walker

TOONDAH HARBOUR

CHAPTER 29
ENVIRONMENTAL OFFSETS STRATEGY

saunders havill group

29. Environmental Offsets Strategy

29.1. EPBC Act Environmental Offsets

Environmental offsets are measures that compensate for the residual adverse impacts of an action on the environment. At the national level, environmental offsets are governed by the EPBC Act and EPBC Act Environmental Offsets Policy (2012). Environmental offsets will be required for any significant residual impact on MNES resulting from the Project.

The EPBC Act EIS guidelines for the Project specify that offsets for unavoidable significant residual impacts to MNES must directly contribute to the ongoing viability of the MNES impacted by the Project, be based on scientifically robust information and deliver an overall conservation outcome that improves or maintains the viability of the MNES as compared to what is likely to have occurred under the status quo, i.e., if neither the action nor the offset had taken place. Further, the outcomes of the offset strategy need to be specific, measurable and achievable, based on robust baseline data and demonstrate with a high degree of certainty that predicted outcomes will be achieved.

The EIS guidelines state the specific requirements of the offset strategy, which must include:

a) Objectives;
b) Quantity of impacts which are being offset;
c) The type of offsets proposed (direct/indirect);
d) The location (including a geo-referenced map) and suitability of proposed direct offsets;
e) Current land tenure or proposed future (e.g. over areas that are presently water) of any proposed offset and the method of securing enduring protection of the offset site and managing the offset for the life of the impact;
f) The nature of and extent to which actions of the Queensland Government or Redland City Council would be required to implement the proposed offsets;
g) How staging of the overall development will impact the delivery of offsets;
h) Specific environmental outcomes to be achieved, and reasoning for these in reference to relevant statutory recovery plans, conservation advice and threat abatement plans;
i) A completed 'offsets guide'. All figures used to determine the suitability of offsets including habitat quality scores at the Project footprint must be derived using a suitably robust and repeatable framework. Details about each framework must also be provided;
j) Risk assessment;
k) Environmental management activities and mitigation measures including the timing of actions;
l) A monitoring program, which must include:
    - performance indicators (clear and concise criteria against which achievement of outcomes are to the measured), which are capable of accurate and reliable measurement
    - outcomes (time bound outcomes as measured by performance indicators), which might include milestones (interim outcomes)
    - monitoring requirements (timing and frequency of monitoring to detect changes in the performance indicators, to determine if outcomes are being achieved, and to inform adaptive management), and
    - trigger values for corrective actions;
m) Detail and time-specific outcomes Key Performance Indicators (KPIs) against which the achievement of the proposed offset outcomes will be measured. This includes interim milestones so that the Proponent can demonstrate they are on track to achieving the proposed offset outcomes;
n) Potential corrective actions to be implemented if trigger values are reached, and how environmental incidents and emergencies will be managed;
o) Roles and responsibilities (clearly stating who is responsible for activities);
p) Auditing and review mechanisms; and

q) An analysis of how the offset package meets the requirements of the EPBC Act Offsets Policy.

This chapter addresses the requirements of the EPBC Act Offsets Policy and Project EIS Guidelines. It is noted that some of the items such as environmental management and monitoring programs cannot be described in detail at this preliminary design stage, however the strategy will set out a framework for how offsets will be implemented and how the Project will provide an overall benefit to MNES.

29.1.1 EPBC Act Environmental Offsets Policy Requirements

The EPBC Act Environmental Offsets Policy contains eight principles that suitable offsets must address. These are:

1. Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action;
2. Be built around direct offsets but may include other compensatory measures;
3. Be in proportion to the level of statutory protection that applies to the protected matter;
4. Be of a size and scale proportionate to the residual impacts on the protected matter;
5. Effectively account for and manage the risks of the offset not succeeding;
6. Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs;
7. Be efficient, effective, timely, transparent, scientifically robust and reasonable; and
8. Have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

Offset packages can comprise a combination of direct offsets (i.e. on ground creation or rehabilitation of habitat) and indirect compensatory measures (i.e. research or educational programs) that aligns with published conservation priorities and provides a conservation gain for the MNES being impacted.

Conservation gain is the benefit that a direct offset delivers to the MNES, which maintains or increases its viability or reduces any threats of damage, destruction or extinction. A conservation gain may be achieved by:

- improving existing habitat for the protected matter;
- creating new habitat for the protected matter;
- reducing threats to the protected matter;
- increasing the values of a heritage place; and/or
- averting the loss of a protected matter or its habitat that is under threat.

Conservation gain in the marine environment may include improving protection of important protected species habitat, such as sea grass, or by addressing pressures on the protected matter or its habitat, such as removing derelict fishing nets and other marine debris.

Generally, the policy requires a minimum of 90% of the offset requirements to be met through direct offsets. Deviation from the 90 per cent direct offset can be considered though where:

- it can be demonstrated that a greater benefit to the protected matter is likely to be achieved through increasing the proportion of other compensatory measures in an offsets package; or
- scientific uncertainty is so high that it is not possible to determine a direct offset that is likely to benefit the protected matter.

Where possible offsets should be tailored specifically to the attribute of the protected matter that is being impacted in order to deliver a conservation gain. For example, if the impact is on foraging habitat for a threatened bird species an appropriate offset would be creating new foraging habitat or enhancement and protection of existing foraging habitat.

However, the policy acknowledges that in some circumstances it may be possible to demonstrate that a better conservation outcome can be achieved for the protected matter by creating or enhancing a different attribute. To continue the above example, if the limiting attribute for a threatened bird species is roosting habitat and not foraging habitat then a better conservation outcome for that species would be the creation of new roosting habitat or enhancement and protection of existing roosting habitat.

29.2. Summary of Residual Significant Impacts

Offsets provide environmental benefits to counterbalance the impacts that remain after avoidance and mitigation measures have been applied. These remaining, unavoidable impacts are termed 'residual impacts'.

For assessments under the EPBC Act, offsets are only required if residual impacts are significant as defined by the Significant Impact Guidelines 1.1. As the Project does not impact on Commonwealth land and is not an action by a Commonwealth agency, the Significant Impact Guidelines 1.2 are not applicable. Residual significant impacts to MNES have been assessed against the Significant Impact Guidelines 1.1 in Chapters 24, 25, and 27.

Table 29-1 summarises potential impacts to MNES, proposed management and avoidance measures, and identifies the remaining significant residual impact. The impact areas are shown spatially on Figure 29-1.

Based on the outcomes of detailed assessments the Project is considered likely to have a significant residual impact on the following MNES:

- The loss of 28.9 ha of foraging habitat for a range of threatened and migratory shorebird species which will reduce the potential area of occupancy for these species within Moreton Bay by 0.29%; and
- An area of the MBRS will be substantially modified impacting on a range of wetland habitats including seagrass, mangrove and unvegetated sand and mud substrate. The Project will result in the permanent loss of:
    - 2.5 ha of mangroves from within the MBRS (approximately 0.03% of all mangroves in the MBRS);
    - 24.8 ha of seagrass from within the MBRS (approximately 0.2% of all seagrass in the MBRS); and
    - 7.5 ha of unvegetated sand and mud substrate from within the MBRS (approximately 0.2% of mudflats within the MBRS).

The EPBC Act Environmental Offsets Policy identifies that where the protected matter is the whole of the environment, such as a Ramsar site, offsets must be targeted to the aspect of the environment that is being impacted so as to directly compensate for the impact. Therefore, offsets associated with the MBRS will focus on the habitat types impacted.

While the Project will have a direct impact on a number of wetland habitats (seagrass, mangroves and unvegetated sand and mud) the area being impacted is very small compared to its availability within the MBRS, and the Project will not impact any habitat with high or unique values. Project design and proposed management measures are expected to avoid any significant residual impacts outside of the immediate Project footprint. As a result, the Project will not result in any change to the ecological character of the MBRS (refer to Chapter 27 for a detailed assessment of potential change in ecological character).

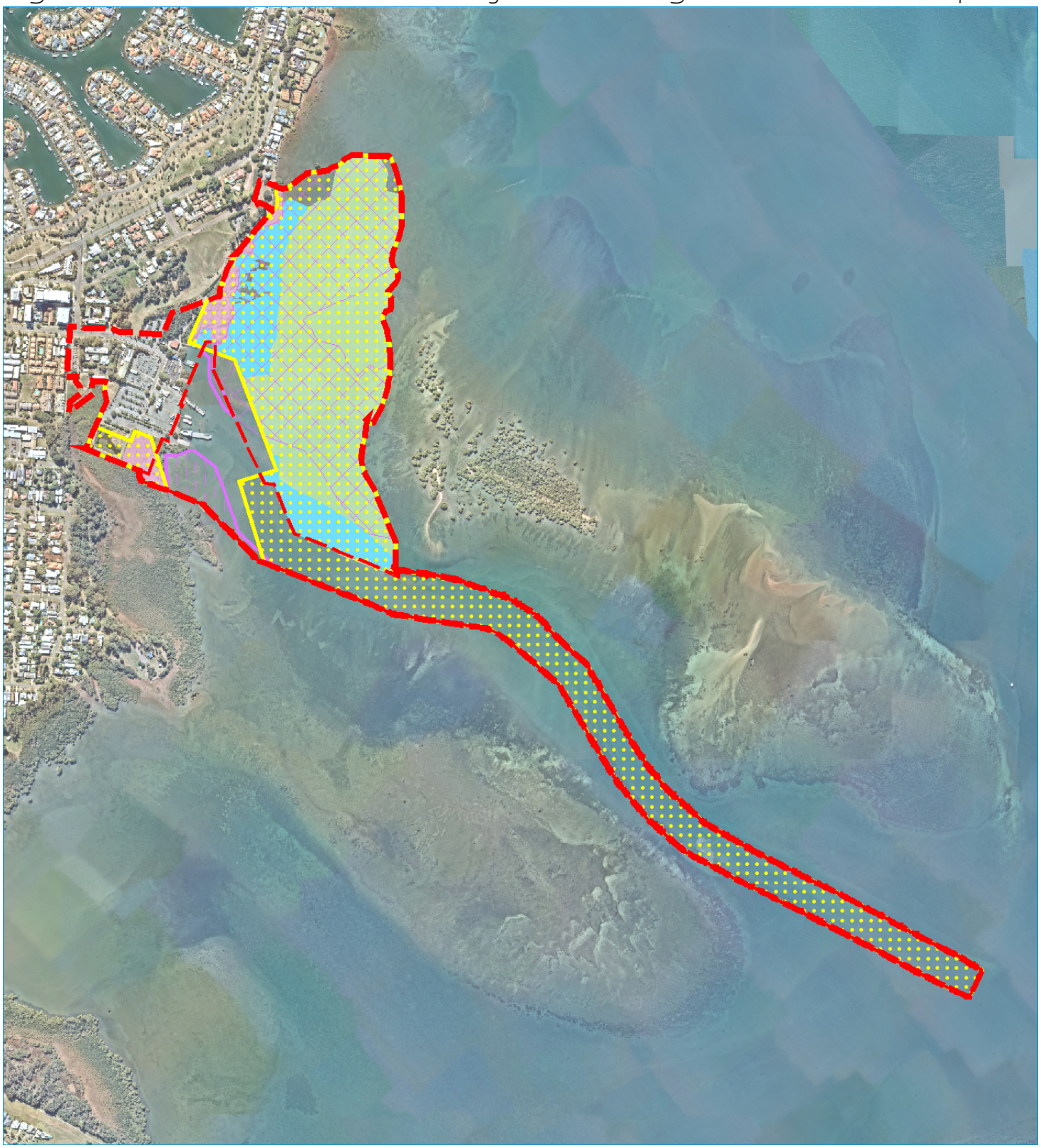
Guidance material from the Ramsar Convention outlines that compensatory measures can be provided to demonstrate an overall benefit to a Ramsar site as a result of an action (refer to the Ramsar Handbook 19: Addressing change in wetland ecological character). While the Project will not result in a change to the ecological character of the MBRS, compensatory measures proposed through this offsets strategy will provide and overall benefit to the processes, components and services that characterise the MBRS.

Table 29-1: Summary of Significant Residual Impacts to MNES from the Toondah Harbour Project.

MNES Potentially Impacted	Key Management Actions	Project Activity	Significant Residual impact Area	Draft EIS Chapter Justifying Impact
Direct impacts on listed threatened and migratory species – loss of a habitat within the Project footprint will result in the loss of shorebird foraging habitat used or potentially used by eastern curlew, Bar-tailed godwit, great knot, lesser sand plover, grey-tailed tattler, whimbrel, terek sandpiper, red-necked stint and common greenshank	▪ Reclamation areas will be enclosed before any other works to ensure impacts are contained within the footprint. ▪ Construction machinery will not be allowed outside Project boundaries in intertidal areas. ▪ Trained marine fauna spotters will be used to relocate any fauna trapped within the reclamation areas. ▪ Marine fauna exclusion zones will be established with no works allowed until fauna move outside the zone. ▪ Relevant management measures are listed in sections 16.6 and 17.5.	Northern reclamation	18.8 ha	Chapter 16 – Marine Ecology Chapter 17- Migratory Shorebirds Section 24.4 – Threatened Marine Species Significant Impact Assessment Section 25.4 – Marine Migratory Species Significant Impact Assessment
		Southern reclamation	7.8 ha	
		Stage 1 dredging	2.3 ha	
		Stage 2 dredging	0.0 ha	
		Terrestrial works	0.0 ha	
		Total	**28.9 ha**	
Indirect impacts on listed threatened and migratory species – a range of management measures have been put in place to avoid and minimise indirect impacts to threatened and migratory species that may use areas within the Project's zone of influence.	▪ High noise generating activities near sensitive areas will be restricted to periods when migratory species are unlikely to be present. ▪ Dredging to be restricted to periods when migratory species are unlikely to be present. ▪ Silt curtains to be used where possible during dredging to reduce turbidity plumes. ▪ Lighting strategy will keep construction and operational lighting contained to the site. ▪ Relevant management measures are listed in sections 16.6 and 17.5.	Northern reclamation	0.0 ha	Chapter 16 – Marine Ecology Chapter 17- Migratory Shorebirds Section 24.4 – Threatened Marine Species Significant Impact Assessment Section 25.4 – Marine Migratory Species Significant Impact Assessment
		Southern reclamation	0.0 ha	
		Stage 1 dredging	0.0 ha	
		Stage 2 dredging	0.0 ha	
		Terrestrial works	0.0 ha	
		Total	**0.0 ha**	
Direct impacts on wetland of international importance – The Project will result in an area of the MBRS being substantially modified permanently impacting on **seagrass** habitat.	▪ Reclamation areas will be enclosed before any other works to ensure impacts are contained within the footprint. ▪ Construction machinery will not be allowed outside Project boundaries in intertidal areas. ▪ Seagrass in Fison Channel is expected to regrow as has occurred after recent maintenance dredging events. ▪ Relevant management measures are listed in section 16.6.	Northern reclamation	15.5 ha	Chapter 16 – Marine Ecology Chapter 27 – MBRS Impact Assessment
		Southern reclamation	9.3 ha	
		Stage 1 dredging	0.0 ha	
		Stage 2 dredging	0.0 ha	
		Terrestrial works	0.0 ha	
		Total	**24.8 ha**	

MNES Potentially Impacted	Key Management Actions	Project Activity	Significant Residual impact Area	Draft EIS Chapter Justifying Impact
Direct impacts on wetland of international importance – The Project will result in an area of the MBRS being substantially modified impacting on **mangrove** habitat.	▪ Reclamation areas will be enclosed before any other works to ensure impacts are contained within the footprint. ▪ Construction machinery will not be allowed outside Project boundaries in intertidal areas. ▪ Relevant management measures are listed in section 16.6.	Northern reclamation	1.5 ha	Chapter 16 – Marine Ecology Chapter 27 – MBRS Impact Assessment
		Southern reclamation	0.0 ha	
		Stage 1 dredging	0.3 ha	
		Stage 2 dredging	0.0 ha	
		Terrestrial works	0.7 ha	
		Total	**2.5 ha**	
Direct impacts on wetland of international importance – The Project will result in an area of the MBRS being substantially modified impacting on **unvegetated sand and mud** habitat.	▪ Reclamation areas will be enclosed before any other works to ensure impacts are contained within the footprint. ▪ Construction machinery will not be allowed outside Project boundaries in intertidal areas. ▪ Relevant management measures are listed in section 16.6.	Northern reclamation	4.6 ha	Chapter 16 – Marine Ecology Chapter 27 – MBRS Impact Assessment
		Southern reclamation	2.9 ha	
		Stage 1 dredging	0.0 ha	
		Stage 2 dredging	0.0 ha	
		Terrestrial works	0.0 ha	
		Total	**7.5 ha**	
Indirect impacts on wetland of international importance – a range of management measures have been put in place to avoid and minimise indirect impacts to wetland habitats outside the footprint but within the Project's zone of influence.	▪ Silt curtains to be used where possible during dredging to reduce turbidity plumes. ▪ Water quality monitoring focused on sensitive receptors and using site data and scientific literature to set threshold criteria. ▪ Capture, treatment, and reuse of tailwater from reclamation areas onsite. ▪ Continual testing and treatment of PASS during dredging and reclamation work. ▪ Rockwall breakwater to be brought forward in construction schedule if erosion near Cassim Island occurs. ▪ Relevant management measures are listed in sections 9.5, 10.5 and 16.6.	Northern reclamation	0.0 ha	Chapter 16 – Marine Ecology Chapter 27 – MBRS Impact Assessment
		Southern reclamation	0.0 ha	
		Stage 1 dredging	0.0 ha	
		Stage 2 dredging	0.0 ha	
		Terrestrial works	0.0 ha	
		Total	**0.0 ha**	

Figure 29-1: Toondah Harbour Project MNES Significant Residual Impacts



Toondah Harbour EIS

Legend

- Project Footprint
- Dredge boundary
- Ramsar within development footprint (58.7 ha)

Reclamation Significant Residual Impacts

- Mangrove - 2.5ha
- Unvegetated Sand/Mud - 7.5ha
- Seagrass - 24.8ha
- Shorebird feeding habitat area (26.6 ha)

Dredging Significant Residual Impacts

- Shorebird feeding habitat area (2.3 ha)

TOONDAH HARBOUR

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N

0 100 200 300 400 Meters

GDA 1994 MGA zone 56

Scale (A4): 1:14,000

Layer Source: © State of Queensland Datasets (Department of Resources 2022), Aerial (Nearmap 2020) DATE 26/09/2022 FILE REF. 9858 E Figure 29 1 Toondah Harbour Project MNES Significant Residual Impacts B

It should be noted that the Project will also result in several benefits to MNES and the MBRS. While these are not considered part of the offsets strategy, they will compensate for some of the impacts. Benefits include:

- Creation of approximately 1.5 km of rockwall that will be designed to provide fish habitat and roosting habitat for a number of migratory bird species, including grey-tailed tattler, ruddy turnstone and terek sandpiper.
- Marine structures such as dolphins and jetties will provide structure and habitat for fish species.
- Creation of oyster reefs within the Project footprint will provide further habitat for fisheries species.
- Stormwater treatment will reduce nutrient loads released into Moreton Bay during storm events given that the existing harbour currently has no treatment measures.
- The upgrade of the ferry terminal, turning basin and Fison Channel, and the provision of an education centre as well as a visitor information centre, will add significantly to the recreational, tourism and educational values of Moreton Bay, both of which are considered critical services of the MBRS.
- The interpretation and awareness raising of Aboriginal cultural heritage values through signage, public art and opportunities for land and sea country management and cultural and nature-based tourism activities will promote the Indigenous cultural heritage of Moreton Bay, which is considered a critical service of the MBRS.
- A 3.5 ha foreshore park including an education centre, providing for a range of recreational activities and community engagement with Moreton Bay.

29.3. Offset Delivery Framework

29.3.1 Offset Delivery Approach

The overall objective of the offsets strategy is to provide a conservation gain for the MNES impacted by the Project, which will in turn provide a benefit to the ecological character of the MBRS.

Offset projects are particularly challenging to implement in coastal and marine environments where most available natural areas are under council or state government ownership. The complicated tenure arrangements and overlapping rights and interests make it difficult for non-government organisations to access such areas to undertake physical works or research activities. For example, if an offset project to improve a tidal area adjacent to a coastal park was proposed approval would be required from the local council and the State Government to access the land. Further approvals would be required for any works carried out, which may involve assessment by several agencies.

As a result of these difficulties, the Proponent proposes to deliver a suite of direct and indirect offsets through a fund managed by a third party with the ability to access public land and obtain approvals not available to a commercial entity such as the Proponent. The fund will need to be established so that offset projects undertaken meet the principles outlined in the EPBC Act Environmental Offsets Policy.

There are no tools under the EPBC Act to calculate funds for offsets delivery, therefore the Queensland environmental offset financial calculator (QEOFC) has been used to provide an indication of the appropriate financial contribution required to offset impacts from the Project.

The QEOFC calculates financial offsets based on three components: on ground costs, landholder incentive costs and administrative costs. A multiplier is also applied to the calculation to ensure additionality based on the size and scale proportionate to the significant residual impact. For habitats comparable to the MNES being impacted (i.e. marine plants and wetlands) a multiplier of four is applied. That is, the financial calculation assumes that for every 1 ha of habitat impacted the financial equivalent of 4 ha of a similar habitat will be delivered through the offset funds.

For marine and aquatic habitats landholder incentive costs are not included in the calculation as tidal land is generally state-owned. While no landholder payment is required for offsets on tidal land, owner's consent from the State and any other approval requirements would be included as part of the administrative costs.

On ground costs encompass establishment and ongoing maintenance of the habitats being offset. Estimates of on-ground management costs are highly variable, dependant on multiple site factors including location, access, and the type of management actions involved. The cost approach in the QEOFC is based on expert advice from Natural Resource Management bodies and local government, academic papers and industry feedback.

Administrative costs have been excluded from the calculation for the Toondah Harbour Project EPBC Act offsets fund as, in order to meet the EPBC Act Offsets Policy, all monies in the fund must be spent on providing a conservation outcome for the MNES that have been significantly impacted. All administrative costs will be met separately by the proponent or other parties involved with offset delivery.

Further detail on the methodologies that underpin the QEOFC is provided in Appendix 4 of the Queensland Environmental Offsets Policy.

Using the Queensland financial offsets calculator, significant residual impacts as outlined in Table 29-1 (28.9 ha of foraging habitat for threatened and migratory shorebirds, 32.3 ha of marine wetland habitats and 2.5 ha of marine plants) require a financial offset of $4.75 million (calculator outputs are included as Appendix 3-D).

The offset funds will be released in stages aligning with impacts associated with dredging and reclamation stages:

- The northern reclamation and stage 1 dredging will result in approximately 65 per cent of the significant residual impacts therefore $3.09 million will be provided for offset projects prior to the commencement of external sheet piling for the northern reclamation.
- The southern reclamation will result in approximately 35 per cent of the significant residual impacts therefore $1.66 million will be provided for offset projects prior to the commencement of external sheet piling. Initial works on the southern reclamation are expected to start approximately five years after project commencement.

An outline of how the funds will be used to deliver offsets is provided in the following sections.

29.3.2 Offset Delivery Method

The offset will be delivered through an established and experienced third party not for profit or government supported organisation (henceforth referred to as the Offset Fund Manager). While the funds from the Toondah Harbour Project will only be spent on offsets providing a conservation outcome for the significantly impacted MNES (habitat for migratory and threatened shorebirds, marine wetland habitats and marine plants) it is anticipated they will be a catalyst for further environmental investment. The Offset Fund Manager (OFM) may utilise grants, donations and other voluntary regulatory (offset) contributions to fund essential and highly needed landscape-scale environmental works programs throughout SEQ to provide a benefit for Moreton Bay and its tributaries.

The OFM will provide a mechanism for offset funds to be targeted to areas and matters as required by the regulatory framework. For the Project, this will allow for the prioritisation and coordinated delivery of projects in the Redland City LGA area in partnership with community organisations, Traditional Owners, conservation bodies, industry and government groups focusing on the MNES being impacted (refer to Table 29-1). These will include priority actions identified in the Redlands Coast Bay and Creeks Plan and supplementary Action Plan (the local documents that align with and operationalise implementation of the Lower Brisbane-Redlands Coast Bay and Creeks Plan, which was endorsed by RCC in 2018). Examples include the restoration of degraded systems, such as Ross Creek, which is close to Toondah Harbour.

The aim of the OFM is to deliver environmental works through a strategic landscape-scale approach, building on local programs and existing initiatives. Donations made to the fund will form part of a long-term collaboration between industry, local government authorities, the community and potentially the Australian and Queensland Governments.

A memorandum of understanding (MOU) will be established between the fund manager and the respective Federal and State environment departments to enable the OFM to receive monies as part of offset conditions as part of approvals required under the EPBC Act or state laws.

The OFM will allow the offsets to be delivered through third-party partners, including Traditional Owners, universities, schools, catchment organisations, environment groups and community organisations, to deliver projects that achieve better and more connected biodiversity conservation outcomes within the SEQ region and most importantly on coastal lands within or bordering the MBRS.

29.3.3 OFM Framework

A framework for how the OFM will operate is described below with a summary flow chart included as Figure 29-2.

29.3.3.1 *Aims*

To advance the protection and long-term conservation of MNES and MSES within Moreton Bay, and the Redland City LGA, in particular.

29.3.3.2 *Objectives*

Provide an effective and practicable delivery method for actions that compensate for residual impacts caused by approved developments under the EPBC Act. Funding and actions to deliver environmental works will be coordinated through:

- Engagement with communities and land managers;
- Identification of MNES and MSES features in need of protection and/or restoration;
- Maintain existing MNES/MSES in a healthy condition;
- Ensure upstream features and coastal processes are maintained to help sustain MNES ecological function, for example, keeping soil on the land and out of Redlands' creeks which is crucial to the health of Moreton Bay and the many species that inhabit it;
- Deliver education, training, compliance and awareness programs that help protect MNES; and
- Research and monitoring to inform future actions.

29.3.3.3 *Key Stakeholders*

The key stakeholders for the OFM include:

- SEQ LGAs;
- DCCEEW;
- The Queensland Department of Environment and Science (DES);
- Funding partners;
- Approval holders;
- Scientific advisors; and
- Third party delivery agents which may include Traditional Owners, universities, catchment organisations, schools, environment and community groups.

Note that the holder of any offset obligation under the EPBC Act (or any other Act) is ultimately responsible for its delivery and success, even where delivered by third parties. Legal agreements will need be used for each offset project to address implementation and reporting obligations.

29.3.3.4 *Independent Advisory Group*

The OFM will establish an independent advisory group (IAG), including key stakeholder representatives, to provide advice and oversight for selection and implementation of projects under the fund. The committee will be made up of scientific, community, government and industry members with knowledge and interest in Moreton Bay. Representatives from DCCEEW and DES will be invited to join the IAG to provide inputs from the peak federal and state environmental authorities.

The IAG's role will be to:

- Provide advice on the suitability and preference of environmental projects;
- Review project plans, budgets and methods;
- Review monitoring reports and data; and
- Advise on any future changes to the operation of the Fund.

Offset projects will be identified by the OFM and IAG based on relevant strategies and action plans, known environmental needs or submissions from community groups, Traditional Owners, universities or other research bodies or other government agencies. Projects submitted will be evaluated based on a set of defined criteria.

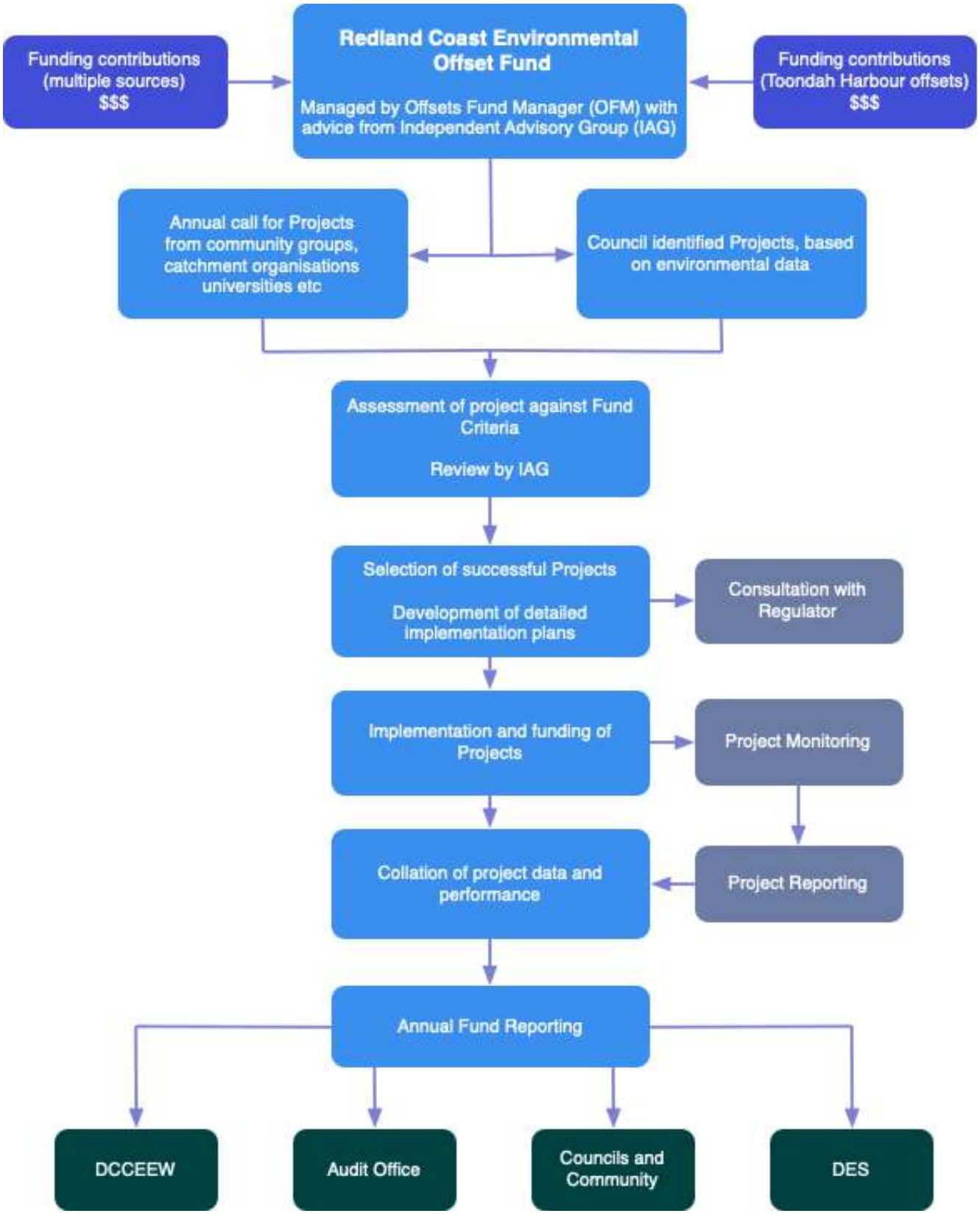

Figure 29-2: Toondah Harbour Offset Fund General Steps and Operation.

29.4. Potential Toondah Harbour Offset Projects

While offset projects will ultimately be selected by the OFM based on recommendations from the IAG, there are a range of publicly available sources, including various government strategies and policies, that could be utilised for an initial tranche of projects. RCC has developed a number of strategies and plans that guide council and community actions, these include:

- Redlands Coast Bay and Creeks Plan and Action Plan;
- RCC Biodiversity Policy and Strategy;
- RCC Vegetation Enhancement Policy and Strategy;
- Redland Koala Policy and Strategy;
- Conservation Land Management Strategy; and
- Pest Management Strategy.

A recent report prepared by the University of Queensland for Healthy Land and Water on Managing Threats to Migratory Shorebirds in Moreton Bay (Fuller *et al*. 2021) also outlines a range of management actions to mitigate threats to migratory shorebirds and their habitats in Moreton Bay, providing a conservation benefit.

Offset projects will need to be additional to activities that are already planned and proposed to be funded from other sources; actions that are mandated by other laws and approvals will also not qualify for offset funding. Any proposed offset project will also need to address whether implementation of that project will have a significant impact on any other MNES.

The general approach to how offsets will provide a conservation outcome for the MNES significantly impacted is outlined in the sections below.

29.4.1 Approach for Threatened and Migratory Shorebird Offset Projects

Migratory shorebirds that feed on tidal flats in Australia during their non-breeding season have two key habitat requirements that must be met to enable them to achieve a positive daily energy budget and accumulate fat reserves before migration back to their breeding grounds:

1. Tidal flats with sufficient benthic invertebrate food resources where they can feed during the low tide phase of the tide cycle (energy input); and
2. Nearby roost sites where they can rest undisturbed and safe from the risk of predation to conserve energy during high tide when they are unable to feed.

The further that suitable roost sites are from preferred feeding habitat, the greater distances the birds must fly each day, which increases energy loss through the energetic costs of flight. Each time birds are disturbed and take flight to circle and either return to the roost site after the disturbance agent has gone or fly to an alternative roost site, increases their loss of energy.

Maximising energy input during low tide (feeding habitat) and minimising energy expenditure during high tide (roost sites) can be viewed as two sides to the same coin in maintaining a positive daily energy balance by shorebirds.

A multitude of threats face migratory shorebirds globally. Pressures are particularly intense in the East Asian – Australasian Flyway (EAAF), with the key driver of shorebird population declines being the loss of two thirds of the intertidal habitat in the Yellow Sea over the past 50 years (Fuller *et al*. 2021). Changes in shorebird numbers at various sites across Moreton Bay are not uniform suggesting that threats are operating at the local scale, as well as external

sources. This demonstrates a clear need for localised and robust management of the birds and their habitats within Moreton Bay.

A recent report prepared by the University of Queensland for HLW (Fuller *et al*. 2021) has assessed the key threats to migratory shorebirds in Moreton Bay and prioritised a set of recommended management actions to address these threats.

A key threat identified is to the number, distribution and management of roost sites in Moreton Bay, with 95% of roost sites impacted by one or more threats, in particular disturbance, development and mangrove encroachment. A significant concern for shorebirds in Moreton Bay is the imminent loss of the existing temporary roost site on the Port of Brisbane reclamation area, which provides roosting habitat for approximately approximately 8,000 of Moreton Bay's shorebirds.

The report by Fuller *et al*. 2021 also assessed the availability of feeding habitat and identified over 100 km^2 of intertidal habitat that may provide foraging resources for migratory shorebirds in Moreton Bay. While significant habitat is available many tidal areas in Western Moreton Bay are subject to regular human disturbance such as anglers, boats, kite surfers, walkers, on-leash and off-leash dogs, and horses. Minimisation of these disturbances was considered the most urgent management action for feeding habitat.

The most urgent and important management actions to mitigate threats to migratory shorebirds and their habitats in Moreton Bay were identified by the Fuller report as:

1. Conduct a major strategic planning process to establish how sufficient roosting site capacity will be provided for the shorebirds using the Port of Brisbane reclamation ponds, which currently provide roosting habitat for more than 8,000 migratory shorebirds. The strategic plan should include options to enhance management of existing roost sites and identify locations for the construction of additional artificial sites. Suggested locations include Dynah Island (located at Cabbage Tree Creek approximately 9 km north west of the Port of Brisbane) and the western side of Minjerribah (North Stradbroke Island), both being close to important feeding areas, with the Dynah Island location potentially providing an alternative site for many birds currently using the Port of Brisbane;
2. Implement threat management at roost sites, including threats from disturbance and mangrove encroachment; and
3. Design and implement strategies to reduce disturbance to migratory shorebirds foraging at low tide, particularly from dogs being walked off leash on tidal flats.

Consistent with the threat analysis for Moreton Bay more broadly, threats to the migratory shorebird roost site network have and are still being experienced at roost sites in the vicinity of the Project.

Development of Raby Bay in 1994 (within 1 km of the Project) resulted in the loss of one of the larger roosts in the Cleveland area that was used by up to 4,500 roosting shorebirds (Fuller *et al*. 2021). A small roosting area was eventually constructed nearby at Empire Point (2.5 km north-west of Raby Bay) in an attempt to accommodate the birds displaced by the Raby Bay development (Lawler 1995). However, it never supported large numbers of birds (Harding *et al*. 1999), and, in the absence of active management it became overgrown with vegetation and abandoned as a roost site (Fuller *et al.* 2021).

The Nandeebie Claypan has been abandoned as a roost due primarily to mangrove encroachment. During surveys conducted for the Toondah Harbour Project, migratory shorebirds using Oyster Point that historically would have used the nearby Nandeebie Claypan, were increasingly observed flying north along the coast from the direction of Victoria Point and Thornlands towards Cleveland Point. It is likely these birds were on their way to the major roost sites at either

Geoff Skinner Reserve, which is located approximately 8 km flying distance north-west of Oyster Point and Nandeebie Claypan, or the Manly Marina located a further 6 km north-west of Geoff Skinner Reserve. Bar-tailed godwits carrying individually identifiable engraved leg flags that roost at Oyster Point have also been resighted roosting at the Manly Marina, confirming the connection between these roost sites.

Therefore, it is likely that migratory shorebirds feeding in southern Moreton Bay are becoming increasingly reliant on the major roost sites at Geoff Skinner Reserve and Manly Marina and are having to fly further each day to and from feeding areas to these sites due to their declining use of Nandeebie Claypan.

Conservation outcomes for shorebird species could also be achieved through indirect offset measures. There are a range of indirect measures that could be implemented that would align with key recommendations from Fuller et al. 2021. These include:

- Funding a strategic planning process to establish how sufficient roosting site capacity will be provided for the shorebirds using the Port of Brisbane once the port reclamation is fully completed;
- Establishing a program (potentially utilising Indigenous rangers) for regular monitoring of important foraging habitat areas in the Redland City LGA to assess disturbances; and
- Educational programs and signage to enhance compliance with dog off-leash policies.

29.4.2 Approach for Marine Wetland Habitat in Moreton Bay

While no saltmarsh will be directly impacted by the Project it is listed as threatened under the EPBC Act and a protected marine plant community under Queensland legislation. A recent assessment using the IUCN framework, saltmarshes in Moreton Bay were assessed as endangered, while mangroves and seagrass were assessed as least concern (Sievers *et al.* 2020). This was in large part due to 'coastal squeeze' from sea level rise, with mangroves colonising landward into saltmarsh areas, but with the landward progression of saltmarsh constrained by urbane areas and landform. A number of recent studies have shown mangroves and seagrass coverage in Moreton Bay has been consistent for several years (refer Section 16.3).

Mangrove encroachment is also likely to result in a decrease in habitat availability for fauna requiring open vegetation structure, such as migratory shorebirds (Kellaway *et al*. 2017). Significantly, the assessment also noted that, given the importance of connectivity among these ecosystems, collapse in any one ecosystem (such as saltmarsh) could have much broader, seascape-wide, consequences (Sievers *et al*. 2020).

Numerous examples exist of successful rehabilitation and protection of saltmarsh in South East Queensland and NSW, and consequently there is a high confidence in achieving conservation outcomes by rehabilitating and protecting these ecosystems. The 'Blue Heart' project on the Sunshine Coast, a project jointly managed by Sunshine Coast Council, Unity Water and the DES, provides an example of a cane field being converted to estuarine wetland. Similar work has been successfully completed in a variety of projects in NSW, including the Tomago Wetlands on the Hunter River and the Big Swamp floodplain near Taree. These projects are also notable for their provision of habitat for shorebirds.

While the distribution and condition of seagrass meadows in Moreton Bay is not anticipated to significantly decline in the next 50 years (Sievers *et al*. 2020), significant events such as major flooding, can impact on seagrass health and extent by reducing water quality, particularly in western Moreton Bay. Seagrass health has a strong correlation with water quality and the maximum depth limit of seagrass growth has been used as a biological indicator of light availability in Moreton Bay since 1996 (Maxwell *et al.* 2019).

The 2011 SEQ floods caused a significant decrease in water quality with an estimated one million tonnes of sediment from the Brisbane River catchment deposited in Moreton Bay (Zhang and Lemckert 2017). This material impacts on

seagrasses in two ways, by settling on existing seagrass beds and smothering them and by being re-suspended in the water column by tidal movement and reducing light penetration of the water column. This has flow on effects for marine megafauna such as dugong and marine turtles that forage on seagrass. The seagrass meadows most heavily affected by the 2011 floods were in Deception Bay to the north of the river mouth and Waterloo Bay with the coverage of some seagrass species in these areas reduced by up to 50% (Hanington *et al.* 2015). While the impacts of the recent 2022 floods on Moreton Bay are not yet fully understood, preliminary estimates indicate that they have resulted in more sediment being deposited in the bay than the 2011 floods.

Consequently, the actions that are most likely to result in significant ecological benefit for marine habitats in Moreton Bay include:

- Increasing the area and condition of saltmarsh;
- Improving water quality in Moreton Bay and its tributaries to minimise sediment loads from catchment areas during major events; and
- Planning for the impact of predicted sea level rise.

Sea Level Rise Ecological Adaptation Plan

RCC's Coastal Hazard Adaption Strategy focuses on engineering aspects of coastal hazards and how sea level rise may impact on hard infrastructure. It only addresses impacts on coastal wetlands in broad terms. Impacts to intertidal and subtidal habitats (including seagrass and coral communities) are not addressed. Further, potential impacts to native vegetation landward of current tidal extent are not addressed in detail.

Recognising there are significant areas of coastal wetlands including mangroves, saltmarsh and seagrass within the Redland City LGA, offset funds could be used to assist council to develop a comprehensive plan to provide for these areas, and for other areas of native vegetation, as sea level rises. This may include:

- Modelling the likely increase in water depth over seagrass beds, and estimating the improvement in total suspended solids required to maintain seagrass at these greater depths;
- Identification of coastal habitats most at risk, and as a consequence most likely impacts to species and ecosystems that are MNES;
- Identifying and purchasing property that these ecosystems can migrate onto; and
- Modifying and managing this land to facilitate colonisation by coastal wetland species.

As sea level rise impacts on ecosystems and green infrastructure is absent from coastal planning in many Australian jurisdictions, such a plan may provide a prototype for wider consideration of this important climate change issue.

29.5. Offset Suitability

The suitability of any offset will be assessed against the EPBC Act Environmental Offsets Policy. Criteria and minimum information requirements for proposals will be developed in consultation with DCCEEW and implemented with oversight of the Offset Fund's IAG to ensure offsets for the Toondah Harbour Project address the eight EPBC Act Offset Policy requirements.

Policy requirements, draft criteria/information and how they apply to the Toondah Harbour Project are outlined in Table 29-2. Where referred to below, a 'suitably qualified expert' means a person who has professional qualifications, training, skills and at least 10 years' experience in the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.

Table 29-2: EPBC Act Environmental Offsets Policy Requirements, OFM Project Draft Criteria and Application to Toondah Harbour.

Policy Requirement	Draft Criterion/Information Requirements
1. Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matter	Offsets projects must be able to demonstrate a conservation outcome for the matter being impacted. In order to do so the following information must be provided: **1A.** The matter impacted must be clearly identified and the impact quantified on ground using published methods or a method developed in consultation with a suitably qualified expert. **1B.** A review of key threats and conservation priorities for the matter impacted must be carried out including national guidelines, conservation advice, recovery plans and recent peer reviewed literature. **1C.** The proposed offset project must align with conservation priorities for the matter impacted or alleviate a key threat. **1D.** The proposed offset project must be peer reviewed by a suitably qualified expert and written endorsement provided that the proposed offset will improve or maintain the viability of the matter being impacted. **1E.** The proposed offset project must be reviewed against all MNES to identify whether potential for significant residual impacts to other matters exists. If so the offset project may require referral under the EPBC Act prior to implementation. *Significant residual impacts resulting from the Project are identified and quantified by the EIS and summarised in section 29.2. A review of key threats and conservation priorities for these matters is provided in section 29.4. Once specific projects are identified a peer review process will take place to further demonstrate a conservation benefit for the protected matter.*
2. Suitable offsets must be built around direct offsets but may include other compensatory measures	Offset projects must be able to demonstrate conservation outcomes will provide direct benefits to the matter impacted **2A.** Proposed offsets projects must quantify tangible/measurable benefits using the same method as criterion 1A. Benefits can be displayed through a range of outcomes for example: ▪ Creation of new habitats; ▪ Improved protection and/or enhancement of existing habitats; ▪ Improved breeding/birthing rates for threatened and migratory species; ▪ Reducing risk of potential threats to threatened and migratory species such as risk of boat strikes; and ▪ Improving ecological processes or critical components, such as water quality or where it can be demonstrated there will be a direct benefit to the protected matter **2B.** Indirect offsets should be considered where it can be demonstrated that a greater benefit to the protected matter is likely to be achieved. This may include species or protected matter management plans and research projects. The project(s) must be supported by a suitably qualified expert and government authority at the federal, state and/or local level. *A review of key threats and conservation priorities for MNES significantly impacted is provided in section 29.4. Specific project's will be nominated through the OFM. Recent studies (Fuller et al 2021) have also identified a strategic planning process addressing shorebird roosting habitat is a high priority for that matter in Moreton Bay.*

Policy Requirement	Draft Criterion/Information Requirements
3. Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter	**3A.** Consideration must be given to the level of protection of the matter being impacted. For matters with higher level of protection (i.e. endangered and critically endangered) offsets must address key conservation outcomes identified in conservation advices and recovery plans. *Offset projects for the Project will need to demonstrate compliance with this criterion on a case-by-case basis.*
4. Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter	**4A.** Offset proposals must include quantification of impacts and benefits to the matter being impacted (refer to criterion 1A and 2A) using published methods or a method developed in consultation with a suitably qualified expert. The measures (or series of measures) nominated must show overall benefit is being provided to the matter being impacted. *Offset projects will need to demonstrate compliance with these criteria on a case-by-case basis.*
5. Suitable offsets must effectively account for and manage the risks of the offset not succeeding	**5A.** Offsets projects must be able to demonstrate that there is a high level of certainty the proposed conservation outcomes will be achieved. Examples of how this could be demonstrated include: ▪ Proposed measures are based on industry standard techniques; ▪ The objectives and approach to gains are based on the outcomes of independent scientific studies; and ▪ The proposed conservation gains have been successfully achieved elsewhere, preferably within Australia. In some instances, a risk vs benefit analysis may justify a lower level of certainty where the potential beneficial outcome is high, or where new techniques with high potential value are being trialled. **5B.** A draft management plan will be provided with the offset project proposal including an ongoing monitoring program and criteria for measuring conservation outcomes at milestones and completion of the project. *Offset projects for the Toondah Harbour Project will need to demonstrate compliance with these criteria on a case-by-case basis.*
6. Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs	**6A.** Proposed offset projects must not be a requirement of an existing approval, law or funded management program. Offsets projects may include measures identified through federal, state or local government plans, programs or strategies that have no current or known future funding source. *Offset projects for the Toondah Harbour Project will need to demonstrate compliance with this criterion on a case-by-case basis.*

Policy Requirement	Draft Criterion/Information Requirements
7. Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable	**7A.** Proposed offset projects must include a delivery schedule outlining when conservation outcomes will be achieved. **7B.** A draft management plan (refer to criterion 5B) must be provided outlining key measures, parties responsible for delivering those measures and timing of delivery. **7C.** Proposed offsets must include a review of peer reviewed scientific literature demonstrating conservation outcomes can be achieved. *Offset projects for the Toondah Harbour Project will need to demonstrate compliance with this criterion on a case-by-case basis.*
8. Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced	**8A.** Offset projects must be in compliance with all EPBC Act approval conditions. **8B.** A draft management plan (refer to criterion 5B) will be provided with each offset project including details on monitoring, auditing and reporting requirements. **8C.** Offset projects must provide annual compliance reporting, at a minimum demonstrating conservation objectives are being achieved, and, if not, measures to be taken to rectify non-compliances. Compliance reporting is to be audited by the IAG annually. *Offset projects for the Toondah Harbour Project will need to demonstrate compliance with this criterion on a case-by-case basis.*

Delivery of environmental offsets through a third party not for profit or government supported organisation overseen by a panel of independent experts will ensure transparency in the process and provide positive conservation outcomes for the MNES impacted by the Project. It is expected that offset projects will be delivered within the Redland City LGA as well as the broader Moreton Bay area providing benefits at the local and regional scales. While the $4.75 million divested to the OFM from the Project will be used to provide an overall benefit for threatened and migratory shorebird species and wetland habitats, it is expected that it will be the catalyst for further financial contributions that will combine to provide significant conservation benefits to Moreton Bay.