Mackay Port Access Project

Bassett Basin Fish Habitat Area – Social, Commercial and Cultural Values of the Proposed Revocation Area

Department of Transport and Main Roads

Reference: P525929

Revision: 1

2024-10-17

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Document control record

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Document control		aurecon				
Report title		Bassett Basin Fish Habitat Area – Study on the Social, Commercial and Cultural Values of the Proposed Revocation Area				
Document code		525929-W0006-REP-EN-0002	**Project number**		P525929	
File path		https://aurecongroup.sharepoint.com/sites/525929/3_Develop/For%20Delivery/WP06%20%E2%80%93%20Basin%20FHA%20Existing%20Habitats%20and%20Environmental%20Values%20of%20Proposed%20Revocation%20Area%20Study/525929-W00006-REP-EN-0002_Rev1.docx				
Client		Department of Transport and Main Roads				
Client contact		TMR	**Client reference**		CN-20686 WP06	
Rev	**Date**	**Revision details/status**	**Author**	**Reviewer**	**Verifier** (if required)	**Approver**
0	2024-08-02	Draft for Client Comment	Aurecon	Aurecon	Aurecon	Aurecon
1	2024-10-17	Issued as Final	Aurecon	Aurecon		Aurecon
Current revision		**1**				

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Glossary of Terms

Term	Definition
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
AFPS	Australasian Fish Passage Services
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
DAF	Department of Agriculture and Fisheries
DESI	Department of Environment, Science and Innovation
EMP	Environmental Management Plan
FHA	Fish Habitat Area
FTE	Full-Time Equivalent
FY	Financial Year
GBR	Great Barrier Reef
GRP	Gross Regional Product
GSP	Gross State Product
GVP	Gross Value of Production
HRTRP	Healthy Rivers to Reef Partnership
LGA	Local Government Area
MIW	Mackay, Isaac and Whitsunday
MNES	Matter of National Environmental Significance
MPAP	Mackay Port Access Project
MPAR	Mackay Port Access Road
MRC	Mackay Regional Council
MRR	Mackay Ring Road
PASS	Potential Acid Sulfate Soils
QR	Queensland Rail
SLR	SLR Consulting Australia Pty Ltd (formally frc Environmental)
TEV	Total Economic Value
TMP	Traffic Management Plan
TMR	Department of Transport and Main Roads
TOR	Terms of Reference

1 Introduction

1.1 Background and Project description

The Department of Transport and Main Roads (TMR) is undertaking the Mackay Port Access Project (MPAP) to develop the Mackay Port Access Road (MPAR), connecting the Bruce Highway to the Port of Mackay to reduce the interactions between local and regional traffic. This initiative would reduce congestion within Mackay and improve the supply chain connectivity for the freight industry. The MPAP is an outcome of the Mackay Ring Road (MRR) Planning Study, which commenced in 2013 with additional funding released in 2020 for a more detailed comparative analysis of shortlisted options for the MPAR.

The MPAR is split in three sections:

- Section 1 – extending between MRR Stage 1 (at the Bruce Highway) and Glenella-Richmond Road
- Section 2 – extending between Glenella-Richmond Road and approximately 600 meters (m) west from the Glenpark Street overpass – referred to as the Glenella/Mt Pleasant Section
- Section 3 – the section between approximately 600 m west from the Glenpark Street overpass and Harbour Road (or Slade Point Road) – referred to as the Bassett Basin Section.

The Bassett Basin Section is the relevant area for this assessment ('the Project') and the alignment will henceforth be referred to as the 'Project footprint' within this report. The Project footprint is proposed to be developed on low-lying ground (< 5 m AHD), in tidal zones comprised of mud/sandy mud, mangrove swamps and estuarine deposits. Key design elements of the MPAR through the Bassett Basin Section include:

- Existing Glenpark Street Overpass over the QR Harbour Rail Line to be retained. The MPAR will pass under existing spans of this bridge
- The MPAR continues as an arterial road (rural) running parallel with the QR Harbour Rail Line. This segment traverses the low-lying Bassett Basin tidal area and includes a 600 m-long viaduct (bridge) on the western side of the Bassett Basin and an additional 300 m-long bridge that is likely to be required on the eastern side of the Basset Basin
- The section of the concept design from just east of the Valley Street connection to Harbour Road, 3 km length, has a minimum flood immunity of 20% AEP through the Bassett Basin
- At grade connection of MPAR to Harbour Road in the form of a 70 m-diameter dual lane roundabout.

Aurecon has previously carried out an ecological assessment for the MPAP prior to updates between the 2013 Concept Design Footprint and the 85%-Complete Concept Design (2024) footprint. A subsequent Ecology Report (2020) pertaining to the ecology assessment was produced containing the findings.

1.2 Purpose of this report

The Project will require the revocation of ~19.9 ha of habitat within the Bassett Basin Fish Habitat Area (herein referred to as the FHA). To support this, two studies are required:

1. a Revocation Support Study
2. a FHA Land Compensation Study.

SLR (formerly frc Environmental) have been commissioned to deliver a technical report titled *Bassett Basin FHA Support Study - Existing Habitat and Environmental Values of the Proposed Revocation Area* to assess the existing habitat and environmental values of both the revocation area and the FHA Land Compensation areas, which is provided as Addendum A of the Revocation Support Study (SLR, 2024a and 2024b).

This report complements SLR's technical report (2024a) to address the requirements from Sections 10 to 12 of TMR's Terms of Reference (TOR) - *Declared Fish Habitat Area Revocation Assessment Study*, in terms of the socio-economic component.

Sections 10 to 12 of the TOR are:

- 10.0 Current Social and Economic Values (refer to Section 2 of this report)
- 11.0 Potential Impacts (refer to Section 3 of this report)
- 12.0 Impacts Minimisation Measures (refer to Section 4 of this report).

1.3 Scope of works

A high-level assessment will be conducted that will focus on the recreation and commercial fishery values, and socio-cultural heritage and community value and uses of the proposed revocation area, the FHA and its surroundings.

1.3.1 Report exclusions

This report does not address traditional fisheries values, tangible and non-tangible cultural heritage, and Native Title considerations. Stakeholder consultation was also not undertaken as part of this report's scope. At the time of writing this report, TMR were finalising arrangements to undertake broad and targeted stakeholder consultation for the revocation process.

This report only considers mitigation measures to minimise impacts to the social, cultural and commercial values.

Compensations for the proposed FHA revocations are to be addressed by the additions of land to the declared FHA, which is directly addressed in SLR (2024b) Addendum A – Land Compensation Study. As such, offsets are not required and therefore a MNES Significant Impact Assessment is not part of this report.

2 Socio-economic values of estuaries

2.1 Overview

Estuaries and intertidal communities provide vital environmental functions, values and services to the local and surrounding ecosystem. These habitats also provide social and cultural values to users and non-users of the ecosystem. Estuaries provide social values through the provision of recreational activities such as boating, fishing, or bird watching and provide aesthetic benefits and health benefits for humans who interact with the space, as well as the general population. Economically, estuaries support fish populations for aquaculture, recreation and commercial fishing through the provision of critical life-cycle habitats for economically important species, such as barramundi.

Estuaries contribute to individual and community wellbeing (NSW Government, 2021) through the provision of usable space, aesthetic and amenity values as well as creating connection to place and country. Non-use values, such as these, are complex to quantify as they involve intangible aspects that cannot be valued through market prices.

A combination of anecdotal, academic and economic values has been used to inform the following valuation and assessment. At the time of writing this report, TMR was finalising arrangements to undertake broad and targeted stakeholder consultation for the revocation process.

The following valuations are not intended to provide a definitive market value, but rather where possible, provide an indication of the minimum annual market value that this habitat contributes to socio-economic and cultural functions. As an overarching perspective, assessments should be conducted through consideration of the prevention and precautionary principles.

2.2 Value of recreational fisheries

2.2.1 FHA

The Bassett Basin and the offshore waters of Mackay support a variety of recreational fishing resources and recreational activities for locals and visitors to the area. Recreational and Indigenous fishing occurs within the declared FHA, which provides habitat for several highly sought after target species (Queensland Government, 2021). Activities such as boating, net and line fishing and crabbing are popular, year-round activities for locals. The area supports adult populations of barramundi (*Lates calcarifer*), whiting (*Sillago spp*.), king threadfin (*Polydactylus macrochir*), queenfish (*Scomberoides commersonnianus*), flathead (*Platycephalus spp.*) and yellowfin bream (*Acanthopagrus australis*) (Hooked on Mackay, 2024), as well as an abundance of mud crabs (*Scylla serrata*). The Department of Environment, Science and Innovation (previously the Department of Environment and Science, DES) (DESI, 2023) noted that the fisheries values in the FHA also included blue salmon (*Eleutheronema tetradactylum*), estuary cod (*Epinephelus malabaricus*), grunter (*Amniataba spp.* and *Terapon spp.*), mangrove jack (*Lutjanus argentimaculatus*), and tiger prawns (*Penaeus spp.*).

In addition to the recreationally important species, the FHA also supports active yabbie beds, herring and mullet, which enable bait gathering for fishers and supports the recreationally important fish populations as a key food resource.

Recreational fishing provides an important amenity to the local region and visitors. Hooked on Mackay (2024) reported that the area is ‘excellent (for) family fishing’ and anecdotal evidence confirms that this is one of the most popular fishing spots in the area. SLR (2024a) noted that the FHA provides significant habitat for recreational fisheries in the Mackay region and maintenance of these fisheries are fundamental to maintaining and expanding current fisheries in Mackay, as well as the Great Barrier Reef (GBR).

The Department of Agriculture and Fisheries *Statewide Recreational Fishing Surveys* (DAF, 2021) estimated in 2019 to 2020, 40,000 people participated in recreational fishing in Mackay, and as of July 2022, there were a total of 15,227 vessels with a home registration within the Local Government Area (LGA) (BMT, 2023) which are mostly used within the region.

Recreational fishing is popular within Mackay and the surrounding region due to its reliable catches, sizeable fish, and allocation of net free zones, making it a more accessible activity for inland and onshore anglers.

Estuarine habitats within the FHA are currently used for:

- shallow water fishery for whiting, bream and flathead
- bait fishery for yabbies and beach worms
- trapping fishery for mud crabs
- boat fishery for shallow reef and pelagic fishes
- line fishing
- land based fishing, with access available on all public walkways and pontoons along the existing rock walls along the Pioneer River and from Harbour Beach and Town Beach.

2.2.2 FHA revocation area

The proposed revocation area within the FHA is ~3.06% of the FHA, which has a total area of 650 ha.

Within the revocation area itself, access is mostly restricted due to the adjacent QR rail line and Council gates, limiting access from Harbour Road. Access via boat is also limited to high tides times due to the rock barrage immediately upstream of the Vines Creek bridge. This is supported by Figure 4.1 of BMT (2023) which indicates the lack of boats that use this portion of Vines Creek. Due to this, current use is mostly limited to trap fishing.

Values for recreational fishing within the revocation area predominantly result indirectly from the habitat value provided for species and ecosystem connectivity.

2.2.3 Economic values of recreational fisheries within the FHA

The economic value of recreation fisheries can be mostly quantified by:

- spending by recreational fishers on fishing supplies
- contribution to GRP (Gross Regional Product)
- visitor spending
- the creation of jobs.

The area of estuarine wetlands along the Queensland coast is ~2.67 million hectares (Queensland Government, 2017) and the total area of the FHA is 650 ha. This means that the entire FHA is 0.024% of the total estuarine wetland area of Queensland. Values have been provided for the entire FHA, as it is assumed that revocation of a portion of the FHA will have some impact on its overall worth. Values have also been provided for the proposed ~19.9 ha of the FHA which has been earmarked for revocation.

DAF (2021) reported that approximately 660,000 Queenslanders went fishing recreationally in Queensland in 2019 to 2020 and, spent approximately $600 million on recreational fishing items. In 2016, 5% of visitors (2,450 of the 49,000 visitors) to the Mackay region undertook fishing as an activity (MRC, 2017) and fishing visitors to the Mackay region contributed an estimated $23 million in tourism expenditure (MRC, 2017).

DAF (2021) surveys calculated that total expenditure in the Mackay, Isaac and Whitsunday (MIW) region of fish related trip costs was $5.56 million (i.e. boat fuel, bait, boat hire). There was an additional expenditure of $50.67 million on all other fishing related expenses in the region (i.e. club memberships, clothing, equipment, boat registration).

Referring to the LGA 2019 wetland system extents (DESI, 2013) (extracts provided in Table 2-1 and Table 2-2), it was determined that the FHA was 2.23% of the intertidal habitat of Mackay and 0.78% of the intertidal area of the MIW region.

Table 2-1: Extract from DESI (2013) Mackay Local Government Area wetland area by system 2019

Mackay LGA wetland area by system 2019	Area (ha)
Intertidal (saltmarsh, saltflats, mangroves) (natural) (ha)	29,054
Intertidal (saltmarsh, saltflats, mangroves) (slightly modified) (ha)	54
Total intertidal area	29,108
Total wetland area (which includes other wetland systems not listed here)	56,082
Mackay LGA total land area	759,328

Table 2-2: Extract from DESI (2013) Mackay, Isaac and Whitsunday Regional Plan wetland area by system 2019

Mackay, Isaac and Whitsunday Regional Plan wetland area by system 2019	Area (ha)
Intertidal (saltmarsh, saltflats, mangroves) (natural) (ha)	80,850
Intertidal (saltmarsh, saltflats, mangroves) (slightly modified) (ha)	2,733
Total intertidal area	83,583
Total wetland area (which includes other wetland systems not listed here)	328,916
Mackay, Isaac and Whitsunday Regional Plan total land area	9,013,274

It can be inferred that the potential economic contribution of recreational fishing within the FHA will be 2.23% of the potential intertidal fishing opportunities in Mackay and 0.78% of the potential intertidal fishing opportunities in the MIW region. Using the travel cost method to determine the Total Economic Value (TEV) of recreational fishing in the MIW region, BDO (2021) estimated that total expenditure on recreational fishing was $64.44 million p.a., equating to $770 p.a. per hectare of intertidal area, which provides a potential resource for recreational fishing ($64,440,000/83,583 ha). This provides an annual value for potential expenditure on recreational fishing within the **FHA of $501,130.00 p.a.** ($770x650 ha) and **$15,342.00 p.a**. ($770x19.9 ha) of potential expenditure on recreational fishing **provided by the revocation area**.

The total recreational fishing related contribution to GRP in the MIW region's economy was $23.03 million p.a. in 2019 to 2020 (BDO, 2021), being a contribution of $127.31 per person p.a. Using the population of Mackay from the 2021 census[1], this equates to a potential contribution of $15.49 million p.a. in potential GRP from the population of Mackay from recreational fishing.

The estimated total household income contribution in the MIW region from recreational fishing activities in 2019 to 2020 was $14.39 million p.a., or $79.55 per person p.a. This equates to $9.68 million p.a. for the population of Mackay as potential household income contributions resulting from recreational fishing activities.

Total recreational fishing related contributions to employment in the MIW region was 221.5 full-time equivalent (FTE) jobs in 2019 to 2020, with 145.7 FTE jobs generated by recreational fishing directly and 76.4 FTE jobs supported in other sectors of the regional economy through flow-on effects (BDO, 2021).

2.3 Value of commercial fisheries

The economic value of commercial fisheries relating to the FHA can be quantified by:

- ecosystem services contributing to fisheries specific habitat requirements and the maintenance of commercially valuable species population

[1] MIW population from 2021 census was 180,894; Mackay population in 2021 census was 121,691 (ABS, 2021)

- habitat for vulnerable lifecycle stages of commercially valuable fish species
- the creation of jobs.

The estuary habitat and coastal waters of the wider Mackay region are very important to commercial fishing in the MIW region and extend outwards to the GBR. The value of commercial fishing and aquaculture production in the GBR from the MIW region for financial year (FY) 2015 to 2016 was $10 million (Statista, 2024) and was valued at approximately $54.9 million in Gross Value of Production (GVP) in the 2020 to 2021 FY (DAF, 2021) for the east coast of Queensland. The FHA provides habitat for foraging, fish nursery for species such as grey mackerel, and protection, which is important for the productivity of commercial fisheries. The FHA also has a unique feature of freshwater ponds and connectivity of waterways to freshwater/brackish wetlands to the north and west of the revocation area, which provide significant habitat for the local barramundi fishery (DESI, 2023).

2.3.1 Economic value of commercial fisheries within the FHA

FHA

Referring to the LGA 2019 wetland system extents (DESI, 2013), it was determined that the FHA was 2.23% of the intertidal area of Mackay. Values have been provided for the entire FHA, as it is assumed that revocation of a portion of the FHA will have some impact on its overall worth. Values have also been provided for the proposed ~19.9 ha of the FHA which has been earmarked for revocation.

BDO (2020) identified the direct economic contribution of commercial fishing activity in the MIW region in 2018 to 2019 to be $15.3 million p.a. Gross State Product (GSP), being a contribution of $84.58 per person p.a. to GSP. Using the population of Mackay from the 2021 census, this equates to a potential contribution of $10.29 million p.a. in potential GSP from fishing activities[2], plus potential employment of 295 FTE jobs (BDO, 2021). The economic contribution of Queensland's commercial fisheries to the MIW region in FY2018 to 2019 was an additional $25.9 million, or $17.42 million based on the population of Mackay, plus potential employment of 388 FTE jobs.

Two additional recent studies by Raoult et al. (2022) and Taylor et al. (2018) aimed to value the contribution of different estuarine habitats (i.e. saltmarsh, seagrass, mangroves) to commercial fisheries production using stable isotope analysis. Raoult et al. summarised the per hectare value of habitats as:

- Saltmarsh: AU $621 ± 191 ha^{-1} y^{-1}
- Mangroves: AU $227 ± 66 ha^{-1} y^{-1}
- Seagrasses: AU $63 ± 29 ha^{-1} y^{-1}

Taylor et al. (2018) estimated the values of fisheries harvest supported by habitats, within the model regions of their study, ranged from ~AU$100,000 p.a. to ~AU$7,200,000 p.a.

These studies demonstrate the importance of considering both habitat extent and productivity when assessing estuarine habitat values and may be used to contribute to understanding the potential economic contribution of the FHA to commercial fisheries.

FHA revocation area

There have been no recent valuations to determine the TEV for ecosystem services contributing to estuarine habitats for fisheries, so information from Costanza et al. (1997) has been used and adjusted for inflation into today's value, being AU$62,400.00 per ha, p.a., or **AU$1,241,760.00 p.a. for the revocation area** (see Appendix A for conversions). This valuation includes disturbance regulation, nutrient cycling, biological control, habitat refugia, food production and raw materials which contributes to the maintenance of habitat to support commercially valuable fish populations. This calculation does not consider the cumulative impacts of habitat destruction and assumes equal value and importance to each hectare of intertidal area within the FHA.

[2] MIW population from 2021 census was 180,894; Mackay population in 2021 census was 121,691 (ABS, 2021)

It is not possible to know the quantitative direct and indirect impacts that removal of the revocation area will have on specific fish populations, ecosystem quality and the provision of ecosystem services.

2.4 Social and cultural values

It is challenging to quantify the economic value of social and cultural values associated with estuaries and the FHA as they are generally intangible and are direct non-use, indirect non-use, bequest, option and existence values.

Generally, declared fish habitat areas protect 29% of estuarine wetlands in Queensland (DESI, 2023) and the environmental benefits of the FHA are discussed in SLR (2024a). However, there are also values from the improved environmental benefits that are experienced by users, locals and the general population, which are not economically quantifiable but should be considered as part of the intangible valuation of the area when considering the Project impacts. These features contribute to the amenity of the area and provide significant social and cultural values for locals and visitors.

The following proxies could be used to qualify and articulate the social and cultural values obtained from this ecosystem:

- the value placed on aesthetics or use of a space
- the contribution of a place to cultural and spiritual value
- bequest or existence values
- local education resource
- anthropocentric value of biodiversity
- buffer zone between human influence and the tidal environment
- recreational use
- Governmental financial support for environmental sustainability
- Indigenous practices and cultural value
- provision of ecosystems services for improved environmental conditions, such as erosion and coastal protection, nutrient cycling, water purification which contribute to environmental value for society.

2.4.1 Economic value of social and cultural values within the FHA

FHA

The Mackay-Whitsunday-Isaac 2022 Report Card (Healthy Rivers to Reef Partnership, 2023) identified the “high social, cultural, and economic value fishing has within our community”, supporting the recognition of non-use values that local residence place on the local environment and sense of place for residents. As noted, the area is not only a popular fishing location, but also provides an experience for users. Hooked on Mackay (2024) reported that the FHA provides an area for ‘peaceful fishing in a breeze’, which also indicates the intrinsic and intangible value generated by this environment.

There have been no recent valuations to determine the TEV for social and cultural values generated by estuarine habitats, so information from Costanza et al. (1997) has been used and adjusted for inflation into today’s value. Costanza et al. (1997) (extract provided in Appendix A) provides a framework to value recreation and cultural values of estuaries as AU$1,206.38 per ha p.a. This generates a value of **AU$784,147.00 p.a. for the FHA** and **AU$24,006.96 p.a. for the proposed revocation area[3].** As the valuations used in Costanza et al. (1997) are from 1994 and generally only consider use-values, the value provided for recreation and culture should be considered as indicative only.

[3] the value has been adjusted for inflation and converted into 2024 AUD value, see Appendix A

FHA revocation area

The proposed revocation area provides natural visual amenity as part of the FHA and, considering the anticipated removal of marine plants and construction required to complete the Project, it is likely that the Project will impact the value of the aesthetics and amenity of the area.

3 Assessment of potential social and commercial impacts

3.1 Overview

This section details the potential impacts to the social and commercial values of estuarine habitats related to the proposed revocation area, as well as social and cultural values which may be impacted by the Project. The Project is intended to be an access restricted, rural arterial highway that primarily services the Port of Mackay. There will be a high percentage of heavy vehicle usage (approximately 30%), and therefore there is currently no consideration of recreational access to the Bassett Basin as part of the Project's design. Providing public access from the Project to the adjacent estuarine environment would significantly increase the overall disturbance footprint.

3.2 Potential impacts to fisheries values

As the estuarine habitat in the proposed revocation area is in good condition (SLR, 2024a), it is expected that the proposed revocation will not result in the loss of any significant fishery values, provided that appropriate and adequate mitigation actions are undertaken to ensure the maintenance and rehabilitation of the quality of the existing FHA and adequate land compensation areas are provided to mitigate the loss of estuary and marine plant areas. The impact on recreational and commercial fishery values will ultimately be determined by the impact the Project has on the environmental condition of the FHA, which supports the ecosystem for commercial and recreational fishing in the Mackay area and greater region.

It is likely that the majority of the FHA will remain productive and provide value for local fisheries. Given the relatively small area of revocation, is not likely that there will be a significant impact to the existing economic value of commercial fisheries in the area provided that adequate mitigation measures are taken to minimise disturbance and damage to existing vegetation and maintain fish habitat quality, as well as rehabilitation of temporary impacts to provide contiguous fish habitat, as per the recommendations in SLR (2024a).

3.3 Potential impacts to social values

As recreational access to the Bassett Basin is not currently part of the Project's design, there may be some implications on social value. Restricted access might limit the use of the area for the community and those engaged in recreational fishing. This could lead to a decline in fishing activities, potentially affecting the social value that the community derives from the FHAs amenities.

However, as anecdotal evidence suggests, there are nearby alternative locations which offer the same opportunities, so it is plausible that fishers who experience restricted access might opt to relocate their activities to these alternative areas. Additionally, due to pre-existing restrictions on fishing within the revocation area, the likely impact to social values for this specific area is likely less than what is anticipated for the entire FHA. Due to the proximity of other fishing locations, it is anticipated that any impact on the social value that fishers associate with the revocation area will be minimal, provided the existing fish habitat's quality is either preserved or restored following Project works.

The revocation area's social and economic value predominantly stems from its role as a fish nursery and ecosystem habitat, rather than a location regularly accessed for fishing. Consequently, any potential restriction in access to the revocation area is unlikely to significantly impact overall social values, given that it does not provide extensive recreational opportunities due to access limitations.

4 Mitigation measures to minimise commercial and social impacts

The following mitigation measures have been suggested to minimise the direct and indirect impacts to social, cultural and commercial values resulting from the proposed revocation of ~19.9 ha of fish habitat within the FHA.

4.1 Recreational and commercial fishing values

To address and limit the anticipated impacts on recreational and commercial fishing values as a result of the Project works within the FHA and the proposed revocation area, it is recommended that the following mitigation measures be considered or continued:

1. Planning and Design

- Minimise area of disturbance where avoidance is not possible
  - Achieved by optimal reduction in disturbance footprint where possible
- Ongoing design reviews and advice by a qualified Fisheries Biologist
- Bassett Basin tidal monitoring program
- Salt couch replanting trials within the FHA
- Lowering Council Harbour Rd stockpile area to reinstate tidal flushing and promote marine plant regeneration. Restoration Plan to be developed during detailed design to improve tidal flushing of the wetlands adjacent to the eastern side of the Bayersville Landfill (Lot 257 C12426)
- Re-create habitats lost during construction in other areas
  - SLR (2024a) initially noted the opportunity to include ~54 ha of additional fish habitat within the FHA as part of a land compensation package. This area reduced to ~41.56 ha after the completion of on-ground surveys (SLR, 2024b)
- Seek out opportunities to improve fish passage and/or habitat within other areas of the Bassett Basin that are not affected by the Project footprint, i.e. Vines/Gooseponds Creek catchment or McCreadys Creek (TMR, 2024)
- Provide designs that reduce destruction of fish habitat
  - 300 m bridge across Vines Creek on the eastern side of the Bassett Basin has been incorporated into design to assist in impact mitigation
  - 600 m bridge on the western side of the Bassett Basin has been incorporated into design to assist in impact mitigation
- Confirm recreational fishing can recommence within or around proposed revocation area post-construction by providing access/designing accessible areas.

2. Construction

- Rehabilitate surrounding habitat to represent natural pre-construction state to mitigate any losses
- Ensure fish migratory pathways are maintained and rehabilitated
  - Bassett Basin tidal monitoring program, ongoing Australasian Fish Passage Services (AFPS) design reviews & advice and updated design (additional bridging) have contributed to this mitigation measure (TMR, 2024)
- Manage noise and air quality impacts from construction and increased vehicle presence, through an Environmental Management Plan (EMP) and Traffic Management Plan (TMP)
- Adhere to best practice environmental management techniques to minimise impacts from environmental nuisance (i.e. noise, dust etc), including at a minimum, the implementation of TMRs Technical Standards:

  - MRTS 51 Environmental Management
  - MRTS 52 Erosion and Sediment Control
  - MRTS 16 Landscape and Revegetation Works
- Ensure waterway flows are maintained during construction phases
- Minimising disturbance and damage to existing vegetation where practicable to maintain fish habitat, ecosystem values and condition of marine plants
- Rehabilitate temporary impacts within revocation area to provide contiguous fish habitat, potentially extending beyond the current mapped FHA
- Monitor and address significant changes in water quality parameters (SARA, 2023 (Part 2, Section 8)).

3. Operation

- Maintain or replicate hydrological regime of the waterway
- Monitoring and establish a contingency plan to ensure no adverse impacts on fish habitats or fisheries productivity.

4.2 Social and cultural values

To address the anticipated social and cultural values impacts, the following mitigation measures should be considered:

- Provide a suitable FHA compensation package for the proposed revocation area for any habitats lost during construction. Confirm the revocation and the associated compensation package generates no net social loss
  - TMR are developing FHA Land Compensation Package as the result of the proposed FHA boundary revocation process to address this mitigation measure (TMR, 2024)
- Consultation with Traditional Owners and local residents to identify mitigation actions that may help maintain and/or restore the cultural or heritage value loss potentially incurred by the proposed revocation
  - Community, stakeholder and Traditional Owner engagement is to be undertaken to inform this mitigations measure
- Potential to leverage the findings of BMT (2023) to explore opportunities to contribute to publicly accessible recreational boating facilities to improve the amenity and community usage of the Bassett Basin by recreational fishers
- Investigate opportunities to improve recreational access to other areas of the FHA
- Communicate anticipated impacts and interferences to the local fishers/groups in the area. Specify the area impacts, time frame and seek community feedback regarding potential mitigation measures.

5 Conclusion

The proposed Project will provide a strategically important freight transport corridor, while simultaneously improving safety for motorists, increasing road capacity, and enhancing network efficiency for Mackay and the greater region.

Approximately ~19.9 ha of intertidal fish habitat area within the Bassett Basin has been earmarked for revocation to enable the Project works to be completed. The remainder of the FHA will be a broader management area and is not anticipated to be physically impacted. The overall environmental values of the FHA were found to be in good condition (SLR, 2024a).

This study is to complements SLR's technical report and has focused on the recreation and commercial fishery values, and socio-cultural heritage and community value and uses of the proposed revocation area, the FHA and its general surroundings.

The following can be concluded about the anticipated impact to socio-economic and cultural values related to the FHA and proposed revocation area as a result of Project works:

Recreational fisheries

- The Bassett Basin and the offshore waters of Mackay support a variety of recreational fishing resources and supports recreational activities for locals and visitors to the area. The FHA also provides a high value as a recreational fishing spot, which is a popular activity in Mackay and an important amenity for the region
- Fishing activities contribute substantially to the local and wider economy
- Values for recreational fishing within the revocation area predominantly result indirectly from the habitat value provided for species and ecosystem connectivity
- Within the revocation area itself, access is mostly restricted, with boat access limited to high tide times
- Restricted access might limit the use of the area for those engaged in recreational fishing. This could lead to a decline in fishing activities and the economic benefit of those activities
- There are nearby alternative locations which offer similar opportunities, so it is anticipated that fishers who experience restricted access will relocate to alternative areas
- Due to pre-existing restrictions on fishing within the revocation area, the likely impact to recreational fishing values for this specific area is likely less than what is anticipated for the entire FHA
- Due to the proximity of other fishing locations, the impact to recreational fishing is anticipated to be minimal, provided by adequate mitigation of any anticipated impacts.

Commercial fisheries

- The estuary habitat and coastal waters of the wider Mackay region are very important to commercial fishing as they provide specific habitat for commercially important aquatic species
- These ecosystems contribute substantially to the local and wider economy through the provision of important habitat
- As the estuarine habitat in the proposed revocation area is in good condition (SLR, 2024a), it is expected that the proposed revocation will not result in the loss of any significant fishery values, provided that appropriate and adequate mitigation actions are undertaken
- Given the relatively small area of revocation, is not likely that there will be a significant impact to the existing economic value of commercial fisheries and that most of the FHA will remain productive and provide value for local fisheries.

Social and cultural values:

- It is challenging to quantify the economic value of social and cultural values associated with estuaries and the FHA
- Considerable social value is generated by the amenity and experience of locals and visitors to the area. It also contains cultural and amenity values for both Indigenous and non-Indigenous users

- Restricted access to the FHA and the Project works might limit the use of the area and impact visual amenity, potentially affecting the social value that the community derives from the FHA
- The Project works will impact the visual amenity and noise/air quality during construction and operation phases. By following the EMP and TMP, as well as delivering the proposed land compensation package, the impact to amenity should be minimised. Additionally, stakeholder engagement could assist in reducing impacts to cultural and social values by integrating stakeholder feedback and maintaining transparent and open communication
- A Cultural Heritage Assessment will be addressed directly by TMR and will contribute to the understanding and value of cultural and Indigenous heritage of the Bassett Basin.

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Appendix A

Extract from Costanza et al. (1997) for economic valuation of ecosystem services

Historic currency conversion: Average exchange rate US to AUD in 1997 = 0.74 (Macrotrends, 2024)

US$22,832 (1997) = AU$30,854 (1997)

Conversion from AU (1997) to AU (2024) accounting for inflation: AU$30,854 to AU$62,400 (Alioth Finance, 2024)

Table 2 Summary of average global value of annual ecosystem services

Biome	Area ($ha \times 10^6$)	Ecosystem serivces (1994 US$ $ha^{-1} yr^{-1}$) 1 Gas regulation	2 Climate regulation	3 Disturbance regulation	4 Water regulation	5 Water supply	6 Erosion control	7 Soil formation	8 Nutrient cycling	9 Waste treatment	10 Pollination	11 Biological control	12 Habitat/ refugia	13 Food production	14 Raw materials	15 Genetic resources	16 Recreation	17 Cultural	Total value per ha ($ $ha^{-1} yr^{-1}$)	Total global flow value ($ $yr^{-1} \times 10^9$)
Marine	36,302																		577	20,949
Open ocean	33,200	38							118			5		15	0			76	252	8,381
Coastal	3,102			88					3,677			38	8	93	4		82	62	4,052	12,568
Estuaries	180			567					21,100			78	131	521	25		381	29	22,832	4,110
Seagrass/ algae beds	200								19,002						2				19,004	3,801
Coral reefs	62			2,750						58		5	7	220	27		3,008	1	6,075	375
Shelf	2,660								1,431			39		68	2			70	1,610	4,283
Terrestrial	15,323																		804	12,319

Figure A 1 - Extract from Costanza et al. (1997)

Appendix B

Extract from BDO (2021) for the economic contribution of recreational fishing to Mackay, Isaac and Whitsunday after removing the effects of COVID-19, 2019/20

Table 5-11 Economic contribution of recreational fishing to Mackay, Isaac and Whitsunday after removing the effects of COVID-19, 2019/20

	Expenditure ($m)	GRP ($m)	Household income ($m)	Employment (fte jobs)
		On-trip		
Direct effects				
Offshore	4.29	1.28	0.68	11.5
Coastal boat based	3.40	0.67	0.40	7.1
Coastal shore based	0.95	0.32	0.18	3.6
Inland boat based	0.14	0.03	0.02	0.4
Inland shore based	0.12	0.03	0.02	0.4
Total Direct	8.90	2.34	1.30	22.9
Flow-on effects				
Offshore		0.94	0.48	7.3
Coastal boat based		0.54	0.27	4.2
Coastal shore based		0.24	0.12	1.9
Inland boat based		0.03	0.01	0.2
Inland shore based		0.03	0.01	0.2
Total Flow-on		1.78	0.90	13.8
Total				
Offshore		2.23	1.16	18.8
Coastal boat based		1.21	0.67	11.2
Coastal shore based		0.56	0.30	5.5
Inland boat based		0.06	0.03	0.6
Inland shore based		0.06	0.03	0.6
Total		**4.12**	**2.20**	**36.7**
		Off-trip		
Direct effects	55.54	10.77	8.09	122.7
Flow-on effects		8.15	4.10	62.1
Total		**18.91**	**12.19**	**184.8**
		Combined		
Direct effects	64.44	13.11	9.39	145.7
Flow-on effects		9.92	5.00	75.9
Total		**23.03**	**14.39**	**221.5**

Source: BDO EconSearch analysis.

Figure B 1 - Extract from BDO (2021) p. 36

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