ENVIRONMENTAL IMPACT ASSESSMENT & EMMP

NParks

OUTLINE

The Marine Environment

Environmental Impact Assessments (EIA)

Environmental Monitoring and Management Plan (EMMP)

THE MARINE ENVIRONMENT

The Marine Environment covers over 70% of our planet and contains most of earths water.

Includes seas, bays, estuaries and coastal waters

Represent a significant source of biodiversity, water, food and oxygen.

Marine environment is essential in maintaining environmental conditions necessary for our health and wellbeing.

Large, complex and impossible to measure or monitor all aspects of the environment as part of a coastal and marine management

SINGAPORE'S MARINE BIODIVERSITY

Singapore's coastal and marine waters are home to:

More than 250 species of hard corals

(32% of hard coral species found worldwide)

SINGAPORE'S MARINE BIODIVERSITY

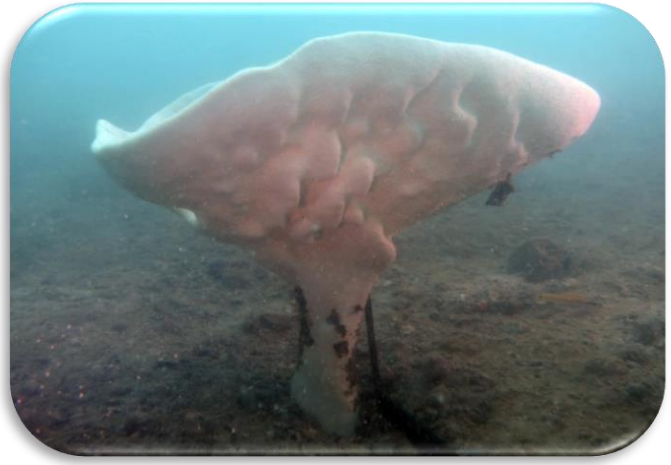
Singapore's coastal and marine waters are home to:

More than 100 species of reef fish

SINGAPORE'S MARINE BIODIVERSITY

Singapore's coastal and marine waters are home to:

200 species of sponges



12 seagrass species
(~ 50% of the Indo-Pacific species)

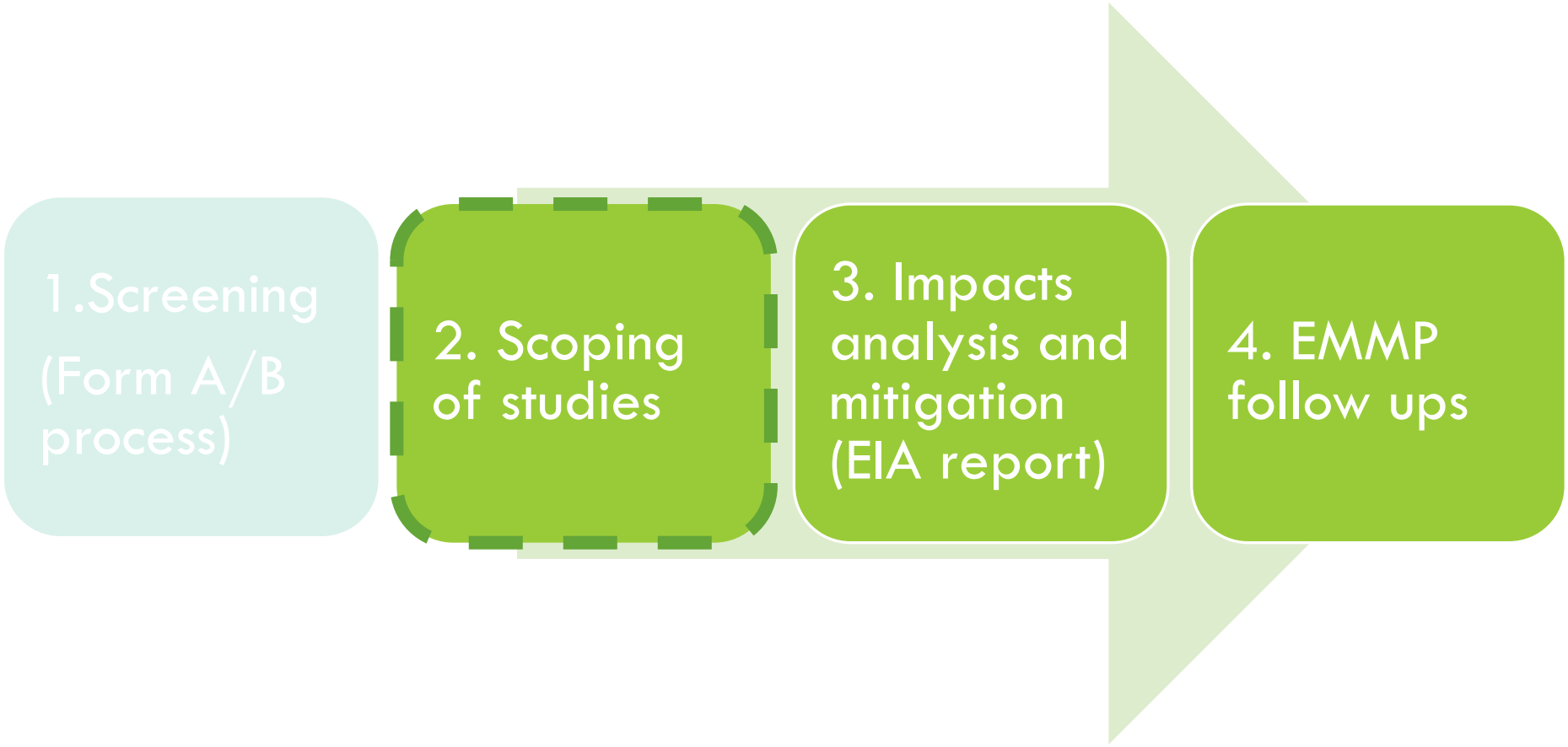
ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

An Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.

EIA done at the planning stage when an aquaculture zone is identified, or expansion to existing aquaculture zones are proposed. The developer or coordinating Agency will then conduct the EIA with inputs from technical agencies. This is done before any operators come on board or expansion is performed.

Any proposed development or aquaculture project that is not captured withion the EIA will be assessed independently under the EIA Framework

Workflow For Environmental Studies



- A full environmental study is termed an Environmental Impact Assessment (EIA)
- A subset of the EIA is the Biodiversity Impact Assessment (BIA), which focuses on NParks' main concerns
- More importantly, the environmental study report should be **scoped** according to agencies' concerns
- Types of studies include
  - Environmental baseline: Habitat mapping, water quality, flora and fauna
  - Modelling (waves, sedimentation, water quality, eutrophication)

WHAT IS IN A EIA REPORT?

A full scale impact assessment typically has the following components:

- Baseline survey: to determine existing site conditions
  - Noise (NEA)
  - Light (NEA)
  - Air Quality (NEA)
  - **Water Quality (NEA/PUB/NParks)**
  - **Flora (NParks)**
  - **Fauna (NParks)**
- Environmental Quality Objectives (EQO)
- Impact assessment
- Mitigation measures
- Environmental Monitoring and Management Plan (EMMP)

A subset of the EIA is the **Biodiversity Impact Assessment (BIA)**, which focuses on NParks' main concerns

ENVIRONMENTAL QUALITY OBJECTIVES (EQO)

Environmental Quality Objectives (EQOs) are parameters (e.g. water quality, sediments) set to define acceptable impact levels in a given environmental receptor.

Environmental Receptors can be biotic living things (e.g. species of conservation concern) or abiotic physical parameters (e.g. water quality, soil, air). EQOs are often pegged to existing legislation, such as NEA's air, water, soil, and noise pollution.

However, there is no existing legislation or international standards guiding for flora and fauna EQOs for biodiversity concerns. The EQOs will need to be formulated by the environmental consultant specific to the environmental receptor.

Example : High Nitrogenous waste (Water Pollution)

Seagrass

Dissolved inorganic Nitrogen threshold identified

0.13mg/L DIN

→

Classify the level of Impacts and tolerance limits

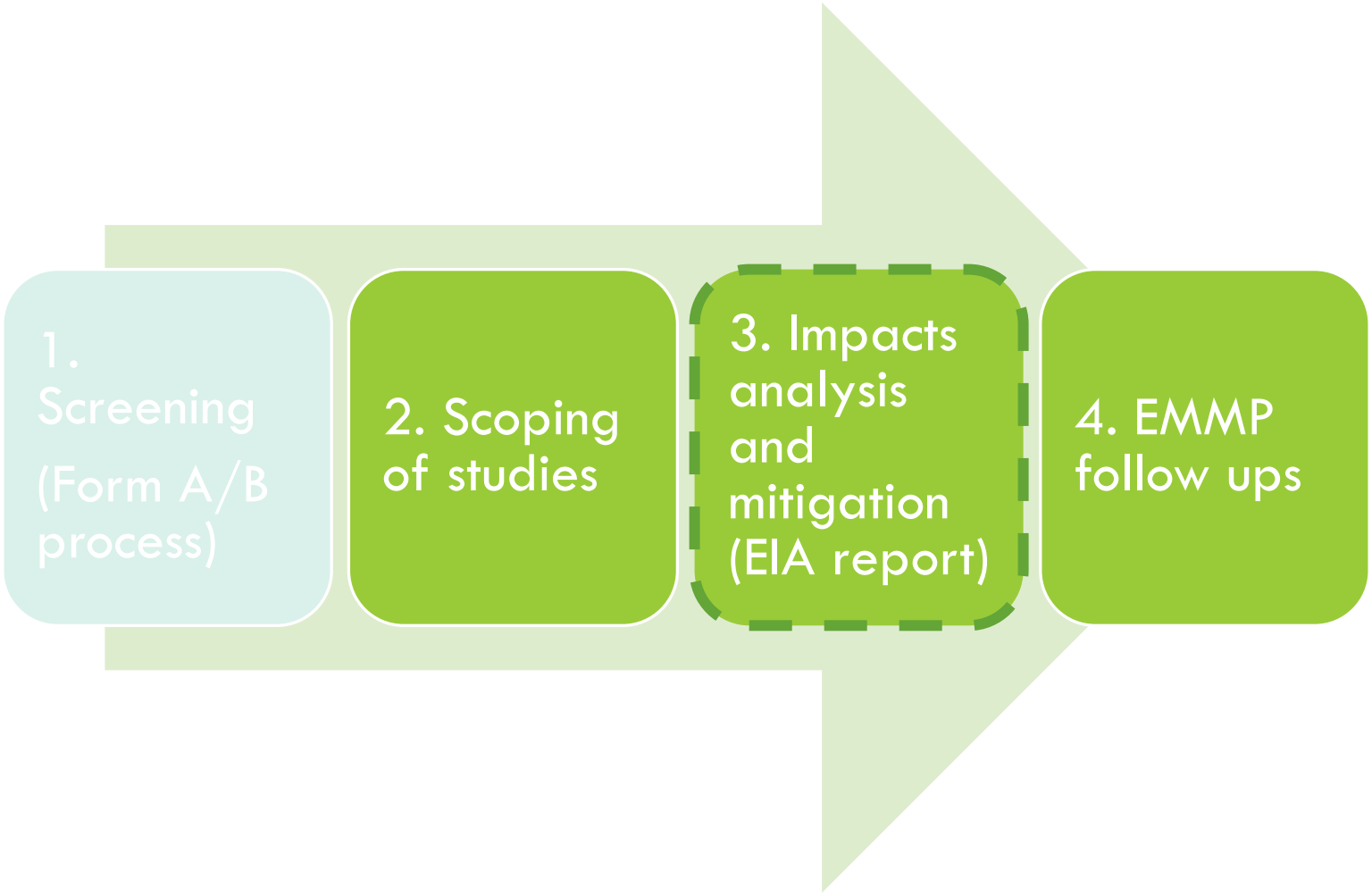
→

EQOs

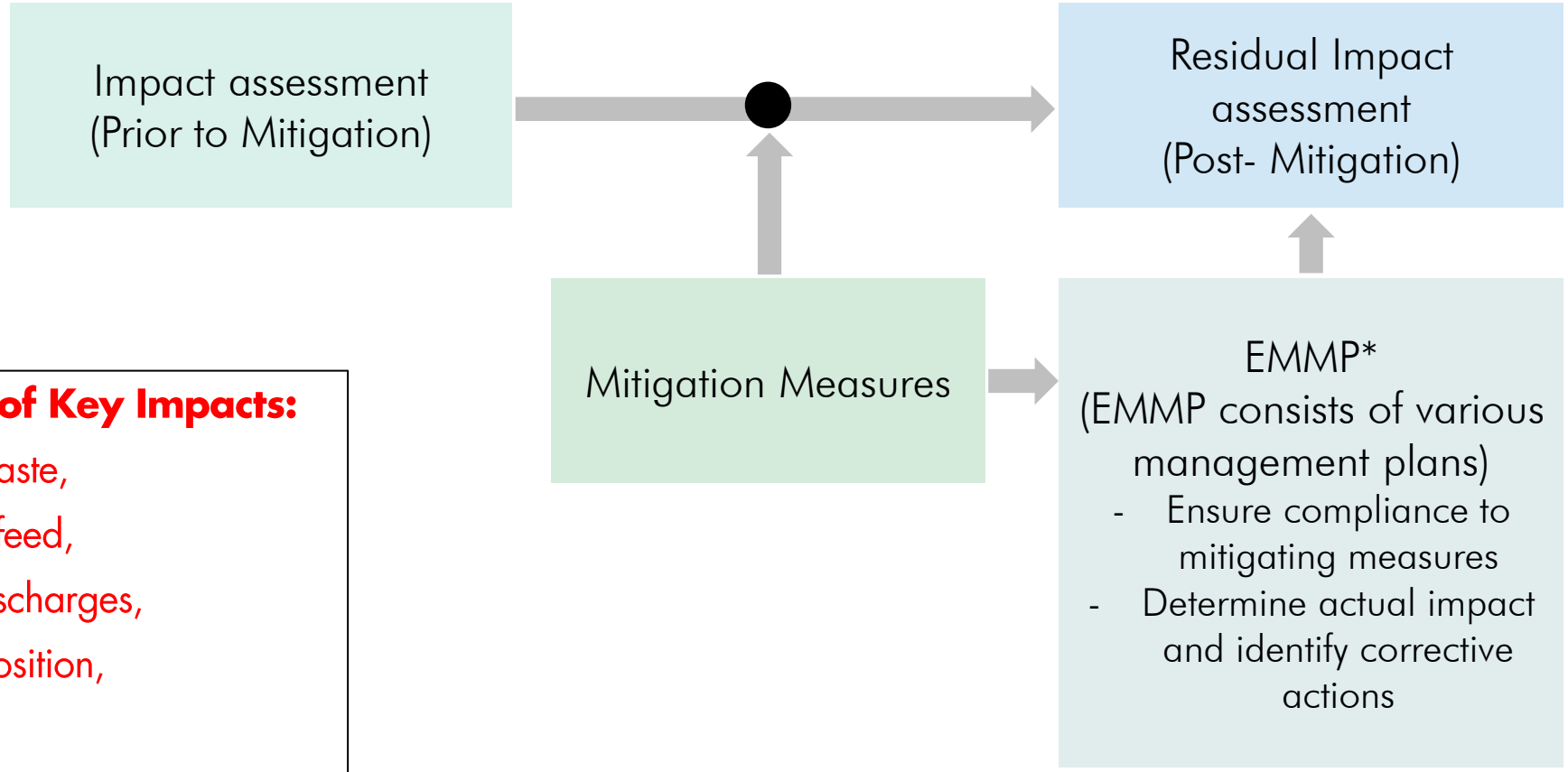
No impact to seagrass receptors

Classification	Description
No Impact	Changes are significantly below physical detection level and below the reliability of numerical models, so that no change to the quality or functionality of the receptor will occur. e.g. Modelled median DIN concentrations increase by <0.01 mg/L No measurable change in the seagrass receptor
Slight Impact	Changes can be resolved by numerical models, but are difficult to detect in the field as they are associated with changes that cause stress, not mortality, to ecosystems. Slight impacts may be recoverable once the stress factor has been removed. e.g. Modelled median DIN increase by above 0.01 mg/L but median concentrations are not expected to surpass a median of 0 13 mg/L No measurable change in seagrass receptor expected but increase in stress may occur ⟵✖
Minor Impact	Changes can be resolved by numerical models and are likely to be detected in the field as localised mortalities, but to a spatial scale that is unlikely to have any secondary consequences.
Moderate Impact	Changes can be resolved by numerical models and are detectable in the field. Moderate impacts are expected to be locally significant.
Major Impact	Changes are detectable in the field and are likely to be related to complete habitat loss. Major impacts are likely to have secondary influences on other ecosystems.

Workflow For Environmental Studies



ASSESSING IMPACTS



Examples of Key Impacts:

Metabolic waste,

Animal/fish feed,

Untreated discharges,

Carbon deposition,

Habitat loss,

Eutrophication

MITIGATION MEASURES

- Mitigation measures are measures taken to avoid, reduce, or remedy adverse impact arising from a development.

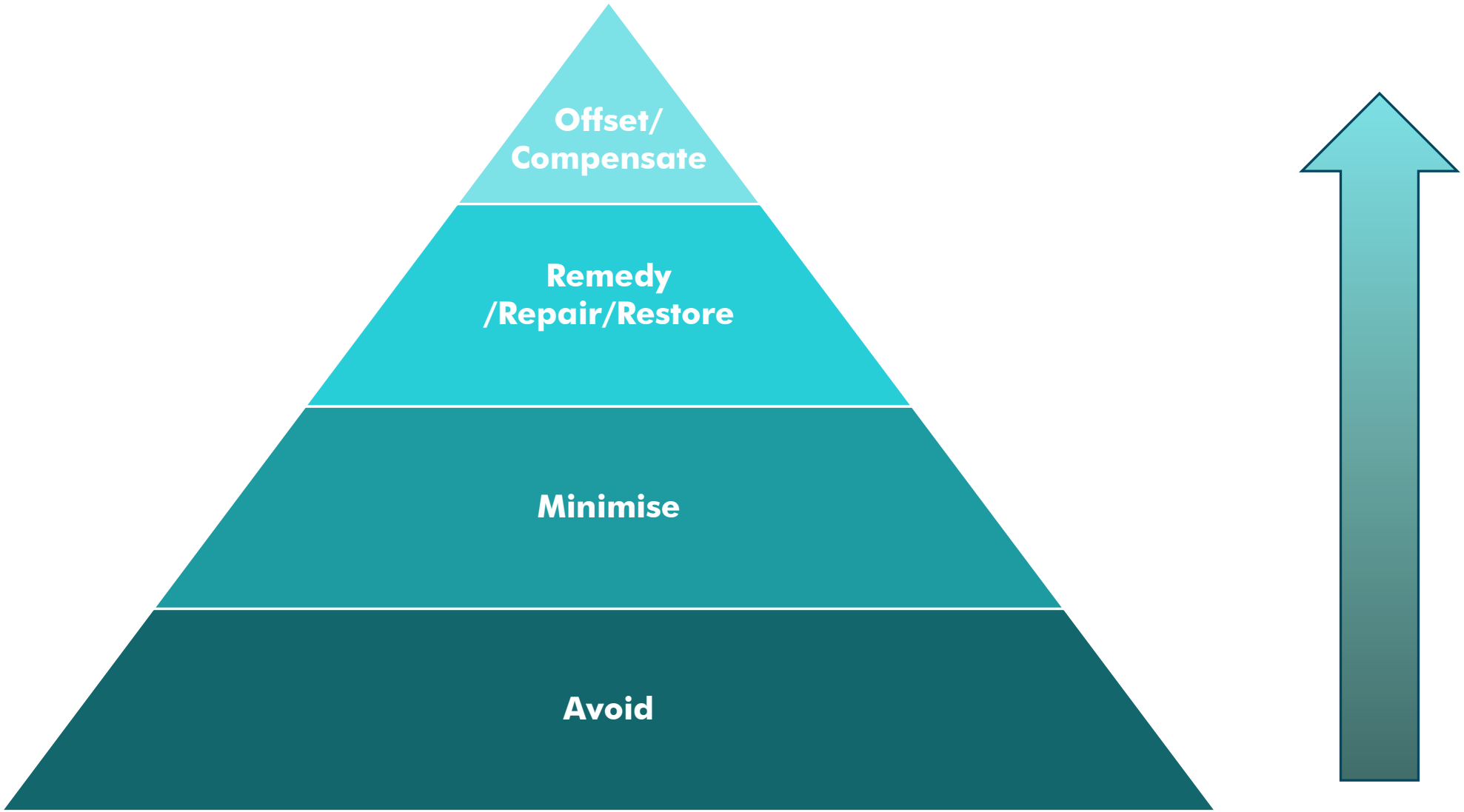
- NParks BIA Guidelines covers explanations and examples of mitigating measures, including a guide on how to write specific, measurable, achievable, realistic and time-bound mitigation measures

- Directly linked to the impact assessment, and should be developed with the aim of reducing net impact

- Mitigation measures should be tailored to address the different types and stages of construction work, as well as for the different habitats on site

- Most importantly, they **must be feasible** and the developer/operator must be able to undertake the measures

MITIGATION HIERARCHY



MITIGATION HIERARCHY

Example of Avoiding

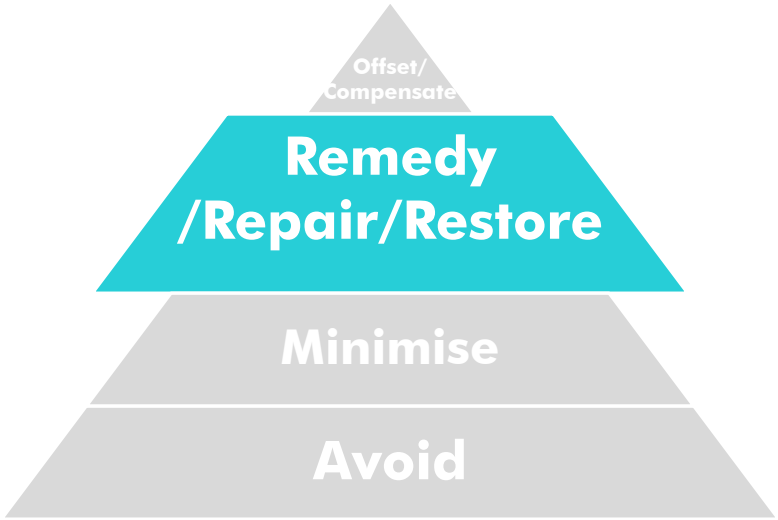
The aquaculture zone or farm is relocated/shifted away from the sensitive habitats to avoid the impact to the entire habitat patch during the design and planning phase of the project

MITIGATION HIERARCHY

Example of Minimising impacts

- Treating aquaculture discharge
- Using high quality feed/pellets
- Management of feeding quantity
- Type of farms
- Optimising plot layouts

MITIGATION HIERARCHY

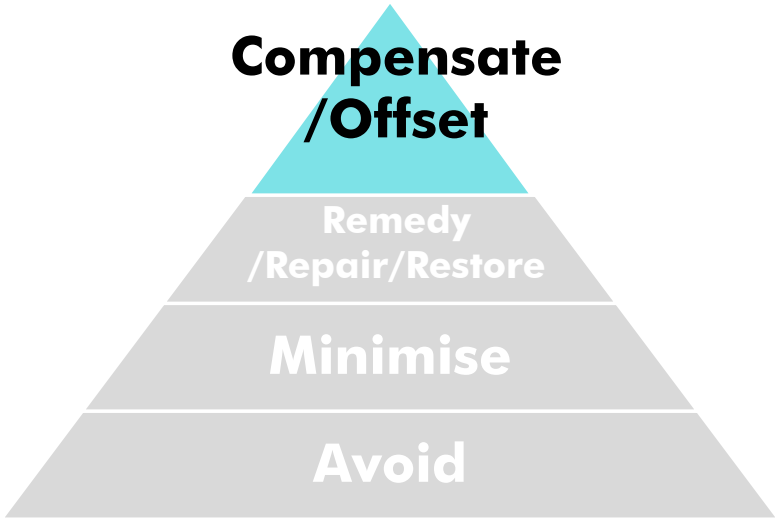


Example of Remedy/Repair/Restore

After construction, appropriate flora or habitat are re-established in appropriate locations on the impacted site to restore part of the habitat.

Difficult for marine based systems

MITIGATION HIERARCHY



Example of Compensate/offset

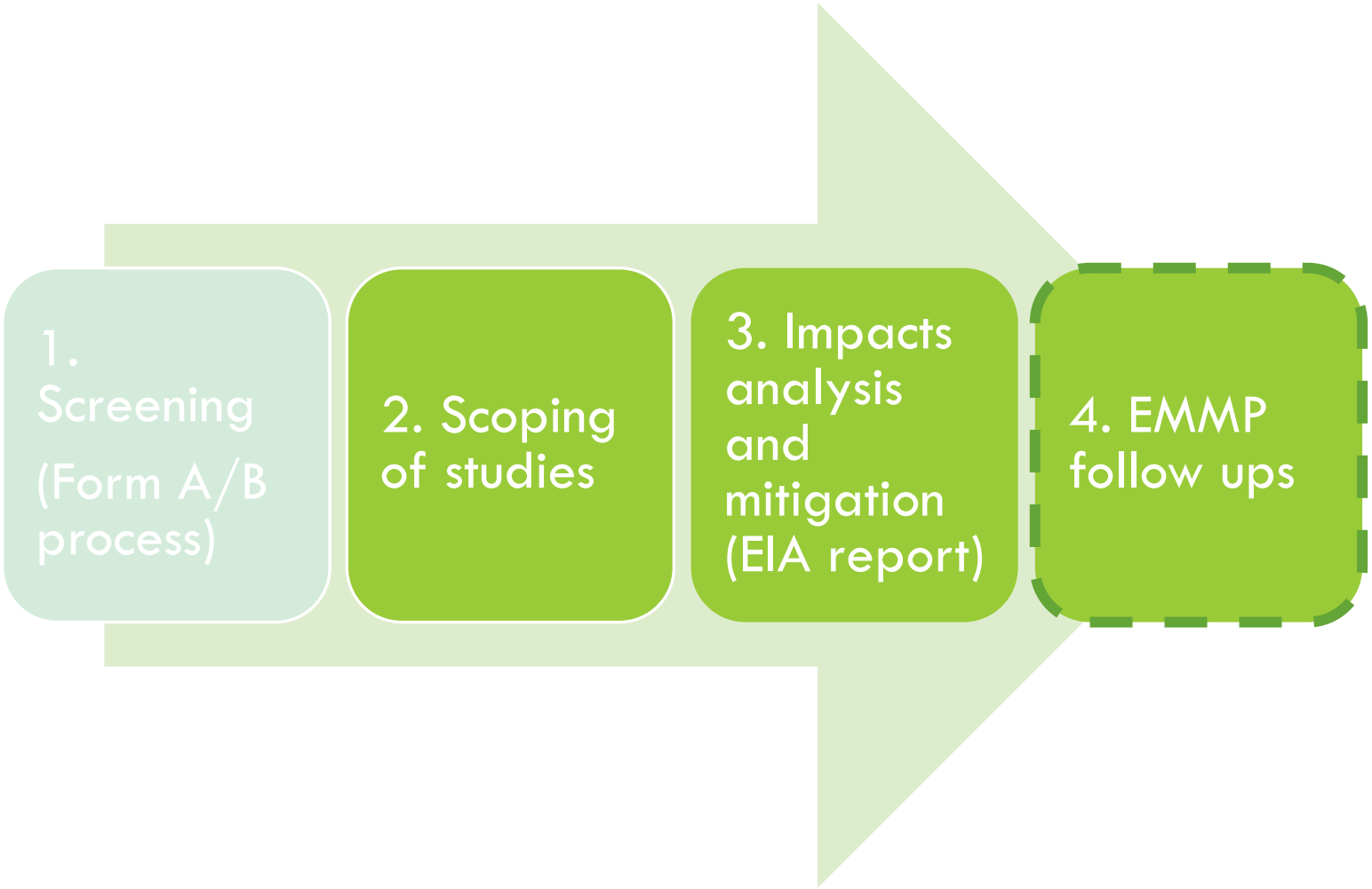
Where site clearance is unavoidable and biodiversity that are located in the impacted site are salvaged, to be translocated elsewhere in consultation with NParks.

Corals are relocated from direct impact zone to alternative sites within and/or outside of project area, in consultation with NParks.

RESIDUAL ENVIRONMENTAL IMPACTS

- EIA framework does not remove all environmental impacts
- Ultimately, the environmental study takes in inputs from the developer and their constraints
- If the study finds that residual impacts are major, other cost, benefits and demands such as land/sea space use needs will need to be considered together to assess if the impacts can be accepted

WORKFLOW FOR ENVIRONMENTAL STUDIES



ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN (EMMP)

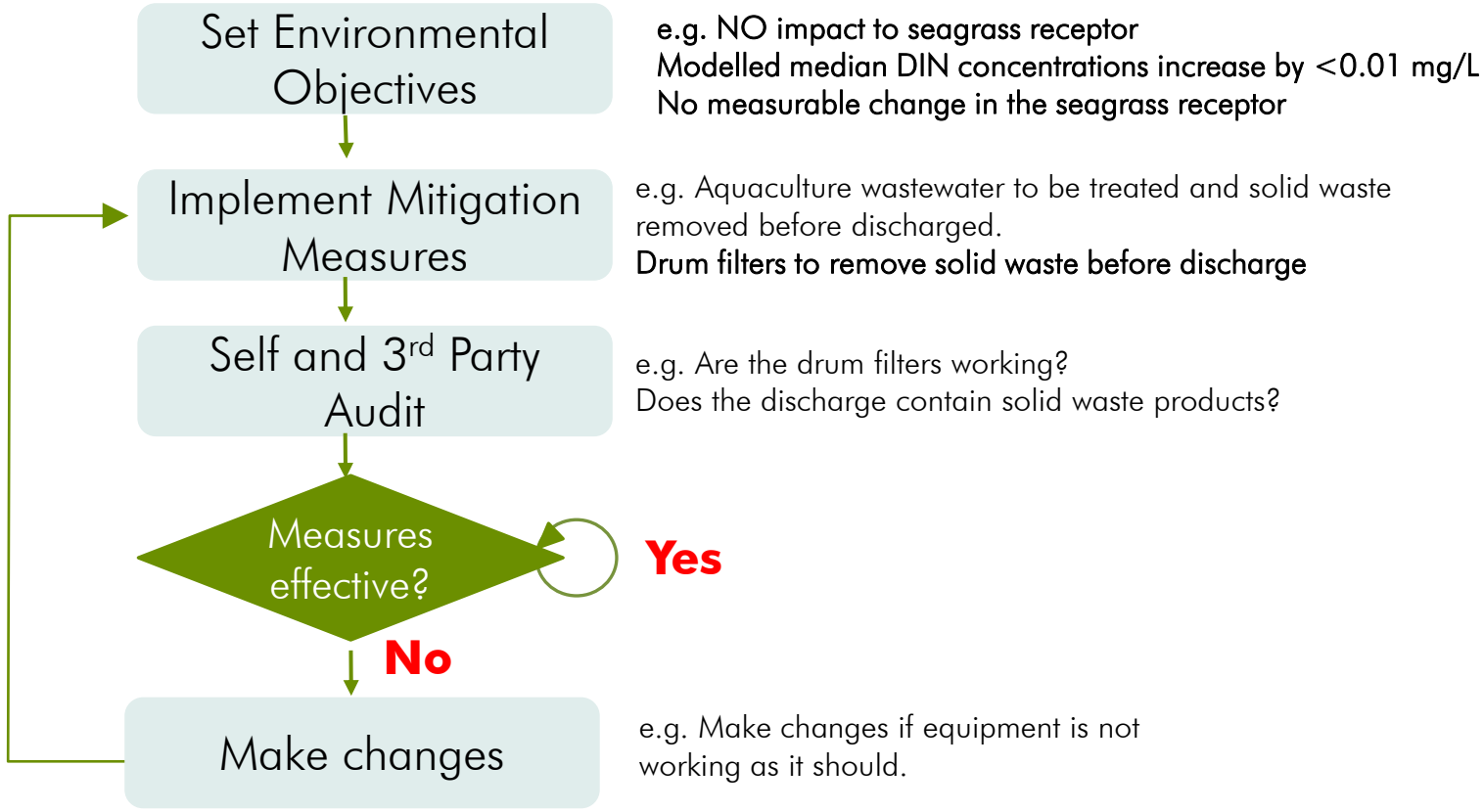
The EMMP is the implementation tool of the overall Environmental Impact Assessment (EIA), which includes but is not exclusive to biodiversity.

To proactively manage and confirm that impacts of a development do not exceed the stipulated Environmental Quality Objectives (EQOs) for the project

An EMMP describes how an action might impact the natural environment in which it occurs, and sets out clear commitments from the entity taking the action on how those impacts will be avoided, minimised, managed, remedied and compensated so that they are environmentally acceptable.

ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN (EMMP)

A tool to monitor the development:



Types of monitoring/management

- Water quality monitoring
- Discharge monitoring
- Feed Control
- Regular checks on equipment and mitigation measures

INSIDE AN EMMP

1. Executive summary or introduction
2. Project description
3. Environmental objectives
4. Potential environmental impacts and risks
5. Environmental management measures which will include:
   - Activities, controls and performance targets
   - Management maps and diagrams
   - Monitoring programmes and response plans
   - Corrective actions
6. Environmental Management Roles and Responsibilities
7. Reporting procedures
8. Environmental training for site workers
9. Emergency contacts and procedures
10. Audit and review procedures which include:
    - Environmental auditing
    - Environmental management plan review

Management roles and responsibilities can be further designated for specific entities in aquaculture zone.

E.g. Aquaculture zone level or Farm Level

Thank You!