Clearing Assessment Report – CPS 818

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Mandurah Estuary Bridge Duplication

February 2024

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Contents

Amendments

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1 PURPOSE

The purpose of this Clearing Assessment Report (CAR) is to provide a report detailing the assessment of native vegetation clearing that is proposed to be undertaken using the Statewide Clearing Permit CPS 818 issued to Main Roads Western Australia (Main Roads).

The CAR outlines the key activities associated with the project, the existing environment and an assessment of native vegetation clearing. This assessment provides an evaluation of the vegetation clearing impacts associated with the project using the ten Clearing Principles, and the strategies used to manage vegetation clearing.

2 SCOPE

2.1 Project Scope

Project Name: Mandurah Estuary Bridge Duplication (MEBD)

Project Purpose / Components:

Originally built in the mid-1980s, the Mandurah Estuary Bridge was suitable to accommodate the lower traffic volumes at that time. However, it was recognised that traffic growth could result in the requirement for another bridge. Consequently, the existing bridge was designed to accommodate the construction of an additional one to cater for a future increase in traffic. This threshold was reached with the recent population rise in Perth, Mandurah and the wider South-West. In February 2021, the Premier released a media statement announcing that a second Mandurah Estuary Bridge would be constructed to alleviate traffic in the area. The Premier announced that this bridge will be built for two lanes with the capacity to be expanded to accommodate three lanes in the future. This proposal is expected to complement the existing bridge thus reducing traffic congestion and travel times as well as improving cycling and pedestrian connectivity in the Peel region.

The proposal will involve the following components:

- Construction of Bridge 1910 as a duplication of the existing Mandurah Estuary Bridge (No. 1085) and associated tie-in works:
  - Approximate length 383m and width 13-14m (TBC), 8 spans / 7 piers
  - Ultimate configuration: 3 x 3.5m wide lanes with 1.0m verge and median shoulders
  - Pier locations and span lengths to be as per existing bridge
  - Minimum navigational envelope to be as per existing bridge
- The bridge location will be directly south of the existing estuary bridge
- Construction of a PSP located on the south side of the bridge and connection to existing path and local road network.
- Associated items including but not limited to:
  - Service relocations, drainage, safety barriers, street lighting, fencing, noise walls, urban design and landscaping.

The proposed impacts considered under CPS 818 are as follows:

- **Total maximum impacts to benthic vegetation are 0.12 ha comprising:**
  - Clearing of 0.12 ha of benthic vegetation (direct impact)

The proposed temporary clearing undertaken using CPS 818 is: None.

Project Location(s):

Bridge 1910 is located on Lakelands Lake Clifton Road (SLK 10.6 to 12.8) within the City of Mandurah (see Figure 1).

- Latitude: -32.5491211
- Longitude: 115.7188163

As indicated in Figure 1, benthic vegetation will be directly impacted by the construction of work platforms. The area of impact to native vegetation has been referred to as the impact area throughout this document and is displayed in Figure 1.

2.2 Assessment Report Scope

The assessment area (see Figure 2) is confined to a local area of 5 km radius from the impact area.

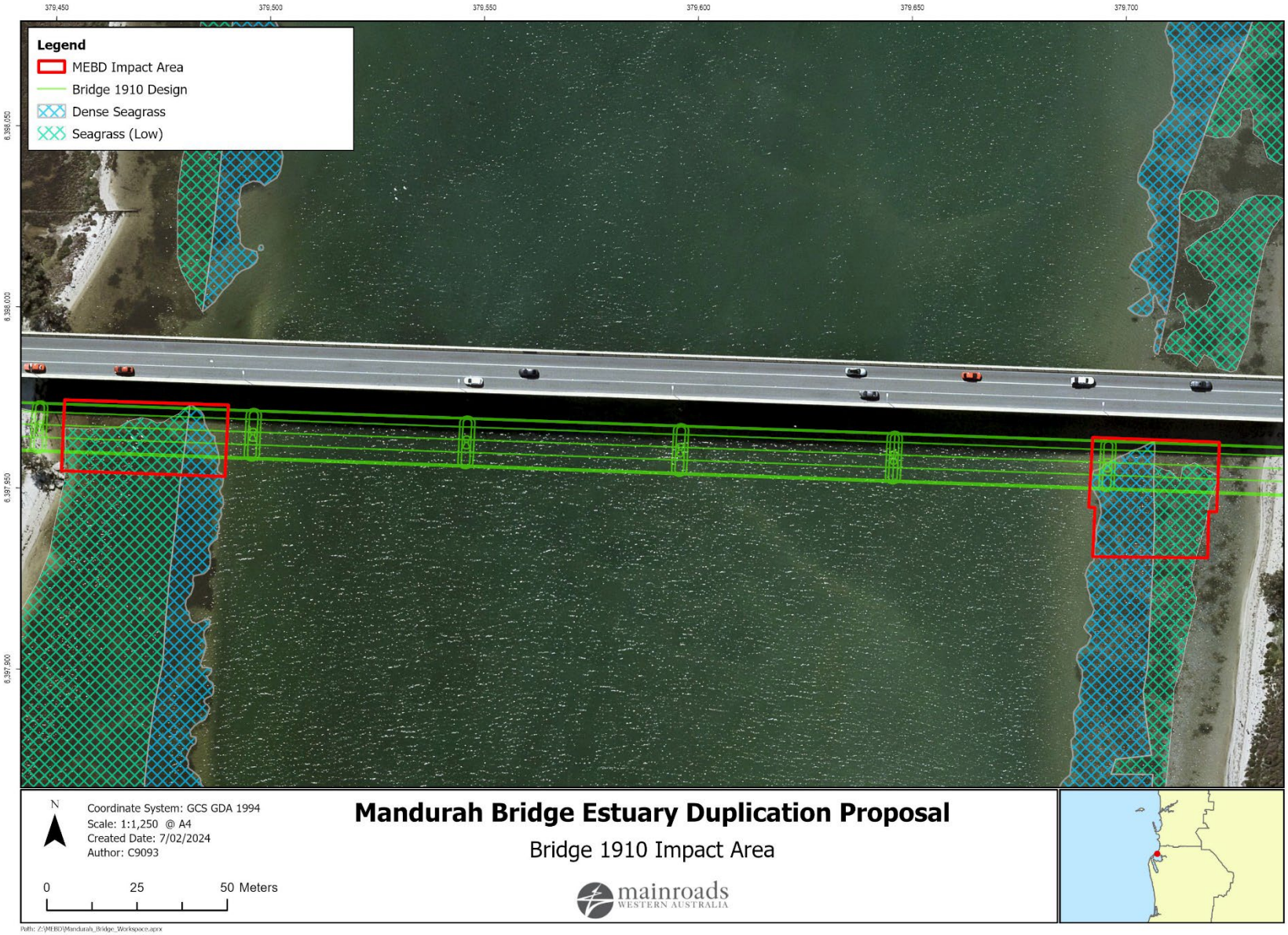

Figure 1. Location of Bridge 1910 and Impact Area

Figure 2. Assessment Area of the Mandurah Estuary Bridge Duplication (MEBD) proposal

2.3 Alternatives to clearing

- The proposed bridge will be duplicated immediately south of the existing bridge and will exhibit an identical substructure and similar superstructure configuration. This approach was adopted to reduce the footprint and minimise impacts to benthic habitat within the estuary.
- Alternate construction methodologies will be implemented to avoid both dredging of the estuary bed and the construction of temporary reclaimed causeways for access purposes during piers construction.

2.4 Measures to Avoid, Minimise, Reduce and Manage Project Clearing Impacts

The design and management measures implemented to avoid and minimise the clearing impacts by the project are provided in Table 1.

Table 1. Measures undertaken to Avoid, Minimise, Reduce and Manage the Project Clearing Impacts

Design or Management Measure	Discussion and Justification
Reduction of Clearing Footprint	The clearing footprint has been reduced as far as practicable to minimise impacts to areas mapped as benthic vegetation (seagrass) within the estuary.
Steepen batter slopes	Not Applicable
Installation of safety barriers	Not Applicable
Alignment to one side of existing road	Not Applicable
Alternative alignment to follow existing road (or) to preferentially locate within pasture or a degraded areas	Not Applicable
Installation of kerbing	Not Applicable
Simplification of design to reduce number of lanes and/or complexity of intersections	Not Applicable
Preferential use of existing cleared areas for access tracks, construction storage and stockpiling	Existing cleared areas will be utilised for vehicle turnarounds. Where possible cleared areas in the vicinity of the proposal will be used to stockpile and store construction material and equipment.
Drainage modification	Drainage water designs will incorporate bioretention basins to treat drainage water from the bridge before it enters the Mandurah estuary. The bioretention basins are expected to provide the required filtration to remove pollutants from stormwater.

2.5 Approved Policies and Planning Instruments

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 1.3), Main Roads has also had regard to the below instruments.

Other Legislation of relevance for assessment of clearing and planning/other matters

- Biodiversity Conservation Act 2016 (WA) (BC Act)
- Conservation and Land Management Act 1984 (WA) (CALM Act)
- Country Areas Water Supply Act 1947 (WA) (CAWS 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)
- Rights in Water and Irrigation Act 1914
- Aboriginal Heritage Act 1972 (WA)
- Town Planning and Development Act 1928

Environmental Protection Policies

- Environmental Protection (Peel Inlet - Harvey Estuary) Policy 1992;
- Environmental Protection (Western Swamp Tortoise Habitat) Policy 2011

Other Relevant policies and guidance documents:

- Environmental Offsets Policy (Government of Western Australia, 2011)
- A guide to the assessment of applications to clear native vegetation (DER, December 2014)
- Procedure: Native vegetation clearing permits (DWER, October 2021)
- Environmental Offsets Guidelines (Government of Western Australia, August 2014)
- Technical guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016)
- Technical guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2020)
- Approved conservation advice under section 266B of the EPBC Act for threatened flora/fauna/vegetation communities
- Approved Recovery Plans for threatened species
- EPBC Act Referral guidelines for the three threatened black cockatoo species
- Strategic advice - EPA

3 SUMMARY OF SURVEYS

3.1 Biological Survey

The Mandurah Estuary Bridge Duplication biological survey was conducted on 15 September 2021 and 23 November 2021 by AECOM.

In accordance with CPS 818 condition 8 (e) (iii), a copy of the relevant sections of the executive summary and report conclusions from the biological survey and/or field assessments are provided in Appendix 1.

Section 3.1.1 contains the summary of the surveys.

3.1.1 Summary of Biological Survey

AECOM was commissioned to undertake a biological survey for the Mandurah Estuary Bridge Duplication proposal. The objective of the biological survey was to delineate key flora, vegetation, fauna and wetland values of the survey area to inform the environmental assessment and approval process. AECOM completed a detailed flora and vegetation assessment in September 2021. Areas of native vegetation were traversed on foot and subjected to detailed surveys including flora sampling and opportunistic recordings. A basic fauna and targeted black cockatoo survey was completed in November 2021. The basic fauna survey primarily focused on verifying the findings of the desktop assessment and mapping fauna habitat, while also searching for signs of significant fauna species. The targeted black cockatoo survey was conducted to identify potential breeding, roosting and foraging habitat. The survey area extended beyond the boundary of the MEBD proposal and covered a total of 64.34 ha.

Findings of the biological survey:

A total of 16 native flora species and 11 weed species were recorded during the survey.

No threatened flora listed under the EPBC Act or *Biodiversity Conservation Act 2016* (BC Act) were recorded during the survey. In addition, no native endemic species listed as Priority by DBCA were recorded in the survey area.

No weeds listed as Declared Pests or as a Weed of National Environmental Significance were recorded.

During the survey, the Subtropical and Temperate Coastal Saltmarsh Threatened Ecological Community (TEC) was found in the survey area. This vegetation community was assessed as being in an Excellent condition with no evidence of weed invasion.

Four broad fauna habitats were defined and mapped, based predominantly on vegetation, landform and soils. These comprised, Banksia Woodlands; Mixed Trees; Riparian and Water. Thirty-six vertebrate fauna species were recorded during the field survey. Three of these species were listed as Marine. Only one fauna habitat, namely, Water, occurs within the impact area. No significant fauna species were identified in the impact area during the survey.

A total of 172 native and introduced eucalypts with a diameter at breast height (DBH) ≥ 500 mm were observed and two of these trees had suitable hollows for Black Cockatoo breeding habitat. Foraging evidence of the Forest Red-tailed Black Cockatoo in the form of chewed *Corymbia calophylla* nuts were observed in the survey area.

The impact area is solely located within the Mandurah estuary and hence does not support any terrestrial habitats. The Subtropical and Temperate Coastal Saltmarsh TEC was mapped at a

minimum distance of 49 m south-east of the impact area and the two sites are separated by bare areas and planted vegetation. There are no Black Cockatoo foraging or potential breeding habitat in the vicinity of the impact area.

3.2 Summary of Benthic Habitat Assessment

The benthic habitat assessment of the Mandurah estuary was undertaken by O2 Metocean on 11 May 2022 and 1 June 2022.

Section 3.3.1 contains the summary of the survey.

3.2.1 Summary of Benthic Habitat Assessment

A benthic habitat assessment was conducted to assess the area around the current Mandurah bridge and the proposed one. Data acquired for the investigation includes a combination of side scan sonar to map the habitats and drop camera / visual verification to ground truth the mapped habitats. The survey area extended beyond the boundary of the MEBD proposal.

Findings of the Benthic Habitat Assessment:

Overlapping side scan sonar data showed that there were nine different benthic communities and classes in the survey area as follows:

- Large dunes (3.27 ha)
- Small dunes (4.45 ha)
- Bare Sandy Mud (15.23 ha)
- Deep Channel (0.70 ha)
- Mud (1.90 ha)
- Rubble (0.18 ha)
- Shallow Sands (2.08 ha)
- Structure (0.40 ha)
- Seagrass (6.77 ha)

The dominant macrophytic community comprised the seagrass, *Ruppia megacarpa* and there was a lack of any other significant macroalgae present. Epibenthos and other fauna species was also lacking in the survey area and this was attributed to the presence of coarse sediments and strong influence of currents through the channel. Bare sediment dominated the substrate which prevented the establishment of attaching sessile organisms. A total of 0.12 ha of benthic vegetation (seagrass) was mapped within the total impact area.

4 VEGETATION DETAILS

4.1.1 Project Site Vegetation Description

The impact area lies within the Mandurah estuary and does not support any terrestrial habitat (Figure 1). It was estimated that a total of 0.12 ha of native vegetation in the form of benthic vegetation (seagrass) will be cleared during construction of the MEBD proposal (Figure 3). The remaining section of the proposal area was found to comprise of bare sandy mud with no visible macrophytes or benthic communities (O2 Metocean 2022). The benthic habitat assessment undertaken by O2 Metocean indicated that the benthic community was dominated by *Ruppia megacarpa* (O2 Metocean 2022). This assessment also reported that the channel sands appear to be very loose and unstable, and therefore do not provide a good substrate for attaching organisms.

Tables 2 and 3 provide details of the Pre-European Vegetation Associations mapped over the impact area.

Table 2. Summary of Impact area's Mapped Pre-European Vegetation Associations

Pre-European Vegetation Association(s)	Impact Description	Vegetation Condition	Comments
Vegetation Association 27 Medium woodland (*E. gomphocephala* and *E. marginata*) (Government of Western Australia, 2019)	Impact to 0.12 ha of benthic vegetation.	Not Applicable	Mapping based on a benthic habitat assessment conducted in 2022.

Vegetation that has less than 30% remaining is considered to represent an area that is significant as a remnant vegetation. The objective of the Environment Protection Authority (EPA) is to retain more than 30% of the pre-European vegetation cover of each ecological community, as below this threshold, species loss appears to accelerate exponentially at an ecosystem level (Commonwealth of Australia 2001). According to Beard's mapping (Beard et al 2013), the impact area lies within Vegetation Association 27 which has been defined as 'Medium woodland (*E. gomphocephala* and *E. marginata)'*. However, no terrestrial native vegetation will be impacted by the proposal.

Table 3. Pre-European Vegetation Representation

Pre-European Vegetation Association	Scale	Pre–European (ha)	Current Extent (ha)	% Remaining	% Remaining in DBCA reserves
Veg Assoc No. 27	**Statewide**	130,385.33	92,501.98	70.95	59.24
	IBRA Bioregion Swan Coastal Plain	5,836.25	1,750.74	30.00	12.39
	IBRA Sub-region Perth	5,836.25	1,750.74	30.00	12.39
	Local Government Authority City of Mandurah	306.20	57.66	18.83	11.98

4.1.2 Vegetation Complexes and Representation

Heddle et al. (1980) and Mattiske and Havel (1998) defined and mapped a series of vegetation complexes that enabled a refinement of Beard's vegetation mapping (Beard et al 2013) within the Perth and Peel region. Table 4 indicates the vegetation complex mapped for the impact area.

Table 4. Vegetation Complexes (Heddle/Mattiske) within the Impact area

Heddle/Mattiske Veg Complex	Pre-European Extent (ha)	2013 Vegetation Extent	% Remaining
Vasse Complex (Closed scrub fringing woodland and open forest)	15,691.63	4,926.97	31.40

As shown in Table 3, Vegetation Association 27 has less than 30% of its extent remaining at the State, IBRA bioregion, IBRA subregion and local government authority. The Heddle Vegetation Complex (Vasse Complex) mapped within the impact area retains approximately 31% of pre-European vegetation within the Swan Coastal Plain (Table 4) and is not considered as a significant remnant vegetation. The area mapped as seagrass does not correspond to either Vegetation Association 27 or Vasse Complex as it is an aquatic vegetation community.

Consequently, no vegetation classified as pre-European or Swan Coastal Plain complexes occurs within the impact area.

5 ENVIRONMENTALLY SENSITIVE AREAS

The Mandurah estuary lies within the Peel-Yalgorup wetland system which is classified as a 'Wetland of International Importance' under the Ramsar Convention on Wetlands Ramsar wetland. The Peel-Yalgorup Ramsar Site is situated approximately 80 kilometres south of Perth within four Local Government Authorities, namely, the City of Mandurah and the Shires of Murray, Waroona and Harvey (PHCC 2019). The Peel-Harvey Estuary comprises two large shallow basins, namely, the circular Peel Inlet and the elongate Harvey Estuary (PHCC 2019). The Peel Inlet is roughly 10 kilometres in diameter and is connected to the Harvey Estuary by a narrow navigation channel at its southern end (PHCC 2019). The impact area is located within the Peel Inlet in a zone where the average salinities are slightly less than marine conditions because of freshwater inflow from the Murray and Serpentine rivers (DWER 2020). Nutrients and chlorophyll *a* concentrations were reported as being mostly below guidelines and the fish community index was rated as poor within the shallower waters of the Peel Inlet (DWER 2020).

Figure 3. Occurrence of benthic habitat within the Impact Area.

6 ASSESSMENT AGAINST THE TEN CLEARING PRINCIPLES

In assessing whether the project's proposed clearing is likely to have a significant impact on the environment, the project was assessed against the ten Clearing Principles (*Environmental Protection Act 1986*, Schedule 5).

Each principle has been assessed in accordance with DWER's 'A Guide to the Assessment of Applications to Clear Native Vegetation' and other relevant CPS Decision Reports prepared by DWER.

The proposed impact to 0.12 ha of a seagrass community under CPS 818/17 is considered to be at variance to Principle (f), maybe at variance to Principle (i), not likely to be at variance to Principles (a), (b), (h) and not at variance to Principles (c), (d), (e), (g) and (j).

(a) Native vegetation should not be cleared if it comprises a high level of biological diversity.

Proposed clearing is not likely to be at variance to this Principle
Comment Following a biological survey and benthic habitat assessment undertaken within and in the vicinity of the proposed clearing footprint, the only native vegetation recorded within the impact area is a seagrass community located within the Mandurah estuary. It was estimated that a total of 0.12 ha of this benthic vegetation will be cleared for the construction of work platforms within the estuary. The benthic vegetation to be impacted was reported to be dominated by *Ruppia megacarpa* (O2 Metocean 2022). This species of seagrass was noted to be a rapid coloniser with an abundance that can vary greatly over time (Bennett et al 2021). The health of the seagrass community was reported to be variable (O2 Metocean 2022). Impacts to a total of 0.12 ha within the seagrass community is not expected to have a significant impact on the occurrence of this benthic vegetation within the Mandurah estuary. Results from a desktop assessment indicated that there are known records of six significant flora species within the assessment area. Of these species, none were assessed as having the potential to occur within the impact area due to an absence of suitable habitats. Given that the impact area does not support any terrestrial habitats and no Threatened or Priority flora species will be impacted, it is unlikely that the direct loss of 0.12 ha of seagrass community will significantly reduce the biodiversity of the locality. A desktop assessment showed records of 45 significant fauna species within the assessment area. Due to the extensively modified nature of the area and the absence of terrestrial vegetation, none of these species are considered as having the potential to occur in the impact area. The November 2021 biological survey did not identify any significant fauna species within the impact area and its vicinity, however, recognised the estuary as potential habitat for significant bird species (AECOM 2022). However, the benthic habitat assessment found that most of the impact area and its vicinity comprised of a bare substrate with no visible macrophytes or benthic communities (O2 Metocean 2022). In addition, the occurrence of other larger benthic communities in the area were considered rare (O2 Metocean 2022). These findings would therefore suggest that impacts to 0.12 ha of seagrasses within the estuary will not significantly impact any fauna species or fauna habitats in the area. The desktop assessment identified four Threatened Ecological Communities (TECs) within the assessment area. However, none of them are expected to occur in an aquatic habitat and the biological survey also did not record any TECs in the impact area (AECOM 2022). Based on the above, the proposed clearing is not likely to be at variance to this Principle.
Methodology Bennett et al 2021 Biological Survey (AECOM 2022)

Benthic Habitat Assessment (O2 Metocean 2022)
DBCA shapefiles
EPA (2016, 2020)
Main Roads GIS Shapefiles

(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.

Proposed clearing is not likely to be at variance to this Principle

Comment

The Peel Harvey Estuary is of international and national significance for water birds, including migratory birds overwintering from their northern hemisphere breeding grounds (PHCC 2019). The Peel Harvey Estuary is recognised as an Important Bird Area and listed as a major component of the Peel Yalgorup Ramsar site (PHCC 2019). According to Hale and Butcher (2007), benthic vegetation (seagrass) is restricted to the shallow margins of the Peel Inlet and provides habitat for birds, fish and invertebrates. Potential threats to migratory birds in the Peel Harvey Estuary, Include the loss of foraging and roosting habitat, disturbance on the foraging and roosting sites, degradation of water quality, invasive species, climate change and effects from artificial noise and light (DWER 2020).

A desktop assessment showed records of 45 significant fauna species within the assessment area. These include, 33 species of birds, two species of terrestrial invertebrate, two species of marine mammals, four species of terrestrial mammals, one species of marine reptile and one species of terrestrial reptile. None of the terrestrial fauna species would occur in the impact area due to the absence of land habitat and associated vegetation.

One broad fauna habitat namely, 'Water' was defined and mapped within the impact area.

The biological survey and the benthic habitat assessment did not identify habitats that would be suitable for these significant fauna species. No fauna species of significance were recorded during the biological survey (AECOM 2022) and benthic habitat assessment (O2 Metocean).

During the benthic habitat assessment, data were acquired using a combination of overlapping side scan sonar and drop camera over the impact area and its vicinity. The data collected did not detect any aquatic fauna species or epibenthos and this absence was attributed to the occurrence of coarse sediments as well as the strong influence of currents through the Mandurah channel. The benthic survey also showed that bare sediment dominated the substrate thereby preventing the establishment of attaching sessile organisms. This investigation further indicated that the MEBD proposal will cause minimal loss of benthic habitats within the Mandurah estuary (O2 Metocean 2022).

Duplication of the existing Mandurah bridge will cover a small footprint of up to 0.42 ha, within the estuary. Findings from the benthic habitat assessment showed that a total of 0.12 ha of benthic vegetation (seagrass) was recorded in the impact area. Impacts to these small patches of benthic vegetation, are not likely to have any significant impact on the ecosystem of the Mandurah estuary.

It is important to note that no migratory birds were recorded within the impact area, and none are expected to occur due to a lack of suitable habitat (AECOM 2022). Indeed, the absence of benthic communities within the impact area indicate that the habitat does not have the necessary characteristics to provide feeding grounds for migratory bird species. Migratory birds are expected to fly over the area but would not be impacted by construction works as these species are not utilising the impact area and its immediate vicinity for feeding, breeding or shelter.

One individual of the loggerhead turtle (*Caretta caretta*, Endangered) was identified in the desktop assessment as being previously recorded within the assessment area. This record dates back to 2002 and is located 1.7 km north of the impact area at Halls Head, which is closer to the mouth of the estuary. It is important to note that the loggerhead turtle feeds on bottom dwelling invertebrates such as shellfish, crabs, sea urchins and jellyfish, none of which were observed during the benthic habitat survey. The estuary floor was described as being dominated by coarse sediments with loose and unstable sand that

did not provide a good substrate for attaching organisms. Moreover, as outlined in Section 5, the average salinity of the locality of the impact area, is slightly less than marine conditions because of freshwater inflow from the Murray and Serpentine rivers (DWER 2020). Consequently, the available habitat within the impact area would not support marine bottom dwelling invertebrates, as evidenced by the data obtained during benthic survey. The loggerhead turtle is therefore not expected to occur in the proposal footprint due to a lack of suitable food sources and shelter. Furthermore, no evidence of its presence was detected by the drop camera used to survey the impact area and its vicinity.

Historic records of the Pouched Lamprey (*Geotria australis*, P3) were noted at Halls Head, 1.7 km from the impact area. This species is migratory, spending its juvenile period in freshwater rivers, but moving to the ocean as an adult and returning to freshwater to spawn. The Pouched Lamprey is likely to pass through the proposal footprint during its migration but is not expected to inhabit this locality due to a lack of adequate food sources.

The Peel-Harvey estuary is known to support a resident population of Bottlenose dolphins. During the construction of the existing Mandurah bridge, it was noted that the dolphins inhabiting the Mandurah Channel moved to another location while the piers were being constructed and reappeared once the works were completed (Nicholson K, Murdoch University, pers. Comm to AECOM). It is anticipated that the dolphins will adopt the same behaviour while pile-driving activities are conducted for the bridge construction. Nonetheless, a fauna spotter will be present during construction works to ensure that the dolphins are not present within the pile-driving areas during construction of the piers.

An aquatic fauna management plan that includes impacts of underwater noise and vibration to species in the area, will be prepared for the proposal. Management measures will be addressed in the project specific EMP and will include soft-start piling procedures and stop-work procedures to minimise potential impacts to fauna species.

Impacts to the seagrass community within the impact area is not expected to have any significant impacts on fauna species of significance or fauna habitats.

Based on the above, the proposed clearing is not likely to be at variance to this Principle.

Methodology

Biological Survey (AECOM 2022)
Benthic Habitat Assessment (O2 Metocean 2022)
DBCA Shapefiles
DBCA website
DWER report (DWER 2020)
EPA (2016, 2020)
Hale and Butcher (2007)
Peel-harvey Catchment Council (PHCC 2019)

(c) Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, threatened flora.

Proposal is not at variance to this Principle

Comment

The desktop assessment did not identify any Threatened flora species within 5 km of the impact area.

In addition, no Threatened flora species occur in the waters of the Mandurah estuary, and none were recorded during the detailed flora and vegetation survey undertaken in September 2021 (AECOM 2022).

Based on the above, the proposed clearing is not at variance to this Principle.

Methodology

Biological Survey (AECOM 2022) DBCA shapefiles EPA (2016) Florabase (Accessed 7/10/2022)

(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.

Proposed clearing is not at variance to this Principle
Comment The desktop assessment identified four Threatened Ecological Communities (TECs) within the assessment area. However, none of them occur within an aquatic habitat. The biological survey did not identify any TECs in the impact area (AECOM 2022). Based on the above, the proposed clearing is not at variance to this Principle.
Methodology Biological Survey (AECOM 2022) DBCA shapefiles EPA (2016)

(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.

Proposed clearing is not at variance to this Principle
Comment The EPA recognises the Perth Metropolitan Region as a constrained area, which provides for the reduction of vegetation complexes to a minimum of 10% of the pre-European extent (EPA 2006). The only native vegetation occurring within the impact area corresponds to a seagrass community which is aquatic. Consequently, the native vegetation of the impact area is not representative of any pre-European vegetation associations (Beard et al 2013) or vegetation complexes (Heddle et al 1980). Based on the above the proposed clearing is not at variance to this Principle.
Methodology Aerial photography Beard et al 2013 Biological Survey (AECOM 2022) EPA (2006) Government of Western Australia (2019) Heddle at al 1980

(f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.

Proposed clearing is at variance to this Principle
Comment Findings from the benthic habitat assessment showed that a total of 34.85 ha of the Mandurah estuary was surveyed, out of which 6.76 ha supported a seagrass community which was dominated by *Ruppia megacarpa* (O2 Metocean 2022). A lack of other significant macroalgae was noted (O2 Metocean 2022).

Mapping data showed that a total of 0.12 ha will be removed for the construction of work platforms. The area proposed to be cleared represents 1.77% of the total seagrass community mapped within, and in the locality of, the impact area (O2 Metocean 2022). The level of this impact is not expected to be significant as it will not cause a detectable decline in the abundance of seagrasses in that area This impact is not considered to be significant as post-construction recolonisation of seagrasses from surrounding benthic vegetation is anticipated, to some extent. It should be noted that the MEBD proposal will not fragment continuous seagrass meadows but will instead affect the edges of two patches of seagrasses along the southern section of the existing Mandurah bridge (Figure 1). Based on available data, impacts to the benthic vegetation within the Mandurah estuary is not expected to be significant. Indeed, the recent Mandurah estuary investigation reported that the MEBD proposal will cause minimal loss to benthic habitats (O2 Metocean 2022).

Management actions to mitigate the impacts of sedimentation, siltation and turbidity during construction will be addressed in the EMP. These measures are intended to prevent smothering of benthic vegetation and riparian vegetation downstream of the impact area. As an example, during construction, measures such as an incremental launch of the bridge super structure from the abutments and the use of silt curtains during the installation of in-water piers will be undertaken to minimise disturbance to the estuary. Furthermore, monitoring of the water and sediment quality of the estuary will be conducted. Pre-construction water quality and sediment quality testing are currently being undertaken over a 12 month period, in order to capture seasonal variation in river flow volumes. Subsequent water and sediment quality monitoring upstream and downstream of the impact area will be conducted to identify any deterioration and take appropriate corrective actions. These measures will ensure that construction works will not have any significant impacts on the environmental values of the locality.

The MEBD proposal is not expected to increase the salinity or levels of pollutants and nutrients such as total nitrogen and phosphorus in the Peel Inlet. Consequently, construction of the new Mandurah bridge is not expected to have a significant impact on the seagrass community occurring in that area.

Based on the above, the proposed clearing is at variance to this Principle as 0.12 ha of benthic vegetation will be impacted for the MEBD proposal.

Methodology

Benthic Habitat Assessment (O2 Metocean 2022)
Biological Survey (AECOM 2022)
DWER and DBCA shapefiles
Peel-harvey Catchment Council (PHCC 2009)
Waterways Assessment (BG&E 2022)

(g) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

Proposed clearing is not at variance to this Principle

Comment

The impact area and its locality within the Mandurah estuary exhibits a low risk of flooding (<3% of map unit has a moderate to high flood risk). Clearing of the small patch of seagrass on the Mandurah channel floor is not likely to exacerbate the risk of flooding and erosion in the area. Consequently, no adjacent land deterioration is expected to occur.

The SLIP/ASRIS database indicated that the area is classified as High risk of acid sulfate soils (ASS). A Preliminary Site Investigation (PSI) conducted by Senversa reported that the ASS risk mapping for most the impact area is high to moderate in the top 3 m of natural soil surface (Senversa 2022). The geotechnical investigation undertaken for the MEBD proposal also identified the presence of potential ASS (PASS) in the soil and sediment beneath the impact area (WSP 2022). Measures to manage ASS will be addressed in the

EMP. If excavation of ASS is likely to exceed 100 m^3, an ASS Management Plan will be prepared in accordance with the 'Treatment and Management of soil and water in acid sulfate soil landscapes guideline' and submitted to DWER for approval prior to the commencement of site works.

Based on the above the proposed clearing is not at variance to this Principle.

Methodology
DAFWA shapefiles
Senversa PSI (Senversa 2022)
Geotechnical Investigations (WSP 2022)

(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.

Proposed clearing is not likely to be at variance to this Principle

Comment
A search of ArcGIS shapefiles indicates that the impact area intersects the Peel-Yalgorup wetland system which is classified as a 'Wetland of International Importance' under the Ramsar Convention.

However, the proposed works are unlikely to significantly impact the environmental values of the Ramsar site for the following reasons:

- No areas of wetland will be destroyed or substantially modified. The MEBD proposal will occupy a total area of 0.42 ha within the estuary and any disturbance for the bridge works will be confined to a maximum area of 2 m around each pier and the area of the working platforms. Impacts to 0.12 ha of seagrasses will not significantly affect the environmental values of the Peel-Yalgorup wetland system as no benthic communities, epibenthos or other aquatic fauna species were recorded during the benthic habitat assessment (O2 Metocean 2022).
- Indirect impacts in the form of smothering of aquatic and terrestrial vegetation by increased sedimentation will be prevented through the use of silt curtains, removal of sediments and monitoring exercises. In addition, water quality and sediment quality testing will be conducted upstream and downstream of the impact area in order to identify any deterioration and take appropriate corrective actions. These measures will ensure that construction works will not have any significant impacts on the Peel-Yalgorup wetland system.
- Dewatering will be localised and of a short duration. This activity is not expected to impact the neighbouring Subtropical and Temperate Coastal Saltmarsh TEC and will be conducted in accordance with the conditions of a groundwater licence from DWER. A licence under the *Waterways and Conservation Act 1976* will also be required for works within the Mandurah estuary. Construction of piers within the estuary will therefore comply with the conditions that will be stipulated in the licence. Furthermore, methods to reduce dewatering requirements will be explored by contractors.
- A waterways assessment of the area showed that the construction of the new piers will not cause any substantial alteration in flow regime or velocities, and hence the overall sediment deposition and erosion regime of the Mandurah channel is expected to be unaltered by the proposed bridge (BG&E 2022). Indeed, modelling indicated that the proposed bridge piers and piles will be subject to the same velocities and shear forces and as such, similar local scour depths would be expected around the proposed piers (BG&E 2022).

Based on the above the proposed clearing is not likely to be at variance to this Principle.

Methodology
DBCA shapefiles
EPA (2016)
Benthic Habitat Assessment (O2 Metocean 2022)
Waterways assessment (BG&E 2022)

(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.

Proposed clearing may be at variance to this Principle
Comment The impact area intersects the Mandurah estuary but does not occur within a Proclaimed Surface Water Area or Public Drinking Water Source Area. The seagrass community is part of the Peel- Yalgorup wetland system, which is part of the surface water systems in the area. Clearing may result in short term elevated levels of turbidity or siltation which has the potential to impact the surface water quality. Potential impacts, including surface water runoff and erosion of sediments into the Mandurah estuary will be managed during construction through the EMP. Due to the limited extent of clearing and the temporary nature of the works, changes to the water quality are expected to be localised and temporary and will not lead to long term degradation of the surface water. Based on the above the proposed clearing may be at variance to this Principle.
Methodology Biological survey (AECOM 2022) DWER and DBCA shapefiles

(j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

Proposed clearing is not at variance to this Principle
Comment The MEBD proposal will involve impacts to 0.12 ha of a seagrass community on the floor of the Mandurah channel. It is highly unlikely that the loss of this small patch of seagrass will cause or exacerbate the incidence or intensity of flooding on the banks of the Mandurah estuary. Based on the above the proposed clearing is not at variance to this Principle.
Methodology Biological survey (AECOM 2022) DAFWA shapefiles

7 ADDITIONAL ACTIONS REQUIRED

Table 5 summarises what further pre-clearing impact assessment and vegetation management is required in accordance with CPS 818.

Table 5. Summary of Additional Management Actions Required by CPS 818

Impact of Clearing	Yes/No or NA	*Further Action Required*
1. The CAR indicates that the clearing is 'At Variance' or 'May be at Variance' with one or more of the Clearing Principles.	**Y**	**1.** Submissions were sought from relevant parties, including the LGA, in accordance with Condition 8 of CPS 818/17, no submissions were received. **2.** A Vegetation Management Plan (VMP) has been completed, refer to Appendix 2.

Impact of Clearing	Yes/No or NA	*Further Action Required*
Where the clearing is at variance or may be at variance to Clearing Principle (f) and no other Clearing Principle, and the area of the proposed clearing is less than 0.5 hectares in size and the Clearing Principle (f) impacts only relate to: (i) a minor non-perennial watercourse(s); (ii) a wetland(s) classed as a multiple use management category wetland(s); and/or (iii) a wetland that is not a defined wetland; the preparation of an Assessment Report, as required by condition 6(e), is not required.		
2. Clearing is at variance or may be at variance with Clearing Principle (g) land degradation, (i) surface or underground water quality or (j) the incidence of flooding.	**Y**	Main Roads has received an approval of the VMP from DWER in accordance with 7(j) of CPS 818/17.
3. The project involves clearing for temporary works (as defined by CPS 818).	**N**	No further action required.
4 a. Project is within Region that: - Has rainfall greater than 400mm and - Is South of the 26th parallel and - Works are in 'Other than dry conditions' and - Works have potential for **uninfested** areas to be impacted	**N**	The NRM WA Dieback mapping tool has no records of dieback occurrence in the area. Due to the clearing being limited to submerged benthic vegetation dieback is not considered an issue. Standard Vehicle and Plant management actions (PEMR's and Vehicle and Plant Hygiene Checklists) will be included in the EMP.
4b. Does the proposed works require clearing within or adjacent to DBCA estate in non-dry conditions?	**N**	No further action required.
5. Main Roads has been notified by DWER or an environmental specialist that the area to be cleared is susceptible to a pathogen other than dieback	**N**	No further action required.

Impact of Clearing	Yes/No or NA	*Further Action Required*
6. The vegetation within the area to be cleared and/or the surrounding vegetation in a good or better condition and weeds likely to spread to and result in environmental harm to adjacent areas of native vegetation that are in good or better condition	**N**	No further action required.

8 STAKEHOLDER CONSULTATION

Main Roads has conducted extensive formal and informal stakeholder consultation in relation to the Project. In fact, early engagement has been undertaken with key stakeholders such as City of Mandurah, Traditional Owners and Peel Development Commission. Frequent visits to Mandurah were also conducted to identify project constraints that will influence the classification of negotiables and non-negotiable features of the MEBD proposal. In that context, a comprehensive list of key stakeholder requirements (over 100, including design requirements, assessment criteria and opportunities) have been determined through stakeholder meetings and an issues/constraints workshop. The feedbacks continue to be reviewed during project development with a view to mitigate potential issues and to inform the Scope of Works and Technical Criteria.

The following table identifies stakeholders who have had input to date or will have an interest throughout the project lifetime. The design and construction contractor will add to this list as the project progresses.

Table 5. Summary of Stakeholder Consultation

Group	Stakeholder	Relevance to Project	Level of engagement
State Government	• Minister for Transport, Hon Rita Saffioti • Director General Transport, Peter Woronzow	Funding contributor	Approval of communication material Individual briefings as required, or on request.
Federal Government	• Supported by Federal Labour government. • Funding approved by previous Federal Liberal government	Funding contributor	Approval of communication material
Federal Local Member	• Andrew Hastie (Lib) Canning	Local representative	Individual briefings as required, or on request.
State Local Member	• Lisa Munday (Lab) Dawesville • David Templeman (Lab) Mandurah	Local representative	Individual briefings as required, or on request.
Government Agencies	• Office of Environmental Protection Authority • Public Transport Authority (PTA) • Department of Aboriginal Affairs • Department of Transport (Urban Mobility / Maritime) • Department of Biodiversity, Conservation and Attractions • Department of Planning, Lands and Heritage • Department of Water and Environmental Regulation • Department of the Environment and Energy (DoTEE (Federal)) • Office of the Government Architect • State Heritage Office • Fisheries WA	Portfolio partners PSP networks Interface with state planning Responsibility for environmental issues Service providers Emergency services Bus network	Inform, consult, involve, collaborate Regular meetings with technical officers

Group	Stakeholder	Relevance to Project	Level of engagement
	• Tourism WA • West Australian Planning Commission • Peel Development Commission • Department of Parks and Wildlife	Project approvals	
Local Government Authority	• City of Mandurah	Collaboration and engagement required to ensure interface with planned local road projects meets local needs. Owners of some assets	Inform, consult, involve, collaborate Regular meetings with technical officers. Council briefings at key milestones, and on request.
Indigenous	• Nidjalla Waanga Mia • Winjan Aboriginal Corporation • Bindjareb (Pinjarup) Noongar representatives • Local Aboriginal businesses	Interest in preserving heritage sites and environment. Employment, contract work,	Inform, consult, involve, collaborate Keep informed Project approvals / consent Monitoring of works as per approval conditions
Environment Groups	• Peel Harvey Catchment Council • Friends of Samphire Cove • Conservation Council of WA • Friends of Samphire Cove • Peel Preservation Group • Mandurah Environment and Heritage Group • Estuary Guardians • Birdlife • Birds Australia • The Nature Conservancy Australia	Groups active within project LGA	Inform, consult, involve Add to subscriber lists General community awareness Project briefings as required Engagement on specific design aspects (fishing platform, cycleway etc)
Emergency Services	• St John Ambulance • Department of Fire and Emergency Services (FESA) • WA Police	Service providers Emergency services	Inform, consult, involve, collaborate
Utility Service Providers	• ATCO Gas • Alinta Energy • Telstra • Water Corporation • Western Power		Inform, consult, involve, collaborate

Group	Stakeholder	Relevance to Project	Level of engagement
	• Telcos / Service Providers (e.g. NBN,Optus, AARNET)		
Property Owners / Residents	• Local landowner/occupiers • Tenants		
Developers	• Mirvac		
Businesses	• Local businesses		
Special Interest, Community & Business Groups	• Westcycle • Fishability Group (Mandurah) • Peel Regional Leaders Forum • Peel Development Commission • Peel Chamber of Commerce and Industry • Mandurah and Peel Tourism Organisation • Fishers with Disabilities Association • RecfishWest • Mandurah Licenced Fisherman's Association • Mandurah Communities page – Facebook Group • Mandurah Notice Board - Facebook group • Our Dawesville Community - Facebook Group • South West Community Notice Board - Facebook Group • Visit Mandurah • Mandurah Over 55 Cycle Club • Winjan Rangers	Groups active within project LGA	Inform, consult Add to subscriber lists General community awareness Project briefings as required Engagement on specific design aspects (fishing platform, cycleway etc)
Estuary Users	• Boating WA • Unmotorised Paddlecraft membership groups • Mandurah Licensed Fisherman's Association • Mandurah Off-shore Fishing and Sailing Club • Blue Lighting Charters • Port Bouvard Charters • Mandurah Over 55 Kayak Club • Mandurah Vikings Dragon Boat Club • Rowing WA • Various businesses, clubs and societies	Groups active within project LGA	Inform, consult
Cyclist Groups	• WestCycle • Local groups	Groups active within project LGA	Inform, consult, involve
Media	• West Australian (Perth) • Community Newspaper Group (Mandurah Coastal Times) • Mandurah Mail • Southern Telegraph • GWN	Local, regional and state media outlets	Inform

Group	Stakeholder	Relevance to Project	Level of engagement
Community (suburbs):	• (Adjacent) Dudley Park, Erskine, Bouvard, Halls Head, Dawesville • (Surrounding) Clifton, Coodanup, Falcon, Greenfields, Herron, Lakelands, Madora Bay, Mandurah, Meadow Springs, Parklands, San Remo, Silver Sands and Wannanup.	Manage adjacent works Operational notifications Project is immediately adjacent or directly impacts	Inform, consult, involve Direct mailouts Encourage to subscribe for project updates Door knocking (where applicable) One on one meetings

In addition to ongoing stakeholder consultation, the CAR was published on Main Roads website to invite submissions from the public and other interested parties (including the City of Mandurah and DWER), in accordance with CPS 818 Condition 8. No submissions were received.

Minor amendments to the CAR were submitted to DWER on 8 February 2024. Main Roads received confirmation from DWER on 21 February 2024 that an exemption to seek further stakeholder submissions in accordance with Condition 7(n) was approved. DWER also approved Main Roads' offset exemption request and the amended CAR, including VMP, on the basis that the additional clearing of 0.02 ha of seagrass will not result in any material change to the assessment for the previously approved clearing of 0.1 ha of seagrass for the project.

9 VEGETATION MANAGEMENT

Main Roads will avoid clearing native vegetation where possible. Where clearing cannot be avoided then this clearing is kept to a minimum. A Vegetation Management Plan (VMP) has been developed to manage and minimise vegetation clearing for the project (refer to Appendix 2).

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11 APPENDICES

Appendix	Title
Appendix 1	CPS 818 condition 8 (e) (iii) Biological Surveys and Field Assessment Executive Summary and Report Conclusions
Appendix 2	Vegetation Management Plan

Appendix 1: CPS 818 condition 8 (e) (iii) Biological Surveys and Field Assessment Executive Summary and Report Conclusions

O2 Metocean (2022). Mandurah Estuary Bridge Duplication Project, Benthic Communities and Habitat Assessment. Unpublished report prepared for Main Roads by O2 Metocean, May 2022.

Executive Summary

Main Roads Western Australia is currently responsible for the development and construction of a new two-lane bridge, on the south side of the existing Mandurah Estuary Bridge. This second bridge is to service the increased traffic due to population growth in the region. The project will also include construction of a new shared path to improve connectivity and a universally accessible recreational fishing platform.

As part of this project a benthic habitat investigation was implemented to assess the area around the current existing bridge and the proposed new second bridge location. Data acquired for the investigation includes using a combination of side scan sonar to map the habitats and drop camera / visual verification to ground truth the mapped habitats.

Overlapping side scan sonar data was collected over an area of approximately 31 Ha and this data was analysed and mapped indicating that there was nine different benthic communities and classes in the survey area. Mapped classes and their approximate area coverage that were defined from the survey are defined as below;

- Large dunes (3.27 Ha)
- Small dunes (4.45 Ha)
- Bare Sandy Mud (15.23 Ha)
- Deep Channel (0.70 Ha)
- Mud (1.90 Ha)
- Rubble (0.18 Ha)
- Shallow Sands (2.08 Ha)
- Structure (0.40 Ha)
- Seagrass (6.77 Ha)

The dominant macrophytic community comprised the seagrass, *Ruppia megacarpa* and there was a lack of any other significant macroalgae present. Epibenthos and other fauna species was also lacking in the survey area more than likely due to the coarse sediments and strong influence of currents through the channel. Bare sediment dominated the substrate which prevents the establishment of attaching sessile organisms.

The investigation showed that there will be minimal loss of important benthic habitats due to the construction of the Bridge and associated shared path and fishing platform. Two small areas of current *Ruppia megacarpa* will be directly impacted by the construction of the new bridge (small patches to the SE and SW of the current bridge). This species of seagrass however is noted to be a rapid coloniser and is known to vary greatly over time and may require repeat mapping in the future to ensure map reliability (Bennett et al. 2021). It is possible that the current beds may be transitional beds that will increase or decrease in size over time.

Conclusion

- The BCH of the Mandurah Estuary Bridge area were successfully mapped using a combination of sidescan sonar, multibeam bathymetry, satellite imagery and underwater video.
- A 34.86 Ha was mapped, and largely comprised bare sediment. Coarse sandy sediment dunes were found in the centre of the channel, with finer sediments on the shallower banks and side channels.
- The dominant visible macrophytic community comprised dense stands of *Ruppia megacarpa* dominated seagrass beds, comprising 6.77 Ha of habitat area. Attaching (sessile) organisms such as sponges and ascidians were restricted to hard substrates which are primarily anthropogenic.
- The sidescan sonar survey identified several objects on the seabed which may require further investigation. It should be noted that these items all appear to be relatively small, <0.25 m^3. Due to the strong tidal streams use of drop camera is not recommend, instead diver or ROV investigations should be planned accordingly, with warning of possible burial caused by mobile bed forms.
- Objects associated with magnetic anomalies M1 and M2 identified by WSP Golder could not be detected using tow camera techniques.
- During shoreline investigation, areas of erosion, undercutting and dead trees were identified on the eastern bank, approximately 100 – 150 m south of the existing bridge and north of the canal opening.

Appendix 2: Vegetation Management Plan

MANDURAH ESTUARY BRIDGE DUPLICATION

Purpose and Scope

This Vegetation Management Plan (VMP) has been prepared by Main Roads for the purpose of managing native vegetation clearing impacts associated with the Mandurah Estuary Bridge Duplication project.

The MEBD proposal involves the construction of Bridge 1910 adjacent and to the south of the existing one (Bridge 1085) on Mandurah Road in order to address the bottleneck issue and provide a continuous four lane dual carriageway for road users crossing the Mandurah Estuary. Bridge 1910 will have a similar configuration to Bridge 1085 and will accommodate two 3.5 m wide lanes with wide shoulders to substantially upgrade safety standards. The new bridge will include a Principal Shared Path (PSP) to improve connectivity.

In specified circumstances, Main Roads VMP is required to be approved by Department of Water and Environmental Regulation (DWER) as a condition of Main Roads Statewide Clearing Permit CPS 818.

Action

Appendix 1.1 references the standard Principal Environmental Management Requirements (PEMRs) (Table's 1 to 9) that will be utilised for all projects that involve clearing to avoid, mitigate and manage the environmental impacts of the project.

Project Specific Environmental Management Requirements are contained in Table 1.

Timeframes

Actions shall be undertaken in accordance with those described in the relevant PEMR and the Project Specific Environmental Management Requirements.

Responsibilities

It is the responsibility of the Superintendent's Contract Management Team to ensure that the requirements are implemented by the Contractor. This shall be done by adhering to the Environmental Measurement and Evaluation Checklist.

Appendix 1.1: Vegetation Management

VMP Requirement	Standard Management Action	Specific Management Action
Clearing	Refer to Table 1: Clearing PEMR Specification 204 Environmental Management Construction Environmental Management Plan Specification 301 Vegetation Clearing and Demolition Environment Measurement and Evaluation Checklist (for release of HOLD POINTS) Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Impacts to 0.12 ha of seagrass will be consistent with conditions stipulated by DWER.
Erosion and Sedimentation Control	Refer to Table 3: Erosion and Sedimentation Control PEMR Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	All drainage water will be treated prior to entering the receiving water body. Silt fence will be utilised to prevent over land transport of sediment into the river. Post-construction hard and soft landscaping will be implemented to control erosion and sedimentation.
Fauna	Refer to Table 4: Fauna PEMR Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	An aquatic fauna management plan that also includes impacts of underwater noise and vibration to species in the area, will be prepared for the proposal. Management measures will be addressed in the EMP and will include the presence of fauna spotters, soft-start piling procedures and stop-work procedures.
Machinery and Vehicle Management	Refer to Table 5: Machinery and Vehicle Management PEMR Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable

VMP Requirement	Standard Management Action	Specific Management Action
Mulch and Topsoil Management	Refer to Table 6: Mulch and Topsoil Management Specification 204 Environmental Management Construction Environmental Management Plan Specification 301 Vegetation Clearing Specification 304 Revegetation and Landscaping Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Pegging and Flagging	Refer to Table 7: Pegging and Flagging PEMR Specification 204 Environmental Management Construction Environmental Management Plan Specification 301 Vegetation Clearing and Demolition Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Water Drainage Management	Refer to Table 8: Water Drainage PEMR Specification 204 Environmental Management Construction Environmental Management Plan	All drainage water will be treated prior to entering the receiving water body.
Weed Management	Refer to Table 9: Weed Management PEMR Specification 204 Environmental Management Construction Environmental Management Plan Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	Not Applicable
Monitoring	Specification 204 Environmental Management Construction Environmental Management Plan	

VMP Requirement	Standard Management Action	Specific Management Action
	Superintendent's Contract Management Plan & Environmental Measurement and Evaluation Checklist. Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	
Auditing	Specification 204 Environmental Management Superintendent's Contract Management Plan & Environmental Measurement and Evaluation Checklist. Contract Tender Documents available at https://www.mainroads.wa.gov.au/technical-commercial/tender-preparation/	

Principal Environmental Management Requirements (PEMR's)

Table 1: Clearing PEMR

STANDARD MANAGEMENT ACTIONS

STANDARD MANAGEMENT REQUIREMENTS
PRE WORKS 1. The Contractor must prepare, implement and maintain processes to ensure that the movement of all vehicles, plant and machinery does not occur outside of the Limits of Vegetation Clearing. This must include all turnaround areas. 2. The Contractor must minimise vegetation clearing and the area of disturbance on ground by utilising existing cleared area where possible.
DURING WORKS 1. The Contractor must report any damage to vegetation beyond the Limits of Vegetation Clearing as an Environment Incident. 2. The Contractor must ensure Movements are confined to the Limits of Vegetation Clearing during the works 3. The Contractor must undertake the clearing in accordance with the Fauna PEMR.
POST WORKS 1. NIL

Table 2: Erosion and Sedimentation

PRE WORKS

1. The Contractor must develop, implement and maintain processes and procedures to ensure that:
   - The Contractor is responsive to and addresses incidents of erosion and sedimentation within and adjacent to the work areas.
   - Prevent water and wind soil erosion within and adjacent to the works areas.
   - Prevent the sedimentation and siltation of watercourses located within and adjacent to the works area.
   - Ensure that sedimentation and siltation of drainage lines due to the removal of riparian vegetation is avoided, minimised and mitigated.
   - Ensure that loose surfaces and recently cleared areas are protected from wind and soil erosion.
   - Minimise exposed soil working surfaces or protect them from stormwater erosion.
   - Ensure material such as gravel, crushed rock and excavated material is stockpiled away from drainage paths and covered to prevent erosion.
   - Ensure that water quality monitoring is undertaken when turbidity and sedimentation is an issue.

DURING WORKS

1. Implement, monitor and adhere to the sedimentation and erosion processes developed to address the requirements in the pre-works.

POST WORKS

1. If required, the Contractor must continue to monitor water quality until the turbidity/sedimentation dissipates.
2. The Contractor must ensure that disturbed areas are stabilised as soon as is practicable after construction activities are completed.

Table 3: Fauna

PRE WORKS

1. The Contractor must ensure that fauna management requirements are communicated to the crew undertaking the clearing works during the induction and pre-start meeting.
2. Where active nests, burrows or dens are identified, works must not proceed until the Contractor obtains the Superintendents approval of the management of active nests, burrows or dens adheres to the Superintendents advice.

DURING WORKS

1. The Contractor must undertake the clearing and water works in a manner to allow fauna to move out of the impact area. Fauna spotters to be present during works in the estuary to ensure that aquatic fauna such as dolphins are not located within or in the immediate vicinity of the work area.
2. The Contractor must ensure that all onsite personnel undertake visual monitoring and are vigilant to the presence of fauna. Any sightings of fauna, including injury or fatality, must be reported as an Environmental Incident.
3. The Contractor must ensure that;
   i. No pets, traps or firearms are brought into the impact area.
   ii. Fauna are not fed
   iii. Fauna are not intentionally harmed or killed
   iv. Fauna that venture into the work area are encouraged to leave in a manner that does not harm the animal or operator (loud noise, slowly approaching in a vehicle etc.)
4. The Contractor must ensure that in the event that sick, injured or orphaned native wildlife are located on the project site, the WILDCARE Helpline ((08) 9474 9055) will be contacted for assistance. The Contractor must maintain records of any animal taken to a wildlife carer.

POST WORKS

1. The Contractor must provide any records of fauna impact to the Superintendent.

Table 4: Machinery and Vehicle Management

PRE WORKS

1. The Contractor must ensure that all areas associated with the storage, parking, servicing, wash down and refuelling of all vehicles, plant and machinery is located within the Limits of Clearing and approved by the Superintendent.
2. The Contractor must ensure that all vehicles, machinery and plant are clean on entry (i.e. free of all soil and vegetation material) and comply with the requirements of 204.B.32.
3. The Contractor must ensure that vehicle servicing and refuelling will be undertaken at designated areas approved by the Superintendent.
4. The Contractor must ensure that all staff suitably qualified and competent to undertake works, especially refuelling activities.

DURING WORKS

1. The Contractor must maintain records of checking all vehicles, machinery and plant are clean on entry.

POST WORKS

Table 5: Mulch and Topsoil Management

PRE WORKS

1. The Contractor must ensure that the movement of soil and vegetation is only undertaken in dry conditions unless otherwise approved and / or directed by the Superintendent.
2. The Contractor must ensure that poor quality topsoil and mulched vegetation does not contaminate the good quality topsoil and vegetation.

DURING WORKS

1. The Contractor must ensure that all machinery used in the removal of weed-infested topsoil must be cleaned down before and between operations to prevent the introduction and spread of weeds.
2. The Contractor must ensure the movement of large equipment over topsoil materials is avoided to minimise compaction.
3. The Contractor must ensure that Dieback and weed infected topsoil and mulch vegetation must be handled separately to minimise the risk of spreading dieback and weed species across the site and stockpiles.
4. The Contractor must ensure that stockpiling operations must occur in a manner to ensure that the properties of the topsoil are not degraded and the topsoil made unsuitable for use in revegetation.

POST WORKS

Table 6: Water Drainage

PRE WORKS

1. Use pollution control and containment strategies for project activities in Public Drinking Water Source Areas (PDWSAs) / Underground Water Pollution Control Areas (UWPCAs) and liaise with the DWER where necessary

DURING WORKS

1. Existing natural drainage paths and channels along the road or the vicinity of the impact area will not be unnecessarily blocked or restricted.
2. Temporary drainage systems may be installed to carry surface water away from the areas where excavation and foundation construction work is taking place or from any other area where the accumulation of water could cause delay or damage to the work.
3. Maintain these drainage systems in proper working order at all times.
4. Runoff from disturbed areas must be managed to minimise adverse impacts on surrounding vegetation, watercourses and properties.
5. Booms and silt fences must be used when working over or adjacent to areas of surface water in order to protect the quality of surface water from construction impacts.

POST WORKS

1. Water quality monitoring to be undertaken (if turbidity/ sedimentation is an issue).
2. Prior to backfilling the completed pipe work certify that the entire system is flushed clean and tested
3. Disturbed areas will be stabilised soon after construction activities are completed.
4. Culvert and drainage structures will be free of all grass, weeds, silt and debris

Table 8: Weed Management

PRE WORKS

1. The Contractor must remove or kill any weeds growing in the vicinity of the impact area that are likely to spread and result in environmental harm to adjacent areas of native vegetation that are in good or better condition.
2. The Contractor must develop, implement and maintain procedures to identify and control declared and invasive weed species within the Contract areas, to the satisfaction of the Superintendent.
3. The Contractor must prepare a weed control program, for nominated weed species for control and disposal, to the satisfaction of the Superintendent.
4. The Contractor must undertake weed management in Stockpiles as directed by the Superintendent.

DURING WORKS

1. The Contractor must implement the weed control procedures and management plan and record and manage records of its implementation.
2. The Contractor must treat nominated weed infestations as many times as necessary to control and eradicate the weed species in accordance with the approved weed control program
3. The contractor must ensure that no known weed, pest or diseased affected soil, mulch, fill or other material is brought into the Site.

POST WORKS

1. The relevant Vegetation Maintenance Record Sheets available at: https://www.mainroads.wa.gov.au/BuildingRoads/Contracting/Pages/ReportingForms.aspx must be completed and sent to the Superintendent.