Government of Western Australia
Department of Water and Environmental Regulation

Decision Report

1 Application details and outcome

1.1. Permit application details

Permit number:	CPS 9996/1
Permit type:	Area permit
Applicant name:	City of Albany
Application received:	05 December 2022
Application area:	0.10 hectares of native vegetation
Purpose of clearing:	Flood mitigation (Drainage)
Method of clearing:	Mechanical clearing
Property:	Closed Road Reserve (PIN 588431)
Location (LGA area/s):	City of Albany
Localities (suburb/s):	Collingwood Park

1.2. Description of clearing activities

The City of Albany is proposing to undertake the clearing of 0.10 hectares of native vegetation on the bank of Closed Road Reserve in Collingwood Park, Albany. The proposed clearing is proposed to facilitate the widening of the river stream to accommodate better drainage. The proposed clearing is contained within a single continuous area approximately 300 meters long by 5 meters wide (see Figures 1 and 2, Section 1.5).

Project Background

The City of Albany applied for a clearing permit application on 18 December 2018 to clear 0.115 hectares of native vegetation within the Closed Road reserve (PIN 588431), Collingwood Park, for the purpose of improving drainage of the waterway (reference CPS 8299/1). This clearing application was assessed and received expert advice from the Department of Biodiversity, conservation, and Attractions (DBCA) and regional advice from the Department of Water and Environmental Regulation (DWER) South Coast Region (DBCA, 2019; DWER, 2019a). The assessment determined the application to be at variance with principles (f), (g), (h), and (i), may be at variance with principles (b) and (e) and is not likely to be at variance with the remaining principles. After no response from the City of Albany to address these concerns, the permit was refused on the 21 February 2020.

The City of Albany applied for a new clearing permit on 5 December 2022 to clear a reduced 0.10 hectares of native vegetation within the Closed Road Reserve (PIN 588431), Collingwood Park, for the purpose of improving drainage of the waterway (reference CPS 9996/1). The City of Albany provided an Acid Sulfate Soil survey (GDH, 2022) to address impacts.

Figure 1: Map of CPS 8299/1 application area. The area crosshatched Blue indicates the area applied to be cleared.

1.3. Decision on application

Draft Decision:	Refused
Decision date:	27 March 2024
Decision area:	0.10 hectares of native vegetation as depicted in Section 1.5, below.

1.4. Reasons for decision

This clearing permit application was submitted, accepted, assessed and determined in accordance with sections 51E and 51O of the *Environmental Protection Act 1986* (EP Act). The Department of Water and Environmental Regulation (DWER) advertised the application for 21 days and no submissions were received.

In making this decision, the Delegated Officer had regard for the site characteristics (see Appendix A), relevant datasets (see Appendix E.1), the findings of an acid sulphate soil survey, a site inspection (see Appendix D), the clearing principles set out in Schedule 5 of the EP Act (see Appendix B), advice received from relevant experts, relevant planning instruments and any other matters considered relevant to the assessment (see Section 3).

The assessment identified that the proposed clearing will result in:
- export of nutrients and silt into the surrounding wetlands;
- potential land degradation through water erosion;
- damage to Subtropical and Temperate Coastal Saltmarsh Threatened Ecological Community (TEC) downstream of the application area;
- the potential introduction and spread of weeds into adjacent vegetation including a TEC and Oyster Harbour, which could impact on the quality of the adjacent vegetation and its habitat values; and
- loss of 0.10 hectares of native riparian vegetation that is in pristine to good condition.

After consideration of the available information, the Delegated Officer determined that the proposed clearing is likely to have long-term adverse impacts on surface water quality, land degradation, damage to a TEC, downstream environmental values of Oyster Harbour and not achieve the desired purpose of the proposed clearing. The impacts cannot be minimised and managed to be unlikely to lead to an unacceptable risk to the environment.

The Delegated Officer decided to refuse to grant a clearing permit.

1.5. Site maps

Figure 2: Context map of the application area. The area crosshatched Blue indicates the area applied to be cleared.

CPS 9996/1

Figure 3: Map of the application area. The area crosshatched Blue indicates the area applied to be cleared.

2 Legislative context

The clearing of native vegetation in Western Australia is regulated under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (Clearing Regulations).

In addition to the matters considered in accordance with section 51O of the EP Act (see Section 1.4), the Delegated Officer has also had regard to the objects and principles under section 4A of the EP Act, particularly:

- the precautionary principle
- the principle of intergenerational equity
- the principle of the conservation of biological diversity and ecological integrity.

Other legislation of relevance for this assessment include:

- *Biodiversity Conservation Act 2016* (WA) (BC Act)
- *Conservation and Land Management Act 1984* (WA) (CALM Act)
- *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act)
- *Planning and Development Act 2005* (WA) (P&D Act)
- *Soil and Land Conservation Act 1945* (WA)

The key guidance documents which inform this assessment are:

- *A guide to the assessment of applications to clear native vegetation* (DER, December 2013)
- *Procedure: Native vegetation clearing permits* (DWER, October 2019)

3 Detailed assessment of application

3.1. Avoidance and mitigation measures

Avoidance and minimisation

The City of Albany has made changes to the original application area in response to application CPS 8299/1 being refused. The area for clearing has been reduced from 0.115 hectares to 0.10 hectares and will only be a maximum of 5 metres in width and 300 metres in length. Additional avoidance and minimisation proposed by the City are as follows (City of Albany, 2022);

- the proposed clearing is limited and does not extend to the cadastral boundary of the Closed Road Reserve, higher quality remnant vegetation (with intact overstory) remains within the land parcel to the north and south of the Proposed Area. This remaining vegetation will help to maintain an intact habitat corridor/ecological linkage to vegetated lots (lot 343 on Plan 222010 and Reserve 15879), vested with the City of Albany, at the northeastern end of the Proposal Area.
- the proposed clearing is to be undertaken during dry conditions when the water table is generally at its lowest (early summer/ early Autumn) to mitigate sediment flowing into Oyster Harbour.
- mechanical vegetation removal will remove the sedge root zone and sediments down to the shell layer (up to 200 millimetres deep), minimising residual sediment flow into Oyster Harbour.
- silt control fencing is to be placed at the downstream end of the Proposal Area during the first flush flows following the clearing.
- the City of Albany propose to undertake weed control and revegetation within the Closed Road Reserve on either side of the Proposal Area, to improve habitat connectivity.
- alternative locations to relocate the drainage system would likely require more clearing.

Conclusion

Despite the measures undertaken by the applicant to avoid and minimise potential impacts of the proposed clearing on the environmental values, the Delegated Officer determined that there was remaining uncertainty in relation to the extent these measures would mitigate impacts, particularly the export of nutrients into the surrounding wetlands, the potential land degradation through water erosion, and the damage to TECs surrounding the application area.

3.2. Assessment of impacts on environmental values

In assessing the application, the Delegated Officer has had regard for the site characteristics (see Appendix A) and the extent to which the impacts of the proposed clearing present a risk to biological, conservation, or land and water resource values. The Delegated Officer also took into consideration advice from the DBCA (DBCA, 2019; 2023a; 2023b), DWER's South Coast Region (DWER, 2019; 2023a; 2023b; 2023c), Department of Primary Industries and Regional Development (DPIRD) (CSLC, 2023), Acid Sulfate Soil Investigation (GDH, 2022), and senior civil engineering officer drainage advice from the City of Albany (City of Albany, 2020b).

The assessment against the clearing principles (see Appendix B) identified that the impacts of the proposed clearing present a risk to biological values (high biodiversity, fauna, TEC's), significant remnant vegetation and conservation areas, and land and water resources (watercourse or wetland, land degradation, surface or underground water). The consideration of these impacts is set out below.

3.2.1. Biological values (Biodiversity, fauna, and TEC) - Clearing Principles (a), (b) and (d)

Assessment

According to the City of Albany (2022) and site visits undertaken by DWER (DWER, 2019; 2023a; 2023b), the native vegetation in the proposed clearing area is in good to pristine (Keighery, 1994) condition. The vegetation condition in the application area has seen improvement since the last assessment in 2019, where it was rated as good. The predominantly riparian vegetation contains a dense understorey of *Gahnia trifida* and *Juncus kraussii* (DWER, 2023a; City of Albany, 2019).

Conservation significant Fauna

According to available databases, 82 conservation-significant fauna species have been recorded within the local area. In forming a view of the likelihood of each species occurring within the application area, the following was considered:

- the preferred habitat and vegetation types of the species, and
- their recorded proximity to the application area (see Appendix A.4).

Seven species were considered possible to occur (See Appendix A.4), with consideration of the impacts summarised below:

Blue-billed Duck (P4)

Oxyura australis (Blue-billed duck (BBD)) has been recorded 178 times within the local area. The species is endemic to south-eastern and south-western Australia. The BBD can be found in terrestrial wetlands in temperate regions, within both fresh and saline wetlands (Birdlife International, 2023). The species predominantly rests/roosts in rushes, sedges, and *Melaleuca* sp. The BBD is an omnivorous species feeding predominantly on aquatic insect larvae, seeds and plant material. The BBD breeds between November and March, with individuals separating from flocks and dispersing into smaller waterbodies where they build nests from dead sedge leaves (Birdlife International, 2023). Given the purpose of the clearing is to remove riparian vegetation through the river system, the proposed clearing may impact the Blue-billed duck during the breeding season.

Rakali (P4)

Hydromys chrysogaster (Rakali) are amphibious or semiaquatic mammals feeding largely underwater on a wide range of prey, including insects, crustaceans, mussels, fishes, frogs, lizards, small mammals, and water birds (DWER, 2021a). Rakali prefer low banks with flat, densely vegetated water edges for protection and ease of stalking prey, with intact riparian vegetation and associated bank stability being critical to their survival (DWER, 2021a). Although the Rakali are dependent on water for foraging, when Rakali are not foraging, they can be found resting in hollowed logs and burrowing in low banks of rivers, lakes, wetlands, and estuaries, including coastal areas (DWER, 2021a).

There are no records of the Rakali in the proposed application area. However, the closest record of this species is approximately 2.16 kilometres away in Lake Seppings. Within a 10-kilometer radius of the application area, there are two records in Lake Seppings and one in Oyster Harbour. Additionally, there are four records in tributaries leading into Oyster Harbour. As the ranging territory of the Rakali can extend up to 4 kilometres, individuals may travel a distance of 200 meters to a kilometre at night when foraging (DWER, 2021a). Therefore, the proposed clearing may have an impact on the Rakali, as they may forage within the application area.

Carter's freshwater mussel (VU)

The *Westralunio carteri* (Carter's freshwater mussel) has been recorded 224 times within the local area. The species inhabits freshwater of the southwest region, occurring in greatest abundance in slower-flowing waters where sediments are stable and soft enough to allow the species to burrow (Klunzinger et al., 2015; 2021). The species has been found to have undergone a 49 per cent reduction in the extent of occurrence in less than three generations due primarily to secondary salinisation. Apart from salinity, perenniality of stream flow was identified to be the other significant limiting variable in the distribution of Carter's freshwater mussel, suggesting that habitat drying, inadequate provision of environmental stream flows, and dewatering could pose further conservation constraints on the species (Klunzinger et al., 2015; 2021).

According to available datasets, Carter's freshwater mussel has not been recorded within the application area. However, suitable habitat is present within nearby conservation-significant wetlands (Oyster Harbour) (DBCA,

2023a), and suitable habitat may occur within the application area. The nearest historical record of the mussel is 6.24 kilometres away in a tributary connecting to Oyster Harbour. Whilst it is acknowledged that both Oyster Harbour and Lake Seppings have been sampled, with no population being found within the two wetlands (DWER, 2021b), advice received from DBCA advised that there are potential impacts to Carters Freshwater Mussel if clearing is to go ahead. Specifically, the removal of the sediment bed down to the shell layer and the removal of riparian vegetation that filters out nutrient export could cause the potential loss of habitat (DBCA, 2023a) and impact the ability for Carters Freshwater Mussel to occur.

Pouched lamprey (P3)

The *Geotria australis* (Pouched lamprey) are located predominantly in the southern coastal regions of Australia. They live in sandy stream sediment burrows in the upper reaches of streams for most of their lives and will migrate to the ocean every four years to spawn and then migrate back upstream (Salas et al., 2015). The Pouched lamprey filter feeds on plankton, algae, and suspended organic material for up to four years before metamorphosis and becoming a parasitic species feeding on fish species within the ocean. The closest recorded lamprey was 0.41 kilometres from the application area at Emu Point. Oyster Harbour and Lake Seppings have been sampled, with no population within the two wetlands. However, two populations have been sampled and recorded within a 10-kilometre radius of the application area, with one found within a tributary that leads into Oyster Harbour (DWER, 2023d). Based on the sampling around the application area, habitat requirements, and closest record lamprey, the clearing may impact suitable habitat for the pouched lamprey.

Western trout minnow (EN)

The *Galaxias truttaceus* (Western trout minnow) is a fast-swimming aquatic species that inhabit the shore margins of still or flowing rivers, streams and lakes that predominately feed on aquatic and terrestrial insects, larva and crustations (DCCEEW, 2019). The species is known to be most common at lower elevations closer to the coast, with juveniles inhabiting lakes as nurseries and adults living in narrow riverine environments (DCCEEW, 2019). The species is resilient, surviving in acidic and tannin-stained waters and streams (DCCEEW, 2019). The only record found within 10 kilometres of the proposed clearing area is a historical record from 1914. Whilst based on site description and photos, the environment of the proposed area could be suitable for the species, given the lack of records within the surrounding 10 kilometres and the limited scope of the clearing project, it is unlikely that the Western trout minnow will be negatively impacted by the clearing.

Migratory water birds (MI)

Multiple species of migratory waterbirds may be transient visitors to the application area including *Tringa glareola* (Wood sandpiper) and *Tringa nebularia* (Common greenshank). Given the size of the application area, proximity to larger wetlands that provide habitat (Oyster Harbour and Lake Seppings), and that none of these species have breeding habitat within Australia, clearing the application area is unlikely to affect the conservation status of these species.

Ecological Linkage

According to aerial imagery and available databases, the application area is part of an important hydrological and direct ecological linkage from Lake Seppings (a Conservation Class South Coast Significant Wetland to the south) to Oyster Harbour (a Directly Important Wetlands in Australia (DIWA) site (Formally known as ANCA)), acting as both an aquatic fauna and riparian vegetation ecological corridor (DWER, 2019; 2023; DBCA, 2019; 2023a). In the absence of geomorphic wetland mapping within the south coastal region, the application area is likely to meet the preliminary evaluation criteria contained with the DBCA 2017 wetlands evaluation methodology to align it to a Conservation Category Wetland (CCW) (DBCA, 2023a).

The clearing of the ecological linkage application area means that the following issues may occur post-clearing:

- inundated with faster-moving waters, potentially increasing the risk of erosion,
- influx of nutrient-rich waters into Oyster harbour potentially impacting seagrass beds,
- degradation of the ecological values of the shallow pools directly downstream of the proposed clearing,
- potential impacts to the Subtropical and Temperate Coastal Saltmarsh TEC (further discussed below),
- mobilisation of sediments years after the clearing has been undertaken,
- potential remobilisation of sediments trapped by the silt control fencing,
- invasion of weeds posts clearing.

Advice from DBCA in 2023 indicate that the natural nutrient and sediment filtration benefits resulting from the vegetation within the application area may extend to adjacent areas, including Voyagers Park (R33308), Un-named Reserve (R 33308), Green Island Nature Reserve (R 24808), and Gull Rock National Park (R 27107) (DBCA, 2023a). Whilst the clearing proposed is small, impacts to the function of the ecological linkage may occur as a result of the proposed clearing.

Threatened and Priority Ecological Community (TEC, PEC)

According to GHD (2022), the area proposed to be cleared does not contain species that indicate the presence of a TEC. This is consistent with available databases that show no TECs within the application area. However, vegetation and habitat conditions consistent with the Subtropical and Temperate Coastal Saltmarsh TEC were located approximately 85 metres downstream of the application area (GHD, 2020). This TEC is synonymous with the Priority 3 Priority Ecological Community (PEC) as listed by DBCA. Coastal salt marshes are recognised as ecosystems of immense ecological value that are increasingly threatened due to rising settlements along wetlands (DCCEEW, 2013). Some of the critical threats that affect the community are species invasion (weed), eutrophication, alteration of hydrology/ tidal restrictions, and Acid Sulfate Soil, as well as many more (DCCEEW, 2013). Furthermore, areas critical to the survival of the Subtropical and Temperate Coastal Saltmarsh are areas that meet the key diagnostic characteristics of the TEC and an appropriate buffer zone.

The distance from the application area means that post-clearing, the TEC may be affected by the following issues:

- inundated with faster-moving waters, potentially increasing the risk of erosion,
- influx of nutrient-rich waters as the vegetation that performs important biofiltration functions in the ecological corridor no longer buffers the TEC,
- mobilisation of sediments years after the clearing has been undertake,
- potential remobilisation of sediments trapped by the silt control fencing,
- invasion of weeds posts clearing.

Advice from DBCA in 2019 and reaffirmed in 2023 states that the application area serves as a hydrological corridor between Lake Seppings and Oyster Harbour, with the native vegetation providing essential ecological values such as soil stabilisation, flood mitigation, and bio-filtration. The DBCA (2019; 2023) and DWER (2019a; 2023) considers that the clearing will likely cause weed invasion into adjacent areas, sedimentation, influx of nutrient, and will lower the conservation values of the remaining habitats. DWER (2019a; 2023) note that there is a potential risk of untapped sediments having a localised deposition effect on the fringing TEC community (DWER, 2019, 2023a).

Mitigation and management measures proposed by the City of Albany includes the installation of silt control fencing at the downstream end of the proposed clearing area during the first flush flows. However, advice received (DWER, 2019; 2023a; DBCA, 2019; 2023a) questions the effectiveness of this practice as no measurements of the silt control sizing were provided, fundamentally limiting the assessment that can be conducted. Furthermore, the installation of silt control fencing may have undesired outcomes, such as water retention during high-volume flush events and after heavy rainfall, contributing to flooding of the area, the remobilisation of sediment caught during the first flow and later deposited post removal. The removal of the fence may also cause sedimentation in an already disturbed environment (DBCA 2023; DWER, 2023).

The City of Albany has proposed to undertake weed control and revegetation within the Closed Road Reserve on either side of the Proposal Area, to improve habitat connectivity. Although implementing this mitigation method may be effective in controlling weeds within the designated application area, it fails to address the issue of weed spread through the channel passageway, potentially affecting adjacent areas of both the TEC and Oyster Harbour. The introduction and or spread of weeds into adjacent vegetation may cause a decline in condition of surrounding vegetation and habitat values.

Conclusion

Based on the size and condition of the proposed clearing area, it is likely that the application area may provide significant habitat for fauna of conservation significance. The clearing of wetland habitat in pristine to good condition is likely to affect many species that rely on the unique properties of the slower-moving tributary that provide excellent habitat for species such as the Rakali, Pouched lamprey, and Carter's freshwater mussel. The proposed clearing will also likely negatively impact Oyster Harbour and the Subtropical and Temperate Coastal Saltmarsh TEC adjacent to the application area through inundation of faster-moving waters, causing erosion, influx of nutrient-rich waters, mobilisation of sediments, and invasion of weeds. The proposed impacts on these values are not able to be adequately managed based on the current proposal.

3.2.2. Riparian vegetation and conservation areas (nearby conservation area and environment associated with a watercourse or wetland) - Clearing Principles (h) and (f)

Assessment

According to available databases, 14 conservation areas have been mapped within the local area. Of the 14, the conservation areas that would be directly affected by the proposed clearing are Oyster Harbour and Lake Seppings.

Oyster Harbour is listed as a DIWA site (Formally known as ANCA) (Environment Australia, 2001). It occurs approximately 10 metres downstream of the application area. Oyster Harbour is a major nursery and feeding area

for estuarine fishes and other marine fauna (DBCA, 2019; 2023). The proposed clearing of the sedges is likely to cause the destabilisation of the sediments along the banks, resulting in erosion and siltation on downstream environments.

Lake Seppings is a wetland with a unique formation history and is classified as a CCW. It is the only representative of its wetland type and is associated with a complex system of adjoining sumpland and dampland wetlands (DWER, 2023a). During a site visit by DWER South Coast Region, it was confirmed that the proposed clearing area vegetation is continuous with Lake Seppings and forms an ecological linkage between Lake Seppings and Oyster Harbour (DWER, 2023a). Therefore, the migration of weeds into the application area may infiltrate Lake Seppings and negatively impact the CCW (DBCA, 2020).

Water Flow Rate

According to the 'Water Quality Protection notes' by the former Department of Water (2006), native vegetation buffers to estuaries, reservoirs, watercourses, and wetlands slow down water movement into these water bodies. Moreover, these buffers protect against pathogens, turbidity, nutrient-enriched runoff, and waterborne spread of weed species that enter into wetlands (DoW, 2006). The 'Decision process for stormwater management in western Australia, 2017' stresses the importance of retaining and planting vegetation (preferably local native species) wherever possible to reduce stormwater runoff volumes and peak flow rates rather than removing native vegetation (DWER, 2017). Extrapolating from both reports, the vegetation within the application area is likely causing the slow movement of water through the ecological linkage.

The elevation of the application area is less than two meters Isohyet. The surrounding elevation from Lake Sepping to Oyster Harbour is also less than two meters Isohyet, indicating that the area is level and very close to the sea level elevation, with minimal water movement within the application area. In addition, it should be noted that the outfall water elevation levels from Lake Seppings to Oyster Harbour are 0.996 metres and 0.053 metres Isohyet, respectively, indicating a medium flow rate. However, the flow rate within the application area is extremely low. This is due to the immediate surrounding outfall water elevation levels of Troode Street and Griffith Street being 0.951 and 0.893 metres Isohyet, respectively. Demonstrating that the hydraulic gradient of the water flow is minimal within the application area. The significant jump in water elevation levels occurs a few hundred meters downstream, resulting in the low-velocity outflow within the application area (Figures N and O).

During DPIRD's site visit upstream from the application area, the Troode St and Griffith St bridle trail culverts flowed freely without evidence of constrained flow. However, the flow was being constrained within the Bird Street Road reserve. DPIRD conducted a roughness coefficient (Manning's n) within the Bird Street Road reserve and the application area, finding that Bird Street had a mannings roughness coefficient of approximately 0.03s/m1/3, and within the application area the mannings roughness coefficient was 0.25 s/m1/3 (Figure S). The increase in surface roughness encountered at the road reserve resulted in the loss of velocity head, causing the water to disperse out onto private property. DPIRD suggests that the clearing of the vegetation within the application area will reduce the roughness coefficient and lead to a reduction in flooding (CSLC, 2023).

Briefing notes from the senior civil engineer officer of drainage 2020 indicate that the widening the road reserve flow path, as notified within the permit to clear native vegetation, would assist in water passing out of the floodplain and reducing the hydroperiod. However, the incidence of flooding would not be reduced to a level that would satisfy residents seeking to develop within the floodplain and thus not mitigating flooding to a satisfactory amount (City of Albany, 2020b).

Conclusion

Based on the above assessment, the water flow rate within the application area is extremely low due to its relative level elevation within the application area, outfall water elevation levels, and roughness coefficient. It is acknowledged that the clearing will decrease the roughness coefficient within the application area and that the removal of the root zone and sediments down to the shell layer (~200 millimetres) may slightly increase the flow rate through the application area. However, the change in elevation within the application area compared to the outfall water elevation levels is relatively unchanged. The proposed clearing will likely increase flow rates and assist in water passing through the application area, reducing hydroperiods. However, not to the degree that the flooding will be substantially mitigated. Without a flow rate survey or comprehensive engineering/hydrological study, the Department cannot comprehensively analyse the probability of the clearing achieving its desired goals.

With the wetland being a vital connection point between Lake Seppings and Oyster Harbour, the best course of action is not to remove vegetation as removal of the vegetation has a high likelihood of disturbing the conservation wetlands, potentially leading to erosion, siltation, nutrient exportation, pathogens and spreading weed species. Additionally, the proposed clearing goes against best practice outlined in The Water Quality Protection notes and stormwater management guidelines in Western Australia. Advice from the DBCA and DWER south coast region also advises against clearing in this area due to potential impacts to surrounding wetlands and conservation areas.

3.2.3. Land and water resources (Land degradation and Water quality) - Clearing Principles (g) and (i)

Assessment

Water Quality

The application area is within a perennial ecological estuarine corridor that flows west from Lake Seppings east to where the river becomes Oyster Harbour and is classified within the Albany Waterways Management Areas, proclaimed under the *Waterways Conservation Act 1976*, to provide special protection to estuaries and their associated waterways considered especially vulnerable to degradation (DoW, 2006). As stated above, the vegetation is riparian and provides essential biofiltration functions from runoff of the surrounding environment.

Oyster Harbour is a shallow estuary located in the Great Southern region of Western Australia, near Albany. The estuary is permanently open to the ocean through a channel at Emu Point. In the 1970s-1980s Oyster Harbour suffered from an ecosystem collapse due to excessive nutrient inputs and since has been recovering due to local management groups (Oyster Harbour Catchment Group) and with partnership from DPIRD, farmers and local groups have helped reduce runoff from farms (DWER, 2021a; DPIRD, 2023). The water quality in Oyster Harbour near the outfall (the region where the channel flows into Oyster Harbour) (Figure Q), is usually good due to marine exchange/ flushing, and it is considered monitoring would be unlikely to detect any changes as DWER have not detected any for Yakamia Creek (a small estuarine north of the application area) (DWER, 2023a). The water quality leading to Oyster Harbour outfall is approximately 1.56 kilometres of tributary that continues from the application area that may negatively impact the Subtropical and Temperate Coastal Saltmarsh TEC.

DWER's South Coast Region advised that the vegetation is likely to have an essential role in reducing the contaminants in water flowing from Lake Seppings into Oyster Harbour and that the removal of the sedges is likely to cause destabilisation of sediments along the banks, leading to erosion and siltation of the downstream environments, impacting on water quality (DBCA 2023a; DWER, 2023b). DBCA wetlands division also advises that the proposed clearing of sedges within the drainage channel will destabilise the sediments, leading to erosion and sedimentation downstream, emphasising that the proposed clearing is likely to have detrimental impacts on overall water quality (DBCA, 2023a).

Additionally, the surrounding residential land uses can exacerbate the nutrient problem by clearing vegetation, filling and draining, and creating lawns, gardens and ornamental ponds, likely reducing the water quality draining from these areas into Lake Seppings and, in turn, through the application area and to the TEC (DBCA, 2023b). Furthermore, with sea-levels rising and relatively stable evaluation, the retention of vegetation through the application area may provide protection, lowing the movement of storm surges of saline water flowing upstream to freshwater habitat at Lake Seppings (DBCA, 2023b). Any proposed clearing will likely impact the water quality arriving into Oyster Harbour as the native sedge species within the drainage system provide biological and nutrient filtration.

Acid Sulfate Soils (ASS)

Groundwater salinity within the application area is mapped as between 500 and 1000 total dissolved solids, milligrams per litre. This level of groundwater salinity is classified as "marginal". The application area is mapped within a high risk zone for ASS. Photographs provided by the DWER South Coast Planning Branch show iron coloured sediments, demonstrating that the proposed scalping of sediments will expose these ASS areas, mobilising the acid into the waterway, and threatening Oyster Harbour downstream (Figure M and N) (DWER, 2019). This is supported further by advice received from DBCA wetlands (DBCA, 2019).

GHDs ASS investigation in 2022 (GHD, 2022), undertook a site inspection and took 19 samples across 4 sites, collecting soil samples every 0.50 metres depth for a total of 1.25 metres below ground level. After the PH screening tests, values were compared to that of DWER's Guidelines (DER 2015) to identify any suspected actual acid sulfate soils (AASS) and potential acid sulfate soils (PASS). There was found to be no indication of AASS or PASS risk within the extent of the soil profile assessed. Furthermore, the ASS risk within the proposed disturbance corridor was determined to be Low (GHD, 2022).

The DBCA still raise concern based on the colour of the water from the site photos (Figure M and N) (DBCA 2023a; 2023b), still indicating that iron-coloured sediments suggest the presence of ASS. If ASS is present, the proposed removal of vegetation and sediments may expose ASS and mobilise the acid into the water.

Land Degradation

The application is mapped as the Owingup Subsystem (Schoknecht et al., 2004). The land degradation risk categories that apply to this subsystem are demonstrated in Appendix A.1. Soils have been mapped as having a low to moderate water erosion risk. This may be due to the bivalve shells covering the stream bed. Advice from DWER and DBCA indicates that the removal of sedges (via the mechanical process of sedge scalping) is likely to cause the destabilisation of sediments along the banks, leading to erosion and siltation of the downstream environments (DWER, 2019; DBCA 2019). DPIRD's assessment identified that the clearing will have a net benefit in reducing erosion from within the wetland as there are signs of erosion current from their site inspection. DPIRD considers that the clearing will manage the velocity of water through the road reserve, thus potentially improving water quality downstream (CSLC, 2023). Whilst it is acknowledged that DPIRD considers there may be a low risk of erosion and potential improvement in water quality, experts from DWER and DBCA consider the potential impacts, even if low risk, to be significant to the downstream TEC and Oyster Harbour. The Delegated Officer has therefore taken the precautionary principle approach and consider that there is still a risk of land degradation occurring.

Soils have been mapped as having high waterlogging probability. However, as the explicit purpose of the clearing is for flood mitigation, it is unlikely that the clearing will exacerbate any waterlogging issues.

Conclusion

The proposed clearing may negatively impact water quality entering downstream into the TEC and Oyster Harbour due to the removal of biofiltration sedge species from within the application area. The proposed clearing of native vegetation will unlikely lead to ASS mobilisation downstream into the TEC and Oyster Harbour. There is likely to be destabilisation of sediments along the banks, leading to erosion and siltation.

3.3. Relevant planning instruments and other matters

Achieve the desired goal of flood mitigation

Advice received from DBCA in 2023 states that there is limited evidence provided to support the effectiveness of vegetation clearing as a mitigation measure for flood/inundation management. Although appropriate drainage measures may improve inundation in the short term, the surrounding land uses and water management will also significantly impact inundation and incidence of flood through the application area, suggesting that the likelihood of the clearing achieving the desired outcome is temporary at best. It is suggested that a comprehensive engineering/hydrological study be implemented with a management plan/hydrological assessment undertaken, adopting water sensitive urban design principals for the entirety of the landscape to assess and model flood risk and identify appropriate actions to mitigate inundation, rather than just responding to the localised flooding (DBCA, 2023a).

DWER South Coast Region advised that undertaking the proposed clearing activity is contrary to best practices for the management of waterways and wetlands. With DWER engineer advice stating that there was a limited chance of the works achieving the desired outcome due to the low gradient of the land. DWER South Coast Region would apply the precautionary principle and recommends against the proposed works (DWER, 2019, 2023a, and 2023b). DWER stresses the importance of maintaining the vegetation for wetland health.

DPIRD advised that the clearing within wetlands is generally undesirable, however in this instance the proposed clearing by the City of Albany may have a net benefit to the wetland system, allowing for greater flow through the Bird Street reserve, reducing the inundation period upstream of the wetland. Consequently, returning the upstream wetlands to a more natural hydroperiod improving biodiversity outcomes.

Briefing notes from the senior civil engineer officer of drainage 2020 indicate that the widening the road reserve flow path, as notified within the Permit to clear native vegetation, would assist in water passing out of the floodplain and reducing the hydroperiod. However, the incidence of flooding would not be reduced to a level that would satisfy residents seeking to develop within the floodplain and thus not mitigating flooding to a satisfactory amount (City of Albany, 2020b).

Noting the majority of the advice above do not support the proposed works in achieving the desired outcome, as well as the importance of maintaining the wetland vegetation, the precautionary principle does not support the proposed clearing in going ahead.

City of Albany's policy on Upgrades and maintenance of watercourses and drainage channels

"This policy recognises that watercourses and drainage channels and their associated vegetation should be left in as undisturbed a state as possible unless extraordinary circumstances apply. Notwithstanding this, the Council recognises that there are instances in which the condition of watercourses may deteriorate as a result of erosion and/or sedimentation, overgrowth with weeds or dumping or accumulation of rubbish. In such cases, where there is

an identifiable public interest it is recognised that maintenance and/or rehabilitation of these waterways may be required." (City of Albany, 2018).

The Department does not recognise this instance of clearing for flood mitigation within minimal residential properties as "extraordinary circumstances". Additionally, the second line of the policy pertains to preventing contamination from deteriorating wetlands, and the maintenance and rehabilitation of the waterway is necessary. Furthermore, the Department does not recognise the proposed clearing as an 'instance in which the condition of the watercourse may deteriorate'; on the contrary, the vegetation within the application area is pristine to good, with an improvement in vegetation condition identified from the previous assessment. The removal of the vegetation will likely cause an instance of the deterioration of the watercourse for the reasons listed above. The Department believes the wetland is already functioning optimally and requires no further improvement.

Approvals still required

RIWI approvals are still required as the application area rests upon the Southwest Coastal (UFI 43) groundwater area. The City of Albany has not provided the Department with any RIWI approvals. The City would need a bed and banks RIWI permit for the proposed works.

Conclusion

DWER and DBCA consider that the proposed clearing is unlikely to ameliorate the issue of flooding within the proposed area, however DPIRD believes that the clearing will achieve the desired goal of flood mitigation within Bird Street reserve. Briefing notes from the senior civil engineer officer believe the clearing will have a minimum effect, not satisfactory to the residents seeking to develop within the flood plain. Based on the advice received, DWER considers that there is not sufficient evidence from all of the experts that the proposed clearing would lead to the long term desired outcome.

No Aboriginal sites of significance have been mapped within the application area. However Oyster Harbour is directly linked to the application area and is an Aboriginal Heritage site (Purriyup). Advice should be sought in this regard. It is the permit holder's responsibility to comply with the *Aboriginal Heritage Act 1972* (WA) and ensure that no Aboriginal Sites of Significance are damaged through the clearing process.

End

Appendix A. Site characteristics

A.1. Site characteristics

The information provided below describes the key characteristics of the area proposed to be cleared and is based on the best information available to the Department at the time of this assessment. This information was used to inform the assessment of the clearing against the Clearing Principles, contained in Appendix B.

<table>
<tr><th>Characteristic</th><th>Details</th></tr>
<tr><td>Local context</td><td>The area proposed to be cleared is part of an expansive tract of native vegetation in the intensive land use zone of Western Australia. The application area is located within Purriyup waterway that links Tjuitgellong (Lake Seppings) to Miaritch (Oyster Harbour).

Spatial data indicates the local area (10-kilometre radius from the centre of the area proposed to be cleared) retains approximately 37.61 per cent of the original native vegetation cover.</td></tr>
<tr><td>Ecological linkage</td><td>The application area is a part of an important hydrological and direct ecological linkage from Lake Seppings, a CCW, to Oyster Harbour, a DIWA site (Formally known as ANCA) (Environment Australia, 2001), acting as both an aquatic fauna and riparian ecological corridor (DWER, 2019, 2023; DBCA, 2019, 2023a) (see Figure L).</td></tr>
<tr><td>Conservation areas</td><td>The application area does not lie within any reserve areas. However, it is adjacent to the ANCA wetland, Oyster Harbour, 10 meters east of the application area. Additionally, Lake Seppings downstream of the application area approximately 1.47 kilometres west.

There are 26 DBCA national parks within 10 kilometres of the application area. The closest DBCA national parks include:

<table>
<tr><th>Conservation area name</th><th>Conservation object ID</th><th>Distance from application (km)</th><th>Direction from application area</th></tr>
<tr><td>Voyagers Park</td><td>R 21792</td><td>1.90</td><td>Southeast</td></tr>
<tr><td>Un-named Reserve</td><td>R 33308</td><td>2.00</td><td>Southeast</td></tr>
<tr><td>Green Island Nature reserve</td><td>R 24808</td><td>2.51</td><td>Northeast</td></tr>
<tr><td>Gull Rock National Park</td><td>R 27107</td><td>3.39</td><td>Southeast</td></tr>
</table>
The proposed clearing is unlikely to have any adverse effects on the DBCA regional parks within the radius of the application area.</td></tr>
<tr><td>Vegetation description</td><td>Site inspection by DWER's South Coast Region Branch indicates that the application area primarily consists of a dense understorey of Gahnia trifida and Juncus kraussii (DWER, 2019a). Vegetation structure retains basic vegetation structure or ability to regenerate (DWER, 2019a; Keighery, 1994).

The application has been mapped as Beard Southern Jarrah Forest vegetation association which is described as "Sedgeland; reed swamps, occasionally with heath". The mapped vegetation retains approximately 49.52 per cent of the original extent (Government of Western Australia, 2019).</td></tr>
<tr><td>Vegetation condition</td><td>The City of Albany application and site visits from DWER identified that the native vegetation within the proposed clearing area is in a good to pristine (Keighery, 1994) condition.

The full Keighery (1994) condition rating scale is provided in Appendix C. Representative photos are available in Appendix D.</td></tr>
<tr><td>Climate and landform</td><td>The climate experienced in the application area is Mediterranean, characterized by hot and dry summers and cool and wet winters. According to the Bureau of Meteorology (2022), the average annual rainfall in the application area is 922.8 millimetres, mostly falling between May and September (Bureau of Meteorology, 2022).</td></tr>
</table>

<table>
<tr><th>Characteristic</th><th>Details</th></tr>
<tr><td></td><td>The elevation of the application area is less than 2 meters Isohyet. The surrounding elevation from lake Sepping to Oyster Harbour is also less than 2 meters Isohyet see (see Figure P-R and Table 1).</td></tr>
<tr><td>Soil description</td><td>The soil across the application area is mapped as:

<table>
<tr><td>Name</td><td>Qwingup Subsystem</td></tr>
<tr><td>Soils</td><td>242Tb</td></tr>
<tr><td>Description</td><td>Plains with swamps, lunettes and dunes. Yellow solonetzic soils, organic loams and diatomaceous earth; Wattle-Paperbark thickets, Teatree heath and reeds. Podzols on dunes; Banksia-Sheoak woodland (Schoknecht et al., 2004).</td></tr>
</table></td></tr>
<tr><td>Land degradation risk</td><td>The degradation risk factors mapped over the application area are detailed below:

<table>
<tr><td></td><td>Qwingup system</td></tr>
<tr><td>Wind erosion</td><td>10-30% of map has an extreme risk</td></tr>
<tr><td>Water erosion</td><td>3-10% of map has an extreme risk</td></tr>
<tr><td>Salinity risk</td><td>3-10% of map unit has a moderate to high salinity risk or is presently saline</td></tr>
<tr><td>Phosphorous export</td><td>30-50% of map unit has a high to extreme phosphorus export risk</td></tr>
<tr><td>Waterlogging</td><td>>70% of map unit has a moderate to very high risk</td></tr>
</table>
<table>
<tr><td>Subsurface acidification</td><td>>70% of map unit has a high subsurface acidification risk or is presently acid</td></tr>
<tr><td>Acid sulphate soils</td><td>High to moderate risk</td></tr>
</table>
<table>
<tr><td>Flooding</td><td>10-30% of the map unit has a moderate to high flood risk</td></tr>
<tr><td>Floodplains</td><td>The linkage follows the natural contours of the inter-dunal swales and floodplain area</td></tr>
</table>
The salinity of the application area is mapped as 500-1000 total dissolved solids milligrams per litre.</td></tr>
<tr><td>Waterbodies</td><td>The desktop assessment and aerial imagery indicated that the closest mapped wetlands to the application area are:

<table>
<tr><th>Mapped Wetland names</th><th>Type of wetland</th><th>Distance from application area (km)</th><th>Direction from application area</th></tr>
<tr><td>Oyster Harbour</td><td>Directly of Important Wetlands in Australia (DIWA) site (Formally known as a Nationally Important Wetland in Western Australia ANCA).</td><td>0.10</td><td>East</td></tr>
<tr><td>Lake Sepping</td><td>coast signification wetland from the DBCA</td><td>1.67</td><td>Southwest</td></tr>
<tr><td>Unnamed wetlands</td><td>perennial manmade wetlands</td><td>0.90</td><td>North</td></tr>
<tr><td>Unnamed swamp</td><td>perennial natural swamp</td><td>1.18</td><td>Southwest</td></tr>
<tr><td>Indian Ocean</td><td>Ocean</td><td>0.70</td><td>South</td></tr>
</table></td></tr>
<tr><td>Hydrogeography</td><td>
<table>
<tr><td>Hydrological Zone</td><td>Coastal Plain</td></tr>
<tr><td>Basin</td><td>Harvey River (613)</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Characteristic</th><th>Details</th></tr>
<tr><td></td><td>
<table>
<tr><td>Hydrographic Catchment</td><td>Harvey Estuary_Harvey River</td></tr>
</table>
<table>
<tr><td>RIWI Act Surface Water and Irrigation District</td><td>No</td><td></td></tr>
<tr><td>RIWI Act Rivers</td><td>No</td><td></td></tr>
<tr><td>RIWI Act Groundwater Areas</td><td>Yes</td><td>Southwest Coastal (UFI 43)</td></tr>
<tr><td>CAWS Act Clearing Control Catchment</td><td>No</td><td></td></tr>
<tr><td>Public Drinking Water Source Areas</td><td>No</td><td></td></tr>
<tr><td>Wellhead Protection Zone</td><td>No</td><td></td></tr>
<tr><td>Reservoir Protection Zone</td><td>No</td><td></td></tr>
</table>
</td></tr>
<tr><td>Flora</td><td>According to available database, 74 conservation significant flora species have been recovered within the local area (10-kilometre buffer). Comprising seven Priority 1, 15 Priority 2, 21 Priority 3, 19 Priority 4, nine threatened, one endangered, and one critically endangered flora taxa. Additionally, one extinct flora has been recorded within the local area.

None of these records occur over the application area The closest protected flora to the application area is Poa billardierei located approximately 0.92 kilometres from the application area.

The application area does not provide suitable habitat requirements for any of the 74 conservation significant flora species.</td></tr>
<tr><td>Ecological communities</td><td>According to available databases, six conservation significant ecological communities have been mapped within the local area (10-kilometre buffer). None of these records occurs over the application area. However, the closest TEC is a Subtropical and Temperate Coastal Saltmarsh located approximately 0.09 kilometres northeast of the application area.

According to GHD (2022), the Subtropical and Temperate Coastal Saltmarsh is located approximately 0.085 kilometres from the application area.</td></tr>
<tr><td>Fauna</td><td>According to available databases, 81 conservation significant fauna species have been recorded within the local area comprising one Priority 2, three Priority 3, eight Priority 4, 16 Endangered, 18 Vulnerable, six critically endangered, 23 migratory, three specially protected species (OS), and two conservation dependent fauna taxa.

Of the 67 terrestrial fauna species, 44 are non-avian. The closest are the Pseudocheirus occidentalis (Western ringtail possum, ngwayir) and Elapognathus minor (Short-nosed snake) located approximately 0.42 and 0.92 kilometres away, respectively.

Of the 15 Marine fauna species, the application area has suitable habitat requirements for the following marine species, Geotria australis (Pouched lamprey) and Westralunio carteri (Carter's freshwater mussel) with the closest recorded 0.41 and 6.24 kilometres from the application respectively.

Of the 54 avian species the closest are; Actitis hypoleucos, Calidris acuminata (Sharp-tailed sandpiper), Calidris ruficollis (Red-necked stint), Calyptorhynchus latirostris (Carnaby's cockatoo), Limosa lapponica (Bar-tailed godwit), Pluvialis squatarola (Grey plover), Thalasseus bergii (Crested tern), and Tringa nebularia (Common greenshank, greenshank). All located approximately 0.41 kilometres from the application area.

The application area is within the distribution of the Carnaby’s Cockatoo (Zanda latirostris), Baudin’s Cockatoo (Zanda baudinii), and the Forest Red-tailed Black-cockatoo</td></tr>
</table>

Characteristic	Details
	(*Calyptorhynchus banksii naso*). As the clearing is not proposing to clear any black cockatoo habitat, there are no issues regarding black cockatoos. Noting the habitat requirements, the distribution of the recorded species, the mapped vegetation types, and the condition of the vegetation within the application area. The application area is likely to comprise suitable habitat for the following fauna species: • *Oxyura australis* (Blue-billed duck) • *Tringa glareola* (Wood sandpiper) • *Tringa nebularia* (Common greenshank) • *Hydromys chrysogaster* (rakali) • *Westralunio carteri* (Carter's freshwater mussel) • *Galaxias truttaceus* (Western Australian population) (western trout minnow, western spotted galaxias) • *Geotria australis* (Pouched lamprey)

A.2. Vegetation extent

	Pre-European extent (ha)	Current extent (ha)	Extent remaining (%)	Current extent in all DBCA managed land (ha)	Current proportion (%) of pre-European extent in all DBCA managed land
IBRA bioregion*					
Jarrah Forest	4,506,660.25	2,399,838.15	53.25	1,673,614.25	39.43
Vegetation complex**					
Southern Jarrah Forest	2,607,879.52	1,292,457.94	49.52	967.278.06	37.09
Local area					
10km radius	21,374.77	8,039.30	37.61	-	-

*Government of Western Australia (2019a)

**Government of Western Australia (2019b)

A.3. Flora analysis table

With consideration for the site characteristics set out above, relevant datasets (see Appendix E.1). impacts to the following conservation significant flora required further consideration.

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Acacia ataxiphylla subsp. *ataxiphylla*	P3	N	N	N	5.35	2	N
Adenanthos x cunninghamii	P4	N	N	N	5.46	49	N
Agrostocrinum scabrum subsp. *littorale*	P2	N	N	N	5.46	1	N
Amanita drummondii	P3	N	N	N	2.84	2	N
Amanita preissii	P3	N	N	N	3.98	5	N
Andersonia auriculata	P3	Y	N	Y	1.45	12	N

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Andersonia setifolia	P3	N	N	N	1.85	1	N
Andersonia sp. Jamesii (J. Liddelow 84)	P4	N	N	N	6.60	1	N
Banksia brownii	CR	N	N	N	3.45	16	N
Banksia goodii	EN	N	N	N	5.35	31	N
Banksia seneciifolia	P4	N	N	N	9.00	1	N
Banksia serra	P4	N	N	Y	4.35	7	N
Banksia verticillata	T	N	N	N	4.33	9	N
Boronia crassipes	P3	N	N	Y	2.63	7062	N
Bossiaea divaricata	P4	N	N	N	9.85	3	N
Bossiaea lalagoides	P3	N	N	N	9.67	1	N
Bossiaea sp. Mt Frankland (L. Graham 2174)	P2	Unknown			4.33	1	N
Caladenia evanescens	P1	Unknown			4.33	1	N
Caladenia harringtoniae	T	Y	N	N	3.95	52	N
Calectasia cyanea	T	N	N	N	4.33	1	N
Caustis sp. Boyanup (G.S. McCutcheon 1706)	P3	N	N	N	7.25	1	N
Chordifex abortivus	T	N	N	N	7.23	6	N
Chorizema carinatum	P3	N	Y	N	4.33	1	N
Conospermum quadripetalum	P2	N	N	N	9.15	5	N
Conospermum spectabile	P2	N	N	N	5.92	1	N
Conostylis misera	T	Y	N	N	4.33	1	N
Corybas abditus	P3	N	N	N	7.79	1	N
Corybas limpidus	P4	N	Y	N	5.23	9	N
Degelia flabellata	P2	N	N	N	5.48	10	N
Drakaea micrantha	T	N	N	N	2.62	44	N
Drosera fimbriata	P4	N	N	N	2.96	18	N
Drosera paleacea	P1	N	N	N	5.46	13	N
Eucalyptus newbeyi	P3	Y	N	N	8.19	1	N
Gahnia sclerioides	P4	N	N	N	9.07	22	N
Gonocarpus pusillus	P4	N	N	N	3.52	2	N
Gonocarpus simplex	P4	N	N	N	6.23	1	N
Goodenia sp. South Coast (A.R. Annels ARA 1846)	P3	N	N	N	8.45	3	N
Gyrostemon thesioides	P2	N	N	N	5.46	4	N
Hakea lasiocarpha	P3	N	N	N	7.45	1	N
Isopogon buxifolius var. *buxifolius*	P2	Y	N	N	5.46	2	N
Isopogon uncinatus	T	N	N	N	5.46	10	N
Juncus meianthus	P3	Y	N	N	3.39	2	N
Kunzea pauciflora	P4	N	N	N	5.75	2	N
Lachnagrostis billardierei subsp. *billardierei*	P3	N	N	N	2.08	1	N
Lasiopetalum sp. Denmark (B.G. Hammersley 2012)	P3	N	N	N	5.80	1	N

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Leucopogon alternifolius	P3	Y	Y	Y	5.46	3	N
Leucopogon altissimus	P3	N	N	N	2.40	>10	N
Leucopogon bracteolaris	P2	N	N	N	3.65	3	N
Lysinema lasianthum	P4	Y	Y	N	5.48	18	N
Microtis globula	T	N	N	N	8.58	20	N
Microtis pulchella	P4	N	Y	N	4.33	4	N
Microtis quadrata	P4	Y	Y	Y	4.33	1	N
Pleurophascum occidentale	P4	N	N	N	3.90	>60	N
Poa billardierei	P3	Y	N	Y	0.92	4	N
Prasophyllum paulinae	P1	N	N	Y	8.70	2	N
Pterostylis heberlei	P2	N	N	N	9.80	1	N
Schoenus sp. Grassy (E. Gude & J. Harvey 250)	P2	Y	N	Y	9.22	1	N
Schoenus sp. Grey Rhizome (K.L. Wilson 2922)	P1	N	N	N	9.86	1	N
Spyridium spadiceum	P4	N	N	N	4.18	>14	N
Stenanthemum sublineare	P2	N	N	N	2.91	1	N
Stylidium articulatum	P2	N	N	N	1.90	2	N
Stylidium falcatum	P2	N	N	N	3.35	13	N
Styphelia cymbiformis	P2	Unknown			5.48	1	N
Synaphea preissii	P3	N	N	N	4.20	7	N
Thelymitra sp. South coast (G. Byrne 5133)	P2	Unknown			5.46	6	N
Thomasia multiflora	P1	Y	N	N	5.46	2	N
Thomasia purpurea x solanacea	P1	Y	N	N	7.32	2	N
Thomasia quercifolia	P4	Y	N	N	7.32	1	N
Thomasia solanacea	P4	Y	N	N	3.50	>30	N
Thysanotus isantherus	P4	N	N	N	2.57	>58	N
Usnea pulvinata	P1	N	N	N	9.00	2	N
Verticordia endlicheriana var. *angustifolia*	P3	N	N	N	5.92	1	N
Verticordia fimbrilepis subsp. *australis*	T	N	N	N	9.21	1	N

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

A.4. Fauna analysis table

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Birds						
Actitis hypoleucos	MI	N	Y	0.41	119	N
Apus pacificus	MI	N	Y	8.66	2	N

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Ardenna carneipes (Flesh-footed Shearwater)	VU	N	N	0.92	23	N
Arenaria interpres (Ruddy turnstone)	MI	N	N	1.28	122	N
Atrichornis clamosus (noisy scrub-bird, tjimiluk)	EN	N	N	2.90	3	N
Botaurus poiciloptilus (Australasian bittern)	EN	N	Y	5.47	6	N
Calidris acuminata (Sharp-tailed sandpiper)	MI	N	Y	0.41	60	N
Calidris alba (Sanderling)	MI	N	N	3.21	6	N
Calidris canutus (Red knot)	EN	N	N	1.28	92	N
Calidris ferruginea (Curlew Sandpiper)	CR	N	N	1.67	2075	N
Calidris ruficollis (Red-necked stint)	MI	Y	N	0.41	5008	N
Calidris subminuta (Long-toed Stint)	MI	N	N	6.79	1	N
Calidris tenuirostris (Great knot)	CR	N	N	1.28	185	N
Calyptorhynchus banksii naso (Forest red-tailed black cockatoo)	VU	N	N	2.21	131	N
Zanda baudinii (Baudin's cockatoo)	EN	N	N	1.14	342	N
Zanda latirostris (Carnaby's cockatoo)	EN	N	N	0.41	2358	N
Cereopsis novaehollandiae grisea (Cape Barren Goose)	VU	N	N	8.12	2	N
Charadrius leschenaultii (Greater sand plover)	VU	Y	N	0.81	176	N
Charadrius mongolus (Lesser Sand Plover)	EN	Y	N	1.48	19	N
Dasyornis longirostris (Western bristlebird)	EN	N	N	5.47	2	N
Diomedea exulans (Wandering albatross)	VU	N	N	5.47	2	N
Falco peregrinus (Peregrine falcon)	OS	N	N	2.36	19	N
Hydroprogne caspia (Caspian Tern)	MI	N	Y	0.41	380	N
Leipoa ocellata (malleefowl)	VU	N	N	1.37	1	N
Limosa lapponica (Bar-tailed godwit)	MI	Y	Y	0.41	208	N
Limosa limosa (Black-tailed godwit)	MI	N	N	6.21	7	N
Macronectes giganteus (Southern giant petrel)	MI	N	N	0.90	6	N
Numenius madagascariensis (Eastern curlew)	CR	N	N	5.21	22	N
Numenius phaeopus (Whimbrel)	MI	Y	N	4.12	50	N
Oceanites oceanicus (Wilson's storm-petrel)	MI	N	N	1.32	2	N
Oxyura australis (Blue-billed duck)	P4	Y	Y	0.81	178	N
Pandion cristatus (Osprey, eastern osprey)	MI	N	N	1.32	198	N
Pezoporus flaviventris (western ground parrot)	CR	Y	N	4.33	3	N
Phaethon rubricauda (Red-tailed tropicbird)	P4	N	N	0.56	1	N
Philomachus pugnax (Ruff (reeve))	MI	N	N	5.46	2	N
Pluvialis fulva (Pacific golden plover)	MI	N	N	1.67	126	N
Pluvialis squatarola (Grey plover)	MI	Y	Y	0.41	331	N
Psophodes nigrogularis (western whipbird)	EN	N	N	2.73	2	N
Psophodes nigrogularis nigrogularis (western whipbird (western heath))	EN	N	N	1.26	4	N

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Puffinus huttoni (Hutton's shearwater)	EN	N	N	2.58	3	N
Stercorarius antarcticus lonnbergi (Brown Skua, Subantarctic skua)	P4	N	N	0.81	12	N
Stercorarius parasiticus (Arctic jaeger, Arctic Skua)	MI	N	N	7.27	3	N
Thalassarche carteri (Indian yellow-nosed albatross)	EN	N	N	5.46	1	N
Thalassarche chlororhynchos (Atlantic yellow-nosed albatross)	VU	N	N	3.55	8	N
Thalassarche melanophris (Black-browed albatross)	EN	N	N	6.54	5	N
Thalasseus bergii (Crested tern)	MI	N	Y	0.41	513	N
Thinornis rubricollis (Hooded plover, hooded dotterel)	P4	N	N	1.83	7	N
Tringa brevipes (Grey-tailed tattler)	P4	N	N	1.67	108	N
Tringa glareola (Wood sandpiper)	MI	Y	Y	5.64	1	N
Tringa nebularia (Common greenshank, greenshank)	MI	Y	Y	0.41	299	N
Tringa stagnatilis (Marsh sandpiper, little greenshank)	MI	N	N	1.52	14	N
Tyto novaehollandiae novaehollandiae (masked owl (southwest))	P3	N	N	5.46	2	N
Xenus cinereus (Terek sandpiper)	MI	Y	N	3.63	21	N
Mammals						
Arctocephalus forsteri (New Zealand fur-seal, long-nosed fur-seal)	OS	N	N	0.92	7	N
Arctocephalus tropicalis (Subantarctic fur-seal)	VU	N	N	4.33	1	N
Balaenoptera musculus (Blue whale)	EN	N	N	5.47	4	N
Dasyurus geoffroii (chuditch, western quoll)	VU	N	N	3.53	3	N
Eubalaena australis (southern right whale)	VU	N	N	2.54	16	N
Hydromys chrysogaster (Water-rat, rakali)	P4	Y	Y	2.16	19	N
Isoodon fusciventer (Quenda)	P4	N	N	1.19	210	N
Megaptera novaeangliae (humpback whale)	CD	N	N	6.52	1	N
Neophoca cinerea (Australian sea-lion)	VU	N	N	1.07	4	N
Notamacropus irma (Western brush wallaby)	P4	N	N	4.33	4	N
Phascogale tapoatafa wambenger (South-western brush-tailed phascogale)	CD	N	N	2.33	8	N
Physeter macrocephalus (Sperm whale)	VU	N	N	4.33	8	N
Potorous gilbertii (Gilbert's potoroo)	CR	N	Y	6.56	1	N
Pseudocheirus occidentalis (Western ringtail possum, ngwayir)	CR	N	N	0.42	687	N
Setonix brachyurus (Quokka)	VU	N	N	5.47	8	N
Reptiles						
Caretta caretta (loggerhead turtle)	EN	N	N	0.81	7	N
Dermochelys coriacea (leatherback turtle)	VU	N	N	0.82	1	N
Elapognathus minor (Short-nosed snake)	P2	Unknown		0.92	6	N

Species name	Conservation status	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Invertebrates						
Hylaeus globuliferus (woolybush bee)	P3	N	N	4.91	1	N
Trioza barrettae (Banksia brownii plant-louse)	EN	Unknown		6.34	1	N
Westralunio carteri (Carter's freshwater mussel)	VU	Y	Y	6.24	229	N
Zephyrarchaea mainae (Main's assassin spider)	VU	N	Y	7.26	3	N
Fish						
Carcharias taurus (Grey nurse shark)	VU	N	N	5.47	2	N
Carcharodon carcharias (Great white shark)	VU	N	N	5.47	2	N
Galaxias truttaceus (Western Australian population) (western trout minnow, western spotted galaxias)	EN	Y	Y	2.44	1	N
Geotria australis (Pouched lamprey)	P3	Y	Y	0.41	7	N
Rhincodon typus (Whale shark)	OS	N	N	9.99	1	N

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

A.5. Ecological community analysis table

Community name	Conservation status (WA)	Suitable habitat features? [Y/N]	Suitable vegetation type? [Y/N]	Suitable soil type? [Y/N]	Distance of closest record to application area (km)	Number of known records (total)	Are surveys adequate to identify? [Y, N, N/A]
Subtropical and Temperate Coastal Saltmarsh	Priority 3	Y	Y	Y	0.085	43	Y
Banksia coccinea Shrubland/Eucalyptus staeri/Sheoak Open Woodland (Community 14a - Sandiford & Barrett 2010)(all/or portion in EPBC listed Kwongkan community)	Priority 1	Y	N	Y	0.22	92	N
Astartea scoparia Swamp Thicket	Priority 1	N	Y	Y	0.25	14	N
Banksia littoralis woodland / Melaleuca incana Shrubland	Priority 1	N	N	N	8.28	7	N
Coastal Melaleuca incana / Taxandria juniperina Shrubland/Closed Forest	Priority 1	N	N	N	8.85	10	N
Melaleuca striata /Banksia spp Coastal Heath (all/or portion in EPBC listed Kwongkan community)	Priority 1	N	N	N	9.68	1	N

T: threatened, CR: critically endangered, EN: endangered, VU: vulnerable, P: priority

Appendix B. Assessment against the clearing principles

Assessment against the clearing principles	Variance level	Is further consideration required?
Environmental value: biological values		
Principle (a): *"Native vegetation should not be cleared if it comprises a high level of biodiversity."* Assessment: The area proposed to be cleared consists of a small continuous vegetation corridor within a wetland that is an ecological linkage between Lake Seppings and Oyster Harbour. The vegetation provides vital biofiltration, erosion prevention and sediment stabilisation. Vegetation 0.09 kilometres downstream of the application area is consistent with that of a TEC. Furthermore, the application area potentially contains habitat for conservation significant fauna.	At variance	Yes *Refer to Section 3.2.1, above*
Principle (b): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna."* Assessment: The area proposed to be cleared contains habitat for conservation significant fauna.	May be at variance	Yes *Refer to Section 3.2.1, above.*
Principle (c): *"Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora."* Assessment: The area proposed to be cleared is unlikely to contain threatened flora. Spatial data indicates that no threatened flora species have been recorded within the application area..	Not at variance	No
Principle (d): *"Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community."* Assessment: The area proposed to be cleared does not contain species that can indicate a TEC. However, the closest TEC is located 0.08 kilometres northeast of the application area, with clearing likely to affect the occurrence of this TEC.	At variance	Yes *Refer to Section 3.2.1, above.*
Environmental value: significant remnant vegetation and conservation areas		
Principle (e): *"Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared."* Assessment: The extent of the mapped vegetation type and vegetation extent in the local area is consistent with the national objectives and targets for biodiversity conservation in Australia.	Not at variance	No
Principle (h): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area."* Assessment: Given the distance of the application area from Lake Seppings and Oyster Harbour, the proposed clearing may have an impact on the environmental values of nearby conservation areas.	At variance	Yes *Refer to Section 3.2.2, above.*
Environmental value: land and water resources		
Principle (f): *"Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland."* Assessment: The proposed clearing is within a watercourse and wetland.	At variance	Yes *Refer to Section 3.2.2, above.*

Assessment against the clearing principles	Variance level	Is further consideration required?
Principle (g): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation."* Assessment: The mapped and surveyed soils are moderately susceptible to nutrient export and salinity export. Noting the application area's location, the proposed clearing is likely to have an appreciable impact on land degradation.	At variance	Yes *Refer to Section 3.2.3, above.*
Principle (i): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water."* Assessment: The proposed clearing may impact surface water quality.	At variance	Yes *Refer to Section 3.2.3, above.*
Principle (j): *"Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding."* Assessment: The mapped soils and topographic contours in the surrounding area do not indicate the proposed clearing is likely to increase the incidence or intensity of flooding. The stated purpose of clearing is to decrease the amount of flooding within the application area and surrounding environments.	Not at variance	No

Appendix C. Vegetation condition rating scale

Vegetation condition is a rating given to a defined area of vegetation to categorise and rank disturbance related to human activities. The rating refers to the degree of change in the vegetation structure, density and species present in relation to undisturbed vegetation of the same type. The degree of disturbance impacts upon the vegetation's ability to regenerate. Disturbance at a site can be a cumulative effect from a number of interacting disturbance types.

Considering its location, the scale below was used to measure the condition of the vegetation proposed to be cleared. This scale has been extracted from:

Keighery, B.J. (1994) *Bushland Plant Survey: A Guide to Plant Community Survey for the Community*. Wildflower Society of WA (Inc). Nedlands, Western Australia.

Measuring vegetation condition for the South West and Interzone Botanical Province (Keighery, 1994)

Condition	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance.
Excellent	Vegetation structure intact, with disturbance affecting individual species; weeds are non-aggressive species.
Very good	Vegetation structure altered, with obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and/or grazing.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and/or grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and/or grazing.
Completely degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Appendix D. Photographs of the vegetation and DWER South Coastal Region site inspection report

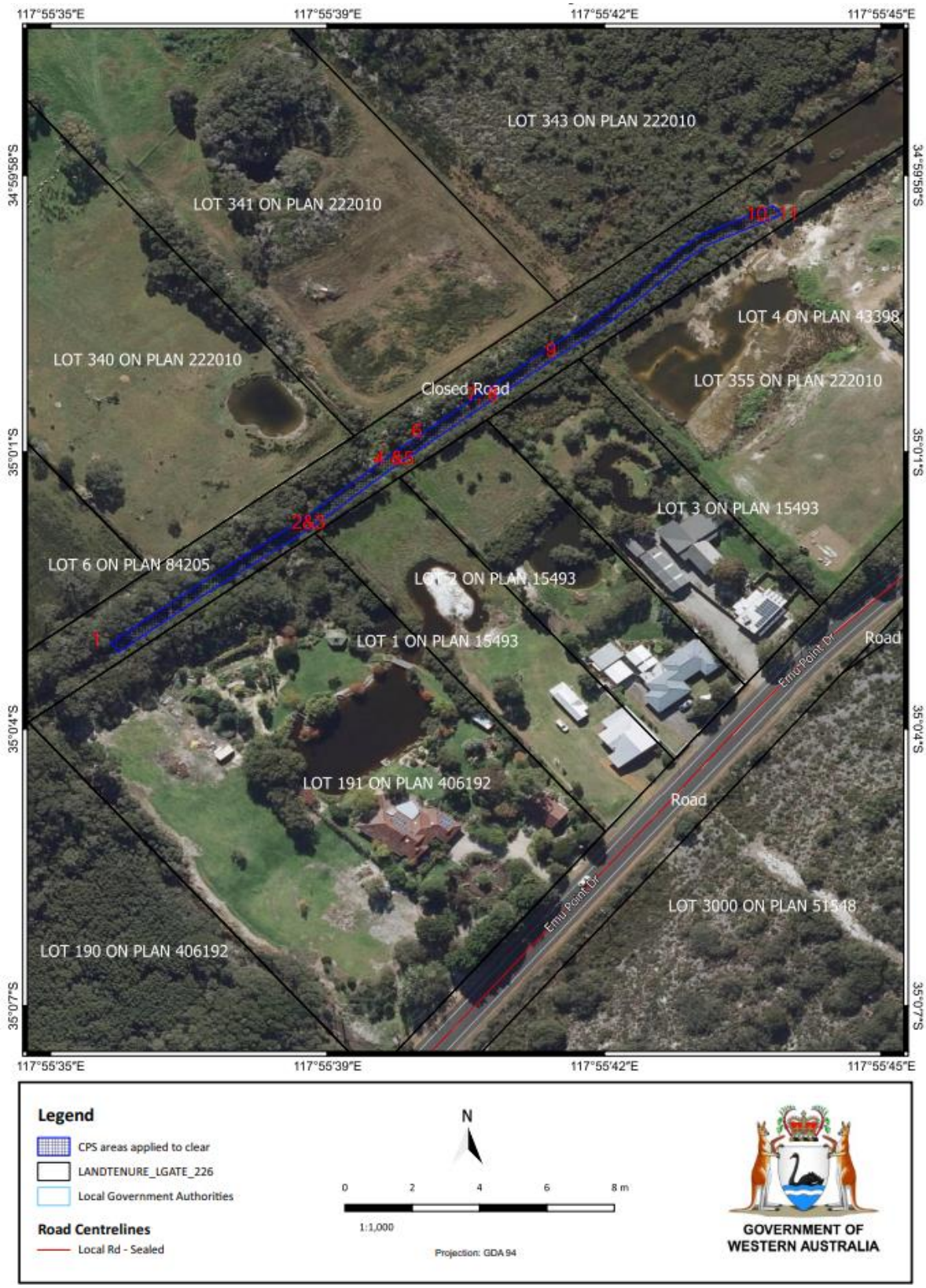

Figure A: DWER southwest region context photos for site photos. Site visit 18 April 2023 – Lake Seppings outfall (DWER, 2023a).

Figure B: Photo 1 – View North east (downstream) Western extent of proposed clearing area.

Figure C: Photo 2 – View north east (downstream) Partway along proposed clearing alignment (*Juncus kraussii, Gahnia trifida, and Melaleuca sp.).*

Figure D: Photo 3 – View south West (upstream) Partway along proposed clearing alignment, (*Juncus kraussii and Gahnia trifida, Melaleuca sp).*

Figure E: Photo 4 – View south - Uncontrolled access from Lot 1 into proposed clearing area facilitating access into adjoining Lot 2.

Figure F: Photo 5 – View northeast - Vehicle impacts on vegetation within proposed clearing area -note samphire in foreground indicating potentially saline conditions, (G*ahnia trifida).*

Figure G: Photo 6 – Narrow stream bed with standing water present, (G*ahnia trifida).*

Figure H: Photo 7 – View south west (upstream), (*Melaleuca sp., and* G*ahnia trifida).*

Figure I: Photo 8 – View South east (downstream), (*Taxandria sp*., *Melaleuca sp., and* G*ahnia trifida)*

Figure J: Photo 9 – View north – *Melaleuca* sp., stand adjacent to proposed clearing area (within Road reserve).

Figure K: Photo 10 – View southwest (upstream) - Eastern extent of proposed clearing area (at boundary of mapped Oyster Harbour DIWA wetland) (*Melaleuca sp., Taxandria sp.*, *and Gahnia trifida).*

Figure L: Site photo of application area confirming the likely presence of active ASS from DWER South coastal region site visit. Weed species identified by DBCA include *Cortaderia selloana*, *Acacia longifolia* , *Psoralea pinnata* (DWER, 2019; DBCA 2023).

Figure M: Photo 11 – View northeast (downstream) - Eastern extent of proposed clearing area (at boundary of mapped Oyster Harbour DIWA wetland) looking eastwards to natural downstream pool. Note survey marker on right midground at edge of stream.

Figure N: Site photo of application area confirming the likely presence of active ASS from DWER South coastal region site visit. (DWER, 2019).

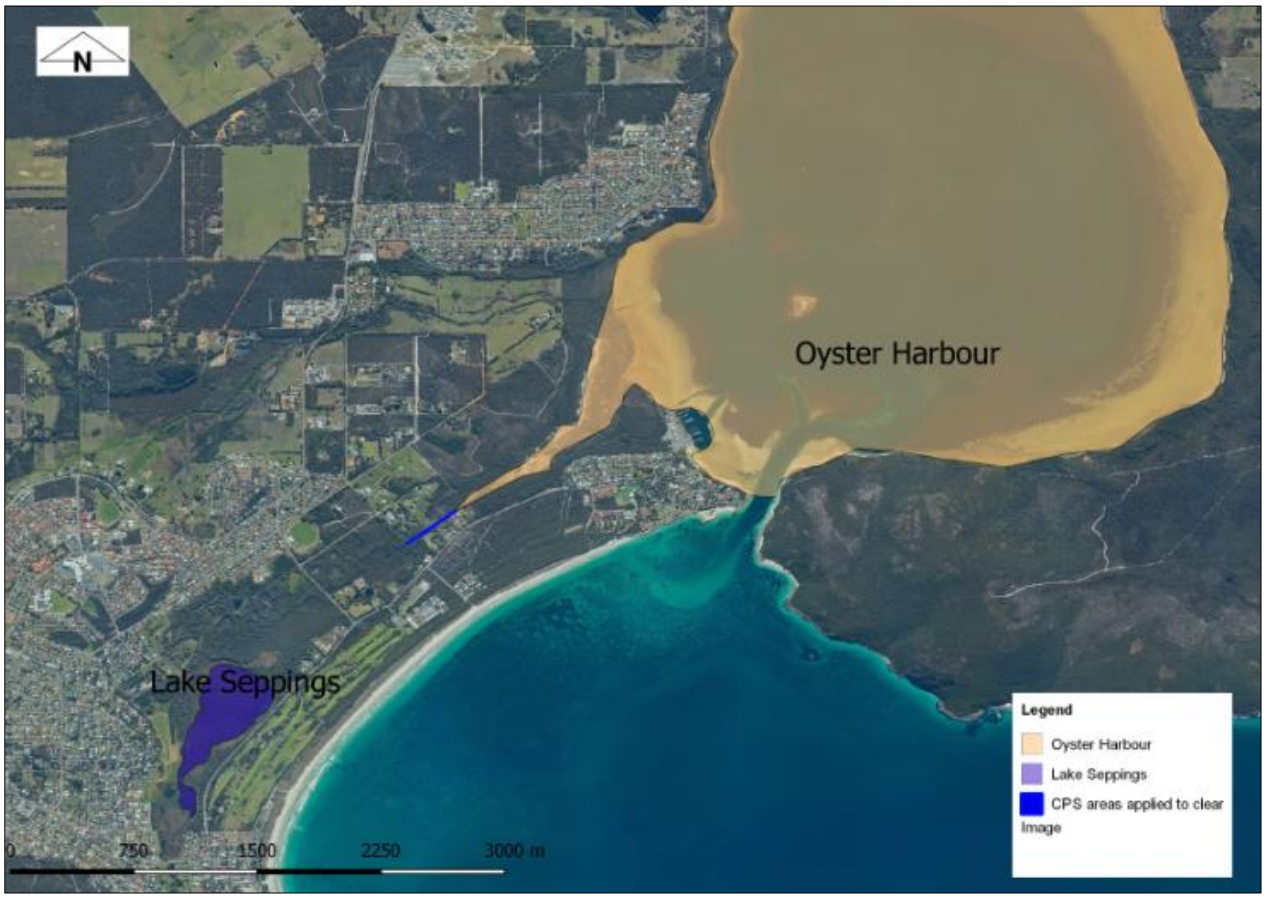

Figure O: Application area downstream from Lake Seppings (Conservation Category Wetland) and flowing into Oyster Harbour (ANCA Wetland). Tidal pools located directly downstream of the application area form part of Oyster Harbour (DBCA, 2023a).

Figure P: Lake Sapping's outflow elevation levels (DWER, 2023a).

Figure Q: Lake Seppings outfall elevation levels (DWER, 2023a).

Figure R: Lake Seppings outfall elevation levels (DWER, 2023a).

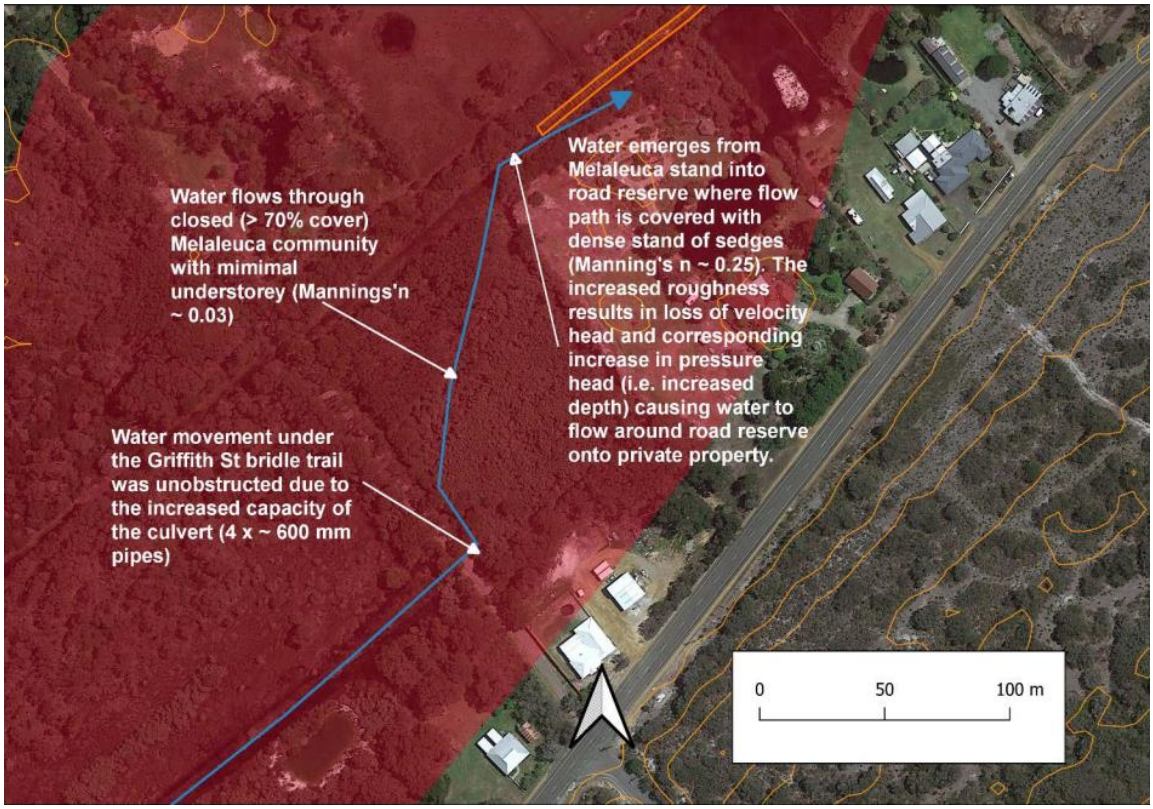

Figure S: Observed changes in hydrological flow within the wetland during site inspection (DPIRD, 2023).

Table 1: Lake Seppings outfall elevation levels Levels taken by RTK GPS Tim Bond and A Rogerson 29/11/2016; Measurements taken within 3 hour period to account for tide which was low and not influencing outflow at Oyster Harbour., +/- 30mm(z) (DWER, 2023a).

FID	Name	FeatureCod	Easting	Northing	Elevation
1	100	WATER_LEVEL	585761.3895	6127492.907	0.053
2	101	WATER_LEVEL	585599.9774	6127188.575	0.165
3	102	WATER_LEVEL	585335.9147	6127035.488	0.300
4	103	WATER_LEVEL	585106.3123	6126869.550	0.368
5	104	WATER_LEVEL	584801.6140	6126666.134	0.393
6	105	BOUNDARY PEG	584816.8727	6126685.907	0.781
7	106	WATER_LEVEL	584895.4218	6126775.749	0.390
8	107	IL/DS_TROODE	584073.7220	6125897.072	0.409
9	108	WATER_LEVEL_TROODE	584073.5117	6125897.023	0.932
10	109	WATER_LEVEL_TROODE	584064.0705	6125889.524	0.951
11	110	IL/US_TROODE	584063.9625	6125889.364	0.435
12	111	IL/150_POND Freds	584243.6950	6126070.057	0.851
13	112	IL/150_POND Freds	584243.5721	6126070.187	0.770
14	113	IL/150_POND Freds	584243.4900	6126070.318	0.790
15	114	IL/150_POND Freds	584243.3868	6126070.417	0.836
16	115	NS/POND Freds water level	584243.3464	6126070.396	0.953
17	116	IL/PIPE horse path	584525.4142	6126306.674	0.541
18	117	WATER_LEVEL horse path	584525.4027	6126306.838	0.818
19	118	WATER_LEVEL	584469.9947	6126387.637	0.893
20	119	BOTTOM_LEVEL	584470.2176	6126387.953	0.784
21	120	WATER_LEVEL	583446.3332	6125495.634	0.996
22	121	WATER_LEVEL	583605.7784	6125356.648	0.982
23	122	WEIR Eyres park outflow	583020.5268	6124039.665	1.153
24	123	WATER_LEVEL eyre park outflow	583020.2044	6124039.919	1.001
25	124	WATER_LEVEL Lake Sepping inflow from Eyre park	583018.6452	6124066.409	1.000
26	125	WATER_LEVEL Laker Seppings Drv pond water edge	582946.9741	6124186.033	1.127

Appendix E. Sources of information

E.1. GIS databases

Publicly available GIS Databases used (sourced from www.data.wa.gov.au):

- 10 Metre Contours (DPIRD-073)
- Aboriginal Heritage Places (DPLH-001)
- Aboriginal Heritage Places (DPLH-001)
- Cadastre (LGATE-218)
- Cadastre Address (LGATE-002)
- Contours (DPIRD-073)
- DBCA – Lands of Interest (DBCA-012)
- DBCA Legislated Lands and Waters (DBCA-011)
- Directory of Important Wetlands in Australia – Western Australia (DBCA-045)
- Environmentally Sensitive Areas (DWER-046)
- Flood Risk (DPIRD-007)
- Groundwater Salinity Statewide (DWER-026)
- Hydrography – Inland Waters – Waterlines
- Hydrological Zones of Western Australia (DPIRD-069)
- IBRA Vegetation Statistics
- Imagery
- Local Planning Scheme – Zones and Reserves (DPLH-071)
- Native Title (ILUA) (LGATE-067)
- Offsets Register – Offsets (DWER-078)
- Pre-European Vegetation Statistics
- Public Drinking Water Source Areas (DWER-033)
- Ramsar Sites (DBCA-010)
- Regional Parks (DBCA-026)
- Remnant Vegetation, All Areas
- RIWI Act, Groundwater Areas (DWER-034)
- RIWI Act, Surface Water Areas and Irrigation Districts (DWER-037)
- Soil Landscape Land Quality – Flood Risk (DPIRD-007)
- Soil Landscape Land Quality – Phosphorus Export Risk (DPIRD-010)
- Soil Landscape Land Quality – Subsurface Acidification Risk (DPIRD-011)
- Soil Landscape Land Quality – Water Erosion Risk (DPIRD-013)
- Soil Landscape Land Quality – Water Repellence Risk (DPIRD-014)
- Soil Landscape Land Quality – Waterlogging Risk (DPIRD-015)
- Soil Landscape Land Quality – Wind Erosion Risk (DPIRD-016)
- Soil Landscape Mapping – Best Available
- Soil Landscape Mapping – Systems
- Wheatbelt Wetlands Stage 1 (DBCA-021)

Restricted GIS Databases used:

- ICMS (Incident Complaints Management System) – Points and Polygons
- Threatened Flora (TPFL)
- Threatened Flora (WAHerb)
- Threatened Fauna
- Threatened Ecological Communities and Priority Ecological Communities
- Threatened Ecological Communities and Priority Ecological Communities (Buffers)

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