species are known to occur within the Inundation Area and at one or more Construction Footprints; the Murray Cod (*Maccullochella peelii peelii*) (DELWP 2018) and Silver Perch (*Bidyanus bidyanus*) (DELWP 2018). These species have the potential to occur in the Murray River or major creeks including the Lindsay River and Mullaroo Creek. Threatening processes such as creation of instream barriers, lowering water quality and habitat degradation have the potential to occur (NMCRT, 2010) during construction.

It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the passing flow available. Further hydrological investigations will then establish whether the passing flow is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction.

Temporary cofferdams in the Lindsay River at Berribee Regulator will be constructed with sheet piling. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning season for these fish and pile-driving method should, if feasible, use a vibrating hammer above the water line to install sheet piles. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods.

If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Murray Cod and Silver Perch as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will need to assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process.

Localised impacts possible due to sediment/ contaminant run-off from construction sites into waterways will be managed through the CEMP for the project, with preparation of an aquatic fauna management plan.

Operation of the project has the potential to impact Murray Cod and Silver Perch. Key to protecting EPBC Act listed species (specifically Murray Cod but also Silver Perch) will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River. DELWP (2018) provide detail on how this objective could be achieved and provide an assessment of the risk that each proposed operational scenario is likely to have on native fish communities. A summary of this assessment is provided in **Table 12**. It should be noted that the Berribee Intermediate scenario was assessed at a level of 21.7 mAHD (at Berribee Regulator) and 22.6 mAHD (at Lock 7). The currently proposed operating regime for Berribee Intermediate is based on levels ranging from 22.1 mAHD to 23.1 mAHD. The Berribee Maximum scenario was originally assessed at 23.2 mAHD. As such, the DELWP (2018) Berribee Intermediate assessment is likely an understatement of risk and under the currently proposed operating regime can be considered of equivalent risk to the Berribee Maximum scenario. Risks to fish under the Seasonal fresh and Wallawalla East and West scenarios were considered low risk to Murray Cod and Silver Perch.

DELWP (2018) provide key recommendations to reduce the risk to the Murray Cod population in the Lindsay – Mullaroo system which may be caused by a reduction of flowing habitats. These are summarised below:

1. Maintain water velocities in core habitats by reducing the frequency (e.g. 1-in-10 years) and duration of the Berribee Maximum inundation scenario. Where this scenario is implemented consider a six-week winter fill.
2. Consider whether implementing alternative low risk inundation scenarios that do not reduce core water velocities will also provide for management outcomes.
3. Avoid consecutive year implementation of Berribee Maximum or Intermediate scenarios.

The risk assessment by DELWP (2018) found that these recommendations, along with specific mitigation measures, were considered to lower the risk to Murray Cod when the Berribee Maximum/Intermediate inundation scenarios were implemented but that the Murray Cod population in the Lindsay-Mullaroo system will still remain at high risk. As such, operation of the Berribee Regulator to allow for broad-scale floodplain inundation (specifically the Berribee Maximum regime but also the Berribee Intermediate scenario as currently proposed) is considered a high risk to existing Murray Cod as well as to Silver Perch populations. To address this matter VMFRP is proposing to carry out further assessment to identify opportunities to refine the proposed operating regime to protect Murray Cod and Silver Perch habitat while still aiming to meet the various ecological objectives for the site.

Table 12 Summary of risk to hydraulic habitats (and therefore Murray Cod populations) within the Lindsay-Mullaroo system based on selected operating scenarios

Scenario	Unmitigated risk to hydraulic habitat of Lindsay-Mullaroo system*	Residual risk to hydraulic habitat of Lindsay-Mullaroo system*
Seasonal fresh	Low	n/a
Berribee – Intermediate	High**	Low**
Berribee – Maximum	Very High	High
Wallawalla East Wallawalla West	Low	n/a
Berribee Intermediate (includes secondary components - Crankhandle Wetland Complex and Crankhandle West)	Moderate	n/a

* Risks are based on the operating scenarios assessed by DELWP (2018). Residual risks were calculated based on adoption of DELWP (2018) mitigation measures. Risk will need to be re-assessed following the development of additional mitigation measures as part of reviewing operating scenarios.

** DELWP (2018) risk assessment results. Under currently proposed operating regime this risk is likely to be equivalent to Berribee Maximum (i.e. high residual risk).

Operation of the Berribee Regulator also has the potential to restrict fish passage in the Lindsay River, especially during anoxic blackwater events, when fish will require safe, unrestricted downstream passage. The impact that anoxic blackwater events can have was most recently demonstrated in 2016, when large numbers of fish were killed in the lower and mid-Murray River, Edward-Wakool system, Frenchman's Creek, Rufus River and Mullaroo Creek when unable to escape the anoxic water (Tonkin et al., 2017). Operation of the Berribee fishway and regulator to appropriate standard, provision of permanent passing flow, the capacity to provide appropriately deep tailwater and the ability to quickly dismantle the regulator if significant anoxic blackwater event is occurring are provided as possible mitigation measures by DELWP (2018) to minimise the potential impacts to fish passage. DELWP (2018) highlight that this will remain a high risk during operation of both the Berribee Maximum and Intermediate scenarios.

The ability for fish to exit the floodplain is of importance to avoid impacts to the species. The Fish Management Plan for the site (DELWP 2018) provides details of the recommended operational regime to minimise the risk of stranding during drawdown events. Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands. Murray Cod and Silver Perch are not likely to inhabit the floodplain wetlands in large numbers but further consideration should be given to whether fish will have the potential to exit these wetlands during a drying phase.

Mitigation of downstream impacts due to return flows will be managed during project operation. Mallee CMA has operational experience through the TLM projects in managing water quality risks associated with return flows, including from suspended sediment, nutrients and low dissolved oxygen levels. Water quality monitoring would be carried out before, during and after watering events to inform adaptive management strategies and real-time operational decision making. A range of measures could be implemented to manage poor water quality including timing of watering for when temperatures are low, scheduling watering events and releases to make use of dilution flows, delaying outflows if river flows are too low, agitating water to increase aeration, and disposal of hypoxic water by pumping to higher wetlands.

Additional impacts due to operation were identified by DELWP (2018) and included the risk that floodplain inundation may increase carp populations, which may impact native fish species present within the complex. Management measures to reduce these risks include:

- Implementing a winter fill regime
- Develop a native fish exit strategy to strand carp
- Drying of wetlands with high carp density

9.3.2 Impacts to EPBC Act listed migratory species

Eleven species listed as migratory under the EPBC Act are predicted to occur, or were previously recorded from a VBA and PMST search within the Study Area. These species are Fork-tailed Swift (*Apus pacificus*), Grey Wagtail (*Motacilla cinerea*), Yellow Wagtail (*Motacilla flava*), Common Sandpiper (*Actitis hypoleucus*), Sharp-tailed Sandpiper (*Calidris acuminata*), Curlew Sandpiper (*Calidris ferruginea*), Pectoral Sandpiper (*Calidris melanotos*), Latham's Snipe/Japanese Snipe (*Gallinago hardwickii*), Eastern Curlew (*Numenius madagascariensis*), Osprey (*Pandion haliaetus*) and Common Greenshank (*Tringa nebularia*). All eleven of these species was assessed as having a possible likelihood of occurrence within the Inundation Area but only the Fork-tailed Swift and Osprey were assessed as having a possible likelihood of occurrence within the Construction Footprint (see **Table 11**).

Construction

Two species, the Fork-tailed Swift and Osprey, were considered to have potential to occur within the Construction Footprint. These species may fly over the Construction Footprint whilst foraging, but are considered highly unlikely to be impacted, as both species are highly mobile, wide ranging, and suitable surrounding habitat is widespread. No other listed migratory species were considered as likely to occur within the Construction Footprint during the time of the survey, mostly due to the lack of recent records within the Construction Footprint and/or a lack of suitable habitat present (see Appendix D and Appendix J for rationale). While suitable habitat for these mostly migratory wading shore-birds may be present in some Construction Footprints (e.g. Lake Wallawalla) when water is present, it is intended that construction works would be undertaken during dry periods when sufficient water to attract these species is unlikely to be present and therefore impacts on these species are unlikely.

Operation

Eight of the listed migratory species assessed as potentially occurring in the Inundation Areas are wading shore-birds, and along with the two species of Wagtail (Grey and Yellow), are likely to benefit from the reinstatement of more frequent inundation of their preferred wetland and mudflat habitats in areas such as Lake Wallawalla, which is known to attract a regionally significant number of waterbirds when flooded, including the Common Greenshank and other listed migratory and threatened waterbirds (MDBC 2006). Specifically, reinstatement of a more natural flooding regime would contribute to increased productivity of the wetland communities, and increased vegetation diversity and structure from more dominant drought-tolerant species, which would likely improve breeding, foraging and refuge resources for listed migratory species, in particular the Common Greenshank and Sharp-tailed Sandpiper. The Fork-tailed Swift may fly over the Inundation Area whilst foraging, but is considered unlikely to be impacted, as the species is highly mobile, wide ranging, and suitable surrounding habitat is widespread.

No listed migratory species were considered as likely to be impacted by the proposed construction or operation of the project, and are all likely to benefit directly from greatly increased suitable habitat, and indirectly through improved habitat. Potential impacts have been assessed in relation to the EPBC Act Significant Impact Guidelines for listed migratory species (see Appendix J), which determined that the project is not likely to have a significant adverse impact on listed migratory species provided the recommended mitigation measures (Section 11) are implemented.

9.3.3 Impacts to FFG Act listed terrestrial fauna species

Construction

Twenty-one FFG Act listed terrestrial fauna species (16 bird, one mammal, one amphibian (Growling Grass Frog) and three reptile species (Carpet Python, Lace Monitor, Red-naped Snake)) are considered to have potential to occur within the proposed Construction Footprint, these are listed in **Table 11**, and Appendix D.

Most of the FFG Act listed species possibly occurring in the Construction Footprint are highly mobile bird species and moderately mobile reptile species and all have access to large areas of suitable habitat in the immediate surrounding areas in which to disperse. None of these species is considered likely to be significantly impacted by the proposed construction, though highly localised impacts are possible to individuals within the construction footprints (e.g. through removal of hollow-bearing trees, large woody debris). Localised impacts can be largely avoided and minimised through pre-clearance surveys of Construction Footprints and translocation of these fauna, as per Section 11.

Consideration of potential FFG Act listed threatening processes has included alteration to the natural flow regimes of rivers and streams; degradation of native riparian vegetation along Victorian rivers and streams; habitat fragmentation as a threatening process for fauna in Victoria; infection of amphibians with Chytrid Fungus, resulting in chytridiomycosis; loss of hollow-bearing trees from Victorian native forests; reduction in biodiversity resulting from Noisy Miner populations in Victoria, and wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing, along with non-listed threats including land clearance; and habitat fragmentation. All of these have the potential to impact a number of threatened species. In particular, localised impacts on hollow-dependent species (e.g. Carpet Python), ground dwelling species (e.g. De Vis' Banded Snake and Red-naped Snake) and semi aquatic species (frogs and turtles) are possible.

From a landscape perspective the proposed Construction Footprints represent a relatively small area of around 105.89 ha, within a total area of approximately 15,000 ha (0.706%) of Lindsay Island, centred largely on existing tracks and degraded areas, within a broader, very large intact area of tens of thousands of high quality native vegetation along the Murray River corridor. Impacts are expected to largely be constrained to the removal of vegetation as habitat for ground-dwelling and semi-aquatic species, which are expected to recover rapidly. For these reasons the proposed construction impacts are considered unlikely to significantly impact FFG Act listed threatened fauna species and communities.

It must be noted that without intervention through works such as those proposed in the project, current water diversion and extraction practices, climate change and resultant lack of inundation of floodplain areas, it is likely that most areas of floodplain will continue to deteriorate in condition, and many areas will cease to function as floodplain and become semi-arid woodlands or shrublands, with a resultant loss of many ecological characteristics, and flora and fauna species which are dependent to a greater or lesser extent on these areas. The operation of the proposed infrastructure will also function on a very large scale to directly reduce or prevent some of these FFG Act listed Threatening Processes, including: alteration to the natural flow regimes of rivers and streams; degradation of native riparian vegetation along Victorian rivers and streams; habitat fragmentation as a threatening process for fauna in Victoria; loss of hollow-bearing trees from Victorian native forests; reduction in biodiversity resulting from Noisy Miner populations in Victoria, and wetland loss and degradation as a result of change in water regime. Current water management and extraction practices will only continue to exacerbate these FFG Act listed Threatening Processes, to the point that many habitats and the species they support will likely be lost from the landscape.

Direct impacts as a result of habitat removal, e.g. the removal of hollow-bearing trees, should be mitigated for, particularly impacts to species such as the Carpet Python and bats (seeks refuge in hollow-bearing trees). An on-site ecologist with a Management Authorisation under the *Wildlife Act 1975* should be present during vegetation removal to readily relocate any pythons found within larger trees.

Additionally, all hollow-bearing trees proposed for removal should be thoroughly inspected prior to removal for refuging wildlife and at risk of harm from felling. A Fauna Management Plan (FMP) or equivalent should be developed and implemented (as part of the CEMP) during the works associated with the project to mitigate impacts to all native fauna that may result from removal of vegetation during works.

Operation

Thirty-two FFG Act listed threatened terrestrial fauna species, including six EPBC Act listed threatened terrestrial fauna species are either known, or have a possible occurrence within the Inundation Area including species such as Growling Grass Frog (*Litoria raniformis*), Giles' Planigale (*Planigale gilesi*), Lace Monitor (*Varanus varius*), Carpet Python (*Morelia spilota metcalfei*), Regent Parrot (*Polytelis anthopeplus monarchoides*), Hooded Robin (*Melanodryas cucullata*), Major Mitchell's Cockatoo (*Lophochroa leadbeateri*), Painted Honeyeater (*Grantiella picta*), Diamond Dove (*Geopelia cuneata*) and Ground Cuckoo-Shrike (*Coracina maxima*). Each of these species either have a broad foraging/dispersal range and are unlikely to be adversely impacted by the relatively short and occasional periods of inundation (e.g. Giles' Planigale, Diamond Dove, Ground Cuckoo-shrike) or will have the ability to continue utilising these habitats during inundation (e.g. Growling Grass Frog, Carpet Python, Painted Honeyeater). The application of episodic environmental water will be expected to maintain and enhance the conditions of these woodland communities in the face of future climate change scenarios rather than a 'do nothing' approach to leaving these habitats in their current ecological state.

Previous condition monitoring at Hattah-Kulkyne National Park where floodplain environmental watering has been used for over 15 years (e.g. Cook et al. 2011 and Wood et al. 2018b) has shown that the introduction of environmental water has had positive benefits for threatened water birds including observations of the nationally endangered (EPBC) Australian Painted Snipe (*Rostratula australis*) recorded historically and confirmed again in the 2018 Lake Bitterang inundation event (Wood et al. 2018b). Other threatened waterbirds recorded during the 2018 inundation event included Freckled Duck (*Stictonetta naevosa*), Blue-billed Duck (*Oxyura australis*) and Glossy Ibis (*Plegadis falcinellus*), with several White-bellied Sea-eagle (*Haliaeetus leucogaster*) observed including a successful breeding pair.

9.3.4 Impacts to FFG Act listed aquatic fauna species

Construction

Five FFG Act listed fish species and one reptile species are considered to have potential to occur within the proposed Construction Footprint (Broad-shelled Turtle, Murray Cod, Silver Perch, Murray-Darling Rainbowfish, Unspecked Hardyhead and Freshwater Catfish). A likelihood of occurrence and impact summary for these species is included in **Table 11** and Appendix D.

Potential impacts to the FFG Act listed fish species (Murray Cod, Silver Perch, Murray-Darling Rainbowfish, Unspecked Hardyhead, Freshwater Catfish) and the Broad-Shelled Turtle during construction would be localised and associated with cofferdam construction (potential barriers to fish passage, noise and vibration), dewatering works (drawdown and saline water management), and potential for sediment/contaminant run-off from construction sites into wet areas. These potential impacts are not likely to be significant provided the recommended mitigation measures are implemented, including preparation of an aquatic fauna management plan, specifically addressing threatened species, as part of the CEMP. Potential impacts and mitigation measures for two of the FFG Act listed fish species (Murray Cod and Silver Perch) that are likely to be present within the inundation area are further discussed in Section 9.3.1.

Operation

Operation of the project to restore semi-permanent wetland habitat in the Crankhandle wetlands complex would likely benefit FFG Act listed fish species, particularly small-bodied, generalist fish species, provided the timing, frequency and duration of inundation satisfies the recommended flow regime (DELWP, 2018). However, a loss of fast-flowing habitat in the Lindsay-Mullaroo system during larger inundation scenarios is likely to impact large-bodied FFG Act listed fish species known to inhabit this system, including the Murray Cod, Silver Perch and Freshwater Catfish. Key to protecting FFG Act listed species (specifically Murray Cod but also Silver Perch and Freshwater Catfish) will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River. Recommended measures to maintain fast-flowing habitat for the Murray Cod and Silver Perch, and to otherwise mitigate potential impacts on these species as discussed in Section 9.3.1, would also mitigate potential impacts on Freshwater Catfish.

Provision of fish passage at the Berribee Regulator fishway and passive fish passage at other regulators would allow for fish to exit to the Murray and Lindsay Rivers, provided a suitable drawdown regime is implemented and regulators/fishways are operated to an appropriate standard. Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands.

The FFG Act listed Broad-shelled Turtle is likely to benefit from expanded habitat when environmental water is present and indirectly from improved habitat condition following environmental watering. There is some potential for impacts to this species associated with entrainment via temporary pumping and passage through structures, however these impacts are not likely to be significant provided the recommended mitigation measures are implemented (see Section 11).

9.3.5 Impacts to FFG Act listed fauna communities

Three FFG Act listed fauna communities have the potential to occur within the Construction Footprint and Inundation Area:

- Victorian Temperate Woodland Bird Community (VTWBC)
- Victorian Mallee Bird Community (VMBC)
- Lowland Riverine Fish Community of the Southern Murray-Darling Basin (LRFC)

The VTWBC is a community defined by a group of woodland dependent bird species, characteristically found in a range of woodland types, and over a broad geographic area. The geographic area is defined as the slopes and plains inland of the Great Dividing Range within Victoria. Riverine floodplains associated with the Murray River are not specifically included or excluded from the VTWBC description. Twenty-six bird species characteristic to the community, of which 10 are considered dependent, were identified in the desktop and field assessments. Impacts to this community are likely to be negligible as Lindsay Island is comprised largely of intact vegetation and the proposed construction of floodplain infrastructure is unlikely to impact on habitat connectivity or remove important habitat for the VTWBC. The proposed inundation of floodplain and wetland habitats however, is likely to provide important future benefits to the VTWBC particularly under climate change scenarios of longer, drier conditions in a semi-arid environment.

Loyn and Dutson (2017) have been studying woodland bird habitat use, abundance and diversity in black box habitats during and after inundation events and have shown that frequently inundated sites may be more productive than sites which rarely flood, but are only useful to small birds, including rare species such as Black Honeyeater (*Sugomel niger*) when Noisy Miners are absent. It is expected that the proposed environmental watering is likely to be beneficial to the VTWBC, particularly in areas of habitat where Noisy Miners are absent.

The VMBC is defined by a suit of 20 bird species that are almost completely restricted to habitat that is dominated by mallee, which distinctly characterises their distribution within Victoria. It is unlikely that this community is present within the Construction Footprint or Inundation Area as mallee habitats have not been observed within these locations.

The LRFC is associated with the lowland river reaches and associated floodplains of the Murray River tributaries in Victoria that drain the northern slopes of the Great Dividing Range, together with the lowland section and floodplain of the Murray River upstream of the South Australian border. The community is defined by a suite of native fish species that is typical of and largely restricted to this geographical area, including the five FFG Act listed fish species known to occur in the Project Area (Murray Cod, Silver Perch, Murray-Darling Rainbowfish, Unspecked Hardyhead, Freshwater Catfish). The project has the potential to both positively and negatively impact the FFG Act listed LRFC. Potential impacts and recommended mitigation measures to avoid or minimise impacts on this FFG Act listed fish community are consistent with those described for the constituent EPBC Act and FFG Act listed fish species. Operation of the project has the potential to restore semi-permanent wetlands that support small-bodied fish and to allow for protection of existing high value fish communities, including threatened fish species. Key to protecting EPBC Act and FFG Act listed species (Murray Cod, Silver Perch) and therefore the FFG Act listed LRFC, is the operation of the project to maintain the permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River.

9.4 FFG Act-listed threatening processes

Potentially threatening processes are listed in accordance with Section 10 of the FFG Act. There are a number of threatening processes that are relevant to the project that have the potential to be exacerbated by either the construction process or proposed inundation of floodplain and wetlands.

9.4.1 Construction Phase

FFG Act listed threatened processes could include:

- Loss of hollow-bearing trees from Victorian native forests

  The Construction Footprint has been reduced and minimized during the various phases of the project (see Section 12) from earlier assessment footprints (Australian Ecosystems 2013, GHD 2013, GHD 2014, GHD 2016) to the current Construction Footprint to minimise removal of hollow-bearing trees and avoid removal of any hollow-bearing trees identified as having potential to supporting Regent Parrot nests during targeted nest surveys in November / December 2019 (none occur within Construction Footprint including all infrastructure areas and access tracks). A qualified ecologist should be on-site to manage the removal of any fauna habitat and capture and translocate fauna observed within the Construction Footprint. It is still possible that hollow-bearing trees will be removed as part of the project, however the broader objective to inundate 4,845 ha of Black Box and River Red-gum woodland, swampy woodland and wetland vegetation is critical to the maintenance and creation of hollow-bearing trees into the future.

- The spread of *Phytophthora cinnamomi* from infected sites into parks and reserves, including roadsides, under the control of a state or local government authority
- Increase in sediment input into Victorian rivers and streams due to human activities
- Input of toxic substances into Victorian rivers and streams

  A CEMP will be prepared that will include measures such as vehicle hygiene protocols to mitigate the potential spread of weeds and *Phytophthora cinnamomi* and measures to minimise sedimentation inputs or toxic substances (e.g. fuel) to waterways.

- Alteration to the natural flow regimes of rivers and streams
- Prevention of passage of aquatic biota as a result of the presence of instream structures

  Any construction activity that requires works within waterways has the potential to temporarily prevent passage of biota and to alter flow regimes. These impacts are likely to be relatively short-term and an aquatic fauna management plan for the project should be prepared to minimise impacts to aquatic fauna.

- Removal of wood debris from Victorian streams

  The likely extent of construction in the Lindsay River (and to a lesser extent the Murray River) means that submerged woody habitat may be impacted during project construction. Consideration should be given to minimising this threatening process by avoiding disturbance of this habitat. If not feasible, any habitat removed should be placed back in the same waterway, as close to its original location as possible.

9.4.2 Operation and Inundation Phase

FFG Act listed threatened processes could include:

- Predation of native wildlife by the introduced Cat, *Felis catus*
- Predation of native wildlife by the introduced Red Fox *Vulpes vulpes*
- Soil degradation and reduction of biodiversity through browsing and competition by Feral Goats (*Capra hircus*)

  There is potential for the introduction of environmental water to lead to an increase in abundance of feral predators (cats, foxes), herbivores (e.g. goats) and omnivores (e.g. pigs) due to the associated increase in productivity. Some of the species such as feral cats could potentially prey on migratory waterbirds, woodland birds, small mammals, reptiles and frogs that may respond to the application of water to floodplains/wetlands. An accompanying pest animal management and control program would need to be implemented and funded within the inundation area, in consultation with Parks Victoria to expand current pest control programs within the park to target these areas during inundation events.

- Alteration to the natural flow regimes of rivers and streams

  Additional mitigation measures provided by the Lindsay Island Fish Management Plan (DELWP, 2018) should be followed to minimise potential fish passage impacts during operation and to maintain hydraulic habitat attributes critical to the local native fish community. Operating fishways to appropriate standards will reduce the risk of restricting fish passage.

  As mentioned in Section 8.2, there may be areas outside of the Inundation Area that could be impacted through near-surface salinization. Further assessment is required to identify and determine this potential impact. If further assessment identifies that changes to groundwater would adversely impact native vegetation, then additional mitigation measures would need to be developed and implemented as a part of the project through the EWMP and the VMFRP Monitoring Evaluation and Reporting (MER) Plan.

10. Impacts to native vegetation

This section summarises the likely impacts to native vegetation associated with the proposed works. Native vegetation impacts have been estimated based on the current Construction Footprint. Native vegetation within the Construction Footprint has been subject to desktop and field assessment. Field assessment of native vegetation (Habitat Hectares) and Large Tree data is based on 2015 field assessments of the construction footprint current at that time (GHD 2016) and supplemented with additional data collected in 2019. The combined Vegetation Quality Assessment (Habitat Hectare) results are outlined in Appendix K for the native vegetation currently proposed to be impacted within the Construction Footprint.

Some changes to the construction footprint have occurred since 2015 and 2019 assessments and approximately 8.15 ha of the current construction footprint would require further assessment of native vegetation and Large Trees. Modelled condition data has been used in these areas to calculate the overall impacts to native vegetation associated with the proposed works.

10.1 Objective of the Guidelines

The *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines) were incorporated into the Victoria Planning Provisions and all planning schemes in Victoria in December 2017 (DELWP 2017a).

The purpose of the Guidelines is to provide direction on how impacts on biodiversity should be considered when assessing an application for a permit to remove, destroy or lop native vegetation. The Guidelines set out the rules and tools for how the responsible authority (Mildura Rural City Council) and referral authority (DELWP) should consider biodiversity when assessing an application. Adherence to the practices and procedures outlined in the Guidelines will help protect native vegetation. They aim to ensure that the proposed removal of native vegetation is appropriately assessed, that opportunities to avoid and minimise removal are considered, and that appropriate offsets are secured (DELWP 2017a).

When native vegetation removal is permitted, an offset must be secured that achieves a no net loss outcome for biodiversity. To achieve this, the offset needs to make a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation that was removed. Therefore, the type and amount of offset required depends on the native vegetation being removed and the contribution it makes to Victoria's biodiversity. An Offset Statement which confirms that an offset has been identified (and how it will be secured) will need to be included in the planning permit application for the removal of native vegetation under the *Planning and Environment Act 1987* (P&E Act) for this project.

10.2 Proposed impacts to native vegetation during construction

10.2.1 Ecological Vegetation Classes

Based on the current Construction Footprint, the estimated direct loss of native vegetation for the project is 105.89 hectares, which would occur across more than 30 discrete infrastructure construction sites and along the edges of mostly existing access tracks. The removal of vegetation for the project would occur in the context of more than 15,000 hectares of largely intact native vegetation within Lindsay Island and within the more than 666,615 hectares of Murray-Sunset National Park. All of the impacts are associated with the installation of infrastructure and access track works, and efforts have been made during each iteration of the design, to avoid and minimise impacts to native vegetation and fauna habitat (including large trees where present).

The estimated direct loss of native vegetation for the project includes 7.6 ha of vegetation classified as vulnerable, 87.33 ha of vegetation classified as depleted and 10.95 of vegetation classified as least concern (**Table 13**). However it is anticipated that any impacts to these EVCs associated with the proposed works, will be greatly outweighed by the benefits and improvements to these same EVCs through environmental watering within the 4,845 ha Inundation Area, which includes:

- 7.91 ha of vegetation classified as endangered
- 1039.68 ha of vegetation classified as vulnerable
- 1899.13 ha of vegetation classified as depleted
- 1669.25 ha of vegetation classified as least concern[19]

The total proposed impacts to each individual EVC within the Construction Footprint is outlined in **Table 13**. The location of EVCs within the Construction Footprint is shown in **Figure 5**.

Table 13 Proposed impacts to each Ecological Vegetation Class (EVC) within the Construction Footprint

EVC No.	EVC	EVC conservation significance	Area (ha) impacted by infrastructure	Area (ha) impacted by tracks
98	Semi-arid Chenopod Woodland	Depleted	0.03	0.0013
101	Samphire Shrubland	Least concern	0.59	2.03
102	Low Chenopod Scrubland	Depleted	3.19	10.11
103	Riverine Chenopod Woodland	Depleted	22.45	11.26
104	Lignum Swamp	Vulnerable	1.49	5.72
106	Grassy Riverine Forest	Depleted	3.86	0.93
806	Alluvial Plains Semi-arid Grassland	Vulnerable	0.39	N/A
808	Lignum Shrubland	Least concern	0.14	0.89
810	Floodway Pond Herbland	Depleted	0.48	0.27
813	Intermittent Swampy Woodland	Depleted	11.46	2.65
818	Shrubby Riverine Woodland	Least concern	5.89	1.41
823	Lignum Swampy Woodland	Depleted	14.28	6.36
	Total	**105.89**	64.26	41.63

Of the 105.89 ha of native vegetation proposed to be removed, approximately 64.26 ha is potentially impacted by the Construction Footprint of proposed structures, containment banks, hardstands and temporary laydown areas, and 41.63 ha is associated with access tracks (**Table 13**). For construction of proposed infrastructure and temporary laydown areas, native vegetation impacts have been calculated based on a Construction Footprint of 28.86 ha[20] and allowance for TPZ impacts. As the Development Footprint of permanent infrastructure is only proposed to extend to 13.47 ha based on the current design, it is anticipated that there will be opportunity to further minimise impacts on native vegetation and Large Trees.

[19] These area values (ha) have been calculated using the DELWP modelled mapping.
[20] This is the area of construction footprint for infrastructure and currently identified temporary laydown areas only and does not include tracks

For access tracks, native vegetation impacts have been calculated based on a 5 m wide impact corridor for minor track works and a 10 m wide corridor for new or more substantial track works. In some instances these works may be limited to minor maintenance and upgrades that require minimal if any vegetation clearance, but there will also be areas where the construction of new pavement along existing tracks will be required and along any newly proposed tracks.

Whilst vegetation is not currently proposed to be cleared within this 5 m buffer along approximately 50 km (60%) of the proposed track network, it is acknowledged that use of the tracks by heavy machinery during the construction phase of the project may require some track maintenance that could impact trees. Once the Construction Footprint and required track access has been confirmed, a qualified arborist will be engaged to undertake an assessment along the existing tracks, with a project design/construction engineer, to confirm the extent of works required (if any) and any potential losses to trees along the existing tracks either directly (through removal) or indirectly (through encroachment of their TPZs, or the removal of >30% of their canopy). Once this assessment has been undertaken, the extent of impacts along access tracks will be confirmed and this report will be updated to reflect any losses of native vegetation. Once this assessment has been undertaken, the extent of impacts along access tracks will be confirmed and this report will be updated to reflect any losses of native vegetation.

Recommendations on measures that can be taken during the design and construction phases of the project to avoid and minimise impacts to EVCs are outlined in Section 11.

10.2.2 Current Wetlands

There are a number of wetlands listed under the DELWP current wetland list that occur across the Project Area (Appendix L). Areas that were mapped as native vegetation during the field assessment within the Construction Footprint have been classified by DELWP as current wetlands (approximately 1.58 hectares). At the time of the field assessment, these areas were dry and had not received recent rainfall, therefore a VQA assessment was undertaken classifying these patches as the EVC modelled to be present. However, the modelled condition for these wetlands was utilised during the creation of the NVRR for the project, where current wetlands intercepted the current Construction Footprint.

10.2.3 Canopy Trees

During the field assessments 2,362 large trees were recorded within the Area of Investigation (see Appendix M for the details of the trees that are proposed for retention and removal). It is expected that 1,291 of these Large Trees will be retained, while 1071 of these Large Trees will be impacted by the proposed works (directly or through TPZ impacts). This includes 482 large trees proposed to be impacted by structures and 589 large trees impacted along proposed tracks. No Scattered Trees were identified as impacted as a part of the project. The DBH of each tree has been recorded at 1.3 m above ground level to determine the size class (as per the Guidelines, DELWP 2017a). 8.15 ha of the current construction footprint has not yet been assessed in the field and additional Large Trees are likely to be identified in these areas.

A qualified arborist may need to be engaged to determine the full extent of impacts to native trees (both within and immediately adjacent to the proposed Construction Footprint). This assessment will take in to account direct impacts to trees (tree removal) and indirect impacts to trees (through encroachment of their TPZs). Whilst the size class of a tree is determined by measuring the DBH at 1.3 m under the Guidelines, the TPZs of a tree are calculated by recording the DBH of a tree at 1.4 m (and for multi-stemmed trees such as some eucalypts, the TPZ is determined by combining the DBH measurements of each individual stem). An arborist assessment will also consider the individual tree location and habit, as well as specific characteristics of certain tree species (e.g. mallee eucalypts) where it's possible that individual trees will survive greater than 10% encroachment of their TPZs or the pruning of over 30% of the existing crown (the standard measures for determining indirect tree losses under the guidelines).

Recommendations on measures that can be taken during the design and construction phases of the project to avoid and minimise impacts to Large Trees are outlined in Section 11.

10.3 Proposed operational impacts to native vegetation

The project proposes to inundate approximately 5,108 ha of water-dependent floodplain ecosystems (including approximately 4,845 ha in Victoria and over 200 ha in NSW), containing habitat for rare or threatened flora, fauna and communities. The ecological assessments undertaken for the project to date have identified the known or predicted presence of 105 flora and 46 fauna species listed under the EPBC Act, FFG Act and/or the DELWP Advisory List for rare or threatened species, within the 5,108 ha Inundation Area.

As described in Section 7, targeted ground-truthing in parts of the Inundation Areas modelled as containing non-flood dependent EVCs has confirmed there was no Semi-arid Woodland (EVC 97) or Semi-arid Chenopod Woodland (EVC 98) present within the modelled location of these EVCs. The vegetation present in these areas was usually Riverine Chenopod Woodland (EVC 103), Lignum Shrubland (EVC 808) and occasionally Alluvial Plains Semi-arid Grassland (EVC 806). These EVCs are located on alluvial terraces and are prone to flooding. All other EVCs modelled to occur within the Inundation Area are flood-dependent EVCs that have been specifically identified in the water regime classes targeted for restoration by the project.

As discussed in Section 2, environmental watering delivered to meet the hydrological requirements of vegetation communities and habitats, has been demonstrated to deliver a range of ecological benefits to native vegetation, listed threatened species and communities. On the basis that the proposed environmental watering will be managed to deliver the preferred hydrological regime for native vegetation communities within the proposed Inundation Areas, native vegetation consisting of flood-dependent EVCs within the proposed Inundation Areas is expected to be benefited from the project rather than adversely impacted. Altering the hydrological regimes in the Inundation Area may cause minor negative impacts to some terrestrial species, for instance flora that have adapted to drying conditions. However, these impacts are likely to be short term through the retention of surface water during inundation events, or through changes in water quality. It is considered unlikely that the proposed environmental watering will have a negative impact on the ongoing survival of any populations of listed flora that may be present in (or that may colonise) the area of inundation.

An assessment of the potential impacts to vegetation within the Inundation Areas as a result of environmental watering has not been undertaken as part of this impact assessment, as baseline condition monitoring has not yet been undertaken within the proposed area of inundation and draft operating scenarios are still being refined. ARI developed a Monitoring, Evaluation and Reporting (MER) Plan designed to collect baseline condition data that will enable ongoing condition monitoring to be undertaken across the site to confirm the gains in the health and condition of native vegetation within the area of inundation that may result from the proposed environmental watering. ARI specialists have been adopting and aligning methods with previous The Living Murray (TLM) projects (including the findings of the Hattah Lakes Offsets Monitoring Program and the Mulcra Island Offsets Monitoring Program). The aim here has been to (1) maximise consistency of methods across VMFRP and TLM, (2) take advantage of the current capability that has developed for the monitoring at the TLM sites, and (3) provide maximised future opportunities for cross-VMFRP-TLM analysis and evaluation in order to help meet expectations for evaluation and reporting at state and Basin scales (pers. comm. Ashley Sparrow, ARI[21]).

While adverse impacts on flood-dependent EVCs within the Inundation Area are not anticipated through adaptively managed environmental watering, a desktop groundwater assessment (R8, 2020b) has identified that environmental watering could result in rising saline groundwater mounds pushing into some areas outside the Inundation Area, which has the potential to cause waterlogging or salinity impacts on native vegetation in these areas. Native vegetation within the Inundation Area is not expected to be impacted by waterlogging from shallow groundwater as vegetation within the Inundation Area is flood-dependent. Native vegetation within the Inundation Area is not expected to be impacted by near-surface salinisation as this vegetation would benefit from the flushing effects of floodwaters to mitigate rising saline groundwater. However, R8 (2020b) has identified potential for near-surface salinisation in some areas outside of the managed inundation area in the medium to long term. Vegetation in these areas would not benefit from flushing by environmental watering and may include non-flood dependent EVCs potentially more susceptible to near-surface salinisation impacts. Further assessment is required to fully understand this potential for impact on native vegetation outside the Inundation Area in areas potentially affected by rising saline groundwater mounds. Where a potential for impact is identified, monitoring (baseline and long-term vegetation condition data) and adaptive management is proposed to mitigate this potential impact.

[21] Email communication between ARI and R8 Ecology staff on 5 June 2020

10.4 Assessment pathway

Applications to remove native vegetation are categorised into one of three assessment pathways with corresponding application requirements and decision guidelines. The assessment pathway for an application to remove native vegetation reflects its potential impact on biodiversity and it is determined from the location and extent of the native vegetation to be removed (DELWP 2017b).

The three assessment pathways recognised by DELWP are:

- *Basic:* limited impacts on biodiversity
- *Intermediate:* could impact on large trees, endangered EVCs, and sensitive wetlands and coastal areas
- *Detailed:* could impact on large trees, endangered EVCs, sensitive wetlands and coastal areas, and could significantly impact on habitat for rare or threatened species

The assessment pathway determines the information that is required to accompany an application to remove, lop or destroy native vegetation. There are three location categories that indicate the potential risk to biodiversity from removing a small amount of native vegetation: Location 1, 2 and 3, and these play a role in determining the assessment pathway. The higher category is used if native vegetation proposed to be removed includes more than one location category. The process for determining the assessment pathway is summarised in **Table 14**.

The entire Area of Investigation occurs in areas mapped as Location 3. Given the scale of the project and both the extent of native vegetation and the number of large trees identified within the Construction Footprint, it is considered likely that the project will follow the Detailed Assessment pathway.

Table 14 Risk matrix for determining the assessment pathway that an application to remove native vegetation will take

Extent of native vegetation	Location Category		
	Location 1	Location 2	Location 3
< 0.5 hectares (ha) and not including any Large Trees	Basic	Intermediate	Detailed
< 0.5 hectares (ha) and including one or more Large Trees	Intermediate	Intermediate	Detailed
0.5 hectares (ha) or more	Detailed	Detailed	**Detailed**

10.5 Summary of native vegetation impacts

The results of the Habitat Hectare (VQA) assessment used to calculate the impact and offset requirements for the project are outlined in Appendix K. Despite the efforts outlined in Section 11 to avoid and minimise impacts to native vegetation during the design and planning phase of the project, the current Construction Footprint estimates that 105.89 hectares of native vegetation removal will be required for the project. Further efforts will be made during the next design phase to avoid and minimise impacts to native vegetation and fauna habitat.

The Habitat Hectare assessments were undertaken at the time of the fieldwork in 2015 using the construction footprint that was current at the time. Due to further changes in the Construction Footprint since the R8 2019 survey and the fact that vegetation along tracks hasn't been fully mapped, some areas of native vegetation proposed to be impacted have not yet been assessed (8.15 ha), however DELWP modelled condition data has been used to fill these gaps. The results of this are presented in the previous report (GHD 2016) and presented in Appendix K. Once the design process is complete and the Construction Footprint has been finalised, it is recommended that a Vegetation Quality Assessment (Habitat Hectares) is undertaken in these areas to confirm the condition and extent of native vegetation within these areas.

Using the current Construction Footprint, a total of approximately 105.89 ha of native vegetation is proposed to be removed. The total proposed impacts to each individual EVC within the Construction Footprint is outlined in **Table 13**. One thousand and seventy-one Large Trees (i.e. canopy trees within patches with a DBH that meets the threshold to be considered Large for a particular EVC) will be impacted as a part of the project.

Table 15 summarises the proposed impacts to native vegetation, as outlined in the excel data files provided by DELWP (in lieu of an NVRR report for the project[22]) on 26 May 2020.

Table 15 Summary of impacts to native vegetation for the project

Summary of Impacts	
Assessment Pathway	Detailed Assessment Pathway
Extent of proposed vegetation removal	105.89 hectares
No. of Large Trees proposed to be removed	1071
Location Category	Location 3 The native vegetation is in an area mapped as an endangered EVC, sensitive wetland or coastal area. Removal of less than 0.5 hectares of vegetation could have a significant impact on habitat for rare or threatened species.

Appendix K outlines the results of the Habitat Hectare assessments undertaken during the site assessments.

10.5.1 Offset requirements

The excel data files provided by DELWP outline the offset requirements for the project, including specific species offsets for 136 species of rare and threatened flora and fauna, and 1071 Large Trees.

Offsets will be sought in accordance with the requirements of the *Guidelines for removal, destruction or lopping of native vegetation* (DELWP 2017a) or through an alternate arrangement agreed with the Secretary to DELWP such as an exemption for conservation works under Clause 52.17 of the Mildura Planning Scheme. The loss of native vegetation due to construction activities is proposed to be offset, at least in part, by the expected improvement in native vegetation quality in the Inundation Area resulting from environmental watering. The method for confirming this offset would be developed in consultation with DELWP.

[22] Due to the size of the data set for Lindsay Island, DELWP were required to process the data manually. As this process is being undertaken remotely by DELWP staff due to the effects of Covid-19, DELWP have indicated that they will prepare a final pdf NVRR report once the construction footprint has been finalised.

11. Avoidance, minimisation and mitigation measures

Efforts have been made throughout the planning and design phases for the project to avoid and minimise impacts to ecological values including native vegetation and fauna habitat, threatened flora, fauna and communities. Where possible, areas of native vegetation that are proposed to be impacted are adjacent to existing vehicle tracks and areas of previous disturbance, and represent inferior areas of habitat to those which surround them. From a landscape perspective the proposed Construction Footprints represent a small area within a very large intact area of high quality native vegetation.

VMFRP are adopting specific design principles which minimise the footprint of the proposed containment banks, whilst also ensuring that the core functions of the bank, which are to hold water (and secondly provide a safe trafficable route through the forest,) are also being achieved. These principles include:

- **Freeboard:** has been designed to the minimum required to retain bank functionality with expected wearing and wave impacts.
- **Crest width:** is the minimum crest width for the relevant design speed and aligned to an existing Parks Vic asset classification (i.e. 5D). Furthermore, the verge zone has been reduced from 2 m to 0.5 m recognising that a table drain is not required on top of containment banks, further minimising impacts to native vegetation.
- **Batter slopes:** Adoption of the steepest batter slope which still meets batter stability and road safety requirements (i.e. 3H:1V), reducing the width of the batter and the associated vegetation removal.
- **Alignment:** banks to be located on top of existing tracks within already disturbed areas. The bank alignments will be further refined, taking in to account the results of the ecological and heritage site assessments, to avoid high value areas.

11.1 Design Phase

The following mitigation measures have been and should continue to be implemented during the design phase to minimise and mitigate impacts to threatened flora and fauna identified in previous ecological surveys within and adjacent to the Construction Footprint (Australian Ecosystems 2013, GHD 2013, GHD 2014, GHD 2016):

- Through refinement of the detailed design, there have already been two rounds of review of the construction footprint to reduce the area of native vegetation clearance required to construct the proposed water management infrastructure. The project footprint will be further refined to be the minimum required to undertake construction of the project with necessary set-down areas and access allowed for. The Construction Footprint and impacts on the environment will be further minimised through:
  - Siting of proposed structures primarily along or immediately adjacent to existing access tracks and other previously disturbed areas.
  - Designing containment banks and batters in consultation with Parks Victoria to minimise extent of native vegetation removal and other construction impacts.
- Retain as many Large Trees as practicable within and adjacent to the Construction Footprint, including implementing measures to mitigate TPZ impacts from setdown areas and tracks.
- Where practicable, avoid areas of high quality vegetation and vegetation that supports rare or threatened flora.

- Specific recommendations to avoid and minimise impacts to four FFG Act listed flora species identified within the Construction Footprints are outlined below:
  - ***Acacia oswaldii*** **(Umbrella Wattle):** Two individuals were recorded in the 'CR_D' Construction Footprint and another six individuals were found to be impacted in construction footprints associated with tracks during the 2019 surveys. In order to avoid removal of as many individuals of this species as possible, tracks and infrastructure footprints will need to be refined and individual No-Go zones created.
  - ***Crinum flaccidum*** **(Darling Lily):** This species was not recorded in the Construction Footprints themselves, but several were recorded on higher terraces in the Area of Investigation near the 'CW_B2' Construction Footprint and also in the Area of Investigation immediately adjacent to the 'WE_A' Construction Footprint during the 2019 surveys. It is unlikely this species will be directly impacted by construction works, however, No-Go fencing should be installed as a precaution.
  - ***Eremophila bignoniiflora*** **(Bignonia Emu-bush):** This species was uncommon but scattered, with two recorded in the Construction Footprint for 'BERR_ D', including one located within the 10 m working buffer zone around a proposed regulator structure. It is anticipated that the individual in the working buffer zone could potentially be avoided and fenced off as a No-Go zone during the construction phase of the project. A third individual was recorded within the 'LS_A2' Construction Footprint and a fourth in the 'Laydown Area BERR_A1' Construction Footprint. There is also a group of 14 individuals of this species that are located on both sides of a small stretch of the Sandford track, these are proposed to be impacted by the Construction Footprint associated with the track in that location. In order to avoid removal of as many individuals of this species as possible, individual No-Go zones will need to be created.
  - ***Eremophila maculata*** **subsp. *maculata* (Spotted Emu-bush):** One individual was recorded in the Construction Footprint associated with tracks near the intersection of Bridge Track and Sandford Track. It is unlikely this shrub will be impacted by any works, although it should be flagged as a precaution.
- Consideration should still be given to whether any branches may need to be lopped on tracks to allow heavy machinery such as cranes to access the proposed Construction Footprint areas. Efforts will be made to reduce the width of any track works to as narrow as practicable, to further avoid and minimise impacts to native vegetation along the existing track network.
- Consideration should still be given to whether any submerged woody habitat present in the Lindsay or Murray Rivers need to be moved (also noting if this is required approval .may be required, including under the NSW *Fisheries Management Act 1994* for works in the Murray River)

11.2 Construction phase

The following mitigation measures are recommended to minimise and avoid impacts upon the identified threatened flora, fauna and community values:

- Follow the avoid and minimise protocol in determining the construction works footprint at each site (i.e. make every effort to avoid threatened flora species loss as a high priority).
- Temporary fencing should be erected around remnant native vegetation to be retained, and other 'sensitive' areas to indicate No-Go zones to avoid during construction.
- Establish work zones for each site to avoid 'sensitive' habitats (including areas containing threatened flora). This could be implemented through an initial briefing of construction works crews by a qualified ecologist and subsequent planning of safe work distances and establishment of each site.
- Use existing disturbed areas or areas of non-native vegetation where practicable for laydowns and stockpiling.

- For the protection of threatened flora:
  - Species listed under the FFG Act and EPBC Act that are not permitted to be removed, must be fenced off with temporary one metre high orange barrier mesh medium-heavy weight prior to construction commencing.
  - Fencing must be checked on a weekly basis and the population monitored on a monthly basis.
  - All staff onsite should be made aware through inductions and/or signage of the presence of threatened species and how to identify the species.
  - Locations for stockpiles should be within existing cleared or areas of non-native vegetation where practicable.
  - If any threatened flora species additional to those already identified in site plans (i.e. listed as threatened under the EPBC Act or the FFG Act) are found within the Construction Footprint a suitably qualified ecology specialist will be notified. The number and location of individuals will be recorded and DELWP will be advised.
- Manage the removal of hollow-bearing trees within the Construction Footprint (if required, based on final footprints and potential impacts to tree root zones from track establishment, setdown areas) where construction may impact habitat trees of native fauna, particularly FFG Act listed fauna species and communities:
  - Avoiding the breeding season of hollow-dependant species is recommended, however where this is not practical an assessment must include surveys undertaken by a suitably qualified ecology specialist of the hollow-bearing trees being removed during the breeding season. The survey should also include other native hollow-dependent fauna. A protocol needs to be developed prior to/during construction.
  - Where clearing is proposed outside the breeding season, complete pre-clearance surveys for any remnant hollow-bearing trees to be removed. These trees could harbour one or more species of native hollow-dependent fauna. Pre-clearance surveys should be conducted prior to (within 24 hours) the hollow-bearing trees being removed.
- Develop and implement a CEMP for the construction phase. This CEMP should provide appropriate measures to avoid or minimise indirect impacts such as erosion, sedimentation and the accidental spill of oils or other chemicals. It will also provide a protocol for minimising impacts in ecologically sensitive areas such as waterways and wetlands (e.g. Lindsay River, Murray River, Lindsay Creek South, Toupnein, Mullaroo and Little Mullaroo Creeks). Ideally, the CEMP will be audited during and following the construction process to check that works have been conducted appropriately.
- Develop and implement a Flora and Fauna Management Plan (as part of a CEMP) to manage impacts to all flora and fauna values and particularly threatened species and the habitat pre-clearance and clearance process.
- Implement hygiene and weed management measures to manage weeds during and after the construction phase. This should include standard vehicle hygiene measures to prevent the spread and introduction of weed species, particularly the weeds of national significance and noxious weeds listed under the *Catchment and Land Protection Act 1994* (CaLP Act).
- Implement standard vehicle hygiene measures to prevent the spread or transmission of Chytrid Fungus as per Murray et al. (2011).
- On completion of works, rehabilitate the Construction Footprint, including:
  - Setting aside topsoil to reinstate when works are complete and compacting to original levels.
  - If native vegetation must be removed, re-spreading of stored topsoil should occur, followed by monitoring to assess germination in the following year.
  - Appropriate weed control measures at the site following the works should be incorporated into the rehabilitation program, as soon as possible.
  - If the site is not naturally recolonised by locally indigenous species, planting/seeding of locally indigenous species appropriate to that particular position in the landscape may be undertaken in the following year.
  - Ground debris that is temporarily removed to allow construction activities, should be reinstated.

- All vehicles and plant must only operate on existing tracks and in areas marked as parking areas or construction zones.
- If possible, avoid construction during the main wildlife breeding season of August to December inclusive. If construction is unavoidable, attempt to minimise particularly noisy or intensive activities such as pile driving during this period.
- Construction works should be planned / scheduled to avoid construction of coffer dams during the spawning season for each fish.
- It is proposed that the Berribee Regulator would be constructed in portions so that approximately a quarter of the width of the Lindsay River would provide for passing flows and fish passage throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the availability for passing flows. Further hydrological investigations will then establish whether the passing flows are likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction.
- An Aquatic Fauna Management Plan would be developed and implemented (as part of the CEMP) to manage impacts to aquatic values – with emphasis on threatened fish and turtle species that may be present in vicinity of construction sites. Any construction activities that could lead to entrapment of fauna or temporary loss of habitat (e.g. due to the use of coffer dams and dewatering) should be considered.
- Temporary cofferdams (permanent seepage cutoffs) should be constructed by sheet-piling using barges, with consideration given to the timing of pile-driving placement and the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning seasons for each fish (generally October to February) and pile-driving method should, if feasible, use a vibrating hammer above the water line to install sheet piles.

11.3 Operation phase

The following mitigation measures are recommended to minimise and avoid impacts upon the identified threatened flora, fauna and community values (FFG Act listed threatened species). These measures are general across the Construction Footprint (and in some instances, the Inundation Area), and are not site specific.

- Review and refine draft operating scenarios to consider recommendations in the Fish Management Plan (DELWP 2018) and/or other measures to avoid or mitigate potential impacts on threatened fish species, particularly Murray Cod and Silver Perch. Key recommendations for refinement of operating scenarios to enhance outcomes for threatened fish species by DELWP (2018) include:
  - Reduce the frequency of the Berribee Maximum inundation scenario (e.g. to 1 in 10 years), do not implement after an anoxic blackwater event, limit duration (e.g. 6 weeks), and avoid overlap with Murray Cod spawning season (e.g. preferred timing May-July).
  - Reduce the frequency of the Berribee Intermediate inundation scenario (e.g. to 4 in 10 years), do not implement after an anoxic blackwater event, limit duration (e.g. 8 weeks), and avoid overlap with Murray Cod spawning season (e.g. preferred timing May-July), avoid consecutive year operation.
- To minimise the risk of native fish stranding on floodplains during drawdown, implement slow drawdown to allow fish to migrate from floodplain
- To minimise the risk of increased carp populations, which may impact native fish species present within the complex, implement operating plans that include:
  - Implementing a winter fill regime
  - A native fish exit strategy designed to strand carp
  - Drying of wetlands with high carp density

- Fishways are to be operated to appropriate standards to reduce the risk of restricting fish passage, particularly for the purpose of allowing escape from blackwater events
- Implement ongoing pest plant and animal management.
- Implementation of a blackwater management plan or measures and related water quality monitoring program on-site and within the Murray River to adaptively manage risks to the downstream aquatic environment, which would afford protection to the Murray River during discharge events.
- Operational activities would be undertaken in accordance with an EWMP and operating plan. As noted above, these plans should be developed taking into account the recommendations from the Fish Management Plan to guide operation to mitigate impacts to EPBC Act listed fish species. Adaptive management is proposed in order to maximise the benefits and minimise the impacts of environmental watering activities.
- Mitigation measures to address potentially negative impacts from interactions of groundwater on ecological values in areas outside the inundation areas associated with changes to groundwater level, flow and quality are contained in R8, 2020b. If further assessment identifies that changes to groundwater would adversely impact native vegetation, then additional mitigation measures will need to be developed and implemented as a part of the project through the EWMP and the VMFRP Monitoring Evaluation and Reporting (MER) Plan.

12. Legislative and policy requirements

There are a number of ecological values present within the Project Area as discussed within this report, with the potential to trigger the requirement to obtain permits if impacted. **Table 16** below outlines the potential legislative implications for the project that may result from the removal of native vegetation and/or fauna habitat within the Construction Footprint and the environmental watering within the Inundation Area under Commonwealth and Victorian legislation.

Additional permits and approvals may be required under NSW legislation. VMFRP are currently engaging with the MDBA around the raising of the Lock 7 weir pool and how the proposed Lock 7 operating regime compares to the current operating regime. Impacts associated with changes to the operating regime of Lock 7 and the resultant inundation area in NSW have therefore not yet been assessed and approval requirements under NSW legislation have therefore not yet been identified. This report contains a desktop assessment, based on available information, to identify EPBC-Act listed threatened species and communities that may be present in the NSW inundation areas for the purpose of informing a referral under the EPBC Act. However, further assessment will need to be carried out of the potential for impacts on native vegetation, listed threatened species and communities within the NSW inundation area and associated approval requirements.

Table 16 Summary of probable legislative requirements

Commonwealth	Relevance to project
Environment Protection and Biodiversity Conservation Act 1999	**Threatened ecological communities** A small area (0.03 ha) of Semi-arid Chenopod Woodland (EVC 98) was identified at Crankhandle West B2 Regulator and Containment Bank. These areas correspond with the EPBC Act listed community, *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions*. It is recommended that the Construction Footprint is refined in these locations, so that impacts to listed flora communities can be avoided. One listed community, Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions, is consistent with two EVCs modelled as occurring within the Inundation Area, EVC 97: Semi-arid Woodland and EVC 98: Semi-arid Chenopod Woodland (21.38 ha).One listed community, *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions*, is consistent with two EVCs modelled as occurring within the Inundation Area, EVC 97: Semi-arid Woodland and EVC 98: Semi-arid Chenopod Woodland (21.38 ha). A ground-truthing field assessment was undertaken in June 2020 in locations within the proposed Inundation Area that had been mapped by DELWP as containing these EVCs, and in areas where no modelled EVC data was available. The fieldwork confirmed that there is no Semi-arid Woodland or Semi-arid Chenopod Woodland present within the Inundation Area where its presence had been modelled by DELWP, and no vegetation was identified that is consistent with the listed community: Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions. Therefore, it is considered unlikely that the operation phases of the project will impact the listed flora community. **Threatened species** ***Eleocharis obicis* (Striate Spike-sedge) *and Lepidium monoplocoides* (Winged Peppercress)** Two EPBC Act-listed flora species are considered as having the potential to occur within the Construction Footprint and Inundation Area. Although there are no previous records of these species in the Construction Footprint and Inundation Areas, *Eleocharis obicis* was recorded in a 2013 flora census to the south of the Project Area along the eastern bank of Lake Wallawalla. Assessment against the EPBC Act significant impact criteria for these species determined that no significant impacts on these species are expected to occur (see Appendix H) provided the proposed mitigation measures implemented.

Commonwealth	Relevance to project
	Regent Parrot (Polytelus anthopeplus monarchoides) This species was assessed as present within the Construction Footprint and Inundation Areas, including potential breeding habitat but no confirmed nest trees to be removed. Assessment against the EPBC Act significant impact criteria for this species determined that impacts are not expected to be significant (see Appendix H) provided the proposed mitigation measures are implemented. ***Painted Honeyeater (Grantiella picta)*** This species was assessed as having a possible occurrence within the Construction Footprint and Inundation Areas although there are no previous records of this species in the Project Area. Assessment against the EPBC Act significant impact criteria for this species determined that impacts are not expected to be significant (see Appendix H) provided the proposed mitigation measures implemented. ***Growling Grass Frog (Litoria raniformis)*** This species was assessed as present within the Construction Footprint and Inundation Areas, specifically during minor flooding at the proposed BERR_D regulator and containment bank near Toupnein Creek. Assessment against the EPBC Act significant impact criteria for this species determined that impacts are not expected to be significant (see Appendix H) provided the proposed mitigation measures implemented. **Murray Cod (*Maccullochella peelii*) and Silver Perch (*Bidyanus bidyanus*)** These species were assessed as present within some of the Construction Footprints and Inundation Areas, with important populations associated with the Lindsay-Mullaroo system. Assessment against the EPBC Act significant impact criteria for these species determined that impacts during construction of the project are not expected to be significant (see Appendix H) provided the proposed mitigation measures implemented. However, assessment against the EPBC Act significant impact criteria for these species determined that operation of the project, particularly the larger inundation scenarios, poses a high risk to the fast-flowing habitat in Mullaroo Creek and the upper Lindsay River that supports these two species, and as such, the project has the potential to result in significant impacts to these two species. Further assessments and mitigation measures are proposed, including refinement of operating scenarios, to avoid or minimise potential impacts on these species. **Australasian Bittern (*Botaurus poiciloptilus*), Australian Painted Snipe (*Rostratula australis*), Curlew Sandpiper (*Calidris ferruginea*), Eastern Curlew (*Numenius madagascariensis*)** These waterbird/shorebird species were assessed as having a possible occurrence within the Inundation Areas when water is present although there are no previous records of these species in the Project Area. A full assessment against the EPBC Act significant impact criteria has been undertaken for these species (see Appendix H), however, no adverse impacts are anticipated given each of these opportunistic waterbirds are likely to respond positively to environmental watering ***South-eastern Long-eared Bat (Nyctophilus corbeni)*** This species was assessed as unlikely to occur within the Construction Footprint or Inundation Areas and there are no previous records of this species in the Project Area. A full assessment against the EPBC Act significant impact criteria has not been undertaken for this species as the potential for adverse impacts is negligible proposed mitigation measures implemented.

Commonwealth	Relevance to project
	Listed migratory species Eleven migratory species have been identified as having the potential to occur within the Construction Footprint (Section 9.3.2). It is highly unlikely that the Construction Footprint supports habitat that would be considered important for migratory species foraging or breeding activity or support an ecologically significant proportion of a population of migratory species. While suitable habitat for these mostly migratory wading shore-birds may be present in some construction footprints (e.g. Lake Wallawalla) when water is present, it is intended that construction works would be undertaken during dry periods when sufficient water to attract these species is unlikely to be present and therefore direct impacts on these species are unlikely to occur during construction. ***It is possible that the project may be considered to have a significant impact to MNES primarily due to potential impacts to the Murray Cod and Silver Perch.***
State	
Environment Effects Act 1978 (EE Act)	The project has the potential to trigger an EES referral based on the extent of native vegetation identified within the Construction Footprint. A project can trigger referral under the EE Act if over 10 ha of native vegetation is proposed to be impacted. The project also has the potential to trigger a referral due to impacts to individual species: Murray Cod and Silver Perch (see Section 9.3). Murray Cod and Silver Perch are included in the suite of native fish species that comprise the Lowland Riverine Fish Community (LRFC) of the Southern Murray-Darling Basin and, as such, a significant impact to these species may lead to an impact to the LRFC. ***The project will therefore trigger referral under the EE Act based on the extent of native vegetation identified within the Construction Footprint and potential impacts to threatened fish species (Murray Cod and Silver Perch).***
National Parks Act 1975	Areas of the Project Area that occur in the Murray-Sunset National Park are subject to the objects of the Act, which make provision for the preservation and protection of the natural environment including wilderness areas and natural areas in those parks; for the protection and preservation of indigenous flora and fauna and of features of scenic or archaeological, ecological, geological, historic or other scientific interest in those parks; for the study of ecology, geology, botany, zoology and other sciences relating to the conservation of the natural environment in those parks, and for the responsible management of the land in those parks. The objects of the Act have been considered during the planning and design phase to minimise the Construction Footprint and avoid important threatened species habitat. The proposed inundation of up to 4,845 ha of water dependent habitats on the Victorian Murray floodplain, mostly within the Murray-Sunset National Park, is expected to contribute to the overall maintenance and improvement of the park into the future.

Commonwealth	Relevance to project
Planning and Environment Act 1987 (P&E Act)	Based on the current Construction Footprint, approximately 105.89 hectares of native vegetation (including 1071 Large Trees) will be impacted for the project. Of this, 64.26 ha is potentially impacted by the Construction Footprint of proposed structures, containment banks, hardstands and laydown areas, and 41.63 ha is associated with access tracks. A permit under the *Planning and Environment Act* will be required for the removal of any native vegetation unless exemptions apply (e.g. conservation works exemption). Given the extent of native vegetation identified within the Construction Footprint, it is considered likely that a permit under the P&E Act will be required for the project.
Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017) – the Guidelines.	The location mapping for the Project Area identifies that the Construction Footprint is in an area classified as Location Risk 3. Given the scale of the project and both the extent of native vegetation and the number of trees identified within the Construction Footprint, it is considered likely that the project will need to follow the Detailed Assessment pathway under the DELWP Guidelines. It is noted that Habitat Hectare assessments were undertaken at the time of the fieldwork in 2015 using the Construction Footprint that was current at the time. Due to further changes in the Construction Footprint since the 2019 survey, some areas of native vegetation (approximately 8.15 ha) proposed to be impacted have not yet been assessed including along access tracks, however DELWP modelled condition has been used to fill these gaps. The results of this are presented in this current and previous (GHD 2016) reports and presented in Appendix K. There have been two reviews of the proposed Construction Footprint, with each iteration taking in to account the results of the latest ecological (and other specialist study) data, and efforts made to avoid and minimise impacts. Additional steps will be taken to further reduce and refine the Construction Footprints for the project to minimise impacts to native vegetation and fauna habitat. A Vegetation Quality Assessment (Habitat Hectares) is proposed to be undertaken in Spring 2020 once the design process is complete, to confirm the condition and extent of native vegetation within areas that have been identified as gaps, and to confirm he full extent of impacts to native vegetation associated with the proposed works.

Commonwealth	Relevance to project
Flora and Fauna Guarantee Act 1988	**Fauna species and communities** Twenty-nine FFG Act-listed fauna species have the potential to occur within the proposed Construction Footprint, these are summarised in **Table 11.** All species have been recorded within 10 km of one or more of the Construction Footprints, and utilise habitats such as those found within the Construction Footprint. None of these species is considered likely to be significantly impacted by the proposed construction (Appendix D). Impacts for the six aquatic fauna (Broad-shelled Turtle, Murray Cod, Silver Perch, Murray-Darling Rainbowfish, Unspecked Hardyhead and Freshwater Catfish) (see Section 9.3.4 for potential impacts), should be managed through a construction-specific aquatic fauna management plan developed for all works around waterways (see Section 11). Additionally, three FFG Act listed fauna communities have the potential to occur within the broader Study Area (See Section 9.3.5): • Victorian Temperate Woodland Bird Community (VTWBC) • Victorian Mallee Bird Community (VMBC) • Lowland Riverine Fish Community of the Southern Murray-Darling Basin (LRFCSMDB) The proposed construction impacts are considered unlikely to significantly impact threatened fauna species and communities. However operation of the project under currently proposed operating regimes (especially large-scale inundation events) has the potential to impact an important population of Murray Cod and potentially Silver Perch (as discussed above and in Section 9.3.1). Both of these fish species are included in the suite of native fish species that comprise the LRFC and, as such, a significant impact to these species may lead to an impact to the LRFC. **Flora species and communities** One vegetation community listed under the FFG Act was identified, Semi-arid Shrubby Pine-Buloke Woodland Community (in areas mapped as Semi-arid Chenopod Woodland, Habitat Zone 23) (Section 9.1). The current Construction Footprint will impact 0.03 hectares of this community. Steps should be taken during the detailed design phase to avoid impacting this community. This FFG Act-listed community, Semi-arid Shrubby Pine-Buloke Woodland Community, is consistent with two EVCs modelled as occurring within the Inundation Area, EVC 97: Semi-arid Woodland and EVC 98: Semi-arid Chenopod Woodland. Ground truthing of these areas was undertaken in June 2020 and they were found to not contain EVC 97 or EVC 98, but were in fact found to contain water-dependant EVCs such as EVC 103 (Riverine Chenopod Woodland), EVC 806 (Alluvial Plains Semi-arid Grassland) and EVC 808 (Lignum Shrubland) (Section 7). Therefore it is considered unlikely that the FFG Act-listed community Semi-arid Shrubby Pine-Buloke Woodland will be impacted by the proposed environmental watering in the Inundation Area. Four flora listed as threatened were identified in Construction Footprint areas, *Acacia oswaldii* (Umbrella wattle), *Crinum flaccidum* (Darling Lily), *Eremophila bignoniiflora* (Bignonia Emu-bush) and *Eremophila maculata* subsp. *maculata* (Spotted Emu-bush) (Section 9.2.3). These species have the potential to be impacted by the proposed works, and an FFG permit would be required for their removal. Twenty-seven flora species listed as protected have the potential to be impacted by the proposed works. An FFG permit for the removal of protected flora will need to be obtained prior to the commencement of works.

Commonwealth	Relevance to project
	It is recommended that efforts should be made to avoid and minimise impacts to any species and/or communities listed as threatened or protected under the FFG Act during the design and construction phases of the project and that any relevant FFG Act Management Plans for relevant species is adhered to (See Section 11).
Wildlife Act 1975	Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975* (e.g. if hollow-bearing trees are removed or fauna are rescued from open trenches during construction). A Management Authorisation (MA) will almost certainly be required for this project as hollow-bearing trees and fauna habitat will likely be removed. The MA would be obtained at the time of the construction, and in the name of the suitably qualified ecology specialist who would handle/relocate the fauna.
Catchment and Land Protection Act 1994	Six weeds listed under the CaLP Act were detected • *Carthamus lanatus* (Saffron Thistle); Restricted • *Chondrilla juncea* (Skeleton Weed); Restricted • *Cirsium vulgare* (Spear Thistle); Restricted • *Cuscuta campestris* (Field Dodder); Restricted • *Dittrichia graveolens* (Stinkwort); Restricted • *Xanthium spinosum* (Bathurst Burr); Restricted Mitigation measures to prevent the spread of these species (and any other WONS or CaLP Act listed weed species) will need to be incorporated into a CEMP.
Fisheries Act 1995	The *Fisheries Act 1995* (Fisheries Act) provides a legislative framework for the regulation, management and conservation of Victorian fisheries. A person must not take fish from marine waters or inland waters; or use or possess recreational fishing equipment in or next to Victorian water unless authorised to do so by a licence. Section 119 of the Fisheries Act requires that a person must not create an obstruction across a watercourse or water body that would obstruct the free passage of fish, leave fish stranded, or destroy immature fish without authorisation under the Act. Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands. Although wetting/drying of wetlands is a natural process, approval under the Act should be sought. Design, construction and operation of the project should seek to avoid creating obstructions to fish passage, otherwise authorisation may be required under the Fisheries Act. If the capture, handling or translocation of fish is required during construction (e.g. dewatering work sites) or operation of the project, persons undertaking these activities will need to hold the appropriate permit or licence under the Fisheries Act.

Commonwealth	Relevance to project
Environment Protection Act 1970	The *Environment Protection Act 1970* empowers the Environment Protection Authority Victoria (EPA Victoria) to implement regulations, maintain State Environment Protection Policies (SEPPs) and protect the environment from pollution and the management of wastes. The *Environmental Protection Act 1970* allowed for the establishment of the State Environmental Protection Policy (Waters) (SEPP Waters), which applies to all surface waters, estuarine and marine waters and groundwaters across the State (Vic. Gov. 2018). Relevant clauses of this policy must be adhered to. The following clauses (with a brief description of relevant aspects) are applicable to the project. Clause 40 – Management of instream works • A person undertaking works in or adjacent to surface waters must minimise risks to beneficial uses • Minimise unnatural erosion, sediment re-suspension and other risks to aquatic habitat • Ensure that existing and new in situ structures do not pose a barrier to fish movement The CEMP (and aquatic fauna management plan) for the construction phase must provide details of how waterway values will be protected in terms of minimising sediment mobilisation. Clause 42 - Construction activities • Minimise soil erosion, land disturbance and discharge of sediment and other pollutants to surface waters • Where construction activities impinge on surface waters, construction managers need to monitor affected surface waters to assess whether beneficial uses are being protected The CEMP (and aquatic fauna management plan) for the construction phase must provide details of how waterway values will be protected in terms of minimising sediment mobilisation. Clause 45 – Native vegetation protection and rehabilitation • Minimise the removal of and rehabilitate native vegetation within or adjacent to surface waters Additional steps should be taken to further reduce and refine the Construction Footprints for the project to minimise impacts to native vegetation and fauna habitat. The CEMP must contain further measures to minimise removal of native vegetation and provide for post-construction rehabilitation of sites, including adjacent to surface waters.
Water Act 1989	The *Water Act 1989* provides legislative framework for the allocation and management of water. A Works on Waterways permit is required to construct works on a waterway identified under section 67 of the Water Act. The project must apply to Mallee CMA for a works on waterways permit.

13. Recommendations

The project has the opportunity to provide infrastructure which will allow the reintroduction of more natural flooding and drying regimes to the floodplain of much of Lindsay Island and the surrounding area. This has the potential to sustain these ecosystems and the flora and fauna species and communities which inhabit them, including supporting water dependent vegetation threatened by river regulation, on-going drought and a drying climate. The project has undergone a series of previous surveys to identify ecological values that have the potential to be adversely impacted upon during the construction phase.

13.1 Next steps

R8 recommends the following next steps:

- Develop and implement operation measures to protect key fish species of the Lindsay-Mullaroo system with consideration to the recommendations of the Lindsay Island fish Management Plan (DELWP, 2018). Further work should be carried out by VMFRP to allow for refinement of the operating regime, identify opportunities to mitigate/offset impacts and inform development of monitoring, evaluation and reporting requirements to support adaptive management.
- Refine the Construction Footprint, where possible within the bounds of the 105.89 ha footprint utilising the existing ecological values mapping (**Figure 5**) to avoid and minimise impacts to native vegetation and threatened flora/fauna and communities within the Construction Footprint.
  - This should include the consideration of design alternatives as required to mitigate impacts to vulnerable EVCs.
  - This should include refining track widening works and infrastructure in locations where listed flora species have been identified, to avoid impacts to threatened species (including *Eremophila maculata* subsp. *maculata* and *Acacia oswaldii* individuals located within and adjacent to the existing tracks and structures).
- Refine the Construction Footprint to avoid the small area (0.03 ha) of Semi-arid Chenopod Woodland (EVC 98) that meets the criteria to be considered a listed community under the EPBC and FFG Act.: Buloke Woodlands of the Murray Darling Depression Bioregion and Semi-arid Shrubby Pine-Buloke Woodland Community. This EVC was present at the CW_B2 Regulator and containment bank (in areas mapped as Habitat Zone 23), it is recommended that the construction footprint is refined to avoid these areas, and that they are fenced off as 'No-Go zones' during the construction phase of the project.
- Engage with DELWP, discussing the proposed Construction Footprint and the efforts that have been made to avoid and minimise impacts to native vegetation during the design phases of the project.
- The Habitat Hectare assessments were undertaken at the time of the fieldwork in 2015 (GHD 2016) using the Construction Footprint that was current at the time. Due to further changes in the Construction Footprint since the R8 2019 survey and the fact that vegetation along tracks hasn't been fully mapped, some areas of native vegetation proposed to be impacted have not yet been assessed (8.15 ha), however DELWP modelled condition data has been used to fill these gaps. The results of this are presented in the previous report (GHD 2016) and presented in Appendix K. Once the design process is complete and the Construction Footprint has been finalised, it is recommended that a Vegetation Quality Assessment (Habitat Hectares) is undertaken in these areas to confirm the condition and extent of native vegetation within these areas.
- Depending on the extent of impacts to areas of treed vegetation a qualified arborist may need to be engaged to determine the full extent of impacts to native trees (both within and immediately adjacent to the proposed Construction Footprint). This assessment would take in to account direct impacts to trees (tree removal) and indirect impacts to trees (through encroachment of their TPZs). An arborist assessment would also consider the individual tree location and habit, as well as specific characteristics of certain tree species (e.g. mallee eucalypts) where it's possible that individual trees will survive greater than 10% encroachment of their TPZs or the pruning of over 30% of the existing crown (the standard measures for determining indirect tree losses under the guidelines).

- Undertake a broad-scale ground-truthing assessment of the vegetation within the proposed Inundation Areas, and establish an approved method for monitoring the changes in the vegetation over time once the inundation regime commences. It is recommended that once a method has been developed for these assessments that DELWP review the method prior to undertaking any surveys within the Inundation Area.
- Develop specific impact mitigation measures related to the works. These should be incorporated into a Construction Environmental Management Plan.
- Engage with DELWP, discussing the proposed approach for obtaining planning approval and offsets for the project and whether a conservation works exemption may apply to the works at Lindsay Island. This approach may include the establishment of a vegetation condition monitoring regime within the proposed Inundation Areas that will identify changes in condition to the vegetation within these areas that results from the environmental watering regime.
- Prepare an Offset Plan for the project to support an application for planning approval to remove native vegetation under the *Planning and Environment Act 1987*.
- Develop and implement a Flora and Fauna Management Plan to manage impacts to all flora and fauna values and particularly threatened species and the habitat preclearance and clearance process.
- Develop and implement an Aquatic Fauna Management Plan (as part of the CEMP) to manage impacts to aquatic values – with emphasis on threatened fish species that may be present in the vicinity of construction sites. Any construction activities that could lead to entrapment of fauna or temporary loss of habitat (e.g. due to the use of coffer dams and dewatering) should be considered.
- A Construction Environmental Management Plan (CEMP) should be developed for the project and implemented in full to further avoid and minimise impacts to areas of ecological value. The CEMP should be prepared once the footprint and construction methods for the proposed works have been finalised, and should include provisions relevant to protecting the ecological values identified within the Construction Footprint and as described in this report.
- Develop and implement monitoring and mitigation measures for areas of interest and particularly areas of heightened interest, for potential near-surface salinisation outside the Inundation Area as identified in R8, 2020b..

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Appendix A. Summary of previous reports

Report	Methods	Key Findings	Recommendations
Wildlife Profiles (2006). *A survey and risk assessment of terrestrial vertebrate fauna of the Murray Scroll Belt.*	• Review of existing information • Fauna field surveys (ground dwelling vertebrates, pitfall trapping at 18 sites, bird surveys, nocturnal spotlight surveys targeting: Carpet Python, Growling Gras Frog, Hooded Scaly-foot, De Vis' Banded Snake and nocturnal birds • Recording of incidental observations.	Two EPBC Act listed species: • Regent Parrot - recorded at one site, unlikely to breed within the region. • Growling Grass Frog - two individuals recorded at one site. High quality fauna habitats present across the study area.	'Loss of natural water regimes' identified as a key hazard. More frequent flooding of riverine woodlands and lignum shrublands, particularly in the west of the Murray Scroll Belt (including Lindsay Island)—this could prevent further vegetation degradation and maintain crucial habitats for threatened vertebrates, such as the Giles' Planigale.
Australian Ecosystems (2010).*Lindsay – Wallpolla Frog and Aquatic Vegetation Surveys 2009 - 2010*	Aquatic vegetation and frog populations surveyed in January 2010 at four wetlands at Lindsay Island (Scotties Billabong, Webster's Lagoon, Woodcutters and Mullaroo Creek), to obtain information about the diversity, abundance and distribution of wetland flora that grew in response to watering and the diversity, abundance, distribution and breeding behaviour of frogs within the wetlands. Included analysis of frog call recordings.	**Lindsay** Growling Grass Frog recorded at Scotties Billabong and Webster's Lagoon. Results of this study provide insights into how environmental water allocations can be planned and prioritised, however further study is required to refine when and how allocations should be made.	Decision making about the delivery of environmental water allocations must be based on sound ecological knowledge and principles. Some of the results of this study provide insights into how environmental water allocations can be planned and prioritised, however further study is required to refine when and how allocations should be made.
Australian Ecosystems (2010). *An analysis of 2005 – 2010 waterbird survey data for Lindsay-Wallpolla Islands and Hattah Lakes*	Results were presented and interpreted for waterbird monitoring at sites in the far northwest of Victoria; including Lindsay Island. Waterbird surveys conducted at six sites across Lindsay Island floodplain.	**Lindsay** Thirty waterbird species recorded, including four rare or threatened species: Australasian Shoveler, Freckled Duck, Hardhead and Pied Cormorant. The results of the wetland bird data suggest that the artificial delivery of environmental water allocations can attract and stimulate breeding behaviour in wetland birds, including a diversity of rare and threatened species.	The results of the wetland bird data suggest that the artificial delivery of environmental water allocations can attract and stimulate breeding behaviour in wetland birds, including a diversity of rare and threatened species.

Report	Methods	Key Findings	Recommendations
Australian Ecosystems (2013) *Lindsay Island Flora Census 2013*.	• Review of existing information • Flora field survey in November 2013 (30 m x 30 m quadrats position considered distribution, extent and relative uniformity of each EVC; projected foliage cover recorded for all overstorey and understorey species; photographs of each quadrat; representative photographs of each rare and threatened flora; recording of incidental fauna species) • Plant taxonomy (Flora Information System (DSE, 2012), consideration of the Census of Victoria Vascular Plants (Walsh and Stajsic, 2007)).	• 14 EVCs sampled, most widespread were: Riverine Chenopod Woodland, Low Chenopod Shrubland, Lignum Shrubland • Many areas highly degraded • 285 flora species recorded (228 indigenous, 57 exotic species) • 45 rare or threatened flora (DELWP Advisory List) • One EPBC Act listed species: *Eleocharis obicis* (Striate Spike-sedge) • Seven FFG Act listed species: *Swainsona greyana* (Hairy Darling-pea); *Swainsona phacoides* (Dwarf Swainson-pea); *Atriplex holocarpa* (Pop Saltbush); *Atriplex limbata* (Spreading Saltbush); *Atriplex rhagodioides* (Silver Saltbush); *Crinum flaccidum* (Darling Lily); *Eremophila bignoniiflora* (Bignonia Emi-bush). • Other frequently observed rare species included: *Wahlenbergia tumidifructa* (Mallee Annual-bluebell); *Asperula gemella* (Twin-leaf Bedstraw); *Senecio cunninghamii* var. *cunninghamii* (Branching Groundsel); *Tecticornia triandra* (Desert Glasswort); *Malacocera tricornis* (Goat Head). • Weed coverage usually low: three species classified as restricted under CaLP Act; a number of high and very high risk species under DSE Advisory List of Environmental Weeds; no weeds of National Significance (WONS) recorded.	No recommendations

Report	Methods	Key Findings	Recommendations
GHD (2013) *Preliminary Ecological Investigations and Targeted Regent Parrot Surveys*.	• Review of existing information • Field surveys at 26 sites in September-October 2012 • Fauna field surveys (habitat assessments; targeted Regent Parrot nest surveys using standardised two hour point survey (THPS) at 10 sites; bird surveys with standard 20-min, 2-ha area search; nocturnal spotlight surveys targeting Growling Grass Frog, Carpet Python and nocturnal birds; recording of incidental observations). • Flora field surveys (targeted surveys of each site for rare or threatened flora species; flora species lists for sites; identify dominant EVCs within sites; assess broad condition of native vegetation).	**Lindsay** • 298 fauna species identified by desktop assessment, including 52 listed rare or threatened species • Fauna field surveys: - 123 species (118 native, five exotic), including seven amphibian species, 100 bird species, eight mammal species (five exotic), eight reptile species - Two EPBC Act listed species: Regent Parrot at five of the 26 sites. Potential breeding habitat at some sites. - Growling Grass Frog recorded at one site. Potential to occur at 11 sites (noted that surveys occurred during a minor flood and shallow water present at a number of typically dry sites). • High quality fauna habitats present across the study area. • Flora field surveys: - 79 plant species recorded, no EPBC Act listed plants detected, 16 flora species of state conservation significance recorded - Most sites dominated by native vegetation, 13 EVCs of varying condition - No EPBC Act or FFG Act listed flora communities detected • Determined a Net Gain assessment was required. NOTE: Original Berribee Regulator location was further upstream on Lindsay River in area of large old River Red Gum trees with high potential for Regent Parrot nesting habitat. Regulator has since been moved to the present location in predominantly Black Box, which is lower quality habitat with very low chance of Regent Parrot breeding in this habitat.	Recommendations: • Further study of proposed sites • Net Gain assessments • Design of structures consider ecological values to avoid and minimise impacts. NOTE: Original Berribee Regulator (Berr_A) further upstream on Lindsay River in area of large old River Red-gum trees with high potential for Regent Parrot nesting habitat has since been moved to the present location in predominantly Black Box, lower quality habitat with very low chance of Regent Parrot breeding habitat.

Report	Methods	Key Findings	Recommendations
GHD (2014) SDL Offsets *Fauna Survey Lindsay Island.*	• Review of existing information • Fauna field surveys in November 2013 (16 sites, ground-dwelling vertebrates; pitfall trapping using T-array and open buckets flush to the ground; baited Elliot traps; baited infrared motion-activated fauna camera traps; bird surveys: surveyed within 3 hours of sunrise and late afternoon, using standard 20-min 2-ha area search, detection method included observation or call; bat surveys: Anabat detectors for micro-bat calls with each call assigned a confidence rating, and harp-traps; nocturnal spotlight surveys targeting Carpet Python, Growling Grass Frog and nocturnal birds • Recording of incidental observations.	• 127 native fauna species recorded (93 bird species, four amphibian species, eight terrestrial mammal species, four bat species and 18 reptile species) along with six exotic terrestrial mammal species. • Significant and listed species included: - An incidental record of EPBC Act listed Regent Parrot - Five bird species and one mammal species listed as threatened under FFG Act - Nine species of bird, two mammal species and one reptile listed under the DEPI Advisory List of Threatened Vertebrate Fauna in Victoria 2013 • Potential records of EPBC Act listed *Nyctophilius corbeni* (Corben's long-eared bat).	No recommendations
GHD (2016) *Lindsay Island SDL Project Ecological Assessment.*	• Investigated a total area of 251.78 ha based on construction footprint current at the time • Review of existing information • Field survey in November - December 2015, including: Habitat Hectare assessments of all patches of native vegetation (including Large Old Tree mapping), flora species inventory, identifying and mapping of any threatened flora species or communities listed under the EPBC or FFG Acts, identifying presence of significant weed species, recording incidental fauna species supplemented with: diurnal bird surveys, spotlighting and installation of 12 remote sensing fauna cameras.	• Eleven EVCs, across 39 Habitat Zones identified • 117 native flora species recorded (including 14 species listed as threatened under FFG Act and/or DELWP Advisory List) and 27 introduced species recorded (including four weeds listed under CaLP Act) • A total of 2362 Large Old Trees (LOTs) identified and mapped • Lignum Swamp – Total Habitat Hectares 25.05 with EVC conservation status described as Vulnerable • 48 terrestrial fauna species recorded (44 indigenous species, four introduced species), including three fauna species of conservation significance.	• Retain as many large old trees as possible • Priority to large hollow-bearing trees • Include provision of buffers around each tree during construction (radius 12 x DBH to a max of 15 m but no less than 2 m from base of trunk) • Salvage of fauna where hollow-bearing trees cannot be avoided during construction • Reduce impacts to Vulnerable, Rare or Threatened flora • Flag no go zones for significant species (e.g. Umbrella Wattle) that occur close to the Construction Footprint to avoid impacts • Use existing disturbed areas or areas of non-native vegetation for lay-downs and stockpiling • Management of run-off, spills and sediment management to avoid impacts on waterways.

Report	Methods	Key Findings	Recommendations
DELWP (2018) SDL Fish Management Plan – Lindsay Island.	• Review of existing information. • Review of proposed SDL infrastructure and operation. • Review of existing ecological objectives and targets for the site. • Assessment of fish-related risks and provision of recommended fish-related opportunities for the site.	• Site has potential to support up to 12 native fish species. • Mullaroo Creek supports one of the most valuable native fish assemblages in the lower Murray Valley, especially the EPBC Act listed Murray Cod population. EPBC Act listed Silver Perch and FFG Act listed Freshwater Catfish also present. • The proposed Berribee Regulator would have floodplain benefits but under the full inundation scenario the fast water hydraulics of Mullaroo Creek and Lindsay River would be lost. A key objective should be to maintain current conditions where possible, to support the native fish community. • Floodplain currently not utilised often by fish. There is potential to restore wetlands that support a diversity of macrophytes, productive littoral zones and potentially small-bodied native fish at Webster's Lagoon and the Crankhandle wetlands complex. • The ability to pump water into Lake Wallawalla highlights an important fish opportunity: testing whether the lake can be managed as a Golden Perch nursery habitat.	Monitoring: • Specific evaluation program to investigate Murray cod movement, spawning and recruitment with the preferred hydrograph implemented from Mullaroo regulator • Document the changes in hydraulics which occur throughout the system, especially in Mullaroo Creek, before and after operation of Berribee regulator. • Develop a monitoring program to demonstrate any fish community composition and abundance improvements or changes in wetlands and lagoons before and after implementation of a semi-permanent wetland fish hydrograph with carp control • Evaluation of success of golden perch stocking and recruitment in Lake Wallawalla
GHD (2019) *Floodplain Bat Study. Lindsay and Wallpolla Islands – October-December 2018*.	• 18 sites surveyed on Lindsay Island • Review of existing information Field surveys: Anabat recording, harp trapping (32 harp-trap survey nights), bat call analysis and nocturnal spotlight surveys.	• 13 bat species recorded (all native, but none listed as threatened) • One species of regional significance recorded • Two recordings of Gould's Long-eared Bat (*Nyctophilus gouldi*), representing a 180 km range extension from previous recordings of this species. Anabat surveys: 12 bat species positively identified.	A number of recommendations were made in regards to permits and environmental approvals. The following were recommended to be considered during the detailed design phase, permit application phase and during implementation of the project: • Manage habitat clearing and removal of hollow-bearing trees/limbs with respect to fauna. • Retain as many Large Old Trees as practicable in the Area of Investigation. • Use existing disturbed areas or areas of non-native vegetation for lay-downs and stockpiling.

Appendix B. Flora recorded during previous surveys

Key to table:

Status

en Endangered (Advisory List of Rare or Threatened Plants in Victoria – 2014 (DEPI 2014)

vu Vulnerable (Advisory List of Rare or Threatened Plants in Victoria – 2014 (DEPI 2014)

r Rare (Advisory List of Rare or Threatened Plants in Victoria – 2014 (DEPI 2014)

k Poorly known (Advisory List of Rare or Threatened Plants in Victoria – 2014 (DEPI 2014)

L Listed as threatened under the FFG Act

P Protected under the FFG Act

R Restricted (CaLP Act)

C Regionally Controlled Restricted (CaLP Act)

WONS Weed of National Significance

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Native					
Acacia melvillei	Pedley	L, P, vu	Y		
Acacia oswaldii	Umbrella Wattle	L, P, vu			Y
Acacia rigens	Nealie	P		Y	
Acacia spp.	Wattle		Y		
Acacia stenophylla	Eumong	P	Y	Y	
Alectryon oleifolius subsp. *canescens*	Cattle Bush		Y	Y	
Alternanthera denticulata s.l.	Lesser Joyweed		Y	Y	
Amphibromus nervosus	Common Swamp Wallaby-grass		Y		
Amyema miquelii	Box Mistletoe		Y		
Amyema miraculosa subsp. *boormanii*	Fleshy Mistletoe		Y		
Amyema spp.	Mistletoe			Y	
Angianthus spp.	Angianthus			Y	
Angianthus tomentosus	Hairy Angianthus	P	Y		
Aristida holathera var. holathera	Tall Kerosene Grass		Y		
Asperula gemella	Twin-leaf Bedstraw		Y	Y	Y
Asteraceae sp.	Asteraceae	P		Y	
Asteraceae spp.	Composite		Y		
Atriplex holocarpa	Pop Saltbush	L, P, vu	Y		
Atriplex leptocarpa	Slender-fruit Saltbush		Y	Y	
Atriplex limbata	Spreading Saltbush	L, P, vu	Y		
Atriplex lindleyi	Flat-top Saltbush		Y	Y	
Atriplex lindleyi subsp. *conduplicata*	Baldoo		Y	Y	
Atriplex nummularia	Old-man Saltbush			Y	
Atriplex nummularia subsp. *omissa*	Dwarf Old-man Saltbush		Y	Y	Y
Atriplex pumilio	Mat Saltbush		Y		
Atriplex rhagodioides	Silver Saltbush	L, P, vu	Y		
Atriplex semibaccata	Creeping Saltbush		Y	Y	
Atriplex spp.	Saltbush		Y	Y	

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Atriplex stipitata	Kidney Saltbush		Y	Y	
Atriplex suberecta	Sprawling Saltbush		Y		
Atriplex vesicaria	Bladder Saltbush		Y	Y	
Austrostipa scabra subsp. *falcata*	Rough Spear-grass		Y	Y	
Austrostipa spp.	Spear Grass			Y	
Austrostipa spp.	Spear Grass		Y		
Boronia spp.	Boronia	P		Y	
Brachyscome ciliaris	Variable Daisy	P	Y	Y	
Brachyscome lineariloba	Hard-head Daisy	P	Y	Y	
Brachyscome paludicola	Woodland Swamp-daisy	P	Y		
Brachyscome spp.	Daisy	P		Y	
Bulbine semibarbata	Leek Lily		Y		
Callitris gracilis	Slender Cypress-pine		Y		
Calocephalus sonderi	Pale Beauty-heads	P	Y		
Calotis cuneifolia	Blue Burr-daisy	P, r	Y	Y	Y
Calotis hispidula	Hairy Burr-daisy	P	Y	Y	
Calotis scapigera	Tufted Burr-daisy	P	Y		
Carex spp.	Sedge			Y	
Carpobrotus modestus	Inland Pigface		Y		
Cassytha glabella	Slender Dodder-laurel			Y	
Centipeda cunninghamii	Common Sneezeweed	P	Y		
Centipeda cunninghamii	Old Man Weed	P		Y	
Centipeda minima s.l.	Spreading Sneezeweed	P	Y		
Centipeda thespidioides s.l.	Desert Sneezeweed	P	Y		
Chenopodium nitrariaceum	Nitre Goosefoot		Y	Y	
Convolvulus spp.	Bindweed			Y	
Crassula colorata	Dense Crassula		Y		
Crassula sieberiana s.l.	Sieber Crassula		Y		
Cressa australis	Rosinweed		Y		
Crinum flaccidum	Darling Lily	L, P, vu	Y	Y	Y
Cynodon dactylon	Couch			Y	
Cynodon dactylon var. pulchellus	Native Couch		Y		Y
Cyperus gymnocaulos	Spiny Sedge		Y	Y	
Daucus glochidiatus	Australian Carrot		Y		
Disphyma crassifolium subsp. *clavellatum*	Rounded Noon-flower		Y	Y	
Dodonaea viscosa subsp. *angustissima*	Slender Hop-bush			Y	
Duma florulenta	Tangled Lignum		Y	Y	
Dysphania pumilio	Clammy Goosefoot		Y		
Einadia nutans subsp. *nutans (s.s.)*	Nodding Saltbush		Y	Y	
Elacholoma prostrata	Small Monkey-flower	r	Y		
Eleocharis obicis	Striate Spike-sedge		Y		
Eleocharis pusilla	Small Spike-sedge		Y		
Enchylaena tomentosa var. tomentosa	Ruby Saltbush		Y	Y	
Enneapogon avenaceus	Common Bottle-washers		Y		
Enneapogon spp.	Bottle Washers		Y		

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Epilobium billardiereanum	Variable Willow-herb		Y		
Eragrostis dielsii	Mallee Love-grass		Y	Y	
Eragrostis lacunaria	Purple Love-grass		Y		
Eremophila bignoniiflora	Bignonia Emu-bush	L, P, vu	Y	Y	Y
Eremophila divaricata subsp. *divaricata*	Spreading Emu-bush	P, r	Y	Y	Y
Eremophila glabra	Common Emu-bush	P		Y	
Eremophila longifolia	Berrigan	P	Y		
Eremophila maculata subsp. *maculata*	Spotted Emu-bush	L, P, r			Y
Eriochiton sclerolaenoides	Woolly-fruit Bluebush			Y	
Erodium crinitum	Blue Heron's-bill		Y		
Eucalyptus camaldulensis	River Red-gum		Y	Y	
Eucalyptus largiflorens	Black Box		Y	Y	
Eucalyptus leptophylla	Slender Leaf-mallee			Y	
Euphorbia dallachyana	Flat Spurge		Y	Y	
Exocarpos aphyllus	Leafless Ballart		Y	Y	
Exocarpos strictus	Pale Fruit Ballart		Y	Y	
Frankenia serpyllifolia	Bristly Sea-heath		Y		
Frankenia spp.	Sea-heath			Y	
Geococcus pusillus	Earth Cress		Y		
Glinus lotoides	Hairy Carpet-weed		Y		
Glinus oppositifolius	Slender Carpet-weed		Y		
Glossostigma drummondii	Desert Mud-mat		Y		
Glycyrrhiza acanthocarpa	Southern Liquorice		Y	Y	
Goodenia glauca	Pale Goodenia		Y		
Goodenia heteromera	Spreading Goodenia		Y		
Goodenia spp.	Goodenia		Y		
Hakea leucoptera subsp. *leucoptera*	Silver Needlewood		Y		
Haloragis aspera	Rough Raspwort			Y	
Haloragis glauca f. glauca	Bluish Raspwort		Y		
Isoetopsis graminifolia	Grass Cushion	P	Y		
Juncus aridicola	Tussock Rush		Y		
Juncus spp.	Rush		Y	Y	
Laphangium luteoalbum	Jersey Cudweed	P	Y	Y	
Lemna disperma	Common Duckweed			Y	
Lepidium fasciculatum	Bundled Peppercress		Y		
Lepidium spp.	Peppercress			Y	
Linum marginale	Native Flax		Y		
Lobelia concolor	Poison Pratia		Y		
Lotus cruentus	Red Bird's-foot Trefoil		Y		
Ludwigia peploides subsp. *montevidensis*	Clove-strip			Y	
Lycium australe	Australian Box-thorn			Y	
Maireana aphylla	Leafless Bluebush			Y	
Maireana appressa	Grey Bluebush		Y	Y	
Maireana brevifolia	Short-leaf Bluebush		Y	Y	
Maireana decalvans s.l.	Black Cotton-bush		Y	Y	

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Maireana pentagona	Hairy Bluebush		Y		
Maireana pyramidata	Sago Bush		Y	Y	
Maireana spp.	Bluebush			Y	
Maireana spp.	Bluebush		Y		
Maireana turbinata	Satiny Bluebush		Y	Y	
Malacocera tricornis	Goat Head	r	Y		
Marsdenia australis	Doubah			Y	
Marsilea drummondii	Nardoo		Y	Y	
Marsilea spp.	Nardoo		Y		
Melaleuca lanceolata	Moonah		Y	Y	
Melilotus indicus	Sweet Melilot		Y		
Menkea australis	Fairy Spectacles		Y		
Mentha spp.	Mint			Y	
Millotia muelleri	Common Bow-flower	P	Y		
Minuria cunninghamii	Bush Minuria	P, r		Y	
Myoporum parvifolium	Creeping Myoporum		Y	Y	
Myoporum platycarpum	Sugarwood		Y	Y	
Myosurus australis	Mousetail		Y		
Myriocephalus rhizocephalus	Woolly-heads	P	Y		
Nicotiana velutina	Velvet Tobacco		Y		
Nitraria billardierei	Nitre-bush		Y		
Olearia muelleri	Mueller Daisy-bush	P	Y		
Olearia pimeleoides	Pimelea Daisy-bush	P	Y	Y	
Omphalolappula concava	Burr Stickseed		Y		
Osteocarpum acropterum var. deminutum	Babbagia			Y	
Oxalis perennans	Grassland Wood-sorrel		Y	Y	
Oxalis spp.	Wood Sorrel			Y	
Paspalidium jubiflorum	Warrego Summer-grass		Y	Y	
Pentameris airoides subsp. *airoides*	False Hair-grass		Y		
Persicaria lapathifolia	Pale Knotweed		Y		
Phragmites australis	Common Rush			Y	
Picris squarrosa	Squat Picris	P, r	Y		
Pimelea microcephala subsp. *microcephala*	Mallee Rice-flower			Y	
Pimelea trichostachya	Annual Rice-flower		Y		
Pittosporum angustifolium	Weeping Pittosporum		Y	Y	
Plagiobothrys elachanthus	Hairy Forget-me-not		Y		
Plagiobothrys plurisepalus	White Rochelia		Y		
Plagiobothrys spp.	Rochelia		Y		
Plantago cunninghamii	Clay Plantain		Y		
Plantago spp.	Plantain		Y		
Plantago turrifera	Crowned Plantain			Y	
Poa fordeana	Forde Poa		Y		
Poaceae spp.	Unknown Native Grass		Y	Y	
Pogonolepis muelleriana	Stiff Cup-flower	P	Y		

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Polycalymma stuartii	Poached-eggs Daisy	P	Y	Y	
Polygonum aviculare s.l.	Prostrate Knotweed		Y		
Polygonum plebeium	Small Knotweed		Y		
Ptilotus polystachyus	Long Tails		Y		
Pycnosorus chrysanthus	Golden Billy-buttons	P		Y	
Pycnosorus pleiocephalus	Soft Billy-buttons	P	Y		
Ranunculus sessiliflorus	Annual Buttercup		Y		
Rhagodia spinescens	Hedge Saltbush		Y	Y	
Rhodanthe corymbiflora	Paper Sunray	P	Y		
Rhodanthe moschata	Musk Sunray	P	Y		
Rhodanthe pygmaea	Pygmy Sunray	P	Y		
Rhodanthe spp.	Sunray	P	Y		
Roepera ammophila	Sand Twin-leaf		Y		
Roepera apiculata	Pointed Twin-leaf		Y	Y	
Roepera aurantiaca	Shrubby Twin-leaf			Y	
Roepera crenata	Notched Twin-leaf		Y		
Roepera glauca	Pale Twin-leaf		Y		
Roepera iodocarpa	Violet Twin-leaf		Y		
Roepera spp.	Twin-leaf			Y	
Rumex brownii	Slender Dock		Y	Y	
Rumex crystallinus s.s.	Glistening Dock		Y		
Rumex spp.	Dock			Y	
Rumex tenax	Narrow-leaf Dock		Y		
Rytidosperma bipartitum s.l.	Leafy Wallaby-grass		Y		
Rytidosperma caespitosum	Common Wallaby-grass		Y		
Rytidosperma setaceum	Bristly Wallaby-grass		Y		
Rytidosperma spp.	Wallaby Grass			Y	
Salsola tragus subsp. *tragus*	Prickly Saltwort		Y	Y	
Scleroblitum atriplicinum	Starry Goosefoot		Y		
Sclerochlamys brachyptera	Short-wing Saltbush		Y	Y	
Sclerolaena sp.	Copperburr			Y	
Sclerolaena decurrens	Green Copperburr		Y		
Sclerolaena diacantha	Grey Copperburr		Y	Y	
Sclerolaena divaricata	Tangled Copperburr		Y	Y	
Sclerolaena muricata	Black Roly-poly		Y	Y	
Sclerolaena muricata var. muricata	Black Roly-poly		Y		Y
Sclerolaena obliquicuspis	Limestone Copperburr		Y	Y	
Sclerolaena tricuspis	Streaked Copperburr		Y	Y	
Senecio sp.	Groundsel	P		Y	
Senecio cunninghamii var. cunninghamii	Branching Groundsel	P, r	Y	Y	Y
Senecio glossanthus	Slender Groundsel	P	Y	Y	
Senecio pinnatifolius	Variable Groundsel	P	Y		
Senecio quadridentatus	Cotton Fireweed	P	Y	Y	
Senecio runcinifolius	Tall Fireweed	P	Y	Y	
Senecio spanomerus	Mallee Groundsel	P	Y		

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Senecio spp.	Groundsel	P	Y		
Senna form taxon *'filifolia'*	Fine-leaf Desert Cassia		Y		
Sida corrugata	Variable Sida		Y		
Sida spp.	Sida			Y	
Silene nocturna	Mediterranean Catchfly		Y		
Solanum esuriale	Quena		Y		
Solanum lacunarium	Lagoon Nightshade		Y		
Spergularia brevifolia	Salt Sea-spurrey		Y		
Spergularia marina s.l.	Salt Sand-spurrey		Y		
Spergularia spp.	Sand Spurrey		Y		
Sphaeromorphaea littoralis	Spreading Nut-heads		Y	Y	
Sporobolus mitchellii	Rat-tail Couch		Y		
Stellaria papillata	Rangeland Starwort		Y		
Stelligera endecaspinis	Star Bluebush		Y		
Stemodia florulenta	Blue Rod		Y	Y	
Swainsona greyana	Hairy Darling-pea	P, en	Y	Y	
Swainsona microphylla	Small-leaf Swainson-pea		Y		
Swainsona phacoides	Dwarf Swainson-pea	P, en	Y		
Tecticornia halocnemoides subsp. *Halocnemoides*	Grey Glasswort		Y		
Tecticornia pergranulata	Blackseed Glasswort		Y	Y	
Tecticornia spp.	Glasswort		Y		
Tecticornia tenuis	Slender Glasswort		Y		
Tecticornia triandra	Desert Glasswort		Y	Y	Y
Tetragonia eremaea s.l.	Desert Spinach		Y		
Tetragonia moorei	Annual Spinach		Y		
Tetragonia tetragonioides	New Zealand Spinach			Y	
Teucrium racemosum	Grey Germander		Y	Y	
Triglochin calcitrapa s.l.	Spurred Arrowgrass		Y		
Verbena officinalis s.l.	Common Verbena			Y	
Verbena officinalis var. africana		k			Y
Vittadinia cervicularis	Annual New Holland Daisy	P	Y		
Vittadinia cuneata	New Holland Daisy	P	Y	Y	
Vittadinia dissecta var. hirta	Dissected New Holland Daisy	P	Y		
Vittadinia gracilis	Woolly New Holland Daisy	P	Y		
Vittadinia muelleri	Narrow-leaf New Holland Daisy	P	Y		
Wahlenbergia sp.	Bluebell			Y	
Wahlenbergia communis s.l.	Tufted Bluebell		Y		
Wahlenbergia fluminalis	River Bluebell		Y	Y	
Wahlenbergia gracilenta s.l.	Annual Bluebell		Y		
Wahlenbergia gracilis	Sprawling Bluebell		Y		
Wahlenbergia spp.	Bluebell		Y		
Wahlenbergia tumidifructa	Mallee Annual-bluebell		Y		
Xerochrysum bracteatum	Golden Everlasting	P	Y	Y	

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Introduced					
Aira cupaniana	Quicksilver Grass		Y		
Alopecurus geniculatus	Marsh Fox-tail		Y		
Anagallis arvensis	Pimpernel		Y		
Arctotheca calendula	Cape Weed		Y		
Asphodelus fistulosus	Onion Weed			Y	
Aster subulatus	Aster-weed		Y	Y	
Avena sativa	Oat		Y		
Brassica tournefortii	Mediterranean Turnip		Y	Y	
Bromus rubens	Red Brome		Y		
Bromus spp.	Brome		Y		
Carrichtera annua	Ward's Weed		Y	Y	
Carthamus lanatus	Saffron Thistle	R	Y		
Centaurea melitensis	Malta Thistle		Y		
Centaurium erythraea	Common Centaury		Y		
Centaurium tenuiflorum	Slender Centaury		Y		
Chondrilla juncea	Skeleton Weed	R	Y		
Cirsium vulgare	Spear Thistle	R	Y	Y	
Cotula bipinnata	Ferny Cotula		Y		
Cuscuta campestris	Field Dodder	R	Y		
Dittrichia graveolens	Stinkwort	R	Y		
Erigeron bonariensis	Flaxleaf Fleabane		Y	Y	
Erigeron spp.	Fleabane	P	Y		
Erigeron sumatrensis	Tall Fleabane		Y		
Fumaria bastardii	Bastard's Fumitory		Y		
Galium aparine	Cleavers		Y		
Heliotropium europaeum	Common Heliotrope			Y	
Heliotropium supinum	Creeping Heliotrope		Y		
Helminthotheca echioides	Ox-tongue			Y	
Hordeum leporinum	Barley-grass		Y		
Hordeum marinum	Sea Barley-grass		Y		
Hypochaeris glabra	Smooth Cat's-ear		Y		
Lactuca serriola	Prickly lettuce		Y	Y	
Lactuca spp.	Lettuce		Y		
Lepidium africanum	Common Peppercress			Y	
Limonium lobatum	Winged Sea-lavender		Y	Y	
Lolium rigidum	Wimmera Rye-grass		Y		
Lysimachia arvensis	Pimpernel			Y	
Medicago minima	Little Medic		Y		
Medicago polymorpha	Burr Medic		Y	Y	
Mesembryanthemum crystallinum s.l.	Common Ice-plant		Y		
Mesembryanthemum nodiflorum	Small Ice-plant		Y	Y	
Nicotiana glauca	Tree Tobacco			Y	
Onopordum spp.	Farting Donkey		Y		
Parapholis incurva	Coast Barb-grass		Y		

Scientific Name	Common Name	Status	AE 2013	GHD 2016	GHD 2019
Phyla canescens	Lippia		Y	Y	
Psilocaulon granulicaule	Wiry Noon-flower		Y	Y	
Reichardia tingitana	False Sow-thistle		Y		
Rostraria cristata	Annual Cat's-tail		Y		
Salvia verbenaca var. *verbenaca*	Wild Sage		Y		
Schismus barbatus	Arabian Grass		Y	Y	
Sisymbrium erysimoides	Smooth Mustard		Y	Y	
Sisymbrium irio	London Rocket		Y		
Solanum nigrum s.l.	Black Nightshade		Y	Y	
Sonchus asper s.l.	Rough Sow-thistle		Y		
Sonchus oleraceus	Common Sow-thistle		Y	Y	
Spergularia diandra	Lesser Sand-spurrey		Y		
Tagetes minuta	Stinking Roger		Y		
Trifolium glomeratum	Cluster Clover		Y		
Unknown Introduced Poaceae	Unknown Introduced Grass			Y	
Verbena supina	Trailing Verbena		Y		
Veronica peregrina	Wandering Speedwell		Y		
Vulpia bromoides	Squirrel-tail Fescue		Y		
Vulpia muralis	Wall Fescue		Y		
Vulpia myuros f. *myuros*	Rat's-tail Fescue		Y		
Vulpia spp.	Fescue			Y	
Xanthium occidentale	Noogoora Burr			Y	
Xanthium orientale	Californian Burr		Y		
Xanthium spinosum	Bathurst Burr	R		Y	

Appendix C. Fauna species recorded during R8 surveys

Summary of the fauna species recorded during surveys on 23 October, 14, 18 and 22 November 2019, and 15 January 2020.

Key:

V – Vulnerable under EPBC Act

L – Listed under FFG Act

vu – Vulnerable under Victorian Advisory List

Common Name (Scientific Name)	Number	Comments
23 October 2019 – 7:19. Lake Walla Walla. (WW_A)	**19 Total Abundance**	**6 species**
Emu (*Dromaius novaehollandiae*)	4	
Greater Bluebonnet (*Northiella haematogaster*)	4	
Brown Treecreeper (*Climacteris picumnus*)	2	
Inland Thornbill (*Acanthiza apicalis*)	4	
Weebill (*Smicrornis brevirostris*)	4	
Rufous Whistler (*Pachycephala rufiventris*)	1	
23 October 2019 – 8:10. Little Mullaroo regulator. (Berr_F)	**9 Total Abundance**	**5 species**
Common Bronzewing (*Phaps chalcoptera*)	1	
Sacred Kingfisher (*Todiramphus sanctus*)	2	
Striated Pardalote (*Pardalotus striatus*)	3	
Weebill (*Smicrornis brevirostris*)	2	
Grey Shrikethrush (*Colluricincla harmonica*)	1	
23 October 2019 – 9:44. Little Mullaroo West regulator. (Berr_E)	**3 Total Abundance**	**2 species**
Peaceful Dove (*Geopelia placida*)	2	
Rufous Whistler (*Pachycephala rufiventris*)	1	
23 October 2019 – 10:58. Toupnein Creek containment bank. (Berr_D)	**29 Total Abundance**	**13 species**
Crested Pigeon (*Ocyphaps lophotes*)	2	
Peaceful Dove (*Geopelia placida*)	3	
Little Black Cormorant (*Phalacrocorax sulcirostris*)	2	
Rainbow Bee-eater (*Merops ornatus*)	2	
Crimson Rosella (Yellow) (*Platycercus elegans flaveolus*)	2	
Red-rumped Parrot (*Psephotus haematonotus*)	3	
Purple-backed Fairywren (*Malurus assimilis*)	2	
White-plumed Honeyeater (*Ptilotula penicillata*)	4	
Grey Shrikethrush (*Colluricincla harmonica*)	2	
Pied Butcherbird (*Cracticus nigrogularis*)	1	
Australian Magpie (*Gymnorhina tibicen*)	2	
Willie Wagtail (*Rhipidura leucophrys*)	2	
Magpie-lark (*Grallina cyanoleuca*)	2	

Common Name (Scientific Name)	Number	Comments
23 October 2019 – 11:17. Berribee Regulator. (Berr_A)	**48 Total Abundance**	**20 species**
Australian Wood Duck (*Chenonetta jubata*)	3	
Australasian Darter (*Anhinga novaehollandiae*)	1	
Great Cormorant (*Phalacrocorax carbo*)	1	
Pied Cormorant (*Phalacrocorax varius*)	1	
Australian Pelican (*Pelecanus conspicillatus*)	1	
Whistling Kite (*Haliastur sphenurus*)	2	
Laughing Kookaburra (*Dacelo novaeguineae*)	1	
Sacred Kingfisher (*Todiramphus sanctus*)	1	
Regent Parrot (*Polytelis anthopeplus*)	2	vu / L / V
Red-rumped Parrot (*Psephotus haematonotus*)	4	
Noisy Miner (*Manorina melanocephala*)	6	
Striated Pardalote (*Pardalotus striatus*)	3	
Weebill (*Smicrornis brevirostris*)	6	
Grey Shrikethrush (*Colluricincla harmonica*)	2	
Rufous Whistler (Pachycephala rufiventris)	1	
Pied Butcherbird (*Cracticus nigrogularis*)	1	
Magpie-lark (*Grallina cyanoleuca)*	2	
Australian Raven (*Corvus coronoides*)	2	
Welcome Swallow (Hirundo neoxena)	4	
Tree Martin (*Petrochelidon nigricans*)	4	
23 October 2019 – 13:48. Crankhandle West A (CW_A)	**25 Total Abundance**	**10 species**
Grey Teal (*Anas gracilis*)	4	
Black-tailed Nativehen (*Tribonyx ventralis*)	2	
Black-fronted Dotterel (*Elseyornis melanops*)	2	
Australian Pelican (*Pelecanus conspicillatus*)	1	
Yellow-billed Spoonbill (*Platalea flavipes*)	1	
Crimson Rosella (Yellow) (*Platycercus elegans flaveolus*)	2	
Striped Honeyeater (*Plectorhyncha lanceolata*)	2	
Rufous Whistler (*Pachycephala rufiventris*)	1	
Magpie-lark (*Grallina cyanoleuca*)	2	
White-winged Chough (*Corcorax melanorhamphos*)	8	
14 November 2019 – 8:42. Lake Walla Walla. (WW_A)	**5 Total Abundance**	**4 species**
Greater Bluebonnet (*Northiella haematogaster*)	2	
Brown Treecreeper (*Climacteris picumnus*)	1	
Weebill (*Smicrornis brevirostris*)	1	
Rufous Whistler (*Pachycephala rufiventris*)	1	
14 November 2019 – 10:14. Toupnein Creek containment bank. (Berr_D)	**21 Total Abundance**	**10 species**
Crested Pigeon (*Ocyphaps lophotes*)	3	
Peaceful Dove (*Geopelia placida*)	2	
Crimson Rosella (Yellow) (*Platycercus elegans flaveolus*)	2	
Red-rumped Parrot (*Psephotus haematonotus*)	4	

Common Name (Scientific Name)	Number	Comments
Purple-backed Fairywren (*Malurus assimilis*)	2	
White-plumed Honeyeater (*Ptilotula penicillata*)	2	
Grey Shrikethrush (*Colluricincla harmonica*)	1	
Pied Butcherbird (*Cracticus nigrogularis*)	1	
Willie Wagtail (*Rhipidura leucophrys*)	2	
Magpie-lark (*Grallina cyanoleuca*)	2	
14 November 2019 – 11:02. Berribee Regulator. (Berr_A)	**41 Total Abundance**	**16 species**
Australasian Darter (*Anhinga novaehollandiae*)	1	
Great Cormorant (*Phalacrocorax carbo*)	1	
Australian Pelican (*Pelecanus conspicillatus*)	2	
Whistling Kite (*Haliastur sphenurus*)	1	
Laughing Kookaburra (*Dacelo novaeguineae*)	2	
Sacred Kingfisher (*Todiramphus sanctus*)	2	
Red-rumped Parrot (*Psephotus haematonotus*)	4	
Noisy Miner (*Manorina melanocephala*)	5	
Striated Pardalote (*Pardalotus striatus*)	2	
Weebill (*Smicrornis brevirostris*)	3	
Grey Shrikethrush (*Colluricincla harmonica*)	1	
Rufous Whistler (*Pachycephala rufiventris*)	1	
Magpie-lark (*Grallina cyanoleuca*)	2	
Australian Raven (*Corvus coronoides*)	1	
Welcome Swallow (*Hirundo neoxena*)	5	
Tree Martin (*Petrochelidon nigricans*)	8	
14 November 2019 – 11:02. 500m east of Berribee Regulator. (Berr_B)	**7 Total Abundance**	**4 species**
Red-rumped Parrot (*Psephotus haematonotus*)	2	
Noisy Miner (*Manorina melanocephala*)	3	
Weebill (*Smicrornis brevirostris*)	1	
Australian Raven (*Corvus coronoides*)	1	
18 November 2019 – 13:22. Berribee Regulator. (Berr_A)	**41 Total Abundance**	**19 species**
Great Cormorant (*Phalacrocorax carbo*)	1	
Pied Cormorant (*Phalacrocorax varius*)	1	
Australian Pelican (*Pelecanus conspicillatus*)	1	
Great Egret (*Ardea alba*)	1	
Whistling Kite (*Haliastur sphenurus*)	2	
Laughing Kookaburra (*Dacelo novaeguineae*)	2	
Red-rumped Parrot (*Psephotus haematonotus*)	4	
Superb Fairywren (*Malurus cyaneus*)	2	
Noisy Miner (*Manorina melanocephala*)	5	
White-plumed Honeyeater (*Ptilotula penicillata*)	4	
Striped Honeyeater (*Plectorhyncha lanceolata*)	2	
Striated Pardalote (*Pardalotus striatus*)	2	
Chestnut-crowned Babbler (*Pomatostomus ruficeps*)	4	

Common Name (Scientific Name)	Number	Comments
Black-faced Cuckooshrike (*Coracina novaehollandiae*)	1	
Grey Shrikethrush (*Colluricincla harmonica*)	2	
Grey Butcherbird (*Cracticus torquatus*)	1	
Magpie-lark (*Grallina cyanoleuca*)	1	
Australian Raven (*Corvus coronoides*)	1	
Welcome Swallow (*Hirundo neoxena*)	4	
18 November 2019 – 15:30. Toupnein Creek containment bank. (Berr_D)	**43 Total Abundance**	**16 species**
Crested Pigeon (*Ocyphaps lophotes*)	2	
Peaceful Dove (*Geopelia placida*)	2	
Whistling Kite (*Haliastur sphenurus*)	1	
Red-rumped Parrot (*Psephotus haematonotus*)	2	
Brown Treecreeper (*Climacteris picumnus*)	4	
Yellow-throated Miner (*Manorina flavigula*)	6	
White-plumed Honeyeater (*Ptilotula penicillata*)	4	
Little Friarbird (*Philemon citreogularis*)	2	
Striated Pardalote (*Pardalotus striatus*)	2	
Grey Shrikethrush (*Colluricincla harmonica*)	1	
Dusky Woodswallow (*Artamus cyanopterus*)	2	
Pied Butcherbird (*Cracticus nigrogularis*)	1	
Willie Wagtail (*Rhipidura leucophrys*)	2	
Magpie-lark (*Grallina cyanoleuca*)	2	
Welcome Swallow (*Hirundo neoxena*)	4	
Tree Martin (*Petrochelidon nigricans*)	6	
22 November 2019. 9:09 - 10:41. Little Mullaroo regulator. (Berr_F)	**56 Total Abundance**	**24 species**
Striped Honeyeater (*Plectorhyncha lanceolata*)	2	
Striated Pardalote (*Pardalotus striatus*)	2	
Rufous Whistler (*Pachycephala rufiventris*)	1	
Tree Martin (*Petrochelidon nigricans*)	5	
Weebill (*Smicrornis brevirostris*)	2	
Grey Shrikethrush (*Colluricincla harmonica*)	1	
Laughing Kookaburra (*Dacelo novaeguineae*)	1	
Australian Raven (*Corvus coronoides*)	1	
Brown-headed Honeyeater (*Melithreptus brevirostris*)	3	
Peaceful Dove (*Geopelia placida*)	2	
Superb Fairy-wren (*Malurus cyaneus*)	2	
Grey Butcherbird (*Cracticus torquatus*)	1	
White-winged Triller (Lalage sueurii)	2	
Spiny-cheeked Honeyeater (*Acanthagenys rufogularis*)	1	
Little Friarbird (*Philemon citreogularis*)	1	
Pied Butcherbird (*Cracticus nigrogularis*)	1	
Chestnut-rumped Thornbill (*Acanthiza uropygialis*)	5	
Black-faced Cuckooshrike (*Coracina novaehollandiae*)	2	

Common Name (Scientific Name)	Number	Comments
Jacky Winter (*Microeca fascinans*)	1	
Varied Sittella (*Daphoenositta chrysoptera*)	4	
White-winged Chough (*Corcorax melanorhamphos*)	8	
White-plumed Honeyeater (*Ptilotula penicillata*)	4	
Rainbow Bee-eater (*Merops ornatus*)	2	
Western Grey Kangaroo (*Macropus giganticus*)	2	
22 November 2019. 11:09 - 12:24. Toupnein Creek containment bank. (Berr_D)	**37 Total Abundance**	**16 species**
Noisy Miner (*Manorina melanocephala*)	3	
Superb Fairy-wren (*Malurus cyaneus*)	2	
Crested Pigeon (*Ocyphaps lophotes*)	3	
Striated Pardalote (*Pardalotus striatus*)	2	
Australian Raven (*Corvus coronoides*)	1	
Laughing Kookaburra (*Dacelo novaeguineae*)	1	
Pied Butcherbird (*Cracticus nigrogularis*)	1	
Blue-faced Honeyeater (*Entomyzon cyanotis*)	2	
Black-faced Cuckooshrike (*Coracina novaehollandiae*)	1	
Welcome Swallow (*Hirundo neoxena*)	5	
Grey Butcherbird (*Cracticus torquatus*)	1	
Chestnut-crowned Babbler (*Pomatostomus ruficeps*)	3	
Chestnut-rumped Thornbill (*Acanthiza uropygialis*)	5	
Goat (*Carpa hircus*)	4	
Western Grey Kangaroo (*Macropus giganticus*)	2	
Perons Tree Frog (*Litoria peroni*)	1	
22 November 2019. 12:45 - 14:15. Berribee Regulator. (Berr_A)	**32 Total Abundance**	**15 species**
Noisy Miner (*Manorina melanocephala*)	6	
Australian Pelican (*Pelecanus conspicillatus*)	2	
Striated Pardalote (*Pardalotus striatus*)	2	
Magpie-lark (*Grallina cyanoleuca*)	2	
Welcome Swallow (*Hirundo neoxena*)	4	
Australian Raven (*Corvus coronoides*)	1	
Laughing Kookaburra (*Dacelo novaeguineae*)	1	
Grey Shrikethrush (*Colluricincla harmonica*)	1	
Crested Pigeon (*Ocyphaps lophotes*)	3	
Superb Fairy-wren (*Malurus cyaneus*)	2	
Eastern Great Egret (*Ardea modesta*)	1	vu / L /
Whistling Kite (*Haliastur sphenurus*)	1	
White-plumed Honeyeater (*Ptilotula penicillata*)	3	
Blue-faced Honeyeater (*Entomyzon cyanotis*)	2	
Perons Tree Frog (*Litoria peroni*)	1	

Common Name (Scientific Name)	Number	Comments
15 January 2020. 20:15 - 21:45. Berribee Regulator. (Berr_A)	**41 Total Abundance**	**4 species**
Australian Owlet-nightjar (*Aegotheles cristatus*)	2	
Tree Dtella (*Gehyra variegate*)	13	
Tessellated Gecko (*Diplodactylus tessellatus*)	21	
Perons Tree Frog (*Litoria peroni*)	5	
15 January 2020. 21:55 - 22:50. Toupnein Creek containment bank. (Berr_D)	**27 Total Abundance**	**3 species**
Australian Owlet-nightjar (*Aegotheles cristatus*)	1	
Tree Dtella (*Gehyra variegate*)	18	
Perons Tree Frog (*Litoria peroni*)	8	

Appendix D. Likelihood of occurrence / impact - threatened fauna – Construction Footprint and Inundation Area

Likelihood of occurrence:

Not all of the threatened species identified during this assessment are equally likely to occur in the Construction Footprint or Inundation Area, due to the geographic location or context of the site, or the habitat type and condition. For each species, the likelihood of occurrence was evaluated using the following rationale:

PRESENT – Species known to occur within the Construction Footprint or Inundation Area, or detected during the site visit and targeted surveys associated with the VMFRP project.

POSSIBLE – Potentially suitable habitat occurs within the Construction Footprint or Inundation Area and species' known range encompasses the area. Species recorded historically in the Study Area, and generally within the last 30 years.

UNLIKELY – Species' known range encompasses the Construction Footprint or Inundation Area, but suitable habitat does not occur within these, or occurs within these but with generally low quality and quantity. Species recorded historically in the Study Area but generally not within the last 30 years.

HIGHLY UNLIKELY – No historical records of the species and/or no suitable habitat in the Study Area.

Key: L – Listed EN / en – Endangered. VU / vu – Vulnerable. nt – Near Threatened.
CR / cr – Critically Endangered. Rx – Regionally Extinct

Likelihood of occurrence of listed threatened fauna species and listed migratory species

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
MAMMALS									
Nyctophilus corbeni	Corben's Long-eared Bat	VU	L	en			PMST	**Unlikely**. No previous records. Suitable habitat not present within Construction Footprints.	**Unlikely.** Not recorded previously. Suitable habitat potentially present within Inundation Areas, if species present would likely benefit from environmental water when present and indirectly from improved habitat condition and insect proliferation following environmental water.
Osphranter robustus robustus	Eastern Wallaroo		L	en	2	2004	VBA	**Unlikely**. Just two previous records. Suitable habitat not present within Construction Footprints.	**Unlikely.** Two previous records. Suitable habitat not present within Inundation Areas, if species present would likely benefit from environmental water indirectly through improved habitat condition following environmental water.
Planigale gilesi	Giles' Planigale		L		12	2013	VBA, GHD 2014	**Possible**. Suitable habitat of soil cracks at all Construction Footprints. **Impact Unlikely**. Species reasonably mobile and suitable surrounding habitat widespread.	**Present.** Suitable habitat of soil cracks common across Inundation Areas, species recorded within Inundation Areas. **Impact Unlikely.** Species is mobile and adapted to living on floodplains. Species likely to benefit from improved habitat condition following environmental water.
BIRDS									
Struthidea cinerea	Apostlebird		L		41	2017	VBA GHD 2013 GHD 2014	**Possible**. Suitable habitat at all Construction Footprints. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread.	**Present.** Recorded during 2013 and 2014 surveys within Inundation Area. Species likely to utilise habitats across the Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Botaurus poiciloptilus	Australasian Bittern	EN	L	en	0		PMST	**Unlikely**. No previous records. Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
Spatula rhynchotis	Australasian Shoveler			vu	8	2001	VBA	**Unlikely**. Rare visitor to north west Victoria. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Gelochelidon macrotarsa	Australian Gull-billed Tern		L	en	2	1977	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Rostratula australis	Australian Painted-snipe	EN	L	cr			PMST	**Unlikely**. No previous records. Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Porzana pusilla	Baillon's Crake		L	vu	1	2006	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Ninox connivens	Barking Owl		L	en	2	1991	VBA	**Possible**. Species may utilise habitats within areas of investigation for foraging in taller forest. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Potentially suitable habitat present within Inundation Areas. **Impact Unlikely.** Species highly mobile and likely to benefit from improved habitat condition following environmental water.
Falco subniger	Black Falcon		L	vu	2	1988	VBA	**Possible**. Potentially suitable foraging habitat present within open woodland in areas of investigation. **Impact Unlikely.** Species highly mobile and likely to benefit from improved habitat condition following environmental water.	**Possible.** Species may utilise habitats within Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Manorina melanotis	Black-eared Miner	EN					PMST	**Highly Unlikely.** No previous records. Suitable habitat not present within broader area.	**Highly Unlikely.** No previous records. Suitable habitat not present within broader area.
Oxyura australis	Blue-billed Duck		L	en	2	1987	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Burhinus grallarius	Bush Stone-curlew		L	en	8	2013	VBA, GHD 2014	**Possible**. Species may utilise habitats for foraging. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species highly mobile and likely to benefit from environmental water when present.
Hydroprogne caspia	Caspian Tern		L		25	2013	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Tringa nebularia	Common Greenshank	Mi		vu	3	2001	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Three previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Actitis hypoleucus	Common Sandpiper	Mi		vu			PMST	**Highly Unlikely.** Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Oreoica gutturalis	Crested Bellbird		L		19	2018	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Unlikely.** Suitable habitat not present within Inundation Area.
Calidris ferruginea	Curlew Sandpiper	CR, Mi					PMST	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Geopelia cuneata	Diamond Dove		L		3	1988	VBA	**Possible**. Species may utilise habitats for foraging. **Impact Unlikely**. Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Species may utilise habitats within Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Numenius madagascariensis	Eastern Curlew	Mi	L	vu			PMST	**Highly Unlikely.** No previous records. Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Ardea modesta	Eastern Great Egret		L	vu	48	2019	VBA GHD 2013 GHD 2014 R8 2019	**Present**. Species will utilise open water and wetland habitats for foraging. **Impact Unlikely**. Species highly mobile and wide ranging, suitable surrounding habitat widespread.	**Present.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present and improved habitat condition following environmental water.
Apus pacificus	Fork-tailed Swift	Mi					PMST	**Possible**. Species may fly over Construction Footprints while feeding. **Impact Highly Unlikely**. Species extremely mobile and wide ranging, suitable surrounding habitat widespread. Species may benefit from insect proliferation following environmental water.	**Possible.** Species may fly over Inundation Area while feeding. **Impact Highly Unlikely.** Species extremely mobile and wide ranging, suitable surrounding habitat widespread. Species may benefit from insect proliferation following environmental water.
Stictonetta naevosa	Freckled Duck		L	en	5	2012	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Falco hypoleucus	Grey Falcon		L	en	3	1988	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Species may utilise habitats within Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Motacilla cinerea	Grey Wagtail	Mi					PMST	**Highly Unlikely.** No previous records. Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
Pomatostomus temporalis	Grey-crowned Babbler		L	en	3	1988	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Species may utilise habitats for foraging. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Coracina maxima	Ground Cuckoo-shrike		L	vu	3	2019	VBA	**Possible**. Species may utilise habitats for foraging. **Impact Unlikely**. Species mobile and wide ranging, suitable surrounding habitat widespread.	**Present.** Species recorded within Inundation Area in 2019, may utilise habitats for foraging. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread.
Aythya australis	Hardhead			vu	13	2014	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Melanodryas cucullata	Hooded Robin		L		12	2005	VBA GHD 2013 GHD 2014	**Possible**. Species may utilise habitats for foraging. **Impact Unlikely**. Species mobile and wide ranging, suitable surrounding habitat widespread.	**Present.** Recorded within Inundation Area. Suitable habitat across Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Charadrius australis	Inland Dotterel			vu	3	2004	VBA GHD 2014	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Present.** Recorded within Inundation Area. Suitable habitat across Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Gallinago hardwickii	Latham's Snipe/Japanese Snipe	Mi		nt			PMST	**Highly Unlikely**. No previous records. Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Egretta garzetta	Little Egret		L	en	7	2010	VBA	**Possible**. Species may utilise open water and wetland habitats for foraging. **Impact Unlikely**. Species highly mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Suitable habitat across Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Lophochroa leadbeateri	Major Mitchell's Cockatoo		L	vu	19	2001	VBA	**Possible**. Species may utilise habitats for foraging. **Impact Unlikely**. Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Suitable habitat across Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Stipiturus mallee	Mallee Emu-wren	EN	L	en	1	2000	VBA	**Highly Unlikely**. No previous records within Construction Footprints. Suitable habitat not present within broader area.	**Highly unlikely.** Suitable habitat not present within Inundation Area.
Leipoa ocellata	Malleefowl	VU	L	en	1	1988	VBA, PMST	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Highly unlikely.** Suitable habitat not present within Inundation Area.
Biziura lobata	Musk Duck			vu	6	2014	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Pezoporus occidentalis	Night Parrot	EN		rx			PMST	**Highly Unlikely**. No previous records. Suitable habitat not present within broader area.	**Highly unlikely.** No previous records. Suitable habitat not present within Inundation Area.
Pandion haliaetus	Osprey	Mi					PMST	**Possible**. Species not recorded previously but may occasionally utilise habitats for foraging. **Impact Unlikely**. Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Species not recorded previously but may occasionally utilise habitats for foraging. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread.
Grantiella picta	Painted Honeyeater	VU	L	vu			PMST	**Possible**. Species not recorded previously but may occasionally utilise habitats for foraging. **Impact Unlikely**. Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Species not recorded previously but may occasionally utilise habitats for foraging. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Species likely to benefit from improved habitat condition following environmental water.
Calidris melanotos	Pectoral Sandpiper	Mi		nt			PMST	**Highly Unlikely**. No previous records. Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
Pedionomus torquatus	Plains-wanderer	CR	L	cr			PMST	**Highly Unlikely**. No previous records. Suitable habitat not present within Construction Footprints.	**Highly Unlikely.** No previous records. Limited suitable habitat within Inundation Area.
Ardea intermedia	Plumed Egret		L	en	6	2003	VBA	**Possible**. Species may utilise open water and wetland habitats for foraging. **Impact Unlikely**. Species highly mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Turnix pyrrhothorax	Red-chested Button-quail		L	vu	2	1991	VBA	**Possible**. Species may occasionally utilise habitats for foraging. **Impact Unlikely**. Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Pyrrholaemus brunneus	Redthroat		L	en	5	1988	VBA	**Highly Unlikely**. Suitable habitat of shrublands not present within Construction Footprints	**Highly Unlikely.** No previous records within Inundation Area. Suitable habitat not present within broader area.
Polytelis anthopeplus monarchoides	Regent Parrot	VU	L	vu	34	2009	VBA PMST GHD 2013 GHD 2014 GHD 2016 R8 2019	**Present**. Recorded across the Project Area and at a number of Construction Footprints (Berribee regulator (Berr_A), Toupnein Creek containment bank (Berr_D), Little Mullaroo West regulator (Berr_E) and Little Mullaroo regulator. (Berr_F)), with suitable foraging and potential nesting habitat within these Construction Footprints. **Impact Unlikely.** Targeted surveys for nesting birds during breeding season at Construction Footprints containing potential nest trees did not record any breeding activity. Losses to a relatively small area of foraging and potential breeding habitat proposed, however the species is highly mobile and wide ranging, suitable surrounding habitat widespread. Environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.	**Present.** Many recent previous records within the Project Area, with suitable foraging and potential breeding habitat across the Inundation Area. **Impact Unlikely.** Species is highly mobile and wide ranging, suitable surrounding habitat widespread. Potential breeding habitat is present within the Inundation Area, this breeding habitat (large old River Red-gums) likely to have condition improved, and future breeding habitat sustained by environmental watering. Species likely to benefit from broadly improved habitat condition following environmental water. Environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Neophema splendida	Scarlet-chested Parrot		L	vu	1	1986	VBA	**Unlikely**. One previous record. If present, may benefit from improved ecological condition of Inundation Area.	**Unlikely.** One previous record. If present, would likely benefit from improved ecological condition of Inundation Area.
Calidris acuminata	Sharp-tailed Sandpiper	Mi			3	6/05/2001	VBA, PMST	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat present within Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present.
Ptilonorhynchus maculatus	Spotted Bowerbird		L	cr	1	1988	VBA	**Possible**. Although not recorded in 30 years, suitable habitat present within Construction Footprint at Toupnein Creek containment bank (Berr_D) **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. If present likely to benefit from improved ecological condition of Inundation Area.	**Possible.** Although not recorded in 30 years, suitable habitat present across Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, potentially suitable surrounding habitat widespread. If present, likely to benefit from improved ecological condition of Inundation Area.
Lophoictinia isura	Square-tailed Kite		L	vu	1	1964	VBA	**Unlikely**. Species not recorded in 50 years. Mobile and wide ranging, potentially suitable surrounding habitat widespread.	**Unlikely.** Not recorded in over 50 years. If species present, likely to benefit from improved habitat from environmental water.
Haliaeetus leucogaster	White-bellied Sea-Eagle		L	vu	18	2014	VBA	**Possible.** Suitable habitat at Construction Footprints on Lindsay River (Berribee regulator (Berr_A)) and Toupnein Creek containment bank (Berr_D). **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread.	**Possible.** Suitable habitat across Inundation Area. **Impact Unlikely.** Species mobile and wide ranging, suitable surrounding habitat widespread. Will likely benefit from environmental water when present and indirectly from improved habitat condition following environmental water.
Climacteris affinis	White-browed Treecreeper		L	vu	4	2006	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Unlikely.** No suitable habitat within Inundation Area.
Motacilla flava	Yellow Wagtail	Mi					PMST	**Highly Unlikely.** Suitable habitat not present within Construction Footprints.	**Possible.** No previous records. Suitable habitat not present within Inundation Areas currently, but will be created by environmental watering and species likely to benefit from environmental water when present. **Impact Unlikely.** Species likely to benefit from environmental water when present.

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
AMPHIBIANS									
Litoria raniformis	Growling Grass Frog	VU	L	en	25	2016	VBA, PMST, GHD 2013	**Present**. Recorded in 2012 at the Toupnein Creek containment bank (Berr_D) Construction Footprint while minor flooding was occurring. Has potential to occur at any construction sites when water is present. Potential aquatic habitat within the Murray and Lindsay Rivers, Mullaroo and Little Mullaroo Creeks. **Impact Possible.** Localised impacts possible, coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from Construction Footprints must consider aquatic fauna. A construction specific aquatic fauna management plan should be developed for all works around waterways.	**Present.** Recorded in 2012 at the Toupnein Creek containment bank (Berr_D) Construction Footprint while minor flooding was occurring. Has potential to occur across the Inundation Area when water is present. Potential aquatic habitat within the Murray and Lindsay Rivers, Mullaroo and Little Mullaroo Creeks and all of floodplain when wet from localised rain or river flows. **Impact Unlikely.** Species almost certain to benefit from environmental water when present, and indirectly from improved habitat condition following environmental watering.
REPTILES									
Chelodina expansa	Broad-shelled Turtle		L	en			Seran *et al* 2018	**Possible.** Species is known from the area. May occur in waterways and waterholes especially those that are permanent and have aquatic vegetation, including the Murray River. **Impact Possible.** Localised impacts possible, consideration of coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from Construction Footprints must consider aquatic fauna. A construction specific aquatic fauna management plan should be developed for all works around waterways.	**Possible**. Species is known from the area. May occur in waterways and waterholes especially those that are permanent and have aquatic vegetation, including the Murray River. Suitable habitat expected to increase during environmental watering. **Impact Possible.** Species almost certain to benefit directly from greatly expanded habitat when environmental water is present and flowing habitat and connectivity is improved through the Mullaroo Creek and Lindsay River, and indirectly from improved habitat condition following environmental watering. Project to be designed and operated to minimise risks associated with entrainment via temporary pumping and passage through structures.
Morelia spilota metcalfei	Carpet Python		L	en	6	2008	VBA	**Possible**. Suitable habitat at all sites. **Impact Possible.** Localised impacts possible, consideration of finalised footprint required. Suitable habitat surrounding and widespread.	**Possible**. Suitable habitat at all sites. **Impact Unlikely.** Species likely to benefit from environmental water when present, and indirectly from improved habitat condition following environmental water.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Denisonia devisi	De Vis' Banded Snake			cr	7	2010	VBA	**Possible**. Suitable habitat at all sites. **Impact Possible.** Localised impacts possible, consideration of finalised footprint required. Suitable habitat surrounding and widespread.	**Possible.** Suitable habitat across Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present, and indirectly from improved habitat condition following environmental water.
Pygopus schraderi	Eastern Hooded Scaly-foot		L	cr	12	2018	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Unlikely.** Suitable habitat not present within Inundation Areas
Varanus varius	Lace Monitor		L	en	8	1998	VBA	**Possible**. Suitable habitat at all sites. **Impact Possible.** Localised impacts possible, consideration of finalised footprint required. Suitable habitat surrounding and widespread.	**Possible.** Suitable habitat across Inundation Areas. **Impact Unlikely.** Species likely to benefit from environmental water when present, and indirectly from improved habitat condition following environmental water.
Parasuta spectabilis	Port Lincoln Snake		L	vu	1	2004	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Unlikely.** Suitable habitat not present within Inundation Areas
Furina diadema	Red-naped Snake		L	vu	6	2010	VBA	**Possible**. Suitable habitat at all sites. **Impact Possible.** Localised impacts possible, consideration of finalised footprint required. Suitable habitat surrounding and widespread.	**Possible.** Suitable habitat across Inundation Areas. **Impact Unlikely.** Species likely to benefit indirectly from improved habitat condition following environmental water.
Ctenotus olympicus	Saltbush Striped Skink			cr	2	1999	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Unlikely.** Suitable habitat not present within Inundation Areas
Morethia adelaidensis	Samphire Skink		L	en	6	1999	VBA	**Unlikely**. Suitable habitat not present within Construction Footprints.	**Possible.** Suitable habitat across Inundation Areas. **Impact Unlikely.** Species likely to benefit from improved habitat condition following environmental water.

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
FISH									
Galaxias rostratus	Flat-headed Galaxias	CR		vu			PMST	**Unlikely.** No previous records. Unlikely that inundation will allow for the species to colonise via flooding mechanisms due to the low regional population size. Numerous surveys of riverine habitat completed as part of the Sustainable Rivers Audit between 2004 and 2010 failed to collect a single specimen (Threatened Species Scientific Committee 2015b). Likewise, fish surveys of riverine and floodplain wetland habitat completed between the Murrumbidgee River confluence and the South Australian border also failed to collect the species (Gilligan 2005).	**Unlikely.** No previous records. Unlikely that inundation will allow for the species to colonise via flooding mechanisms due to the low regional population size. Numerous surveys of riverine habitat completed as part of the Sustainable Rivers Audit between 2004 and 2010 failed to collect a single specimen (Threatened Species Scientific Committee 2015b). Likewise, fish surveys of riverine and floodplain wetland habitat completed between the Murrumbidgee River confluence and the South Australian border also failed to collect the species (Gilligan 2005).
Macquaria australasica	Macquarie Perch	EN	L	en			PMST	**Highly Unlikely.** No previous records. Suitable habitat of clear water, deep, rocky holes and cover not present.	**Highly Unlikely.** No previous records. Suitable habitat of clear water, deep, rocky holes and cover not present.
Maccullochella peelii peelii	Murray Cod	VU	L	vu	10	8/03/2017	VBA, PMST MDFRC 2016	**Present**. Species is well known from the Murray and Lindsay Rivers and Mullaroo Creek and suitable habitat present in wetland and creeks throughout the complex. **Impact Possible**. It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further hydrological investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction.	**Present.** Species is well known from the Murray and Lindsay River and Mullaroo Creek and suitable habitat present at wetland and creeks throughout the complex. **Impact Likely.** Operation of the project under larger inundation scenarios (i.e. Berribee Intermediate and Maximum) has the potential to reduce hydraulic complexity in the Lindsay-Mullaroo system by reducing water velocities in the system. Recommendations are provided by DELWP (2018) on the operating regime which provides greatest protection for the existing Murray Cod population. The DELWP (2018) recommendations include: • Operating Berribee Maximum (23.2 m AHD) at low decadal frequency (1-in-10 years) • Operating Berribee Intermediate (21.7 m AHD) at 4-in-10 year frequency • Keep managed flood duration to as short as possible (i.e. 6 weeks for Berribee Maximum, 4-8 weeks for Intermediate) • Implement scenarios in winter (i.e. June/July) to minimise risks posed by carp.

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
								Temporary cofferdams in the Lindsay River at Berribee Regulator will be constructed with sheet piling. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning season for Murray Cod (Oct-Dec) and pile-driving method should, if feasible, use a vibrating hammer above the water line to install sheet piles. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods. If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Murray Cod as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process.	• Avoid consecutive year implementation of Berribee Maximum or Intermediate scenarios DELWP (2018) highlight that high risks to the Murray Cod population would remain under full inundation scenarios, even with implementation of their recommended mitigation measures. To address this matter, further assessment and refinement of the draft operating regime is proposed by VMFRP to protect Murray Cod habitat while still aiming to meet the various ecological objectives for the site. The provision of fish passage at the Berribee Regulator (BERR_A) and passive fish passage at other regulators will allow for fish to exit to the Murray and Lindsay Rivers, provided a suitable drawdown regime is implemented and regulators/fishways are operated to an appropriate standard. This is especially important during anoxic blackwater events. The impact that anoxic blackwater events can have was most recently demonstrated in 2016, when large numbers of fish were killed in the lower and mid-Murray River, Edward-Wakool system, Frenchman's Creek, Rufus River and Mullaroo Creek when unable to escape the anoxic water (Tonkin et al., 2017). Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands. It is unlikely that significant numbers of Murray Cod will inhabit these wetland locations but further consideration should be given to whether fish will have the potential to exit these wetlands during a drying phase.

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
Craterocephalus fluviatilis	Murray Hardyhead	EN	L	cr			PMST	**Unlikely**. Suitable habitat not present - mostly recorded in isolated moderately saline lakes (Backhouse et al. 2008). Stoessel et al. (2020) state that they are predominantly found in permanent brackish wetlands, likely displaced to these locations due to the negative impacts of non-native species in wetlands with fresher water and the Murray Hardyhead's ability to tolerate high salinities. These conditions are not likely to be found in Murray River or existing aquatic habitat on Lindsay island.	**Unlikely.** Suitable habitat not present - mostly recorded in isolated moderately saline lakes (Backhouse et al. 2008). Stoessel et al. (2020) state that they are predominantly found in permanent brackish wetlands, likely displaced to these locations due to the negative impacts of non-native species in wetlands with fresher water and the Murray Hardyhead's ability to tolerate high salinities. These conditions are not likely to be found in Murray River or existing aquatic habitat on Lindsay island.
Bidyanus bidyanus	Silver Perch	CR	L	vu	14	28/03/2017	VBA, PMST	**Present.** Species is known from area and suitable habitat present in waterways including Lindsay River, Mullaroo Creek and the Murray River. **Impact Possible.** It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further hydrological investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction. Temporary cofferdams in the Lindsay River at Berribee Regulator will be constructed with sheet piling. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning season for Silver Perch (Oct-Feb) and pile-driving method should, if feasible, use a vibrating hammer above the water line to	**Present.** Species is known from area and suitable habitat present. **Impact Likely.** Operation of the project under larger inundation scenarios (i.e. Berribee Intermediate and Maximum) has the potential to reduce hydraulic complexity in the Lindsay-Mullaroo system by reducing water velocities in the system. Recommendations are provided by DELWP (2018) on the operating regimes which provide the greatest protection for Murray Cod, which would also minimise impacts to the existing Silver Perch population. These recommendations include: • Operating Berribee Maximum (23.2 m AHD) at low decadal frequency (1-in-10 years) • Operating Berribee Intermediate (21.7 m AHD) at 4-in-10 year frequency • Keep managed flood duration to as short as possible (i.e. 6 weeks for Berribee Maximum, 4-8 weeks for Intermediate) • Implement scenarios in winter (i.e. June/July) to minimise risks posed by carp. • Avoid consecutive year implementation of Berribee Maximum or Intermediate scenarios DELWP (2018) highlight that high risks to the Murray Cod population would remain under full inundation scenarios, even with implementation of their recommended mitigation measures. To address this matter, further assessment and refinement of the draft operating regime is proposed by VMFRP to protect

Species Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Number of Records	Most Recent Record	Source	Construction Footprint: Likelihood of Occurrence / Impact	Inundation Area: Likelihood of Occurrence / Impact
								install sheet piles. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods. If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Silver Perch as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process. Localised impacts possible due to sediment/ contaminant run-off from construction sites into waterways will be managed through the CEMP for the project.	Silver Perch habitat while still aiming to meet the various ecological objectives for the site. The provision of fish passage at the Berribee Regulator and passive fish passage at other regulators will allow for fish to exit to the Murray and Lindsay Rivers, provided a suitable drawdown regime is implemented and regulators/fishways are operated to an appropriate standard. Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands. It is unlikely that significant numbers of Silver Perch will inhabit these wetland locations but further consideration should be given to whether fish will have the potential to exit these wetlands during a drying phase.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Melanotaenia fluviatilis	Murray-Darling Rainbowfish		L	vu			DELWP (2018)	**Present.** Species is known from area and suitable habitat present in wetland and waterways within the complex. **Impact Possible.** It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further hydrological investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction. If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Murray-Darling Rainbowfish as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process. Localised impacts possible due to sediment/ contaminant run-off from construction sites into waterways will be managed through the CEMP for the project.	**Present.** Species is known from area and suitable habitat present in wetland and waterways within the complex. **Impact Possible** Operation of the project to restore semi-permanent wetland habitat in the Crankhandle wetlands complex would likely benefit this species provided the timing, frequency and duration of inundation satisfies the recommended flow regime (ARI, 2018). Provision of fish passage at the Berribee Regulator fishway and passive fish passage at other regulators would allow for fish to exit to the Murray and Lindsay Rivers, provided a suitable drawdown regime is implemented and regulators/fishways are operated to an appropriate standard. Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Craterocephalus stercusmuscarum fulvus	Unspecked Hardyhead		L				DELWP (2018)	**Present.** Species is known from area and suitable habitat present in wetland and waterways within the complex. **Impact Possible.** It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further hydrological investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction. If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Unspecked Hardyhead as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process. Localised impacts possible due to sediment/ contaminant run-off from construction sites into waterways will be managed through the CEMP for the project.	**Present.** Species is known from area and suitable habitat present in wetland and waterways within the complex. **Impact Possible.** Operation of the project to restore semi-permanent wetland habitat in the Crankhandle wetlands complex would likely benefit this species provided the timing, frequency and duration of inundation satisfies the recommended flow regime (ARI, 2018). Provision of fish passage at the Berribee Regulator fishway and passive fish passage at other regulators would allow for fish to exit to the Murray and Lindsay Rivers, provided a suitable drawdown regime is implemented and regulators/fishways are operated to an appropriate standard. Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands.

Species Name	**Common Name**	**EPBC Act**	**FFG Act**	**DELWP Advisory**	**Number of Records**	**Most Recent Record**	**Source**	**Construction Footprint: Likelihood of Occurrence / Impact**	**Inundation Area: Likelihood of Occurrence / Impact**
Tandanus tandanus	Freshwater Catfish		L	en			DELWP (2018)	**Present.** Species is known from area and suitable habitat present in wetland and waterways within the complex. **Impact Possible.** It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further hydrological investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction. If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Freshwater Catfish as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process. Localised impacts possible due to sediment/ contaminant run-off from construction sites into waterways will be managed through the CEMP for the project.	**Present.** Species is known from area and suitable habitat present in wetland and waterways within the complex. **Impact Possible** Operation of the project to restore semi-permanent wetland habitat in the Crankhandle wetlands complex would likely benefit this species provided the timing, frequency and duration of inundation satisfies the recommended flow regime (ARI, 2018). However, a loss of flowing habitat in Mullaroo Creek, where the species is known to inhabit, during large inundation events may impact the species. The provision of fish passage at the Berribee Regulator and passive fish passage at other regulators will allow for fish to exit to the Murray and Lindsay Rivers, provided a suitable drawdown regime is implemented and regulators/fishways are operated to an appropriate standard. Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands. Further consideration should be given to whether fish will have the potential to exit these wetlands during a drying phase.

Appendix E. Likelihood of occurrence / impact – threatened flora – Construction Footprint and Inundation Area

Likelihood of occurrence:

Not all of the threatened species identified during this assessment are equally likely to occur in the project site, due to the geographic location or context of the site, or the habitat type and condition. For each species, the likelihood of occurrence was evaluated using the following rationale:

PRESENT – Species known to occur within the site, or detected during the site visit.

POSSIBLE – Potentially suitable habitat occurs within Construction Footprint or Inundation Area and species' known range encompasses these areas. Species recorded historically in the Study Area, and generally within the last 30 years.

UNLIKELY – Species' known range encompasses the Construction Footprint and/or Inundation Area, but suitable habitat does not present or likely to be present. Species recorded historically in the Study Area but generally not within the last 30 years.

HIGHLY UNLIKELY – No historical records of the species and/or no suitable habitat in the Study Area.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Abutilon fraseri	Dwarf Lantern-flower		L		2	2007	VBA	Usually found as isolated plants on rocky slopes or outcrops.	Unknown	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Abutilon fraseri subsp. *diplotrichum*	Dwarf Lantern-flower		L	en	5	2013	VBA	Apparently co-extensive with the typical subspecies in Victoria	Unknown	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Abutilon otocarpum	Desert Lantern			vu	6	2012	VBA	Rare, confined to red loam ridges and dunes near the floodplain of the Murray River in the far north-west (e.g. Hattah, Mildura and Robinvale areas). Flowering after summer rains (Walsh and Entwisle, 1996).	After Summer rains	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in targeted surveys of the Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Acacia colletioides	Wait-a-while			r	10	1999	VBA	In north-west of state only, growing mainly in mallee scrub or open woodland on sandy loam soils (Walsh and Entwisle 1996).	Aug-Nov	**Unlikely.** This species is not cryptic and it is expected in would have been recorded during recent or previous surveys if it was present.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Acacia melvillei	Yarran		L	vu		2013	AE 2013 report	Scattered through north-western Victoria, mostly along Murray River and its flood-plain, often in woodland.	Sept-Oct	**Possible**. Suitable habitat was identified during survey, but not recorded in 2015 or 2019 surveys within the Construction Footprint. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in targeted surveys of the Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Acacia oswaldii	Umbrella Wattle		L	vu	15	2011	VBA	Possibility. Widespread but rather uncommon throughout north-western Victoria, mainly on calcareous sands or loam (Walsh & Entwisle 1996)	Nov-Jan	**Present.** Recorded during 2019 surveys, within Construction Footprint and broader Area of Investigation. **Impact possible**. Installation of individual shrub No-Go zones would be needed to avoid impact on this species.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Amaranthus grandiflorus	Large-flower Amaranth			vu	2	2011	VBA	In Victoria confined to sandy rises and sandy loam flats in the far north-west (e.g. Merbein, Red Cliffs, Koolonong), but uncommon to rare, and probably appearing in numbers only following summer rain (Walsh and Entwisle 1996).	Feb-Jun	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprints.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Ammannia multiflora	Jerry-jerry			vu	87	2017	VBA	Confined in Victoria to the north-west where found in wet places, sometimes in water, on heavy soils. (Walsh & Entwisle 1996).	All year	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprints.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Amyema linophylla subsp. orientalis	Buloke Mistletoe			vu	3	1999	VBA	Widespread in western Victoria but scarce due to the depletion of its main host plant *Allocasuarina luehmannii* (Buloke).	Jan-April	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Angianthus brachypappus	Spreading Angianthus			vu	6	2013	VBA	Rare in Victoria and confined to the north-west, often on edges of saline depressions. (Walsh & Entwisle 1996).	Sept-Dec	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Aristida holathera var. *holathera*	Tall Kerosene Grass			vu	2	2001	VBA	Rare, confined to stabilised dunes and sandy rises in the far north-west, e.g. Hattah region. (Walsh & Entwisle 1996).	November	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Asperula gemella	Twin-leaf Bedstraw			r	44	2017	VBA	Rare in Victoria where known only from moist riparian sites along the Murray River downstream from Kerang, and with an isolated record from the Avoca River (Walsh & Entwisle 1996).	Sept-March	**Present.** Recorded during 2019 surveys, within Construction Footprint and broader Area of Investigation. **Impact Likely.** Recorded within proposed Construction Footprints.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Atriplex acutibractea subsp. *acutibractea*	Pointed Saltbush		L	vu	1	2001	VBA	Apparently confined to limestone-rich sandy soils in the far north west (e.g. Benetook, Carwarp, Nowingi etc.) and uncommon to rare. Fruits Mar.-Sep. (Walsh & Entwisle 1996).	April-Sept	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Atriplex holocarpa	Pop Saltbush		L	vu	10	2013	VBA	In Victoria apparently confined to the far north-west (Hattah-Benetook area) where localised and uncommon on sandy soils prone to seasonal flooding (Walsh & Entwisle 1996).	Sept-Oct	**Possible**. Suitable habitat was identified during survey, but not recorded in 2015 or 2019 surveys. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Atriplex infrequens		VU					PMST	Atriplex infrequens occurs in western NSW, within the northern and southern far western plains regions. It is not known to occur within a conservation reserve (Briggs & Leigh 1996) and has been recorded from the drier regions of the Bourke District, such as Lake Parnamaroo in 1860; Delalah Downs, undated; and Tarcoola in 1920; and from the Murray-Darling Depression (Wilson 1984; Morton et al., 1995; Ayers et al., 1996). This species occurs within the Lower Murray Darling and Western (NSW) Natural Resource. Management Regions.	Flowering time has not been recorded; however, seeding is recorded in December (Jacobs, 1990; DECC, 2008).	**Unlikely.** This species is only known to occur in NSW.	**Unlikely.** This species is only known to occur in NSW.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Atriplex limbata	Spreading Saltbush		L	vu	6	2011	VBA	In Victoria confined to the extreme north west and known from only a few collections from Mildura area and downstream along the Murray River floodplain (Lakes Wallawalla and Cullulleraine. Fruits Sep.-Feb.	Sept-Jan	**Possible**. Suitable habitat was identified during survey, but not recorded in 2015 or 2019 surveys. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Atriplex lindleyi subsp. *conduplicata*	Baldoo			r	3	2015	VBA	Apparently confined to the Murray River floodplain downstream of Robinvale (e.g. Hattah Lakes Red Cliffs, Merbein), occasionally occurring with the other two sub species but apparently remaining distinct. An invader of degraded and/or salted areas on heavier soils (Walsh & Entwisle 1996).	March-Aug	**Present.** Single specimen recorded during 2019 surveys within the Area of Investigation (but not within the Construction Footprint). **Impact possible.** If the proposed Construction Footprint changes this species has the potential to be impacted by the proposed works as it was identified in the Area of Investigation.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Atriplex nummularia subsp. *omissa*	Dwarf Old-man Saltbush			r	2	2015	VBA	In Victoria apparently confined to floodplains or lake margins west of Mildura in the extreme north west (e.g. Wallpolla and Lindsay Islands). Fruits Oct.-Nov. (Walsh & Entwisle 1996)	Nov-Dec	**Present.** Single specimen recorded during 2019 surveys within the Area of Investigation (but not within the Construction Footprint). **Impact possible.** If the proposed Construction Footprint changes this species has the potential to be impacted by the proposed works as it was identified in the Area of Investigation.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Atriplex pseudocampanulata	Mealy Saltbush			r	17	2013	VBA	Occurs mainly on heavier soils fringing lakes or rivers on the Murray River floodplain downstream of about Cohuna, also recorded from railyards at Bairnsdale and Toora in Gippsland where certainly inadvertently with stock or stock feed. Common in degraded, salted country. Fruits Sep.-May (Walsh & Entwisle 1996)	Sept-May	**Possible**. Suitable habitat was identified during survey, but not recorded in 2015 or 2019 surveys. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Atriplex rhagodioides	Silver Saltbush		L	vu	6	2011	VBA	In Victoria apparently confined to the Murray River floodplain in the far north west and recorded only from Natya area (between Swan Hill and Robinvale), Red Cliffs and Cowra. Fruits Mar., Oct. (two records) (Walsh & Entwisle 1996).	March and October	**Possible**. Suitable habitat was identified during survey, but not recorded in 2015 or 2019 surveys. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Atriplex spinibractea	Spiny-fruit Saltbush			en	1	1999	VBA	Known from Red Cliffs and Drumanure near Numurkah, where occurring on heavy alluvial soils in *Eucalyptus microcarpa* woodland. Fruits Jun. (one record) (Walsh & Entwisle 1996).	Unknown	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Atriplex spongiosa	Small Pop Saltbush			en	2	2003	VBA	In Victoria apparently restricted to Neds Corner Station in the far north west of the State, where it co-occurs with Atriplex holocarpa.	Unknown	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprints.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Austrobryonia micrantha	Mallee Cucumber			r	64	2017	VBA	Occurs on drying or dried clay soils (e.g. lake-beds, ephemeral watercourses and lagoons) on the floodplain of the Murray River in the far north-west, with southerly occurrences at e.g. Lake Tyrrell, Wyperfeld National Park, but rare in Victoria	Nov-April	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Austrostipa pilata	Prickly Spear-grass			vu	2	1986	VBA	Known from only one collection in the extreme north-west corner of the state where occurring on red sandstone cliffs overlooking the Murray River.	November	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

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Austrostipa trichophylla	Spear-grass			r	2	2011	VBA	Relatively rare in Victoria where known from scattered sites in the west and north-west (Little Desert, Black Range near Stawell, Wedderburn, Gunbower, Ouyen, Mildura areas), and occurring in mallee and woodland formations. Victorian specimens, although conforming to the description provided by Vickery el al. (1986), differ from the type (from WA) and Bentham's (1878) description which emphasizes the rigid, smooth, shining leaf-sheaths as well as the hispid blades.	Nov-Jan	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

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Bergia trimera	Small Water-fire			vu	16	2017	VBA	Rare in Victoria, confined to floodplains of the Murray River in the far north-west (Red Cliffs, Lake Wallawalla), where occurring on moist, recently inundated sandy clay soils. Flowers after summer floods. (Walsh & Entwisle 1996)	Jan-April (flood dependant)	**Possible**. Some suitable habitat was identified during survey, was not recorded in 2015 or 2019 surveys. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprints. Flooding would likely benefit this species.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Boerhavia coccinea	Scarlet Spiderling			r	2	2011	VBA	Confined to sandy rises in north-western Victoria at Lake Powell, Hattah Lakes, Mildura, and Neds Corner Station	Nov-April	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprints.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Brachyscome melanocarpa subsp. *melanocarpa*	Black-fruit Daisy			en	11	2017	VBA	Very rare in Victoria where known with certainty only from the far north-west near Lindsay Island and Neds Corner Station. Grows in clay or sandy soils on river banks and floodplains	Aug-Dec	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Bromus arenarius	Sand Brome			r	12	2003	VBA	Rather rare in Victoria, occurring on sand and clay-pan soils in the mallee and on shallower soils over rock in rain-shadow areas of east Gippsland (Walsh & Entwisle 1996).	Jul-Oct	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Calandrinia volubilis	Twining Purslane			r	8	2003	VBA	Largely restricted in Victoria to the far north west in samphire and saltbush communities on saline flats and around salt lakes, but with a remarkably disjunct occurrence on a basalt escarpment of the Moorabool River near Lethbridge.	Sept-Oct	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Calotis cuneifolia	Blue Burr-daisy			r	4	2015	VBA	Scattered along the Murray River and its floodplain downstream from near Barmah, with occurrences away from the river at Kamarooka and Chiltern. Occurs chiefly on alluvial loam or clay soils, often associated with Eucalyptus camaldulensis. Flowers Aug.-Feb. (Walsh & Entwisle 1996).	Aug-Feb	**Present.** Single population recorded during 2019 surveys. **Impact Possible.** Recorded in 2019 surveys in Area of Investigation, not in Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Calotis cymbacantha	Burr-daisy			r	2	1997	VBA	Rare in Victoria. Confined to dune-mallee areas of the far north-west, where sometimes locally common following fire.	Aug-Oct	**Unlikely**. No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Cardamine moirensis	Riverina Bitter-cress			r	2	2012	VBA	In Victoria, occurring in the north and west in seasonally wet areas.	Jun-Nov	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Centipeda crateriformis subsp. *compacta*	Compact Sneezeweed			r	2	2011	VBA	Principally grows on the shores of drying watercourses and in seasonally inundated swamps and depressions in the west, from the Grampians region north.	All year	**Possible**. Some suitable habitat was identified during survey, was not recorded in 2015 or 2019 surveys. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprints.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Centipeda nidiformis	Cotton Sneezeweed			r	3	2011	VBA	Scattered, mostly in northern Victoria along the Murray River and its floodplains, but also in the Grampians, Ballarat district, Gellibrand Hill, and Lake Glenmaggie near Heyfield. Apparently a species of seasonally inundated sites and drying lake margins, often on rather sandy soils (Walsh & Entwisle 1996).	Sept-Feb	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Centipeda pleiocephala	Tall Sneezeweed			en	6	2011	VBA	In Victoria grows in moist sandy, silty or clay soils in floodplains and the edges of watercourses near the Murray River from Mildura west and between Kerang and Ulupna Island.	Sept-Nov	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Centipeda thespidioides s.s.	Desert Sneezeweed			r	3	2011	VBA	On heavy clay soils prone to inundation in depressions surrounded by halophytic shrublands in regions surrounding the Murray River from Kerang through to South Australia with an isolated occurrence near the Grampians.	All year	**Possible**. Some suitable habitat was identified during survey, was not recorded in 2015 or 2019 surveys. Was recorded in local area during AE 2013 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Convolvulus clementii	Desert Bindweed			vu	5	2011	VBA	In Victoria, confined to the north-west part of the State, growing in a variety of habitats from seasonally wet depressions to sandy rises.	Aug-Oct	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Craspedia haplorrhiza	Plains Billy-buttons		L	k	12	2013	VBA	Usually on heavy soils or loamy sands, particularly on floodplains and seasonally wet depressions. Flowers spring and early summer.	Sept-Jan	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Crinum flaccidum	Darling Lily		L	vu	32	2015	VBA	Occurring on alluvial soils and beds of ephemeral streams. Rare in Victoria, confined to the extreme north-west along the Murray River floodplain west of its junction with the Darling River.	Feb-Jun	**Present.** Recorded several times during 2019 surveys as well as previous surveys, within Area of Investigation. **Impact Possible:** Recorded in Area of Investigation immediately adjacent to the Construction Footprint. No-Go fencing needed to avoid impacts.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Cullen cinereum	Hoary Scurf-pea		L	en	2	1991	VBA	Endangered in Victoria, known only from a few localities in the far north west of the state where it grows in moist depressions and on floodplains (Walsh & Entwisle 1996).	Oct-May	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Cyperus flaccidus	Lax Flat-sedge			vu	1	2010	VBA	Rare in Victoria, occurring in seasonally wet sites (e.g. lake and river margins), recorded only from Mildura, Dimboola, Goroke and Cobram areas. Flowers spring-summer (Walsh & Entwisle 1996).	Sept-Feb	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Cyperus gracilis	Slender Flat-sedge		L	en	1	1999	VBA	Apparently confined in Victoria to dry grassy woodland beside the Snowy River between Willis and Suggan Buggan.	Sept-Feb	**Unlikely**. No suitable habitat recorded in the Construction Footprint. Given the distribution for this species is along the Snowy River, likely that there is an error in the single record of this species from 1999.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Cyperus nervulosus	Annual Flat-sedge		L	en	2	1999	VBA	Apparently confined in Victoria to the far north-west (Mildura, Hattah Lakes, and Robinvale) where occasional on damp sandy soil fringing receding water in lakes and watercourses (Walsh & Entwisle 1996).	Sept-Feb	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Cyperus pygmaeus	Dwarf Flat-sedge			vu	44	2017	VBA	On banks and seasonally wet floodways of the Murray River between Mildura and Swan hill, with a distant occurrence upstream near Yarrawonga; on clayey soils in open positions (Walsh & Entwisle 1996).	Sept-Feb	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Diplachne fusca subsp. *fusca*	Brown Beetle-grass			r	1	1991	VBA	Confined in Victoria to floodplains and billabongs of the Murray River and the lower reaches of its major tributaries. Frequently grows in shallow water.	All year	**Possible.** Suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Dissocarpus biflorus var. *biflorus*	Twin-flower Saltbush			r	16	2003	VBA	Occasional in far north western Victoria (e.g. Lake Wallawalla, Mildura, Underbool, Sea Lake areas), on saline, seasonally wet, cracking clay soils, usually in low shrubland formations. Fruits mostly Sep.-Nov.	Sept-Nov	**Unlikely.** This species is not cryptic and it is expected in would have been recorded during recent or previous surveys if it was present.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Duma horrida subsp. *horrida*	Spiny Lignum			r	6	2002	VBA	Infrequent on silty soils and clays fringing shallow swamps and lakes in the northwest, and near the Murray River downstream from about Swan Hill.	Sept-Nov	**Unlikely.** This species is not cryptic and it is expected in would have been recorded during recent or previous surveys if it was present.	**Present.** Incidental observation of this species during the EVC ground truthing assessment in June 2020. As targeted surveys have not been undertaken, the full extent of this species within the Inundation Area is unknown. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Elachanthus glaber	Smooth Elachanth			r	3	2011	VBA	Rare in Victoria. Recorded from a few gypsum-rich, sometimes saline flats and low-rises in the far north-west (e.g. Raak Plain, Pink Lakes, Hattah Lakes, Towan Plains), sometimes occurring with E. pusillus. (Walsh & Entwisle 1996).	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Elachanthus pusillus	Small Elachanth			r	2	2003	VBA	Rare in Victoria. Occurs on loamy, often gypseous soils (less commonly light sand) in flat country and lake-beds of the far north west (e.g. Wyperfeld national Park, Yarrara, Hattah district, kooloonong), sometimes with E. glaber (Walsh & Entwisle 1996).	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Suitable habitat could be present in the Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Elacholoma prostrata	Small Monkey-flower			r	8	2011	VBA	In Victoria, confined to north-western and north-central areas and rather uncommon. Mostly on heavy soils prone to seasonal inundation (gilgais, floodplains etc.).	July-Sept	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Eleocharis obicis		VU		vu		2013	AE 2013 report	Rare, occurring in grasslands, associated with ephemeral wetlands and gilgai hollows	Sept-Feb	**Possible** This species was recorded in 2013 to the south of the Project Area, along the eastern banks of Lake Wallawalla. Some suitable habitat was identified during field assessments for the project, but the species was not recorded within the Construction Footprint in 2013, 2015 or 2019. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Eragrostis australasica	Cane Grass			vu	14	2011	VBA	Apparently confined to a few clay pans and shallow lakes in the north west, mostly between Mildura and environs and the SA border, but also at Chirrup (between Donald and Wycheproof) (Walsh & Entwisle 1996).	Sept-May	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Eragrostis lacunaria	Purple Love-grass			vu	14	2013	VBA	Uncommon to rare, confined to sandy or alluvial soils fringing lakes and seasonally flooded areas in the far north west (e.g. Mildura, Hattah lakes, Lake Powell near Robinvale), with isolated more southerly records from near Dimboola and Warracknabeal (Walsh & Entwisle 1996). Nearest known occurrence?	Dec-March	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Eragrostis setifolia	Bristly Love-grass			vu	5	2011	VBA	Uncommon in Victoria, occurs on clayey soils of seasonally flooded areas, confined to the far north-west. Plants at a young-flowering stage have a very different appearance from the mature plant, with a contracted inflorescence and very short, apparently few-flowered spike-lets. The spikelets elongate rapidly towards maturity and the short panicle branches diverge, giving the plant its typical mature form (Walsh & Entwisle 1996).	Sept-April	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Eremophila bignoniiflora	Bignonia Emu-bush		L	vu	16	2017	VBA	In Victoria confined to the far north-west and considered endangered in this State. Found along river flats and in depressions in woodlands on heavy clay soils. (Walsh and Entwisle 1999)	Jun-Nov	**Present** Identified during the 2019 targeted surveys within the Construction Footprint and within the Area of Investigation. **Impact likely**. Recorded in targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Eremophila divaricata subsp. *divaricata*	Spreading Emu-bush			r	24	2017	VBA	In Victoria confined to woodland communities along the floodplain of the Murray River system north-west from Kerang (Walsh & Entwisle 1996)	Nov-April	**Present** Identified during the 2019 targeted surveys within the Construction Footprint and within the Area of Investigation. **Impact Possible**. Recorded in targeted surveys of Construction Footprint on edge of existing track, if track is widened, some individuals could be impacted.	**Present.** Incidental observation of this species during the EVC ground truthing assessment in June 2020. As targeted surveys have not been undertaken, the full extent of this species within the Inundation Area is unknown. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Eremophila maculata subsp. *maculata*	Spotted Emu-bush		L	r		2019	2019 surveys	In Victoria confined to the north-west, mainly in *Eucalyptus largiflorens* forests or woodlands on heavy clay soils	May-Dec	**Present** Identified during the 2019 targeted surveys within the Construction Footprint. **Impact Possible**. Recorded in targeted surveys of Construction Footprint on edge of existing track, if track is widened, the individual could be impacted.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Eremophila polyclada	Twiggy Emu-bush			vu	6	2011	VBA	In Victoria confined to the far north-west between Mildura and the South Australian border and considered vulnerable in this State. Occurs along river flats and in depressions, mainly in Eucalyptus largiflorens forests and woodlands on heavy clay soils.	Oct-May	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Eremophila sturtii	Narrow-leaf Emu-bush		L	en	6	2003	VBA	Confined in Victoria to the far north-west where a component of Belah (*Casuarina pauper*) and Sugarwood (*Myoporum platycarpum*) woodland on slightly higher ground of the Murray River floodplain. Formerly known from Merbein near Mildura, but apparently not collected from there since 1935. An outlier from Swan Hill (1950) is of uncertain source (possibly cultivated). Two pre-1900 collections labelled 'Wimmera' and 'Sandhurst' are of doubtful provenance.	Sept-Feb	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Eriochlamys behrii s.s.	Woolly Mantle			r	1	2001	VBA	In Victoria known from the far north-west, usually in mallee scrub, or on saline soils around salt lakes.	Sept-Jan	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprints.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Ethuliopsis cunninghamii	Tall Nut-heads			vu	5	2013	VBA	Known in Victoria only from the far north-west where extremely rare, on heavy clay soils that are prone to inundation, usually in *Eucalyptus camaldulensis* and *Eucalyptus largiflorens* communities.	Sept-May	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Eucalyptus cyanophylla	Blue-leaf Mallee			r	2	1985	VBA	A mallee of restricted distribution in far north-western Victoria on sandy flats and low dunes, from north of Murrayville to Morkalla.	Sept-Nov	**Unlikely.** This species is not cryptic and it is expected in would have been recorded during recent or previous surveys if it was present.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

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Euphorbia planitiicola	Plains Spurge		L	en	1	1988	VBA	Known in Victoria only from near Boort, Inglewood, Kerang and Lake Wallawalla, where found on seasonally wet, cracking clay soils.	All year	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Euphorbia tannensis subsp. *eremophila*	Desert Spurge		L	en	8	2013	VBA	Known in Victoria from only a few sites in the far north-west where found on sandhills and rocky cliffs overlooking the Murray River, and an outlying 1905 record purportedly from near Kerang.	All year	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Fimbristylis velata	Veiled Fringe-sedge			r	19	2002	VBA	Occasional on drying mud beside lakes and rivers and in seasonally wet depressions; mostly in northern Victoria, but recent collections in the south, I.e. Bairnsdale and Healesville. Flowers spring-summer. (Walsh & Entwisle 1996).	Sept-Feb	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Frankenia foliosa	Leafy Sea-heath			r	1	1999	VBA	On saline and gypseous soils in the Murray-Mallee region, from Lake Tyrrell to the far north-west corner of Victoria. Flowers most of the year (Walsh & Entwisle 1996).	All year	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Gnephosis tenuissima	Dwarf Cup-flower			r	1	1999	VBA	Rare in Victoria where confined to the far north-west (e.g. Hattah Lakes National park), usually occurring in sandy soils (Walsh & Entwisle 1996).	Sept-Oct	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Gratiola pumilo	Dwarf Brooklime			r	5	2011	VBA	Mainly confined in Victoria to the north and west of state, on damp and drying mud besides lakes and watercourses and seasonally inundated depressions, but also with a few isolated records to the south. Nearest known occurrence < 5 km east of site, 2003.	Dec-Feb	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Isolepis congrua	Slender Club-sedge		L	vu	5	2016	VBA	Apparently rare in Victoria, but possibly overlooked, recorded from cracking clay along the Murray River near Colignan and other seasonally wet areas at Mt Arapiles, near Donald, St Arnaud, Dadswell Bridge and Puckapunyal (Walsh & Entwisle 1996)	Sept-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Lawrencia spicata	Salt Lawrencia			r		2013	AE 2013 report	An occasional component of saltmarsh communities along the coast, rare in saline depressions and around salt lakes of south-western Victoria (Walsh & Entwisle 1996).	Jan-April	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, 2015 or 2019 surveys. Recorded in the local area in 2013. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Leiocarpa leptolepis	Pale Plover-daisy		L	en	1	1988	VBA	In Victoria confined to Lindsay Is where found on heavy soils in riverine woodland (Walsh & Entwisle 1996).	Sept-Feb	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Leiocarpa tomentosa	Woolly Plover-daisy			en	3	2007	VBA	Very rare in Victoria where known by few collections from riverine woodland in the far north-west (Boundary Point and Red Cliffs) and from near Murtoa in the Wimmera.	All year	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Lemooria burkittii	Wires-and-wool			en	3	2013	VBA	Very rare in Victoria, known with certainty only near Lindsay Point in far north-west of the State where rediscovered in 2013 after being presumed extinct. The only other collection from the same area was made in 1948. Common and widespread in other States.	August	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Lepidium monoplocoides	Winged Peppercress	EN	L	en	1	1948	VBA	Uncommon in north western quarter of state, mostly on heavy soils near lakes and watercourses. Flowers mostly spring-summer (Walsh & Entwisle 1996).	Sept-Feb	**Possible** There is a historic record of this species to the west of Lindsay Island from 1948, however this species has not been recorded since this time. Some suitable habitat was identified during field assessments, but this species was not recorded within the Construction Footprint in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Suitable habitat could be present within the Inundation Area, however this species hasn't been recorded within the Study Area for over 70 years. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Lepidium phlebopetalum	Veined Peppercress			en	1	1999	VBA	Arid regions of all mainland states. Rare in Victoria, known only from three scattered localities in far north west of State. Flowers mostly Spring.	Sept-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Limonium australe var. *australe*	Yellow Sea-lavender			r	6	2002	VBA	In Victoria apparently confined to mangrove and saltmarsh communities near Point Lonsdale, Western Port, Shallow Inlet and Corner Inlet.	Jan-April	**Possible** when conditions are less dry. Suitable habitat was not identified within the Construction Footprint based on the known habitat description for the species, but there have been 6 records of the species within the Study Area. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Lipocarpha microcephala	Button Rush			vu	3	2016	VBA	In open damp places such as sandy stream-banks and drying lake margins; widespread but scattered and uncommon. Flowers spring -summer (Walsh & Entwisle 1996).	Sept-Feb	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Maireana georgei	Slit-wing Bluebush			vu	4	2003	VBA	Rare, recorded in Victoria only from heavier, loamy soils of interdune swales in the Sunset Country (3 records). Fruits Sep.-Oct.	Sept-Oct	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

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Maireana sedifolia	Pearl Bluebush			r	30	2012	VBA	In Victoria confined to a few sites with loamy, often limestone rich soils in the far north west (Red Cliffs, Merbein, South Australian border region but sometimes locally common. Fruits mostly Aug.-Oct. (Walsh & Entwisle 1996).	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Maireana triptera	Three-wing Bluebush			r	6	2002	VBA	Rather rare in far north west Victoria (Mildura, Nowingi, Kulwin, Annuello), usually growing on red sandy loams of flats or dune swales (Walsh & Entwisle 1996).	Oct-Dec	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Malacocera tricornis	Goat Head			r	45	2017	VBA	Grows in clay pans and heavy alluvial flats along the Murray River floodplain from Boundary Bend downstream to the South Australian border (Walsh & Entwisle 1996).	Sept-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Marsdenia australis	Doubah			vu	8	2015	VBA	In Victoria confined to the far north west where occasional in dry woodland and scrubland often near watercourses. Flowers late spring-summer (Walsh & Entwisle 1996).	Nov-Feb	**Possible** Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Mimulus prostratus	Small Monkey-flower			r		2013	AE 2013 report	In Victoria confined to north-western and north-central areas and rather uncommon. Mostly on heavy soils prone to seasonal inundation (gilgais, floodplains etc.) (Walsh & Entwisle 1996).	July-Sept	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Minuria cunninghamii	Bush Minuria			r	14	2015	VBA	Confined in Victoria to the north west, and rare (e.g. Raak plain near Benetook, Hattah Lakes, Lake Tyrell), usually occurring on slightly to strongly saline ground in sand, clay or gypseous soils (Walsh & Entwisle 1999).	Feb-April, Aug-Sept	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Minuria denticulata	Woolly Minuria			r	10	2011	VBA	Rare in Victoria, confined to the far north west where usually occurring in clay and clay loam soils of low lying seasonally wet areas (e.g. lake beds, roadside drains). Flowers Aug-Jan. (Walsh & Entwisle 1999).	Aug-Jan	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Minuria integerrima	Smooth Minuria			r	6	2003	VBA	In Victoria confined to heavy clay and alluvial silt on floodplains of Murray River, from Barmah districts to the South Australian border (Walsh & Entwisle 1999).	Sept-March	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Myoporum montanum	Waterbush			r	2	1998	VBA	Scattered across northern Victoria where uncommon to rather rare; mostly in mallee and riparian woodland communities but also in rocky gorges (Walsh & Entwisle 1999). Flowers mainly Jun-Nov.	Jun-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Nicotiana goodspeedii	Small-flower Tobacco			r	4	2017	VBA	In Victoria, confined to the north west where rare and found mostly in alkaline soils, often in sand overlying limestone. Flowers mainly spring and summer.	Sept-Feb	**Possible** Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Ophioglossum polyphyllum	Upright Adder's-tongue			vu	1	1948	VBA	Restricted to north wester Victoria where localised near Mildura, Hattah Lakes and the southern part of Wyperfeld National Park. However this small apparent distribution may be a reflection of the cryptic nature of the species. No flowering data (Walsh & Entwisle 1996).	Unknown	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. This species hasn't been recorded within the Study Area for over 70 years. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area, however this species hasn't been recorded within the Study Area for over 70 years. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Phyllanthus lacunarius	Lagoon Spurge			vu	79	2017	VBA	Limited to cracking clay soils of Murray River floodplain (Walsh & Entwisle 1999).	Dec-Aug	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Phyllanthus lacunellus	Sandhill Spurge			r	9	2012	VBA	Typically occurs on sandy rises, will flower most of year depending on rains (Walsh & Entwisle 1999).	All year	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Picris squarrosa	Squat Picris			r	16	2013	VBA	Widespread in Victoria but of disjunct distribution. Usually found on coastal sand dunes or in alluvial soils on river banks or floodplains, mainly at low altitudes. Flowers mostly Oct.-Apr. (W& E) Occurs in woodland to open forest of less flood-prone (riverine) watercourse fringes, principally on levees and higher sections of point-bar deposits (DSE 2004).	Oct-April	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Ptilotus polystachyus var. polystachyus	Long Tails			en		2013	AE 2013 report	Rare in Victoria, confined to the far north west (Mildura, Boundary Bend areas) where occurring on red sandy loams on low dunes and heavier soils on the Murray River floodplain. Flowers most of year (conditions permitting) but mainly May-Nov.	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Rhagodia ulicina	Spiny Goosefoot			r	3	2008	VBA	Localised in the northern part of the Sunset Country (north and north west of Hattah), but locally common. Occurring on red loamy soils, usually containing limestone, in dune swales and on flat ground (Walsh and Entwisle 1996).	Aug-Nov	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

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Rhodanthe polygalifolia	Milkwort Sunray			r	5	2013	VBA	Found growing mostly on heavy soils of the Murray River floodplains but also in or near depressions some distance from the river (Walsh & Entwisle 1999).	Aug-Oct	**Possible** Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Rhodanthe stricta	Slender Sunray		L	en	5	2013	VBA	Known in Victoria from recent collections in the north-west where recorded from chenopod-dominated shrublands on the Murray River floodplain at Neds Corner Station, and a disjunct 1978 specimen purportedly from the Barmah Forest. It can be locally common following flooding of the river, but is otherwise very rare.	Jul-Dec	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Rhyncharrhena linearis	Purple Pentatrope			vu	4	1999	VBA	A rare and localised species in Victoria restricted to the far north west (Walsh & Entwisle 1996).	April-Jan	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Roepera angustifolia	Scrambling Twin-leaf			r	2	2011	VBA	In Victoria, confined to the far north-west where occasional in mallee scrubland and herbfield, mainly on calcareous soils.	Jun-Feb	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Roepera similis	White Twin-leaf			r	5	2003	VBA	In Victoria, confined mainly to the far north-west where found in mallee scrub and riverine woodland on sand or heavier clay soils, but with an outlying occurrence near Kerang	May-Dec	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Rorippa eustylis	Dwarf Bitter-cress			r	7	2011	VBA	Habitat restricted to scattered swamps and floodplains along Murray (Walsh & Entwisle 1996).	All year	**Possible** Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Rumex crystallinus s.s.	Glistening Dock			vu	3	2002	VBA	Possibility. Recorded from only few sites along margins and drying beds of Wallawalla, Hattah and Lalbert lakes. (Walsh & Entwisle 1996).	Oct-March	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Sarcozona praecox	Sarcozona			r	2	2016	VBA	Occasional in mallee and Callitris-Casuarina woodlands of the north west, usually on loamier soils (Walsh & Entwisle 1996).	Aug-Nov	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Sclerolaena decurrens	Green Copperburr			vu	12	2016	VBA	Found growing on low rises within Murray River floodplains Fruits Jan (Walsh & Entwisle 1996).	Jan	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Sclerolaena intricata	Poverty Bush			vu	11	2013	VBA	Only recorded from Wallpolla Island and areas immediately north of Lake Wallawalla. Fruits Oct (Walsh & Entwisle 1996).	Oct	**Possible** Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Sclerolaena lanicuspis	Woolly Copperburr			en	1	2002	VBA	Known in Victoria from a 1980 collection from the edge of a dried lagoon of the Murray River near Red Cliffs. Fruits Jul., Oct. (two records)	July, October	**Possible** Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Sclerolaena patenticuspis	Spear-fruit Copperburr			vu	8	2017	VBA	In Victoria confined to the far north west near the Murray River downstream from Robinvale, apparently rare and not collected since 1972 (near mouth of Chalka Creek, Hattah-Kulkyne National Park) (Walsh & Entwisle 1996)	Aug-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

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Senecio cunninghamii var. *cunninghamii*	Branching Groundsel			r	120	2018	VBA	Occurs on heavy-sometimes winter wet soils as well as dry rocky soils. Common on embankments or escarpments and woodland to open forest to 15 m tall of less flood-prone (riverine) watercourse fringes, principally on levees and higher sections of point-bar deposits (Walsh & Entwisle 1996).	Aug-April	**Present** Identified during the 2019 targeted surveys within the Construction Footprint and within the Area of Investigation. **Impact Likely**. Recorded in targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Senecio platylepis	Toothed Groundsel			r	5	2000	VBA	In Victoria confined to the far north-west (e.g. Lake Wallawalla, Pink Lakes state Park), where localized on loamier soils. Usually appearing only following good winter rains.	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Senecio productus subsp. *productus*	Riverina Groundsel			vu	4	2012	VBA	Rare along the edges of watercourses in clay soils and in chenopod shrubland, often with *Senecio glossanthus*, in areas near the Murray River upstream to near Kerang.	June-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Sida ammophila	Sand Sida			vu	5	2011	VBA	Occurs on red sand and loam soils in the Hattah-Mildura area, mostly in non-eucalypt open shrublands on dunes and roadsides, depleted by grazing and clearing (Walsh and Entwisle 1996).	Nov-Jun	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Sida fibulifera	Pin Sida			vu	2	2012	VBA	Apparently confined to red loam or clay loam soils near the Murray River between Hattah-Kulkyne and Mildura, but depleted by clearing. Flowers usually spring or autumn (Walsh and Entwisle 1996).	March-May, Sept-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Sida intricata	Twiggy Sida			vu	16	2012	VBA	All mainland states. Moderately common in open areas of the far north and north-west, usually on heavier loam and clay loam soils not far from the Murray River.	All year	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Sida spodochroma	Variable Sida (grey-leaf form)			en	1	2001	VBA	Very rare in Victoria, restricted to limestone soils in far north-west Victoria ('Boundary Point' near South Australian border, Werrimull, and the Red Cliffs-Cardross area).		**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Solanum lacunarium	Lagoon Nightshade			vu	32	2017	VBA	Very rare in Victoria where apparently confined to heavy clay soils of the Murray River floodplain downstream from Mildura.	March-May, Sept-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Present.** Incidental observation of this species during the EVC ground truthing assessment in June 2020. As targeted surveys have not been undertaken, the full extent of this species within the Inundation Area is unknown. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Swainsona greyana	Hairy Darling-pea		L	en	25	2015	VBA	Very rare and apparently confined in Victoria to the far north-west corner (Lindsay Is.) where found on heavy soils in riverine woodland.	Sept-March	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Swainsona microphylla	Small-leaf Swainson-pea			r	36	2011	VBA	In Victoria mainly confined to the far north west but also near Echuca and collected once on the upper Snowy River near Willis. Grows mostly in light soils on sand hills and sandplains (Walsh and Entwisle 1996).	Jun-Oct	**Possible** Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Incidental observation of this species during the EVC ground truthing assessment in June 2020, immediately outside of the Inundation Area on lower sandy slopes. As targeted surveys have not been undertaken, it is unknown if this species also persists within the Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Swainsona phacoides	Dwarf Swainsona-pea		L	en		2013	AE 2013 report	Apparently rare in Victoria, scattered in seasonally inundated habitats along the Murray Valley downstream from about Echuca (Walsh and Entwisle 1999).	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Swainsona purpurea	Purple Swainson-pea		L	en	2	2011	VBA	In Victoria very rare and known only from the far north-west on the Raak Plains and near Lake Hattah. Grows in low-lying areas or on dunes, usually around lake margins in saline or gypseous soils.	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Swainsona pyrophila	Yellow Swainson-pea	VU		vu			PMST	Rare in Victoria, known only from the far north west where rare. Grows in mallee scrub on sandy or loamy soil and usually found only after fire (Walsh and Entwisle 1996).	Sept-Dec	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Swainsona reticulata	Kneed Swainson-pea		L	vu	54	2013	VBA	Rare in Victoria, mainly in north west, usually growing on alluvial flats in grassland and grassy woodland. Flowers Aug.-Oct.	Aug-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Swainsona sericea	Silky Swainson-pea		L	vu	2	2011	VBA	Rare in Victoria, of disjoint occurrence in north of state where usually found in grassland and grassy woodland (Walsh and Entwisle 1996).	Aug-Oct	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Synaptantha tillaeacea var. *tillaeacea*	Native Madder			vu	1	2011	VBA	Known in Victoria from only two recent collections (1999, 2011) from the Murray River floodplain downstream of Robinvale, where occurring in chenopod shrubland and Black Box (Eucalyptus largiflorens) grassy woodland, and from Neds Corner Station, where occurring in shallow depression in chenopod shrubland. No flowering data.	Unknown	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Tecticornia pterygosperma subsp. *pterygosperma*	Whiteseed Glasswort			r	1	2011	VBA	Uncommon, on gypseous or saline soils in far north-western Victoria, associated with salt lakes, but usually part of the outermost zone of salt-marsh from the lake margin	Nov-March	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Tecticornia triandra	Desert Glasswort			r	36	2012	VBA	In Victoria localized in the far north-west (e.g. Rocket Lake west of Nowingi, Merbein area, Lake Cullulleraine, Lake Wallawalla environs), occurring in samphire or mallee communities.	Aug-Oct	**Present** Identified during the 2019 targeted surveys within the Construction Footprint and within the Area of Investigation. **Impact Likely**. Recorded in targeted surveys of Construction Footprint.	**Present.** Incidental observation of this species during the EVC ground truthing assessment in June 2020. As targeted surveys have not been undertaken, the full extent of this species within the Inundation Area is unknown. . **Impact:** positive to neutral impact expected as the result of the operation of the project.
Templetonia egena	Round Templetonia			vu	5	2008	VBA	In Victoria confined to the north west. Favours deep sandy soils in mallee and woodland communities (Walsh and Entwisle 1996).	Aug-Sept	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Trichanthodium skirrophorum	Woolly Yellow-heads			vu	1	1948	VBA	In Victoria confined to the far north-west, frequently in chenopod shrubland in saline and gypseous soils.	Sept-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Trigonella suavissima	Sweet Fenugreek			r	1	2011	VBA	Apparently confined to the drier north-west of the State where it grows along seasonal watercourses, floodplains and depressions (Walsh & Entwisle 1996).	Sept-Nov	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Tripogon loliiformis	Rye Beetle-grass			r	2	2011	VBA	An uncommon grass of scattered occurrence through drier areas of the state (e.g. Mt Arapiles, basalt plains just west of Melbourne, Strathbogie Ranges, Killawarra Forest near Wangaratta, Beechworth, Suggan Buggan). Usually occurring on shallow soils overlying rock.	Oct-March	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Triraphis mollis	Needle Grass			r	1	1999	VBA	Confined to dry sandy ground of the north west and uncommon to rare. Apparently not favoured by stock and occasionally persisting in semi improved pasture. Flowers all year (Walsh & Entwisle 1996).	All year	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.
Velleia arguta	Grassland Velleia			r	2	2012	VBA	Rare in Victoria, apparently confined to the far north west and the Dimboola district, usually in mallee or grassland (Walsh & Entwisle 1996).	Sept-Jan	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.
Vittadinia condyloides	Club-hair New Holland Daisy			r	1	1986	VBA	Uncommon in Victoria, confined to the north-west, usually occurring in grassland and grassy woodlands on better mallee soils and loams of the Riverina (Walsh & Entwisle 1996).	Oct-Dec	**Unlikely.** No suitable habitat recorded in the Construction Footprint.	**Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated.

Scientific Name	Common Name	EPBC Act	FFG Act	DELWP Advisory	Count	Last VBA Record	Source	Description of Habitat	Flowering time	Construction Footprint: Likelihood of occurrence/impact	Inundation Area: Likelihood of occurrence/impact Note: impact in this column pertains to the hypothetical scenario in which the species is actually present. However, many may not actually be present.
Wahlenbergia tumidifructa	Mallee Annual-bluebell			r		2013	AE 2013 report	All mainland states. Apparently rather rare in Victoria, recorded from sandy flats and shallow depressions in the Big Desert and Hattah-Kulkyne area, and on black soils of the floodplain of the Murray River between Barmah and Strathmerton.	Sept-Oct	**Possible** when conditions are less dry. Some suitable habitat was identified during survey, but not recorded in 2013, 2015 or 2019 surveys. **Impact Unlikely**. Not recorded in any targeted surveys of Construction Footprint.	**Possible.** Could occur in Inundation Area. **Impact:** positive to neutral impact expected as the result of the operation of the project.

Appendix F. Results of Regent Parrot Two Hour Point Surveys

Summary of the results of targeted Regent Parrot nest surveys at Lindsay Island Construction Footprint areas during surveys on 23 October, 14, 18 and 22 November 2019. Surveys were completed from observation points around each of the four Construction Footprints (Berribee Regulator. (Berr_A), Toupnein Creek containment bank. (Berr_D), Little Mullaroo West regulator. (Berr_E) and Little Mullaroo regulator. (Berr_F)), where suitable habitat was been identified for Regent Parrot nesting (large old River Red-gums).

23/10/19. DE & AH

7:21. Site Little Mullaroo regulator. (Berr_F). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

9:32. Site Little Mullaroo West regulator. (Berr_E) – Long containment bank. THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

11:19. Site Toupnein Creek containment bank. (Berr_D). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

13:38. Site Berribee Regulator. (Berr_A). THPS x2

No Regent Parrot breeding activity observed. Some Regent Parrot activity in general area. Two Regent Parrot flew through site but breeding activity not observed or suspected.

14/11/19. DE & RR

7:43. Site Berribee Regulator. (Berr_A). THPS x2

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

9:55. Site Toupnein Creek containment bank. (Berr_D). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

12:21. Site Little Mullaroo regulator. (Berr_F). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

18/11/19. DE, AH, ST & GT

7:34. Site Little Mullaroo regulator. (Berr_F). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

7:37. Site Little Mullaroo West regulator. (Berr_E) – Long containment bank. THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

9:59. Site Toupnein Creek containment bank. (Berr_D). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

12:18. Site Berribee Regulator. (Berr_A). THPS x4

No Regent Parrot breeding activity observed. Some Regent Parrot activity in general area. Two Regent Parrot flew through site but breeding activity not observed or suspected.

22/11/19. RR & ST

8:32. Site Little Mullaroo regulator. (Berr_F). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

10:50. Site Toupnein Creek containment bank. (Berr_D). THPS x2.

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

13:08. Site Berribee Regulator. (Berr_A). THPS x2

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

15:11. Site Berribee Regulator. (Berr_A). THPS x2

No Regent Parrot breeding activity observed. No Regent Parrot activity detected, breeding activity not observed or suspected.

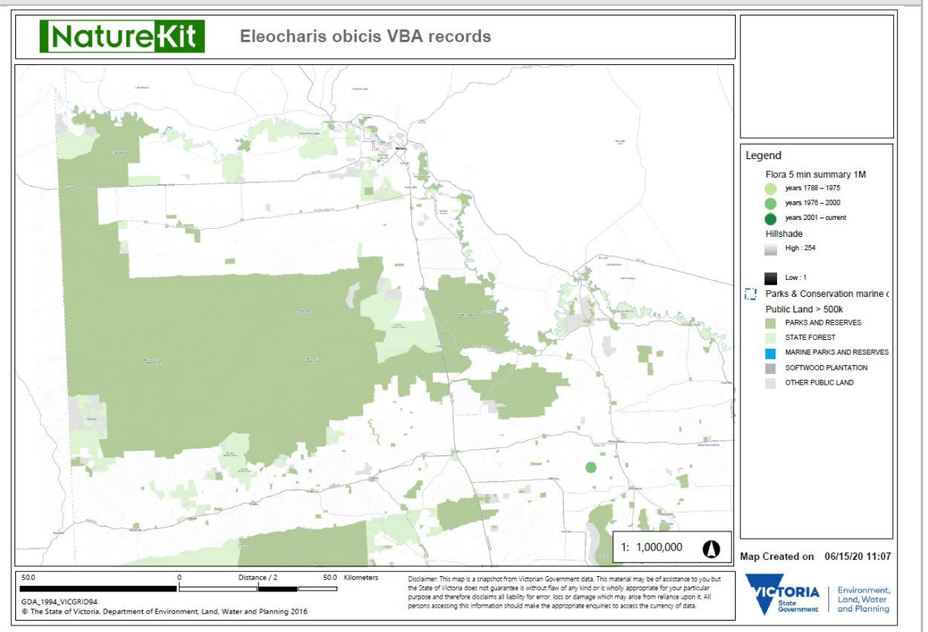
Summary of Regent Parrot Two-hour point surveys

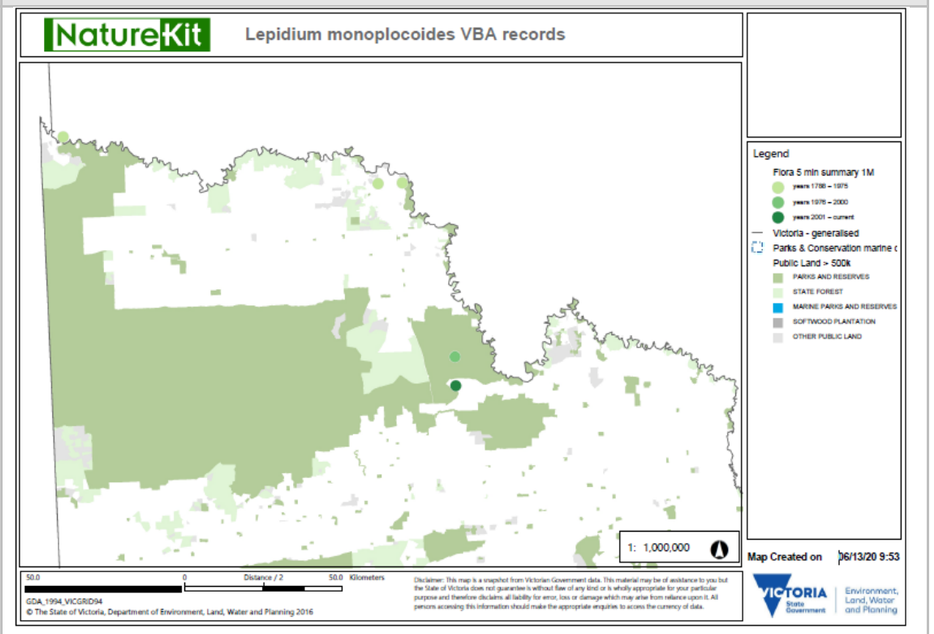
Site	Date and number of THPS	Total THPS
Berribee Regulator. (Berr_A)	23/10/19 (x2). 14/11/19 (x2). 18/11/19 (x4). 22/11/19 (x4).	12
Toupnein Creek containment bank. (Berr_D)	23/10/19 (x2). 14/11/19 (x2). 18/11/19 (x2). 22/11/19 (x2).	8
Little Mullaroo West regulator. (Berr_E)	23/10/19 (x2). 18/11/19 (x2).	4
Little Mullaroo regulator. (Berr_F)	23/10/19 (x2). 14/11/19 (x2). 18/11/19 (x2). 22/11/19 (x2).	8
TOTAL		32

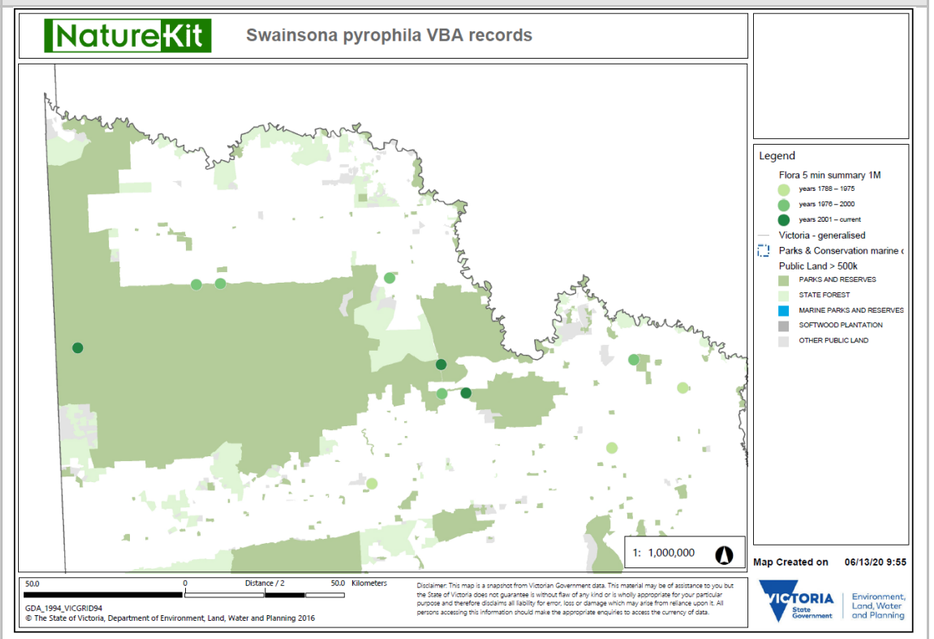
Appendix G. Significance assessment for EPBC Act listed flora

EPBC Act	Below are the significant impact criteria for flora species identified during the PMST search that are listed under the EPBC Act as Vulnerable and Endangered. These species have been considered according to the potential impacts of the construction and operation phases of the project in Victoria. **NB – What is an important population of a species?** An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • Key source populations either for breeding or dispersal • Populations that are necessary for maintaining genetic diversity, and/or • Populations that are near the limit of the species' range **Endangered species - Significant impact criteria** An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will: • Lead to a long-term decrease in the size of a population • Reduce the area of occupancy of the species • Fragment an existing population into two or more populations • Adversely affect habitat critical to the survival of a species • Disrupt the breeding cycle of a population • Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat • Introduce disease that may cause the species to decline, or • Interfere with the recovery of the species. **Vulnerable species - Significant impact criteria** An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • Lead to a long-term decrease in the size of an important population of a species • Reduce the area of occupancy of an important population • Fragment an existing important population into two or more populations • Adversely affect habitat critical to the survival of a species • Disrupt the breeding cycle of an important population • Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline • Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat • Introduce disease that may cause the species to decline, or • Interfere substantially with the recovery of the species.
FFG Act / EE Act	An assessment of the potential for a significant effect on the four EPBC Act listed flora considered for the project was also made under the EE Act 1978, using the *'Ministerial guidelines for assessment of environmental effects under the Environmental Effects (EE) At 1978'* which lists a number of triggers for an Environmental Effects Statement (EES) referral, which for threatened species includes: • Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria. • Matters listed under the Flora and Fauna Guarantee Act 1988: – potential loss of a significant area of a listed ecological community; or – potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or – potential loss of critical habitat; or – potential significant effects on habitat values of a wetland supporting migratory bird species *Note: Additional FFG Act-listed species have not been considered as a part of this significance assessment*

Name and Status	Habitat	Likelihood of Occurrence/Impact	Assessment of Significance under EPBC Act	Assessment of significance under FFG Act and EE Act	Victorian Distribution
Atriplex infrequens VU	Occurs in western NSW, within the northern and southern far western plains regions. It is not known to occur within a conservation reserve (Briggs & Leigh, 1996) and has been recorded from the drier regions of the Bourke District, such as Lake Parnamaroo in 1860; Delalah Downs, undated; and Tarcoola in 1920; and from the Murray-Darling Depression (Wilson, 1984; Morton et al., 1995; Ayers et al., 1996). This species occurs within the Lower Murray Darling and Western (NSW) Natural Resource Management Regions.	**Construction Footprint: Highly Unlikely.** Some suitable habitat present, but only known from NSW. No previous VBA records. **Inundation Area: Highly Unlikely.** Some suitable habitat present, but only known from NSW. No previous VBA records.	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded at Lindsay Island, and in fact is only known to occur in NSW. Therefore there are no important populations of the species present or likely to be impacted by the proposed works. • As the species is known only to occur in NSW, it's unlikely that any areas containing suitable habitat, that would be considered critical to the survival of the species would be impacted by the proposed works. • As the species has not been recorded in Victoria, it is unlikely that the proposed works would impact the lifecycle of this species, or that the works would modify, destroy, remove or isolate or decrease the availability or quality of habitat for this species. • As the species is known only to occur in NSW, it is unlikely that the proposed works would result in invasive species invading habitat for the species, or introducing disease that may cause the species to decline. • As the species is known only to occur in NSW, it's unlikely that the proposed works would interfere with the recovery of the species.	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded at Lindsay Island, and in fact is only known to occur in NSW. Therefore there are no important populations of the species present or likely to be impacted by the proposed works. • The species has not been recorded in Victoria, therefore the works won't impact known habitat or a known population of this species. • The species has not been recorded in Victoria, therefore the works won't impact a genetically important population of the species or any habitat considered critical for the species.	**No known records of this species in Victoria.**

Name and Status	Habitat	Likelihood of Occurrence/Impact	Assessment of Significance under EPBC Act	Assessment of significance under FFG Act and EE Act	Victorian Distribution
Eleocharis obicis **Striate Spike-sedge** VU, vu	Rare, occurring in grasslands, associated with ephemeral wetlands and gilgai hollows	This species was not recorded in either of the targeted threatened flora surveys of the Area of Investigation in 2015 or 2019, but was recorded in a broader flora census undertaken in 2013. During the 2013 survey, the species was recorded by Ecology Australia (EA) on the eastern banks of Lake Wallawalla. The report doesn't confirm the number of individuals that were present. The nearest confirmed (VBA) record of this species is >150 km south-east of the site near Manangatang, VIC (in 1995). Therefore the EA record from 2013 likely suggests significant range extension, and it's likely that the individuals identified would be considered a significant population. **Construction Footprint:** **Possible:** This species was recorded in 2013 to the south of the Project Area, along the eastern banks of Lake Wallawalla. Some suitable habitat was identified during field assessments for the project, but the species was not recorded within the Construction Footprint in 2013, 2015 or 2019. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint. The proposed works will have no direct impact on the location where this species was recorded in 2013. **Inundation Area:** **Possible.** It's possible that there is suitable habitat for this species within the Inundation Area. **Impact:** A positive to neutral impact expected as the result of the operation of the project. Proposed changes to the watering regime will have minimal negative impact of the population of the species, in fact, making Lake Wallawalla more reliably ephemeral, will likely help the species persist in the area.	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded within the Construction Footprint at Lindsay Island, and there will be no direct impacts to an important population of the species. Proposed changes to the watering regime will likely result in Lake Wallawalla becoming more reliably ephemeral, which would help the species persist in the area. • As no individuals/important populations are proposed to be negatively impacted by the works, it's unlikely that the works would reduce the long term occupancy or fragment an existing population. • It is anticipated that the proposed environmental watering will positively affect habitat critical to the survival of the species, both around the edges of Lake Wallawalla and more broadly across the area of inundation. • Survival of this species and potential breeding is dependant of a wetting phase. If an important population of this species occurs in suitable habitat at Lindsay, the proposed works would have a positive effect on the persistence and therefore breeding of this species. • It is anticipated that the proposed environmental watering would increase the availability of habitat / increase the quality of habitat available for this species, and have a positive impact on the species and would not contribute to its decline. • Weed and disease infiltration is possible from the proposed works, and systems must be followed to minimise the impacts of this possibility. However, the species has not been recorded nearby the construction sites, we would not consider it to be core habitat for the species. • The proposed works would not interfere in any negative way in any potential recovery of this species. In fact, it is hoped the watering regime as a result of the works would assist any recovery and persistence of this species.	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded within the Construction Footprint at Lindsay Island, and therefore no losses of individuals or a population are anticipated. • It is anticipated that the proposed environmental watering will have a positive benefit for the species and its habitat, and will likely result in Lake Wallawalla becoming more reliably ephemeral, which would help the species persist in the area. • As the species was recorded in 2013 at Lake Wallawalla in a significant range extension (over 150 km from the nearest known record, VBA record from near Managatang in 1994), it is considered likely that if this population persists it would be considered a significant population. • The proposed environmental watering will benefit potential habitat for this species within the Inundation Area.	

Name and Status	Habitat	Likelihood of Occurrence/Impact	Assessment of Significance under EPBC Act	Assessment of significance under FFG Act and EE Act	Victorian Distribution
***Lepidium monoplocoides* Winged Peppercress** EN, L, en	Uncommon in north western quarter of state, mostly on heavy soils near lakes and watercourses. Flowers mostly spring-summer (Walsh & Entwisle 1996).	**Construction Footprint: Possible** There is a historic record of this species to the west of Lindsay Island from 1948, however this species has not been recorded since this time. Some suitable habitat was identified during field assessments, but this species was not recorded within the Construction Footprint in 2013, 2015 or 2019 surveys. **Impact Unlikely.** Not recorded in any targeted surveys of Construction Footprint **Inundation Area: Possible.** Suitable habitat could be present within the Inundation Area, however this species hasn't been recorded within the Study Area for over 70 years. **Impact:** positive to neutral impact expected as the result of the operation of the project.	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded at Lindsay Island, and despite extensive surveys for this species across the region, the nearest known population is in Hattah-Kulkyne National Park, over 90 km to the south-east. There is a historic record to the west of Lindsay Island, but this record is from 1948 and the species hasn't been recorded within the region since. Therefore there are no populations of the species present or likely to be impacted by the proposed works. • As the species has not been recorded within the region for over 70 years, the works will not decrease the size of a population of this species, reduce the area of occupancy of the species, or fragment an existing population of the species. • As the species has not been recorded within the region for over 70 years, the proposed works are unlikely to affect critical habitat for the species, or to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. • As the species has not been recorded within the region for over 70 years, it is unlikely that the proposed works would impact the lifecycle of individuals within a known population of the species. • As the species is known only to occur in the distinct locations in Victoria, with the closest population over 90 km south-east of Lindsay Island at Hattah-Kulkyne National Park, it is unlikely that the proposed works would result in invasive species invading habitat for the species, or introducing disease that may cause the species to decline. • As the species has not been recorded within the region for over 70 years, it's unlikely that the proposed works would interfere with the recovery of the species.	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded at Lindsay Island, and despite extensive surveys for this species across the region, the nearest known population is in Hattah-Kulkyne National Park, over 70 km to the south-east. There is a historic record to the west of Lindsay Island, but this record is from 1948 and the species hasn't been recorded within the region since. Therefore there are no important populations of the species present or likely to be impacted by the proposed works. • The species has not been recorded within 90 km of Lindsay Island in the last 70 years, therefore the works won't impact known habitat or a known population of this species. • The species has not been recorded within 90 km of Lindsay Island in over 70 years, therefore the works won't impact a genetically important population of the species or any habitat considered critical for the species.	

Name and Status	Habitat	Likelihood of Occurrence/Impact	Assessment of Significance under EPBC Act	Assessment of significance under FFG Act and EE Act	Victorian Distribution
Swainsona pyrophila **Yellow Swainson-pea** VU, vu	Rare in Victoria, known only from the far north west where rare. Grows in mallee scrub on sandy or loamy soil and usually found only after fire (Walsh and Entwisle 1996).	**Construction Footprint: Highly Unlikely.** No suitable habitat recorded in study sites. **Inundation Area: Highly Unlikely.** Suitable habitat is unlikely to be present within the floodplain areas proposed to be inundated	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded at Lindsay Island, and in fact is the closest records in Victoria occur over 50 km to the south at Murray Sunset National Park. Therefore there are no important populations of the species present or likely to be impacted by the proposed works. • The species inhabits mallee scrub, and the nearest known location is >50 km to the south of Lindsay Island. No mallee scrub was identified within the Construction Footprint or in the area of inundation, therefore it's considered unlikely that there is any habitat critical for the survival of this species present. • As the nearest known record of the species is >50 km to the south of Lindsay Island in Victoria, it is unlikely that the proposed works would impact the lifecycle of this species, or that the works would modify, destroy, remove or isolate or decrease the availability or quality of habitat for this species. • As the nearest known record of the species is >50 km to the south of Lindsay Island in Victoria, it is unlikely that the proposed works would result in invasive species invading habitat for the species, or introducing disease that may cause the species to decline. • As the nearest known record of the species is >50 km to the south of Lindsay Island in Victoria, it's unlikely that the proposed works would interfere with the recovery of the species.	It is unlikely that the proposed works will have a significant impact on this species. • The species has not been recorded at Lindsay Island, and the nearest known occurrence is over 50 km away in Murray Sunset National Park. Therefore there are no important populations of the species present or likely to be impacted by the proposed works. • The species has not been recorded within 50 km of Lindsay Island, therefore the works won't impact known habitat or a known population of this species. • The species has not been recorded within 50 km of Lindsay Island, therefore the works won't impact a genetically important population of the species or any habitat considered critical for the species.	

Appendix H. Significance assessment for EPBC Act listed fauna

Below is an assessment of the project in relation to the significant impact criteria contained in the EPBC Act Significant Impact Guidelines 1.1. – Matters of National Environmental Significance (DOTE, 2013) for species listed under the EPBC Act as Vulnerable and Critically Endangered that potentially occur in the project area. The criteria are addressed below for the EPBC Act Vulnerable listed Regent Parrot (eastern) (*Polytelis anthopeplus monarchoides*), Painted Honeyeater (*Grantiella picta*), Growling Grass Frog (*Litoria raniformis*) and Murray Cod (*Maccullochella peelii*), and Critically Endangered Silver Perch (*Bidyanus bidyanus*), and any potential impacts to these species from the proposed works.

NB – What is an important population of a species?

An 'important population' is a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- Key source populations either for breeding or dispersal
- Populations that are necessary for maintaining genetic diversity, and/or
- Populations that are near the limit of the species' range

Regent Parrot (eastern) (*Polytelis anthopeplus monarchoides*) - EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Vulnerable

Summary: Species recorded regularly across the Project Area during fauna surveys in 2012 (GHD 2013), 2013 (GHD 2014) and 2019 (the present study), 34 records in the VBA. Two historic breeding records close to Lock 7, in 1984 and 1985 (VBA). No breeding recorded during targeted Two Hour Point Surveys of suitable areas in 2012 (GHD 2013) and 2019 (the present study).

Lead to a long-term decrease in the size of an important population of a species

The Regent Parrot has been recorded throughout the Lindsay Island area (GHD 2013, GHD 2014 and 2019 (this study)), with two previous records of breeding close to Lock 7 on the Murray River in 1984 and 1985 (VBA), (potentially the same birds in the same tree in consecutive years), within the Project Area.

The proposed Construction Footprints each represent relatively small areas, and four were considered to be in areas of potential Regent Parrot breeding habitat containing large old River Red-gums with suitable hollows at Berribee Regulator (Berr_A), Toupnein Creek containment bank (Berr_D), Little Mullaroo West regulator (Berr_E) and Little Mullaroo regulator (Berr_F). All of these Construction Footprints were targeted for nesting surveys using the standardised two-hour point survey (THPS) method during the breeding season over two years (2013 and 2019), with only small amounts of Regent Parrot activity detected and no nesting activity observed. The siting of Construction Footprints has been in areas that avoid potential Regent Parrot nesting areas; large River Red-gums, resulting in the Construction Footprints avoiding all trees considered to have potential to support Regent Parrot nests. Based on the results of the targeted nest surveys, it is considered unlikely that the proposed actions will lead to a long-term decrease in the size of an important population of this species.

The project is likely to sustain large areas of habitat for this species, by promoting healthy woodlands for foraging (Seran BL&A 2018). Potential Regent Parrot breeding habitat is present within the Inundation Area, and this breeding habitat (large old River Red-gums) is likely to have its condition improved, and therefore future breeding habitat for Regent Parrot sustained by environmental watering. The Regent Parrot is likely to benefit from broadly improved habitat condition following environmental water, and environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.

Reduce the area of occupancy of an important population
The proposed Construction Footprint areas represent less than 0.31% of the potential habitat for this species (47.0 hectares of vegetation communities providing potentially suitable feeding and breeding habitat, within 15,000+ hectares of high quality native vegetation within the surrounding Lindsay Island component of the Murray-Sunset National Park), and are mostly centred on existing tracks and degraded areas. This will not significantly reduce the area of occupancy of this population as the structures will be established on already disturbed tracks and levees. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging (Seran BL&A 2018).
Fragment an existing important population into two or more populations
The proposed Construction Footprints represent small, isolated and discrete areas of habitat within an extensive area of suitable habitat for this highly mobile species, and will not fragment the existing population into two or more populations. Previous similar and larger impacts in this area for The Living Murray projects did not negatively impact Regent Parrot nesting extent and success.
Adversely affect habitat critical to the survival of a species
The proposed Construction Footprints each represent relatively small areas, with four in areas of potential Regent Parrot breeding habitat (Berribee Regulator (Berr_A), Toupnein Creek containment bank (Berr_D), Little Mullaroo West regulator (Berr_E) and Little Mullaroo regulator (Berr_F)). All of these Construction Footprints were targeted for nesting surveys using the standardised two-hour point survey (THPS) method during the breeding season in 2013 and 2019, with little Regent Parrot activity detected and no nesting activity observed. The siting of Construction Footprints has been in areas that avoid potential Regent Parrot nesting areas (only two confirmed nest sites likely to be the same birds in 1984 and 1985 at the mouth of the Mullaroo Creek); large River Red-gums, resulting in the Construction Footprints avoiding all trees considered to have potential to support Regent Parrot nests. Based on the results of the targeted nest surveys, it is considered highly unlikely that the proposed Construction Footprints will remove any potential nesting habitat, or adversely affect habitat critical to the survival of this species, as Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of suitable habitat for this highly mobile species. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging (Seran BL&A 2018). Potential Regent Parrot breeding habitat is present within the Inundation Area, and this breeding habitat (large old River Red-gums) is likely to have its condition improved, and therefore future breeding habitat for Regent Parrot sustained by environmental watering. The Regent Parrot is likely to benefit from broadly improved habitat condition following environmental water, and environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.
Disrupt the breeding cycle of an important population
The Regent Parrot has only ever been recorded breeding in the Lindsay Island Project Area on two occasions; in 1984 and 1985 (VBA), both close to Lock 7, over 1 km from the nearest Construction Footprint at Little Mullaroo regulator (Berr_F) on the Murray River, and potentially the same birds in the same tree in consecutive years. The National Recovery Plan for the Regent Parrot (Baker and Hurley 2011) maps areas of Lindsay Island as potential breeding habitat for this species ('Breeding may occur'), with no areas considered likely breeding habitat. The proposed Construction Footprints each represent relatively small areas, with four in areas of potential Regent Parrot breeding habitat (Berribee Regulator (Berr_A), Toupnein Creek containment bank (Berr_D), Little Mullaroo West regulator (Berr_E) and Little Mullaroo regulator (Berr_F)). All of these Construction Footprints were targeted for nesting surveys using the standardised two-hour point survey (THPS) method during the breeding season in 2013 and 2019, with little Regent Parrot activity detected and no nesting activity observed. The siting of Construction Footprints has been in areas that avoid potential Regent Parrot nesting areas; large River Red-gums, resulting in the Construction Footprints avoiding all trees considered to have potential to support Regent Parrot nests.

Based on the results of the targeted nest surveys, it is considered highly unlikely that the proposed Construction Footprints will remove any potential nesting habitat, or adversely affect habitat critical to the survival of this species, as this species is considered highly unlikely to breed in these areas, and Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of suitable habitat for this highly mobile species.

The project is likely to sustain and enhance large areas of habitat for this species, in particular potential breeding habitat, by promoting healthy woodlands for foraging (Seran BL&A 2018). Potential Regent Parrot breeding habitat is present within the Inundation Area, and this breeding habitat (large old River Red-gums) is likely to have its condition improved, and therefore future breeding habitat for Regent Parrot sustained by environmental watering. The Regent Parrot is likely to benefit from broadly improved habitat condition following environmental water, and environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed Construction Footprints represent relatively small (47.0 ha / 0.31%), isolated and discrete areas of suitable habitat within an extensive area of suitable habitat (over 15,000 ha) surrounded by a much broader landscape (many tens of thousands of hectares) of potential breeding habitat for this species as mapped within the National Recovery Plan (Baker and Hurley 2011).

The proposed Construction Footprints will not impact known nesting trees or areas considered high quality foraging habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Regent Parrot habitat within the area to the extent that the species is likely to decline.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging (Seran BL&A 2018). Potential Regent Parrot breeding habitat is present within the Inundation Area, and this breeding habitat (large old River Red-gums) is likely to have its condition improved, and therefore future breeding habitat for Regent Parrot sustained by environmental watering. The Regent Parrot is likely to benefit from broadly improved habitat condition following environmental water, and environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.

Introduce disease that may cause the species to decline

The proposed construction works are not expected to introduce any avifauna diseases to the Regent Parrot populations of the Project Area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project.

Interfere substantially with the recovery of the species.

The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging (Seran BL&A 2018). Potential Regent Parrot breeding habitat is present within the Inundation Area, and this breeding habitat (large old River Red-gums) is likely to have its condition improved, and therefore future breeding habitat for Regent Parrot sustained by environmental watering. The Regent Parrot is likely to benefit from broadly improved habitat condition following environmental water, and environmental water is essential to sustain the River Red-gums this species requires for breeding habitat.

Painted Honeyeater (*Grantiella picta*) EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Vulnerable

Summary: No previous records of this species within the Project Area.

Lead to a long-term decrease in the size of an important population of a species

The Painted Honeyeater has not been previously recorded within 10 km of the Construction Footprint or Inundation Area, but has the potential to utilise habitats within these areas, and may occasionally forage in mistletoe within areas of woodland. The proposed Construction Footprints are however not likely to significantly impact any areas of important habitat to this extremely mobile nomadic species, which forages widely over large areas in pursuit of mistletoe and flowering eucalypts.

The proposed Construction Footprint represents a relatively small, low quality area of foraging habitat for this highly mobile species, and is considered extremely unlikely to lead to a long-term decrease in the size of an important population of this species. The area does not represent core habitat or range for this species.

Reduce the area of occupancy of an important population

The proposed Construction Footprints are mostly centred on existing tracks and degraded areas wherever possible. This will not significantly reduce the area of occupancy of any population as most structures will be established on previously disturbed tracks and clearances. The area does not represent core habitat or range for this species.

Fragment an existing important population into two or more populations

The proposed Construction Footprints represent small, isolated and discrete areas of habitat within an extensive area of potentially suitable habitat for this highly mobile species, and will not fragment an existing population into two or more populations. The area does not represent core habitat or range for this species.

Adversely affect habitat critical to the survival of a species

The proposed Construction Footprint represents small, isolated and discreet areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and will not fragment an existing population into two or more populations. The area does not represent core habitat or range for this species.

Disrupt the breeding cycle of an important population

The proposed Construction Footprint represents small, isolated and discrete areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to disrupt the breeding cycle of any population of this species. The area does not represent core habitat or range for this species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed Construction Footprint represents small, isolated and discrete areas of habitat within an extensive area of potentially suitable, but largely marginal habitat for this highly mobile species, and it is extremely unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The area does not represent core habitat or range for this species.

The proposed construction works will not impact known or potential nesting trees or suitable foraging habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Painted Honeyeater habitat within the area.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.

Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any avifauna diseases to the Painted Honeyeater populations of the Project Area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project.
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its higher quality breeding and foraging habitats will not be adversely impacted by the proposed works, directly or indirectly. The project is likely to enhance habitat for this species, by promoting healthy woodlands suitable for foraging (Seran BL&A 2018)

Growling Grass Frog (*Litoria raniformis*) - EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Endangered

Summary: Species recorded at one of the Construction Footprints (Toupnein Creek containment bank (Berr_D)) in 2012 (GHD 2013) during a minor flood / high river. No further records from the Project Area from targeted surveys in 2019 (the present study), 25 records in the VBA.

Lead to a long-term decrease in the size of an important population of a species

The Growling Grass Frog is known from the Lindsay Island area and has been previously recorded 25 times within the Project Area (VBA). It was recorded at one of the Construction Footprints (Toupnein Creek containment bank (Berr_D)) in 2012 (GHD 2013) during a minor flood / high river, and has the potential to occur at any of the wet sites on the Murray River or major creeks including the Lindsay River, Mullaroo and Little Mullaroo Creeks, where localised impacts are possible.

The proposed Construction Footprints each represent relatively small, discrete areas, less than 0.31% of the potential habitat for this species (47.0 hectares within 15,000+ hectares of high quality native vegetation within the surrounding National Park), and are centred on existing tracks and degraded areas. Based on the results of the targeted surveys, it is considered unlikely that the proposed actions will lead to a long-term decrease in the size of an important population of this species.

Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from Construction Footprints must consider these aquatic fauna. A construction specific aquatic fauna management plan should be developed for all works around waterways as part of the CEMP. This species is considered likely to benefit from expanded habitat during, and improved habitat condition following environmental water.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands (Seran BL&A 2018).

Reduce the area of occupancy of an important population

The proposed Construction Footprints are centred on existing tracks and degraded areas which are likely to be predominantly dry during the construction process apart from infrastructure planned for the Lindsay River. This will not significantly reduce the area of occupancy of this population as the structures will be established on dry, previously disturbed tracks and areas.

The project is likely to sustain and enhance large areas of habitat for this species, by promoting healthy wetlands for foraging and breeding as previous experience suggests that this species responds rapidly to environmental water application (e.g. Toupnein Creek associated floodplain GHD 2013).

Fragment an existing important population into two or more populations

The proposed Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of potentially suitable habitat for this reasonably mobile species, and will not fragment an existing population into two or more populations. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.

Adversely affect habitat critical to the survival of a species

The proposed Construction Footprints each represent relatively small, discrete areas, less than 0.31% of the potential habitat for this species (47.0 hectares within 15,000+ hectares of high quality native vegetation within the surrounding National Park), and are centred on existing tracks and degraded areas. Based on the results of the targeted surveys, it is considered unlikely that the proposed Construction Footprints will remove any potential critical habitat, or adversely affect habitat critical to the survival of this species.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.

Disrupt the breeding cycle of an important population
The proposed Construction Footprints are predominately in dry areas (apart from the Lindsay River), and construction will occur within these dry areas, which will not disrupt the breeding cycle of any populations of this species within these areas. Based on the results of the targeted surveys, it is considered unlikely that the proposed Construction Footprints will disrupt the breeding cycle of an important population of the Growling Grass Frog, as Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of suitable habitat for this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed Construction Footprints represent relatively small (47.0 ha / 0.31%), isolated and discrete areas of potentially suitable habitat within an extensive area of suitable habitat (over 15,000 ha) surrounded by a much broader landscape (several tens of thousands of hectares) of potential habitat for this species. The proposed Construction Footprints are in predominantly dry areas and will not impact known breeding areas or areas considered high quality habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Growling Grass Frog habitat within the area. Consideration of any in-stream works such as coffer dam construction, dewatering works, and any potential for sediment/ contaminant run-off into wet areas from Construction Footprints must consider these aquatic fauna. A construction specific aquatic fauna management plan should be developed for all works around waterways as part of the CEMP. This species is considered likely to benefit from expanded habitat during, and improved habitat condition following environmental water. The project is likely to sustain and enhance large areas of habitat for this species, by promoting healthy wetland habitats.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.
Introduce disease that may cause the species to decline
Whilst direct impacts from works are not predicted for the Growling Grass Frog, indirect impacts from the proposed works may include the introduction or spread of Chytrid Fungus. Transmission of the disease from vehicles is unlikely. If vehicles traverse between sites and are likely to result in water and mud being transferred to/from other water bodies, hygiene protocols for Chytrid Fungus should be included in a site specific EMP (Murray et al 2011). Additionally if the handling of frogs is required during the proposed works (i.e. during salvage), a suitably qualified and experienced ecologist should be engaged, and employ hygiene protocols identified in Murray et al (2011). The return of environmental watering to the Construction Footprint will restore and enhance important ecological values, including suitable habitat for this species (DEWHA 2010), and many other species reliant of periodic flooding.
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.

Australasian Bittern (*Botaurus poiciloptilus*) - EPBC Act – Endangered, FFG Act – Listed, Victorian Advisory List - Vulnerable

Summary: Species was not recorded during surveys. The closest record occurs 50 km south east.

Lead to a long-term decrease in the size of an important population of a species

In Australia, this species occurs from south–east Queensland to south–east South Australia, Tasmania and in the south–west of Western Australia. The species' Australian extent of occurrence is approximately 1 234 000 km^2 and the area of occupancy is estimated to be around 1150 km^2. Based on survey data from 2010, the total population of the Australasian Bittern in Australia is estimated to be between 250 and 800 individuals (Birds Australia, unpublished data 2010). The population can be divided into two sub–populations, the south–eastern and south–western sub–populations.

The nearest records to the area of investigation are approximately 50 km east on the edge of the floodplain and farmland (VBA 2010), with very few records generally across the broader landscape (). All other records in the VBA are over 20 years old. There are also three records in the ebird database in the vicinity of the area of investigation at Chowilla Game Reserve, South Australia, approximately 30 km to the north west, 2005; Martins Bend near Berri South Australia approximately 100 km to the south west, 2017; and Lake Cullulerraine Recreation Reserve, Victoria approximately 35 km south west, 2018. Each of these records are of a single individual. Whilst there are sporadic records in the area there is a distinct paucity of records for an area so heavily surveyed.

The likelihood of this species using the area of investigation as anything more than an occasional visitor is considered very low given the bulk of the area of investigation lacks the required habitat features for this species (tall, dense aquatic vegetation) and is comprised predominately of woodland and shrubland. Based on the paucity of records from the Lindsay project area, it is considered extremely unlikely that a permanent population of this species exists in the Lindsay project area. It is considered unlikely that the proposed actions will lead to a long-term decrease in the size of an important population of this species.

Given that it is considered unlikely that the species currently persists in the Lindsay area, and that environmental watering of this floodplain could provide habitat suitable for recolonization, the completion of these works may actually increase or re-create an important population of Australasian Bittern.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands (Seran BL&A 2018).

Reduce the area of occupancy of an important population

Based on the paucity of records from the Lindsay project area, it is considered extremely unlikely that a permanent or important population of this species exists in the Lindsay project area.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands for foraging.

Fragment an existing important population into two or more populations

The proposed Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of potentially suitable habitat for this reasonably mobile species, and will not fragment an existing population into two or more populations. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.

Adversely affect habitat critical to the survival of a species

A broad analysis of potential Australasian Bittern habitat (i.e. Ecological Vegetation Classes (EVC) across the Lindsay project Inundation Area that have potential to support this species) was undertaken, and compared with the area of proposed vegetation losses of these EVCs, specifically assessing the extent of wetland and associated EVCs within the Lindsay project Inundation Area. The analysis returned an area of potential habitat of 3008.67 ha (see) to be created and maintained, against an area of just 51.04 hectares (1.70% of the Inundation Area) to be lost in construction footprints. This analysis at least at a broad level demonstrates that there is a large area of potential habitat that may support this species when the appropriate episodic wetland conditions occur, and that the construction footprints represent small isolated patches within this much broader intact landscape of potentially suitable habitat.

Removal of the proposed 51.04 ha, or 0.5 km^2 represents a small trade off (4.4% on the area of occupancy, 1150 km^2) compared to the enhancement and maintenance of the 3008.67 ha (or 30 km^2) of potential habitat from the project.

It is considered unlikely that the proposed Construction Footprints will remove any potential critical habitat, or adversely affect habitat critical to the survival of this species. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.

Disrupt the breeding cycle of an important population

The proposed Construction Footprints are predominately in dry areas, and construction will occur within these dry areas, which will not disrupt the breeding cycle of any populations of this species within these areas.

The likelihood of this species using the area of investigation as anything more than an occasional visitor is considered very low given the bulk of the area of investigation lacks the required habitat features for this species (tall, dense aquatic vegetation) and is comprised predominately of woodland and shrubland. The project is considered unlikely to disrupt the breeding cycle of an important population of this species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed Construction Footprints represent relatively small, isolated and discrete (51.04 ha, or 0.5 km^2 represents a small trade off (4.4% on the area of occupancy, 1150 km^2)), compared to the enhancement and maintenance of the 3008.67 ha (or 30 km^2) of potential habitat from the project.

The proposed Construction Footprints are in predominantly dry areas and will not impact known breeding areas or areas considered high quality habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Australiasian Bittern habitat within the area. This species is considered likely to benefit from expanded habitat during, and improved habitat condition following environmental water.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.

Introduce disease that may cause the species to decline

The proposed construction works are not expected to introduce any avifauna diseases to the Project Area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project.

Interfere substantially with the recovery of the species.

The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.

Australian Painted Snipe (*Rostratula australis*) - EPBC Act – Endangered, FFG Act – Listed, Victorian Advisory List – Critically Endangered

Summary: Species was not recorded during surveys. It is considered unlikely to occur within the Area of Investigation.

Lead to a long-term decrease in the size of an important population of a species

The Australian Painted Snipe is a rare, nomadic bird species that may turn up at any suitable wetland across Australia, when conditions are favourable. This species is widespread but rare throughout most of eastern Australia.

The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (*Melaleuca*). The Australian Painted Snipe sometimes utilises areas that are lined with trees, or that have some scattered fallen or washed-up timber (Marchant & Higgins 1993 within DOE 2020b).

In the vicinity of the area of investigation there are very few records, with none within 10 km of the construction footprint or Inundation Area, and the nearest VBA record from approximately 25 km south. The ebird database shows a vast area largely unoccupied by the species for 250 km or more in every direction with the exception of a single record at Merbein Common near Mildura from 2011. These results are reflective of the rarity of this species in the region, and across Australia.

The likelihood of this species using the area of investigation as anything more than an occasional visitor is considered very low given the bulk of the area of investigation lacks the required habitat features for this species (rank emergent tussocks of grass, sedges, rushes or reeds) and is comprised predominately of woodland and shrubland. Based on the paucity of records from the Lindsay project area and the extreme vagrancy of this species, it is considered almost certain that a permanent population of this species does not exist in the Lindsay project area.

Given that it is considered unlikely that the species currently persists in the Lindsay area, and that environmental watering of this floodplain could provide habitat suitable for recolonization, the completion of these works may actually increase or re-create an important population of Australian Painted Snipe.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands (Seran BL&A 2018).

Reduce the area of occupancy of an important population

Based on the paucity of records from the Lindsay project area, it is considered extremely unlikely that a permanent or important population of this species exists in the Lindsay project area.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands for foraging.

Fragment an existing important population into two or more populations

The proposed Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of potentially suitable habitat for this reasonably mobile species, and will not fragment an existing population into two or more populations. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.

Adversely affect habitat critical to the survival of a species
A broad analysis of potential Australian Painted Snipe habitat (i.e. EVC) across the Lindsay project Inundation Area that have potential to support this species, including waterbodies that will provide habitat as the water recedes) was undertaken, and compared with the area of proposed vegetation losses of these EVCs, specifically assessing the extent of wetland and associated EVCs within the Lindsay project Inundation Area. The analysis returned an area of potential habitat of 3,008.67 ha (see) to be created and maintained, against an area of just 51.04 hectares (1.70% of the Inundation Area) to be lost in construction footprints. Removal of the proposed 51.04 ha, or 0.5 km^2 represents a small trade off compared to the enhancement and maintenance of the 3008.67 ha (or 30 km^2) of potential habitat from the project. It is considered unlikely that the proposed Construction Footprints will remove any potential critical habitat, or adversely affect habitat critical to the survival of this species. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.
Disrupt the breeding cycle of an important population
The proposed Construction Footprints are predominately in dry areas, and construction will occur within these dry areas, which will not disrupt the breeding cycle of any populations of this species within these areas. The likelihood of this species using the area of investigation as anything more than an occasional visitor is considered very low given the bulk of the area of investigation lacks the required habitat features for this species (tall, dense aquatic vegetation) and is comprised predominately of woodland and shrubland. The project is considered unlikely to disrupt the breeding cycle of an important population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed Construction Footprints represent relatively small, isolated and discrete (51.04 ha, or 0.5 km^2) represents a small trade off compared to the enhancement and maintenance of the 3008.67 ha (or 30 km^2) of potential habitat from the project. The proposed Construction Footprints are in predominantly dry areas and will not impact known breeding areas or areas considered high quality habitat, and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Australiasian Bittern habitat within the area. This species is considered likely to benefit from expanded habitat during, and improved habitat condition following environmental water. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.
Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any avifauna diseases to the Project Area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project.
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.

Eastern Curlew (*Numenius madagascariensis*) - EPBC Act – Critically Endangered, FFG Act – Listed, Victorian Advisory List – Vulnerable

Summary: Species was not recorded during surveys. The closest record occurs 40 km south east.

Lead to a long-term decrease in the size of an important population of a species

The Eastern Curlew is a migratory species that breeds outside of Australia. The non-breeding population is estimated at 28,000 individuals (Garnett et al 2010). In Australia the Eastern Curlew primarily inhabits estuaries, mangroves and intertidal flats, primarily throughout coastal areas within every state (Garnett et al 2010, DoE 2015a).

In the vicinity of the area of investigation there are very few records, with none within 10 km of the construction footprint or Inundation Area, and the nearest VBA record from approximately 40 km south. The second closest record in over 60 km east, from 1961.

The likelihood of this species using the area of investigation as anything more than an occasional visitor is considered very low given the bulk of the area of investigation lacks the required habitat features for this species (estuaries, interdental flat etc.) and is comprised predominately of woodland and shrubland. Based on the paucity of records from the Lindsay project area and the extreme vagrancy of this species, it is considered almost certain that a permanent population of this species does not exist in the Lindsay project area.

Given that it is considered unlikely that the species currently persists in the Lindsay area, and that environmental watering of this floodplain could provide habitat suitable for recolonization. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands (Seran BL&A 2018).

Reduce the area of occupancy of an important population

Based on the paucity of records from the Lindsay project area, it is considered extremely unlikely that a permanent or important population of this species exists in the Lindsay project area.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands for foraging.

Fragment an existing important population into two or more populations

The proposed Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of potentially suitable habitat for this reasonably mobile species, and will not fragment an existing population into two or more populations.

Adversely affect habitat critical to the survival of a species

Non-breeding birds of this species occur predominantly in coastal areas. It is considered unlikely that the proposed Construction Footprints will remove any potential critical habitat, or adversely affect habitat critical to the survival of this species. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.

Disrupt the breeding cycle of an important population

The Eastern Curlew does not breed in Australia. The project is considered unlikely to disrupt the breeding cycle of an important population of this species.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposed Construction Footprints are in predominantly dry areas and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Eastern Curlew habitat within the area. This species is considered likely to benefit from expanded habitat during, and improved habitat condition following environmental water.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.

Introduce disease that may cause the species to decline

The proposed construction works are not expected to introduce any avifauna diseases to the Project Area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project.

Interfere substantially with the recovery of the species.

The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly.

The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.

Curlew Sandpiper (*Calidris ferruginea*) - EPBC Act – Critically Endangered, FFG Act – Listed, Victorian Advisory List – Vulnerable

Summary: Species was not recorded during surveys, it is considered unlikely to occur within the area of investigation.

Lead to a long-term decrease in the size of an important population of a species

The Curlew Sandpiper is a migratory species that breeds outside of Australia. The non-breeding population is estimated at 115,000 individuals (Garnett et al 2010). In Australia the Curlew Sandpiper primarily occurs in sand flats, estuaries, brackish lagoons saltmarshes, and less often inland Australia (Garnett et al 2010, DoE 2015b). Non-breeding individuals may remain in Australian during the breeding period (DoE 2015b). Throughout its Victorian distribution the Curlew Sandpiper was once commonly seen through inlets and coastal bays, and sporadically in inland wetlands (DoE 2015b). Preferred foraging habitat includes shallows areas of intertidal mudflats and proximate shallow water.

In the vicinity of the area of investigation there are very few records. According to ALA, there is one record of this species (undated) directly north of the area of investigation, in NSW. The second closest record for this species occurs in South Australia, approximately 35 km west of the Area of Investigation.

The likelihood of this species using the area of investigation as anything more than an occasional visitor is considered very low given the bulk of the area of investigation lacks the required habitat features for this species (e.g. brackish lagoons and salt marshes) and is comprised predominately of woodland and shrubland. Based on the paucity of records from the Lindsay project area and the extreme vagrancy of this species, it is considered almost certain that a permanent population of this species does not exist in the Lindsay project area.

Given that it is considered unlikely that the species currently persists in the Lindsay area, and that environmental watering of this floodplain could provide habitat suitable for recolonization.The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands (Seran BL&A 2018).

Reduce the area of occupancy of an important population
Based on the paucity of records from the Lindsay project area, it is considered extremely unlikely that a permanent or important population of this species exists in the Lindsay project area. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetlands for foraging.
Fragment an existing important population into two or more populations
The proposed Construction Footprints represent relatively small, isolated and discrete areas of habitat within an extensive area of potentially suitable habitat for this reasonably mobile species, and will not fragment an existing population into two or more populations.
Adversely affect habitat critical to the survival of a species
Non-breeding birds of this species occur predominantly in coastal areas. It is considered unlikely that the proposed Construction Footprints will remove any potential critical habitat, or adversely affect habitat critical to the survival of this species. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy woodlands for foraging.
Disrupt the breeding cycle of an important population
The Curlew Sandpiper does not breed in Australia. The project is considered unlikely to disrupt the breeding cycle of an important population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
The proposed Construction Footprints are in predominantly dry areas and therefore will not significantly modify, destroy, remove, isolate or decrease the availability or quality of Curlew Sandpiper habitat within the area. This species is considered likely to benefit from expanded habitat during, and improved habitat condition following environmental water. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Weed infiltration is possible from the proposed works, within the limited areas of construction. Appropriate systems must be set in place and followed to minimise the possibility of weed dispersal and exotic predator control, and will be included in a Construction Environmental Management Plan (CEMP). Impacts to this species from invasive species have not been identified as a threatening process previously and are highly unlikely in this case.
Introduce disease that may cause the species to decline
The proposed construction works are not expected to introduce any avifauna diseases to the Project Area (the greatest chance for this to occur will be transmittal of disease from captive birds to wild birds, with a very low chance of this occurring), particularly with hygiene protocols for vehicles/machinery/staff that will be further described in a CEMP that will be prepared for the project.
Interfere substantially with the recovery of the species.
The proposed construction activities will not interfere substantially with the recovery of the species, as this species and its breeding and foraging habitats will not be impacted by the proposed works, directly or indirectly. The project is likely to sustain and enhance large areas habitat for this species, by promoting healthy wetland habitats.

Murray Cod (*Maccullochella peelii*) - EPBC Act – Vulnerable, FFG Act – Listed, Victorian Advisory List - Vulnerable

Lead to a long-term decrease in the size of an important population of a species

Murray Cod are known from the Lindsay Island area and an important population of the species inhabits the Lindsay-Mullaroo system. Murray Cod have the potential to occur in the Murray River or major creeks including Mullaroo Creek and the Lindsay River. Mullaroo Creek retains a relatively high snag density and water velocities that are significantly faster and stage heights less variable than will occur under natural conditions, providing ideal conditions for Murray Cod (DELWP 2018).

Construction

It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Additional constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further hydrological investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction.

Temporary cofferdams in the Lindsay River at Berribee Regulator will be constructed by sheet piling using barges. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning season for Murray Cod (Sep-Dec) and pile-driving method should, if feasible, use a vibrating hammer above the water line to install sheet piles. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods.

If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Murray Cod as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process.

Localised impacts possible due to sediment/ contaminant run-off from construction sites into waterways will be managed through the CEMP for the project. Construction activities are not likely to result in a long-term decrease in the size of an important population of this species provided the recommended mitigation measures are implemented.

Operation

Under the proposed operating regime there is a high risk that significant impacts to Murray Cod will occur as the Berribee Maximum and Intermediate scenarios are likely to reduce hydraulic complexity (i.e. fast flows) in Mullaroo Creek, which Murray Cod require to complete their life cycle. If not addressed, this could result in a long-term decrease in the size of an important population of this species.

During operation, key measures to protect Murray Cod will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Murray Cod breeding season (October to December). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Murray Cod habitat while still aiming to meet the various ecological objectives for the site.

Reduce the area of occupancy of an important population
Key to protecting Murray Cod will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible (DELWP 2018). If this is not the case, the area of occupancy of the population is likely to be reduced. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Murray Cod breeding season (October to December). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Murray Cod habitat while still aiming to meet the various ecological objectives for the site.
Fragment an existing important population into two or more populations
The existing population in the Lindsay-Mullaroo system is recognised as being a strong population. The project is unlikely to fragment this population if unrestricted upstream and downstream fish passage is provided through the Berribee Regulator and other minor regulators on-site during construction and operation. It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Further constructability investigations will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further hydrological investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction. Design of the Berribee Regulator provides specifically for fish passage via a vertical slot fishway in the south abutment. The proposed fishway is designed to provide for upstream and downstream passage of small, medium and large fish (30-1400 mm long), along with eggs and larvae, during all hydrological scenarios. The Berribee Regulator design also maintains a 1,000 ML/day passing flow to provide suitable attraction for fish towards the fishway. This design criteria means that all life stages of Murray Cod should be able to pass through the regulator during operation and as such it is unlikely that the existing population will be fragmented during operation. A review of the Berribee Regulator design by DELWP (2018) determined that the included design features satisfied key fish passage requirements for this location. An investigation of impacts to Murray Cod within the Murray River, in relation to the operation of Lock 7 and associated fishway, has not been completed as part of this assessment and will be completed as part of future investigations.
Adversely affect habitat critical to the survival of a species
Key to protecting Murray Cod will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible (DELWP 2018). This habitat is likely to be critical to the Lindsay-Mullaroo system but not to the species as a whole. However, loss of this habitat could occur under the current operating scenarios. The project should consider revising the current scenarios to maintain this habitat, especially during the Murray Cod breeding season (October to December). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Murray Cod habitat while still aiming to meet the various ecological objectives for the site. The provision of fish passage at the Berribee Regulator (BERR_A) and passive fish passage at other regulators will allow for fish to exit to the Murray and Lindsay Rivers, provided a suitable drawdown regime is implemented and regulators/fishways are operated to an appropriate standard. This is especially important during anoxic blackwater events. The impact that anoxic blackwater events can have was most recently demonstrated in 2016, when large numbers of fish were killed in the lower and mid-Murray River, Edward-Wakool system, Frenchman's Creek, Rufus River and Mullaroo Creek when unable to escape the anoxic water (Tonkin et al., 2017). Retention of water on the floodplain at locations where drawdown is not proposed (Wallawalla West, Lake Wallawalla and Crankhandle Lower Tier) has the potential to impact fish that cannot escape during drying of the wetlands. It is unlikely that significant numbers of Murray Cod will inhabit these wetland locations but further consideration should be given to whether fish will have the potential to exit these wetlands during a drying phase.

Disrupt the breeding cycle of an important population

Construction

Murray Cod require free passage through the Lindsay River to reach Mullaroo Creek, where the preferred habitat for Murray Cod in the Lindsay-Mullaroo system is located (Tonkin *et al*., 2019).

It is proposed that the Berribee Regulator on the Lindsay River will be constructed in two parts so that approximately a quarter of the width of the Lindsay River will provide for passing flows throughout construction of the regulator. Further investigation will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction.

To allow the construction to take place temporary cofferdams in the Lindsay River at Berribee Regulator will be constructed by sheet piling using barges. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning season for Murray Cod (Oct-Dec) and pile-driving method should, if feasible, use a vibrating hammer above the water line to install sheet piles. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods. Further assessment of construction methodologies and timing is required to determine whether construction activities would significantly disrupt the breeding cycle of an important population.

If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Murray Cod as salinity variation can negatively impact freshwater fish species and could have greater impacts on vulnerable life stages such as egg and larval stages. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement.

Operation

Under the proposed operating regime there is a high risk that significant impacts to Murray Cod will occur as the Berribee Maximum and Intermediate scenarios are likely to reduce hydraulic complexity (i.e. fast flows) in Mullaroo Creek, which Murray Cod require to complete their life cycle.

During operation, key measures to protect Murray Cod will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Murray Cod breeding season (October to December). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Murray Cod habitat while still aiming to meet the various ecological objectives for the site.

Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Under the proposed operating regime there is a high risk that significant impacts to Murray Cod will occur as the Berribee Maximum and Intermediate scenarios are likely to reduce hydraulic complexity (i.e. fast flows) in Mullaroo Creek, which Murray Cod require to complete their life cycle. If not addressed, this could result in a decrease in the availability of quality habitat to an extent that the species could potentially decline.

During operation, key measures to protect Murray Cod will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Murray Cod breeding season (October to December). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Murray Cod habitat, while still aiming to meet the various ecological objectives for the site.

Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
Eleven alien fish species are now established in the Murray-Darling River system, with Carp (*Cyprinus carpio*), Redfin Perch (*Perca fluviatilis*), Goldfish (*Carassius auratus*) and Eastern Gambusia (*Gambusia holbrooki*) the most widespread (National Murray Cod Recovery Team 2010). These species are already established in the vicinity of the project area. The construction phase of the project is not likely to lead to an increase in these species. Inundation of floodplain habitat during the operational phase has a high likelihood of increasing carp populations within wetland habitat and also in aquatic habitat that remains following flood events (DELWP, 2018). Carp are already present on-site. That said, the impact of operation (during floodplain inundation events) will create conditions that are likely to benefit carp, which may negatively impact Murray Cod. Following recommended mitigation measures (see DELWP, 2018) to control carp may minimise their colonisation.
Introduce disease that may cause the species to decline
The likelihood of the introduction of disease during the construction phase is minimal if standard hygiene protocols are implemented. During operation, floodplain inundation is likely to mimic natural flood events so it is unlikely that any disease not already present within the Murray Cod population would be introduced.
Interfere substantially with the recovery of the species.
Threats to Murray Cod have been identified during the construction and operation of the Lindsay Island project which have been identified on a larger scale as being key impacts to recovery of the species (National Murray Cod Recovery Team 2010). Mitigation measures to reduce the impact of construction-related threats (i.e. barriers to fish movement) are likely to minimise threats during the construction phase of the project. During operation, key measures to protect Murray Cod will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Murray Cod breeding season (October to December). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Murray Cod habitat, while still aiming to meet the various ecological objectives for the site.

EPBC Act listed Critically Endangered Species:

Silver Perch (*Bidyanus bidyanus*) - EPBC Act – Critically Endangered, FFG Act – Listed, Victorian Advisory List - Vulnerable

Lead to a long-term decrease in the size of a population

In Victoria, Silver Perch have been recorded from twelve river basins. These include eight basins where populations occur naturally - Upper Murray (Lake Hume stocking), Ovens River, Broken River, Goulburn River, Campaspse River, Loddon River, Murray Riverina and the Mallee. Silver Perch have been introduced into the other four river basins - Wimmera River, Yarra River, Werribee River and Corangamite. The majority of records are from the Goulburn River, Loddon River, Murray Riverina, and Mallee (Clunie and Koehn, 2001).

In terms of habitat, Silver Perch use main river channel habitats for feeding, refuge, spawning, survival and recruitment. They inhabit Lock 11-26 reach of the Murray River because this encompasses the longest unregulated river reach on the main stem of the Murray River and thus provides 500+ km of their preferred flowing water habitat (DELWP, 2018).

Although they are an obligate riverine species, predominantly occupying large fast flowing river regions (e.g. Murray and Darling Rivers) over sand and structure (Clunie and Koehn, 2001; Merrick and Schmida, 1984), they have also been reported in the slow flowing, turbid waters of lower reaches (Rowland 1995). Cadwallader and Backhouse (1983) also suggest they prefer open waters devoid of snags. Small numbers of fish utilise tributaries of main channel and they rarely enter floodplain lakes (DELWP, 2018).

Silver Perch are present in the Murray River and in waterways within Lindsay Island, although in low numbers. Fourteen records exist within the VBA and low numbers have been observed during TLM monitoring (see Ecology Australia, 2019).

Construction

It is proposed that the Berribee Regulator will be constructed in two parts so that approximately quarter the width of the Lindsay River will provide for passing flows and fish passage throughout construction of the regulator. Further investigation will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction.

Temporary cofferdams in the Lindsay River at Berribee Regulator will be constructed by sheet piling using barges. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning season for Silver Perch (Oct-Feb) and pile-driving method should, if feasible, use a vibrating hammer above the water line to install sheet piles. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods.

If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Silver Perch as salinity variation can negatively impact freshwater fish species. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. Any planned discharge will require approval by EPA Victoria, to be assessed through a discharge risk assessment process.

Localised impacts possible due to sediment/ contaminant run-off from construction sites into waterways will be managed through the CEMP for the project. Construction activities are not likely to result in a long-term decrease in the size of a population of this species provided the recommended mitigation measures are implemented.

Operation

As for Murray Cod, maintaining fast flowing hydraulic habitat will be key to protecting the current population of Silver Perch within the Lindsay-Mullaroo system. Following recommended operating regimes and mitigation measures provided by DELWP (2018) will help to avoid a long-term decline in the population within the Lindsay-Mullaroo system. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Silver Perch breeding season (October to February). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Silver Perch habitat, while still aiming to meet the various ecological objectives for the site.

Reduce the area of occupancy of the species

Silver Perch have the potential to occur in the Murray River and major creeks including Mullaroo Creek and the Lindsay River. Mullaroo Creek retains water velocities that are significantly faster and stage heights less variable than will occur under natural conditions, providing ideal conditions for Silver Perch (DELWP 2018).

Key to protecting Silver Perch will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible (DELWP 2018). If this is not the case, the area of occupancy of the population may be reduced. To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Silver Perch habitat while still aiming to meet the various ecological objectives for the site.

Fragment an existing important population into two or more populations

Silver Perch are known from the Lindsay-Mullaroo system. The project is unlikely to fragment this population if unrestricted upstream and downstream fish passage is provided through the Berribee regulator and other minor regulators on-site during construction and operation. Further investigation will be carried out by VMFRP to establish whether the proposed construction method for the Berribee Regulator is likely to allow for fish passage in terms of resulting depth and flow velocity during the construction phase.

Design of the Berribee Regulator provides specifically for fish passage via a vertical slot fishway in the south abutment. The proposed fishway is designed to provide for upstream and downstream passage of small, medium and large fish (30-1400 mm long), along with eggs and larvae, during all hydrological scenarios. The Berribee Regulator design also maintains a 1,000 ML/day passing flow to provide suitable attraction for fish towards the fishway. This design criteria means that all life stages of Silver Perch should be able to pass through the regulator during operation and as such it is unlikely that the existing population will be fragmented during operation. A review of the Berribee Regulator design by DELWP (2018) determined that the included design features satisfied key fish passage requirements for this location.

An investigation of impacts to Silver Perch within the Murray River, in relation to the operation of Lock 7, has not been completed as part of this assessment and will be completed as part of future investigations.

Adversely affect habitat critical to the survival of a species

Key to protecting Silver Perch will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible (DELWP 2018). Loss of this habitat could occur under the current operating scenarios. The project should consider revising the current scenarios to maintain this habitat, especially during the Silver Perch breeding season (October to February). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect Silver Perch habitat while still aiming to meet the various ecological objectives for the site.

Disrupt the breeding cycle of a population
Construction It is proposed that the Berribee Regulator on the Lindsay River will be constructed in two parts so that approximately a quarter of the width of the Lindsay River will provide for passing flows and fish passage throughout construction of the regulator. Further investigation will be carried out by VMFRP to finalise construction methods, which will provide a more accurate estimate of the gap available for passing flows. Further investigations will then establish whether the remaining gap is likely to allow for fish passage in terms of resulting depth and flow velocity likely to occur during construction. To allow the construction to take place temporary cofferdams in the Lindsay River at Berribee Regulator will be constructed by sheet piling using barges. Consideration should be given to the timing of pile-driving placement and also the pile-driving method to minimise impacts to threatened fish present within the Lindsay River. Timing should aim to avoid spawning season for Silver Perch (Oct-Feb) and pile-driving method should, if feasible, use a vibrating hammer above the water line to install sheet piles. Construction during spawning season has the potential to impact fish present, but the magnitude of impact is unclear as impacts of noise and vibration on freshwater fish are largely unknown. If in-water construction is required during the spawning season it is recommended that the lowest impact piling method is employed during these periods. Further assessment of construction methodologies and timing is required to determine whether construction activities would significantly disrupt the breeding cycle of the local population. If disposal of saline groundwater to the Lindsay River is required, there will be potential for negative impacts to Silver Perch as salinity variation can negatively impact freshwater fish species and could have greater impacts on vulnerable life stages such as egg and larval stages. Any discharges would have to meet SEPP (Waters) environmental quality indicators for the region to protect the downstream environment and may require treatment prior to discharge. VMFRP will assess the feasibility of discharging to waterways to meet this requirement. **Operation** Under the proposed operating regime there is a high risk that significant impacts to Silver Perch will occur as the Berribee Maximum and Intermediate scenarios are likely to reduce hydraulic complexity (i.e. fast flows) in Mullaroo Creek, which Murray Cod require to complete their life cycle. During operation, key measures to protect Silver Perch will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Silver Perch breeding season (October to February), while still aiming to meet the various ecological objectives for the site.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline
Under the proposed operating regime there is a high risk that significant impacts to Silver Perch will occur as the Berribee Maximum and Intermediate scenarios are likely to reduce hydraulic complexity (i.e. fast flows) in Mullaroo Creek, which Silver Perch require to complete their life cycle. During operation, key measures to protect Silver Perch will be to operate the system to maintain the integrity of permanent fast-flowing hydraulics of core aquatic habitats in Mullaroo Creek and the upper Lindsay River or to provide these conditions as frequently as possible. The project should therefore consider revising the current scenarios to maintain this habitat, especially during the Silver Perch breeding season (October to February). To address this matter VMFRP will carry out further assessment to refine the proposed operating regime to protect flowing habitat, while still aiming to meet the various ecological objectives for the site.

Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered of critically endangered species' habitat
Eleven alien fish species are now established in the Murray-Darling River system, with Carp *Cyprinus carpio*, Redfin Perch *Perca fluviatilis*, Goldfish *Carassius auratus* and Eastern Gambusia *Gambusia holbrooki* the most widespread (National Murray Cod Recovery Team 2010). These species are already established in the vicinity of the project area. The construction phase of the project is not likely to lead to an increase in these species. Inundation of floodplain habitat during the operational phase has a high likelihood of increasing carp populations within wetland habitat and also in aquatic habitat that remains following flood events (DELWP, 2018). Carp are already present on-site. That said, the impact of operation (during floodplain inundation events) will create conditions that are likely to benefit carp, which may negatively impact Silver Perch. Following recommended mitigation measures (see DELWP, 2018) to control carp may minimise their colonisation.
Introduce disease that may cause the species to decline
The likelihood of the introduction of disease during the construction phase is minimal if standard hygiene protocols are implemented. During operation, floodplain inundation is likely to mimic natural flood events so it is unlikely that any disease not already present within the Silver Perch population would be introduced.
Interfere with the recovery of the species.
Threats to Silver Perch have been identified during the construction and operation of the Lindsay Island project which have been identified on a larger scale as being key impacts to recovery of the species (DSE, 2007). Mitigation measures to reduce the impact of construction-related threats (i.e. barriers to fish movement) are likely to minimise threats during the construction phase of the project. Threats during operation may be minimised by adopting recommendations by DELWP (2018) to protect the existing population.

Appendix I. Assessment of the potential for significant effects on EPBC Act listed fauna under the EE Act referral criteria

A further assessment of the potential for a significant effect on a number of EPBC Act listed fauna identified during the PMST search has been undertaken using the *'Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978'* (EE Act), which lists a number of referral triggers for threatened species including:

- Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria.
- Matters listed under the FFG Act:
  - Potential loss of a significant area of a listed ecological community; or
  - Potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or
  - Potential loss of critical habitat; or
  - Potential significant effects on habitat values of a wetland supporting migratory bird species.

The purpose of this assessment was to provide further detailed information on the potential for significant effects on EPBC-Act listed fauna species to inform the *Environment Effects Act 1978* referral. This assessment has focussed on species that are considered either present or possibly occurring within the construction footprint. The potential presence and impacts on FFG Act listed species and DELWP Advisory listed species is discussed in Section 9 and Appendices D and E.

Although considered unlikely to occur in either the construction footprint or inundation area, the South-eastern Long-eared Bat is also discussed here for completeness as it was identified as potentially impacted in the EPBC Act referral decision notice for the Vinifera Floodplain Restoration Project.

The following EPBC Act listed fauna have therefore been assessed against these referral criteria:

- South-eastern Long-eared Bat (*Nyctophilus corbeni*)
- Growling Grass Frog (*Litoria raniformis*)
- Regent Parrot (eastern) (*Polytelis anthopeplus monarchoides*)
- Painted Honeyeater (*Grantiella picta*)
- Murray Cod (*Maccullochella peelii*)
- Silver Perch (*Bidyanus bidyanus*).

An additional four EPBC Act listed threatened fauna species were identified as possibly occurring within the Inundation Area: Australasian Bittern (*Botaurus poiciloptilus*), Australian Painted Snipe (*Rostratula australis*), Curlew Sandpiper (Calidris ferruginea) and Eastern Curlew (*Numenius madagascariensis*). These have not been discussed further here as suitable habitat is not present within Inundation Areas currently, but would be created by environmental watering. Accordingly these species are likely to benefit from, rather than be impacted by, environmental water when present. These species are assessed in detail in Appendix H.

South-eastern Long-eared Bat (*Nyctophilus corbeni*)

This species is listed as threatened under the FFG Act and Vulnerable under the EPBC Act.

An assessment of the South-eastern Long-eared Bat within the proposed Lindsay Project construction footprint and immediate vicinity is provided below, with each of the relevant EE Act referral triggers assessed.

Potential long-term loss of a significant proportion (e.g. one to five percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria

The Corben's Long-eared Bat is not considered likely to occur within the construction footprint or Inundation Area of the Lindsay project. This species has not been recorded previously within 10 km of the project, with the nearest record from over 30 km east, in NSW (**Figure 8** and **Figure 9**). It has been considered further due to it's relatively poorly understood status in Victoria in regards to habitat preferences and use. This species has a scattered distribution, mostly within the Murray-Darling Basin, but with some records outside of this area. It is recorded in mallee, Buloke *Allocasuarina luehmannii* and box eucalypt dominated communities, and most common in box/ironbark/cypress-pine vegetation. In central Victoria it has been recorded in areas of Black Box along creek lines in an agricultural landscape (at Bullock Creek near Terrick Terrick National Park). It roosts in tree hollows, crevices and under loose bark, and is a slow flying agile bat that hunts for non-flying prey, especially caterpillars and beetles (OEH 2012). Threats to the species include habitat loss and fragmentation, fire and reduction of hollow availability.

The closest records in Victoria to the Lindsay project area are in Mallee vegetation around the Hattah township and Hattah-Kulkyne National Park, over 100 km away (**Figure 8**). Corben's Long-eared Bat has been recorded twice in NSW approximately 30-40 km from the Lindsay project area (**Figure 9**), both in 1999. These records, and others in south-western NSW are all from Mallee and Belah vegetation communities. It is considered unlikely that this species utilises habitats within the Lindsay project area, and that if it does occur, it is likely to be in extremely low numbers that would not be impacted by the proposed works or could be mitigated by preclearance surveys and hollow-bearing tree management protocols in the highly unlikely event that an South-eastern Long-eared Bat is encountered during site development.

In the unlikely occurrence of this species in the construction footprint, impacts as a result of vegetation removal and potential habitat loss will be localised, and therefore resultant impacts to the species are expected to be negligible. However, broader mitigation measures for hollow-dependent species as outlined previously in Section 9.3 will also apply to threatened bats including South-eastern Long-eared Bat, including pre-clearance surveys and hollow-bearing tree management in the unlikely event that a Corben's Long-eared Bat/s were detected.

No Australian, Victorian, or north-western range population estimates for South-eastern Long-eared Bat are available, but given the broad distribution of the species the total number of mature individuals is likely to be greater than 10 000. Based on the paucity of records from the Lindsay project area, it is considered very unlikely that a permanent population of this species exists in the Lindsay project area. It is therefore considered highly unlikely that the Lindsay project will lead to a long-term loss of 1-5% of the Victorian population of the South-eastern Long-eared Bat.

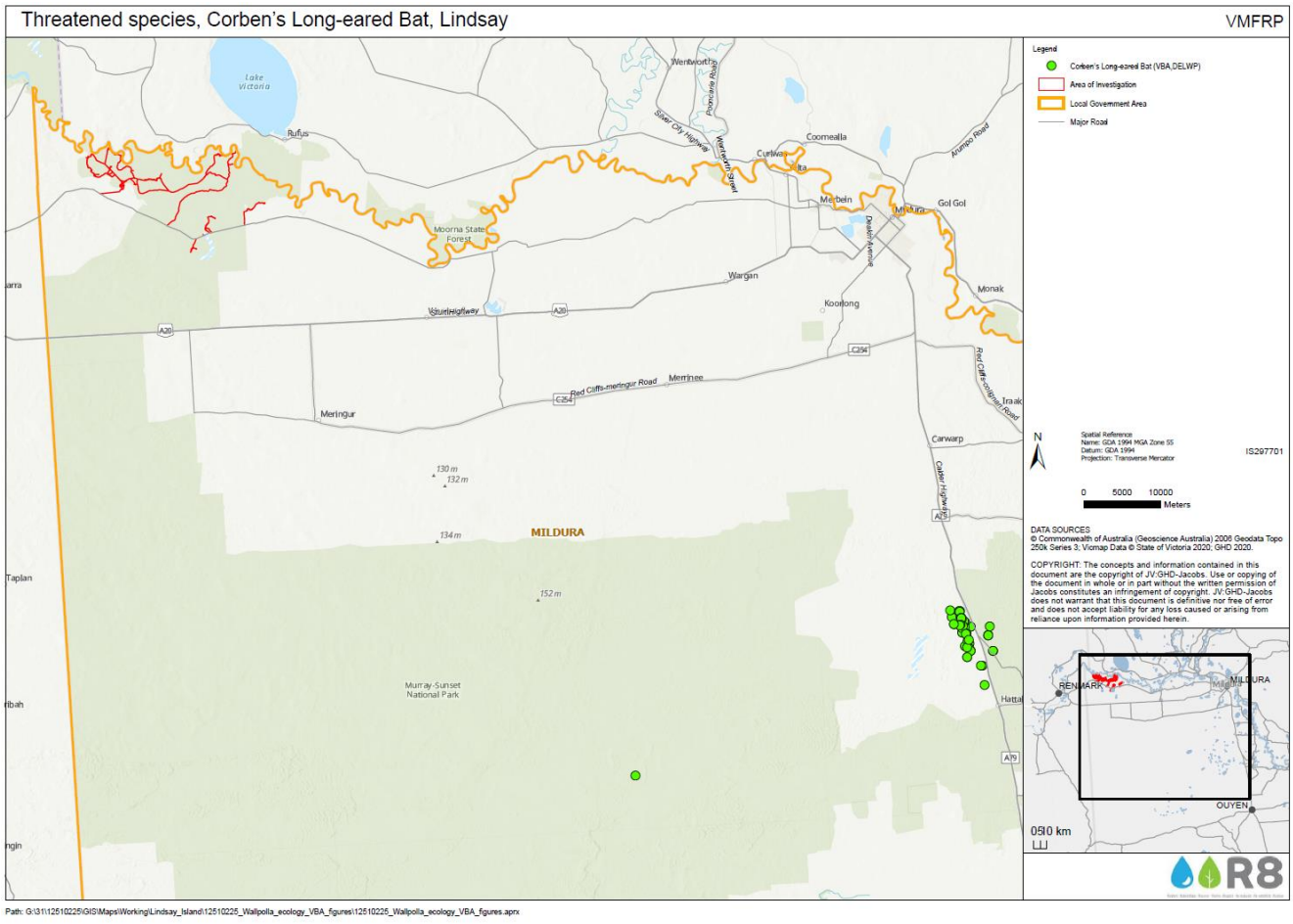


Figure 8 South-eastern Long-eared Bat records from the Victorian Biodiversity Atlas

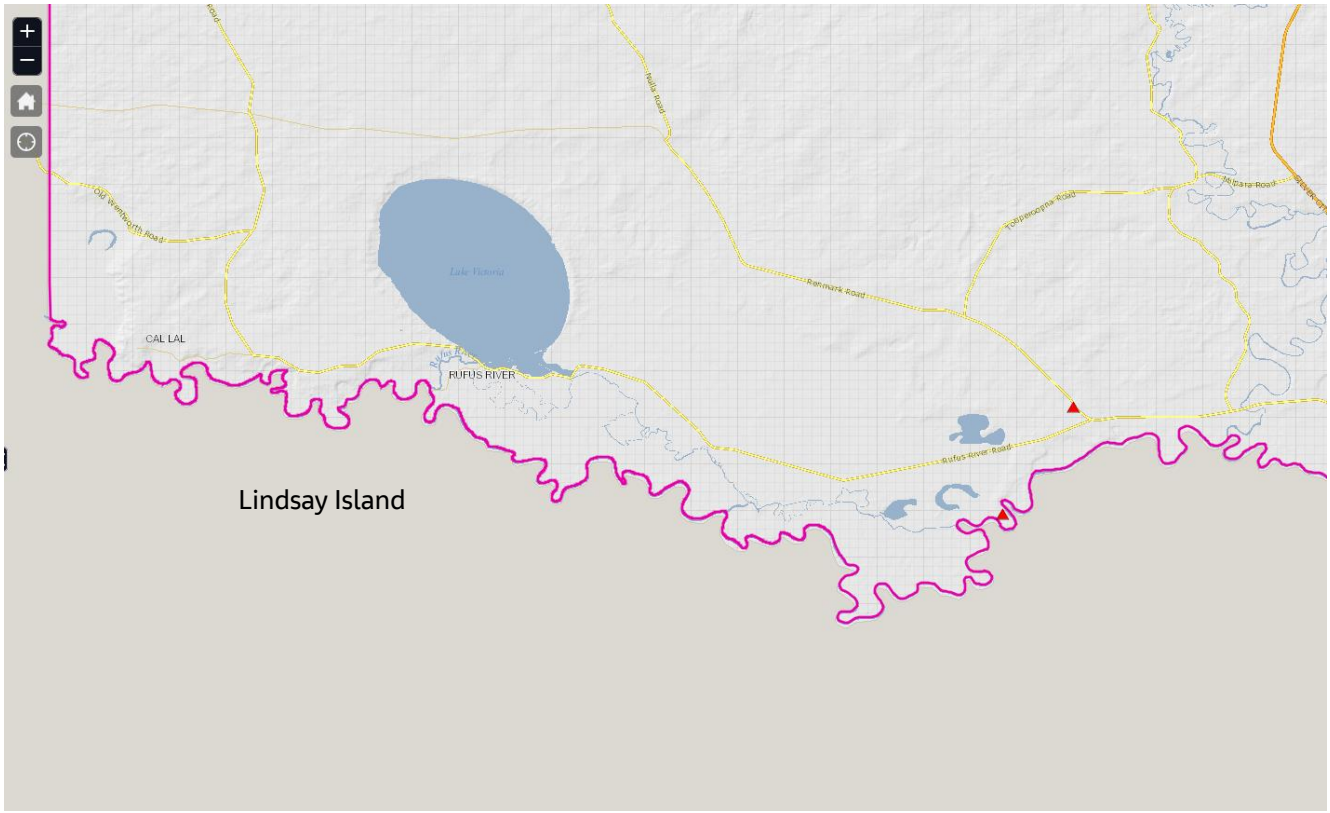


Figure 9 South-eastern Long-eared Bat records from the NSW Wildlife Atlas

Matters listed under the Flora and Fauna Guarantee Act 1988 – questions of relevance to the South-eastern Long-eared Bat:

- **potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or**
- **potential loss of critical habitat.**

As discussed above, the proposed Lindsay project will not result in the loss of preferred habitat for the South-eastern Long-eared Bat and will result in the loss of an extremely small area of low-value potential habitat only. The proposed construction footprint areas represent less than 0.42% of the potential habitat for this species in the area (105.89 hectares within 25,000+ hectares of open woodland and shrubland), and are centred on existing tracks and degraded areas. This will not significantly reduce the area of occupancy of any potential population as the structures will be established on already disturbed tracks and clearings. As discussed above, the project is highly unlikely to result in the loss of 1-5% of the Victorian proportion of the population of South-eastern Long-eared Bat and in fact the trade-off of the loss of a small area of sub-optimal potential habitat (105.89 ha) is the future maintenance of a large area of potential woodland habitat in the 5,108 ha inundation area.

The Lindsay project will not result in the fragmentation of important South-eastern Long-eared Bat habitat as the area is unlikely to presently support a population of this species, and contains limited potential habitat. The proposed construction footprint areas will not adversely affect habitat critical to the survival of this species, as construction footprints represent small, isolated and discrete areas of habitat within an extensive area of low-value potential habitat. Operation of the proposed Lindsay project to deliver environmental water to these areas has the potential to improve and maintain a large area of potential woodland habitat in the 5,671 ha Inundation Area.

If external populations of this species use or recolonise the area, it is likely that these works may increase connectivity for this species across the landscape and Mallee region.

The South-eastern Long-eared Bat occurs as a single broad national population across Victoria, New South Wales, southern Queensland and far eastern South Australia. There are no distinct genetic populations listed or reported and as such the project is unlikely to adversely impact on a genetically important population of this highly mobile species, as it is unlikely to impact any individuals of the species.

Growling Grass Frog (*Litoria raniformis*)

This species is listed as threatened under the FFG Act and Vulnerable under the Federal EPBC Act.

An assessment of the Growling Grass Frog within the proposed Lindsay Project construction footprint and immediate vicinity is provided below, with each of the relevant EE Act referral triggers assessed.

Potential long-term loss of a significant proportion (e.g. one to five percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria

The Growling Grass Frog is one of the largest frog species in Australia, and was once distributed across a large area of south-eastern Australia, including Tasmania. The species was previously widespread across Victoria and absent only from the western desert regions and the eastern alpine regions (Littlejohn 1963; Littlejohn 1982; Hero et al. 1991 in Mahony 1999). The species has disappeared from most of its former range across Victoria, and persists in isolated populations in the greater Melbourne area, in the south-west of Victoria and a few sites in central Victoria and Gippsland (Atlas of Victorian Wildlife database cited in Clemann and Gillespie 2004).

This species is mostly found amongst emergent vegetation (Robinson 1993), including *Typha* sp. (Bulrush), *Phragmites australis* (Common reed) and *Eleocharis* sp.(sedges), in or at the edges of still or slow-flowing water bodies such as lagoons, swamps, lakes, ponds and farm dams (NSW DEC 2005). The Growling Grass Frog can be found floating in warmer waters in temperatures between 18–25°C. Additionally, this species can occur in clays or well-watered sandy soils; open grassland, open forest, and ephemeral and permanent non-saline marshes and swamps. Growling Grass Frog specifically require areas of basking habitat (such as emergent aquatic vegetation or logs), breeding habitat (shallow freshwater lagoons) and refuge habitat (typically soil cracks, fallen timber and dense low vegetation).

Submerged vegetation is important habitat for breeding success as it provides egg-laying sites, calling stages for males, and food and shelter for tadpoles. Grassland provides habitat for foraging, dispersal and shelter, and may also provide overwintering sites for Growling Grass Frogs (Clemann & Gillespie 2004; Hamer & Organ 2006). Hamer and Organ (2006) found that large and relatively permanent waterbodies, with a high proportion of emergent vegetation cover, were more likely to be occupied by the Growling Grass Frog.

The Growling Grass Frog is a highly mobile species, capable of moving up to one kilometre in 24 hours (K. Jervis undated, pers. comm. cited in Robertson et al. 2002; S. Wassens undated, per. comm. cited in NSW DEC 2005). Recent research suggests that, in areas other than the semi-arid/riverine part of the species' range, there are interactions between neighbouring populations (Clemann and Gillespie 2004). When the Growling Grass Frog is occupying ephemeral waterbodies, it has significantly higher levels of dispersal than in permanent waterbodies, indicating lower site fidelity, with individuals moving large distances (Wassens 2005).

The Growling Grass Frog is considered to be present at the Lindsay project, having been recorded 25 times previously within 10 km of the construction footprints and Inundation Area, including at one of the proposed construction sites on Toupnein Creek (Berr_D regulator). This species has the potential to utilise habitats within the some of the proposed construction areas and is known to be present within the broader Inundation Area. Other nearby populations are known from Mulcra Island (10 km east of the site (**Figure 10**)). This species is capable of dispersing large distances, and in times of broadscale flooding this is particularly likely.

A broad analysis of potential Growling Grass Frog habitat (i.e. Ecological Vegetation Classes (EVC) across the Lindsay project Inundation Area that have potential to support this species) was undertaken, and compared with the area of proposed vegetation losses of these EVCs, specifically assessing the extent of wetland and associated EVCs within the Lindsay project Inundation Area. The analysis returned an area of potential habitat of 3,008.67 ha (see **Table 17**) to be created and maintained, against an area of just 51.04 hectares (1.70% of the Inundation Area) to be lost in construction footprints. This analysis at least at a broad level demonstrates that there is a very large area of potential habitat that is likely to support this species when the appropriate episodic wetland conditions occur, and that the construction footprints represent relatively small isolated patches within this much broader intact landscape of potentially suitable habitat.

Table 17 Area of potential habitat and vegetation loss for Growling Grass Frog

EVC No.	EVC Name	Inundation Area (Ha)	Vegetation Losses (Ha)
104	Lignum Swamp	163.80	7.21
200	Shallow Freshwater Marsh	19.34	0
808	Lignum Shrubland	1431.89	1.03
810	Floodway Pond Herbland	23.80	0.75
813	Intermittent Swampy Woodland	814.72	14.11
818	Shrubby Riverine Woodland	237.36	7.3
823	Lignum Swampy Woodland	127.24	20.64
992	Waterbody – Fresh	190.52	0
	TOTAL	**3,008.67**	**51.04**

According to Clemann and Gillespie (2012) within the broad distribution of the Growling Grass Frog, there are two apparently distinct biogeographical groups, differentiated by differences in biology and ecology. Populations at Lindsay align with those in the northern and western parts of its range (NSW and parts of Victoria and South Australia bordering the Murray River), where breeding is triggered by flooding of ephemeral waterbodies during spring or summer, and the larval period can be as short as two months (Schultz 2007, 2008).

In this area the frogs are concentrated in refugia prior to flooding, then disperse across the landscape during flooding / breeding events (Wassens 2006; Schultz 2007). Much of the habitat for this species has been isolated or fragmented, restricting the opportunity for important population processes such dispersal and colonisation. Populations persist in scattered localities throughout lowland regions, particularly along major watercourses. Populations of Growling Grass Frogs in the Mallee region do persist along the Murray River, such as at Lindsay Island in the far north-west, but are likely to have become limited, isolated and fragmented through the lack of regular inundation of the floodplain and provision of suitable areas of habitat between sites, in the form of shallow waterbodies. The operation of the Lindsay project to inundate areas of typically dry floodplain with environmental water is likely to promote breeding by this species, and potentially re-connect isolated populations.

Major watercourses such as the Murray River within the species' range have been substantially altered by impoundments, river regulation and irrigation release schemes. Alterations to the timing, frequency and extent of flooding events have resulted in dramatic changes to many natural processes, such as preventing or greatly reducing spring flood events across natural floodplains. Cold water releases from impoundments have had a considerable impact on downstream ecological processes and native fish populations (MDBC 2003), and are likely to adversely affect the development rates and survivorship of frog eggs and tadpoles. Natural flooding of floodplains probably triggered breeding activity in semi-arid areas in the past (Wassens 2006), and altered hydrological regimes have grossly modified natural processes around extant populations.

No Australian, Victorian, or north-western Victorian range population estimates for Growling Grass Frog are available, but the total number of mature individuals is likely to be <10 000 nationally. Based on the relatively low numbers of records from the Lindsay project area, despite numerous targeted surveys of the area in the last 10 years, it is considered probable that any permanent population of this species in the Lindsay project area is likely to be small and confined to permanent wetlands when there is no flooding. It is therefore considered highly unlikely that the Lindsay project will lead to a long-term loss of 1-5% of the Victorian population of the Growling Grass Frog.

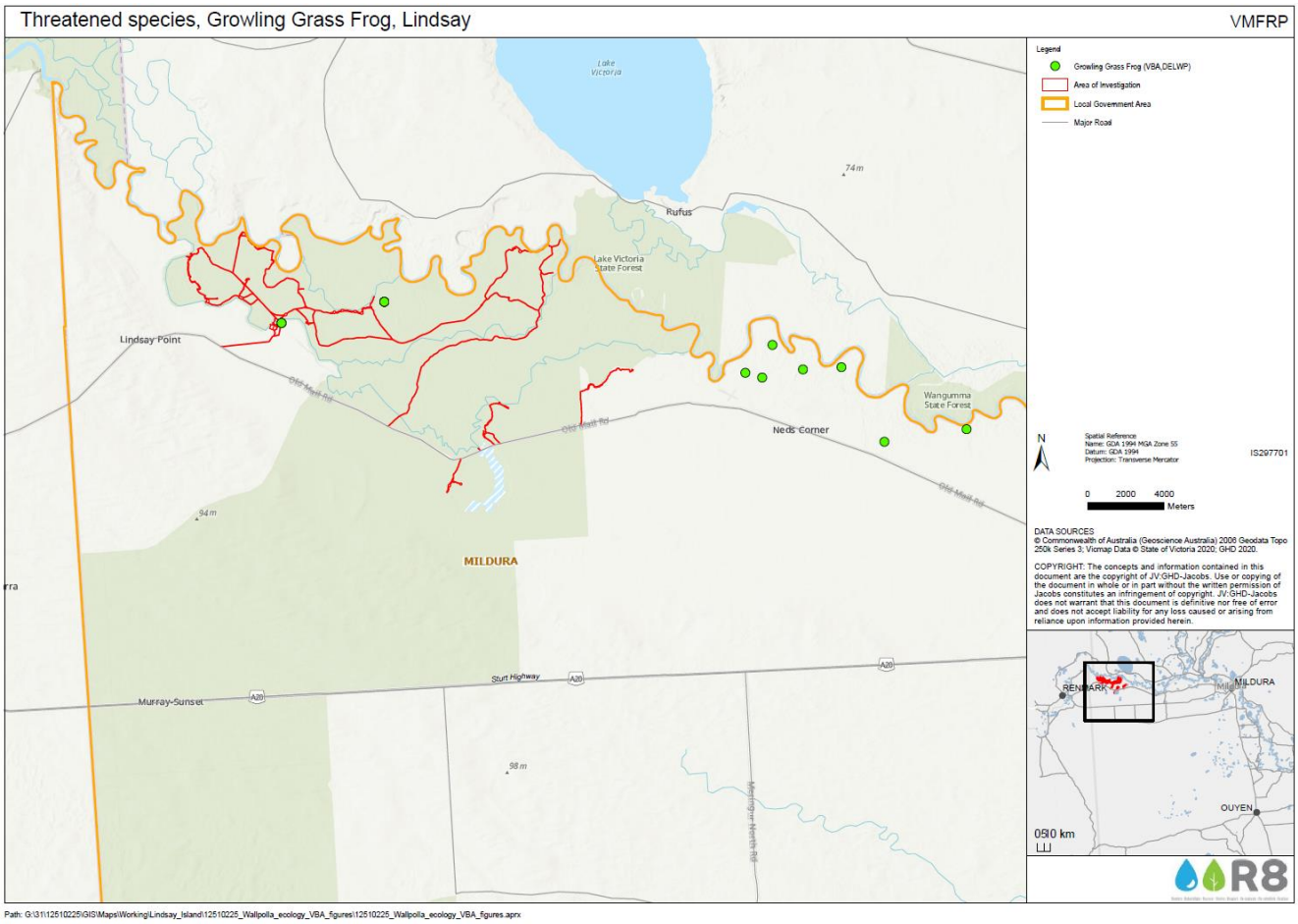


Figure 10 Growling Grass Frog records from the Victorian Biodiversity Atlas

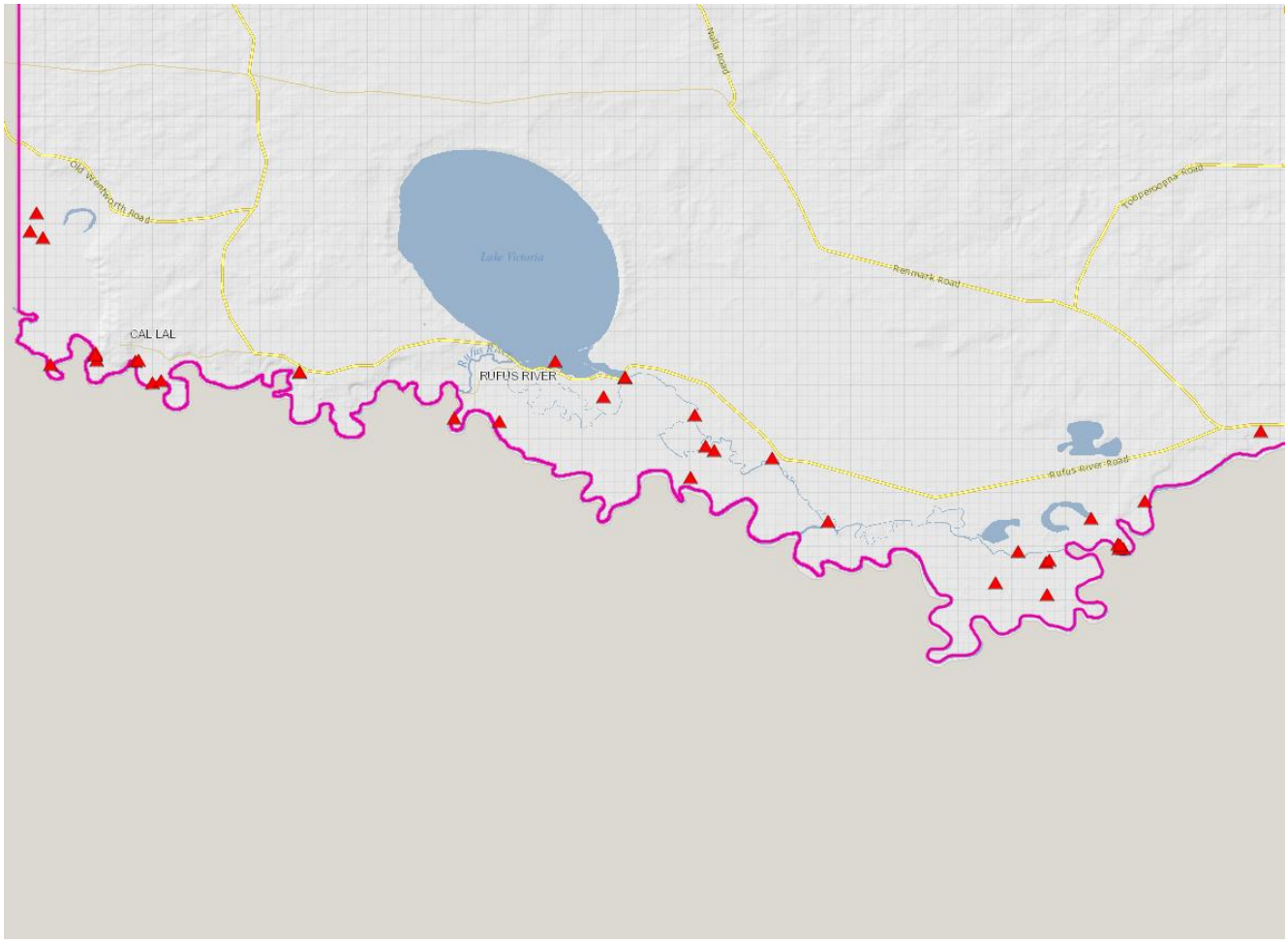


Figure 11 Growling Grass Frog records from the NSW Biodiversity Atlas

Matters listed under the Flora and Fauna Guarantee Act 1988 – questions of relevance to the Growling Grass Frog:

- **potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or**
- **potential loss of critical habitat**

As discussed above, the proposed Lindsay project will not result in the loss of preferred habitat for the Growling Grass Frog as construction footprints are predominately dry, and the few wet areas do not contain emergent vegetation. Construction footprints will result in the loss of a small proportion of low quality potential habitat only. The proposed construction footprint areas represent only 1.70% of the potential habitat for this species in the area (51.04 hectares of wetland EVCs within 3,008.67 hectares of high quality, suitable wetland EVCs within the Inundation Area, as per **Table 17** above), and are centred on existing tracks and degraded areas. This will not significantly reduce the area of occupancy of this population as the structures will be established on already disturbed tracks and clearings. As discussed above, the project will almost certainly not result in the loss of 1-5% of the Victorian proportion of the population of Growling Grass Frog and in fact the trade-off of the loss of a small area of sub-optimal potential habitat (51.04 ha) is the creation and future maintenance of a large area (3,008.67 ha) of potential Growling Grass Frog habitat in the 5,108 ha inundation zone.

The Lindsay project will not result in the fragmentation of important Growling Grass Frog habitat as the project area presently contains very limited potential habitat, and the proposed construction footprint areas will not adversely affect habitat critical to the survival of this species, as construction footprints represent very small, isolated and discrete areas of low quality habitat within an extensive area of rarely used habitats. Operation of the proposed Lindsay project to deliver environmental water to these areas will almost certainly create and maintain a large area (3,008.67 ha) of potential Growling Grass Frog habitat in the 5,108 Ha inundation zone. If local populations of this species recolonise otherwise dry areas, it is likely that these works may increase the size and connectivity of populations of this species across the landscape and lower-Murray/Mallee region.

The Growling Grass Frog occurs as a broad national population across Victoria, New South Wales, South Australia and Tasmania. As noted previously this species occurs in two apparently distinct populations, of which animals at Lindsay will be considered part of the NSW and Murray River ephemeral waters population. Despite this, the project is unlikely to adversely impact on a genetically important population of this species, as it has the potential to provide an increased and improved area of habitat that may help link otherwise disjointed populations upstream and downstream of the Lindsay project area. The National Recovery Plan for the Growling Grass Frog also states that 'In addition, a population of *L. raniformis* could be considered an important population if it is near the limit of the species' range (for example small isolated populations in South Australia)' (Clemann and Gillespie 2012), and any population in the Lindsay project area is close to the northern or north-western limit of the species distribution, and may therefore be considered an important population. Given that is it considered unlikely that the construction footprint will impact important or high quality habitat, and that environmental watering of this floodplain will provide habitat suitable for recolonization, the completion of these works will almost certainly increase an important population of Growling Grass Frog if present.

Regent Parrot (eastern) (*Polytelis anthopeplus monarchoides*)

This species is listed as threatened under the FFG Act and Vulnerable under the Federal *EPBC Act*.

An assessment of the Regent Parrot population within the proposed Lindsay construction footprint and immediate vicinity is provided below, with each of the relevant EE Act referral triggers assessed.

Potential long-term loss of a significant proportion (e.g. one to five percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria.

The Regent Parrot typically nests within suitable hollows of River Red-gum (*Eucalyptus camaldulensis*), with the male initially travelling up to 20 km to forage within mallee habitats, returning to feed the female (when incubating eggs) and later the nestlings (Higgins 1999). There are 34 records of this species from within 10 km of the construction and Inundation Areas in the VBA (**Figure 12**), and the species has been observed numerous times across the Area of Investigation during surveys in 2012 (GHD 2013), 2013 (GHD 2014) and 2019 (this study), and at a number of the Construction Footprints, with potential breeding habitat (nest trees) identified within four of the proposed Construction Footprints (Berribee regulator (Berr_A), Toupnein Creek containment bank (Berr_D), Little Mullaroo West regulator (Berr_E) and Little Mullaroo regulator (Berr_F)). Breeding activity by this species has only been confirmed within the broader Lindsay Island area on two previous occasions; in 1984 and 1985 (VBA), both close to Lock 7 (potentially the same birds in the same tree in consecutive years). It is not clear if these breeding attempts were successful.

Experience from the previous, similar Hattah The Living Murray (TLM) project made identifying potential Regent Parrot nest trees at proposed infrastructure and Construction Footprints at Lindsay a priority. Detection and avoidance of potential Regent Parrot nest trees and colonies has been a key consideration of the Lindsay Island project from its inception, and prompted the initial targeted surveys using the Two Hour Point Survey (THPS) method for this species in 2012. Well studied Regent Parrot nesting colonies at Hattah, Yungera Island and Peacock Creek in NSW (Webster 2002, Webster 2004, Webster & Belcher 2005, Webster & Belcher 2008, GHD 2009, GHD 2013, GHD 2014) have shown these colonies to be located at the particularly large River Red-gums which frequently grow at the confluences of major creeks and tributaries of the Murray River, the locations where large, key water management infrastructure is required to direct or retain water into and from the floodplain. Planning throughout the Lindsay Island project has made allowance for and prioritised survey for this species.

The four sites containing potential Regent Parrot breeding habitat were all subsequently targeted for further investigation. A total of 22 targeted surveys for Regent Parrot nest trees were completed in 2012 and 32 targeted surveys in 2019 (Table 3 in main report and **Figure 12**), using the Two-Hour Point Survey method during the breeding period October and November. Low levels of Regent Parrot activity were observed in each of these areas, no breeding activity was observed, and it is considered very unlikely that nesting was occurring at these sites. The results of these surveys are provided in detail in section 4.4.1.

It is currently estimated that approximately 1,500 birds exist within SE Australia, with 500 – 750 birds in Victoria (Sluiter et al., 2007, Garnett et al., 2010, Hurley 2014), with this number stabilising (V. Hurley pers. comm.). Additionally, recent (though unsubstantiated) surveys in the Annuello Flora and Fauna Reserve recorded as many as 1,600 Regent Parrots (Parks Victoria 2016). Based on the EE referral triggers, the current proposal for the Lindsay Project will need to result in the loss of approximately 5-25 birds (1-5% of 500 birds, which is based on a conservative appraisal of a lower population estimate rather than the up to 1,600 birds possibly observed at Annuello).

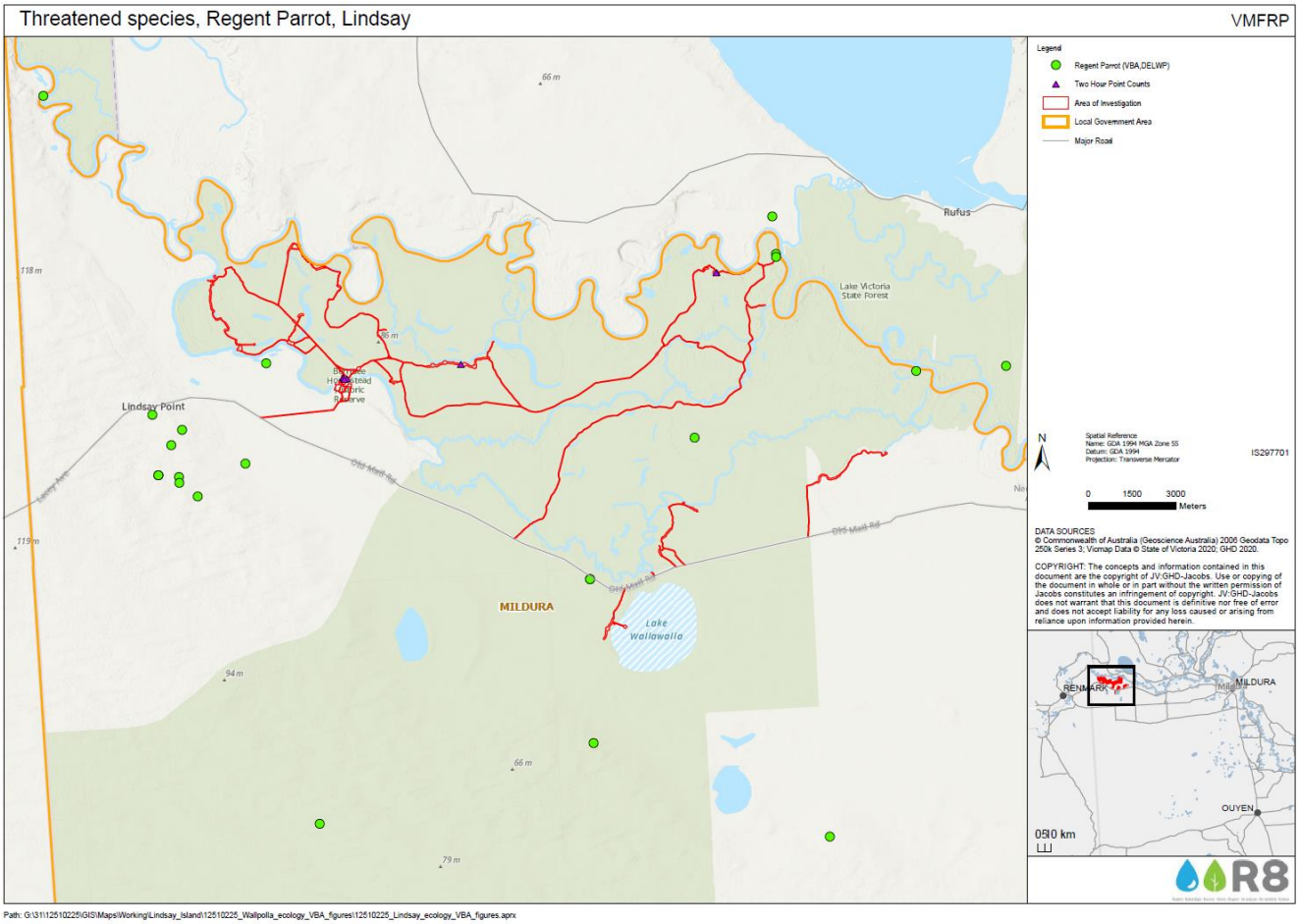


Figure 12 Regent Parrot records and targeted nest surveys (two hour point counts) from the Victorian Biodiversity Atlas

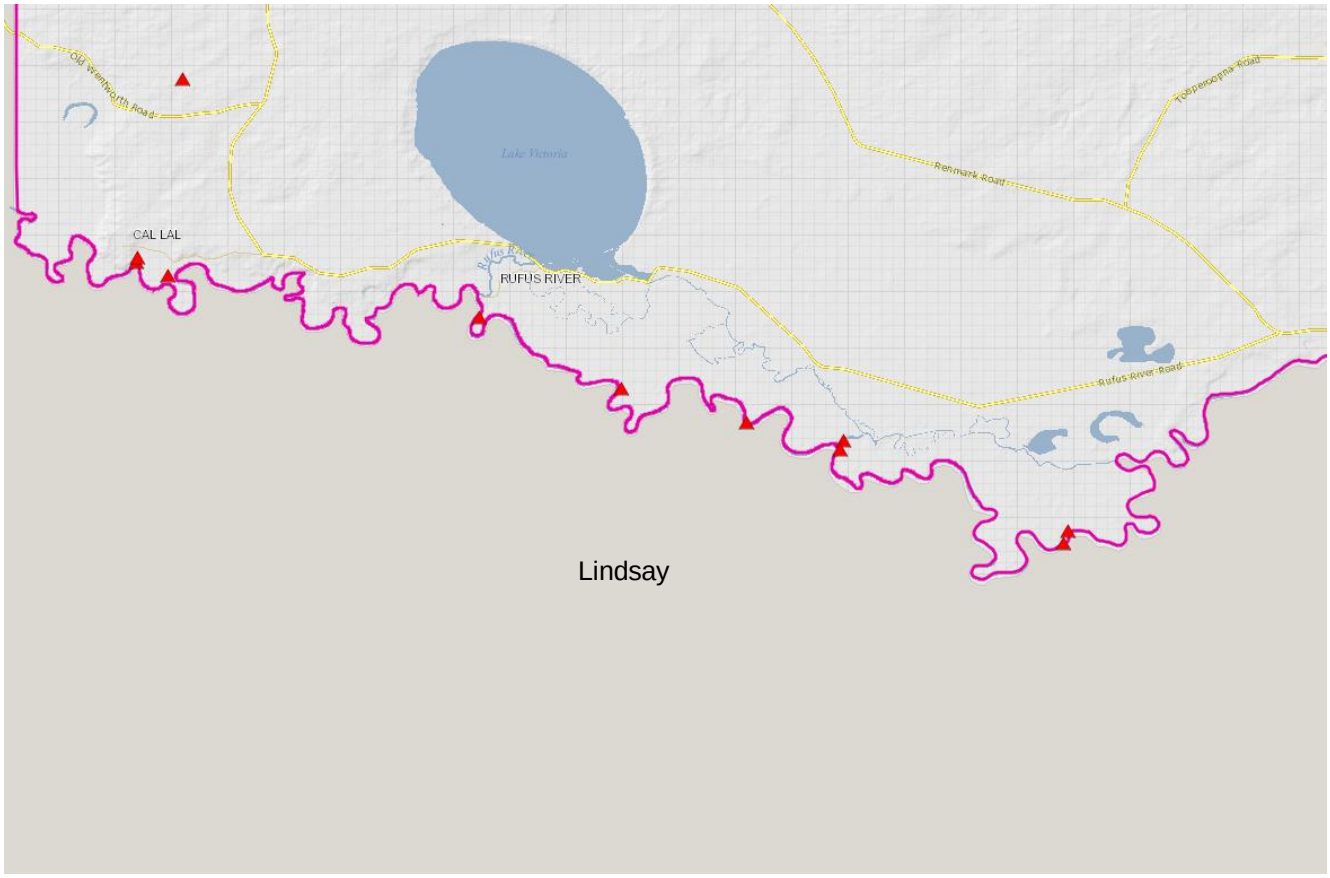


Figure 13 Regent Parrot records from NSW Wildlife Atlas

An analysis of possible Regent Parrot habitat (i.e. Ecological Vegetation Classes (EVC) that are likely to support suitable large hollow-bearing River Red Gums) was undertaken, specifically assessing the extent of Grassy Riverine Forest (EVC 106), Intermittent Swampy Woodland (EVC 813) Shrubby Riverine Woodland (818) and Lignum Swampy Woodland (EVC 823) within the Lindsay Island Inundation Area, and to be lost within the construction footprint (**Table 18**). The analysis returned a total area of 46.84 ha of vegetation loss, and 1,343.12 ha of Inundation Area of EVCs that are likely to support habitat suitable for Regent Parrot nest trees (**Table 18**). This analysis at least at a broad level demonstrates that there is a large area of potential habitat that may support suitable nesting trees within the project area and certainly along the major creeks and riparian corridor along the Murray River. The combined availability of suitable nesting habitat, significant targeted survey effort over a number of years, and no known nests suggests that Lindsay Island does not support a nationally significant population of the Regent Parrot.

Table 18 Area of potential nesting habitat improvement/maintenance and loss for Regent Parrot

EVC No.	EVC Name	Inundation Area (Ha)	Vegetation Losses (Ha)
106	Grassy Riverine Forest	163.80	4.79
813	Intermittent Swampy Woodland	814.72	14.11
818	Shrubby Riverine Woodland	237.36	7.3
823	Lignum Swampy Woodland	127.24	20.64
	TOTAL	**1,343.12**	**46.84**

The proposed construction footprint areas themselves have been specifically surveyed for evidence of Regent Parrot breeding (R8 – these surveys in 2019) and shown to not be used for breeding, and to a very limited extent for foraging and dispersal by this species. The habitats present at most other construction sites are only suitable as occasional low quality foraging and dispersal habitats as they are comprised of open Black Box woodland and grassland and not the preferred mallee (foraging) or River Red-gum (nesting) habitats.

Based on the above information, it is highly unlikely that the proposed Lindsay project will result in the loss of 1-5% of the Victorian population of the Regent Parrot (or conservatively 5-25 birds). Any Regent Parrot population using this area is likely to benefit from broadly improved potential feeding habitat condition following environmental watering and it is likely that under future climate change scenarios, river regulation and drought that works such as these will be absolutely essential at this site and others (where Regent Parrot populations are resident) to sustain the River Red-gums that comprise essential nesting habitat for this species.

Matters listed under the Flora and Fauna Guarantee Act 1988 – questions of relevance to the Regent Parrot:

- **potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or**
- **potential loss of critical habitat**

As discussed above, the proposed Lindsay project will not result in the loss of preferred nesting habitat for the Regent Parrot and will result in the loss of a small proportion of sub-optimal potential foraging and dispersal habitat only. The proposed construction footprint areas are centred on existing tracks and degraded areas, and represent less than 0.42% of the potential foraging and dispersal habitat for this species within the Lindsay project area (105.89 hectares to be cleared within 25,000+ hectares of high quality native floodplain vegetation within the surrounding area of Murray-Sunset National Park) itself surrounded by a much broader contiguous landscape (many tens of thousands of hectares) of potential feeding and dispersal habitat in remnant native vegetation.

This project will not significantly reduce the area of occupancy of this population as the structures will be established on already disturbed tracks and clearings. As discussed above, the project is highly unlikely to result in the loss of 1-5% of the Victorian proportion of the population of Regent Parrot (conservatively 5-25 birds) and in fact the trade-off of the loss of a small area of sub-optimal foraging and dispersal habitat (105.89 ha) is the future maintenance and improvement of Regent Parrot potential nesting and feeding habitat across the 5,108 ha inundation zone.

The Lindsay project will not result in the fragmentation of important Regent Parrot habitat as Lindsay Island supports over 25,000 ha of contiguous habitat, most of which is suitable for Regent Parrot foraging, though desktop and survey results would suggest it is not frequently used by this species. The proposed construction footprint is located on existing tracks and disturbed areas within an unbroken canopy of open woodland and shrubland vegetation. The proposed construction footprint areas will not adversely affect habitat critical to the survival of this species, as construction footprints represent very small, isolated and discrete areas of habitat within an extensive area of suitable habitat for this highly mobile species. The proposal does not plan to remove any potential nesting habitat.

The eastern subspecies of the Regent Parrot occurs as a relatively continuous and mobile population across the three states of South Australia, New South Wales and Victoria. There are no distinct genetic populations listed or reported and as such the project is unlikely to adversely impact on a genetically important population of this species.

In closing, it should be noted that one of the protection measures outlined in the recovery plan for the Regent Parrot (Baker-Gabb and Hurley 2011) mentioned “the use of environmental water to initially rescue River Red-gum from drought was first undertaken in Victoria in 2002”. The recovery plan then mentions that this continued under The Living Murray (TLM) project with important breeding sites for Regent Parrot such as those at the upstream Hattah-Kulkyne being listed as one of six ‘icon’ sites and targeted for the construction of water regulation structures to provide a more natural watering regime to these wetland ecosystems. The VMFRP project has similar objectives to TLM and will aim to maintain and enhance the condition of River Red-gum habitats and broader floodplain and wetland habitats which are likely to be highly beneficial to the long term recovery of the eastern subspecies of the Regent Parrot.

Painted Honeyeater (*Grantiella picta*)

This species is listed as threatened under the FFG Act and Vulnerable under the Federal EPBC Act.

An assessment of the Painted Honeyeater within the proposed Lindsay Project construction footprint and immediate vicinity is provided below, with each of the relevant EE Act referral triggers assessed.

Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria

The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26ºS, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (Higgins et al., 2001). During the winter it is more likely to be found in the north of its distribution[23].

[23] https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10357 (accessed june 2020)

The Painted Honeyeater is the only small to medium honeyeater with a wholly or mostly pink bill, and the only yellow-winged honeyeater with almost wholly white underparts (marked only with sparse, fine and short black streaks) (Higgins et al., 2001). This species generally uses the following habitats:

- Inhabits Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests.
- 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.
- Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.

The species exhibits seasonal north-south movements governed principally by the fruiting of mistletoe, with which its breeding season is closely matched (Barea and Watson, 2007). Many birds move after breeding to semi-arid regions such as north-eastern South Australia, central and western Queensland, and central Northern Territory. Considering its dispersive habits, the species is considered to have a single population (Garnett et al., 2011).

Painted Honeyeater, is considered to have potential to utilise habitats within the proposed construction area and broader Inundation Area, albeit on a very infrequent basis. This species has not been previously recorded within 10 km of the construction footprints, with the nearest records approximately 70 km east (in 2006), and very few records across broader landscape (see **Figure 14** below from recent Bird Data records and **Figure 15** from recent VBA records), however they are known to be highly mobile and have the potential to rarely forage in the woodlands of the Lindsay Project area.

An analysis of possible Painted Honeyeater foraging habitat [i.e. Ecological Vegetation Classes (EVC) across the Lindsay Island Inundation Area that may support occasional foraging habitat which includes open woodland] was undertaken, specifically assessing the extent of Semi-arid Chenopod Woodland (EVC 98), Riverine Chenopod Woodland (EVC 103), Intermittent Swampy Woodland (EVC 813), Shrubby Riverine Woodland (EVC 818) and Lignum Swampy Woodland (EVC 823) within the Lindsay Island inundation area. The analysis returned an area of potential improved foraging habitat of 1,915.13 ha (**Table 19**). This analysis at least at a broad level demonstrates that there is a large area of potentially improved foraging habitat that may support this species when the appropriate episodic conditions for mistletoe fruiting and flowing occur, and that the construction footprints represent relatively small isolated patches within a much broader intact landscape of woodland habitat.

Table 19 Area of potential foraging habitat for Painted Honeyeater within Inundation Area

EVC No.	EVC Name	Area (Ha)
98	Semi-arid Chenopod Woodland	19.14
103	Riverine Chenopod Woodland	716.67
813	Intermittent Swampy Woodland	814.72
818	Shrubby Riverine Woodland	237.36
823	Lignum Swampy Woodland	127.24
	TOTAL	**1,915.13**

According to Garnett et al., 2011, estimating population size is difficult given the species' rarity in most of its range. However, the total number of mature individuals is likely to be <10 000. The total number of mature individuals is not considered extremely low, very low or low (Garnett et al., 2011). Given the difficulty of assessing the national population of Painted Honeyeater, there is no Victorian population estimate available. Given the highly nomadic nature of this species, there is unlikely to be a permanent population of this species present in the broader Mallee Region, nor the Lindsay Project area, and the availability of suitable foraging resources (mistletoe) is likely to be seasonal and dependent on rainfall (and also potentially in response to flooding) dictating when there is the potential for this species to occur. It is highly unlikely that the Lindsay project will lead to a long-term loss of 1-5% of the Victorian population of the Painted Honeyeater, a species that is very rarely present within the park and will only sporadically support suitable habitat for this species.

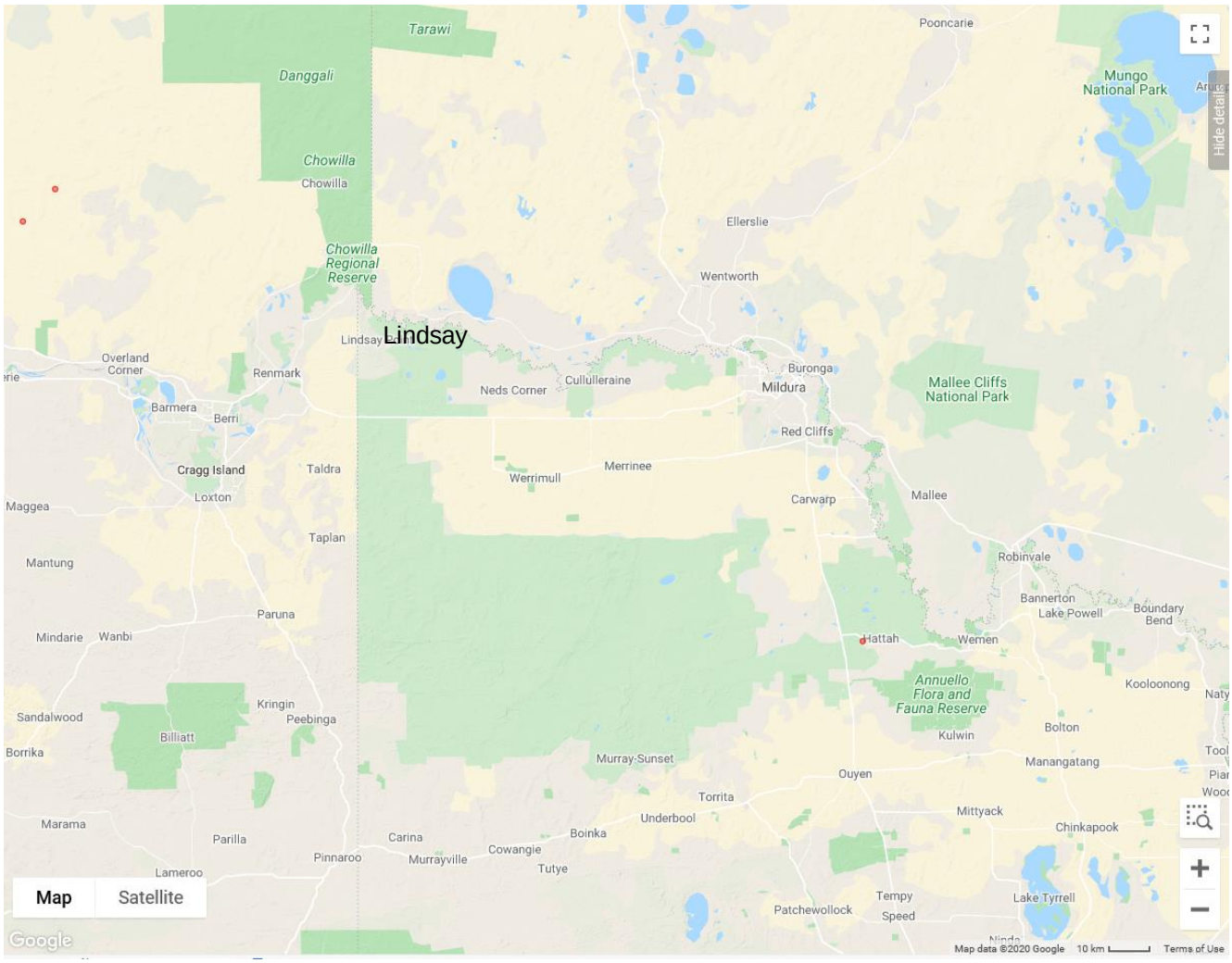


Figure 14 Painted Honeyeater records from Birdlife Australia BirdData www.birdata.birdlife.org.au

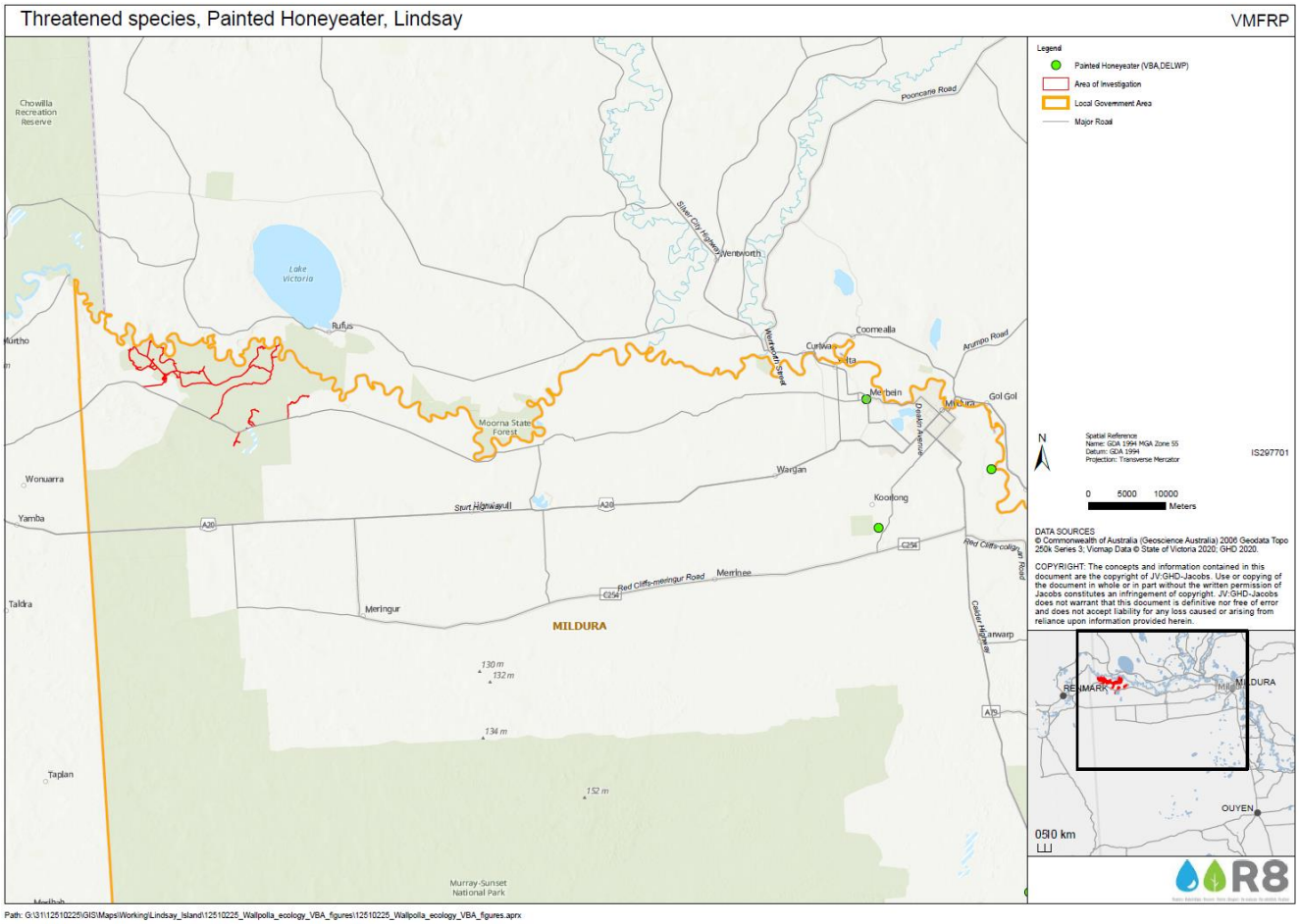


Figure 15 Painted Honeyeater records from the Victorian Biodiversity Atlas

Matters listed under the Flora and Fauna Guarantee Act 1988 – questions of relevance to the Painted Honeyeater:

- **potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or**
- **potential loss of critical habitat**

As discussed above, the proposed Lindsay project will not result in the loss of preferred foraging or nesting habitat for the Painted Honeyeater and will result in the loss of an unmeasurably small proportion of sub-optimal foraging, nesting and dispersal habitat only. The proposed construction footprint areas represent less than 0.42% of the potential habitat for this species (105.89 hectares within 25,000+ hectares of high quality native floodplain vegetation within the surrounding area of Murray-Sunset National Park), and are centred on existing tracks and degraded areas. This will not significantly reduce the area of occupancy of this population as the structures will be established on already disturbed tracks and clearings. As discussed above, the project is highly unlikely to result in the loss of 1-5% of the Victorian proportion of the population of Painted Honeyeater and in fact the trade-off of the loss of a small area of sub-optimal foraging and dispersal habitat (105.89 ha) is the future maintenance and improvement of Painted Honeyeater potential foraging habitat in the 1,915.13 ha Inundation Area.

The Lindsay project is highly unlikely to result in the fragmentation of important Painted Honeyeater habitat as the park supports more than 25,000 ha of contiguous floodplain habitat, surrounded by a much larger area (many tens of thousands of hectares) of remnant mallee and non-eucalypt semi-arid woodland, with the proposed construction footprints located on existing tracks and disturbed areas within an unbroken canopy of open woodland vegetation. The proposed construction footprint areas will not adversely affect habitat critical to the survival of this species, as construction footprints represent very small, isolated and discrete areas of habitat within an extensive area of rarely used habitats for this highly mobile and infrequently recorded species.

The Painted Honeyeater occurs over a broad national population across South Australia, the Northern Territory, Queensland, New South Wales and Victoria. There are no distinct genetic populations listed or reported and as such the project is unlikely to adversely impact on a genetically important population of this extremely mobile nomadic species, which forages widely over large areas in pursuit of mistletoe and flowering eucalypts.

Loyn and Dutson (2018) have been studying woodland bird habitat use, abundance and diversity in black box habitats during and after inundation events and have shown that frequently inundated sites may be more productive than sites which rarely flood, but are only useful to small birds, including rare species such as Black Honeyeater (*Sugomel niger*) when Noisy Miners are absent. There is some potential that the inundation proposed by the Lindsay project may be beneficial to the Painted Honeyeater in the future, particularly in areas of habitat where Noisy Miners are absent or in low numbers.

Murray Cod (*Maccullochella peelii*)

This species is listed as threatened under the FFG Act and Vulnerable under the EPBC Act.

An assessment of the Murray Cod within the proposed Lindsay Island Project construction footprint and immediate vicinity is provided below, with each of the relevant EE Act referral triggers assessed.

Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria.

In terms of population status, the Murray cod population in Victoria has experienced large historic declines, both in size and in extent of distribution. The species has been successfully stocked into a number of waters within its distribution in Victoria, but there are few tributaries of the Murray River where it could be considered common (DoE 2016). However, there is no overall Murray Cod population monitoring program within Victoria (National Murray Cod Recovery Team 2010 cited in DOE 2020c) to provide an understanding of current population status. The last statewide estimate of recreational catch of Murray Cod in Victoria was measured as part of the National Recreational and Indigenous Fishing Survey conducted from 2000 to 2001 (Ye et al. 2014). Hatchery-produced Murray Cod have been stocked in Victoria since 1981. In 2013, approximately 600 000 Murray Cod were stocked into 29 waters across Victoria. Other surveys, such as the Murray–Darling Basin Authority Sustainable Rivers Audit, indicate fish biomass to have increased in some catchments (Ovens, Goulburn and Loddon rivers) and declined in others (Broken and Kiewa rivers). In the absence of current statewide recreational fishing survey data, insufficient information is available to confidently classify the biomass of Murray Cod (Ye et al. 2014).

In terms of habitat, The Murray Cod utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW, to slow-flowing, turbid lowland rivers and billabongs (McDowall 1996). That said, Murray Cod are frequently found in the main channels of rivers and larger tributaries. The species is, therefore, considered a main-channel specialist (DoE 2020c). Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures. Such structures reduce or influence stream flows and provide Murray Cod with shelter from fast-flowing water (Koehn 2009).

The current population status and distribution in Victoria is unknown. However, a significant, self-sustaining, population of Murray Cod exists in the Lindsay Island complex – including Mullaroo Creek and the Lindsay River. Mullaroo Creek retains a relatively high snag density and water velocities that are significantly faster and stage heights less variable than would occur under natural conditions, providing ideal conditions for Murray Cod (DELWP 2018). An assessment of impacts to habitat (i.e. physical habitat and water quality/hydrology) allows for the most valid assessment of potential long-term impacts.

Operation of the project under larger inundation scenarios (i.e. Berribee Intermediate and Maximum) has the potential to reduce hydraulic complexity in the Lindsay-Mullaroo system by reducing water velocities in the system. Recommendations are provided by DELWP (2018) on the operating regime which provides greatest protection for the existing Murray Cod population. They highlight that high risks to the Murray Cod population would remain under full inundation scenarios, even with implementation of their recommended mitigation measures.

These recommendations include:

- Operating Berribee Maximum (23.2 m AHD) at low decadal frequency (1-in-10 years)
- Operating Berribee Intermediate (21.7 m AHD) at 4-in-10 year frequency
- Keep managed flood duration to as short as possible (i.e. six weeks for Berribee Maximum, four to eight weeks for Intermediate)
- Implement scenarios in winter (i.e. June/July) to minimise risks posed by carp
- Avoid consecutive year implementation of Berribee Maximum or Intermediate scenarios

Implementation of these recommendations will reduce the risk to Murray Cod habitat. However, DELWP (2018) state that high risks to the Murray Cod population would remain under full inundation scenarios, even with implementation of their recommended mitigation measures. Therefore, the loss of lotic habitat has the potential to lead to a long-term loss of a significant proportion of known remaining habitat or population of Murray Cod. To address this matter VMFRP will carry out further investigations to refine the proposed operating regime to protect flowing habitat while still aiming to meet the various ecological objectives for the site.

Matters listed under the Flora and Fauna Guarantee Act 1988 – questions of relevance to Murray cod:

- **potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or**
- **potential loss of critical habitat.**

Any section of a waterway that comprises a connected system of habitats suitable for sustained use by a Murray Cod population for sheltering, foraging, breeding and upstream and downstream movement is considered by DoE (2016) to be habitat critical to the survival of the species. As discussed above, operation of the project has the potential to reduce flow velocities in Mullaroo Creek, which may lead to a loss of habitat critical to Murray Cod when large inundation events are implemented. To address this matter VMFRP will carry out further investigations to refine the proposed operating regime to protect flowing habitat while still aiming to meet the various ecological objectives for the site.

Silver Perch (*Bidyanus bidyanus*)

Silver Perch are listed as threatened under the FFG Act and Critically Endangered under the EPBC Act.

An assessment of Silver Perch within the proposed Wallpolla Project construction footprint and immediate vicinity is provided below, with each of the relevant EE Act referral triggers assessed.

Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria.

In Victoria, Silver Perch have been recorded from twelve river basins. These include eight basins where populations occur naturally - Upper Murray (Lake Hume stocking), Ovens River, Broken River, Goulburn River, Campaspse River, Loddon River, Murray Riverina and the Mallee. Silver Perch have been introduced into the other four river basins - Wimmera River, Yarra River, Werribee River and Corangamite. The majority of records are from the Goulburn River, Loddon River, Murray Riverina, and Mallee (Clunie and Koehn, 2001).

In terms of habitat, Silver Perch use main river channel habitats for feeding, refuge, spawning, survival and recruitment. They inhabit Lock 11-26 reach of the Murray River because this encompasses the longest unregulated river reach on the main stem of the Murray River and thus provides 500+ km of their preferred flowing water habitat (DELWP, 2018).

Although they are an obligate riverine species, predominantly occupying large fast flowing river regions (e.g. Murray and Darling Rivers) over sand and structure (Clunie and Koehn, 2001; Merrick and Schmida, 1984), they have also been reported in the slow flowing, turbid waters of lower reaches (Rowland 1995). Cadwallader and Backhouse (1983) also suggest they prefer open waters devoid of snags. Small numbers of fish utilise tributaries of main channel and they rarely enter floodplain lakes (DELWP, 2018).

Silver Perch are present in the Murray River and in waterways within Lindsay Island although in low numbers (see Ecology Australia, 2019). The current population status and distribution in Victoria is unknown. Therefore an assessment of impacts to habitat (i.e. physical habitat and water quality/hydrology) allows for the most valid assessment of potential long-term impacts.

Operation of the project under larger inundation scenarios (i.e. Berribee Intermediate and Maximum) has the potential to reduce hydraulic complexity in the Lindsay-Mullaroo system by reducing water velocities in the system. Recommendations are provided by DELWP (2018) on the operating regime which provides greatest protection for the existing Murray Cod population, which would provide protection for Silver Perch, also a flow-dependent specialist. It is likely that risks to Silver Perch would remain, even with implementation of the DELWP (2018) recommended mitigation measures.

These recommendations include:

- Operating Berribee Maximum (23.2 m AHD) at low decadal frequency (1-in-10 years)
- Operating Berribee Intermediate (21.7 m AHD) at 4-in-10 year frequency
- Keep managed flood duration to as short as possible (i.e. six weeks for Berribee Maximum, four to eight weeks for Intermediate)
- Implement scenarios in winter (i.e. June/July) to minimise risks posed by carp
- Avoid consecutive year implementation of Berribee Maximum or Intermediate scenarios

Implementation of these recommendations will reduce the risk to Silver Perch habitat. However, there is potential that risks would remain under full inundation scenarios, even with implementation of their recommended mitigation measures. The loss of lotic habitat has the potential to lead to a long-term loss of habitat for Silver Perch, especially if flows are reduced during spawning season (October to February), although the importance of the Lindsay Island complex for Silver Perch spawning is unknown. To address this matter VMFRP will carry out further investigations to refine the proposed operating regime to protect flowing habitat while still aiming to meet the various ecological objectives for the site.

Matters listed under the Flora and Fauna Guarantee Act 1988 – questions of relevance to Silver Perch:

- **potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or**
- **potential loss of critical habitat.**

As discussed above, operation of the project has the potential to reduce flow velocities in Mullaroo Creek, which may lead to a loss of flowing habitat when large inundation events are implemented. The loss of lotic habitat has the potential to lead to a long-term loss of habitat for Silver Perch, especially if flows are reduced during spawning season (October to February). The importance of the Lindsay Island complex for Silver Perch spawning is unknown and the population size in the complex is likely to be low. It is therefore unclear whether operation of the project will lead to the loss of a genetically important population of Silver Perch or lead to a loss of a genetically important population. To address this matter VMFRP will carry out further investigations to refine the proposed operating regime to protect flowing habitat while still aiming to meet the various ecological objectives for the site.

Appendix J. Significance assessment for EPBC Act listed migratory species

Below is an assessment of the project in relation to the significant impact criteria for EPBC Act listed migratory species contained in the EPBC Act Significant Impact Guidelines 1.1. – Matters of National Environmental Significance (DOTE, 2013) and used to determine whether there is a likelihood of a significant impact. These criteria were applied to all listed migratory species identified by the PMST database search. The likelihood of occurrence, and likelihood of impact for these species has also been considered for the Construction Footprints and Inundation Area (Appendix D).

Important information regarding migratory species includes the following (DOTE, 2013):

What is important habitat for a migratory species?

An area of 'important habitat' for a migratory species is:

a. habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or

b. habitat that is of critical importance to the species at particular life-cycle stages, and/or

c. habitat utilised by a migratory species which is at the limit of the species range, and/or

d. habitat within an area where the species is declining.

What is an ecologically significant proportion?

Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).

What is the population of a migratory species?

'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.

Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species

Eleven migratory species were identified as having the potential to occur within the Construction Footprints and Inundation Area (PMST and VBA). Two species – the Fork-tailed Swift and Osprey, was considered to have potential to occur within the Construction Footprint. All eleven species were considered to have potential to occur within the Inundation Area. The Fork-tailed Swift may occasionally fly over the Construction Footprint and Inundation Area whilst foraging, but is considered highly unlikely to be impacted, as the species is highly mobile, wide ranging, and suitable surrounding habitat is widespread. The Osprey has not been previously recorded within the Study Area, but has the potential to utilise wetland habitats within the Construction Footprints and Inundation Area for foraging. This species is also highly mobile and wide ranging and is considered unlikely to be impacted by the proposed works, and most likely to benefit from watering of the Inundation Area which will create a large area of suitable habitat. The nine additional species are all considered to have potentially suitable habitat within the Inundation Area, but an adverse impact is unlikely, as these species are all highly mobile and ultimately likely to benefit from environmental water when present. Other migratory species were not considered likely to occur within the Construction Footprint during the time of the survey, mostly due to the lack of recent records within the Construction Footprint and/or a lack of suitable habitat / water present (see 9.3.2 **and** Appendix D for rationale).

As it is anticipated that construction works would be carried out to the extent practicable under dry conditions, it is considered highly unlikely that the Construction Footprint supports habitat that will be considered important for migratory species foraging or breeding activity or support an ecologically significant proportion of a population of migratory species, prior to the proposed construction.

Within the proposed Construction Footprints, it is considered unlikely that the proposed works will result in the introduction of invasive species that might be harmful to migratory species. A CEMP will be developed for the project that will include measures such as vehicle hygiene protocols to mitigate the potential spread of weeds.

There is potential for the introduction of environmental water to the Inundation Area to lead to an increase in abundance of feral predators (cats, foxes), herbivores (e.g. goats) and omnivores (e.g. pigs) due to the associated increase in productivity. Some of the species such as cats and foxes could potentially prey on migratory waterbirds. An accompanying feral animal management and control program will need to be implemented within the Inundation Area, however this may simply involve Parks Victoria applying or expanding current pest control programs within the park.

Several species of migratory shorebird such as the Australian Painted Snipe and Latham's Snipe have been shown to respond to environmental water at Hattah-Kulkyne National Park. A number of migratory species could be expected to utilise the proposed Inundation Areas for the Lindsay Island project.

Given that the proposed Construction Footprints do not provide important habitat for listed migratory species, it is considered unlikely that the planned works will disrupt the lifecycle of an ecologically significant proportion of a population of a migratory species.

Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species

Within the proposed Construction Footprints it is unlikely that the proposed works will result in the introduction of invasive species that might be harmful to migratory species. A CEMP will be developed for the project that will include measures such as vehicle hygiene protocols to mitigate the potential spread of weeds.

There is potential for the introduction of environmental water to the Inundation Area to lead to an increase in abundance of feral predators (cats, foxes), herbivores (e.g. goats) and omnivores (e.g. pigs) due to the associated increase in productivity. Some of the species such as cats and foxes could potentially prey on migratory waterbirds. An accompanying feral animal management and control program will need to be implemented within the inundation extent, however this may simply involve Parks Victoria applying or expanding current pest control programs within the park.

Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

Given that the proposed Construction Footprints do not provide important habitat for listed migratory species, it is unlikely that the planned works will disrupt the lifecycle of an ecologically significant proportion of a population of a migratory species. The proposed Inundation Area does have potential to provide some habitat value to a number of the considered species but this value is most likely to be greatly improved and expanded in area if the proposed works are completed and environmental watering occurs within the Inundation Area.

Appendix K. Habitat Hectare scoring results for the Construction Footprint (Data collected by GHD in 2015 and R8 in 2019)

Hab Zone	EVC	EVC Name	LOTs	Tree Canopy	Lack of Weeds	Understorey	Recruitment	Litter	Logs	Landscape- Patch size	Landscape – Neighbourhood	Landscape - Distance to core area	Maximum Score	Total Score	Standardised score	Total Area (ha) identified during surveys
1	103	Riverine Chenopod Woodland	9	2	11	15	6	5	3	8	8	4	100	71	0.71	10
2	103	Riverine Chenopod Woodland	6	0	15	15	6	3	3	8	8	4	100	68	0.68	5
3	103	Riverine Chenopod Woodland	9	4	11	15	6	5	5	8	8	4	100	75	0.75	14
4	103	Riverine Chenopod Woodland	3	0	11	5	6	5	0	8	8	4	100	50	0.5	8
5	102	Low Chenopod Shrubland	N/A	N/A	7	5	6	5	N/A	8	8	4	80	43	0.54	5
6	818	Shrubby Riverine Woodland	10	5	13	15	10	3	5	8	8	4	100	81	0.81	7
7	818	Shrubby Riverine Woodland	0	0	11	15	10	5	0	8	8	4	100	61	0.61	0
8	818	Shrubby Riverine Woodland	3	2	7	5	6	2	0	8	8	4	100	45	0.45	0
9	103	Riverine Chenopod Woodland	10	5	13	15	10	5	5	8	8	4	100	83	0.83	11
10	102	Low Chenopod Shrubland	N/A	N/A	11	15	6	5	N/A	8	8	4	80	57	0.71	44
11	813	Intermittent Swampy Woodland	10	5	13	15	6	5	3	8	8	4	100	77	0.77	4
12	808	Lignum Shrubland	N/A	N/A	13	15	6	5	N/A	8	8	4	80	59	0.74	5
13	102	Low Chenopod Shrubland	N/A	N/A	11	5	3	5	N/A	8	8	4	80	44	0.55	14
14	813	Intermittent Swampy Woodland	0	0	13	5	6	3	5	8	8	4	100	52	0.52	6
15	104	Lignum Swamp	N/A	N/A	13	5	3	5	N/A	8	8	4	80	46	0.58	25
16	103	Riverine Chenopod Woodland	6	1	13	15	3	5	5	8	8	4	100	68	0.68	10

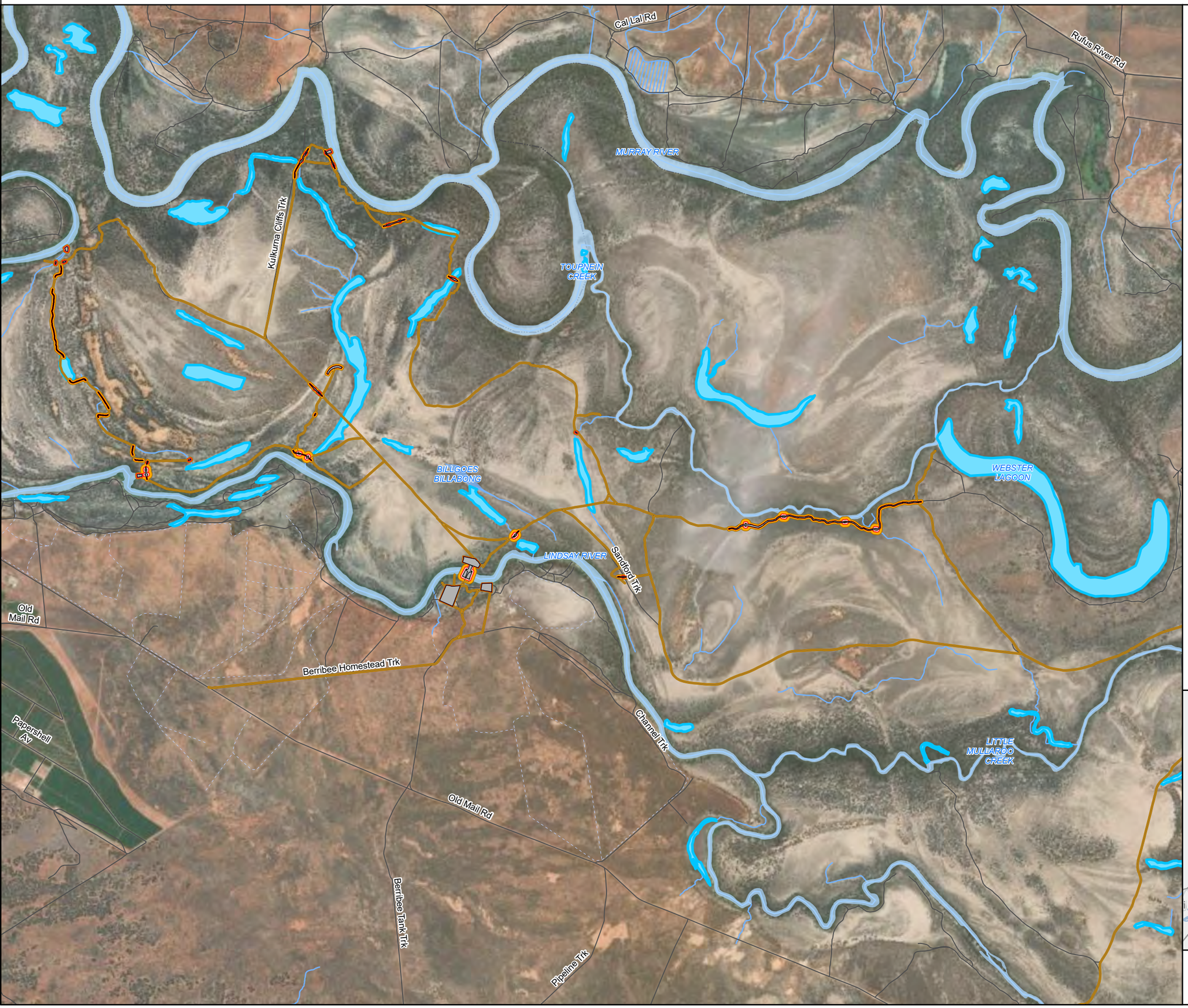
Hab Zone	EVC	EVC Name	LOTs	Tree Canopy	Lack of Weeds	Understorey	Recruitment	Litter	Logs	Landscape- Patch size	Landscape – Neighbourhood	Landscape - Distance to core area	Maximum Score	Total Score	Standardised score	Total Area (ha) identified during surveys
17	813	Intermittent Swampy Woodland	10	5	13	15	10	5	5	8	8	4	100	83	0.83	1
18	106	Grassy Riverine Forest	10	5	13	5	6	3	5	8	8	4	100	67	0.67	2
19	810	Floodway Pond Herbland	N/A	N/A	13	15	6	3	N/A	8	8	4	80	57	0.71	2
20	823	Lignum Swampy Woodland	8	5	13	5	10	5	3	8	8	4	100	69	0.69	4
21	823	Lignum Swampy Woodland	4	1	13	5	6	5	5	8	8	4	100	59	0.59	16
22	823	Lignum Swampy Woodland	4	5	13	5	10	5	3	8	8	4	100	65	0.65	3
23	98	Semi-arid Chenopod Woodland	N/A	N/A	15	5	3	5	N/A	8	8	4	80	48	0.6	0
24	813	Intermittent Swampy Woodland	9	2	15	15	6	5	5	8	8	4	100	77	0.77	12
25	101	Samphire Shrubland	N/A	N/A	7	15	6	N/A	N/A	8	8	4	75	48	0.64	11
26	823	Lignum Swampy Woodland	10	5	13	15	6	5	5	8	8	4	100	79	0.79	10
27	103	Riverine Chenopod Woodland	4	5	13	15	10	3	5	8	8	4	100	75	0.75	2
28	103	Riverine Chenopod Woodland	2	0	6	5	6	5	3	8	8	4	100	47	0.47	1
29	103	Riverine Chenopod Woodland	4	5	6	5	6	5	5	8	8	4	100	56	0.56	1
30	813	Intermittent Swampy Woodland	9	4	6	15	6	5	5	8	8	4	100	70	0.7	0
31	103	Riverine Chenopod Woodland	2	1	6	5	6	3	3	8	8	4	100	46	0.46	2
32	103	Riverine Chenopod Woodland	3	2	13	15	6	5	3	8	8	4	100	67	0.67	1

Hab Zone	EVC	EVC Name	LOTs	Tree Canopy	Lack of Weeds	Understorey	Recruitment	Litter	Logs	Landscape- Patch size	Landscape – Neighbourhood	Landscape - Distance to core area	Maximum Score	Total Score	Standardised score	Total Area (ha) identified during surveys
33	103	Riverine Chenopod Woodland	0	0	13	15	6	3	2	8	8	4	100	59	0.59	0
34	813	Intermittent Swampy Woodland	4	5	13	15	6	3	5	8	8	4	100	71	0.71	0
35	818	Shrubby Riverine Woodland	3	2	13	15	6	5	2	8	8	4	100	66	0.66	0
36	823	Lignum Swampy Woodland	4	3	13	15	6	5	2	8	8	4	100	68	0.68	3
37	106	Grassy Riverine Forest	10	5	13	15	6	3	3	8	8	4	100	75	0.75	3
38	810	Floodway Pond Herbland	N/A	N/A	11	15	6	3	N/A	8	8	4	80	55	0.69	0
39	818	Shrubby Riverine Woodland	10	5	13	15	6	3	5	8	8	4	100	77	0.77	7

Appendix L. Map of DELWP current wetlands at Lindsay Island

Current Wetlands at Lindsay Island

VMFRP



Legend

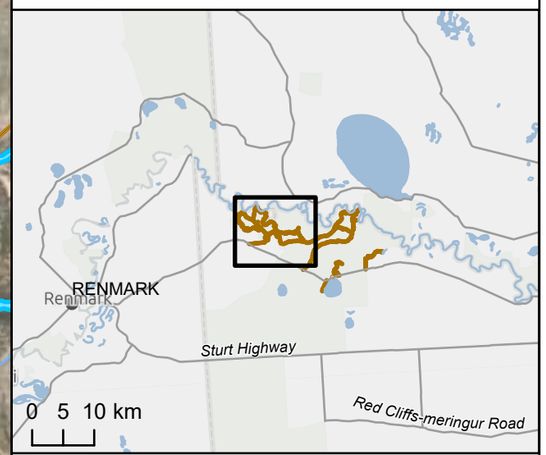
- Current Wetlands
- Arterial
- Collector
- Watercourse
- Lake
- Stream
- Drain/Channel/Other
- LGA outline
- Development Footprint
- Construction Footprint Tracks
- Construction Footprint Structures
- Area of Investigation

N

Spatial Reference
Name: GDA 1994 MGA Zone 55
Datum: GDA 1994
Projection: Transverse Mercator

IS297701

0 500 1000
Meters



R8

Current Wetlands at Lindsay Island

Legend

- Current Wetlands
- Arterial
- Collector
- Watercourse
- Lake
- River
- Stream
- Drain/Channel/Other
- LGA outline
- Development Footprint
- Construction Footprint Tracks
- Construction Footprint Structures
- Area of Investigation

N

Spatial Reference
Name: GDA 1994 MGA Zone 55
Datum: GDA 1994
Projection: Transverse Mercator

IS297701

0 500 1000
Meters

Current Wetlands at Lindsay Island

VMFRP

Legend

- Current Wetlands
- Collector
- Watercourse
- Lake
- Stream
- Drain/Channel/Other
- LGA outline
- Development Footprint
- Construction Footprint Tracks
- Construction Footprint Structures
- Area of Investigation

N

Spatial Reference
Name: GDA 1994 MGA Zone 55
Datum: GDA 1994
Projection: Transverse Mercator

IS297701

0 500 1000 Meters

DATA SOURCES
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R8

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Appendix M. Large Trees recorded within the Area of Investigation

Of the 2,362 large trees identified in the Area of Investigation and listed in this table, 1,071 have been assessed as potentially impacted by works. Trees have been considered as a loss through direct removal (within the construction footprint) or through encroachment of >10% of their TPZs (immediately adjacent to the construction footprint).

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1	Black Box	40	Retain
2	Black Box	48	Retain
3	Black Box	50	Retain
4	Black Box	55	Retain
5	Black Box	48	Retain
6	Black Box	52	Retain
7	Black Box	58	Retain
8	Stag	108	Retain
9	River Red-gum	95	Remove
10	Black Box	66	Retain
11	Black Box	69	Retain
12	Black Box	57	Remove
13	Black Box	103	Retain
14	Black Box	56	Retain
15	Black Box	46	Retain
16	Black Box	57	Retain
17	Black Box	41	Retain
18	Stag	40.5	Retain
19	Stag	41	Retain
20	Black Box	45.5	Retain
21	Black Box	77	Remove
22	Stag	85	Retain
23	Black Box	43	Remove
24	Black Box	44	Remove
25	Black Box	51	Retain
26	Black Box	70	Remove
27	Black Box	51	Remove
28	Black Box	64	Retain
29	Stag	42.5	Retain
30	Black Box	60	Retain
31	Black Box	41	Retain
32	Black Box	49	Retain
33	Black Box	44	Remove
34	Black Box	40	Retain
35	Black Box	55	Retain
36	Black Box	48	Retain
37	Stag	48	Retain
38	Black Box	62	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
39	Black Box	58	Retain
40	Black Box	47	Retain
41	Black Box	47	Retain
42	Black Box	45	Retain
43	Black Box	71	Retain
44	Black Box	47	Retain
45	Black Box	70	Retain
46	Stag	46.5	Remove
47	Black Box	76	Remove
48	Black Box	60	Retain
49	Black Box	44	Retain
50	Stag	83	Remove
51	Black Box	45	Remove
52	Black Box	47	Retain
53	Black Box	60	Retain
54	Black Box	58	Retain
55	Black Box	81	Retain
56	Black Box	69	Retain
57	Black Box	42	Retain
58	Black Box	43	Retain
59	Black Box	45	Retain
60	River Red-gum	100	Retain
61	Black Box	70	Retain
62	Black Box	80	Retain
63	River Red-gum	115	Retain
64	River Red-gum	81	Retain
65	River Red-gum	113	Retain
66	Black Box	42	Retain
67	Black Box	54	Retain
68	Stag	64	Remove
69	Stag	51	Remove
70	Stag	43	Retain
71	Stag	78	Retain
72	Stag	51	Retain
73	Stag	48	Remove
74	Stag	60	Retain
75	Black Box	48	Remove
76	Black Box	52	Remove
77	Black Box	80	Remove
78	Black Box	119	Remove
79	Black Box	67	Remove
80	Black Box	53	Retain
81	Stag	65	Remove
82	River Red-gum	135	Remove
83	Stag	75	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
84	Stag	48	Retain
85	Stag	45	Remove
86	Black Box	56	Retain
87	Stag	49	Remove
88	Stag	53	Retain
89	River Red-gum	168	Retain
90	River Red-gum	279	Retain
91	Stag	215	Retain
92	Black Box	65	Retain
93	Stag	68	Retain
94	River Red-gum	163	Remove
95	River Red-gum	100	Remove
96	River Red-gum	140	Remove
97	River Red-gum	138	Retain
98	River Red-gum	187	Retain
99	Stag	188	Retain
100	Stag	190	Retain
101	Black Box	81	Retain
102	Black Box	56	Retain
103	Black Box	81	Remove
104	Black Box	111	Remove
105	Black Box	89	Retain
106	Black Box	117	Retain
107	Black Box	88	Retain
108	Black Box	56	Retain
109	Black Box	57	Retain
110	Black Box	52	Retain
111	Black Box	71	Remove
112	Black Box	115	Remove
113	Black Box	61	Remove
114	Black Box	52	Remove
115	Black Box	62	Remove
116	Black Box	77	Retain
117	Black Box	62	Remove
118	Black Box	64	Remove
119	Black Box	43	Remove
120	Black Box	62	Retain
121	Black Box	70	Remove
122	Black Box	92	Remove
123	Black Box	78	Remove
124	Black Box	80	Remove
125	Black Box	80	Remove
126	Black Box	85	Retain
127	Black Box	63	Remove
128	Black Box	51	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
129	Black Box	115	Remove
130	Black Box	77	Retain
131	Black Box	79	Remove
132	Black Box	55	Retain
133	River Red-gum	116	Retain
134	River Red-gum	202	Remove
135	River Red-gum	98	Remove
136	River Red-gum	195	Remove
137	River Red-gum	125	Remove
138	River Red-gum	150	Retain
139	Stag	199	Remove
140	Stag	160	Remove
141	River Red-gum	87	Remove
142	River Red-gum	86	Remove
143	River Red-gum	98	Remove
144	River Red-gum	85	Remove
145	Stag	190	Remove
146	River Red-gum	134	Remove
147	River Red-gum	179	Remove
148	River Red-gum	100	Remove
149	River Red-gum	123	Remove
150	River Red-gum	111	Remove
151	River Red-gum	95	Remove
152	River Red-gum	186	Remove
153	River Red-gum	146	Retain
154	River Red-gum	149	Remove
155	Stag	179	Remove
156	Stag	110	Remove
157	Stag	130	Remove
158	Stag	121	Remove
159	Stag	122	Remove
160	River Red-gum	104	Remove
161	River Red-gum	97	Retain
162	Black Box	44	Remove
163	Black Box	54	Retain
164	Black Box	54	Retain
165	Black Box	75	Retain
166	Black Box	82	Remove
167	Black Box	115	Remove
168	Stag	80	Retain
169	Black Box	60	Remove
170	Black Box	78	Retain
171	Black Box	62	Remove
172	Black Box	95	Remove
173	Stag	55	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
174	Black Box	53	Retain
175	Black Box	48	Retain
176	Black Box	66	Remove
177	Stag	65	Retain
178	Stag	58	Retain
179	Stag	64	Retain
180	Black Box	44	Retain
181	Black Box	55	Retain
182	Black Box	45	Retain
183	Stag	59	Retain
184	Stag	52	Retain
185	Black Box	59	Remove
186	Black Box	46	Retain
187	Black Box	43	Retain
188	Black Box	57	Retain
189	Black Box	58	Retain
190	Black Box	53	Retain
191	Black Box	42	Retain
192	Black Box	45	Remove
193	Black Box	46	Remove
194	Black Box	40	Retain
195	Black Box	53	Remove
196	Black Box	68	Remove
197	Black Box	47	Remove
198	Black Box	44	Retain
199	Black Box	67	Remove
200	Black Box	43	Retain
201	Black Box	53	Remove
202	Black Box	48	Retain
203	Black Box	63	Remove
204	Black Box	48	Remove
205	Black Box	45	Remove
206	Black Box	69	Retain
207	Black Box	53	Retain
208	Black Box	72	Remove
209	Black Box	67	Remove
210	Black Box	55	Retain
211	Black Box	70	Retain
212	Black Box	100	Remove
213	Black Box	65	Retain
214	Stag	70	Remove
215	Black Box	80	Retain
216	Black Box	70	Remove
217	Black Box	100	Remove
218	Black Box	78	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
219	Black Box	83	Retain
220	Black Box	67	Retain
221	Black Box	96	Remove
222	Black Box	62	Remove
223	Black Box	42	Retain
224	Black Box	70	Retain
225	Stag	82	Retain
226	Stag	87	Retain
227	Black Box	65	Retain
228	Black Box	55	Retain
229	Black Box	46	Remove
230	Black Box	78	Retain
231	Black Box	55	Retain
232	Black Box	60	Retain
233	Black Box	102	Retain
234	River Red-gum	158	Retain
235	River Red-gum	813	Remove
236	River Red-gum	103	Remove
237	River Red-gum	84	Retain
238	Stag	88	Retain
239	River Red-gum	103	Retain
240	Stag	84	Retain
241	Stag	68	Retain
242	Stag	86	Retain
243	Stag	84	Remove
244	Stag	80	Retain
245	Stag	78	Remove
246	Stag	96	Retain
247	Stag	96	Retain
248	Black Box	105	Retain
249	Stag	90	Retain
250	Stag	80	Retain
251	Stag	80	Retain
252	Black Box	98	Retain
253	Black Box	60	Retain
254	Black Box	95	Retain
255	Black Box	67	Retain
256	Black Box	108	Remove
257	Black Box	89	Remove
258	Black Box	44	Remove
259	Black Box	57	Remove
260	Stag	71	Retain
261	Black Box	71	Remove
262	Black Box	113	Remove
263	Black Box	41	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
264	Black Box	42	Remove
265	Black Box	42	Remove
266	Black Box	58	Remove
267	Black Box	121	Remove
268	Black Box	68	Retain
269	Black Box	91	Retain
270	Black Box	54	Retain
271	Black Box	63	Retain
272	Black Box	49	Retain
273	Stag	64	Retain
274	Black Box	47	Retain
275	Black Box	51	Retain
276	Black Box	69	Retain
277	Stag	51	Retain
278	Black Box	66	Retain
279	Black Box	74	Retain
280	Black Box	53	Retain
281	River Red-gum	83	Retain
282	Black Box	98	Retain
283	River Red-gum	131	Retain
284	Stag	146	Retain
285	River Red-gum	220	Retain
286	River Red-gum	90	Remove
287	River Red-gum	111	Retain
288	River Red-gum	125	Remove
289	River Red-gum	180	Retain
290	River Red-gum	185	Retain
291	River Red-gum	185	Remove
292	Stag	200	Retain
293	Stag	175	Retain
294	Stag	120	Retain
295	Stag	105	Retain
296	Stag	86	Retain
297	River Red-gum	185	Retain
298	Stag	160	Remove
299	Stag	150	Retain
300	Stag	160	Retain
301	Stag	75	Retain
302	Stag	80	Retain
303	Black Box	95	Retain
304	Stag	85	Retain
305	Black Box	95	Retain
306	Black Box	90	Retain
307	Black Box	97	Retain
308	Black Box	97	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
309	Black Box	98	Remove
310	Black Box	101	Remove
311	River Red-gum	162	Retain
312	River Red-gum	303	Retain
313	River Red-gum	89	Remove
314	River Red-gum	320	Remove
315	River Red-gum	110	Remove
316	River Red-gum	190	Retain
317	River Red-gum	112	Retain
318	River Red-gum	115	Retain
319	River Red-gum	84	Retain
320	River Red-gum	170	Retain
321	River Red-gum	180	Remove
322	River Red-gum	190	Remove
323	Stag	175	Retain
324	Stag	100	Retain
325	Stag	95	Retain
326	Black Box	85	Retain
327	Black Box	74	Retain
328	Stag	100	Retain
329	Stag	60	Retain
330	Stag	95	Retain
331	Stag	110	Retain
332	Black Box	63	Retain
333	Black Box	110	Retain
334	Black Box	112	Retain
335	Black Box	120	Retain
336	Black Box	78	Retain
337	Black Box	69	Retain
338	Black Box	65	Retain
339	Black Box	102	Remove
340	Black Box	82	Retain
341	Stag	105	Retain
342	Stag	102	Retain
343	Black Box	83	Remove
344	Black Box	120	Remove
345	Stag	60	Remove
346	Black Box	100	Retain
347	Black Box	50	Remove
348	Black Box	48	Remove
349	Stag	60	Retain
350	Stag	60	Retain
351	Stag	75	Retain
352	Black Box	85	Retain
353	Stag	60	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
354	Stag	62	Retain
355	Black Box	90	Retain
356	Black Box	48	Retain
357	Black Box	73	Retain
358	Black Box	70	Retain
359	Black Box	70	Retain
360	Black Box	65	Retain
361	Black Box	55	Retain
362	Stag	73	Retain
363	Stag	95	Retain
364	Stag	95	Retain
365	Stag	108	Retain
366	Stag	115	Retain
367	Stag	115	Retain
368	Stag	115	Retain
369	Black Box	119	Retain
370	Stag	130	Remove
371	Stag	90	Retain
372	Stag	105	Retain
373	Black Box	126	Retain
374	Black Box	50	Retain
375	Black Box	100	Retain
376	Black Box	95	Remove
377	Black Box	60	Remove
378	Black Box	65	Retain
379	Black Box	47	Retain
380	Black Box	55	Retain
381	Stag	180	Retain
382	Stag	110	Retain
383	Black Box	62	Remove
384	River Red-gum	115	Remove
385	Black Box	45	Retain
386	Black Box	60	Retain
387	Black Box	61	Retain
388	Black Box	65	Retain
389	River Red-gum	130	Remove
390	Black Box	70	Remove
391	Black Box	90	Remove
392	Black Box	65	Remove
393	River Red-gum	120	Retain
394	River Red-gum	105	Retain
395	Black Box	78	Remove
396	Black Box	85	Remove
397	Black Box	98	Retain
398	Black Box	113	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
399	Black Box	111	Retain
400	Black Box	62	Retain
401	Black Box	75	Remove
402	Black Box	63	Remove
403	Black Box	52	Remove
404	Black Box	62	Retain
405	Black Box	80	Retain
406	Stag	95	Retain
407	Black Box	71	Retain
408	Stag	113	Retain
409	Stag	119	Retain
410	Stag	160	Retain
411	Black Box	81	Remove
412	Black Box	110	Remove
413	Black Box	148	Remove
414	Black Box	108	Retain
415	Stag	130	Retain
416	Stag	105	Retain
417	Black Box	85	Retain
418	Black Box	60	Retain
419	Black Box	55	Retain
420	Black Box	73	Retain
421	Black Box	80	Retain
422	River Red-gum	98	Remove
423	River Red-gum	180	Remove
424	Black Box	105	Remove
425	Black Box	70	Remove
426	Black Box	55	Remove
427	Black Box	118	Remove
428	Black Box	131	Remove
429	Black Box	115	Remove
430	Black Box	88	Retain
431	Black Box	60	Retain
432	Black Box	175	Remove
433	Black Box	52	Retain
434	Stag	125	Retain
435	Black Box	98	Retain
436	River Red-gum	133	Remove
437	Black Box	73	Retain
438	Black Box	75	Retain
439	Black Box	138	Remove
440	Stag	140	Retain
441	Stag	135	Retain
442	Black Box	75	Retain
443	Stag	92	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
444	Stag	130	Retain
445	Black Box	95	Remove
446	Black Box	150	Remove
447	Stag	112	Remove
448	Stag	105	Retain
449	Stag	130	Retain
450	River Red-gum	105	Remove
451	River Red-gum	180	Remove
452	River Red-gum	138	Remove
453	Black Box	150	Remove
454	Stag	109	Retain
455	Black Box	85	Remove
456	Black Box	79	Retain
457	River Red-gum	114	Retain
458	River Red-gum	106	Retain
459	River Red-gum	107	Remove
460	Stag	119	Remove
461	Black Box	55	Retain
462	Stag	117	Retain
463	River Red-gum	121	Retain
464	River Red-gum	124	Retain
465	Black Box	70	Retain
466	Black Box	66	Remove
467	Black Box	79	Remove
468	Stag	122	Retain
469	Black Box	52	Retain
470	Stag	104	Retain
471	Black Box	110	Retain
472	Stag	140	Retain
473	Stag	125	Retain
474	Black Box	70	Retain
475	Black Box	110	Remove
476	Black Box	60	Retain
477	Black Box	76	Retain
478	Black Box	90	Retain
479	Black Box	71	Retain
480	Black Box	92	Retain
481	Black Box	70	Retain
482	Black Box	50	Retain
483	Black Box	69	Retain
484	Black Box	78	Retain
485	Black Box	161	Retain
486	Black Box	91	Retain
487	Black Box	65	Remove
488	Stag	127	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
489	Stag	320	Retain
490	Stag	95	Retain
491	Stag	98	Retain
492	River Red-gum	135	Retain
493	River Red-gum	163	Retain
494	River Red-gum	148	Retain
495	Black Box	62	Remove
496	Black Box	62	Remove
497	Black Box	72	Remove
498	Black Box	52	Retain
499	Black Box	58	Remove
500	Stag	61	Retain
501	Black Box	58	Remove
502	Black Box	63	Remove
503	Black Box	64	Remove
504	Black Box	56	Remove
505	Black Box	94	Remove
506	Black Box	76	Remove
507	Black Box	65	Retain
508	Black Box	80	Remove
509	Stag	72	Retain
510	Stag	65	Retain
511	Black Box	47	Remove
512	Black Box	50	Retain
513	Black Box	54	Retain
514	Black Box	111	Remove
515	Black Box	71	Remove
516	Black Box	96	Retain
517	Black Box	132	Remove
518	Black Box	67	Remove
519	Stag	67	Retain
520	Black Box	105	Remove
521	Black Box	80	Retain
522	Black Box	94	Retain
523	Black Box	79	Remove
524	Black Box	129	Remove
525	Black Box	83	Remove
526	Black Box	95	Remove
527	Black Box	134	Remove
528	Black Box	103	Remove
529	Black Box	90	Retain
530	Black Box	120	Retain
531	Black Box	56	Retain
532	Black Box	43	Remove
533	Black Box	48	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
534	Black Box	101	Remove
535	Black Box	52	Remove
536	Black Box	75	Remove
537	Black Box	90	Retain
538	Black Box	116	Remove
539	Black Box	42	Remove
540	Black Box	68	Retain
541	Black Box	64	Retain
542	Black Box	52	Remove
543	Black Box	105	Remove
544	Stag	84	Retain
545	Black Box	65	Remove
546	Black Box	76	Retain
547	Black Box	111	Remove
548	Stag	110	Retain
549	Stag	98	Retain
550	River Red-gum	126	Remove
551	River Red-gum	180	Retain
552	Stag	107	Remove
553	River Red-gum	86	Remove
554	River Red-gum	102	Remove
555	Stag	89	Retain
556	River Red-gum	85	Remove
557	River Red-gum	96	Remove
558	River Red-gum	81	Remove
559	River Red-gum	150	Remove
560	River Red-gum	121	Retain
561	River Red-gum	167	Remove
562	Black Box	124	Remove
563	River Red-gum	125	Remove
564	River Red-gum	89	Remove
565	Black Box	134	Remove
566	Black Box	132	Remove
567	River Red-gum	120	Remove
568	River Red-gum	93	Remove
569	River Red-gum	123	Remove
570	River Red-gum	154	Remove
571	River Red-gum	154	Remove
572	River Red-gum	94	Remove
573	Black Box	51	Retain
574	Black Box	70	Retain
575	Black Box	91	Remove
576	Black Box	60	Retain
577	Black Box	73	Remove
578	Black Box	55	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
579	Black Box	68	Remove
580	Black Box	70	Remove
581	Black Box	94	Remove
582	Black Box	48	Retain
583	Black Box	89	Remove
584	Black Box	41	Retain
585	Black Box	61	Remove
586	Black Box	49	Remove
587	Black Box	75	Retain
588	Black Box	59	Remove
589	River Red-gum	140	Remove
590	Stag	90	Retain
591	Black Box	81	Remove
592	Stag	105	Retain
593	Black Box	105	Remove
594	Black Box	150	Remove
595	Black Box	195	Remove
596	Black Box	150	Remove
597	Black Box	65	Retain
598	Black Box	45	Retain
599	Stag	60	Retain
600	Black Box	53	Retain
601	Black Box	63	Retain
602	Black Box	75	Retain
603	Black Box	46	Remove
604	Black Box	63	Retain
605	Black Box	60	Retain
606	Black Box	47	Remove
607	Black Box	97	Remove
608	Black Box	102	Retain
609	Black Box	47	Retain
610	Black Box	52	Retain
611	Black Box	60	Retain
612	River Red-gum	120	Retain
613	River Red-gum	110	Retain
614	River Red-gum	110	Retain
615	River Red-gum	92	Retain
616	Black Box	110	Retain
617	Black Box	72	Remove
618	Black Box	71	Remove
619	Black Box	46	Remove
620	Black Box	105	Remove
621	Black Box	43	Remove
622	Black Box	62	Remove
623	Black Box	94	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
624	Black Box	67	Retain
625	Black Box	82	Retain
626	Black Box	85	Retain
627	Black Box	56	Remove
628	Black Box	75	Remove
629	Black Box	48	Remove
630	Black Box	51	Retain
631	Black Box	47	Retain
632	Black Box	42	Retain
633	Black Box	62	Retain
634	Black Box	43	Remove
635	Black Box	63	Remove
636	Black Box	66	Remove
637	Black Box	45	Remove
638	Black Box	49	Remove
639	Black Box	59	Remove
640	Black Box	52	Remove
641	Black Box	55	Remove
642	Black Box	95	Remove
643	Black Box	65	Remove
644	Black Box	78	Remove
645	Black Box	40	Retain
646	Black Box	64	Retain
647	Black Box	59	Retain
648	Black Box	77	Retain
649	Black Box	81	Retain
650	Black Box	74	Retain
651	Black Box	121	Retain
652	Black Box	52	Retain
653	Black Box	64	Retain
654	Black Box	75	Retain
655	Black Box	59	Retain
656	Black Box	47	Remove
657	Black Box	48	Remove
658	Black Box	48	Retain
659	Black Box	49	Retain
660	Black Box	41	Retain
661	Black Box	53	Retain
662	Stag	102	Retain
663	Stag	49	Retain
664	Stag	48	Remove
665	Black Box	73	Remove
666	Black Box	52	Retain
667	Black Box	45	Retain
668	Black Box	40	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
669	Black Box	62	Retain
670	Black Box	45	Retain
671	Black Box	105	Retain
672	Black Box	44	Retain
673	Black Box	115	Remove
674	Black Box	118	Remove
675	Black Box	141	Retain
676	Black Box	94	Retain
677	Black Box	88	Remove
678	Black Box	67	Retain
679	Black Box	78	Remove
680	Black Box	114	Remove
681	Black Box	46	Retain
682	Black Box	96	Retain
683	Black Box	63	Retain
684	Black Box	72	Retain
685	Black Box	60	Retain
686	Black Box	57	Retain
687	Black Box	47	Retain
688	Black Box	68	Retain
689	Black Box	83	Retain
690	Black Box	59	Retain
691	Black Box	40	Retain
692	Black Box	77	Retain
693	Black Box	58	Retain
694	Black Box	73	Remove
695	Black Box	68	Retain
696	Black Box	85	Remove
697	Black Box	53	Retain
698	Black Box	82	Retain
699	Black Box	127	Remove
700	Black Box	68	Remove
701	Black Box	139	Remove
702	River Red-gum	139	Remove
703	Black Box	121	Retain
704	Black Box	126	Remove
705	Stag	101	Remove
706	Black Box	61	Remove
707	Stag	124	Retain
708	Black Box	106	Remove
709	River Red-gum	99	Remove
710	Black Box	100	Retain
711	Black Box	84	Retain
712	Black Box	98	Remove
713	Black Box	88	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
714	Black Box	49	Retain
715	Black Box	96	Retain
716	Black Box	93	Retain
717	Black Box	86	Retain
718	Black Box	105	Retain
719	Black Box	112	Retain
720	Black Box	73	Retain
721	Black Box	56	Retain
722	Black Box	62	Remove
723	Black Box	58	Retain
724	Stag	64	Remove
725	Black Box	43	Retain
726	Black Box	43	Retain
727	Black Box	55	Retain
728	River Red-gum	133	Retain
729	River Red-gum	138	Retain
730	River Red-gum	130	Retain
731	Stag	111	Retain
732	River Red-gum	129	Retain
733	River Red-gum	81	Retain
734	River Red-gum	103	Retain
735	River Red-gum	81	Retain
736	River Red-gum	109	Retain
737	River Red-gum	217	Retain
738	Stag	120	Retain
739	Black Box	92	Retain
740	Black Box	50	Retain
741	Stag	65	Retain
742	Black Box	79	Remove
743	Black Box	50	Retain
744	Black Box	90	Retain
745	Stag	94	Remove
746	Black Box	73	Remove
747	Black Box	74	Remove
748	Black Box	63	Remove
749	Black Box	72	Remove
750	Stag	110	Retain
751	Black Box	62	Retain
752	Black Box	106	Remove
753	Black Box	76	Remove
754	Black Box	63	Remove
755	Black Box	56	Remove
756	Black Box	79	Retain
757	Black Box	49	Retain
758	Black Box	94	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
759	Stag	186	Retain
760	Stag	263	Retain
761	Stag	88	Retain
762	Stag	123	Retain
763	Stag	94	Retain
764	Stag	165	Retain
765	Stag	110	Retain
766	Stag	95	Retain
767	Stag	134	Retain
768	Stag	92	Retain
769	River Red-gum	137	Retain
770	Stag	134	Retain
771	Stag	130	Retain
772	Stag	112	Retain
773	Black Box	130	Retain
774	Stag	80	Retain
775	Stag	102	Retain
776	Black Box	120	Retain
777	Black Box	94	Retain
778	Black Box	68	Remove
779	Black Box	97	Retain
780	Stag	110	Remove
781	Black Box	125	Retain
782	Stag	90	Retain
783	Black Box	124	Remove
784	Black Box	71	Retain
785	Stag	98	Retain
786	Black Box	93	Retain
787	Stag	130	Retain
788	Stag	260	Retain
789	Stag	142	Retain
790	Black Box	52	Retain
791	Stag	130	Retain
792	Stag	120	Retain
793	River Red-gum	116	Retain
794	River Red-gum	144	Retain
795	River Red-gum	113	Retain
796	Stag	120	Retain
797	Black Box	55	Retain
798	Black Box	67	Retain
799	Black Box	89	Remove
800	Stag	60	Remove
801	Black Box	71	Remove
802	Stag	105	Retain
803	Black Box	110	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
804	Black Box	64	Remove
805	Black Box	90	Retain
806	Black Box	94	Remove
807	Black Box	92	Retain
808	Black Box	90	Remove
809	Black Box	74	Retain
810	Black Box	70	Retain
811	Stag	120	Retain
812	Black Box	72	Retain
813	Black Box	59	Retain
814	Black Box	74	Retain
815	Black Box	57	Retain
816	Black Box	105	Retain
817	Black Box	95	Remove
818	Black Box	95	Remove
819	Stag	90	Retain
820	Stag	90	Retain
821	Stag	95	Retain
822	River Red-gum	93	Retain
823	Black Box	66	Retain
824	River Red-gum	105	Retain
825	Black Box	65	Retain
826	River Red-gum	92	Retain
827	Black Box	70	Retain
828	River Red-gum	89	Retain
829	Black Box	101	Retain
830	Black Box	83	Retain
831	River Red-gum	162	Retain
832	Black Box	95	Retain
833	Black Box	98	Retain
834	Black Box	85	Retain
835	Black Box	79	Retain
836	Black Box	88	Retain
837	Black Box	70	Retain
838	Stag	120	Retain
839	Stag	150	Retain
840	Stag	122	Retain
841	Stag	125	Retain
842	River Red-gum	83	Retain
843	River Red-gum	114	Retain
844	River Red-gum	98	Retain
845	Stag	105	Retain
846	Black Box	93	Retain
847	River Red-gum	95	Retain
848	Stag	99	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
849	Stag	100	Retain
850	River Red-gum	85	Remove
851	Black Box	52	Retain
852	River Red-gum	161	Retain
853	Stag	95	Retain
854	River Red-gum	95	Remove
855	Black Box	84	Retain
856	Black Box	89	Retain
857	River Red-gum	220	Retain
858	River Red-gum	180	Retain
859	River Red-gum	157	Retain
860	River Red-gum	123	Retain
861	River Red-gum	137	Remove
862	River Red-gum	108	Retain
863	River Red-gum	112	Retain
864	River Red-gum	120	Retain
865	Black Box	92	Retain
866	Black Box	109	Retain
867	River Red-gum	89	Retain
868	River Red-gum	142	Retain
869	River Red-gum	118	Retain
870	River Red-gum	133	Remove
871	River Red-gum	131	Retain
872	River Red-gum	116	Retain
873	River Red-gum	200	Remove
874	River Red-gum	230	Remove
875	River Red-gum	220	Remove
876	River Red-gum	105	Remove
877	River Red-gum	125	Retain
878	River Red-gum	96	Retain
879	Black Box	62	Retain
880	Stag	95	Retain
881	Black Box	122	Retain
882	Black Box	61	Retain
883	Black Box	83	Retain
884	Black Box	146	Remove
885	River Red-gum	131	Remove
886	River Red-gum	128	Remove
887	River Red-gum	109	Remove
888	River Red-gum	160	Remove
889	River Red-gum	162	Remove
890	Black Box	95	Retain
891	Stag	98	Retain
892	Black Box	95	Remove
893	Black Box	84	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
894	Black Box	107	Remove
895	Black Box	55	Retain
896	Black Box	43	Remove
897	River Red-gum	123	Remove
898	River Red-gum	124	Remove
899	Black Box	82	Remove
900	Black Box	81	Remove
901	Black Box	91	Remove
902	Black Box	72	Retain
903	Black Box	180	Retain
904	Black Box	113	Remove
905	River Red-gum	96	Remove
906	Black Box	114	Retain
907	River Red-gum	113	Remove
908	River Red-gum	118	Retain
909	River Red-gum	98	Retain
910	River Red-gum	124	Retain
911	River Red-gum	92	Retain
912	River Red-gum	127	Remove
913	River Red-gum	99	Remove
914	River Red-gum	132	Remove
915	River Red-gum	165	Retain
916	Stag	118	Retain
917	River Red-gum	128	Remove
918	River Red-gum	107	Remove
919	River Red-gum	163	Remove
920	River Red-gum	171	Remove
921	River Red-gum	93	Retain
922	River Red-gum	151	Remove
923	Stag	85	Retain
924	Black Box	114	Retain
925	Black Box	71	Retain
926	Black Box	93	Remove
927	Black Box	115	Remove
928	Black Box	73	Retain
929	River Red-gum	129	Remove
930	River Red-gum	124	Retain
931	River Red-gum	134	Remove
932	River Red-gum	106	Remove
933	River Red-gum	210	Retain
934	River Red-gum	102	Remove
935	River Red-gum	112	Remove
936	River Red-gum	118	Retain
937	River Red-gum	137	Retain
938	River Red-gum	124	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
939	River Red-gum	105	Remove
940	River Red-gum	119	Retain
941	River Red-gum	126	Remove
942	River Red-gum	95	Remove
943	River Red-gum	89	Retain
944	River Red-gum	135	Remove
945	River Red-gum	214	Retain
946	River Red-gum	156	Retain
947	River Red-gum	126	Retain
948	Black Box	81	Remove
949	River Red-gum	98	Remove
950	Black Box	65	Retain
951	Black Box	55	Remove
952	River Red-gum	100	Remove
953	River Red-gum	122	Remove
954	River Red-gum	81	Remove
955	River Red-gum	101	Remove
956	River Red-gum	260	Remove
957	Black Box	74	Remove
958	Black Box	80	Remove
959	Black Box	52	Remove
960	Black Box	58	Remove
961	Black Box	48	Retain
962	Black Box	62	Remove
963	Black Box	68	Remove
964	Black Box	95	Retain
965	Black Box	56	Remove
966	Black Box	72	Retain
967	Black Box	64	Retain
968	Black Box	90	Retain
969	Black Box	101	Retain
970	River Red-gum	135	Remove
971	Black Box	97	Retain
972	Black Box	63	Remove
973	Black Box	44	Retain
974	Black Box	107	Remove
975	Black Box	203	Retain
976	Black Box	89	Retain
977	Black Box	131	Retain
978	Black Box	147	Retain
979	Black Box	87	Retain
980	Black Box	89	Retain
981	Black Box	49	Retain
982	Black Box	97	Remove
983	Black Box	73	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
984	Black Box	94	Remove
985	River Red-gum	83	Remove
986	Black Box	51	Remove
987	Black Box	65	Remove
988	Black Box	52	Remove
989	Black Box	61	Retain
990	Black Box	107	Remove
991	Black Box	116	Retain
992	Stag	72	Remove
993	Black Box	69	Remove
994	River Red-gum	127	Remove
995	Black Box	164	Remove
996	Black Box	68	Remove
997	River Red-gum	85	Retain
998	Black Box	110	Retain
999	Black Box	83	Remove
1000	River Red-gum	84	Remove
1001	Black Box	51	Remove
1002	Black Box	49	Remove
1003	Black Box	58	Retain
1004	Black Box	70	Remove
1005	Black Box	62	Remove
1006	Black Box	83	Remove
1007	Black Box	54	Remove
1008	Black Box	78	Remove
1009	Black Box	50	Remove
1010	Black Box	121	Remove
1011	Black Box	99	Remove
1012	Black Box	100	Retain
1013	Black Box	64	Retain
1014	Black Box	107	Remove
1015	River Red-gum	110	Remove
1016	River Red-gum	180	Retain
1017	River Red-gum	168	Remove
1018	Black Box	55	Retain
1019	Black Box	53	Retain
1020	Black Box	43	Retain
1021	Black Box	57	Retain
1022	Black Box	61	Retain
1023	Black Box	47	Remove
1024	Black Box	88	Remove
1025	Black Box	83	Retain
1026	Black Box	127	Remove
1027	Black Box	71	Remove
1028	Black Box	89	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1029	Black Box	51	Remove
1030	Stag	51	Remove
1031	Black Box	62	Retain
1032	Black Box	43	Remove
1033	Black Box	62	Remove
1034	Black Box	42	Remove
1035	Black Box	61	Remove
1036	Black Box	82	Remove
1037	Black Box	82	Retain
1038	Black Box	60	Retain
1039	Black Box	84	Retain
1040	Black Box	71	Remove
1041	Black Box	57	Retain
1042	Black Box	49	Remove
1043	Black Box	47	Retain
1044	Black Box	48	Remove
1045	Black Box	68	Retain
1046	Black Box	52	Retain
1047	Black Box	45	Remove
1048	Black Box	41	Retain
1049	Black Box	61	Remove
1050	Black Box	43	Remove
1051	Black Box	48	Remove
1052	Black Box	47	Retain
1053	Black Box	47	Retain
1054	Black Box	40	Retain
1055	Black Box	68	Retain
1056	Black Box	81	Retain
1057	Black Box	85	Retain
1058	Black Box	47	Retain
1059	Black Box	41	Retain
1060	Stag	50	Retain
1061	Stag	48	Retain
1062	Stag	54	Retain
1063	Black Box	48	Retain
1064	Stag	49	Retain
1065	Stag	72	Retain
1066	Black Box	48	Retain
1067	Black Box	55	Retain
1068	Black Box	66	Retain
1069	Black Box	92	Retain
1070	Black Box	60	Retain
1071	Black Box	41	Retain
1072	Stag	57	Retain
1073	Black Box	98	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1074	Stag	52	Retain
1075	Stag	73	Retain
1076	Black Box	53	Remove
1077	Black Box	61	Retain
1078	Stag	57	Retain
1079	Black Box	84	Retain
1080	Black Box	44	Remove
1081	River Red-gum	104	Retain
1082	River Red-gum	155	Retain
1083	Stag	120	Retain
1084	River Red-gum	122	Remove
1085	River Red-gum	220	Remove
1086	River Red-gum	240	Remove
1087	Black Box	90	Remove
1088	Black Box	63	Remove
1089	River Red-gum	110	Remove
1090	Black Box	91	Remove
1091	Black Box	71	Retain
1092	Stag	102	Retain
1093	Stag	112	Retain
1094	Black Box	70	Retain
1095	Stag	92	Retain
1096	Black Box	64	Retain
1097	Black Box	58	Remove
1098	Black Box	67	Remove
1099	Stag	99	Retain
1100	Stag	40	Retain
1101	Stag	57	Retain
1102	Stag	42	Retain
1103	Black Box	46	Retain
1104	Black Box	52	Retain
1105	Black Box	79	Retain
1106	Black Box	52	Retain
1107	Stag	42	Remove
1108	Stag	52	Retain
1109	Stag	58	Retain
1110	Stag	48	Remove
1111	River Red-gum	332	Retain
1112	Black Box	54	Remove
1113	Black Box	84	Remove
1114	Black Box	81	Remove
1115	Black Box	119	Remove
1116	Black Box	54	Remove
1117	Black Box	57	Remove
1118	Black Box	55	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1119	Black Box	72	Remove
1120	Black Box	59	Remove
1121	Black Box	79	Remove
1122	River Red-gum	115	Remove
1123	River Red-gum	129	Remove
1124	Black Box	95	Remove
1125	Black Box	63	Remove
1126	Black Box	69	Remove
1127	Black Box	70	Retain
1128	Black Box	53	Retain
1129	Black Box	62	Retain
1130	Black Box	74	Remove
1131	Black Box	58	Remove
1132	Black Box	58	Remove
1133	Black Box	75	Remove
1134	Black Box	64	Remove
1135	Black Box	60	Remove
1136	Black Box	72	Remove
1137	River Red-gum	170	Remove
1138	River Red-gum	155	Remove
1139	Black Box	52	Retain
1140	Black Box	54	Retain
1141	Black Box	106	Retain
1142	Black Box	61	Retain
1143	Black Box	67	Remove
1144	Black Box	75	Retain
1145	Black Box	56	Retain
1146	Black Box	63	Retain
1147	Black Box	43	Retain
1148	Black Box	90	Remove
1149	Black Box	115	Remove
1150	Black Box	147	Remove
1151	Black Box	119	Remove
1152	River Red-gum	95	Remove
1153	River Red-gum	109	Remove
1154	River Red-gum	88	Remove
1155	Black Box	53	Remove
1156	Black Box	46	Remove
1157	Black Box	56	Remove
1158	Black Box	54	Remove
1159	Black Box	52	Remove
1160	Black Box	41	Remove
1161	Black Box	42	Remove
1162	Black Box	42	Remove
1163	Black Box	49	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1164	Black Box	44	Remove
1165	Black Box	44	Remove
1166	Black Box	51	Remove
1167	Black Box	102	Remove
1168	Black Box	40	Remove
1169	Black Box	58	Remove
1170	Black Box	41	Remove
1171	Black Box	40	Remove
1172	Black Box	49	Remove
1173	Black Box	64	Remove
1174	Black Box	43	Retain
1175	Black Box	54	Retain
1176	Black Box	70	Retain
1177	Black Box	91	Remove
1178	Black Box	90	Retain
1179	River Red-gum	87	Remove
1180	River Red-gum	84	Retain
1181	River Red-gum	98	Retain
1182	River Red-gum	112	Retain
1183	Black Box	110	Remove
1184	Black Box	64	Retain
1185	Black Box	47	Remove
1186	Black Box	63	Retain
1187	Black Box	49	Retain
1188	Black Box	107	Retain
1189	Black Box	101	Retain
1190	Black Box	48	Retain
1191	Black Box	45	Retain
1192	Stag	86	Retain
1193	Black Box	59	Retain
1194	Black Box	47	Retain
1195	Black Box	42	Retain
1196	Black Box	89	Retain
1197	River Red-gum	110	Retain
1198	Stag	158	Retain
1199	Stag	108	Retain
1200	River Red-gum	118	Retain
1201	Stag	73	Retain
1202	Stag	124	Retain
1203	Stag	135	Retain
1204	Stag	224	Retain
1205	Stag	83	Retain
1206	River Red-gum	232	Remove
1207	River Red-gum	142	Retain
1208	Black Box	50	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1209	River Red-gum	135	Retain
1210	River Red-gum	168	Remove
1211	River Red-gum	165	Remove
1212	River Red-gum	140	Remove
1213	Stag	114	Remove
1214	River Red-gum	108	Retain
1215	River Red-gum	82	Retain
1216	River Red-gum	103	Retain
1217	River Red-gum	130	Retain
1218	River Red-gum	111	Retain
1219	River Red-gum	152	Retain
1220	River Red-gum	131	Retain
1221	River Red-gum	192	Retain
1222	Stag	181	Retain
1223	Stag	224	Retain
1224	River Red-gum	113	Remove
1225	River Red-gum	129	Remove
1226	River Red-gum	168	Remove
1227	River Red-gum	141	Retain
1228	River Red-gum	150	Retain
1229	Stag	91	Retain
1230	Stag	160	Retain
1231	Stag	161	Retain
1232	River Red-gum	183	Remove
1233	River Red-gum	131	Remove
1234	River Red-gum	108	Retain
1235	River Red-gum	106	Retain
1236	River Red-gum	132	Retain
1237	River Red-gum	107	Retain
1238	River Red-gum	125	Remove
1239	River Red-gum	95	Retain
1240	River Red-gum	98	Retain
1241	River Red-gum	116	Remove
1242	River Red-gum	100	Remove
1243	Stag	152	Retain
1244	Stag	122	Retain
1245	Stag	107	Retain
1246	River Red-gum	117	Remove
1247	River Red-gum	133	Retain
1248	River Red-gum	88	Retain
1249	River Red-gum	153	Retain
1250	River Red-gum	107	Retain
1251	River Red-gum	83	Retain
1252	Stag	94	Retain
1253	River Red-gum	160	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1254	River Red-gum	103	Remove
1255	River Red-gum	98	Remove
1256	River Red-gum	104	Remove
1257	River Red-gum	96	Retain
1258	Stag	84	Retain
1259	River Red-gum	114	Remove
1260	Stag	103	Remove
1261	River Red-gum	118	Retain
1262	Stag	139	Retain
1263	Stag	103	Retain
1264	River Red-gum	104	Remove
1265	Stag	83	Retain
1266	Stag	91	Retain
1267	River Red-gum	108	Retain
1268	River Red-gum	131	Retain
1269	River Red-gum	156	Remove
1270	Stag	88	Retain
1271	River Red-gum	109	Retain
1272	River Red-gum	127	Retain
1273	River Red-gum	97	Retain
1274	River Red-gum	94	Remove
1275	River Red-gum	122	Remove
1276	River Red-gum	127	Retain
1277	River Red-gum	201	Remove
1278	Stag	95	Retain
1279	Stag	171	Retain
1280	Stag	98	Retain
1281	River Red-gum	127	Retain
1282	River Red-gum	125	Remove
1283	Stag	134	Retain
1284	Stag	95	Remove
1285	Stag	85	Remove
1286	River Red-gum	196	Remove
1287	River Red-gum	84	Remove
1288	River Red-gum	96	Retain
1289	River Red-gum	98	Retain
1290	River Red-gum	120	Retain
1291	River Red-gum	105	Retain
1292	River Red-gum	194	Remove
1293	River Red-gum	88	Retain
1294	River Red-gum	110	Retain
1295	River Red-gum	123	Retain
1296	River Red-gum	106	Retain
1297	River Red-gum	140	Retain
1298	River Red-gum	106	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1299	River Red-gum	153	Remove
1300	Stag	134	Retain
1301	River Red-gum	178	Retain
1302	River Red-gum	156	Retain
1303	River Red-gum	138	Remove
1304	River Red-gum	144	Retain
1305	River Red-gum	192	Remove
1306	River Red-gum	120	Retain
1307	River Red-gum	219	Retain
1308	River Red-gum	181	Retain
1309	Black Box	105	Retain
1310	River Red-gum	124	Retain
1311	Black Box	109	Remove
1312	River Red-gum	269	Retain
1313	Black Box	89	Retain
1314	Black Box	88	Retain
1315	River Red-gum	132	Remove
1316	Black Box	63	Retain
1317	River Red-gum	129	Retain
1318	River Red-gum	155	Retain
1319	River Red-gum	95	Retain
1320	River Red-gum	85	Retain
1321	River Red-gum	91	Retain
1322	River Red-gum	129	Retain
1323	River Red-gum	90	Retain
1324	River Red-gum	164	Retain
1325	River Red-gum	112	Retain
1326	River Red-gum	158	Retain
1327	Stag	88	Retain
1328	River Red-gum	142	Retain
1329	River Red-gum	138	Retain
1330	River Red-gum	134	Remove
1331	River Red-gum	86	Retain
1332	River Red-gum	120	Retain
1333	River Red-gum	98	Retain
1334	River Red-gum	125	Retain
1335	River Red-gum	110	Retain
1336	River Red-gum	140	Remove
1337	Black Box	105	Retain
1338	Black Box	96	Remove
1339	Black Box	110	Retain
1340	Stag	85	Retain
1341	River Red-gum	97	Remove
1342	River Red-gum	110	Retain
1343	River Red-gum	115	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1344	River Red-gum	158	Remove
1345	Black Box	57	Remove
1346	Black Box	89	Retain
1347	River Red-gum	136	Retain
1348	River Red-gum	160	Retain
1349	River Red-gum	132	Retain
1350	River Red-gum	183	Retain
1351	Black Box	76	Retain
1352	Black Box	50	Retain
1353	Black Box	54	Remove
1354	Stag	54	Retain
1355	Stag	52	Retain
1356	Black Box	54	Retain
1357	Black Box	93	Retain
1358	Black Box	63	Retain
1359	Black Box	44	Retain
1360	Black Box	57	Retain
1361	Black Box	64	Remove
1362	Black Box	48	Retain
1363	Black Box	59	Remove
1364	Black Box	66	Remove
1365	Stag	49	Retain
1366	Black Box	54	Retain
1367	Black Box	53	Remove
1368	Stag	65	Retain
1369	Black Box	80	Remove
1370	Stag	43	Retain
1371	Black Box	49	Retain
1372	Black Box	43	Retain
1373	Black Box	88	Retain
1374	Stag	80	Retain
1375	Black Box	45	Retain
1376	Black Box	57	Retain
1377	Black Box	68	Retain
1378	Black Box	51	Retain
1379	Black Box	57	Remove
1380	Black Box	52	Retain
1381	Black Box	49	Remove
1382	Black Box	52	Remove
1383	Black Box	42	Retain
1384	Stag	62	Retain
1385	Black Box	44	Retain
1386	Black Box	49	Retain
1387	Black Box	84	Retain
1388	Stag	47	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1389	Black Box	75	Retain
1390	Black Box	48	Retain
1391	Black Box	50	Retain
1392	Black Box	53	Remove
1393	Black Box	60	Retain
1394	Black Box	49	Remove
1395	Black Box	68	Remove
1396	Black Box	41	Retain
1397	Black Box	73	Retain
1398	Black Box	59	Remove
1399	Black Box	68	Remove
1400	Stag	50	Retain
1401	Stag	52	Retain
1402	Black Box	69	Retain
1403	Black Box	63	Remove
1404	Black Box	60	Remove
1405	Black Box	62	Retain
1406	Black Box	55	Retain
1407	Black Box	98	Remove
1408	River Red-gum	139	Retain
1409	River Red-gum	79	Retain
1410	River Red-gum	80	Retain
1411	River Red-gum	80	Retain
1412	River Red-gum	102	Retain
1413	River Red-gum	101	Retain
1414	River Red-gum	77	Retain
1415	River Red-gum	73	Retain
1416	River Red-gum	127	Retain
1417	River Red-gum	147	Retain
1418	Stag	105	Remove
1419	River Red-gum	143	Retain
1420	River Red-gum	93	Retain
1421	River Red-gum	134	Remove
1422	River Red-gum	102	Retain
1423	River Red-gum	88	Retain
1424	River Red-gum	116	Remove
1425	River Red-gum	110	Remove
1426	Stag	110	Retain
1427	Stag	100	Retain
1428	Stag	105	Retain
1429	Stag	108	Retain
1430	Stag	105	Retain
1431	Stag	167	Retain
1432	Stag	99	Retain
1433	Stag	95	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1434	River Red-gum	152	Remove
1435	Stag	100	Remove
1436	River Red-gum	107	Remove
1437	River Red-gum	144	Remove
1438	River Red-gum	144	Remove
1439	Stag	120	Retain
1440	River Red-gum	94	Remove
1441	River Red-gum	120	Retain
1442	Stag	102	Remove
1443	River Red-gum	135	Retain
1444	River Red-gum	95	Retain
1445	River Red-gum	125	Remove
1446	River Red-gum	100	Retain
1447	River Red-gum	95	Retain
1448	River Red-gum	127	Remove
1449	River Red-gum	111	Remove
1450	Stag	134	Retain
1451	River Red-gum	95	Retain
1452	River Red-gum	111	Remove
1453	River Red-gum	125	Remove
1454	Stag	120	Retain
1455	Stag	85	Retain
1456	River Red-gum	117	Retain
1457	River Red-gum	138	Retain
1458	River Red-gum	149	Retain
1459	River Red-gum	112	Retain
1460	Stag	98	Retain
1461	Stag	70	Retain
1462	River Red-gum	129	Remove
1463	River Red-gum	75	Remove
1464	River Red-gum	115	Remove
1465	River Red-gum	125	Remove
1466	River Red-gum	105	Remove
1467	Stag	102	Remove
1468	River Red-gum	135	Remove
1469	Stag	191	Retain
1470	Stag	140	Remove
1471	Stag	134	Remove
1472	Stag	135	Retain
1473	River Red-gum	130	Retain
1474	River Red-gum	206	Remove
1475	River Red-gum	141	Remove
1476	River Red-gum	120	Retain
1477	River Red-gum	136	Remove
1478	Stag	87	Remove
1479	Stag	134	Remove
1480	Stag	94	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1481	Stag	92	Retain
1482	Stag	118	Retain
1483	Stag	108	Retain
1484	Stag	123	Retain
1485	Stag	120	Retain
1486	Stag	92	Retain
1487	River Red-gum	98	Remove
1488	River Red-gum	90	Retain
1489	River Red-gum	117	Remove
1490	River Red-gum	113	Retain
1491	River Red-gum	113	Remove
1492	River Red-gum	112	Retain
1493	Stag	115	Retain
1494	Stag	166	Retain
1495	Stag	144	Retain
1496	Stag	148	Retain
1497	River Red-gum	96	Remove
1498	River Red-gum	164	Remove
1499	River Red-gum	105	Remove
1500	Stag	146	Retain
1501	Stag	134	Remove
1502	River Red-gum	164	Retain
1503	River Red-gum	213	Remove
1504	River Red-gum	155	Retain
1505	River Red-gum	156	Retain
1506	Stag	107	Retain
1507	River Red-gum	132	Remove
1508	River Red-gum	160	Retain
1509	River Red-gum	84	Remove
1510	River Red-gum	74	Remove
1511	River Red-gum	155	Remove
1512	River Red-gum	94	Remove
1513	Stag	97	Retain
1514	Stag	92	Retain
1515	Stag	130	Retain
1516	Stag	113	Retain
1517	River Red-gum	72	Retain
1518	River Red-gum	125	Remove
1519	Black Box	56	Retain
1520	Black Box	42	Retain
1521	Black Box	46	Remove
1522	Black Box	51	Remove
1523	Black Box	51	Retain
1524	Black Box	45	Remove
1525	Black Box	52	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1526	Black Box	44	Remove
1527	Black Box	53	Retain
1528	Black Box	44	Remove
1529	Black Box	45	Retain
1530	Black Box	46	Remove
1531	Black Box	50	Retain
1532	Black Box	41	Retain
1533	Black Box	41	Retain
1534	Black Box	66	Remove
1535	Black Box	41	Remove
1536	Black Box	46	Retain
1537	Black Box	48	Retain
1538	Stag	74	Retain
1539	Black Box	44	Remove
1540	Black Box	41	Retain
1541	Black Box	52	Remove
1542	Black Box	40	Remove
1543	Black Box	46	Remove
1544	Black Box	46	Remove
1545	Black Box	48	Remove
1546	Black Box	41	Remove
1547	Black Box	45	Remove
1548	Black Box	49	Remove
1549	Black Box	45	Remove
1550	Black Box	43	Remove
1551	Black Box	44	Remove
1552	Stag	45	Retain
1553	Black Box	49	Retain
1554	Black Box	40	Remove
1555	Black Box	41	Retain
1556	Black Box	46	Remove
1557	Black Box	48	Retain
1558	Black Box	40	Remove
1559	Black Box	40	Retain
1560	Black Box	61	Remove
1561	Black Box	73	Retain
1562	Black Box	75	Remove
1563	Black Box	52	Retain
1564	Black Box	78	Remove
1565	Black Box	42	Retain
1566	Black Box	54	Remove
1567	Black Box	52	Remove
1568	Black Box	58	Retain
1569	Black Box	85	Remove
1570	Black Box	57	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1571	Black Box	65	Remove
1572	Black Box	55	Remove
1573	Black Box	43	Retain
1574	Black Box	48	Remove
1575	Black Box	69	Remove
1576	Black Box	47	Retain
1577	Black Box	41	Remove
1578	Black Box	58	Remove
1579	Black Box	59	Retain
1580	Black Box	54	Retain
1581	Black Box	54	Remove
1582	Black Box	40	Remove
1583	Stag	42	Retain
1584	Black Box	68	Remove
1585	Black Box	43	Retain
1586	Black Box	60	Retain
1587	Black Box	49	Remove
1588	Black Box	64	Retain
1589	Black Box	40	Retain
1590	Black Box	48	Retain
1591	Black Box	101	Retain
1592	Black Box	44	Retain
1593	Black Box	62	Remove
1594	Black Box	101	Remove
1595	Black Box	105	Remove
1596	Black Box	61	Remove
1597	Stag	48	Retain
1598	Stag	47	Retain
1599	Black Box	40	Remove
1600	Black Box	46	Retain
1601	Black Box	51	Remove
1602	Black Box	57	Remove
1603	Black Box	60	Retain
1604	Black Box	47	Retain
1605	Black Box	49	Remove
1606	Black Box	72	Remove
1607	Black Box	58	Retain
1608	Black Box	52	Remove
1609	Black Box	48	Remove
1610	Black Box	46	Retain
1611	Black Box	63	Retain
1612	Black Box	74	Remove
1613	Black Box	55	Retain
1614	Black Box	46	Remove
1615	Black Box	42	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1616	Black Box	40	Retain
1617	Black Box	44	Retain
1618	Black Box	44	Retain
1619	Black Box	64	Remove
1620	Black Box	49	Retain
1621	Black Box	102	Remove
1622	Black Box	52	Retain
1623	Black Box	48	Retain
1624	Black Box	40	Retain
1625	Black Box	40	Retain
1626	Black Box	42	Retain
1627	Black Box	109	Retain
1628	Black Box	40	Retain
1629	Black Box	46	Retain
1630	Black Box	81	Remove
1631	Black Box	61	Remove
1632	Black Box	41	Retain
1633	Black Box	41	Retain
1634	Black Box	60	Remove
1635	Black Box	40	Remove
1636	Black Box	43	Retain
1637	Black Box	61	Retain
1638	Black Box	54	Retain
1639	Stag	50	Remove
1640	Black Box	41	Remove
1641	Stag	55	Retain
1642	Black Box	50	Remove
1643	Black Box	42	Retain
1644	Black Box	68	Retain
1645	Stag	43	Remove
1646	Black Box	54	Retain
1647	Black Box	42	Retain
1648	Black Box	40	Retain
1649	Black Box	42	Retain
1650	Stag	43	Remove
1651	Black Box	52	Retain
1652	Black Box	65	Retain
1653	Stag	50	Retain
1654	Black Box	119	Retain
1655	Black Box	64	Retain
1656	Black Box	47	Retain
1657	Black Box	80	Retain
1658	Black Box	49	Retain
1659	Black Box	41	Retain
1660	Black Box	45	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1661	Black Box	58	Retain
1662	Black Box	45	Retain
1663	Black Box	90	Retain
1664	Black Box	43	Retain
1665	Black Box	78	Remove
1666	Black Box	55	Retain
1667	Black Box	53	Remove
1668	Stag	45	Retain
1669	Black Box	108	Remove
1670	Black Box	52	Retain
1671	Black Box	49	Retain
1672	Black Box	64	Retain
1673	Black Box	46	Retain
1674	Black Box	96	Retain
1675	Black Box	41	Retain
1676	Stag	44	Retain
1677	Stag	131	Retain
1678	River Red-gum	142	Remove
1679	River Red-gum	90	Remove
1680	Stag	97	Retain
1681	River Red-gum	171	Retain
1682	River Red-gum	161	Retain
1683	River Red-gum	105	Retain
1684	River Red-gum	95	Retain
1685	River Red-gum	97	Remove
1686	River Red-gum	123	Retain
1687	River Red-gum	198	Remove
1688	Black Box	106	Retain
1689	River Red-gum	87	Retain
1690	River Red-gum	121	Remove
1691	River Red-gum	188	Remove
1692	River Red-gum	97	Remove
1693	River Red-gum	108	Remove
1694	River Red-gum	121	Remove
1695	River Red-gum	145	Retain
1696	River Red-gum	168	Remove
1697	River Red-gum	120	Retain
1698	River Red-gum	81	Remove
1699	River Red-gum	83	Remove
1700	River Red-gum	100	Retain
1701	River Red-gum	97	Retain
1702	River Red-gum	240	Retain
1703	River Red-gum	104	Remove
1704	River Red-gum	110	Remove
1705	River Red-gum	113	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1706	River Red-gum	115	Remove
1707	River Red-gum	182	Remove
1708	River Red-gum	119	Remove
1709	River Red-gum	152	Remove
1710	River Red-gum	100	Remove
1711	River Red-gum	97	Remove
1712	River Red-gum	160	Retain
1713	River Red-gum	144	Retain
1714	River Red-gum	110	Retain
1715	River Red-gum	160	Retain
1716	River Red-gum	115	Retain
1717	River Red-gum	133	Remove
1718	River Red-gum	132	Remove
1719	River Red-gum	101	Remove
1720	River Red-gum	85	Retain
1721	River Red-gum	101	Retain
1722	River Red-gum	139	Remove
1723	River Red-gum	127	Remove
1724	River Red-gum	87	Remove
1725	River Red-gum	159	Remove
1726	River Red-gum	105	Remove
1727	River Red-gum	136	Retain
1728	River Red-gum	96	Retain
1729	River Red-gum	137	Retain
1730	River Red-gum	88	Remove
1731	River Red-gum	72	Remove
1732	River Red-gum	120	Remove
1733	River Red-gum	130	Remove
1734	River Red-gum	120	Remove
1735	River Red-gum	1140	Remove
1736	River Red-gum	116	Remove
1737	River Red-gum	138	Remove
1738	River Red-gum	178	Remove
1739	River Red-gum	125	Retain
1740	River Red-gum	94	Retain
1741	River Red-gum	136	Retain
1742	River Red-gum	158	Retain
1743	River Red-gum	120	Retain
1744	River Red-gum	134	Retain
1745	River Red-gum	120	Remove
1746	River Red-gum	84	Remove
1747	River Red-gum	88	Remove
1748	River Red-gum	195	Remove
1749	River Red-gum	162	Remove
1750	River Red-gum	80	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1751	River Red-gum	85	Remove
1752	River Red-gum	166	Remove
1753	River Red-gum	122	Remove
1754	River Red-gum	96	Remove
1755	River Red-gum	128	Retain
1756	River Red-gum	111	Remove
1757	River Red-gum	124	Remove
1758	River Red-gum	164	Remove
1759	Black Box	94	Remove
1760	River Red-gum	145	Remove
1761	Black Box	106	Remove
1762	Black Box	102	Remove
1763	Black Box	41	Remove
1764	Black Box	48	Remove
1765	Black Box	49	Remove
1766	Black Box	96	Remove
1767	Black Box	73	Retain
1768	Black Box	65	Remove
1769	Black Box	82	Remove
1770	Black Box	57	Retain
1771	River Red-gum	94	Remove
1772	Black Box	95	Retain
1773	Black Box	72	Retain
1774	Black Box	84	Remove
1775	Black Box	55	Retain
1776	Black Box	128	Remove
1777	Black Box	91	Retain
1778	Black Box	123	Remove
1779	River Red-gum	72	Remove
1780	River Red-gum	74	Remove
1781	Black Box	79	Remove
1782	Black Box	81	Retain
1783	Black Box	70	Retain
1784	Black Box	126	Remove
1785	Black Box	83	Remove
1786	Black Box	70	Remove
1787	Black Box	67	Retain
1788	River Red-gum	93	Remove
1789	River Red-gum	133	Remove
1790	River Red-gum	133	Remove
1791	River Red-gum	77	Remove
1792	River Red-gum	110	Remove
1793	River Red-gum	201	Remove
1794	Stag	90	Retain
1795	Black Box	54	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1796	Stag	45	Retain
1797	Black Box	67	Remove
1798	Stag	40	Remove
1799	Stag	62	Retain
1800	Black Box	63	Retain
1801	River Red-gum	93	Retain
1802	River Red-gum	81	Retain
1803	River Red-gum	142	Retain
1804	River Red-gum	98	Remove
1805	River Red-gum	157	Remove
1806	River Red-gum	122	Remove
1807	River Red-gum	98	Remove
1808	River Red-gum	104	Remove
1809	River Red-gum	111	Remove
1810	River Red-gum	158	Remove
1811	River Red-gum	136	Remove
1812	River Red-gum	102	Remove
1813	River Red-gum	141	Remove
1814	Black Box	54	Retain
1815	River Red-gum	98	Remove
1816	River Red-gum	108	Remove
1817	River Red-gum	96	Remove
1818	Black Box	55	Retain
1819	Black Box	68	Remove
1820	Black Box	47	Remove
1821	Black Box	60	Remove
1822	Black Box	55	Remove
1823	River Red-gum	197	Remove
1824	River Red-gum	237	Remove
1825	River Red-gum	96	Remove
1826	River Red-gum	145	Remove
1827	River Red-gum	132	Remove
1828	River Red-gum	134	Remove
1829	River Red-gum	95	Remove
1830	Black Box	84	Remove
1831	River Red-gum	100	Remove
1832	River Red-gum	119	Remove
1833	River Red-gum	189	Remove
1834	River Red-gum	76	Remove
1835	River Red-gum	152	Remove
1836	River Red-gum	107	Remove
1837	River Red-gum	95	Remove
1838	River Red-gum	71	Remove
1839	River Red-gum	92	Remove
1840	River Red-gum	79	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1841	River Red-gum	81	Remove
1842	River Red-gum	83	Remove
1843	River Red-gum	105	Remove
1844	River Red-gum	134	Remove
1845	River Red-gum	120	Remove
1846	River Red-gum	88	Retain
1847	River Red-gum	92	Retain
1848	River Red-gum	180	Retain
1849	Stag	74	Retain
1850	Stag	92	Retain
1851	Stag	94	Retain
1852	River Red-gum	116	Remove
1853	River Red-gum	108	Retain
1854	River Red-gum	75	Retain
1855	River Red-gum	114	Retain
1856	River Red-gum	94	Retain
1857	River Red-gum	167	Remove
1858	Stag	110	Retain
1859	River Red-gum	159	Retain
1860	River Red-gum	160	Retain
1861	River Red-gum	152	Retain
1862	River Red-gum	112	Remove
1863	River Red-gum	123	Remove
1864	River Red-gum	123	Retain
1865	River Red-gum	143	Retain
1866	Stag	86	Retain
1867	River Red-gum	191	Remove
1868	River Red-gum	196	Remove
1869	River Red-gum	109	Remove
1870	River Red-gum	101	Remove
1871	River Red-gum	104	Remove
1872	River Red-gum	120	Remove
1873	River Red-gum	127	Remove
1874	River Red-gum	100	Remove
1875	River Red-gum	105	Retain
1876	River Red-gum	110	Retain
1877	River Red-gum	172	Remove
1878	River Red-gum	104	Retain
1879	River Red-gum	116	Retain
1880	River Red-gum	101	Remove
1881	River Red-gum	105	Remove
1882	River Red-gum	82	Remove
1883	River Red-gum	75	Remove
1884	River Red-gum	99	Remove
1885	Stag	90	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1886	River Red-gum	93	Remove
1887	River Red-gum	78	Retain
1888	River Red-gum	93	Remove
1889	River Red-gum	129	Remove
1890	River Red-gum	105	Remove
1891	River Red-gum	95	Remove
1892	River Red-gum	107	Remove
1893	River Red-gum	105	Remove
1894	River Red-gum	98	Retain
1895	Stag	155	Remove
1896	River Red-gum	72	Remove
1897	Black Box	50	Retain
1898	River Red-gum	125	Remove
1899	River Red-gum	87	Remove
1900	River Red-gum	124	Remove
1901	Stag	113	Retain
1902	River Red-gum	92	Remove
1903	Stag	85	Retain
1904	Stag	74	Retain
1905	River Red-gum	91	Remove
1906	Stag	84	Retain
1907	River Red-gum	80	Retain
1908	River Red-gum	124	Remove
1909	River Red-gum	91	Remove
1910	River Red-gum	95	Remove
1911	River Red-gum	131	Remove
1912	River Red-gum	93	Remove
1913	River Red-gum	144	Remove
1914	River Red-gum	109	Remove
1915	River Red-gum	137	Retain
1916	River Red-gum	97	Retain
1917	River Red-gum	195	Remove
1918	Stag	140	Retain
1919	River Red-gum	103	Retain
1920	River Red-gum	109	Retain
1921	Stag	124	Retain
1922	River Red-gum	116	Retain
1923	River Red-gum	111	Remove
1924	River Red-gum	73	Remove
1925	River Red-gum	162	Retain
1926	River Red-gum	125	Retain
1927	River Red-gum	151	Retain
1928	Stag	168	Remove
1929	Stag	120	Retain
1930	Stag	160	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1931	River Red-gum	190	Retain
1932	River Red-gum	147	Retain
1933	River Red-gum	148	Retain
1934	River Red-gum	218	Remove
1935	River Red-gum	161	Remove
1936	River Red-gum	247	Remove
1937	River Red-gum	188	Remove
1938	River Red-gum	129	Remove
1939	River Red-gum	196	Retain
1940	River Red-gum	135	Retain
1941	River Red-gum	87	Retain
1942	River Red-gum	161	Remove
1943	River Red-gum	140	Remove
1944	Black Box	124	Remove
1945	Stag	119	Retain
1946	Black Box	101	Remove
1947	Black Box	95	Retain
1948	Black Box	61	Remove
1949	Black Box	68	Remove
1950	Black Box	54	Retain
1951	Black Box	43	Retain
1952	Black Box	48	Retain
1953	Black Box	64	Remove
1954	Black Box	42	Retain
1955	Black Box	41	Retain
1956	Black Box	59	Retain
1957	Black Box	54	Retain
1958	Black Box	79	Retain
1959	Stag	62	Retain
1960	Black Box	52	Retain
1961	Black Box	115	Remove
1962	Black Box	80	Retain
1963	Black Box	43	Remove
1964	Black Box	64	Retain
1965	Black Box	108	Remove
1966	Black Box	88	Retain
1967	Black Box	119	Retain
1968	River Red-gum	89	Retain
1969	River Red-gum	172	Remove
1970	Stag	134	Retain
1971	River Red-gum	145	Remove
1972	River Red-gum	108	Remove
1973	River Red-gum	98	Remove
1974	Stag	168	Retain
1975	Stag	102	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
1976	Stag	105	Retain
1977	River Red-gum	76	Remove
1978	River Red-gum	164	Retain
1979	River Red-gum	98	Retain
1980	River Red-gum	97	Retain
1981	River Red-gum	85	Remove
1982	River Red-gum	99	Retain
1983	River Red-gum	158	Retain
1984	River Red-gum	102	Retain
1985	River Red-gum	121	Remove
1986	River Red-gum	116	Retain
1987	River Red-gum	181	Remove
1988	Stag	80	Retain
1989	River Red-gum	99	Retain
1990	River Red-gum	110	Retain
1991	River Red-gum	92	Retain
1992	Black Box	84	Remove
1993	Black Box	74	Remove
1994	Black Box	83	Retain
1995	Black Box	51	Retain
1996	Black Box	82	Remove
1997	Black Box	59	Retain
1998	Black Box	84	Retain
1999	Black Box	142	Remove
2000	Black Box	117	Retain
2001	Black Box	112	Retain
2002	Black Box	112	Remove
2003	Black Box	93	Retain
2004	Black Box	62	Retain
2005	Black Box	107	Retain
2006	Black Box	93	Retain
2007	Black Box	54	Retain
2008	Black Box	109	Remove
2009	Black Box	58	Retain
2010	Black Box	69	Remove
2011	Black Box	55	Remove
2012	Stag	72	Retain
2013	Black Box	72	Remove
2014	Black Box	72	Remove
2015	Black Box	63	Remove
2016	Black Box	131	Remove
2017	Black Box	115	Remove
2018	Black Box	67	Remove
2019	River Red-gum	173	Remove
2020	River Red-gum	160	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2021	River Red-gum	129	Remove
2022	Black Box	92	Retain
2023	Black Box	157	Remove
2024	Black Box	127	Remove
2025	Black Box	93	Remove
2026	Black Box	74	Remove
2027	River Red-gum	148	Remove
2028	River Red-gum	159	Remove
2029	River Red-gum	136	Remove
2030	Black Box	93	Remove
2031	Black Box	58	Retain
2032	Black Box	79	Remove
2033	Black Box	91	Remove
2034	Black Box	99	Remove
2035	Black Box	89	Retain
2036	Black Box	99	Remove
2037	Black Box	68	Retain
2038	Black Box	90	Remove
2039	Black Box	98	Remove
2040	Black Box	114	Remove
2041	Black Box	127	Remove
2042	Black Box	98	Remove
2043	Black Box	108	Retain
2044	Black Box	127	Remove
2045	Black Box	66	Retain
2046	River Red-gum	165	Remove
2047	River Red-gum	121	Remove
2048	River Red-gum	175	Remove
2049	River Red-gum	99	Remove
2050	River Red-gum	145	Remove
2051	River Red-gum	120	Remove
2052	River Red-gum	83	Remove
2053	Black Box	69	Retain
2054	Black Box	95	Remove
2055	Black Box	110	Remove
2056	Black Box	88	Remove
2057	Black Box	89	Remove
2058	Black Box	112	Remove
2059	Black Box	104	Remove
2060	Black Box	70	Remove
2061	Black Box	109	Remove
2062	Black Box	53	Retain
2063	Black Box	53	Remove
2064	Black Box	88	Remove
2065	Black Box	95	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2066	Black Box	60	Remove
2067	Black Box	98	Remove
2068	Black Box	149	Remove
2069	Black Box	101	Remove
2070	Black Box	51	Remove
2071	Stag	75	Remove
2072	Black Box	87	Remove
2073	Stag	68	Retain
2074	Stag	70	Retain
2075	Stag	50	Retain
2076	Black Box	57	Retain
2077	Black Box	45	Retain
2078	Black Box	77	Remove
2079	Stag	48	Retain
2080	Black Box	70	Retain
2081	Stag	65	Retain
2082	Stag	85	Retain
2083	Stag	104	Retain
2084	Black Box	128	Remove
2085	Black Box	64	Remove
2086	Black Box	55	Retain
2087	Stag	95	Retain
2088	Stag	69	Retain
2089	Stag	51	Remove
2090	Stag	103	Retain
2091	Black Box	115	Retain
2092	Stag	67	Retain
2093	Stag	57	Retain
2094	River Red-gum	131	Remove
2095	River Red-gum	171	Remove
2096	River Red-gum	150	Remove
2097	River Red-gum	130	Retain
2098	River Red-gum	230	Retain
2099	River Red-gum	198	Remove
2100	River Red-gum	205	Remove
2101	Black Box	139	Remove
2102	Black Box	60	Retain
2103	Black Box	85	Retain
2104	Black Box	86	Retain
2105	Black Box	90	Remove
2106	Black Box	120	Remove
2107	Black Box	132	Remove
2108	Black Box	163	Remove
2109	Black Box	47	Retain
2110	Black Box	103	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2111	Black Box	52	Retain
2112	Black Box	96	Remove
2113	Black Box	57	Remove
2114	Black Box	52	Remove
2115	Black Box	62	Remove
2116	Black Box	91	Remove
2117	Black Box	106	Remove
2118	Black Box	104	Remove
2119	Black Box	48	Remove
2120	Black Box	106	Remove
2121	Black Box	56	Retain
2122	Black Box	56	Retain
2123	Black Box	54	Retain
2124	Black Box	65	Retain
2125	Black Box	106	Remove
2126	Black Box	61	Remove
2127	Black Box	65	Remove
2128	Black Box	80	Remove
2129	Black Box	63	Retain
2130	Black Box	69	Remove
2131	Black Box	51	Retain
2132	Black Box	155	Remove
2133	Black Box	132	Remove
2134	Black Box	67	Remove
2135	Black Box	118	Remove
2136	Black Box	53	Retain
2137	Black Box	62	Retain
2138	Black Box	86	Remove
2139	River Red-gum	93	Remove
2140	Black Box	117	Remove
2141	River Red-gum	163	Remove
2142	Stag	140	Retain
2143	River Red-gum	105	Remove
2144	River Red-gum	113	Remove
2145	River Red-gum	194	Remove
2146	River Red-gum	104	Remove
2147	River Red-gum	129	Remove
2148	River Red-gum	116	Remove
2149	River Red-gum	86	Remove
2150	River Red-gum	100	Remove
2151	River Red-gum	220	Remove
2152	Stag	135	Retain
2153	Stag	119	Retain
2154	Black Box	113	Remove
2155	Stag	96	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2156	Black Box	67	Remove
2157	Black Box	91	Retain
2158	Black Box	92	Remove
2159	Stag	50	Retain
2160	Stag	90	Retain
2161	Black Box	68	Remove
2162	Black Box	66	Remove
2163	Stag	50	Retain
2164	Stag	90	Retain
2165	Black Box	147	Remove
2166	Black Box	71	Remove
2167	Stag	60	Retain
2168	Black Box	83	Remove
2169	Black Box	110	Remove
2170	Stag	101	Retain
2171	River Red-gum	118	Remove
2172	Black Box	56	Retain
2173	River Red-gum	106	Remove
2174	Stag	52	Retain
2175	Black Box	61	Remove
2176	Black Box	55	Retain
2177	Black Box	100	Remove
2178	Black Box	71	Remove
2179	Black Box	59	Retain
2180	Black Box	76	Retain
2181	Black Box	83	Retain
2182	Black Box	130	Remove
2183	Black Box	94	Remove
2184	Black Box	50	Remove
2185	Black Box	90	Remove
2186	Black Box	103	Remove
2187	Stag	93	Retain
2188	Black Box	99	Remove
2189	Black Box	70	Remove
2190	Black Box	52	Remove
2191	River Red-gum	122	Retain
2192	Black Box	94	Remove
2193	Black Box	65	Retain
2194	Stag	103	Retain
2195	River Red-gum	158	Remove
2196	Black Box	88	Remove
2197	Black Box	128	Remove
2198	Black Box	105	Remove
2199	Black Box	93	Remove
2200	Black Box	116	Retain

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2201	Black Box	76	Remove
2202	Black Box	68	Remove
2203	Black Box	102	Retain
2204	Black Box	52	Remove
2205	Black Box	105	Remove
2206	Black Box	104	Remove
2207	Black Box	105	Remove
2208	Stag	56	Retain
2209	Black Box	100	Remove
2210	Stag	55	Retain
2211	Stag	58	Retain
2212	Stag	85	Retain
2213	Black Box	60	Retain
2214	Black Box	110	Remove
2215	Black Box	57	Retain
2216	Black Box	76	Remove
2217	Stag	142	Retain
2218	Stag	105	Retain
2219	River Red-gum	155	Remove
2220	River Red-gum	128	Remove
2221	Black Box	76	Retain
2222	Black Box	52	Retain
2223	Black Box	51	Remove
2224	Black Box	56	Retain
2225	Black Box	92	Remove
2226	Black Box	57	Remove
2227	Black Box	91	Remove
2228	Black Box	104	Remove
2229	Black Box	102	Remove
2230	Black Box	108	Remove
2231	Black Box	94	Remove
2232	Black Box	65	Retain
2233	Black Box	118	Remove
2234	Black Box	127	Retain
2235	Black Box	68	Retain
2236	Black Box	64	Retain
2237	Black Box	126	Remove
2238	Black Box	49	Retain
2239	Black Box	76	Retain
2240	Black Box	111	Remove
2241	Black Box	52	Retain
2242	Black Box	58	Retain
2243	Black Box	44	Retain
2244	Black Box	56	Retain
2245	Black Box	68	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2246	Black Box	40	Remove
2247	Black Box	53	Remove
2248	Black Box	40	Remove
2249	Black Box	41	Remove
2250	Black Box	49	Retain
2251	Black Box	42	Retain
2252	Black Box	59	Retain
2253	Stag	40	Retain
2254	Black Box	105	Remove
2255	Black Box	48	Retain
2256	Black Box	53	Retain
2257	Black Box	68	Retain
2258	Stag	129	Retain
2259	Black Box	56	Retain
2260	Black Box	46	Remove
2261	Black Box	89	Remove
2262	Black Box	41	Retain
2263	Black Box	57	Remove
2264	Black Box	46	Retain
2265	Black Box	80	Remove
2266	Black Box	50	Retain
2267	Black Box	46	Remove
2268	Black Box	57	Retain
2269	Black Box	66	Remove
2270	Black Box	72	Retain
2271	Black Box	50	Retain
2272	Black Box	86	Remove
2273	Black Box	40	Retain
2274	Black Box	50	Retain
2275	Black Box	108	Remove
2276	Black Box	55	Remove
2277	Black Box	61	Remove
2278	Stag	98	Retain
2279	Black Box	108	Remove
2280	River Red-gum	131	Remove
2281	Black Box	113	Remove
2282	Stag	63	Retain
2283	Stag	75	Retain
2284	Black Box	88	Remove
2285	Black Box	84	Remove
2286	River Red-gum	90	Retain
2287	Black Box	80	Remove
2288	Black Box	67	Remove
2289	Black Box	81	Remove
2290	Black Box	69	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2291	Stag	75	Retain
2292	Stag	118	Retain
2293	Black Box	95	Remove
2294	Black Box	60	Remove
2295	Black Box	69	Remove
2296	Stag	75	Retain
2297	Black Box	65	Remove
2298	Stag	106	Retain
2299	Stag	85	Retain
2300	Stag	102	Retain
2301	River Red-gum	100	Remove
2302	Stag	90	Retain
2303	River Red-gum	156	Remove
2304	River Red-gum	133	Remove
2305	Black Box	133	Remove
2306	River Red-gum	196	Remove
2307	River Red-gum	175	Remove
2308	River Red-gum	142	Remove
2309	River Red-gum	148	Remove
2310	Stag	118	Retain
2311	River Red-gum	84	Remove
2312	River Red-gum	109	Remove
2313	Stag	110	Retain
2314	Stag	95	Retain
2315	Stag	110	Retain
2316	River Red-gum	100	Retain
2317	River Red-gum	110	Remove
2318	Black Box	123	Remove
2319	Black Box	118	Remove
2320	River Red-gum	115	Remove
2321	River Red-gum	115	Remove
2322	Black Box	91	Remove
2323	Black Box	81	Remove
2324	Stag	110	Retain
2325	River Red-gum	129	Remove
2326	River Red-gum	243	Retain
2327	River Red-gum	157	Remove
2328	River Red-gum	141	Remove
2329	River Red-gum	138	Remove
2330	River Red-gum	110	Remove
2331	Stag	70	Retain
2332	River Red-gum	90	Remove
2333	River Red-gum	100	Remove
2334	River Red-gum	129	Remove
2335	River Red-gum	232	Remove

Tree ID	Tree Species	DBH (cm)	Retain or Remove
2336	Black Box	110	Retain
2337	River Red-gum	120	Retain
2338	River Red-gum	112	Remove
2339	Stag	205	Retain
2340	River Red-gum	126	Remove
2341	River Red-gum	182	Retain
2342	Black Box	67	Remove
2343	Black Box	52	Remove
2344	Black Box	47	Remove
2345	Black Box	42	Remove
2346	Stag	80	Retain
2347	River Red-gum	90	Remove
2348	Stag	130	Retain
2349	River Red-gum	150	Remove
2350	River Red-gum	132	Remove
2351	Black Box	67	Remove
2352	Black Box	87	Remove
2353	Black Box	70	Retain
2354	Black Box	73	Remove
2355	Black Box	54	Retain
2356	Black Box	54	Retain
2357	Stag	54	Retain
2358	Black Box	59	Remove
2359	Black Box	88	Remove
2360	Black Box	66	Remove
2361	Black Box	76	Remove
2362	Black Box	50	Remove