Biodiversity Non-Technical Summary

1. Biodiversity Action Plan (BAP)

1.1 Overview and Context

The New Manila International Airport (NMIA) Project (i.e., the 'Project') is a development Project to construct a new airport to meet the growing demands of Metro Manila and adjacent provinces and complement air traffic operations of the existing and congested Manila Ninoy Aquino International Airport. The Project is located in Bulakan, Bulacan Province, 35km North of Manila and is being developed by San Miguel Aerocity Inc.

The potential financial lenders for the Project include organizations that apply international financial institution standards. Therefore, the Project needs to demonstrate that all environmental and socio-economic risks and impacts are identified, assessed and mitigated in accordance with standards such as the International Finance Corporation (IFC) Performance Standards (PS) on Environmental and Social (E&S) Sustainability and the Equator Principles 4 (EP4).

1.2 Presence of Critical and Natural Habitat

The potential biodiversity impacts of both construction and operation are described in the Project's Environmental and Social Impact Assessment (ESIA). As part of this ESIA a Critical Habitat Assessment (CHA) was undertaken as part of the IFC Performance Standard for Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC PS6). In the Project's Critical Habitat Assessment, it is concluded that the Project impacts Critical Habitat and Natural Habitat [Mott Macdonald, 2021]. Critical habitat is defined as an area with high biodiversity value). Natural Habitat includes areas with viable assemblages of plant and/or animals species of largely native origin, and/or with little modification of ecological functions and species composition (IFC PS6, 2012).

Critical habitat has been identified according to the following biodiversity criteria:

- Criterion 1 (C1): Critically Endangered (CR) and/or Endangered (EN) species;
- Criterion 2 (C2): Endemic and/or restricted range species;
- Criterion 3 (C3): Migratory and/or congregatory species.

The biodiversity features that have been assessed and trigger criteria C1/C2/C3 include 22 birds, eight fish, one amphibian, one mollusc, one snail and one crustacean.

For a project that triggers Critical Habitat, it is a requirement of IFC PS6 to prepare a Biodiversity Action Plan (BAP). The BAP needs to demonstrate:

1. Biodiversity Net Gain (BNG) for Critical Habitat;
2. No Net Loss (NNL) for Natural Habitat.

1.3 Approach and structure

In order to demonstrate BNG for Critical Habitat and NNL for Natural Habitat, the mitigation hierarchy (Figure 1) is applied to Project biodiversity impacts:

1. Avoid impacts where practical;
2. Reduce and mitigate impacts where avoidance is not possible;
3. Restore habitats or species populations;
4. Use Biodiversity Offsets and compensation only as a last resort when impacts cannot be avoided or mitigated.

The BAP is an overarching document that is intended to be used by SMAI and Contractor environmental managers. Some actions in the BAP are translated into more detailed plans, or more specific method statements for different construction activities. The additional plans and procedures prepared so far include:

- The Habitat Removal and Restoration Plan (HRRP)and the Construction Biodiversity Management Plan (CBMP), that describes how the Project manages steps 1-3 in the mitigation hierarchy;
- The Biodiversity Offset Management Plan, that describes how the Project manages step 4 in the mitigation hierarchy.

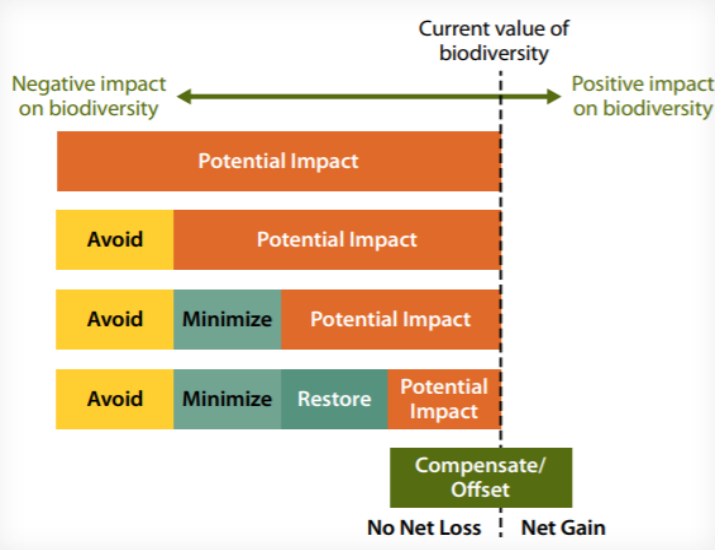


Figure 1 – Mitigation hierarchy [source: World Bank Group. 2016. Biodiversity Offsets: A User Guide. World Bank, Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/25758 License: CC BY 3.0 IGO.]

1.3.1 Avoidance, minimization and habitat restoration (steps 1-3 in mitigation hierarchy):

Steps 1, 2 and 3 in the mitigation hierarchy prescribe the avoidance, minimization and restoration of habitats.

Avoidance of biodiversity losses can be achieved in various ways. For this Project most feasible opportunities are found in smartly avoiding impacts during specific times of the year (i.e., avoiding works in areas with high biodiversity value during the peak bird migration season). Minimization of biodiversity loss is achieved by implementing by adjusting construction or operation activities. Where adverse impacts cannot be avoided or minimized during the project it is aimed to restore habitat loss as much as possible within the project area and to postpone any biodiversity impacts where possible. This is done by temporary enhancement of habitats within the Project site.

In this context a Habitat Removal and Restoration Plan (HRRP) and a Construction Biodiversity Management Plan (CBMP) have been developed. Reference is made to Figure 2 and section 2 of this summary.

1.3.2 Biodiversity Offset (step 4 in mitigation hierarchy):

Step 4 in the mitigation hierarchy prescribes the Use Biodiversity Offsets and compensation only as a last resort, when impacts cannot be avoided or mitigated.

The Project will result in the degradation and loss of valuable habitats as a consequence of the change of land use from areas of mudflats (tidal and permanently inundated), fishponds (temporary dry and shallow and permanently inundated), mangrove and rivers into an airport with all its facilities. It is concluded that most of these changes in land use cannot be mitigated and need to be compensated offsite. Where impacts cannot be avoided or mitigated, Biodiversity Offsets are used. Biodiversity Offsets are measurable conservation activities intended to compensate for the otherwise inevitable damage to species or ecosystems resulting from a development project.

In this context a Biodiversity Offset Management Plan (BOMP) has been developed. Reference is made to Figure 2 and section 3 of this summary.

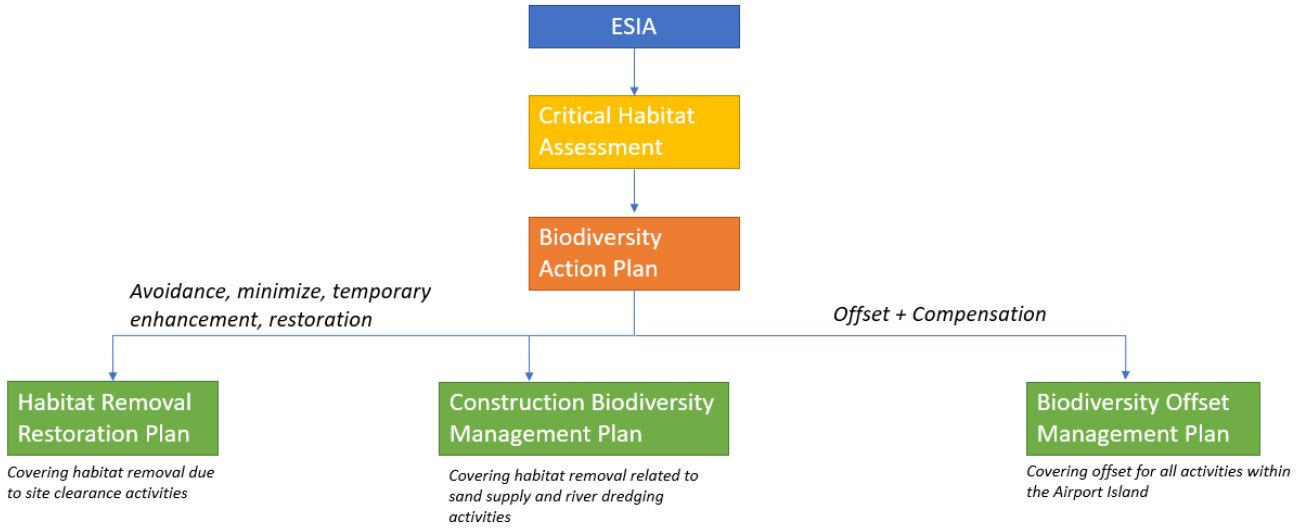


Figure 2 - Overview of Biodiversity Management Plans as part of the BAP

1.3.3 Quantification and Description of Impacts

The Project has adopted a habitat-based approach to achieve BNG/ NNL for priority biodiversity features. The actual ecological value of the critical habitats affected by the Project is determined both in a quantitative and qualitative way as input for the determination of the offset scope.

In order to derive the functions that have to be replaced or improved by the offset an assessment is made on the use of the Project area by the relevant trigger species. This assessment includes an evaluation of the actual and recent use of the Project area by the relevant trigger species in relation to the surrounding landscape and habitats in the Northern Manila Bay area. Based on this assessment a plan is developed to offset habitats and to allow for a continuation and if possible, enhancement of these habitat functions.

A quantitative methodology developed by Natural England (Panks, 2021a; 2021b) has been selected and adapted to the conditions of the Project area to estimate required areas for offsetting and their quality. This same methodology can and has also been used to assess the biodiversity value of potential offset areas. The methodology calculates “Baseline Biodiversity Units” using a scoring method that accounts for the habitat distinctiveness, condition and strategic significance of the habitats lost. The methodology is widely used in the UK and is considered appropriate to quantify the offset scope in the framework of this project.

1.4 Biodiversity Impact

As input to the methodology set out in section 1.3.3, a habitat map (Figure 3) has been developed for the Airport Island. Based on this habitat map, the total calculated permanent loss per habitat type under the Airport Island is determined (Table 1). It is assumed that all habitats under the Airport Island (2561 ha) will be permanently lost. Approximately 1646ha of critical (natural and modified) habitat will be permanently lost within the Airport Island. The majority of habitat to be lost under the Project areas are critical (natural) mudflats (~53%).

Of the total loss under the footprint of the Airport Island, 18% is considered to be tidal mudflats, 35% is inundated mudflats (containing abandoned tidal fishponds), 34% is inundated fishponds, 8% is tidal fishponds, 2% is mangrove habitat and 2% is river. Reference is made to Figure 3 and Table 1.

Figure 3 - Affected habitats on the Airport Island [Source: Biodiversity Offset Management Plan]

Table 1 - Affected Habitats on the Airport Island and within the Land Development Boundary [Source: Biodiversity Offset Management Plan]

Habitat type	Critical (Natural / Modified)	Area (ha)	Habitat Description	Habitat Function for Critical Trigger Species	Sources
Tidal Mudflats	Critical (Natural)	**466**	Substrate muddy, formed in fishponds abandoned after 2013. Part of the time dry or very shallow. No vegetation. Elevation -40 to + 40 cm MSL	Foraging (wading birds at low tide and terns and gulls at high tide). Highest parts hightide roost	Satellite (2020) and bathymetry (2018)
Mudflats permanently inundated	Critical (Natural)	**900**	Substrate muddy, formed in fishponds abandoned after 2013. Almost always inundated. Elevation below -40 cm MSL	Foraging (terns and gulls) at any tide.	Satellite (2020) and bathymetry (2018)
Fishponds temporarily dry & shallow	Critical (Modified)	**216**	Until 2020 managed as fishpond. Between 2013 and 2020 occasionally dry or shallow	Foraging and roost (wading birds & terns)	Satellite (2018 + 2020) and bathymetry (2018)

Habitat type	Critical (Natural / Modified)	Area (ha)	Habitat Description	Habitat Function for Critical Trigger Species	Sources
Fishponds permanently inundated	Modified	**864**	Until 2020 managed as fishpond. Between 2013 and 2020 almost always filled with water	Foraging (terns and gulls) at any tide.	Satellite (2018 + 2020) and bathymetry (2018)
Mangrove	Critical (Natural)	**64**	Planted and naturally developed mangrove stands	Foraging and roost of some of the trigger species	Mott MacDonald (Namria 2015)
Rivers	Natural	**51**	The Alipit river and creeks within the Airport Island that will be lost. Always filled with water and subject to tide	Foraging terns and gulls at any tide	Mott MacDonald (2021)

2. Construction Biodiversity Management Plan (CBMP)

The Construction Biodiversity Management Plan (CBMP) focuses on the avoidance, minimization and Temporary Habitat Enhancement of biodiversity impacts during the construction of the Land Platform, covering steps 1, 2 and 3 in the mitigation hierarchy. As in the course of time almost all critical habitats and natural habitats on the Airport Island within the Land Development Boundary will disappear, the opportunity for long term avoidance, minimization and on-site enhancement of considered habitats is limited. In that context the CBMP has a focus on the initial construction phases to allow for the development of a robust and feasible Biodiversity Offset Management Plan (BOMP). Until the BOMP has been implemented, the Temporary Habitat Enhancement areas will be in place.

The CBMP relates to the habitats affected during Contractor's activities due to sand supply, river dredging and disposal activities on the Airport Island and within the Land Development Boundary. Habitat removed due to site clearance activities and related to avoidance, minimization and restoration of mangroves, vegetation and fauna are covered in the Habitat Removal and Restoration Plan (HRRP).

2.1 Avoidance and minimization of impacts (steps 1 and 2 in mitigation hierarchy)

The most Critical Habitat providing the highest biodiversity value per hectare are the tidal mudflat areas, based on the Natural England methodology that is applied for deriving the permanent Offset scope (Panks, 2021a; 2021b). These mudflats are Critical Habitat for wading birds. A strategy is chosen to avoid and minimize the loss of this Critical Habitat as much as possible during the initial construction activities on the Project site until the offset scope is implemented. This is done by adopting an optimized construction phasing scenario that avoids loss of most valuable habitats (tidal mudflats) as long as possible. Where the loss of Critical Habitat cannot be avoided prior to implementation of the offset scope, on-site temporary habitat enhancement will be done.

2.2 Temporary Habitat Enhancement (step 3 in mitigation hierarchy)

Taking the optimized construction phasing scenario as a start point a Temporary Habitat Enhancement scope is derived, using the Natural England methodology (Panks, 2021a; 2021b). The Temporary Habitat Enhancement scope further reduces biodiversity impacts within the Project site during construction, therefore allowing for a realistic timeframe to develop and implement the biodiversity offset scope.

The following methods for Temporary Habitat Enhancement have been considered:

- Improvement of the quality of existing habitats within the Project site;
- Creating new and similar habitats on the Project site as well as in the surroundings off-site;
- Beneficial reuse of dredged material.

Based on these methods, several opportunities for Temporary Habitat Enhancement have been identified within the Airport Island. The most promising location for temporary habitat enhancement is the Northern Disposal site (See Figure 3). For this area a more detailed assessment has been made in which fishponds in this area are evaluated regarding their suitability to enhance habitat conditions for wading birds in a feasible way. This assessment is done based on recent drone surveys, topographic survey, bathymetrical data and site visits. Based on this information, it is evaluated how much (repair) works are needed to enhance the biodiversity value of the existing fishponds

To determine the increased Biodiversity value of the Temporary Habitat Enhancement sites a similar method is applied as for the permanent offset, which is based on the Natural England methodology.

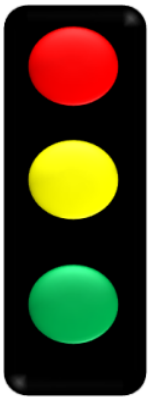
The fishponds will be managed to create a suitable habitat for wading birds with a higher value than in the baseline situation. Historically, these fishponds were aimed for aquaculture and only accidently provided suitable conditions for wading birds during the dry season. To optimize the management of existing fishponds use is made of recommendations for fishpond management as provided by professor Rheindt (Rheindt, 2021a; 2021b). Pond Design & Management Principles for the Temporary Habitat Enhancement sites take into account i.e., required water depths and fluctuation therein, connectivity with the broader ecosystem and the availability of mud-substrate.

Since the approach provided by professor Rheindt is also considered in the permanent Biodiversity Offset as described in the BOMP, the Temporary Habitat Enhancement will serve as a pilot for the permanent Biodiversity Offset and the lessons learned obtained in Temporary Habitat Enhancement scope can serve as valuable input to optimize the permanent Biodiversity Offset management strategy.

2.3 Adaptive Management and Monitoring Approach

Biodiversity management and the envisaged Temporary Habitat Enhancement works for this Project require an adaptive management approach. Adaptive management is common practice within the environmental management of dredging projects and is applied by continuously monitoring risk and the performance of the measures whilst taking note of the changing environment. Adaptive management related to this plan is applied in several ways and will be informed mainly by additional field surveys and monitoring, including:

1. Supplemental bird- and macro-invertebrate surveys.
2. Behavioral monitoring of trigger species related to the disturbance from construction activities. A traffic light system is adopted as presented in Figure 4. Special attention will be given to the following wading birds:
    - Pacific golden Plover
    - Far Eastern Curlew
    - Black-faced Spoonbill
    - Great Knot
    - Red-necked Stint
3. Monitoring and measuring the performance of the Temporary Habitat Enhancement activities (e.g., bird surveys in fishponds, recording of nesting sites, macro-invertebrate sampling in fishponds, monitoring of vegetation cover, visual inspections of algae, water quality measuring).
4. Water management monitoring.



Tier 3 HOLD: trigger species observed in the sand filling areas, disturbance observed for a prolonged period and measures applied insufficiently effective. Works to be ceased near the areas identified to be critical.

Tier 2 ALARM: trigger species observed in the sand filling areas and disturbance observed, mitigation measures to be adapted and effectiveness of measures to be monitored.

Tier 1 Business as usual: no trigger species observed near the sand filling activities or no disturbance

Figure 4 - Trigger system for disturbance to trigger species

3. Biodiversity Offset Management Plan (BOMP)

As part of the ESIA process for The New Manila International Airport (NMIA) (i.e., the 'Project') it is required to assess the value of the existing biodiversity in the project area. Following the mitigation hierarchy, the permanent loss of biodiversity as result of Project impacts that cannot be avoided, minimized or restored within the project area has to be offset outside the Project boundary. The Biodiversity Offsetting Management Plan (BOMP), which is currently in draft status contains the first steps towards implementation of the biodiversity offsetting scope for the Project. The BOMP describes biodiversity offsetting requirements and proposes a roadmap towards implementation, long term management and maintenance of an offset scope. Offset proposition have been explored from a landscape perspective and will be detailed further by following an integrated multistakeholder approach. To this end, the Project has embraced the Building with Nature philosophy while adhering to clear design principles.

3.1 Towards a permanent biodiversity offset scope

3.1.1 Starting principles

In the development of potential offset propositions, the IFC Guidance Note 6 and the Business and Biodiversity Offsets Programme Standards on Biodiversity Offsets have been used. The offsets are targeted for priority biodiversity with significant residual impacts, and monitoring will enable the Project to demonstrate that offset targets are achieved. The 10 offset principles for achieving No Net Loss and Net Gain include:

- **Adherence to the mitigation hierarchy**: A biodiversity offset is a commitment to compensate for significant residual adverse impacts on biodiversity identified after appropriate avoidance, minimization and on-site rehabilitation measures have been taken according to the mitigation hierarchy.
- **Limits to what can be offset**: There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.
- **Landscape Context**: A biodiversity offset should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes considering available information on the full range of biological, social and cultural values of biodiversity and supporting an ecosystem approach.
- **No net loss**: A biodiversity offset should be designed and implemented to achieve in situ, measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity.
- **Additional conservation outcomes**: A biodiversity offset should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place. Offset design and implementation should avoid displacing activities harmful to biodiversity to other locations.
- **Stakeholder participation**: In areas affected by the project and by the biodiversity offset, the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their evaluation, selection, design, implementation and monitoring.
- **Equity**: A biodiversity offset should be designed and implemented in an equitable manner, which means the sharing among stakeholders of the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way, respecting legal and customary arrangements. Special consideration should be given to respecting both internationally and nationally recognized rights of indigenous peoples and local communities.
- **Long-term outcomes**: The design and implementation of a biodiversity offset should be based on an adaptive management approach, incorporating monitoring and evaluation, with the objective of securing outcomes that last at least if the project's impacts and preferably in perpetuity.

- **Transparency**: The design and implementation of a biodiversity offset, and communication of its results to the public, shall be undertaken in a transparent and timely manner.
- **Science and traditional knowledge**: The design and implementation of a biodiversity offset should be a documented process informed by sound science, including an appropriate consideration of traditional knowledge.

Furthermore, the principles set out in the Manila Bay Sustainable Development Master Plan (MSDSMP) have also been used on this Project. The MBSDMP envisions “a sustainable and resilient Manila Bay”, consistent with the aspiration of its communities and stakeholders. In addition, it is believed that offset proposition should be scalable to support the development towards a more sustainable and resilient Manila Bay.

3.1.2 Valuing Biodiversity

The Natural England methodology is used to value the biodiversity of the proposed offsetting scope (Panks, 2021a; 2021b). The methodology provides a useful tool to systemically value a habitat development based on its distinctiveness, its condition, its strategic significance and its difficulty to implement. Next, to ensure long term sustainable implementation of derived offset scope, it is essential to translate these abstract values into an ecologically coherent system, which suits the local landscape context and considers the specific functions for relevant bird-species. In order to do so, several aspects are considered in the development of the permanent biodiversity offsetting:

- **Offset site**: Any site that will be used to realize the offset scope, has already a certain biodiversity value. The baseline biodiversity value of the offset site will be incorporated in the offset proposition.
- **Ecologic Rationale**: The offset proposition should create sufficiently distinct habitats to accommodate all trigger species. Some habitats are interchangeable, however only to some extent. Replacing one habitat with another based on biodiversity points should not lead to a situation where one offset habitat does not exist at all in the compensation proposition. Some key ecological considerations include:
    - Mangroves can only be offset by mangroves;
    - Between tidal mudflats and temporally dry & shallow fishponds some interchange is possible since their function “foraging for wading birds” coincides;
    - The high-water roost function of the temporally dry & shallow fishponds is not interchangeable with mudflats and will have to be developed in the offset area;
    - There is also some interchange with mudflats and inundated mudflats as these are part of a continuous landscape. During high tide the mudflats act as inundated mudflats and, over time and with sufficient sedimentation, inundated mudflats might evolve into mudflats.
- **Size versus value**: As habitat types have different biodiversity value per hectare and the effectiveness of intervention measures determines the extra biodiversity value per area, the total size of the offsetting proposition will depend on an iterative design process;
- **Cost-effectiveness**: It should be considered that some interventions have much higher biodiversity value per hectare but are also accompanied by larger costs. In such a scenario it could be more cost-effective to include a larger area with lower biodiversity scores per hectare.

3.1.3 Materialize offset scope

Based on the starting principles and required biodiversity values that need to be offset, the feasibility to materialize the offsetting scope has been assessed by developing various landscape propositions. These propositions include the creation and maintenance of the following measures:

- Mudflats tidal
- Fishponds temporally dry & shallow based on associated mangrove aquaculture or silvo-aquaculture best practices
- Mangrove green belts
- Rivers

Given the methodology, the size of the offset site is very sensitive to the existing and created (or enhanced) habitat conditions at the offset site. Based on the current system understanding, this results in an offset area of between approximately 1000-1700 ha.

3.2 Area Characteristics for suitable offset site

To develop a sustainable offsetting a thorough system understanding is required. The BOMP presents an elaborate system (physical, ecological and socio-economic) assessment that should serve as primary input for the selection of appropriate offsetting locations. Based on this assessment the area West of the airport (North coast of Manila Bay) is considered best suitable for compensation and the habitats that have to be offset are also naturally found in this area.

Recent significant developments in the northern Manila Bay coastal system can be characterized by reduced sediment discharge (through Pampanga and Angat rivers); flood control related canalization and diversions leading to lack of spreading of sediments over the coastal foreshores; reduced trapping of sediments as a result of i.e., the disappearance of mangroves; uncontrolled groundwater abstraction leading to land subsidence and a variety of spatial developments and changes in land-use. In selecting any offset site and developing any offset proposition, it is therefore important to re-introduce delta dynamics with enhanced sediment supply and trapping, stop the soil subsidence process and include (alternative) livelihood opportunities. The developments will be studied in further detail and have been integrated in the design of the initial offset propositions to guarantee the permanence of the offset up to at least 50 years.

3.3 Design philosophy

By adhering to the principles for permanent offsetting, a long term and sustainable offset scope can be implemented, managed, and maintained. To integrate habitats into the existing landscape and regional context, it is paramount to develop mutual understanding, support and ownership from stakeholders, both locally as well as at the national level. In addition, the dynamic character of natural habitats requires a different way of thinking when designing, constructing, and maintaining them. To support this process, the Building with Nature philosophy is embraced that integrates multiple benefits and provides flexibility to adapt to the long-term processes that are characteristic for Manila Bay.

Building with Nature places natural processes and system understanding at its center to create Nature-based Solutions. Building with Nature is inherently dynamic, multifunctional, innovative, and context specific. Six instrument enablers have been identified based on our experience of over a decade with Building with Nature. These enablers (see Figure 5) are instrumental to address the unique characteristics of Building with Nature projects. The enablers can aid in the creation, implementation and upscaling of Nature-based Solutions through the Building with Nature approach.

Figure 5: Building with Nature Enablers.

3.4 Roadmap towards implementation

As a result of the dynamic and innovative character of this offset scope (both from a physical and socio-economic perspective), it is anticipated that the road toward implementation is an iterative process, which require input and understanding from many stakeholders. Preferably, a collective (i.e., with the involved stakeholders) decision making process identifies what are the right measures for each location, which critical aspects to monitor, how to interpret the information and how to respond to changes. A collective approach contributes to acceptance measures to be implemented of the information from monitoring activities. The governance structure is at the core of an adaptive management process (Figure 6) which should therefore be critical to set up in the road towards implementation. Moreover, including stakeholders allows for gathering additional local data and information on systems functioning.

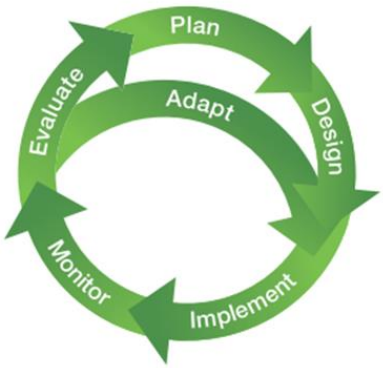


Figure 6 Adaptive management strategy

The current BOMP is considered as the start point in working towards implementation of a sustainable biodiversity offset scope. Knowledge of the local context and available site data are of great importance. The availability of good quality data determines the quality of the offset proposition design, construction and maintenance approach. Local context determines the acceptance and ownership of the biodiversity offsetting by local stakeholders. The foreseen roadmap towards implementation of the biodiversity offset scope is presented in Figure 7.

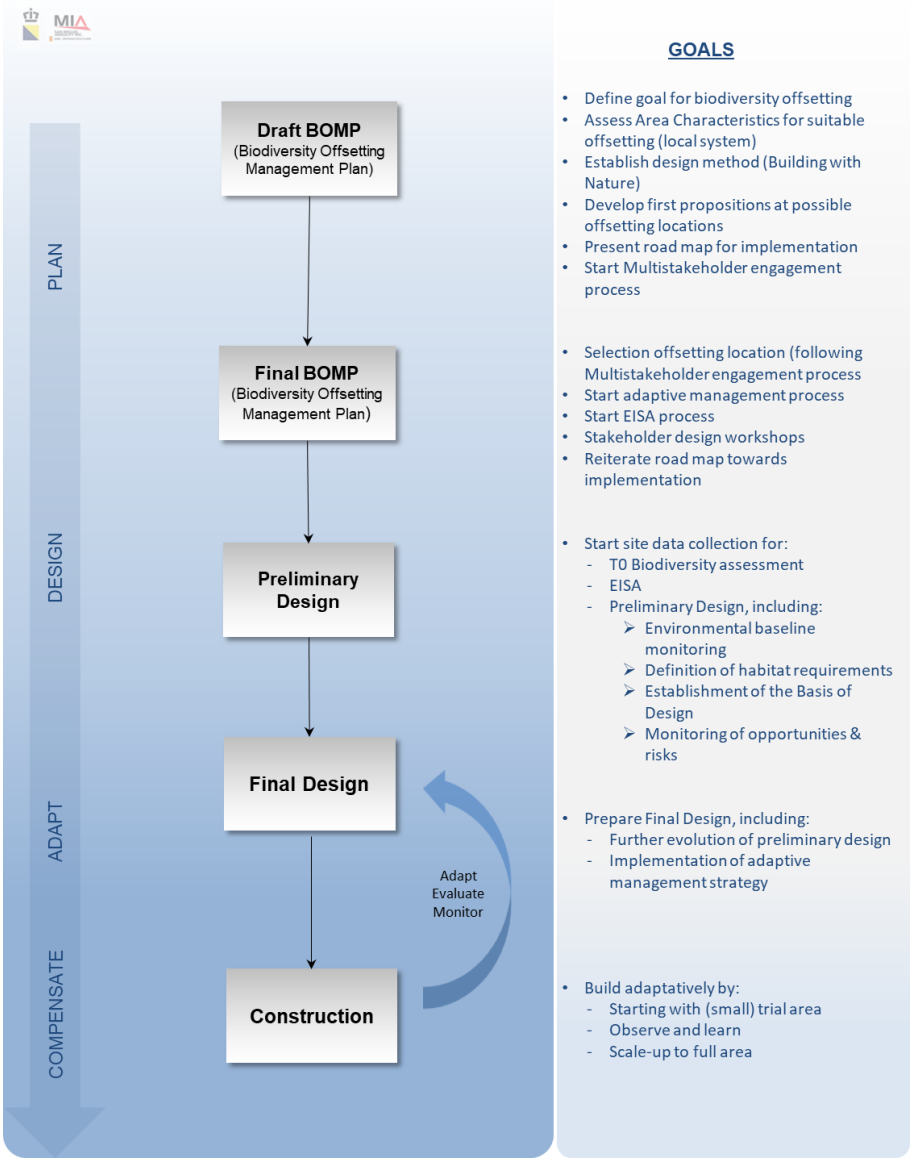


Figure 7 Roadmap of permanent biodiversity offsetting strategy

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