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| **Benthic Communities and Habitat** - To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained. | Environmental Factor Guideline – Benthic Communities and Habitats (EPA 2016a).<br>Statement of Environmental Principles, Factors and Objectives (EPA 2020).<br>*Environmental Protection Act 1986.* | Previous surveys in the Fremantle Harbour have indicated that the Inner Harbour has a low level of benthic habitat and communities. This is due to the historical disturbance of the area in its use as an active port and episodic dredging. Fremantle Ports regularly maintains the dredged depth of the harbour through raking and therefore it is unlikely that any benthic habitat occurs downstream of the Development Envelope.<br>A recent survey by RPS (Attachment 8) found that seabed habitat in the RPS study area was either dominated by coarse sands, or exposed hard substrate (rock and substrates of anthropogenic origin) beneath the bridges and jetty. This difference in dominant habitat type is generally indicative of the direct effect of anthropogenic structures (e.g. bridges, jetties, concrete slabs and wreckage) or their effects on local hydrodynamics, causing scouring/erosion of soft substrates and exposing underlying rock (historic disturbance). These aspects highlight that the study area is not pristine and is affected by human activities and waste (including discarded materials and wreckage).<br>Invertebrate assemblages and macroalgae were common across the study area, particularly on hard substrates. The high relative abundance of filter feeders emphasises the dynamic nature of the hydrodynamic conditions. The dynamic environment also indicates that the benthic assemblages are likely to recover relatively quickly due to colonisation of new hard substrate by pelagic larval stages. Bioturbation of soft sediments was also commonly recorded, mostly due to the feeding or digging/ burrowing actions of motile benthic fauna and demersal species (e.g. fish).<br>No seagrass beds were recorded, though the occasional seagrass frond was recorded.<br>The invasive Australian mud whelk (*Batillaria australis*) was recorded in a single location. No other species of local or regional significance were identified during the RPS survey. | • Direct loss of benthic habitat by removal of the FTB and by sediment excavation during construction.<br>• Smothering of benthic habitat through sedimentation caused by disturbance of river sediments.<br>• Toxicological impacts on organisms within the benthic habitat due to the mobilisation of pollutants in river sediments. | • The mitigation hierarchy of avoid and minimise will be used to reduce any significant residual impact to as low as practicable.<br>• The Disturbance Footprint has been reduced as far as reasonably practicable in the portion within the Swan River through realignment of the Fremantle Traffic Bridge (FTB).<br>• Existing piers on the FTB will be cut down, rather than pulled out, in order to minimise sediment disturbance.<br>• Main Roads will examine opportunities to create habitat for benthic communities as part of the bridge construction works. DBCA Rivers and Estuaries Division noted that the piers of the new bridges could be used to create habitat. Further investigations will be undertaken to determine if this is feasible. | • DBCA permits under the *Swan and Canning Rivers Management Act 2006* have been obtained to undertake investigative works within the Development Control Area (DCA).<br>• Development Approval will be obtained through the WA Planning Commission (WAPC), via the State Development Assessment Unit (SDAU), under Part 17 of the *Planning and Development Act 2005*. In addition to the public comment period of six weeks, the development application will be referred to external agencies and landowners for comment, including:<br>• Fremantle Ports<br>• DBCA<br>• City of Fremantle (CoF)<br>• Department of Planning, Lands and Heritage (DPLH)<br>• Public Transport Authority (PTA)<br>• Department of Transport (DoT)<br>• Development Approval will be obtained through Fremantle Ports for works within Port lands and waters. | • Impacts are not expected to be significant to benthic habitats due to the lack of significant or extensive benthic habitat within the Development Envelope.<br>• Impacts from bridge construction and demolition will not cause any more sedimentation than the periodic raking that occurs within the harbour or the high volume of shipping movements within the vicinity of the Development Envelope.<br>• Due to past activities within the Development Envelope, including dredging, Port activities, recreational use and existing infrastructure, it is considered unlikely that any significant benthic communities or habitat occurs within the Development Envelope.<br>• Any benthic habitats or communities that may be temporarily disturbed during implementation of the Proposal would be expected to recolonise following completion of the works.<br>• Any impact on sea grass benthic habitat will be less than 250 $m^2$ (<1% of the Development Envelope within the Swan River). | The EPA's objectives for this factor can be met, as there is unlikely to be any permanent impact on significant benthic communities and/or habitat. |
| **Marine Environmental Quality** - To maintain the quality of water, | Environmental Factor Guideline – Marine Environmental Quality (EPA 2016b) | The area considered for assessment is the waters of the Swan River Estuary, from the Stirling Bridge in Fremantle to the boundary of the Fremantle Harbour, downstream of the rail bridge. This is described as part of the Lower Swan Estuary. | • Reduced water quality due to mobilisation of sediments and/or sediment excavations, | • Water quality monitoring during construction will be conducted.<br>• Existing piers on the FTB will be cut down, rather than pulled out, in order to minimise sediment disturbance. | • DBCA permits under the *Swan and Canning Rivers Management Act* | • Impacts on marine environmental quality during construction will be minimal and can be appropriately | The EPA's objectives for this factor can be met, as there is |

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| sediment and biota so that environmental values are protected. | Statement of Environmental Principles, Factors and Objectives (EPA 2020).<br>*Environmental Protection Act 1986.*<br>*Swan and Canning Rivers Management Act 2006* | Water quality in the Development Envelope is influenced by both the marine environment and, to a lesser extent, by freshwater river flows in winter. The Lower Swan Estuary has a strong tidal influence and is largely composed of marine and saline waters.<br>The low-nutrient marine waters limit algal blooms in the lower estuary during summer. During winter, nutrient rich freshwater is discharged to the ocean as a plume flowing over saline waters. Deeper waters in the lower estuary remain saline even in winter. The ecosystem health of the Lower Swan Estuary is considered to be good, despite large historical disturbance (Swan River Trust 2007).<br>The Swan River in this location has had several potentially contaminating activities that may have impacted the quality of the existing river sediments including:<br>• Fremantle Port operations – Fremantle has been an active harbour since the 19th century<br>• Dredging of Fremantle Harbour<br>• Mooring and operation of private river vessels<br>• Previous industry<br>• Historical crossing infrastructure<br>• Historical in-river works.<br>Only the higher levels of the riverine sediments are expected to contain contaminants from historical uses. Deeper sediments from limestone and sandstone layers were relatively inert.<br>The Swan River within the Development Envelope is mapped as a “high to moderate risk” (risk class 1) of encountering ASS. The southern foreshore (up to Riverside Road) is a “moderate to low” risk of encountering ASS (risk class 2).<br>Surface water quality monitoring completed by RPS (Attachment 15) over the past thirteen months showed consistent water quality for the duration of the monitoring period. Concentrations of all metal and metalloids were below relevant guidelines at all monitoring locations. All hydrocarbon and organochlorine pesticides were below their relevant Limit of Reporting and below the adopted criteria. Minor detections of Per- and Polyfluoroalkyl Substances (PFAS) were identified in all samples.<br>Given the disturbed nature of the site (i.e. usage for historical and current industrial and port activities), this area is not a pristine environment.<br>Results of the recent Preliminary Sediment Contamination and ASS Assessment (Attachment 9) confirmed the absence of gross contamination and confirmed low level anthropogenic impact to sediments and surface waters within the RPS (2021c) study area. The Sediment Sampling Report and Sediment Survey Report are provided in Attachments 11 and 12 respectively. | and potential contaminant release.<br>• Vessel movements have the potential to mobilise sediments when operating in shallow waters during construction, resulting in a reduction in water quality.<br>• Piling driving activities may mobilise small quantities of sediments through the action of hammering the piles or when “mucking out”, leading to localised reduction in water quality. This is the material most likely to contain contaminants including ASS that may pollute the water column during construction. | • Silt curtains will be used where practicable for in-river works to mitigate potential plumes. The use of silt curtains will be limited for this Proposal due to the fast currents in the main river channel.<br>• Visual monitoring for plumes during in-river construction activities will be conducted. A camera will be installed to provide remote real-time surveillance for plumes. DBCA and Fremantle Ports will be provided access to the camera footage. There will also be a spotter on-site looking for plumes. When visible plumes do not rapidly disperse, in-river works will stop until the reason for the plume is identified and remediated in a timely manner.<br>• A vacuum pump will undertake “mucking out” of piles. The first 3-5 m will be retained for disposal off-site (material most likely to contain contaminants including ASS).<br>• An ASS investigation and management plan will be developed and implemented in accordance with DWER’s ASS guidelines.<br>• Sediment transport modelling is being undertaken to understand the existing sediment movement patterns and how they will be affected by the new structures.<br>• Hydrological modelling will ensure there is no adverse flood risk from the Proposal. | *2006* have been obtained to undertake investigative works within the DCA.<br>• Development Approval will be obtained through the WAPC, via the SDAU, under Part 17 of the *Planning and Development Act 2005*. In addition to the public comment period of six weeks, the development application will be referred to external agencies and landowners for comment, including:<br>• Fremantle Ports<br>• DBCA<br>• CoF<br>• DPLH<br>• PTA<br>• DoT.<br>• Development Approval will be obtained through Fremantle Ports for works within Port lands and waters. | controlled to minimise adverse environmental harm.<br>• The hydrology of the Swan River will be maintained throughout construction and operation.<br>• Construction activities may cause temporary sediment suspension in the water column, which may mobilise any existing contaminants present in the sediment. Given that sedimentation and suspension of sediments occurs naturally within the river system at this location (e.g. during high rainfall events when there is increased run-off entering the river, and also due to Fremantle Port’s existing operations), this impact is considered temporary and unlikely to have a significant impact on the marine environmental quality during operations.<br>• Sediment excavations are limited in scale and may only be required to allow access to the northern river foreshore. The amount of material to be excavated is relatively minor and excavation may result in a temporary reduction in river water quality of the immediate area.<br>• No dredging is proposed during construction, sediment disturbance is limited to areas immediately surrounding piling of bridge supports and removal of existing or former infrastructure. Given the minimal level of sediment | unlikely to be any permanent impact on hydrology or water quality during bridge construction or operation. |

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| | | | | | | disturbance proposed, the depth of the water column and the strength of the current through the area it is considered likely that the impact of any sediment disturbance on water quality would be short lived and rapidly diluted by the flow of the river. | |
| **Marine Fauna** - To protect marine fauna so that biological diversity and ecological integrity are maintained. | Environmental Factor Guideline – Marine Fauna (EPA 2016c).<br>Statement of Environmental Principles, Factors and Objectives (EPA 2020).<br>*Environmental Protection Act 1986.*<br>*Swan and Canning Rivers Management Act 2006.* | The Swan River contains a mix of marine and estuarine species at the location of the FTB including turtles, dolphins, swans, seals, crustations, fish, and sharks.<br>SLR Consulting Australia Pty Ltd (SLR, 2021) conducted aquatic noise modelling and an assessment of relevant impacts on marine fauna species a result of the construction activities of the Proposal (Attachment 13). Aquatic sensitive receptors of concern include marine mammals, particularly Swan River Dolphins (i.e., Indo-Pacific bottlenose dolphins), and fish species.<br>The Swan-Canning River system is home to a small resident community of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*), plus juveniles and calves. The spatial and temporal patterns of dolphins' occurrence within the river show that animals are distributed heterogeneously, with the Fremantle Inner Harbour area being identified as a seasonal 'hotspot' strongly lined with dolphin foraging behaviour (Attachment 13). | • Pile driving noise during construction causing change in behaviour of marine mammals (i.e. dolphins), and their ability to communicate with each other.<br>• Pile driving noise during construction causing direct physical trauma in marine mammals, birds and fish.<br>• Vessel movement noise during construction causing change in behaviour of marine mammals (i.e. dolphins).<br>• Reduced water quality and smothering of marine fauna habitat due to contaminant release and mobilisation of sediments caused by pile driving activities during construction. | • Implement the Aquatic Noise Management Plan (Attachment 13).<br>• A trained marine mammal observer (MMO) will be present during pile driving activities. The MMO shall keep a record of all marine mammal sightings in accordance with the Swan River Dolphin Watch program.<br>• Pre-start visual monitoring will be implemented for at least 30 minutes before piling commences using a soft start procedure.<br>• Soft start: if marine mammals have not been observed inside the shut-down zone during the pre-start observations, soft start (6 strikes/min at low impact energy) may commence with piling impact energy gradually increased over a 10-minute period. A soft start will also be used after long breaks of more than 30 minutes in piling activity.<br>• Normal piling procedure will commence if marine mammals have not been observed inside the shut-down or observation zones during the soft start. Visual observations will continue throughout piling activities.<br>• If marine mammals are sighted within the observation zone during the soft start or normal operation piling, the operator of the piling rig will be placed on stand-by to shut down the piling rig, while visual monitoring of the animal continues.<br>• Piling activity will be stopped if a marine mammal is sighted within or are about to enter the shut-down zone. If the animal is observed to move outside the zone again, or 30 minutes have elapsed with no further sightings, piling activities will recommence with the soft start procedure.<br>• Records of procedures employed during piling, including information on any marine mammals sighted, and their reaction to the piling activity, will be maintained. | • DBCA permits under the *Swan and Canning Rivers* DBCA permits under the *Swan and Canning Rivers Management Act 2006* have been obtained to undertake investigative works within the DCA.<br>• Development Approval will be obtained through the WAPC, via the SDAU, under Part 17 of the *Planning and Development Act 2005*. In addition to the public comment period of six weeks, the development application will be referred to external agencies and landowners for comment, including:<br>• Fremantle Ports<br>• DBCA<br>• CoF<br>• DPLH<br>• PTA<br>• DoT.<br>• Development Approval will be obtained through Fremantle Ports for works within Port lands and waters. | • Proposed mitigation measures including MMO's, soft start procedures for piling and marine fauna exclusion zones, which have worked successfully for other major Swan River projects, will minimise the possibility of harm to marine mammals.<br>• Vessel movements have much lower noise emissions, and their characteristics are continuous in nature. The noise emissions from supporting vessel activities under the full-load operation conditions generally occur under their full travel speeds which are not expected to take place curing construction. The emission levels from vessel operations are expected to be comparable to noise emissions from the existing vessel traffic (SLR 2021). The extent of potential impact from vessel operations are not significant.<br>• There is limited benthic habitat in the form of seagrass within or adjacent to the Development Envelope that may be impacted by the Proposal. | The EPA's objectives for this factor can be met as bridge construction and demolition is unlikely to significantly impact marine fauna within the Swan River. |

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| | | | | • Pile driving noise management and mitigation measures will be included in the relevant contract documentation.<br>• Mitigation for reduced water quality and smothering of marine fauna habitat is addressed under *Benthic Communities* and *Habitats, and Marine Environmental Quality*. | | | |
| **Inland Waters** - To maintain the quality of groundwater and surface water so that environmental values are protected. | Environmental Factor Guideline- Inland Waters Environmental Quality (EPA, 2016d)<br>Statement of Environmental Principles, Factors and Objectives (EPA, 2020).<br>*Environmental Protection Act 1986.* | There is a significant overlap between the Inland Waters environmental factor and the Marine Environmental Quality environmental factor. This is due to the Proposal's proximity to the mouth of the Swan River.<br>The area considered for assessment is the waters of the Swan River Estuary, from the Stirling Bridge in Fremantle to the boundary of the Fremantle Harbour, downstream of the rail bridge. This is described as part of the Lower Swan Estuary. The Swan River Estuary is classified as an Estuary-Waterbody and a Conservation Category Wetland.<br>Water quality in the Development Envelope is influenced by both the marine environment and to a lesser extent by freshwater river flows in winter. The Lower Swan Estuary has a strong tidal influence and is largely composed of marine and saline waters.<br>The low-nutrient marine waters limit algal blooms in the lower estuary during summer. During winter, nutrient rich freshwater is discharged to the ocean as a plume flowing over saline waters. Deeper waters in the lower estuary remain saline even in winter.<br>The ecosystem health of the Lower Swan Estuary is considered to be good, despite large historical disturbance (SRT, 2007).<br>The Swan River in this location has had a number of potentially contaminating activities that may have impacted the quality of the existing river sediments including:<br>• Port operations – Fremantle has been an active harbour since the 19th century.<br>• Dredging of Fremantle Harbour.<br>• Mooring and operation of private river vessels.<br>• Previous industry.<br>• Historical crossing infrastructure.<br>• Historical in-river works.<br>Only the higher levels of the riverine sediments are expected to contain contaminants from historical uses.<br>The Swan River within the Development Envelope is mapped as a "high to moderate risk" (risk class 1) of encountering ASS. The southern foreshore (up to Riverside Road) is a "moderate to low" risk of encountering ASS (risk class 2).<br>Depth to groundwater within the Development Envelope varies with the ground topography. The groundwater level throughout the project area is 0-1 mAHD. Groundwater is likely to be saline due to saltwater intrusion to the surficial aquifer. However, this may still be suitable for construction purposes, but it is unlikely to be suitable for irrigation.<br>Groundwater to the north of the river has the potential to be contaminated by historical land uses. Several sites are listed | • The Proposal has the potential to result in minor temporary impacts to water quality the hydrological regime and aquatic fauna.<br>• Temporary, short-term impacts on the Swan River Reserve may occur during the construction phase, including:<br>• increased turbidity and sediment resuspension from piling, demolition, excavation and other works in the river that may create sediment plumes (and potentially mobilise contaminants within these plumes)<br>• hydrocarbon spills due to project activities<br>• impacts to aquatic fauna, due to benthic habitat modifications, increased turbidity, mobilised contaminants in sediments and impacts arising from construction noise and vibration (these are addressed under the Environmental Factor – *Marine Fauna*)<br>• Permanent impacts that may arise from bridge construction may include modifications to riverbed levels and condition. The installation of bridge | • Where possible, there will be no foreshore disturbance on the Swan River outside of the permanent footprint of the Proposal.<br>• The drainage design will incorporate measures to improve the current situation regarding potential downstream impacts from run-off. Drainage water will be treated prior to entering the river.<br>• The principles of water sensitive urban design for stormwater management will be incorporated into road and bridge drainage design.<br>• Runoff from the road and rail bridges will not drain directly to the river.<br>• Management of impacts from riverbed/benthic habitat disturbance and prevention of sediment plumes.<br>• Careful consideration of bridge construction methods in order to minimise riverbed impacts outside of the permanent footprint.<br>• If temporary filling of the river is required (i.e. for the construction of a temporary causeway) all fill material is to be removed from the river and the river bed reinstated to reconstruction levels using clean fill material approved by DBCA. All temporary fill material placed into the river below the water line is to have a minimum diameter/ particle size of 50 mm.<br>• If excavation of river sediments is required, the excavated sediments will be removed from the river and disposed of or reused (outside of the river) in an appropriate manner.<br>• Collection of river baseline data on water quality, sediments and benthic habitat/fauna.<br>• Silt curtains will be used where practicable for in-river works to mitigate potential plumes. The use of silt curtains will be limited for this Proposal due to the fast currents in the main river channel.<br>• Measures to protect fauna from underwater noise and vibration impacts including the use of a MMO, soft-start piling and stop-work procedures will be implemented. | • DBCA permits under the *Swan and* DBCA permits under the *Swan and Canning Rivers Management Act 2006* have been obtained to undertake investigative works within the DCA.<br>• Development Approval will be obtained through the WAPC, via the SDAU, under Part 17 of the *Planning and Development Act 2005*. In addition to the public comment period of six weeks, the development application will be referred to external agencies and landowners for comment, including:<br>• Fremantle Ports<br>• DBCA<br>• CoF<br>• DPLH<br>• PTA<br>• DoT.<br>• Development Approval will be obtained through Fremantle Ports for works within Port lands and waters. | Given the Proposal's close proximity to the mouth of the Swan River, there is a significant overlap between the Inland Waters environmental factor and the Marine Environmental Quality environmental factor. Only one of these factors should be considered potentially significant for this Proposal.<br>Due to the significant marine influence on this part of the Swan Estuary, Main Roads considers it more appropriate that the impacts are assessed under Marine Environmental Quality rather than Inland Waters.<br>The bridge construction and demolition works may have a small direct effect on Swan River water quality. Construction operations (e.g. piling) may cause sediment resuspension, which is likely to temporarily impact on sessile benthic species and may remobilise any contaminants present in the sediment. However, given that increased sedimentation and resuspension of sediments occurs naturally within the river system (e.g. during high rainfall events when there is increased run-off entering the river), this temporary impact is considered unlikely to have a significant detrimental impact on the ecosystem of the area in the longer term. | The EPA's objectives for this factor can be met, as there is unlikely to be any permanent negative impact on hydrology or water quality during bridge construction or operation. Impacts on water quality during construction will be minimal and can be readily controlled to ensure that there is no environmental harm.<br>Hydrology of the Swan River will be maintained throughout construction and operation. |

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| | | as contaminated or remediated restricted use and may have leached hydrocarbons and heavy metals to the groundwater. | footings will result in the loss of small area of benthic habitat (<1 ha) and temporary impacts to a small area of benthic habitat surrounding this. | • Fit-for-purpose lighting will be installed that minimises light spill into the river to avoid impacts to aquatic fauna during construction and operation.<br>• Access to the foreshore by members of the public will be maintained or enhanced postconstruction.<br>• A geotechnical and groundwater investigation to determine the risk of the mobilisation of contaminated groundwater into the river will be carried out prior to construction.<br>• Any works within the Development Control Area requires approval by DBCA under the SCRM Act. | | | |
| **Social Surroundings** - To protect social surroundings from significant harm. | Environmental Factor Guideline – Social Surroundings (EPA, 2016e).<br>Statement of Environmental Principles, Factors and Objectives (EPA, 2020).<br>*Aboriginal Heritage Act 1972.* | **Aboriginal Heritage**<br>There is one registered Aboriginal heritage site within the Development Envelope:<br>• ID 3536 Swan River - The Swan River is a mythological site of significance to the Noongar people. Any impacts to the river are generally considered to have an impact on the mythological site.<br>One registered site abuts the southern extent of the proposed works:<br>• ID 3419 Fremantle: Cantonment Hill (Registered Site) - Cantonment Hill is a ceremonial, mythological and campsite.<br>An Aboriginal Archaeological and Ethnographic Site Identification Heritage Survey (Attachment 3) was undertaken by Archae-aus and Ethnosciences in October 2020. The assessment was undertaken alongside representatives of the Whadjuk Nyoongar community and supported Main Roads' application for consent under Section 18 of the *Aboriginal Heritage Act 1972.*<br>Consultation with Whadjuk Nyoongar Elders has continued since the Swan River Crossings Proposal was referral in August 2020.<br>Whadjuk Elders have developed the cultural context for the Proposal, and the themes and stories have informed the Heritage Interpretation Strategy. | One registered Aboriginal site (ID 3536 Swan River) will be temporarily disturbed by the Proposal during construction activities such as pile driving. | • A Whadjuk Nyoongar Elders Advisory Group has been established to guide heritage interpretation and Aboriginal engagement activities by Main Roads.<br>• The number of piers for the have been reduced as far as practicable using the maximum span width possible for a launched bridge. The Proposal will require construction of five in-river piers to support the new rail and road traffic bridges, shown on Figure 4 (Attachment 1). However, the demolition of the existing FTB will remove up to 24 piers from the river, greatly improving water flows in the area.<br>• Ensure the Heritage Interpretation Strategy (HIS), which was developed in consultation with Whadjuk Elders, stakeholders and the Heritage Council of WA (HCWA), informs the heritage outcomes for the project. A Heritage Interpretation Plan, informed by the HIS, will describe the design and management approach for heritage.<br>• Develop and implement an Aboriginal Heritage Management Plan, which includes an Unexpected Finds Procedure.<br>• Aboriginal monitors to be present during ground disturbing activities within the Swan River area.<br>• Implement interpretive signage and cultural celebration.<br>• Cultural ceremony prior to works commencing and prior to bridge opening.<br>• Consider Aboriginal place names for the bridge(s), in consultation with the Whadjuk Nyoongar Elders Advisory Group. | Consent under Section 18 of the *Aboriginal Heritage Act 1972* has been obtained for the Proposal (Attachment 4). | • Pier structures are culturally disruptive because they interfere with the flow of water and disturb the movement of songlines and totems through the area.<br>• Reducing the number of piers in the river will improve water flow and reduce sediment disturbance.<br>• Removal of the existing FTB and reducing in-river structures supports the wishes of the Whadjuk Nyoongar Elders.<br>• Cultural protocols have been implemented and will continue during the construction phase. | The EPA's objective of protecting Aboriginal Heritage can be achieved for this Proposal through meaningful consultation and cultural celebration. Consent under Section 18 of the Aboriginal Heritage Act 1972 has been obtained for the Proposal, and a Whadjuk Elders Advisory Group established to guide heritage interpretation and celebration. |

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| | | **Historic Heritage** | | | | | |
| | | The FTB and ferry capstan base are listed as a single entry on the Heritage Council of Western Australia's Register of Heritage Places. The State Heritage Register listing identifies several historic and community values associated with the FTB and ferry capstan base.<br>The FTB as a piece of road infrastructure is obsolete and unable to be maintained. The bridge does not meet current safety design standards for road users, pedestrians or cyclists. The structure of the bridge does not allow the existing structure to be maintained or upgraded. The wooden structure has deteriorated in the marine environment over the past 80 years of its operational life and is at risk of catastrophic failure.<br>The Ferry Capstan is currently in a deteriorative state with limited public access, and little public awareness of its existence and significance.<br>There are several places on the State Register of Heritage Places whose boundaries abut that of the project area but works will not impact these places: Place No. 991 Artillery Barracks and Fremantle Harbour Signal Station (former) which includes three Child Places [Naval Stores (Place No. 20320); Limestone Features (Place No. 21554) at 101 Queen Victoria Street; and Fmr Married Officers Quarters (Place No. 21555) at 105-121 Queen Victoria Street].<br>Place No 991 Artillery Barracks & Fremantle Harbour Signal Station (former) is listed on the Local Heritage Survey Areas and abuts the Project Area but will not be impacted. The Artillery Barracks Place is also a Listed Place on the Commonwealth Heritage Register (Place ID 105332) under the EPBC Act.<br>There are also five places on the Local Heritage Surveys within the Project Area:<br>• Place No. 22385 North Fremantle Precinct.<br>• Place No 22095 House, 85 Stirling Highway.<br>• Place No 22097 House, 87 Stirling Highway.<br>• Place No 22417 Everybody's Park.<br>• Place No 21605 Limestone Feature(s), Beach Street Reserve.<br>There are also two registered sites on the Western Australian Museum Database (Carnac Register Number 1179, Priestman Grab Crane Pontoon 'A' Register Number 574). However, as they have a wreckage date of 1940 and 1968 respectively, they are not managed under the *Maritime Archaeology Act 1973*. | • The Proposal will significantly impact the State Heritage registered site "Fremantle Traffic Bridge and Capstan". The existing FTB will be demolished as part of the Proposal.<br>• A number of sites listed on the Municipal Heritage Inventory will potentially be impacted. These include but are not limited to:<br>  • Direct impact on the Beach Street Reserve "Limestone Feature" (Place no 21605)<br>  • Works within the North Fremantle Precinct (Place no 22385) and a PSP through "Everyman's Park" North Fremantle (Place no 22417).<br>  • Other sites listed on the Local Heritage Survey Areas above may also be impacted. | • Ensure the Heritage Interpretation Strategy (HIS), which was developed in consultation with stakeholders and the Heritage Council of WA (HCWA), informs the heritage outcomes for the project. A Heritage Interpretation Plan, informed by the HIS, will describe the design and management approach for historic heritage.<br>• Develop and implement an Unexpected Finds Procedure.<br>• Following selection of Alignment One, Main Roads has consulted regularly with HCWA, including formal presentations on 13 August and 10 September 2021 on heritage interpretation opportunities. A summary of stakeholder consultation is provided in Attachment 2.<br>• A program of public consultation was undertaken to inform the heritage interpretation plans for the Proposal:<br>  • The release of a design inspiration document to share heritage visions, stories and themes with the community<br>  • Four community Design Forums (26 August 2021, 28 August 2021, 30 August 2021 and 31 August 2021) were conducted<br>  • An online survey was conducted, seeking feedback from community and stakeholders on aesthetics and heritage interpretation opportunities for the Proposal.<br>• Celebrate the history of the Swan River Crossings through retention of remnant portions of the existing FTB, restoration of the ferry capstan, architectural treatments, public art and celebration of historic heritage. | Main Roads has ongoing engagement with the HCWA in the development of the Heritage Interpretation Strategy for the Proposal. A Heritage Impact Statement and Heritage Interpretation Plan will be lodged with DPLH (Heritage) for approval and included in the development application to WAPC, via the SDAU. | • The Proposal location has been the site of four previous road bridges since European settlement and will continue to be an important crossing point of the Swan River. The existing FTB will be demolished as part of the Proposal, however will be celebrated through heritage interpretation and retention of remnant portions. The interpretation opportunities are being informed through consultation with HCWA, stakeholders and community (design forums, surveys etc).<br>• The Ferry Capstan will be restored, improved, celebrated, and connected to the southern foreshore. Interpretive signage and way finding will be included within 'Capstan Park', significantly increasing public awareness of the significant site.<br>• Public interest in potential historic heritage impacts related to this Proposal have been addressed through the public consultation program, including State Agencies and community members. Impacts will be managed via existing approval pathways. | The EPA's objective of protecting social surroundings (Historic Heritage) from significant harm can be achieved for this Proposal. Whilst the Fremantle Traffic Bridge requires demolition, this will be done in consultation with HCWA and consideration of public feedback. The Proposal will restore and celebrate the ferry capstan, significantly increasing public awareness of the site. Remnant portions of the FTB will be retained and integrated through urban and landscape design, encouraging community appreciation for all Swan River Crossings. |
| | Environmental Factor Guideline – Social Surroundings (EPA, 2016e).<br>*Environmental Protection Act 1986.* | **Noise** | | | | | |
| | | The following existing noise sources occur within and adjacent to the Development Envelope:<br>• Fremantle harbour – vessel movement and freight handling<br>• Passenger railway<br>• Freight railway | • Noise from this proposal has the potential to impact nearby noise sensitive receivers (i.e. residential | • General construction noise will be managed in accordance with the Environmental Protection (Noise) Regulations 1997. | • Development Approval will be obtained through the WAPC, via the SDAU, under Part 17 of the *Planning* | • Construction noise is likely to cause impacts to adjacent residents. However, this will be a temporary impact during construction | The EPA's objective of protecting social surroundings (Noise) from |

| Relevant EPA Factor & Objective | Policy and Guidance | Existing Environment<br>Unless otherwise indicated, refer to *Swan River Crossings - EPA Referral Supporting Document* for references | Potential Impacts | Mitigation Measures | Regulation and Other Approvals | Predicted Outcomes | Meets EPA Objective? |
|---|---|---|---|---|---|---|---|
| | | **Consideration of Significance: (a)** | **Consideration of Significance: (b)(e)(f)** | | | **Consideration of Significance: (c)(d)(f)(h)** | **Consideration of Significance: (g)** |
| | Statement of Environmental Principles, Factors and Objectives (EPA, 2020).<br>State Planning Policy 5.4 – Road and Rail Traffic Noise (DPLH, 2019). | • Road traffic along Queen Victoria Street, Tydeman Road and Canning Highway<br>• Other river vessels.<br>Noise sensitive receivers are located to the north and south of the river. Many of these receivers have been in place for many years and are unlikely to have any form of noise mitigation within the structures. However there are a number of more recent developments north of the river that have been built in the context of the existing noise environment and have had noise mitigation installed during construction. | apartments) during construction.<br>• Noise from pile driving activities during bridge construction will impact nearby sensitive receivers during construction (residential apartments are likely to be within 50 m of pile driving activities).<br>• Noise from pile driving activities within the Swan River during construction will impact recreational swimmers within the works area.<br>• The detailed noise assessment (Attachments 7) shows that the Proposal will have no significant impact when compared with the "no build" scenario, and in some cases a general reduction in noise levels as a result of new alignment and/or shielding of the railway line as a result of the elevated road bridge. | • A Construction Noise and Vibration Management Plan will be developed for the Proposal.<br>• An Out-of-Hours Noise Management Plan will be submitted to the City of Fremantle for approval.<br>• Consultation with nearby noise sensitive receivers will be conducted to inform them of planned construction activities.<br>• Implement the Aquatic Noise Management Plan (Attachment 13).<br>• Pile driving noise impacts (for recreational swimmers within the Swan River) will be mitigated through the following actions:<br>  • Restricting pile driving to the hours of 7am to 5pm Monday to Friday (note an allowance for an extension of time to 7pm where pile driving has commenced but was not completed prior to 5pm)<br>  • No piling permitted on Sundays or public holidays<br>  • Piles are to be hollow to improve penetration (in comparison to flat bottomed piles)<br>  • Piling hammer is to be encased and if possible to be fitted with a shroud<br>  • Piling hammer selection will consider noise impacts and noise modelling will be undertaken.<br>• Observation and shut down zones for recreational river users and swimmers are detailed in the Aquatic Noise Management Plan (Attachment 13). | *and Development Act 2005*.<br>• Noise impacts on sensitive receivers from the built asset will be assessed through the WAPC development application process against the criteria in *State Planning Policy No. 5.4 Road and Rail Noise*.<br>• All out-of-hours construction work will be submitted to the City of Fremantle for approval via an Out-of-Hours Noise Management Plan. Managed in accordance with the Environmental Protection (Noise) Regulations 1997. | and can be managed under the provisions of the Environmental Protection (Noise) Regulations 1997.<br>• Operational road and rail traffic noise is not expected to significantly increase because of the Proposal, and likely to decrease as a result of the chosen Alignment. | significant harm can be achieved as modelling shows the Proposal will have no significant impact when compared to current levels, and in some cases a general reduction in noise once the FTB is removed. |
| **Terrestrial Environmental Quality** - To maintain the quality of land soils so that environmental values are protected. | Environmental Factor Guideline – Terrestrial Environmental Quality (EPA, 2016f).<br>Statement of Environmental Principles, Factors and Objectives (EPA 2020).<br>*Environmental Protection Act 1986.*<br>*Contaminated Sites Act 2003.*<br>Contaminated Sites Guidelines (2014).<br>Assessment, Remediation and Management of Asbestos - Contaminated Sites in WA (2009). | The Development Envelope has been heavily disturbed by a number of land uses over the past century or more. Many of these land uses have been potentially contaminating through historical industrial or port activities.<br>Fremantle Port has been classified as "Remediated Restricted Use" and is restricted to commercial/ industrial use. This classification is due to detection of petroleum hydrocarbons in soils and groundwater and residual Asbestos Containing Material (ACM) in soil in a confined containment cell.<br>The existing rail bridge was built around the same time as Fremantle Port's North Quay expansion in the 1960s. It is likely that the fill material used to construct the approaches to the rail bridge is of similar quality to the adjacent port fill material.<br>The Development Envelope within the river – between the bridge abutments – is a "high to moderate risk" (risk class 1) of encountering ASS. The southern foreshore (up to Riverside Road) is a "moderate to low" risk of encountering ASS (risk class 2). | • There is a high likelihood of encountering contaminated soils (within fill material) during terrestrial ground disturbing works.<br>• The rail embankment material, particularly on the northern side of the Swan River, may contain ACM or other contaminants.<br>• The railway line is likely to contain asbestos and metals from railway operations. | • Further to the Preliminary Site Investigation (Attachment 10), Main Roads is currently undertaking a Detailed Site Investigation (DSI) for the Disturbance Footprint in accordance with DWER's Contaminated sites guidelines.<br>• A Contamination Management Plan will be developed and implemented based on the results of the DSI and the proposed construction methodology.<br>• Main Roads is currently undertaking a detailed ASS investigation. An ASS Management Plan will be developed and implemented in consultation with DBCA (Rivers and Estuaries Branch) and in accordance with DWER's ASS guidelines.<br>• Develop and implement an Asbestos Management Plan.<br>• Develop and implement an Unexpected Finds Management Procedure for suspected ASS or contaminated | • Development Approval will be obtained through the WAPC, via the SDAU, under Part 17 of the *Planning and Development Act 2005*.<br>• Depending on the outcomes of the DSI and ASS investigation, a Contamination and ASS management plan will be submitted as part of the development application and to DWER.<br>• Managed in accordance with the Contaminated | • It is unlikely that there will be any uncontrollable releases of any contaminants into the environment because of the Proposal.<br>• The potential for encountering contamination is well known, and the expected contaminants will be appropriately managed to minimise any adverse impacts to the environment. | The EPA's objective for Terrestrial Environmental Quality can be readily met through routine contamination management. |

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| | | **Consideration of Significance: (a)** | **Consideration of Significance: (b)(e)(f)** | | | **Consideration of Significance: (c)(d)(f)(h)** | **Consideration of Significance: (g)** |
| | Identification and investigation of Acid Sulfate Soils and acidic landscapes (2015).<br>Treatment and Management of Soil & Water in an Acid Sulfate Soils Landscape (2015). | | | material. If contaminated material / ASS is suspected, the area will be sampled and investigated in accordance with the Contaminated Site Guidelines (2014) and/or ASS guidelines (2015).<br>• Contaminated material, ASS, and/or asbestos waste must be removed by appropriately trained personnel and disposed of at an appropriately licenced waste facility. | Sites Regulations 2006. | | |