MOTT MACDONALD

New Manila International Airport

Non-technical summary (NTS) of the Environmental and Social Impact Assessment (ESIA) report

April 2022

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Issue and Revision Record

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A	8 Dec 2021	SC See B Roa	R Barloso	J Mercado	Draft submission to SMAI for review
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1 Introduction

1.1 Overview

This non-technical summary (NTS) of the environmental and social impact assessment (ESIA) presents an overview of the Project, including the findings and recommendations of the environmental and social (E&S) studies that have been undertaken for the development of the New Manila International Airport (NMIA, thereafter referred to as 'the Project') located in the Municipality of Bulakan, Province of Bulacan, Philippines. As part of the airport construction, several associated facilities and project components are required. Supplementary ESIAs for these associated facilities and project components have been carried out, of which the findings and recommendations are also summarised in this NTS.

The ESIA report for the platform area, construction and operation of the airport prepared by Mott MacDonald includes the following volumes:

- Volume I: Project description (Report reference: 409686-02-V1 30 November 2021)
- Volume II: Scoping and Methodology (Report reference: 409686-02-V2 30 November 2021)
- Volume III: Environmental and Social Baseline (Report reference: 409686-02-V3 30 November 2021)
- Volume IV: Stakeholder Engagement Framework and Grievance Mechanism (Report reference: 409686-02-V4 30 November 2021)
- Volume V: Impact Assessment (Report reference: 409686-02-V5 30 November 2021)
- Volume VI: Environmental and Social Management Plan (ESMP) (Report reference: 409686-02-V6 30 November 2021)

Supplementary ESIA reports for the project components and associated facilities prepared by Environmental Resources Management (ERM) includes the following:

- Access channel (Report reference: 0592849_Boskalis_Access Channel_ESIA_FINAL_Rev 03 dated 30 September 2021)
- Offshore disposal (Report reference: 0592849_Boskalis_Disposal site_ESIA_Rev 03 dated 29 June 2021)
- San Nicholas Shoal (SNS) sand winning area (Report reference: 0607694_SNS_ESIA_Rev 03 dated 9 December 2021)

As part of the social impact assessment, standalone human rights impact assessments (HRIA) have been carried. The findings from the following HRIAs have also been summarised in this NTS:

- HRIA for platform area (Report reference: 409686-06-G HRIA for NMIA-Revised Draft dated 07 February 2022) prepared by Mott MacDonald
- HRIA for access channel and SNS sand winning area (Report reference: Human Rights Impact Assessment Report 0607694 Rev 02 dated 10 December 2021) prepared by ERM.
- HRIA for offshore disposal (Report reference: Human Rights Impact Assessment Report 0592849 Rev 03 dated 29 June 2021) prepared by ERM.

1.2 What is the NMIA Project and who is developing the Project?

The Project is being developed by San Miguel Aerocity, Inc. (SMAI, the Project Company) and governed by a 50-year Concession Agreement (CA) with the Republic of Philippines and will be

built under a Build-Operate-Transfer (BOT) framework through the Department of Transportation (DOTr)[1].

SMAI is a wholly owned subsidiary of San Miguel Corporation's (SMC) infrastructure arm, San Miguel Holdings Corp. (SMHC), which is one of the Philippines' largest and most diversified conglomerates. In recent years, SMC has added to its portfolio additional market-leading businesses and investments in the Philippines' fuel and oil, power, infrastructure, real estate and banking industries, which contributes approximately 5% of the country's gross domestic product (GDP).

SMAI has appointed Mott MacDonald to prepare the ESIA for development of the platform area and Phase 1 of the airport complex development and operation. SMAI has also appointed Boskalis Philippines Inc. (Boskalis) as the main contractor for the platform area, access channel, temporary berthing facility, San Nicholas Shoal (SNS) winning area and offshore disposal area.

A summary of the Project information is presented in Table 1.1 and shown in Map 1.1 and Map 1.2.

Table 1.1: Summary of Project information and components

Aspect	Detail
Project developer	
Project name	New Manila International Airport (NMIA)
Project company	San Miguel Aerocity, Inc (SMAI)
Address	40 San Miguel Avenue, Mandaluyong City, Metro Manila, The Philippines
Website	https://www.sanmiguel.com.ph/page/san-miguel-aerocity-inc[2]
Email	feedback@aerocity.sanmiguel.com.ph
Phone	+632 8632 3000
Location	
Project location	Barangays Taliptip and Bambang, within the Municipality of Bulakan. Geographical coordinates: 14º 44' 30''N, 120º 52' 41''E
Project area	2,565 hectares
Project components	
Land development	● Site preparation works involving site clearance, formation of ground platform, levelling and compaction works to achieve the desired elevation of the ground platform, and appurtenant coastal structures necessary for the subsequent construction of airport facilities and required structures, within an estimated area of 1,700 hectares
Airfield facilities	● Two runways capable of independent simultaneous operations ● Taxiway ● Apron ● Isolated aircraft position ● Airside service road ● Air traffic control tower ● Navigation aids and equipment
Terminal facilities	● Passenger terminal building. This includes main functional areas of a passenger terminal building e.g. departures and check-in halls, Customs, Immigration and Quarantine checkpoints, Security checkpoints, Boarding lounges, Departure baggage handling area, Arrival hall, Retail area, Arrival baggage handling area ● Cargo terminal building.
Airport support facilities	● Airport police and security facilities

[1] The right to develop to develop the airport complex was given to the Project Company through a long-term lease agreement with an option to develop and acquire the relevant areas to be covered by the Project.

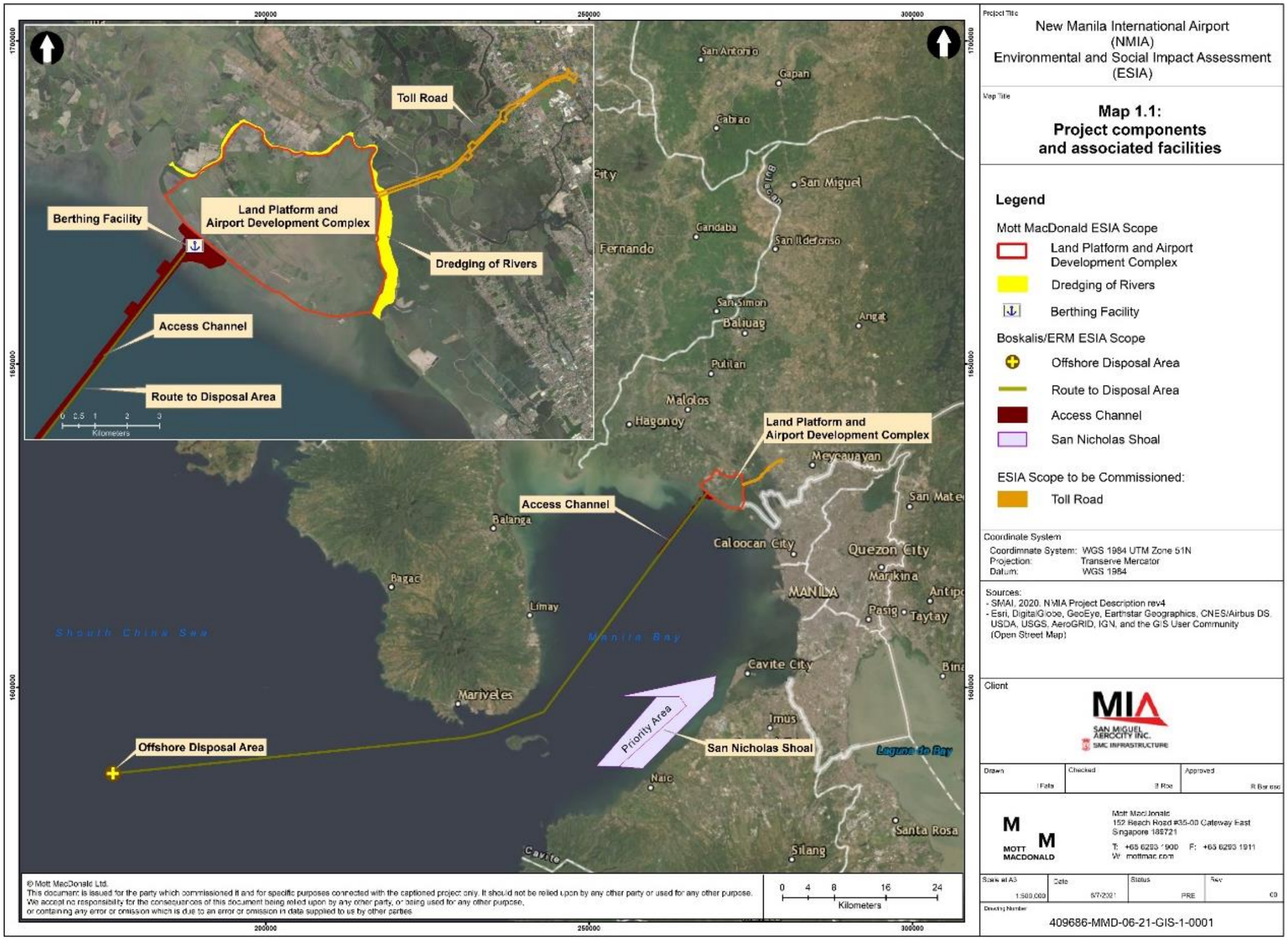
[2] Development of the Project dedicated website (sanmiguelaerocity.com) is currently in progress

Aspect	Detail
	● Customs, immigration and quarantine facilities ● Air rescue and firefighting station (ARFF) ● Perimeter roads, fencing and landscaping ● Maintenance building ● Meteorological station ● Airport employee restaurant ● Administration building
Airline support facilities	● Aircraft maintenance hangar ● Ground service equipment (GSE) maintenance and storage facility ● Aircraft fuelling facilities
Airport access and parking facilities	● Main access ● Vehicular parking and circulation
Airport utilities	● Power supply (construction phase)[3] ● Sewerage and sewage treatment facility ● Water supply ● Solid and hazardous waste facility ● Communications facility
Ancillary components and facilities	● Embankments, revetments and bunds ● Drainage outfalls
Access channel	Due to the shallow water depths at inner Manila Bay adjacent to the platform area, a navigation and an access channel that is approximately 15km long and 250m wide with water depths ranging from -16.5m to -8.75m below mean sea level) is required to be dredged to allow for construction vessels to reach the platform area. A separate ESIA was undertaken for the access channel by ERM.
Associated facilities	
San Nicholas Shoal (SNS) sand winning area	The risk of airport inundation was found to increase at lower platform elevations and therefore the project area will be required to be elevated by at least 3.85m above sea level. The material for the airport platform will be sourced from SNS sand winning area which is located approximately 30km from the Airport site and within Manila Bay. A separate ESIA was undertaken for the winning area by ERM.
Offshore disposal area	An area located offshore has been designated as a disposal site for all dredged material coming from the development of the access channel. Since the material to be dredged is soft silt/clay, it is unsuitable to be re-used in the land formation for the platform area and needs to be disposed. The offshore disposal site is located approximately 115km from the airport site. Since the Project is limited to the offshore disposal activities and the transportation of the dredged materials to the disposal site only, the ESIA does not cover an operation phase. The disposal area is a Project associated facility, for which a separate ESIA was undertaken and developed by ERM.
Toll road	A toll road of approximately 8km in length will be constructed to link the NMIA to Metro Manila via the North Luzon Expressway with a long-term masterplan for access network being finalized. The toll road is not within the scope of these ESIAs (ESIA for the platform area and supplementary ESIAs for access channel, offshore disposal and SNS sand winning area) and will undergo a separate ESIA (Note: Assessment yet to be commissioned).
Access road	The Project may require the construction of new roads and the expansion/upgrade of existing roads for the transportation of materials to the NMIA. The access roads network is currently still in the process of selection and finalisation. The access road is not within the scope of these ESIAs (ESIA for the platform area and supplementary ESIAs for access channel, offshore disposal and SNS sand winning area) and will undergo a separate ESIA (Note: Assessment yet to be commissioned).

Source: SMAI, 2021

[3] Power requirements during airport operations will be sourced from the national grid. However, depending on future energy availability from the national grid, a power supply facility may be constructed for the purpose of the operation of the Project, which will undergo a separate ESIA.

Map 1.1: Project components and associated facilities



Source: Mott MacDonald, 2021

Map 1.2: Project layout and components of the airport platform

Source: SMAI, 2021

1.3 Why is the NMIA Project needed and what alternatives were considered?

The current Ninoy Aquino International Airport (NAIA) is the main international aviation gateway to the Philippines and the main airport serving Metro Manila and surrounding areas. Prior to the COVID-19 pandemic, NAIA had reached its runway capacities despite all the improvements being implemented or contemplated.

In response to the growth in travel demand and to prevent economic losses, a new airport near Metro Manila is required. The Project Company intends to "construct, develop, establish, operate and maintain" the NMIA with the intention to address the existing air traffic congestion at the NAIA. It also aligns with the government's effort to revive the economy through the implementation of significant infrastructure projects.

The Project has been developed with consideration of technical, environmental, social, and economic perspectives and three project alternatives were assessed

Table 1.2: Project alternatives analysis details

Project Alternatives	Detail
'Do nothing' option	If the Project is not built, the negative impacts associated with this type of project would not occur (for example impact on human resettlement or aquatic ecology). However, the area would not benefit from the wider benefits the Project would provide (eg any financial benefits such as employment of local people) In addition, the Project would not alleviate the already reached runway capacities of NAIA. This lost demand will have a negative impact on the Philippine economy, particularly the tourism industry which amounts for 12.2% of the national economy in 2017.
Alternative airport systems	Two existing reports have been used to assess different potential airport sites, the Japan International Cooperation Agency (JICA) survey (May 2016) assessed nine potential airport sites, concluding the existing air base located offshore Cavite Peninsular was most feasible. On the other hand, the feasibility study (September 2016) of SMAI had considered alternative solutions to air traffic decongestions at NAIA, concluding that a twin/dual airport system was not optimal, instead a single airport system should be selected.
Alternative site options	The following criteria were used in considering the best locations for the Project. ● Aviation safety requirements ● Flightpath/aerodrome requirements ● Likelihood of availability of land area ● Distance away from Metro Manila (within 20 min of Metro Manila) ● Ease of accessibility ● Environmental and social impacts ● Disturbance to surrounding population The location of Bulacan was chosen as it best fulfilled the site selection criteria.

Source: SMAI, 2021

1.4 What is the Project's implementation schedule?

The Project includes the development, construction, and operation of the which will be delivered in three phases. The succeeding phases will be built based on a schedule reflecting projected demand:

- Develop and construct passenger terminals, airside facilities, including aviation-related equipment and support facilities required in the operation to cater a minimum annual capacity of 35 million annual passenger (MAP) under Phase 1. The scope of the ESIAs stated in Section 1.1 and this NTS cover only Phase 1 impacts.
- Phase 2 will increase the annual passenger capacity of the Project up to 60 MAP. SMAI will start implementation on the day that is 15 years from the date of issuance of the Certificate

of Substantial Completion for the Phase 1 or when actual passenger volume at the NMIA has reached at least 60% of the first Phase Capacity, whichever comes earlier.

- The final implementation Phase (3) shall further increase annual passenger capacity up to 100 million. SMAI will start implementation on the day that is 15 years from the date of issuance of the Certificate of Substantial Completion for the second Implementation Phase or when actual passenger volume at the NMIA has reached at least 60% of the second Phase capacity, whichever comes earlier.

Site preparation was planned to start in the second quarter of 2020. Due to effects of the COVID-19 pandemic, land development works have been adjusted to commence within the first quarter of 2021. Physical works are targeted to start by second quarter of 2021. Based on the approved and revised implementation schedule, commercial operation is expected to start in March 2027.

1.5 How will the Project be constructed?

The Project will require several marine and land-based equipment as part of the land development, dredging and airport complex construction activities. This will involve the use of the following:

- Earth moving equipment, pavers, and construction vehicles
- General civil and building works equipment such as concreting equipment including lighting tower (needed in all activities during night works), generator sets and asphalt batching plant
- Marine vessels such as dredgers and support vessels and a logistics base

Main construction activities will involve:

- Land preparation, including site clearance, formation of ground platform, levelling and compaction works to achieve the desired elevation of 3.85m above sea level. Approximately 150 million cubic metres of sand will be sources from the San Nicholas Shoal.
- Dredging activities, river rehabilitation works, proposed embankments, bunds and revetment walls, drainage outfalls and temporary marine berthing facility. Approximately 900,000 tonnes of rocks will be sources from a quarry located in Lusong, Mariveles, province of Bataan.
- Site office and ancillary facilities construction
- Access and internal road network (civil works)
- Mobilisation of materials and equipment to site
- Generation, management, storage and disposal of hazardous and non-hazardous waste
- Generation, treatment and disposal of wastewater
- Stakeholder engagement and grievance management

During the construction phase, the Project will require an average of 1,500 workers during the peak construction period for land platform development. Workers will be accommodated on a floating vessel and an accommodation camp planned to be established within the land development boundary.

For the airport construction, a total of 18,000 workers are expected to be employed to undertake unskilled, skilled, technical and professional positions, who will be housed on land-based accommodations. Location of accommodation for all workers for airport construction is yet to be finalized. It is envisaged that SMAI will hire qualified local applicants based on the following order of priority:

- First priority: residents within the host Barangays (Taliptip and Bambang)
- Second priority: residents within the Municipality of Bulakan

- Third priority: residents within the Province of Bulacan

1.6 Project E&S compliance requirements

SMAI has secured all government and regulatory approvals, including approval of two environmental impact assessments (EIA) from the Department of Environment and Natural Resources (DENR). The two regulatory EIA studies for the land development (i.e. land area only) and the NMIA (i.e. the airport complex), were conducted in 2018 and 2019, respectively, as per regulatory requirements. Separate Environmental Impact Statement (EIS) reports were prepared as part of the EIA process. The Environmental Compliance Certificate (ECC) for the land development was obtained on 14 June 2019, whilst the ECC for the airport development was obtained on 01 June 2021.

In addition to complying with the requirements of the laws and regulations of Philippines, the Project is also required to comply with the international standards and guidelines including the following:

- Equator Principles IV, July 2020
- International Finance Corporation (IFC) Performance Standards (2012)
- World Bank Group (WBG) Environmental Health and Safety (EHS) Guidelines, such as:
  - WBG General EHS Guidelines, 2007
  - WBG EHS Guidelines for Airports, 2007
  - WBG EHS Guidelines for Airlines, 2007
- United Nations Framework Convention on Climate Change (UNFCCC)
- Convention on Biological Diversity (CBD)
- Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES)
- Convention on Conservation of Migratory Species of Wild Animals
- United Nations Guiding Principles on Business and Human Rights
- International Bill of Human Rights
- International Labour Organisation core labour standards
- UN human rights treaties
- Dhaka Principles for Migration with Dignity

In addition, the following airport specific standards and guidelines were used:

- International Civil Aviation Organizations (ICAO) – safety and environmental requirements
- International Air Transport Association (IATA) standards
- International Standards Organisation ISO14001:2015[5] Environmental management systems and ISO45001:2018[6] Occupational health and safety management systems standards

[5] Checked to be accurate as of Aug 2021, ISO 14001:2015 – Environmental management systems

[6] Checked to be accurate as of Aug 2021, ISO45001:2018 – Occupational health and safety management systems

2 What is the ESIA process and approach?

The ESIA follows a systematic process that evaluates the potential impacts of the Project that could have impacts on the physical, biological, social/socio-economic and cultural environment; identifies preliminary measures that the Project will take to avoid, minimise/reduce, mitigate offset or compensate for potential adverse impacts; and identifies measures to enhance potential positive impacts where practicable.

2.1 Screening & scoping

Screening of the Project was conducted against international and national regulations to indicate the potential E&S risks which would need to be further considered during the scoping process. The potential Area of Influence (AoI) was established through the investigation of the Project's context in relation to the existing environment and sensitive receptors. The AoI was used as the basis for scoping, to identify potential interactions between the project and any sensitive resources/receptors, to prioritise these interactions with regards to the magnitude and severity of their impacts. The Project description was developed and confirmed by SMAI in order to set out the scope of the Project features and activities, with particular reference to the aspects which have the potential to impact the environment.

2.2 Baseline description

Following the initial steps of screening and scoping, a baseline study which includes a combination of information from field studies, publicly available information and literature was conducted. To provide a context within which the Project can be assessed, a description of physical, biological, social / socio-economic conditions that would be expected to prevail in the absence of the Project is characterised. The baseline includes information on all resources/receptors that were identified during scoping as having the potential to be affected by the Project. Details on the baseline description can be found in section 3 of this NTS.

2.3 Impact assessment

Impact identification and assessment starts with scoping and continues through the remainder of the ESIA process which comprises:

a. Impact predictions: to determine potential impacts to sensitive receptors as a consequence of the Project and its associated activities;
b. Impact evaluation: to evaluate the significance of the predicted impacts by considering magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the receptor;
c. Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts; and
d. Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

The impact significance for the platform area, construction and operation of the airport was determined based on the following matrix:

Sensitivity	Magnitude						
	Adverse			*Beneficial*			
	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
High	Major	Major	Moderate	Negligible	Moderate	Major	Major
Medium	Major	Moderate	Minor	Negligible	Minor	Moderate	Major
Low	Moderate	Minor	Negligible	Negligible	Negligible	Minor	Moderate
Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

Source: Mott MacDonald, 2021

The impact significance for the access channel, offshore disposal site and SNS sand winning area was determined based on the following matrix:

Magnitude of Impact	Sensitivity/Vulnerability/Importance of Resource/Receptor		
	Low	**Medium**	**High**
Negligible	**Negligible**	**Negligible**	**Negligible**
Small	**Negligible**	**Minor**	**Moderate**
Medium	**Minor**	**Moderate**	**Major**
Large	**Moderate**	**Major**	**Major**

Source: ERM, 2021

In accordance with the UNGPs, Principle 14, severity of human rights impacts should be determined by considering the scope (number of people affected), scale (seriousness of the impact), irremediability (any limits to restore the individual impacted to at least the same as, or equivalent to, her or his situation before the adverse impact occurred) and vulnerability of the project affected person[8]. Identifying severity helps to define the priority in which human rights impacts and risks should be addressed, focussing on the potential severity of the consequences of the impact according to

The impact severity classification scoring matrix used for the platform area, construction and operation of the airport was determined based on the following severity and vulnerability matrix:

Parameter	Description	Score
Severity		
Scale	Life- or long-term health threatening	A
	Non-life or health threatening, but tangible infringement of access to basic life necessities or freedoms including education, livelihood, etc.	B
	All other impacts	C
Scope	Estimated approximately >50% of identifiable group (most)	A
	Estimated approximately 11-50% of identifiable (less than half)	B
	Estimated approximately <10% of identifiable group (a few)	C

[8] Human rights potential severity evaluation assesses scale, scope, irremediability and the vulnerability of the project affected people (PAP), in accordance with UNGPs, Principle 14

Parameter	Description	Score
Severity		
Irremediability	High – complex technical requirements, little acceptance of remediation by the identified group, low capacity of implementation partner, no viable replacement for loss caused by impacts	A
	Moderate – simpler technical requirements, acceptance by the identified group of remediation, implementation partner can deliver remediation with some capacity development	B
	Low – simple technical requirement, acceptance by the identified group, implementation partner has capacity to deliver remediation measures	C
Vulnerability of affected people		
Very limited capacity to absorb change		High
Limited capacity to absorb change		Medium
Some capacity to absorb change		Low

Source: Danish Institute of Human Rights and Community Insights Group (2016); International Petroleum Industry Environmental Conservation Association (2021) based on UN Guiding Principles

		Scale, scope and irremediability		
		Mostly A	Mostly B	Mostly C
Vulnerability	High	5 (priority)	4 (priority)	3
	Medium	4 (priority)	3	2
	Low	3	2	1 (least severe)

Source: Mott MacDonald, 2021

In assessing human rights impacts, the access channel, offshore disposal site and SNS sand winning area HRIA used the following impact classification matrix:

Severity	Likelihood		
	Unlikely	Likely	High likely
Low	Low	Low	Medium
Medium	Low	Medium	High
High	Medium	Medium	High

Source: ERM, 2021

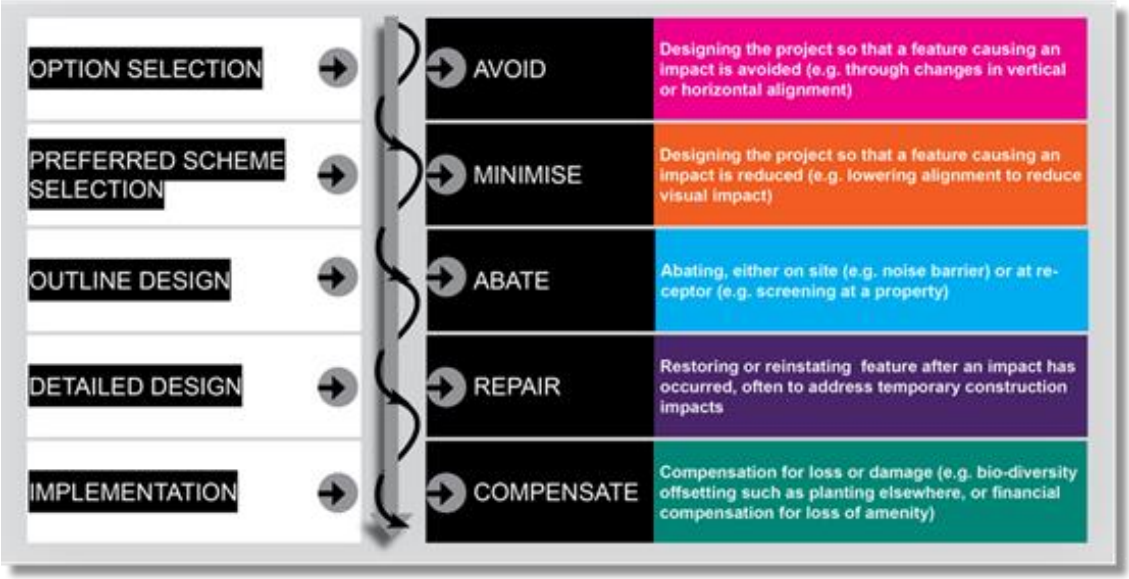
The findings from the impact assessments can be found in section 3.4.

2.4 Identification of mitigation and enhancement measures

Following the characterization of the significance of potential impacts, the next step is to evaluate what mitigation and enhancement measures are warranted to address the impact.

Where feasible, the following mitigation hierarchy was applied (Figure 2.1).

Figure 2.1: Mitigation Hierarchy



Source: Mott MacDonald, 2020

2.5 Management, monitoring, audit and reporting

The final stage in the impact assessment process is the management, monitoring, audit and reporting of the Project. These measures are needed to identify whether associated Project impacts and components remain in compliance with applicable standards, and if the mitigation measures are effectively addressing the impacts and compensatory measures and offsets are reducing the effects predicted. As part of this process, the Environmental and Social Management Plan (ESMP) has been developed. More details can be found in Section 0.

2.6 Stakeholder engagement

Finally, an effective impact assessment requires active engagement with relevant stakeholders throughout the key stages of the Project development. This assists in informing stakeholders about the Project, understanding stakeholder views of the Project and in identifying issues that should be considered in the prediction and evaluation of the impacts. More details on stakeholder engagement can be found in Section 7.

3 Baseline conditions

3.1 Overview

As part of the ESIAs, baseline information was collated from a range of sources such as publicly available information, primary data collection and consultation with stakeholders . Key environment and social (E&S) baseline conditions are presented in the following subsections. Further details can be found in the ESIAs available online. Environmental baseline

Environmental components that are most relevant to the Project within the context of potential environmental impacts include geology, seismicity and natural hazards, water resources and sediment quality, seabed features/profile, air quality, climate change and meteorology, noise and vibration, waste, materials handling and storage and biodiversity.

Environmental baseline conditions of the project area and its surroundings were generally compliant when compared with the national and international standards as summarised in Table 3.1 below.

Table 3.1: Environmental baseline conditions

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
Geology, seismicity, and natural hazards	**Geology** The Project is located in the south-eastern portion of the Ilocos-Luzon Basin. Boreholes undertaken at the project site indicated shallow deposits of soft or loose clays, silts, or sands or deeper deposits of more stiff, dense clays, silts, or sands. **Seismicity** The project site and surrounding area are situated in a highly seismic and active tectonic region. There are no known active faults believed to cross the project site or at any location within a 20km radius. However, there is historical evidence of an earthquake epicentre 15km south of the project site in Metro Manila, so the risk should not be discounted. **Natural hazards** 1. Earthquakes: The valley fault system which runs through Greater Manila and portions of Metro Manila, while it has not produced earthquakes greater than M.5 in modern history, historical records indicated that a M5.7 earthquake occurred in Metro Manila. 2. Volcanism: There are three active volcanoes located about 70km to 100km to the project area, namely Mt. Pinatubo, Taal Volcano and Mt.	Same as platform area	NA[9]	NA

[9] NA denotes that the information is not available in the respective ESIA/ not applicable to the specific area.

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
	Banahaw. A major eruption from any of these volcanoes would be highly disruptive to the construction or, the operation of the airport. 3. Tsunami: The project area is located along the coast of Manila bay, at elevations between 0 to 3m, and is susceptible to tsunami. Two were two recorded tsunamis that affected Manila Bay, one in 1828 and 1863. 4. Subsidence: The project area has been classified to be prone to subsidence. A significant portion of the eastern half of the project area is already submerged in water due to slow subsidence. 5. Flooding: The area is classified as highly susceptible to flooding with flood heights ranging from 1m to 2m, and flood duration which could last for more than 3 days.			
Oceanography and hydrology	NA	The Project is located at inner Manila Bay, which is about 60 km long and about 19 km to 56 km wide semi-enclosed basin with tidal exchange of waters occurring through 18 km wide channel opening into the West Philippine Sea through deep channels (called North Channel and South Channel. The tide is reported to be predominantly diurnal with an average tidal range of 1.2 meters during spring tide and 0.4 meter during neap tide. Tidal exchange is through the entrance of Manila Bay is relatively weak and residence time of	NA	Same as access channel

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
		water in the bay is estimated to be about 31 days. Manila Bay also receives freshwater flows from major rivers Pasig River, Talisay, Pasag, Meycauayan, Navotas-Malabon-Tullahan-Tenejeros, and Maragondon Rivers. Owing to its coastal configuration, strongest tidal currents are found at the mouth of the bay with velocities in excess of 0.5m/s during peak flood and ebb flow and decrease to the inner bay meaning tidal currents are reported to be characterised as weak within the project area.		
Seabed features/ profile	NA	Manila Bay consists of a gently sloping basin with the depth increasing at a rate of 1 meter per kilometer from the interior to the entrance and has an average depth of 17 meters. The mid-section of the bay is relatively deep at 20 to 25m. As described previously, Manila Bay is a relatively sheltered low energy environment with seabed consisting clayey-muddy sediment deposits. Within the access channel site, existing water depths range from 0.5m to 20m. Seabed survey covering the access channel found no notable seabed features within the project area with seabed observed to comprise featureless muddy substrate, with the exception of “tram lines” crisscrossing the seabed from past trawling activities. No features of marine archaeological potential were identified.	NA	Located in Manila Bay, the area known as the San Nicholas Shoals refers to a wide platform area of shallower waters that extends the shelf region off the Cavite Province coast where seabed is generally sandy substratum. Within the Project Site (i.e. San Nicholas Shoals Winning Area), existing water depths at the San Nicholas Shoals range from 3 to 4 m at shallower regions of the shoal and up to 35 m at deeper slope areas. Seabed survey covering the San Nicholas Shoal winning area found few notable seabed features with most seabed comprising featureless sandy or muddy areas with visible “tram line” scars from past trawling activity and a few identified existing or lost fish trap debris. In addition, a small portion of seabed at San Nicholas Shoal winning area was found to comprise patches of low-relief hard substrate (rock) areas and isolated patches of boulders

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
				No features of marine archaeological potential were identified. There are no submerged or emergent reefs at or in the vicinity of the Project Site.
Water resources and sediment quality	The project area is surrounded by two major rivers, Taliptip and Meycauayan rivers, draining into Manila Bay. **Surface water quality (freshwater)** Surface water quality was sampled during the EIA and ESIA stages. Based on sampling results, exceedances against Department of Environment and Natural Resources (DENR) water quality criteria were observed. Such exceedances indicate that the freshwater may not be suitable for their intended use. **Groundwater quality** Compliant for water quality criteria set by the DENR, except for Dissolved Oxygen (DO) at three stations, oil and grease and mercury at some stations. **Coastal / marine water quality** Compliant for water quality criteria set by the DENR, with exceedance in DO and Total Suspended Solids (TSS). **Sediment quality** All parameters below the thresholds and effects levels except for copper. High levels of copper were due to accumulated discharges from industrial and domestic sources.	**Marine water quality** Waters in the bay have been highly eutrophied by considerable nutrient and organic inputs particularly from rivers, which convey pollutants into the bay. Based on primary data collected in April 2021, exceedances in dissolved oxygen (DO) were observed at 2 out of the 9 sampling points against ASEAN marine water quality criteria and Philippine water quality guidelines. **Sediment quality** Manila Bay receives inflows from about 17,000 km^2 of catchment including agricultural land, which are a potential source of pesticides in runoff. Primary data collected in April and May 2021 shows that nickel level at one location exceeded Australian and New Zealand Conservation Council (ANZECC) sediment quality guidelines for both Sediment Quality Guideline (SQG)-Low and SQG-High level.	**Marine water quality** In terms of water quality the offshore region to the west of the Philippines where the offshore disposal site is located was reported to have an homogenous water mass, which was almost devoid of nutrients particularly nitrate, nitrite and phosphate (i.e. oligotrophic). In terms of salinity and temperature conditions in surface waters were also typical of offshore tropical oceanic waters with salinity ranging from about 33 to 34 psu and temperatures ranging 27 to 32 ºC at the time of the survey. These offshore waters were also observed to be well oxygenated. **Sediment quality** Literature search did not identify secondary data to characterise seabed sediment quality of the disposal site, although it is reasonable to assume that sediments of this deep sea environment will be composed of clay/silt muds. The area is designated as existing disposal facility that has previously been used for disposal of dredged materials from dredging projects	**Marine water quality** Based on primary data collected in June 2021, it shows that sewage pollution reaches across the study area. **Sediment quality** Based on primary data collected in August 2021, there was no evidence of parameters at levels of concern.
Air quality	Ambient air quality monitoring measurements were observed to be compliant with DENR standards and IFC EHS guidelines.	NA	NA	NA

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
Climate change and meteorology	**Extreme weather events** The climate and weather of the Philippines is primarily influenced by the northeast and southeast monsoons with transitional periods between them. The are two pronounced seasons: dry season (November to April) and wet season (May to October) with August being typically the wettest month. During the wet season, storms, typhoons (wind and rain typhoons) and resulting surface flooding and storm surges are common. Typhoon season is generally from April to September with about 8 or 9 crossing the Philippines each year. The peak of the typhoon season is July through October, when nearly 70% of all typhoons develop. **Rainfall** Based on a 30-year record (1971 to 2000) of Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), the wettest time of the year is from July to September, with the average number of rainy days per year in the area at 141 days. **Temperature** Average monthly temperature of the project site ranges from a high of 33.5°C in April to a low of 24.5°C during January.			
Noise and Vibration	Ambient noise survey conducted showed that the noise levels exceeded the National Pollution Control Commission (NPCC) standards and IFC EHS guideline at all monitoring location within residential area and some monitoring locations within commercial areas.	NA	NA	NA
Waste, materials handling and storage	There are two classifications for waste: hazardous and non-hazardous. In the municipality of Bulakan, there a total of 3 material recovery facilities, where wastes collected by dump trucks will be deposited at daily.	Same as access channel	NA	NA

Source: Mott MacDonald/ERM, 2021

3.2 Biological environment baseline

This section presents the biodiversity baseline conditions. It is based upon the outcomes of the scoping assessment, specific baseline fieldwork targeted at identifying terrestrial ecology (in particular birds) and marine ecology and usage patterns across the site. The platform area is situated in a wetland ecosystem and, although highly modified with aquaculture (fishpond), is still an internationally important recognised area for migratory birds. While the access channel, offshore disposal site and SNS sand winning area are situated in a marine ecosystem. A summary of the biological baseline conditions at the four areas are presented in Table 3.2 below.

Table 3.2: Biological environment baseline conditions

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
Protected area and important bird and biodiversity areas	A total of 18 nationally protected areas, two Ramsar sites, seven key biodiversity areas (KBAs) have been identified within 50km of the platform area.	A total of 13 protected areas and 6 Important Bird Areas were identified within 50 km of the access channel area. The closest of these areas is the Manila Bay Important Bird and Biodiversity Area (IBA), located 900 m from the access channel.	A total of six protected areas and three Important Bird and Biodiversity Areas (IBAs) were identified within 50 km from the offshore disposal site, the closest of which is 45 km away.	A total of 13 protected areas and six Important Bird Areas were identified within 50 km of the sand winning area. In which, the Rosario Marine Protected Area is located within the Project Site. The Rosario Marine Protected Area was designated in 2015 by the Local Government Unit (LGU), covering about 580 ha. An Environmental Compliance Certificate (ECC) and Dredging Extraction Permit are in place for the dredging activities in Priority Area 1, by the issue of this permit and ECC, Department of Environment and Natural Resources (DENR) considers the use of the MPA for sand dredging compatible according to local regulations.
Terrestrial plants and mangroves	A total of 22 species were recorded, of which one species is critically endangered in the Philippines, Pisang-pisang (*Kandelia candel)*	The Integrated Biodiversity Assessment Tool (IBAT) did not identify the presence of IUCN listed threatened mangrove species within 5 km of the Project Site.	NA[10]	Same as access channel
Terrestrial mammals	A total of five species were recorded. None were nationally or internationally protected.	NA	NA	NA
Terrestrial amphibians and reptiles	A total of seven species of reptiles and four species of amphibians were recorded. Two endemic reptile species were identified , namely: ● Marbled water monitor (*Varanus marmoratus*) ● Brackish Frog (*Fejervarya moodiei*)	NA	NA	NA
Birds	A total of 80 birds were recorded, of which 47 species were migratory species, eight of conservation	NA	NA	NA

[10] NA denotes that the information is not available in the respective ESIA/ not applicable to the specific area

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
	significance and four which are endemic to the Philippines, namely: ● Chinese Egret (*Egretta eulophotes*) ● Greater Crested Tern (*Thalasseus bergii*) ● Aleutian Tern (*Onychoprion aleuticus*) ● Pygmy Swiflet (*Collocalia troglodytes*) ● Eurasian Curlew (*Numenius arquata*) ● Malay Plover/Malaysian Plover (*Charadrius peronii*) ● Philippine Hawk Owl (*Ninox philippensis*) ● Yellow-breasted Fruit Dove (*Ramphiculus occipitalis*)			
Marine fauna	NA	There is limited available data on records on the presence of conservation significant marine species. Many marine turtle and marine mammal species of conservation significance are known to occur in Philippine waters. However, there is limited regional data on population abundance, range and seasonality including for Manila Bay.	Marine mammals such as the Sei Whale, Blue Whale and other marine species such as the Grey reef shark, Borneo shark, Shortfin Mako, Green sawfish can be found in the region. Refer to Table 5.5 in the offshore disposal site ESIA for more details.	Same as access channel
Corals and benthic habitat	No coral forms (alive or fragments), seagrass or similar macro algae were identified during the surveys.	According to seagrass distribution data from the Philippine government, it is assumed that seagrass beds would not be present in the vicinity of the Project Site. It is also noted that intertidal areas of the coastline adjacent to the Project Site will be lost to land development works, which is outside the scope of this ESIA. Seabed at the Project Site is composed of mud, which does not provide suitable hard	NA	Seagrass beds were not observed in the Sand Winning Area or surrounds during sediment and macrobenthos sampling or from underwater sidescan imagery of seabed surveys. A spot check drop camera survey was conducted in September 2021. No seagrass was found. A spot check drop camera survey was conducted in September 2021. Of the eight sites surveyed, hard corals were observed at four sites (Locations 2, 4, 5

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
		substrate for hard coral attachment, growth and reef development.		and 13) and were represented by five genera including *Goniopora, Goniopora/Alveopora, Fungia, Leptoseris* with between one and three genera encountered per site. These hard corals occurred as scattered, isolated, mostly small, individual colonies indicating low diversity and very sparse coral cover. Hard corals were encrusting forms attached to rocks and rubble and no reef development was observed at the surveyed sites.
Fish and micro-invertebrates	Five species of fish were observed, and six major species of micro-invertebrates were observed, none of international or national conservation significance.	A review of secondary data sources yielded the results of trawl fishing surveys which were conducted at 16 locations spanning Manila Bay from March 2014 to October 2015. Overall, the majority of the fishes caught during the surveys were immature individuals, which was reported to be indicative of high fishing pressure on fish populations.	A review of secondary data sources indicated that the offshore waters in the region had fish assemblages, including larger predatory species, that are typical of offshore waters. The fish assemblages include important commercial species.	Same as access channel
Plankton (Phytoplankton and zooplankton)	A total of 22 genera (dry) and 21 genera (wet) of phytoplankton were recorded A total of 15 zooplankton species were recorded. Arthropods accounted for over 65% of the zooplankton sampled.	NA	In the region, researchers have previously investigated phytoplankton in offshore waters off the west Philippines. Findings indicated that copepods were the most dominant group in zooplankton communities, which were found to comprise to be diverse with 37 taxonomic groups.	NA
Macrobenthos	NA	Benthic grab sampling in April 2021 revealed a patchy abundance, high variability and low diversity of infauna dominated by bivalves with other fauna including polychaetes, ribbonworms, marine snails, brittlestars and crustaceans. Overall, the infauna associated with the soft sediment were expected to be widespread and well-represented in the region and thus regarded as low sensitivity. No species of conservation concern were recorded in collected samples from the survey.	It may be noted that in spite of the disposal site's tropical location, seabed and bottom waters at the disposal site will be cold (only a few degrees above 0ºC) and dark (i.e. aphotic depth zone) and would be expected to have similar assemblages as typically occur globally.	Based on analysis of macrobenthos in all four replicate samples from 18 stations in July 2021, it was found that, overall, the highest proportion (68.24%) of the number of macrobenthic organisms (i.e. abundance) recorded at the sampling locations were from the Class Bivalvia (Phylum Mollusca), followed by Class Polychaeta (Phylum Annelida, 16.39% of the total), Class Gastropoda (Phylum Mollusca, 12.67% of the total), Class Crustacea (Phylum Arthropoda, 2.03% of

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
				the total) and Class Enopla (Phylum Nemertea, 0.68% of the total).

Source: Mott MacDonald/ERM, 2021

3.3 Social baseline

This section presents the socio-economic baseline condition that draws upon secondary data, outcomes of a scoping study, stakeholder engagement and primary data gathered from fieldwork. Several engagement activities (ie information disclosure, consultation, and participation) have been undertaken with stakeholders as part of the ESIA process, which is summarised in Section 7.

The NMIA will be located on the coastal plains of Manila Bay in Barangays Taliptip and Bambang Bulacan, Municipality of Bulakan, Province of Bulacan. The development of NMIA is seen as a major opportunity for providing local employment in Bulacan and surrounding provinces. The SNS sand winning area is located along the south-eastern coast of Manila Bay, off and parallel to the coastal towns, including those of the adjacent Barangays and the whole Municipalities of Ternate, Naic, Tanza, Rosario, Noveleta, Kawit and Cavite City, all within the Province of Cavite.

Key social baseline conditions gathered from the Philippines Statistics Office (PSA), Municipal and Barangay local government units (LGUs) and socio-economic surveys are presented in Table 3.3.

As part of the platform area ESIA, socio-economic baseline surveys for 400 respondents were carried out at Barangay Bambang and Taliptip to establish the baseline of the directly affected communities and 253 respondents at Barangay Bambang, Taliptip, Pamarawan, Pugad, Binauangan, Masukol, Tibaguin, Caliligawan, Namayan, Tanza 1, Masili. Sta Ana, Tibig and San Jose were surveyed as part of the access channel ESIA to understand the impacts of the airport development on fishnet/traps and fishing operations. The scheme for the access channel ESIA socio-economic survey is purposive sampling, hence, only those people that are engaged in fishnet/trap operation and fishing activities within the project area and project exclusion zone were interviewed. Specific profile for each of these barangays are presented in Appendix F of the access channel ESIA.

For the SNS sand winning area, socio-economic surveys were carried out for 479 respondents at 42 Barangays which have been identified to be potentially affected by the SNS sand winning works. These Barangays include: San Juan I, San Rafael I-IV, Kanluran, Ligtong I and IV, Muzon I and II, Sapa I to III, Wawa I to III, Bancaan, Bucana Malaki, Bucana Sasahan, Labac, Latoria, Mabolo, Munting Mapino, Sapa, Timalan Balsahan, Timalan Concepcion, Barangay 8, Amaya I, II, V and VII, Calibuyo, Capipisa, Halayhay, Julugan I to VIII. The scheme for the access channel ESIA socio-economic survey is purposive sampling, hence, only those people that are engaged in fishing activities in the affected Barangays were interviewed.

Table 3.3: Social baseline summary as presented in the Project ESIAs

Aspect	Platform area	Access channel	Offshore disposal site	SNS sand winning area
Demographic	**Provincial level** The Bulacan Province has a total of population of 3,292,071 as of 2015, with population density of 1183 persons/km^2. **Municipal level** Bulakan municipality is made up of 14 barangays with population size of 81,232 as of 2020. **Barangay level** Barangay Taliptip 5,490 people in 2015, a negative growth of 2.2% as compared to 2010 Barangay Bambang 13,604 people in 2015, a positive growth rate of 0.05% as compared to 2010. **Socio-economic surveys** NA	Same as platform area. Additional information for Barangay Pugad, Pamarrawan, Babtnin, Caliligawan, Masile, Sta. Cruz, Binuangan, Namayan are available in appendix F of access channel ESIA.	NA[11]	**Provincial level** The Province of Cavite has a population of 3,678,101 in 2020. **Municipal level** NA **Barangay level** The average population in each of the 42 barangays is 5581, with the Timalan Balsahan, Naic Barangay reaching the largest population of 18,000. **Socio-economic survey** NA
Vulnerable group	**Provincial level** Information not provided in ESIA **Municipal level** Information not provided in ESIA **Barangay level** Barangay Taliptip 1,010 living below the poverty line. 365 senior citizens, 34 persons with disability, and 25 single mother/solo parents Barangay Bambang	Same as platform area **Socio-economic survey** Among the 253 households, 24.71% said that there are household members that belong to the vulnerable groups. The most common type of vulnerable category are widows (26.98%), followed by elderly couples (25.40%), persons with disability (19.05%), divorced persons or single parent families (17.46%), and elderly couples (11.11%).	NA	**Provincial level** NA **Municipal level** NA **Barangay level** The vulnerable groups recognized by all potentially affected Barangays are Person with Disability (PWD), senior citizens, single parents (primarily single mother), and the indigent.

[11] NA denotes that the information is not available in the respective ESIA/ not applicable to the specific area

	1,503 living below the poverty line. 275 overseas Filipino workers, 93 persons with disability and 55 single mother/solo parents. **Socio-economic surveys** NA			**Socio economic survey** Among the 479 households, 71.40% said that their family or a family member/ belong to the vulnerable group/s. The most common type of vulnerable category are those households that are categorized as “poor family earning equal or less than PhP 10.481 per month” which account to 54.91% of the households. This is followed by 22.34% of households having a senior citizens member (aged 60 years old and above). The remaining vulnerable groups present in the households are relatively smaller. These are single parents (7.93%), non-senior widow/er (4.38%), senior widow/er (4.38%), with overseas Filipino worker (OFW) family relatives (3.97%), people with disability (PWD) (4.59%), member of indigenous groups (0.21%). There are 0.63% vulnerable households with ‘other’ category but not identified specifically.
Employment status	**Provincial level** NA **Municipal level** NA **Barangay level** <u>Barangay Taliptip</u> The most employed ages are 25 to 54 years old, of which 91% are employed and 9% are unemployed <u>Barangay Bambang</u> The most productive ages are 15 to 49 years old, of which 75% are employed and 25% are unemployed **Socio-economic surveys** NA	Same as platform area **Socio-economic surveys** All of the respondents are employed, formal or informally. When asked about their main source of income, majority answered fishing (60.87 %) and 39.13% operates fishnets/traps does aquaculture farming. With regard to the occupation of household heads and members, only 39.66% are employed. Of these employed, 236 (22.18%) are fishermen, 77 (7.24%) are fishnet/trap operators, 42 (3.95%) owns their business (such as eatery, sari-sari store, etc.), and 37 (3.48%) are private employees, among others.	NA	**Provincial level** NA **Municipal level** NA **Barangay level** NA **Socio-economic surveys** Only about 2.51% (or 12 HH heads) are said to be unemployed

Economy and livelihood	**Provincial level** The Bulacan Province's major economy is the service, made up of wholesale and retail trade, transportation, storage and communication, finance, insurance, and real estate, and community/social and personal services. and industrial sectors such as marble and limestone, jewelry, pyrotechnics, leather, aquaculture, meat and meat products, garments, furniture, high-value crops, and sweets and native delicacies The local economy is dominated by on the service sector, which is made up of the wholesale and retail trade; transportation, storage, and communication; finance, insurance, and real estate; and community/social and personal services. The service sector accounted for almost 16% of the total regional employment according to a report by the Bulacan government in 2020. **Municipal level** The major economic activities in the municipality are related to farming, fishing, garments, and food processing, while its major products are bakery products, milkfish and rice. Fishing is the main industry in the Municipality as it is strategically located in the center of the five coastal municipalities in the Province of Bulacan, that are considered as the Bay and "Fishing Bank" areas. The Municipality of Bulakan has the largest inland fishing area (brackish and fresh water) in the Province of Bulacan. **Barangay level** NA **Socio-economic surveys**	Same as platform area **Additional information at Provincial level:** Aquaculture production dominates in Bulacan, accounting for 90.8% of the total volume of fisheries production in 2019. The number of fishermen in 2016 is reported to be 22,170 in Bulacan from the data by the Bureau of Fisheries and Aquatic Resources (BFAR). More information on fisheries and livelihood can be found in the access channel ESIA. Additional information for Barangay Pugad, Pamarrawan, Babtnin, Caliligawan, Masile, Sta. Cruz, Binuangan, Namayan are available in appendix F of access channel ESIA.	Since local fishermen are only authorised to fish within the area of 15 km from the coastline, therefore it is unlikely that local fishermen will be encountered in the Project area given its remote location. Bureau of Fisheries and Aquatic Resources (BFAR) indicated that the presence of commercial fishing activities cannot be excluded in the subject area. However, according to the vessel Automatic Identification System (AIS) data within 5km of the disposal site from 14 April 2020 to 13 April 2021, most vessels that travelled through the Project area are vessels carrying cargo or passengers, while no fishing vessels have been identified, and therefore it is likely that no commercial fishing activities or only less commercial fishing activities will be encountered in the Project area.	**Provincial level** Agriculture plays a very active role in the economy of Cavite. According to the data gathered from the Office of the Provincial Agriculturist, the agricultural land is about 41.3% or 142,706 hectares of the total land area of the province. Although largely agricultural, Cavite is also highly industrialized. It has economic zones located all over the region, in the municipalities of Cavite City, Kawit, Noveleta, Bacoor, Imus, Dasmariñas, and Carmona. There are also industrial estates in the municipalities of General Mariano Alvarez, Silang, Tanza, Naic, Tagaytay, and General Trias, among many others. In total, more than 60 economic zones are in operation or under development in the province. For the coastal Municipalities of Rosario, Tanza, Naic and Ternate, fishery serves as an important source of livelihood for Cavite fisherfolk. According to the Cavite Ecological Profile 2019, the Province of Cavite is considered as a popular tourist destination with rich resources of cultural heritage, natural resources and landscapes. With mountains, cave and falls, Cavite attracts visitors both domestic and international. **Municipal level** NA **Barangay level** The top three economic activities in the barangays are fishing, factory workers, and tricycle drivers, among other economic activities eg fish vendors, construction, and small private business. Fishermen constitute on average 29% of the Barangay's total population. **Socio-economic surveys**

	Barangay Taliptip Majority of respondents were engaged in natural-based livelihoods (eg farmers and fisherman) Barangay Bambang Majority of respondents were engaged in wage-based livelihoods (e.g. public/private officers, engineers, workers/laborers, drivers)			Most of the household heads' sources of income is related to fishing (92.28%). This is followed by small business operation (e.g., sari-sari store/eatery/restaurant/etc.) (2.30%), and renting out of boats (0.84%).
Marine traffic	NA	**Provincial level** NA **Municipal level** NA **Barangay level** NA **Marine traffic survey** The southwest part of the access channel is identified to overlap with some marine navigation routes in the bay. Besides, a number of local residents from Barangays of Namayan, Babatnin, Pugad and Panasahan are identified to normally transit through the Project area with a frequency from ~2 to 50 boats every week based on interviews with those Barangay governments.	The marine navigation route proposed for transporting the dredged sediments from the access channel to the offshore disposal site will go through the north channel at the entrance of the Manila Bay. According to a marine traffic density map prepared using the data from public online resources, the numbers of routes per 0.15 km^2 reaches over 222,000 in 2019 at the north channel, which implies the local marine traffic has been comparatively heavy.	**Provincial level** NA **Municipal level** NA **Barangay level** NA **Marine traffic survey** Marine density map demonstrates the traffic flow in and out the Manila Bay in 2020 by analysing the number of navigational lanes per 0.08 km^2 waters. It can be concluded that most of the Project Site does not fall in the busy waters in Manila Bay.
Education	**Provincial level** NA **Municipal level** The Municipality of Bulakan recorded a literacy rate of 99.02% in 2010, a significant increase compared to the previous years **Barangay level** Barangay Taliptip	Same as platform area Additional information for Barangay Pugad, Pamarrawan, Babtnin, Caliligawan, Masile, Sta. Cruz, Binuangan, Namayan are available in appendix F of access channel ESIA.	NA	**Provincial level** NA **Municipal level** NA **Barangay level** NA **Socio-economic survey**

	Only 22 children out of 1219 are out of school Barangay Bambang There are 2559 students aged 6-16 however 45% are out of school due to economic reasons **Socio-economic survey** Barangay Taliptip Most of the respondents can read, write, compute and comprehend Barangay Bambang Most of the respondents can read, write, compute and comprehend			In terms of the highest educational attainment by households, majority were at elementary level (23.89%) and then high school graduate (old system, 20.41%). There are 231 household members (11.97%) who were high school level (old system) and 181 (9.38%) who were elementary graduates. Lastly, a total of 173 household members (8.96%) are either not yet in schooling age or did not have any chance to study at all.
Religion	**Provincial level** NA **Municipal level** NA **Barangay level** NA **Socio-economic surveys** Barangay Taliptip All of the respondents are Roman Catholics Barangay Bambang Most of the respondents are Roman Catholics, but some are Iglesia ni Cristo, Seventh Day Adventist, Methodist and Islam	Same as platform area	NA	**Provincial level** NA **Municipal level** NA **Barangay level** NA **Socio-economic survey** 91.9% of the respondents are Roman Catholics. Other respondents are Christian, Iglesia ni Cristo, Jehovah's Witness, Born Again Christian, Islam, Penteocostal, Seventh Day Adventist, Jesus is Lord Church, Mormon, San Pascual and Dating Daan.
Ethnicity	**Provincial level** NA **Municipal level** NA **Barangay level**	Same as platform area **Socio-economic surveys** No member of ethnic group affiliations or indigenous people were found	NA	**Provincial level** NA **Municipal level** NA **Barangay level**

	NA **Socio-economic surveys** No members of Indigenous People were found from the survey			NA **Socio-economic surveys** Only one respondent identified himself as member of Aeta that was from the Province of Baatan.
Cultural heritage	**Provincial level** Information not provided in ESIA **Municipal level** The most well-known historical structure in Bulakan Municipality is the shrine of Marcelo H. Del Pilar, located approximately 6.5km from the Project site, which is a declared national shrine by the National Historical Commission of the Philippines in honour of Filipino lawyer, poet and propagandist Marcelo H. del Pilar. **Barangay level** NA **Socio-economic survey** The socio-economic survey and consultations with local government units have confirmed that there are no cultural objects and heritage sites found both inside and outside the AoI. Checks for relics have been conducted within and outside the AoI. To confirm this, an archaeological study will be carried out.	Same as platform area **Side scan sonar survey** Sidescan imagery from seabed surveys conducted for the project concluded that there are no features that stand out. Therefore, cultural heritage is considered unlikely to present in the Project area.	NA	**Provincial level** NA **Municipal level** NA **Barangay level** NA **Side scan sonar survey** According to bathymetry and side-scan sonar survey of the area, there is no cultural heritage identified

Source: Mott MacDonald/ERM, 2021

3.4 Human rights baseline

The baseline human rights context and their associated baseline conditions are presented in Table 3.4.

Table 3.4: Human rights baseline summary as presented in the Project ESIA

Aspect	Baseline conditions
Population	Province of Bulacan: 3,369,466 people with 1,183 people per km^2 Bulakan Municipality: 76,565 people, relatively young population with median age of 28
Governance institutions and power	Current President: Rodrigo Duterte (in office since 2016) Freedom of speech and expression, movement and of association is restricted Law and regulation enforcement is sporadic, ambiguous and contingent 2020 International Corruption Perception Index: 115/180
Poverty, income and employment	National unemployment rate: Approximately 3.4% Indications of gender inequality in the labour market National minimum monthly wage ranges from US$169.00 to US$ 287.24 Household income and living standards in Taliptip and Bambang Barangays are much lower than provincial and national averages
Overseas migrants	One of the world's leading labour exporting countries, Overseas Filipino Workers (OFW) makes up 35% of financial flows to the country Due to COVID-19 pandemic, 327,511 OFW were repatriated and returning for job opportunities by end of 2020 Translates to prolonged decline in remittance inflows and consequent increase in unemployment
Labour	Poor labour standards and labour right abuses Reports of forced labour are usually in fishing, construction, small-scale factories, domestic services, agriculture and informal sectors Women, children and urban poor are increasingly vulnerable to modern slavery Some main issues with Filipino labour rights include freedom of association, forced labour, child labour, gender discrimination and social security About 600 trade unions registered in the country, which translates to approximately only 10% of the national workforce
Children	Suffers from poor health, disabilities, and poverty, hence at higher risk of direct or indirect use of child labour At least 3.2 million children in the country aged five to 17 are engaged in child labour, with three million involved in hazardous work Reporting is challenging as it usually occurs in family or informal settings
Fisherfolk	Important industry in the Province of Bulacan, as it provides food requirements and income for the population Majority of households (of Taliptip Barangay) engage in inland fishery activities, with a minority of fishers engage in offshore fishing Modern slavery is an ongoing issue in the fishing industry, where handline fishers are frequently detained fishing illegally in Indonesian waters Fishers' families rely on loans for basic resources, causing significant inflation compared to market rate Typically, fisheries staff do not have employment contracts or social protection, when fishing is a hazardous job
Gender relations, discrimination and harassment	Gender Inequality Index (GII) of 0.43, which ranks 104/162 in 2019 Gender-based violence remains a problem Domestic violence is a serious and widespread problem affecting mainly women and children Under-reporting of abuse and occasional tension between activists and government security forces
Water and sanitation	Province of Bulacan: 84.9% of households have regular access to safe water and almost all households have access to sanitation and toilet facilities

Aspect	Baseline conditions
	Proportion of households with access to sanitation and toilet facilities is 6% higher than national average
Housing and land	Tenure security remains main development challenge in the country Between 20% to 35% of the population lives in informal settlements, and are vulnerable to eviction, fires, flooding and typhoons and commonly unable access to basic services Province of Bulacan ranked fourth out of seven provinces in terms of percentage of residents of housing units with floor area less than 20m^2 Most of the households in Bambang and Taliptip Barangays sized between four and six are 57% and 61%, respectively Average household size is 4.36 members per household, with 4.48 and 4.34 members, for Bambang and Taliptip Barangays, respectively
Health and education	Consist of dual health delivery system, public and private sectors Municipal of Bulakan has two health units,12 Barangay health units, one government hospital, 15 medical clinics and laboratories and one private hospital Leading morbidity cause: acute upper respiratory tract infection (AURI) Leading causes of death: cancers and heart related diseases 26 primary schools and nine public secondary schools Functional literacy rate is estimated to be 91.6% for population between 10 to 64 years old
National security and order	Ongoing challenges in countering terrorism, drug use and human rights violation Human rights defenders and activists are increasingly targeted under drug elimination campaign Deterioration of human rights situation in the country intensified during the COVID-19 pandemic and national curfews, which includes drug users being killed during police operation as well as killing or arrest of human rights activists, journalists, indigenous and community leaders Terrorism remains a continued threat to public security with the military and police forces struggles to deal with extremist groups, particularly in southern islands and Mindanao
Air passengers and victims of human trafficking	Limited international arrivals to 1,500 passenger arrivals per day at Manila's Ninoy Aquino International Airport from 17 March to 19 April 2021 resulted in posing risks to people's rights to freedom of movement Victims of human trafficking are largely from the most vulnerable population in the country to work in numerous sectors in Asia and Middle East Lack of centralised database to detect and track unlawful recruitment and trafficking cases across borders
Civil society freedoms	Approximately 500,000 civil society organisations (CSOs) and 3,000-5,000 non-governmental organisations (NGOs) in the country NGO space has shrunk since 2016 when new administration took action to protect national security and to curb insurgence and terrorism

Source: Mott MacDonald/ERM, 2021

4 Key potential E&S impacts

4.1 Overview

Typical construction-related and operation-related impacts from the Project activities are presented, along with the studies conducted as part of the ESIA to assess the impacts on key E&S components. Mitigation and monitoring measures have also been proposed as part of the ESIA to manage the potential E&S impacts. Since the offshore disposal site and SNS sand winning area are only for construction only, the impacts from operation phase have not been assessed.

4.2 Expected project impacts

Potential E&S impacts may arise throughout the Project lifecycle, including the construction and operation phase. Typical construction phase activities that may impact the environment include: Land preparation (including site clearance, formation of ground platform, levelling and compaction works to achieve the desired elevation), dredging and disposal activities, river rehabilitation works, proposed embankments, bunds and revetment walls, drainage outfalls and temporary marine berthing facility, site office and ancillary facilities construction access and internal road network (civil works); mobilisation of materials, equipment and spoilt to and from site, installation for construction activities etc.

Typical operation phase activities that may impact the environment include: Physical presence of facilities, aircraft movements, operation and maintenance of airport facilities, mobilisation of operations personnel to the site (approximately 10,000 job opportunities), increased traffic movements to and from the airport etc.

Different methodologies from the four ESIAs (platform area, access channel, offshore disposal site and SNS winning area) were adopted during the impact assessment to determine the potential Project impacts throughout development. Each of the ESIAs applied a different set of matrix on the impact significance as set out in Section 2.3. The impact significance are summarised in Table 4.1 and Table 4.2 for pre-construction/construction and operation respectively. Human rights impact assessments were also carried out and the potential impacts/severity are summarised in Table 4.3.

Table 4.1: Summary of construction phase E&S impacts

Impact	Source/Activities	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
Biodiversity	Degradation and loss of habitat due to construction works (terrestrial and coastal habitat)	Significant adverse (major) impact	NA[12]	NA	NA
	Degradation and loss of habitat due to construction works (marine habitat)	Negligible adverse impact	Minor	Minor	Minor
	Introduction or spread of non-native invasive species due to: increased movement of people, vehicles, machinery, vegetation, and soil; foreign vessels (terrestrial and coastal habitat)	Minor adverse impact	NA	NA	NA
	Introduction or spread of non-native invasive species due to: increased movement of people, vehicles, machinery, vegetation, and soil; foreign vessels (marine habitat)	Minor adverse impact	Minor	Minor	Minor
	Accidental killing and injury of species due to Project construction activities such as potential collisions with moving vehicles along access roads, and the operation of machinery within the project area and collisions during access channel development	Minor adverse impact	Moderate	Moderate	Moderate
	Terrestrial and coastal habitat ● Disturbance and displacement of species due to light disturbance (nightworks) from construction activities ● Noise generated by construction; Vibrational and noise impacts underwater	Significant adverse (major) impact	NA	NA	NA
	Marine habitat ● Disturbance and displacement of species due to light disturbance (nightworks) from construction activities ● Noise generated by construction; Vibrational and noise impacts underwater	Minor adverse impact	NA	NA	Negligible
	Dust emissions during construction activities could cause localised reduction in air quality from dust deposition around working areas affecting adjacent habitats	Negligible adverse impact	NA	NA	NA
	Dredging activities and river embankment modifications may cause changes in water quality, streamflow regime modification hydrological conditions and increased risk of localised pollutions	Significant adverse (major) impact	NA	NA	NA
	Workers may access current fishing grounds	Minor adverse impact	NA	NA	Minor to Moderate
	Turtle entrainment in suction equipment	NA	NA	NA	Moderate
	Impacts to marine mammals, marine turtles, seabirds and shorebirds due to generation of sound from dredging	NA	NA	NA	Negligible
Social and socio-economics	Physical and economic displacement of affected landowners by land procurement for the Project	Significant adverse (moderate) impact	NA	NA	NA
	Physical and economic displacement of informal settlers	Significant adverse (substantial) impact	NA	NA	NA
	Physical and economic displacement due to loss of fishing area and access to marine resources	Significant adverse (major) impact	Major	NA	Minor to Moderate
	Reduction of local property prices	Significant adverse (moderate) impact	NA	NA	NA
	Impacts on employment and economy	Positive and moderate beneficial impact is expected	NA	NA	NA
	Influx impacts on: Road infrastructure and congestion	Significant adverse (moderate) impact	NA	NA	NA
	Social and community services, facilities and infrastructure	Significant adverse (moderate) impact	NA	NA	NA
	Service prices for commodities, food and beverages	Minor adverse impacts	NA	NA	NA
	Host communities related to antisocial behaviour and social conflict with migrant workers	Minor adverse impacts	NA	NA	NA
	Community health and safety / public health impacts due to noise, dust and air quality impacts / Impacts on navigation and marine traffic	Significant adverse (major) impact	Major	NA	Moderate
	Flooding impacts on surrounding communities	Significant adverse (moderate) impacts	NA	NA	NA
	Impacts on cultural heritage resources	Negligible adverse impacts	NA	NA	NA
Hydrology, water and sediment quality	Impacts on water quality arising from release of sediment plumes / dissolved contaminants during dredging of the rivers and the marine access channel/capital dredging works	Significant adverse (moderate) impact	Moderate	NA	Moderate
	Impacts on water quality from offshore disposal of sediment	Refer to supplementary ESIA for offshore disposal for impact evaluation	NA	Minor	NA

[12] NA denotes that the information is not available in the respective ESIA/ not applicable the specific area.

Impact	Source/Activities	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
	Major incidents causing spillages / leakage of dredged materials and hydrocarbon fuels	Significant adverse (major) impact	Minor	Minor	Minor
	Potential water quality impacts due to discharges from marine / river construction vessels / dredging activities	Significant adverse (moderate) impact	Negligible	Negligible	Negligible
	Release of sediment during land formation construction activities	Significant adverse (moderate) impact	NA	NA	NA
	Polluted runoff from the construction site	Significant adverse (moderate) impact	NA	NA	NA
	Contamination of groundwater from hazardous / non-hazardous waste and wastewater disposal	Negligible adverse impact	NA	NA	NA
Geology, seismicity and natural hazards	Earthworks which could cause settlement, slope instability and liquefaction due to soft and weak ground conditions	Moderate adverse impact	NA	NA	NA
	Earthquakes / seismic activity causing site failure or structural failure endangering site users	Moderate adverse impact	NA	NA	NA
	High wave heights from tsunamis causing damage to structures and endangering site users or storm surges during inclement weather / typhoons	Moderate adverse impact	NA	NA	NA
	Volcanic hazards causing damage to structures and endangering site users	Minor adverse impact	NA	NA	NA
	Flooding due to ground settlement from earthworks and structural loading and endangering site users	Moderate adverse impact	NA	NA	NA
	Contamination of groundwater due to pollution incidents	Moderate adverse impact	NA	NA	NA
Air Quality	Deterioration of ambient air quality (due to fugitive dust emissions and notably PM_{10}) resulting from earthworks / land formation activities and operation of construction equipment	Significant adverse (major) impact	Negligible	Negligible	Negligible
	Combustion related emissions from increased localised traffic, project vehicles, on-site diesel engines	Negligible adverse impact	NA	NA	NA
Greenhouse gases	GHG emissions: these emissions will principally occur through the use of materials, from the transport of those materials and waste to and from the site, and from the use of construction plant.	Significant adverse impacts	NA	NA	NA
Noise and vibration	Noise annoyance to sensitive receptors adjacent to active construction areas: ● Construction of access roads ● Construction of project components and access roads ● Transport of materials, people and equipment to site ● Use of heavy/percussive equipment	Minor to Major adverse impacts	Negligible	NA	Negligible
	Vibration due to construction activities	Minor adverse impacts	NA	NA	NA
Waste, materials handling and storage	Impacts to marine environment from storage, handling and transportation of dredged materials from access channel to offshore disposal site	Negligible adverse impact	NA	NA	NA
	General construction waste could cause impacts on: ● Impacts on soil and water quality resulting from the improper waste storage on site, disposal of waste in unlicensed facilities or using inappropriate disposal methods. ● Impacts on local communities including loss of land, nuisance, disturbance through increased vehicle movements, indirect impacts as a result of negative impacts on the surrounding environment ● Health related impacts on workers as a result of improper handling, storage and disposal of waste.	Major adverse impact	Minor	Negligible	Minor
	General materials handling and storage	Minor adverse impacts	NA	NA	NA
Seabed features / profile		NA	Negligible	NA	Negligible
Perception of erosion		NA	NA	NA	Moderate
Marine navigation and transport/collision (vessels and marine users)		NA	Negligible to Moderate	Negligible	Negligible to Moderate

Table 4.2: Summary of operation phase E&S impacts

Impact	Source/Activities	ESIA for platform area/NMIA operations
Biodiversity	Risk of collision due to aerodrome operations	Minor adverse impact
	Air, noise and light impacts on the adjacent and surrounding habitats	Significant adverse (major) impact
	Impact on migratory species	Significant adverse (major) impact
	Surface run-offs or accidental spillages from the airport	Significant adverse (moderate) impact
Social and socio-economics	Employment generation	Significant beneficial (major) impact
	Community health, safety and amenity	Significant adverse (moderate) impact
	Socio-economic development from increased tax revenue	Negligible to minor beneficial impact
	Landscape and visual impacts	Significant adverse (major to substantial) impact
Hydrology, water and sediment quality	Change in marine hydrology (due to access channel operations)	To be updated
	Change in river hydrology due to future river dredging maintenance works	Significant adverse (moderate) impact
	Increased flood risk and polluted floodwaters	Significant beneficial (moderate) impact
	Increased water demand which could potentially impact surrounding communities	Negligible adverse impact
	Polluted runoff from airport site	Significant adverse (moderate) impact
	Potential leaks and spills from sewage generated by the airport	Negligible adverse impact
	Accidental spills, leaks and discharges	Minor adverse impact
Geology, seismicity and natural hazards	Earthquakes causing site failure or structural failure and endangering site users	Significant adverse (moderate) impact
	Volcanic activity and seismic movements resulting to disruption to air traffic and possible hindrance to aircraft machinery	Significant adverse (moderate) impact
	River and coastal morphology - Potentially destabilise surrounding infrastructure when more erosion along the riverbanks occurs	Significant adverse (moderate) impact
Air Quality	Reduction in air quality due to airport operations	Minor adverse impact
	Increase pollutant concentrations as a result of Landing and Take Off cycles (LTO), Ground service equipment (GSE) and Auxillary Power Units (APU) and other airside emissions	Negligible to minor
Greenhouse gases	Emissions from airport buildings and ground operations	Significant adverse (major) impacts
	Emissions from surface access	Significant adverse (major) impacts
	Emissions from air transport	Significant adverse (major) impacts
Climate change	Increased surface flooding due to more frequent and more intense rainfall events including: possible heavier rainfall on wet days, possible increase in number of wet days, increase in occurrence of 5 consecutive wet day events	Significant adverse (major) impacts
	Increased ocean level (due to sea level rise and wave setup and storm surge) leading to land loss and increased surface and groundwater flooding	Significant adverse (major) impacts
	Sea level rise leading to groundwater contamination by salt water and risk of increased corrosion on buried pipes and cabling	Significant adverse (major) impacts
	Higher intensity of tropical cyclones and storms leading to damaged infrastructure	Significant adverse (moderate) impact
	Increased air temperatures and associated decrease in air pressure resulting in longer take-off distances required for airplanes.	Significant adverse (moderate) impact
	Increased average daytime temperature and hot temperature extreme events leading to thermal expansion of structural steelworks	Negligible adverse impacts
	Increased average daytime temperature and hot temperature extreme events leading to melting and deformation of asphalt	Minor adverse impacts
	Increased average daytime temperature and hot temperature extreme events leading to electrical equipment failures or damage to telecommunication components	Minor adverse impacts
	Increased average daytime temperature and hot temperature extreme events leading to increased staff and passenger discomfort and heat related health risks.	Minor adverse impacts
	Increased minimum temperatures and reduced number of cold days and nights	Negligible adverse impacts
	Increased average daytime temperature and temperature extreme events as well as increase in daily temperature range leading to increased speed of fatigue and deterioration of infrastructure and damage (e.g. deformation)	Negligible adverse impacts
	Combination of prolonged dry periods, drought and increased temperatures leading to subsidence, resulting in damage to runway / roadside access or built areas.	Minor adverse impacts
	Changes in temperature and precipitation regime resulting in an increase vegetation growth rate. Such changes in habitats affects bird- deterrence and may increase maintenance requirements. Increase vegetation cover may also obstruct essential signage and lighting fixtures.	Minor adverse impacts
Noise and vibration	Potential impact to communities at relatively long distances from the airport due to: ● Aircraft noise comprises intermittent noise events from LTO and more steady noise from aircraft sources on the ground such as engines during taxiing and the APU ● Noise from road traffic accessing the airport can also elevate the general background noise. Localised sources such as the operation of building services plant may also contribute. ● Noise emanating from the airplane landing and take off ● Increased noise levels associated with increase traffic	Significant adverse (major) impacts
	Vibration due to operational activities	Minor adverse impacts
Waste, materials handling and storage	Improper management of general non-hazardous waste from NMIA operations, airplanes, dredging vessels could cause impacts to the surrounding environment, airport users (including employees) and communities	Significant adverse (major) impacts
	Hazardous waste from NMIA operations which could cause impacts to the surrounding environment, airport users (including employees) and communities	Significant adverse (major) impacts

Impact	Source/Activities	ESIA for platform area/NMIA operations
	Hazardous waste from dredging vessels utilised for maintenance dredging of access channel and/or rivers	Significant adverse (major) impacts
	General materials handling and storage	Minor adverse impact

Source: Mott MacDonald, 2021

Table 4.3: Summary of construction phase human rights impacts

Impact	Source/Activities	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
Human rights[13]	Rights to security of land tenure and sustainable livelihood	Severity: 4 (priority)	NA	NA	NA
	Rights to non-exploitative employment and working conditions	Severity: 3	NA	NA	NA
	Rights to safe and healthy workplaces and communities	Severity: 3	NA	NA	NA
	Rights to privacy and data security	Severity: 2	NA	NA	NA
	Rights to safe and respectful security	Severity: 4 (priority)	NA	NA	NA
	Rights to accessibility	Severity: 2	NA	NA	NA
	Rights to participation and freedom of assembly	Severity: 3	NA	NA	NA
	Rights to accessing remedy	Severity: 4 (priority)	NA	NA	NA
	Rights to take part in cultural life	Severity: 1	NA	NA	NA
	Rights to access essential services	Severity: 3	NA	NA	NA
	Rights to liberty and security of person at international borders[14]	Severity: 4 (priority)	NA	NA	NA
	Impact to workers' rights	NA	Medium	NA	Medium
	Potential for child labour to occur	NA	Medium	NA	Medium
	Potential impacts to workers' health and safety	NA	Medium	NA	Medium
	Potential loss of livelihood for those involved in the fishing industry	NA	Medium	NA	Medium
	Potential for an accident or injury to occur involving a local stakeholder	NA	Medium	NA	Medium
	Impacts associated with the employment of security personnel	NA	Medium	NA	Medium
	Inability of stakeholders to participate and/or access remedy (Project workers)	NA	Low	NA	Low
	Inability of stakeholders to participate and/or access remedy (Fishing communities)	NA	Medium	NA	Medium
	Inability of stakeholders to participate and/or access remedy (Surrounding communities)	NA	Low	NA	Low

Source: Mott MacDonald/ERM, 2021

[13] Refer to Section 2.3
[14] Only applies to operation phase

5 Environmental and social management plan

5.1 Mitigation and monitoring measures

To minimise the impacts of the Project on the environment, the Project Company has proposed the implementation of various mitigation and monitoring measures for different phases of the Project (i.e. pre-construction / construction and operation).

Table 5.1 and Table 5.2 below summarises the pre-construction / construction and operation phase measures, respectively. The details of mitigation measures are provided in Volume VI of the platform area ESIA and Section 10 of the access channel, offshore disposal site and SNS winning area ESIAs. Table 5.3 summarizes the recommendation and mitigation measures for potential human rights impact. Detailed mitigation measures are provided in respective Human Rights Impact Assessments (HRIA) for platform area, access channel, offshore disposal site and SNS winning area.

Table 5.1: Summary of pre-construction/construction phase mitigation and monitoring measures

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
Biodiversity	Degradation and loss of habitat due to construction works	Induction and awareness training to all staff and workers covering site rules and information related to biodiversity.	SMAI Contractor	✓[15]	×[16]	×	×
		Establish a Project-wide regulation on biodiversity protection and conservation in compliance with the international guidelines and best practice on biodiversity management and conservation.		✓	×	×	×
		Establish a community based habitat protection and conservation program involving adjacent landowners/land user and overall community around the project site.		✓	×	×	×
		In compliance with ECC requirements, planting of mangroves, including maintenance and monitoring of at least 5000 propagules in areas identified by the Local Government Unit (LGU) concerned will be undertaken.		✓	×	×	×
		Donation of 11,600 bamboo seedlings (at the ratio of 1:100) in support of the National Greening Program.		✓	×	×	×
		Committed offset actions detailed in the BAP such as the planting of 25,000 mangroves in the coastal area of Hagonoy and Bulacan, and the clean-up of 11.5 km of the Tullahan-Tinajeros river.		✓	×	×	×
		Other potential offset actions will be developed in the BAP and draft biodiversity offset management plan (BOMP). An offset feasibility study (OFS) will be carried out which will finalise the offset actions to be undertaken for this project with the objective achieve no net loss for natural habitats and net gains for critical habitats.		✓	×	×	×
		Should land be acquired for any offset or restoration activities, a social assessment will be undertaken taking into account land acquisition requirements according to the IFC performance standards as well as taking into account potential effects from climate change.		✓	×	×	×
		Preparation and implementation of a habitat removal and removal plan (HRRP) and habitat removal procedure (HRP). Preparation of a construction biodiversity management plan (CBMP) which details the planning of work phases such that the loss of critical habitats (eg mudflats and water bird area) are delayed.		✓	×	×	×
		In line with the HRRP and HRP, vegetation clearance area will be clearly identified and marked prior to commencement to avoid accidental clearing, particularly at the boundary areas of the Project. Vegetation clearance will be undertaken outside of the main wildlife breeding area on each taxon (birds, mammals, herpetofauna) whenever applicable. Wildlife shepherding procedures will be developed and implemented to herd and relocate any fauna species present at the project area prior to vegetation clearance.		✓	×	×	×
		Where species of conservation value are identified, appropriate measures to ensure they have dispersed from the area will be undertaken.		✓	×	×	×
		Prior to any construction activities in identified ecological sensitive areas, checks/documentation will be undertaken for protected flora and fauna.		✓	×	×	×
		Other mitigation measures related to vegetation clearance and associated groundworks, relocation of threatened wildlife and to reduce impacts on threatened and migratory birds are also detailed in the BAP (eg protocol and standard operation procedure) following IFC PS6 / GN 6 requirements as well as in compliance with relevant Philippine regulations.		✓	×	×	×
		Project access road shall be restricted to construction vehicles only and vehicle from outside including communities. The project will establish the necessary security arrangement and the checkpoints in each entry point to manage site access and inspect vehicles to ensure less disturbance to biodiversity		✓	×	×	×
		The commencement of marine construction work such as dredging and underwater piling will be conducted incrementally (ie from low intensity and then gradually ramped up to the required construction intensity) to warn and allow any marine fauna present to move away from the source of impact before impacts become detrimental to them.		✓	×	×	×
		The installation of silt curtains (at strategic area, subject to water quality monitoring) to prevent excessive sedimentation to nearby sensitive habitats. Adaptive measures will be implemented, subject to implementation of control and continuous monitoring systems.		✓	×	×	×
		Dredging vessels will be equipped with the appropriate global positioning system (GPS) equipment or other navigational aids.		×	×	×	✓
	Introduction or spread of non-native invasive species due to: increased movement of people, vehicles, machinery, vegetation, and soil; foreign vessels	Alien invasive awareness training to be conducted for all employees and workers involved in site clearing activities.	Contractor	✓	×	×	×
		Where a cleared area has naturally been covered with invasive species, the area is to be localised to prevent spread to other areas.		✓	×	×	×
		Clearing and cleaning invasive vegetation procedure to consider soil type, slope, surrounding area and future action to keep location safe from invasive species.		✓	×	×	×
		Minimise movement of materials (traffic and distance travelled), and disturbance to or movement of soil and vegetation.		✓	×	×	×
		Source goods/materials locally where possible.		✓	×	×	×
		Presence of any invasive species to be contained and reported.		✓	×	×	×

[15] ✓ denotes that the recommendation/mitigation measure has been proposed in the respective ESIAs.

[16] × denotes that the recommendation/mitigation measure has not been proposed in the respective ESIAs.

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
		Washdown area of entire exterior vehicle before entering non-infested areas and after working in infested areas, vehicle tyres are to be pressure washed.		✓	×	×	×
		Cover exposed soil/materials to prevent establishment of invasive species and erosion.		✓	×	×	×
		Use native, non-invasive plants for revegetation and landscaping.		✓	×	×	×
		Develop and implement an invasive species management plan.		✓	×	×	×
		Undertake detailed mitigation measures and reporting (documentation) in accordance to the BAP.		✓	×	×	×
		Use local vessels wherever possible.		✓	×	×	×
		Manage ballast water and sediments according to a ship-specific ballast water management plan.		✓	×	×	×
		Where foreign vessels are being used, vessels are to adhere to best practices with regards to the management of ballast and bilge systems in compliance with the International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM).		✓	×	×	×
		Ships will have a valid international ballast water management certificate. Vessels to maintain records of ballast water uptake and discharge locations in Ballast Water Record Book.		✓	×	×	×
		Adherence to the International Convention for the Control and Management of Ships' Ballast Water and Sediments.		×	✓	✓	✓
	Accidental killing and injury of species due to Project construction activities such as potential collisions with moving vehicles along access roads, the operation of machinery within the project area and collisions during access channel development	Training on wildlife traffic safety is to be included in the biodiversity awareness training that is to be attended by all employees.	Contractor	✓	×	×	×
		Access to be restricted on all site roads including temporary access roads during construction.		✓	×	×	×
		Establish access road traffic speed limit of 20km/hr throughout the project area. Signboards of wildlife crossings are to be installed along access roads where wildlife have been observed. Establish a speed limit of 10km/hr at these sensitive areas		✓	×	×	×
		Installation of speed regulation features to encourage compliance with the speed limit.		✓	×	×	×
		Set up security points at all main access roads within boundaries of the Project.		✓	×	×	×
		Other mitigation measures related to off-road driving are described in the BAP and should be implemented throughout the construction.		✓	×	×	×
		Training on vessel safety to be included in the biodiversity awareness training that is to be attended by all vessel employees.		✓	×	×	×
		Hire or train existing staff to fulfil the role of marine observation officers.		✓	×	×	×
		Briefings to vessel contractors will be conducted regarding presence of marine mammals, sea turtles and whale sharks in the vicinity of the Project Site and the procedures to adopt.		✓	✓	✓	✓
		Establish marine-specific rules that will be incorporated into the company regulation on biodiversity protection and conservation on appropriate conduct such as the prevention of marine litter and accidental oil or other spillages.		✓	×	×	×
		Establish fixed and minimal vessel routes for the Project required for the transportation of earth and materials from SNS winning area.		✓	×	×	×
		Impose fixed speed limit on all Project vessels.		✓	✓	×	×
		Crew on dredging vessels will be trained to watch for marine megafauna with naked eye and aided by binoculars continuously in the access channel during daylight hours, as far as practicable.		✓	×	×	✓
		Any sightings of marine megafauna will be reported if they impose a risk to one or more vessels, including location where the animal was sighted and direction		✓	×	×	✓
		All sightings will be recorded in a Marine Megafauna Observation Log.		✓	×	×	✓
		Dredging vessels will adhere to good industry marine megafauna interaction protocols.		✓	×	×	✓
		Vessels to follow shipping lane routes, as far as practicable.		×	×	✓	×
	• Disturbance and displacement of species due to light disturbance (nightworks) from construction activities • Noise generated by construction; Vibrational and noise impacts underwater	Intensity of construction activities to be gradually ramped up to allow fauna to disperse before maximum noise levels are reached.	Contractor	✓	×	×	×
		Design lighting to avoid intense illumination and night-time lighting glare. Use directional lighting rather than diffuse lighting as far as practicable.		✓	×	×	×
		Night works to be avoided and minimised, and to be conducted only when necessary.		✓	×	×	×
		Night-time illumination of construction sites will be limited to minimise disturbance to nocturnal animals		✓	×	×	×
		Light is to be shaded and directed downwards to avoid light spillage		✓	×	×	×
		Motion activated light sensors are to be installed at workers camp sites to minimise light pollution		✓	×	×	×

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
		The BAP has detailed specific mitigation measures to reduce the impacts of light on insects and their predators and will be implemented		✓	×	×	×
		The commencement of marine construction work such as dredging and underwater piling will be conducted incrementally to warn and allow any marine fauna present to move away from the source of impact before impacts become detrimental to them.		✓	×	×	×
		Sufficient lighting for safe working during 24 hours operation and lighting on vessels is directed to work area to limit light spill to sea.		×	×	×	✓
		Opportunities for light spill to be reduced will be managed through opportunistic inspections during vessel audits/inspections.		×	×	×	✓
	Dust emissions during construction activities could cause localised reduction in air quality from dust deposition around working areas affecting adjacent habitats	Unsealed access roads with moderate to high traffic will be sprayed with water twice a day during the dry season, spray intensity is to be increased with traffic intensity.	Contractor	✓	×	×	×
		Habitats surrounding sites of construction activities are to be sprayed down with water twice a week during the dry season. Spraying intensity is to increase where deposition of dust increased		✓	×	×	×
		Limit the amount of disturbed and exposed area during construction		✓	×	×	×
		Use protective covering for denuded areas and aggregate/soil stockpiles during construction until areas are revegetated		✓	×	×	×
		Prepare temporary/permanent drainage system with a sediment trap for discharge along all access roads and surrounding construction sites.		✓	×	×	×
		Other mitigation measures related to dust minimisation are detailed in the BAP.		✓	×	×	×
	Dredging activities and river embankment modifications may cause changes in water quality, streamflow regime modification hydrological conditions and increased risk of localised pollutions	Ban on fishing is to be imposed for all rivers within the project boundary	Contractor	✓	×	×	×
		No deliberate discharge of materials or any pollutants into the river or its tributaries		✓	×	×	×
		Water sourced from river will not be used to clean vehicle and machinery or for any purpose where pollutants may be released		✓	×	×	×
		Fuel storage, asphalt manufacturing and other potentially polluting activities are to occur away from rivers and adequate pollution control measures are to be implemented		✓	×	×	×
		Exposed work areas near watercourses are to be re-instated with suitable vegetation as soon as possible under the guidance of national regulation and international best practice on rehabilitation		✓	×	×	×
		Habitats to be restored are detailed in the habitat removal and restoration plan (HRRP) and habitat removal procedure (HRP)		✓	×	×	×
		Committed offset actions such as the clean-up of Tullahan-Tinajeros river are described in the BAP. Other potential offset actions for river habitats are also included in the BAP		✓	×	×	×
	Workers may access current fishing grounds	Installation of no hunting, poaching and fishing signs throughout the project area illustrating the hunting ban and capture of any wildlife	SMAI Contractor	✓	×	×	×
		The Project owner will issue a formal company regulation on prohibition of fishing in all marine zones to all company employee, EPC Contractor, all related staff and visitors		✓	×	×	×
		Refer to BAP for other mitigation measures related to the prevention of the exploitation of biological resources		✓	×	×	×
		Community socialisations led by SMAI's community relations officer to ensure good relationship with fishermen associations		✓	×	×	×
		Engagement activities will be recorded		✓	×	×	×
		Community Safety Vessels will be locally hired amongst fisherfolk to ensure safe fishing conditions of fishermen who are present around the dredging area and maintain a safety distance.		×	×	×	✓
		Assign delegated Community Liaison Officers (CLO) onsite to inform communities about the schedule and location of dredging activities on a regular basis.		×	×	×	✓
		Disclose operation plan to inform fishermen and fishing net owners of the working area and disclose vessel routes.		×	×	×	✓
		Disseminate and implement a grievance mechanism.		×	×	×	✓
		Implement an Unforeseen Damage Compensation Framework linked to the Community Grievance Mechanism.		×	×	×	✓
	Turtle entrainment in suction equipment	Active jetting will be switched on before engaging the dredge pumps.	Contractor	×	×	×	✓
		Slow starts to all equipment.		×	×	×	✓
		Any incidents that occur during dredging that result in the death of turtles will be documented and reported to the authorities when required.		×	×	×	✓
	Impacts to marine mammals, marine turtles, seabirds and shorebirds due to generation of sound from dredging	NA		×	×	×	✓

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
Social and socio-economics	Physical and economic displacement of affected landowners by land procurement for the Project	Implementation of identified corrective actions by SMAI, according to the Land Acquisition Audit (LAA; Document reference: 409686-05) to support PAHs in order for them to restore their livelihoods.	SMAI	✓	×	×	×
		Implementation of actions according to the developed livelihood restoration plan (LRP; Document reference: 409686-07).		✓	×	×	×
		SMAI will initiate public consultations/engagements in the local Barangays on daily socioeconomic needs of the communities.		✓	×	×	×
		SMAI will conduct a Security Risk Assessment and develop a security management plan in accordance with IFC PS4 and IFC Good Practice Handbook on Use of Security Forces		✓	×	×	×
	Physical and economic displacement of informal settlers and due to loss of fishing area and access to marine resources	Execute appropriate livelihood restoration programmes proposed in LRP to improve or at least maintain the livelihoods of PAPs.	SMAI	✓	×	×	✓
		Ensure gender equity in all compensation and livelihood restoration measures		✓	×	×	✓
		Monitoring changes to livelihoods of PAPs, if it is identified that the livelihood level of PAPs is declining because of the dredging of access channel, the supplementary livelihood restoration measures should be proposed and implemented.		✓	×	×	✓
		Monitoring implementation of livelihood restoration programs of PAPs of the land development area to ensure that livelihoods of PAPs are maintained/ improved.		✓	×	×	✓
		Implement a grievance mechanism for people to lodge complaints about the Project (including channels to make anonymous complaints if preferred) and to obtain a response from SMAI and Boskalis.		✓	×	×	×
		Consult with and inform the PAPs and other relevant households that are engaged in decisions regarding the livelihood restoration measures.		×	×	×	✓
		Pay particular attention to vulnerable groups to ensure they have equitable access to opportunities and benefits provided by the Project.		×	×	×	✓
		Develop employment programmes to maximise the benefit sharing between the Project and affected fisherfolk by hiring a liaison role locally.		×	×	×	✓
		Close the livelihood restoration activities upon confirmation that impacts induced by the Project have been mitigated in line with the applicable standards.		×	×	×	✓
		Develop a sustainable fishery plan.		×	×	×	✓
		Regularly monitor the yield of fish caught by affected fishermen during the period of sand winning activities.		×	×	×	✓
		Support existing local, regional or MBSDMP Fish Stock program.		×	×	×	✓
		Further action shall be undertaken to improve/restore fish stock in the Project influence area, if the fish catch yield is reduced significantly due to sand winning activities.		×	×	×	✓
	Reduction of local property prices	A clear and objective model for determining compensation to reduce controversy based on regression analysis to identify factors with significant impacts and which considers different land uses and accounts for market value of property loss in design of a compensation package.	SMAI	✓	×	×	×
		SMAI will establish a body respected and trusted by all stakeholders to manage the compensation process.		✓	×	×	×
		Establishment of measures which make it advantageous to live in close proximity to the airport		✓	×	×	×
		Mitigation of noise - and hence of associated - impacts by means of general, economic, social and technical instruments		✓	×	×	×
	Impacts on employment and economy	Employment opportunities to prioritize residents within the direct AoI host Barangays, within the local AoI Municipality of Bulakan and within the wider AoI province of Bulacan.	SMAI Contractor	✓	×	×	×
		No ‘at the gate hiring’ and the use of official employment agencies, in alignment with the local content plan.		✓	×	×	×
		Full suite of labour management plans to be developed safeguarding workers from labour rights abuses.		✓	×	×	×
		Commitment to meet all reference framework requirements on labour for all SMAI’s employees, contracted employees, and primary supply chain employees, as applicable.		✓	×	×	×
		The Project will initiate a social development plan (SDP) framework where it will include vocational skills and livelihood training for the residents of the affected community.		✓	×	×	×
	Influx impacts on: Road infrastructure and congestion	Influx Management Plan will be developed and a good international industry practice (GIIP) on traffic management plan incorporating traffic safety management will be covered. Public transport will be provided for non-local workers who live in workers’ accommodation camps located in or around the project site.	SMAI Contractor	✓	×	×	×
	Influx impacts on: Social and community services, facilities and infrastructure	Establishment of a site healthcare centre/station for the Project to provide daily healthcare and emergency treatment for workers during the construction phase.	SMAI Contractor	✓	×	×	×
		SMAI and the Contractor will work closely with the relevant LGUs in order to ensure sufficient supply of water, electricity and waste/wastewater collection service is available for workers and not compete with community needs.		✓	×	×	×
		Only Project workforce is allowed to board and live on the accommodation vessels.		✓	×	×	×

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
		Basic leisure, exercise, social and telecommunication facilities and services shall be provided to workers which will be made accessible also for non-local workers who stay in the workers' accommodation camps established by the EPC Contractor and sub-contractors.		✓	×	×	×
		Preparation of a separate Occupational Health and Safety Management Plan (OHSMP) and COVID-19 management plan, which includes but is not limited to health and safety training programme for workers.		✓	×	×	×
	Service prices for commodities, food and beverages	Specific mitigation measures to control services prices are not deemed necessary noting that it is expected to stabilise eventually. Business opportunities will attract more entrepreneurial economic migrants to the area to temporarily establish businesses which could further increase demand and prices, but will also increase supply and local competition.	SMAI Contractor	✓	×	×	×
	Host communities related to antisocial behaviour and social conflict with migrant workers	A Code of Conducts for all workers will be developed, including principles and rules when interacting with local communities, especially during off-work hours.	SMAI Contractor	✓	×	×	×
		Safety regulations will be strictly implemented during construction.		✓	×	×	×
		Interaction with local communities shall be avoided to the extent possible.		✓	×	×	×
		The engagement of migrant workers will be averted to the extent possible by employing locals through a local hiring plan.		✓	×	×	×
	Community health and safety / public health impacts due to noise, dust and air quality impacts / Impacts on navigation and marine traffic	Regardless of the size or type of vehicle, owners/operators will implement the manufacturer recommended engine maintenance programmes.	SMAI Contractor	✓	×	×	×
		Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with consideration to meteorological factors and location of sensitive receptors.		✓	×	×	×
		Compacting and periodically grading and maintaining roads		✓	×	×	×
		Use covers and/or control equipment such as water suppressors to minimise dusk		✓	×	×	×
		Installing enclosures and covers, and increasing the moisture content to minimise dust from open area sources, including storage.		✓	×	×	×
		Suppressing dust on unpaved roads, such as applying water or non-toxic chemicals to minimise dust from vehicle movements.		✓	×	×	×
		Vegetating exposed surfaces of stockpiled materials.		✓	×	×	×
		Enforcing a speed limit for HGVs onsite at 20km per hour.		✓	×	×	×
		Explaining and training drivers to minimize noise impacts.		✓	×	×	×
		Manage project vehicles and train drivers not queue up leaving their engines running at the entrance to the site or on the public highway.		✓	×	×	×
		Keeping compressor, generator and engine compartment doors closed and turn off plant when not in use.		✓	×	×	×
		Avoiding the use of particularly noisy equipment and machinery early in the morning and late at night.		✓	×	×	×
		Restricting deliveries to within the working hours of the site minimising significant movements during sensitive times.		✓	×	×	×
		Using adjustable or directional audible vehicle-reversing alarms or use alternative warning systems		✓	×	×	×
		Every crew member will be trained to understand the Project HSSE requirements		✓	×	×	×
		Dredging Project Sailing Plan / Marine Traffic Safety Management Plan shall be developed by both Project Manager and crew members.		✓	×	×	×
		Specific control measures for access to the project site, routes on the project site, separation of people and heavy/light vessels, offshore traffic management.		✓	×	×	×
		All works executed within the boundaries of the Project with main vessels and auxiliary equipment may only start upon approval of Port Control.		✓	×	×	×
		Navigational warnings received from the Control & Marine Guidance Office are taken into account by the vessels' management while planning the route.		✓	×	×	×
		All accidents, damage and near misses are reported to the Contractor Head Office in a timely manner.		✓	×	×	×
		Disclose and implement the Grievance Mechanism for the Project, and investigate any raised grievances in time.		✓	×	×	×
		Community socialisations led by contractor's community relations officer to ensure good relationship with fishermen associations and other marine users along the transport route.		✓	×	×	×
		HSSE management plan shall include guidelines for engagement with communities in the scope of the Project to limit and prevent transmission of disease.		×	✓	×	×
		COVID-19 test shall be conducted for all project workforce before the mobilisation to the Project Site.		×	✓	×	×
		Temperature inspection shall be conducted and documented regularly before and after the work.		×	✓	×	×

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
		Interaction with local communities shall be avoided to the extent possible.		×	✓	×	×
		Engagement with migrant workers should be averted to the extent possible by employing locals through a local hiring plan.		×	✓	×	×
		Only Project workforce is allowed to board and live on the accommodation vessels.		×	✓	×	×
		Staff should stay at home if symptoms of cold occur.		×	×	×	✓
		Do not shake hands.		×	×	×	✓
		Keep a social distance of 1.5m, or more if prescribed by local regulations.		×	×	×	✓
		Wash hands often with soap and water and use hand sanitizer.		×	×	×	✓
		Cough or sneeze into elbow or cover mouth and nose with a tissue and place the used tissue immediately in a bin and wash hands afterwards.		×	×	×	✓
		Visitors must adhere to COVID Outbreak Management System (COMS) visitor requirements and obtain approval from Vessel Captains prior to embarking a vessel.		×	×	×	✓
		For circumstances of medical evacuations, the Vessel Captain shall inform the Project HR and Crewing Manager to maintain communications with necessary personnel outside the project.		×	×	×	✓
		Conduct COVID tests onboard regularly.		×	×	×	✓
		Encourage all Project employees take full vaccination prior to mobilisation.		×	×	×	✓
		Crewmembers will be trained to understand Project HSSE policy and requirements.		×	×	×	✓
		All works executed within the boundaries of the Project area with main vessels and auxiliary equipment may only start upon approval of Port Control.		×	×	×	✓
		Instructions of Port Control will be strictly followed at all time.		×	×	×	✓
		No exclusion zone will be imposed besides the safety buffer zone.		×	×	×	✓
		Navigational warnings received from the Control & Marine Guidance Office are taken into account by the vessels' management while planning the routes.		×	×	×	✓
		Maritime safety notifications will be communicated with the vessels sailing in the Bay during transportation of materials.		×	×	×	✓
		Disclose the operation plan to inform fishermen and fishing net owners of the working area and vessel routes on a regular basis.		×	×	×	✓
		Community safety vessels will approach vessels and steer them away from safety buffer zone during operation.		×	×	×	✓
		Disclose and implement the Grievance Mechanism for the Project.		×	×	×	✓
		All accidents, damage and near misses are reported to the Contractor Head Office in a timely manner.		×	×	×	✓
		Manage speed for Project vessels to ensure safe navigation.		×	×	×	✓
		Provide safety training for Project affected fishermen.		×	×	×	✓
		Project vessels should be clearly illuminated and equipped with speakers and steer away of large ships.		×	×	×	✓
	Flooding impacts on surrounding communities	Surrounding communities prone to flooding will be included in the Flood Management Plan for the operational phase and the Disaster Risk Management Plan for the airport.	SMAI	✓	×	×	×
		Implementing the Strategic Community Investment Plan (SCIP) and Livelihood Restoration Plan, to support the affected communities' livelihoods and disaster preparedness.		✓	×	×	×
	Impacts on cultural heritage resources	A Chance Finds Procedure (CFP) has been developed for the onshore land development and offshore works.	SMAI Contractor	✓	×	×	×
		The CFP will be disclosed to local authorities, contractors and subcontractors for their collaboration and feedbacks.		✓	×	×	×
		An archaeological study and a consultation with the National Commission for Culture and the Arts will be carried out to confirm if there are any cultural objects in the project site.		✓	×	×	×
Hydrology, water and sediment quality	• Impacts on water quality arising from release of sediment plumes / dissolved contaminants during dredging of the rivers and the marine access channel • Impacts on water quality from capital dredging works	Water quality monitoring during dredging dredging works.	Contractor	✓	✓	×	✓
		Project exclusion zones will be established around the coastal area and the marine access channel.		✓	×	×	×
		Mitigation measures will be applied if TSS values >50mg/L is detected outside the project exclusion zone.		✓	×	×	×
		Dredging footprint of the marine access channel, basin and rivers should be reduced as far as practicable		✓	✓	×	×
		Dredging vessels should be equipped with appropriate global positioning systems or similar navigational aids to improve accuracy of dredging works.		✓	✓	×	✓
		Control and monitoring systems to check for leaks and failures should be installed on the dredging vessels.		✓	✓	×	✓

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
		Hoppers should not be filled to a level that would enable sediment to spill or wash overboard during transport to the disposal site.		✓	×	×	✓
		All disposal vessels should be fitted with tight bottom seals to prevent sediment leakage.		✓	✓	×	✓
		Excess sediment on decks should be directed to the sediment container and should not be washed overboard.		✓	×	×	✓
		All construction vessels should maintain adequate clearance from the seabed during all states of the tide to avoid turbidity due to propeller wash.		✓	✓	×	✓
		A construction environmental management plan has been developed by the contractor to further detail the monitoring required.		✓	✓	×	✓
		Overflow system to drain excess seawater from the hopper will demonstrate turbidity concentration will not go over criteria.		×	✓	×	×
		Dredging should be planned to prioritise sediment deposits with lower fines content wherever possible.		×	×	×	✓
		Dispersal of suspended sediment from the dredging vessels will be reduced when the turbidity concentration value is over the criteria.		×	×	×	✓
	Impacts on water quality from offshore disposal of sediment	Dredging vessels will be equipped with appropriate global positioning system (GPS) equipment or other navigational aids.	Contractor	×	×	✓	×
		Control and monitoring systems will be used to alert the crew to leaks or any potential risks.		×	×	✓	×
		Implement standard turbidity controls.		×	×	✓	×
	Major incidents causing spillages / leakage of dredged materials and hydrocarbon fuels	For vessels of 400 gross tonnage or above, MARPOL 73/78 Annex I should be adhered, which specifies that such vessels should carry an approved Shipboard Oil Pollution Emergency Plan (SOPEP).	Contractor	✓	✓	✓	✓
		Vessels will have a valid International Oil Pollution Prevention (IOPP) Certificate.		✓	×	✓	✓
		Project Exclusion Zones will be implemented around the project site.		✓	✓	✓	×
		Contingency / emergency response plans will be set up and training provided to crew on emergency response measures including for major spillage / leakage incidents.		✓	×	×	×
		Chemicals, fuels and oils stored onboard will be handled and stored in compliance with their Material Safety Data Sheet (MSDS).		✓	✓	✓	✓
		Chemical and fuel wastes will be properly stored and labelled for disposal onshore by a reputable/licensed waste contractor.		✓	✓	✓	✓
		Spill response kits will be regularly stocked, checked and located near chemical / fuel storage areas.		✓	✓	✓	✓
		All vessels will fully adhere to safe steering and sailing practices, including keeping lookout of the vicinity, travelling at safe speeds and implementing proper give-way or evasive manoeuvres where a risk of collision is detected.		✓	✓	✓	✓
		All navigational equipment including compass, radar, lights and noise signals will be regularly checked and ensure in proper working order.		✓	✓	✓	✓
		Automatic Identification System (AIS) should be installed and monitored.		✓	✓	✓	✓
		Preparation and implementation of vessel standard operating procedures.		×	✓	✓	✓
		In the event of vessel collision, the SOPEP will be implemented, if required.		×	✓	✓	✓
		Spill response kits will be regularly stocked, checked and located near bunkering areas.		×	✓	✓	✓
		Adherence to minimum safe manning levels.		×	✓	✓	✓
		Use of existing shipping lanes, as far as practicable.		×	×	✓	×
		Navigational systems and equipment required are those specified in Safety of Life at Sea (SOLAS) Chapter V (Regulation 19).		×	×	×	✓
		Establishment of 500m Safety Buffer Zone around each dredging vessel during active operations.		×	×	×	✓
	Potential water quality impacts due to discharges from marine / river construction vessels / dredging activities	Relevant requirements under, and in compliance with the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 shall be applied to discharges (including sewage, sullage, deck drainage, bilgewater, spills and leaks) from vessels.	Contractor	✓	✓	✓	✓
		Implement additional mitigation measures to minimise turbidity / TSS release.		✓	×	×	×
		Implementation of relevant vessel navigational procedures.		✓	×	×	×
		Implement standard turbidity controls.		✓	×	×	×
		Vessels will have valid International Sewage Pollution Prevention (ISPP) Certificate.		✓	✓	✓	✓
		Vessels within 3 nm of the nearest land will be required to either treat their sewage in a MARPOL approved treatment plant before discharge or collect their sewage for disposal outside of the 3 nm boundary.		✓	✓	✓	✓

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
		Sewage which is not comminuted or disinfected has to be discharged at a distance of more than 12 nm from the nearest land.		✓	✓	✓	✓
		No direct overboard drainage from sludge/drain/dirty oil/bilge water collecting tanks.		✓	✓	✓	✓
		Contaminated drainage from decks, machinery spaces or bunded areas will be contained and treated prior to discharge.		✓	✓	✓	✓
		If treatment systems are not available or cannot meet the oil-in-water content specification, the contaminated water will be stored in suitable containers and transported to shore for treatment and/or disposal by a certified waste oil disposal contractor.		✓	✓	✓	✓
		Preparation and implementation of vessel standard operating procedures, and vessel navigational procedures.		✓	×	×	×
		Chemicals and/or hydrocarbons will be handled and stored in compliance with the Material Safety Data Sheet (MSDS).		✓	×	×	×
		Spill response kits will be located in proximity to hydrocarbon storage/bunkering areas and appropriately stocked/replenished as required.		✓	×	×	×
		The SOPEP, if required, will be implemented in the event of a vessel collision.		✓	×	×	×
		Vessels >400 tonnes (or certified for >15 persons on-board) will have a garbage record book.		✓	×	✓	✓
		Lost objects will be recovered if safe and practicable to do so.		✓	×	✓	✓
		Vessels will comply with applicable MARPOL 73/78 Annex V requirements (Reg 3) regarding maceration of food scraps and its discharge and disposal		✓	×	✓	✓
		Vessels will have valid International Oil Pollution Prevention (IOPP) certificate, as appropriate to vessel class.		×	✓	✓	✓
		Bilge water contaminated with hydrocarbons must be contained and disposed of onshore, unless the oil in water (OIW) content is within 15ppm and an IMO approved oil/water separator (OWS) is used to treat the bilge water.		×	✓	✓	✓
		Vessels will maintain an oil record book.		×	✓	✓	✓
		Preventive management measures will be implemented to avoid unintentional bilge water and deck drainage discharge.		×	×	×	✓
	Release of sediment during land formation construction activities	Construct perimeter bund in the northwest corner of the land platform, along the seaward and northern boundaries of the land platform area to prevent water and sediment from filling activities from running towards the Ecopark.	Contractor	✓	×	×	×
		Enclose areas within the land platform site that are being filled, as soon as and as much as practicable to increase settlement of fine sediments before discharge water is released from the site.		✓	×	×	×
		Minimising discharging sediment from close filling activities into Alipit River		✓	×	×	×
		Use existing fish pond structures present at the land development site, where possible, to enable settling of fine sediments before water is discharged from the site.		✓	×	×	×
		Implementation of sedimentation control measures		✓	×	×	×
	Polluted runoff from the construction site	Provision of oil spill prevention measures	Contractor	✓	×	×	×
		Provide garbage bins at active construction sites, strategically located for proper segregation, storage and collection of solid wastes and other wastes.		✓	×	×	×
		Provision of proper solid and hazardous waste management system in compliance with RA 9003 and R 6969.		✓	×	×	×
		Regular checking of all equipment for leakage.		✓	×	×	×
		Store chemicals, fuels/oils in secure areas that are protected from wind and rain.		✓	×	×	×
		Use leak proof containers for storage and transportation of oil/grease.		✓	×	×	×
		Oil spill kits will be made available on site as well as emergency protocols established to alert concerned responders in case there are accidental spills.		✓	×	×	×
		Waste generated from construction activities will be properly collected, sorted, stored and disposed according to provisions of Ecological Waste Management Act of 2000.		✓	×	×	×
		Temporary toilet facilities will be provided by the contractor to workers to prevent sanitary wastes from contaminating the nearby surface waters.		✓	×	×	×
	Contamination of groundwater from hazardous / non-hazardous waste and wastewater disposal	No groundwater extraction is proposed for this Project. No specific measures are identified for the potential effect of saline intrusion due to ground subsidence, which is not considered to be a key concern in the absence of groundwater extraction	Contractor	×	×	×	×
Geology, seismicity and natural hazards	Earthworks which could cause settlement, slope instability and liquefaction due to soft and weak ground conditions	Undertake additional reinforcement measures	SMAI Contractor	✓	×	×	×
		Borrow materials that will be engineered to improve its consistency.		✓	×	×	×
		Undertake ground improvements works to improve the engineering properties of the treated soil mass.		✓	×	×	×

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
		Conduct methods such as deep cement mixing or prefabricated vertical drains to target the clayey layers and vibroflotation or compaction can be used to target the sandy layers.		✓	×	×	×
		Carry out construction of embankments in stages to avoid ground failure		✓	×	×	×
		Application of gravel mats and geogrids to reduce the negative impact of liquefaction.		✓	×	×	×
		For structures with large loads that would be constructed at depths, foundation concrete driven or steel driven piles should be used.		✓	×	×	×
		Slope stability related issues will also be subject to visual monitoring during regular site inspections.		✓	×	×	×
		Liquefaction analysis can be conducted in riverbanks to determine the susceptibility to lateral spreading.		✓	×	×	×
		Emergency preparedness and response plan (EPRP) to be implemented during pre-construction and construction phases.		✓	×	×	×
	Earthquakes / seismic activity causing site failure or structural failure endangering site users	Implementation of the seismic design parameters in accordance with relevant Philippine building codes.	SMAI Contractor External structural experts (optional)	✓	×	×	×
		As per Environmental Compliance Certificate (ECC) requirements, regular monitoring of the geotechnical condition shall be undertaken to maintain ground stability and check the physical quality and integrity of the soil throughout the Project implementation.		✓	×	×	×
		Confirmatory geophysical tests at the project site's current condition, as well as additional geophysical tests after the consolidation/sand filling stage, are to be conducted by SMAI's land development contractor.		✓	×	×	×
		Anchored retaining structure that could hold in-place land platform will be established.		✓	×	×	×
		The foundation and structures near river banks will be designed in a manner where it will not be affected by slope failure of river banks.		✓	×	×	×
		Emergency preparedness and response plan (EPRP) to be implemented during pre-construction and construction phases.		✓	×	×	×
	High wave heights from tsunamis causing damage to structures and endangering site users or storm surges during inclement weather / typhoons	Installation of tsunami / storm surges warning systems.	Contractor	✓	×	×	×
		EPRP to be implemented during pre-construction and construction phases. Evacuation plan will be established and disclosed with local authorities.		✓	×	×	×
		Phasing the works to build up coastal defences during the initial phases of the work.		✓	×	×	×
		Coordination with the Bulacan Provincial Disaster Risk Reduction and Management Council (PDRRMC).		✓	×	×	×
	Volcanic hazards causing damage to structures and endangering site users	Construction facilities and airport structures will be designed to withstand volcanic material being deposited onto the roofs and tops of its buildings.	Contractor	✓	×	×	×
		The volcanic risk to the site is likely to be low but given that there are no studies of the potential hazard, the Project will undertake a study of the volcanic risk potential and its impacts during construction.		✓	×	×	×
		Volcano monitoring will also be actively carried out to have a quick response to an eruption in the vicinity and to prepare for logistics to remove ashfall material from the tops of buildings, roadways and drainage systems.		✓	×	×	×
		Plans should be made for alternative accessibility routes for people and materials to be transported to the site as volcanic material could block access routes to the site.		✓	×	×	×
	Flooding due to ground settlement from earthworks and structural loading and endangering site users	Conduct staff briefings on flood safety issues when working in close proximity to water.	Contractor	✓	×	×	×
		Deployment and maintenance of adequate equipment on site to pump out flood water.		✓	×	×	×
		Equipment and material storage facilities, particularly fuel and chemical stores, will be protected against potential floods.		✓	×	×	×
		Ensure flood management plans are developed and implemented.		✓	×	×	×
		Regular inspection of embankment structural condition to reduce risk failure.		✓	×	×	×
		Designate flood evacuation/ muster points areas on higher ground.		✓	×	×	×
		Development of flood risk management and responses within an EPRP.		✓	×	×	×
		Coordination with the Bulacan PDRRMC		✓	×	×	×
		The ECC contains a condition which stipulates that SMAI shall institute measures to address flooding within the project coverage area in all project phases, in coordination with Department of Public Works and Highways (DPWH) and Provincial Government of Bulacan.		✓	×	×	×
	Contamination of groundwater due to pollution incidents	To mitigate the impacts of potential pollution incidents to groundwater and aquifer resources, spill prevention measures will be adhered to so that any risk of pollution and spillage can be prevented and avoided.	Contractor	✓	×	×	×
Air Quality	Deterioration of ambient air quality (due to fugitive dust emissions and notably PM_{10}) resulting from earthworks / land formation	Minimising dust from material handling sources.	Contractor	✓	×	×	×
		Minimising dust from open area sources.		✓	×	×	×
		Implementing dust suppression techniques on unpaved roads.		✓	×	×	×

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
	activities and operation of construction equipment	No bonfires and burning of waste materials shall be allowed.		✓	×	×	×
		Planning land clearing, removal of topsoil and excess materials, location of haul roads, tips and stockpiles with due consideration to meteorological factors and location of sensitive receptors.		✓	×	×	×
		Designing, installing and applying a simple, linear layout for materials-handling operations to reduce the need for multiple transfer points.		✓	×	×	×
		Compacting and periodically grading and maintaining roads.		✓	×	×	×
		Vegetating exposed surfaces of stockpiled materials.		✓	×	×	×
		Limiting earthwork activities during high winds.		✓	×	×	×
		Sustainable transport plan will be developed to encourage sustainable transport methods for commuting to and from the site for the few construction workers that are not based in the onsite temporary construction accommodation.		✓	×	×	×
		Containment of dusty processes: containment and arrestment is the preferred option for control of emissions to air from processes handling cement.		✓	×	×	×
		Suppression of dust using water or proprietary suppressants.		✓	×	×	×
		Protection of external sources from wind whipping is necessary.		✓	×	×	×
		Regular maintenance of pollution control devices.		✓	×	×	×
		Ships involved in construction and operation of the Project shall operate and comply with International Maritime Organization IMO2020 – cleaner shipping for cleaner air[17].		✓	×	×	×
		The ECC contains a condition which stipulates that a comprehensive Road Network and Traffic Management Plan shall be submitted within 180 days from receipt of the ECC (December 2021).		✓	×	×	×
		Maintain communications with potentially affected households to understand the main concerns and preferences of those affected, including any grievances received in relation to air quality impacts and dust.		✓	×	×	×
		Low sulphur fuel (0.05% sulphur by mass) will be used where available.		×	✓	✓	✓
		Engine maintenance to minimise emissions of unburned hydrocarbons		×	✓	✓	✓
		Vessels will be in compliance with applicable MARPOL 73/38 Regulations for the prevention of air pollution from ships (Annex VI).		×	✓	✓	✓
		Vessels will have a Ship Energy Efficiency Management Plan (SEMP) providing for fuel efficient vessels operations, in accordance with the requirements of Annex VI MARPO 73/78.		×	✓	✓	✓
	Combustion related emissions from increased localised traffic, project vehicles, on-site diesel engines	Drivers will be instructed on the benefits of driving practices that reduced both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits.	Contractor	✓	×	×	×
		Enforce a ‘no-idling’ policy.		✓	×	×	×
		Enforce a speed limit for HGVs on-site at 20km per hour.		✓	×	×	×
		Regardless of the size or type of vehicle, owners / operators will implement the manufacturer recommended engine maintenance programmes.		✓	×	×	×
		Old construction vehicles will be replaced with newer more fuel-efficient alternatives where possible.		✓	×	×	×
		Convert high use vehicles to cleaner fuels where possible.		✓	×	×	×
		Install and maintain emission control devices.		✓	×	×	×
		Implement a regular vehicle maintenance and repair program.		✓	×	×	×
		Low sulphur fuel (0.05% sulphur by mass) will be used where available.		✓	×	×	×
		Engine maintenance to minimise emissions of unburned hydrocarbons.		✓	×	×	×
		Vessels will be in compliance with applicable MARPOL 73/78 Regulations for the prevention of air pollution from ships (Annex VI) (as applicable or required by vessel class).		✓	×	×	×
		Vessels will have a Ship Energy Efficiency Management Plan (SEEMP) providing for fuel efficient vessel operations, in accordance with the requirements of Annex VI MARPOL 73/78 (as applicable or required by vessel class).		✓	×	×	×
Greenhouse gases	GHG emissions: these emissions will principally occur through the use of materials, from the transport of those materials and	Toolbox talks for workers about switching off plant and equipment when not in use.	SMAI/Contractor	✓	×	×	×
		Source construction materials from the local area where possible.		✓	×	×	×
		Adopt a whole-life carbon approach to design and selection of construction materials		✓	×	×	×

[17] IMO2020 – Cleaner ships for cleaner air (2019). International Maritime Organisation. Available at IMO 2020 - cleaner shipping for cleaner air

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
	waste to and from the site, and from the use of construction plant.	Minimise construction related transport impact through enhancement of construction material and worker transportation logistics.		✓	×	×	×
		Regular servicing of plant and equipment; and use machinery which is powered using grid electricity rather than diesel or from portable generators.		✓	×	×	×
		Focus efforts on 'build less', challenging the requirement for materials and exploring alternative approaches.		✓	×	×	×
		Provide a specification of low embodied carbon construction materials.		✓	×	×	×
		The use of energy zoning in construction site cabins to control energy usage.		✓	×	×	×
		Implement appropriate waste management during construction works, adhering to the Waste Management Hierarchy.		✓	×	×	×
Climate change	NA	Potential climate resilience impacts to the Project during the Construction phase are scoped out, as the construction phase will occur in the short term (next 5-10 years), whereas climate change impacts are expected in the medium and long term.	NA	×	×	×	×
Noise and vibration	Noise annoyance to sensitive receptors adjacent to active construction areas: ● Construction of access roads ● Construction of project components and access roads ● Transport of materials, people and equipment to site ● Use of heavy/percussive equipment Vibration due to construction activities	Explain and train drivers to minimise noise impacts.	Contractor	✓	×	×	×
		Maintain vehicles and equipment frequently to ensure manufacturers' noise rating levels are met.		✓	✓	×	✓
		Use adjustable or directional audible vehicle-reversing alarms or broadband noise where practicable or use alternative warning systems.		✓	×	×	×
		Regular maintenance of equipment.		✓	✓	×	✓
		Ensure vehicles and equipment are operated in a manner to minimise noise emissions.		✓	×	×	×
		Keep compressor, generator and engine compartment doors closed and turn off plant when not in use.		✓	×	×	×
		Care will be taken when unloading vehicles to avoid unnecessary noise. Minimise drop height of materials		✓	×	×	×
		The timing of the use of particularly noise generating equipment / plant will be limited.		✓	×	×	×
		If it cannot be avoided, night works should be kept to a minimum and local community informed beforehand to minimise community impacts.		✓	×	×	×
		A speed limit will be applied to the access road and around the site which drivers will be required to adhere to.		✓	×	×	×
		Manage project vehicles to not wait or queue up with engines running at the entrance to the site access or on the public highway.		✓	×	×	×
		Restrict deliveries to be within working hours of the site minimizing significant movements during sensitive times.		✓	×	×	×
		Avoid unnecessary revving of engines, reducing speed of vehicle movement and maintaining the condition of the road surface to avoid body slap from empty lorries, designing and maintaining access routes.		✓	×	×	×
		The number of equipment operating simultaneously will be reduced as far as practicable.		✓	✓	×	✓
		Fit more effective exhaust equipment to earth moving equipment.		✓	×	×	×
		Deploy the use of silencer where necessary.		✓	×	×	×
		Fit enclosures with noise barriers for noisy engines.		✓	×	×	×
		Installation of noise barriers where exceedances arise or where required.		✓	×	×	×
		Maintain communications with potentially affected households to understand the main concerns and preferences of those affected, including any grievances received in relation to noise.		✓	×	×	×
		Any grievances received in relation to noise are to be managed in accordance with the Project's grievance resolution mechanism.		✓	×	×	×
		Machines and construction plant items that may be in intermittent use should be shut down or throttled down between work periods.		×	✓	×	✓
Waste, materials handling and storage	Impacts to marine environment from storage, handling and transportation of dredged materials from access channel to offshore disposal site	The material dredged from the access channel will be disposed in accordance with the requirements in Philippines Coast Guard (PCG) Memorandum Circular number 11-14 "Procedures for the dumping of wastes and other harmful matter within the Philippine Maritime Jurisdiction".	Contractor	✓	×	×	×
		Adherence to the conditions of the disposal permit e.g. dumping activities will be monitored and escorted by a PCG representative, who will be onboard. The permit will also designate the specific area where the dredged materials will be deposited.		✓	×	×	×
	General construction waste could cause impacts on: ● Impacts on soil and water quality resulting from the improper waste storage on site, disposal of waste in	Orientation training will be provided to workers regarding proper waste disposal.	SMAI Contractor	✓	×	×	×
		Training will be provided to workers regarding proper waste disposal.		✓	×	×	×
		Prior to commencement of major construction works at site, a suitably qualified in-house/external expert will be appointed by the Contractor to develop and deliver a training program on implementation, monitoring and reporting of the ESMP to ensure they will be conducted in line with the applicable reference framework for the Project.		✓	×	×	×

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
	unlicensed facilities or using inappropriate disposal methods. • Impacts on local communities including loss of land, nuisance, disturbance through increased vehicle movements, indirect impacts as a result of negative impacts on the surrounding environment • Health related impacts on workers as a result of improper handling, storage and disposal of waste.	A construction site waste management plan (SWMP) will be developed and implemented by the Contractor, with the implementation strictly monitored by SMAI.		✓	×	×	×
		Spoils shall be stockpiled on flat areas away from drainage routes. Designation of spoil disposal areas in natural depressions.		✓	×	×	×
		Garbage bins will be provided on-site for proper segregation, storage and collection of solid wastes.		✓	×	×	×
		Temporary storage area/ MRF for recyclables, electronic wastes, batteries and other special waste will be designated.		✓	×	×	×
		Backyard composting area/ facility (if applicable) should be provided or proof of collection of biodegradable wastes will be provided.		✓	×	×	×
		Hazardous waste will be collected by an accredited waste transporter.		✓	×	×	×
		Temporary toilet facilities will be provided by the company / contractor to workers to prevent sanitary waste from contaminating groundwater and nearby surface waters.		✓	×	×	×
		After the completion of construction phase, temporary sanitation facilities will be dismantled. The workers' camps and site offices will be cleaned and sterilized to ensure no waste is abandoned on-site.		✓	×	×	×
		The ECC requirements includes a condition which stipulates SMAI to establish, operate and maintain a Materials Recovery Facility to handle and manage solid waste and hazardous wastes consistent with the requirements of RA 9003 and RA 6969.		✓	×	×	×
		Mitigation measures will include the implementation of a proper solid and non-hazardous waste management system, including on-site sorting and proper storage in compliance with RA 9003.		✓	×	×	×
		Vessels will comply with applicable MARPOL 73/78 Annex V requirements.		✓	×	✓	✓
		Waste from vessels will be handled as per Vessel Garbage Management Plan (EQP-301).		✓	×	×	×
		Adherence to the conditions and requirements prescribed by the Environmental Management Bureau (EMB) of the Department of Environment and Natural Resources (DENR) as a hazardous waste generator, and hazardous waste management practices in accordance with RA 6969.		✓	×	×	×
		All hazardous waste generated will be properly segregated, labelled and stored in accordance with RA 6969 on proper disposal and treatment of hazardous waste.		✓	×	×	×
		As according to the ERA and ERP, hazardous / noxious liquid material spills (including oil) must have a corresponding Material Safety Data Sheet (MSDS), which should be readily available in areas where the material is stored and/or handled.		✓	×	×	×
		General hazardous solid wastes generated from vessels will be managed in accordance with MARPOL 73/78 requirements.		✓	×	×	×
		An inventory of all hazardous waste generated will be recorded in the self-monitoring reports (SMRs) and submitted to EMB Region 3 (R3) quarterly.		✓	×	×	×
		Emergency response procedures for potential hazards and risks during construction phase in the Emergency Response Programs (ERP) will be followed for leakage/ spillage.		✓	×	×	×
		Prevention measures for accidental spills, such as oil spill kits, container drums for waste oils and daily scraping, as well as collection of spilled oil and grease, will be provided on-site.		✓	×	×	×
		Shipboard Oil Pollution Emergency Plans (SOPEPs) will be developed and kept on-board vessels.		✓	×	×	×
		Chemicals and/or hydrocarbons on vessels will be handled and stored in compliance with the MSDS.		✓	×	×	×
		All chemical and/or hydrocarbon wastes generated on vessels will be segregated into clearly marked containers prior to onshore disposal by a licensed waste management contractor, as per the relevant MSDSs.		✓	×	×	×
		Provide workers with helmets and other appropriate PPE.		✓	✓	✓	✓
		Carry out emergency drills.		×	✓	✓	✓
		Fuel tank area should be bunded and set up away from the construction site offices, labour camps and residential areas.		×	✓	×	×
		Provide training for local communities on the danger of explosion and fire.		×	✓	×	×
		Provide instructions and procedures about safety precautions and emergency evacuations for local communities.		×	✓	×	×
		Maintain communications with local government units and continued community socialisations to understand the main concerns, including any grievances received in relation to waste management.		✓	×	×	×
		Contact with local emergency services to inform them about the works and the mitigation measures in place.		×	×	×	✓
	General materials handling and storage	Implementation of a material handling and storage plan, which includes material use and handling measures.	Contractor	✓	×	×	×
		The construction and operational procedures will include reference to the control measures in order to minimise the likelihood of incidents associated with materials storage, handling and use.		✓	×	×	×

Impact to / environmental sensitivity	Source / activities	Recommendations / mitigation measures	Responsibility	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
Seabed features / profile		Dredging vessels will be equipped with the appropriate global positioning system (GPS) equipment or other navigational aids to ensure dredging will occur at the specified dredge footprint.	Contractor	×	×	×	✓
Perception of erosion		Ensure sand burrow activities are undertaken within the designated area.	Contractor	×	×	×	✓
		Disclose and implement the Grievance Mechanism for the Project.		×	×	×	✓
		Disclose the non-technical summary of the sedimentation and erosion impact assessment report for sand winning area.		×	×	×	✓
		Set up a focal point to explain and clarify any queries raised from potential affected stakeholders regarding coastal erosion.		×	×	×	✓
		Ongoing engagement with Barangays and resort owners who have such concerns to alleviate their worries and anxiety.		×	×	×	✓
		Collect the baseline situation of the coastlines near the Project Site by capturing satellite images and photography.		×	×	×	✓
		Regular monitoring of the change to coastlines adjacent to the Project during and after sand winning.		×	×	×	✓

Source: Mott MacDonald/ERM, 2021

Table 5.2: Summary of operation phase mitigation and monitoring measures

Impact	Source / activities	Recommendations / mitigation measures	Responsibility
Biodiversity	Risk of collision due to aerodrome operations	Implement the aerodrome wildlife management plan	SMAI
		Undertake wildlife hazards risk assessment and establish procedures to manage wildlife hazards (such as bird strikes)	
		Monitoring of birds and other terrestrial and coastal fauna, in particular bird species identified in the critical habitat assessment	
	Air, noise and light impacts on the adjacent and surrounding habitats	Plant trees and shrubs within the boundaries of the project area as part of the landscape engineering design to mitigate and enhance the airport's air quality	SMAI
		Cover areas considered vulnerable to dust generation with grass, and to be sprayed with uncontaminated water on a periodic basis	
		Comply with other mitigation measures covered under air, noise and light impacts	
		Monitoring of dust and air quality and ensuring that it meets IFC PS and prescribed national standards	
		Employ International Civil Aviation Organization (ICAO) noise mitigation strategies	
		Monitoring of terrestrial and aquatic (including fish and plankton) biodiversity with focus on target species	
		Monitoring of terrestrial (restored/created) and meso-habitats	
	Surface run-offs or accidental spillages from the airport	Ban littering and dumping at the boundaries of the aerodrome, especially for airport staff	SMAI
		Train airport staff to respond to any chemical or hazardous waste spillages in a timely manner	
		Design adequate drainages to contain surface run-off to prevent impacts to the adjacent rivers - Alipit river, Santa Maria river and Meycauayan river	
		Set up and maintain proper chemical storage and hazardous waste facilities as far away from the adjacent rivers as possible	
		Monitoring of aquatic (including fish and plankton) biodiversity	
		Monitoring of water quality	
Social and socio-economics	Employment generation	Follow the hiring policy (as noted in regulatory EIA) and ensure that hiring is according to the specified priority order	SMAI Local government units (LGUs)
		Provide vocational skills and livelihood training to the affected households and surrounding communities to upgrade their skills to avail both jobs and business opportunities created by the operation of the Project.	
		Align measures to the Strategic community investment plan (SCIP) containing specific programmes to support or improve local livelihoods as outlined in the SCIP Framework	
		Develop and implement a stakeholder engagement plan (SEP) which will ensure information pertaining to employment opportunities is communicated to the affected households and surrounding communities.	
		Monitor impacts on socio-economic, income generation, employment opportunities, health and safety as stipulated in the social development plan, stakeholder engagement plan, Community grievance mechanism, Influx management plan, Worker's accommodation management plan, Health, safety, social and health management plan, including community health and safety, Airside emission and noise control plan, Traffic management plan, livelihood restoration plans, resettlement action plans and Strategic community investment plan	
	Community health, safety and amenity	Develop and implement mitigation/management measures for noise and vibration from airplane and airport operation according to findings from detailed quantitative dispersion modelling results	SMAI
		Orient workers/staff on health and safety practices (eg life-saving procedures and responses, use of fire-fighting equipment, warning procedures in emergency, first aid training) during unplanned events in accordance with the disaster management plan. Conduct regular drills.	
		Air emissions: Proper operation and maintenance of fuel burning source installation (e.g. gensets)	
		Hazardous materials, waste and wastewater discharges: On-site centralised sewerage treatment plant (STP) and solida and hazardous wastes storage facility will be constructed. Implement the solid waste management plan. Comply with the provisions of RA 6969 on the proper disposal and treatment of hazardous wastes. Keep an inventory of wastes in the self-monitoring reports (SMRs).	
		Road traffics and public access: An integrated multi-modal transport network consisting of toll road, port and water transport, railway facilities leading to regional centres will be developed.	
		Develop and implement the full emergency preparedness and response plan (EPRP) which should detail emergency response procedures for COVID-19 and other infectious disease pandemic outbreaks, fire and explosion, and unplanned events.	
		Develop and implement security management plan to prevent public access or trespassing as well as uphold human rights issues that may impact public perception and relationships.	
		Allocate sufficient open space area as evacuation/ staging area in accordance with the ECC condition and greenbelt area as part of climate change contingency measures.	
		Develop and implement a stakeholder engagement plan (SEP) and a community grievance/feedback mechanism (CGM) to collate feedback on issues related to health and safety of the surrounding communities, airport employees and passengers	
	Socio-economic development from increased tax revenue	Discuss and implement a policy and mechanisms with the national and provincial government for local revenue sharing (eg for local expenditure in the affected communities) of tax accrued from the airport and its supply chains' providing services and goods.	SMAI LGUs
	Landscape and visual impacts	The Project commits to protecting the natural landscape features at the Project location which can be practicably retained alongside future development and make a positive contribution to future character, such as individual or stands of trees.	SMAI
		Minimise the transitory visual impacts of construction activities through careful construction phase management, including minimising material storage and machinery activity close to residential areas.	
		The Project will consider making a contribution to the restoration of lost natural landscape features, such as mangrove forest, and at the same time introducing high-quality built-environments.	

Impact	Source / activities	Recommendations / mitigation measures	Responsibility
Human rights[18]	Rights to security of land tenure and sustainable livelihood	Implementation of actions according to the developed livelihood restoration plan, to restore and diversify affected peoples' livelihoods and to remediate and mitigate past and future contraventions on human rights.	SMAI
		Implementation of local hiring plan with continued engagement and community consultation with affected communities.	
		Monitor livelihoods of affected households in accordance with the livelihood restoration plans	
	Rights to non-exploitative employment and working conditions	Good international practice for human resources (HR) policies, labour commitments and management measures.	SMAI
		Supply chain risks to be managed through suppliers' due diligence and ongoing monitoring.	
	Rights to safe and healthy workplaces and communities	Stakeholder engagement plan details future engagements and community health and safety awareness, as well as implementation of grievance mechanism	SMAI
	Rights to privacy and data security	Good practice privacy measures with secure IT servers and privacy and data security software during construction and operation phases	SMAI
	Rights to safe and respectful security	Security Management Plan to be developed in accordance with IFC PS4 and IFC Good Practice Handbook on Use of Security Forces.	SMAI
		Develop Security Policy to govern security issues with responsible hiring, training, methods and equipment, use of force, grievance mechanism and monitoring.	
	Rights to accessibility	Provide orientation to security personnel with regards to upholding human rights and appropriate conduct during community engagements and interactions	SMAI
	Rights to participation and freedom of assembly	International good practice (refer to NMIA Volume IV on stakeholder engagement and participation)	SMAI
	Rights to accessing remedy	Adopt SMC group-wide whistleblowing and workers and community grievance mechanisms	SMAI
	Rights to take part in cultural life	Refer to NMIA ESIA chapter on cultural heritage	SMAI
	Rights to access essential services	Work with design consultants to ensure key services provision at borders, airport facilities and detention centres	SMAI
	Rights to liberty and security of person at international borders	Provide training to staff to uphold human rights of travellers and migrants detained at borders and victims of human trafficking	SMAI
		Adopt Mandela Rules and international good practice standards to collaborate with governments, national law enforcement agencies, aviation organisations, airlines and suppliers	National law enforcement agencies
Hydrology, water and sediment quality	Change in river hydrology due to future river dredging maintenance works	Develop and implement maintenance dredging management plan	SMAI
		Adopt a phased dredging approach as a precautionary measure to reduce the potential for sedimentation under the present climate situation, with future enlargement to be carried out when required as per changes in climate conditions.	
		Adopt a bioengineering approach (eg use of coir logs and deep-rooted vegetation in combination with gabion mat or geosynthetics) to mitigate erosion via integrating live plant materials with structural support.	
		Visual monitoring of rivers during regular site inspections and audits	
		Survey riverbed profile at least once a year and after any significant storm events.	
		Develop and implement sedimentation and erosion control management plan for operation phase	
		Monitoring of water quality during operation phase	
		River monitoring profiling works for all rivers adjacent to the airport site	
		Seabed bathymetry monitoring along the marine access channel and turning basin	
		Monitoring sedimentation in the dredged channel sections to inform the dredging requirements in the operation phase to maintain the design capacity of the channels.	
		Installation of the rain gauges, river levels, and tide levels to monitor and provide an early warning system.	
	Change in marine hydrology (due to access channel operations)	Subject to the findings of the sedimentation / erosion potential associated with the access channel, maintenance dredging may be required at the access channel and turning basin	SMAI Dredging O&M contractor
		Spot check cross-section surveys and more comprehensive bathymetry surveys should be carried out	
		Where maintenance dredging is necessary, reference shall be made to the recommendations made in the CESMP for construction phase access channel dredging to control the dispersion of sediment plumes associated with dredging activities.	
		Utilise appropriate dredging methods that minimise sediment release / dispersion	
		Monitor dredging process including establishing threshold levels and feedback mechanisms.	
		Use monitoring and automation systems to improve the crew's information regarding the various dredging parameters to improve dredging accuracy and efficiency.	
		Implement monitoring programs to alert the crew to leaks or any other potential risks.	
		Monitoring / bathymetry surveys during regular site inspections and audits. Details can be included on annual reports prepared by dredging / O&M contractor	
		Implement sedimentation and erosion control management plan during operation phase	
	Increased flood risk and polluted floodwaters	Establishment and maintenance of flood control measures incorporated into the design of the airport site	SMAI LGUs Bulacan PDRRMC
		Maintenance of the river channels to increase flood conveyance capacity	
		Rainfall, river and tide gauges will be installed as part of non-structural measures to provide early warning for flood events.	
		Slopes will also be monitored after typhoons and floods.	
		Coordination with the Bulacan Provincial Disaster Risk Reduction and Management Council (PDRRMC).	

[18] Refer to Section 2.3

Impact	Source / activities	Recommendations / mitigation measures	Responsibility
		Development of a flood management approach considering the overall watershed management plan, consulting different agencies and LGUs (as well as affected communities) to align the mitigating measures with long-term plans.	
		Implement flood management plan during operation phase	
	Increased water demand which could potentially impact surrounding communities	No groundwater will be used to avoid effects on groundwater resources. Potable water will be sourced from the Bulacan Water District (primary source) or Bocaue Water District or through SMC subsidiary Luzon Clean Water Development Corporation (optional/provisional).	SMAI Bulacan Water District
		Establish a receiving facility and storage reservoirs with capacity for at least one days' supply. Onsite rainwater harvesting tanks will be provided to supplement water supply for non-potable uses if necessary.	
		Reuse of treated effluent from the onsite STP for non-potable uses (e.g. for aircraft maintenance facility).	
		Monthly consumption records to be maintained and included in quarterly / annual reports	
		Implement community health and safety management plan	
	Polluted runoff from airport site	Landside stormwater runoff from drains can be controlled by conventional measures including road runoff feeding to catchpits, implementing regular road sweeping and good 'housekeeping' practices.	SMAI
		For airside drainage, various at-source separation and onsite stormwater treatment methods are proposed including fuel/water separators, catchpits, filter strips, grass swales, sediment traps and discharge to sewer system.	
		Detention ponds, sedimentation and solid segregation structures be adopted as part of the storm drainage scheme to avoid heavy solid particles discharging into the bay.	
		Regular O&M measures will also be carried out to maintain the long-term effectiveness of the stormwater treatment devices	
		Regular monitoring during regular site inspections and audits.	
		Implement spill prevention and response plan during operation phase.	
	Potential leaks and spills from sewage generated by the airport	A centralised sewage treatment plant (STP) will be installed at the airport to treat the sewage and wastewater generated during operation phase.	SMAI
		Check the efficiency of the STP and where necessary, modify the treatment process (e.g. chemical dosage) in order to meet the standards	
		Implement good housekeeping practices / measures onsite	
		Ensure proper disposal of wastes collected from the toilet facilities	
		Regular clean-up of waterways particularly before the onset of the rainy season	
		Appointment of registered waste transporter to address any residual wastes generated during STP outages / maintenance.	
		Construct and properly operate a Wastewater Treatment Facility (WTF) to treat wastewater generated by the airport operation and ensure that the final effluent conform with the DENR standards, in accordance with the ECC conditions	
		Regular monitoring during regular site inspections and audits.	
		Implement spill prevention and response plan during operation phase.	
	Accidental spills, leaks and discharges	Apron drainage design shall limit the transmission of spilt fuel and the stormwater runoff shall be required to meet local effluent discharge standards.	SMAI
		Surface storm drainage system from the airside development and fuel depot will be separated due to high possibility of contamination resulting from fuel spills.	
		Proper oil or fuel separation mechanisms should be installed prior to discharging or connecting to any storm drainage system.	
		At refuelling areas, a leak detection system is proposed as part of the fuel hydrant system design.	
		Good housekeeping measures to prevent spills and leaks	
		Implement a spill prevention and response plan to deal with spills within the airport environment, including procedures and actions, responsible parties, spill containment and clean-up measures, spill equipment, and training.	
		Spill response equipment will be available on site and regularly checked and maintained. A record of all spillage events will be kept, and lessons learnt applied to regular spill response training activities.	
		A Contingency Response Plan/ Risk Management and Communication Plan shall be formulated to address accidents, ie explosion / leaks particularly during operation of the fuel supply system (fuel farm tank and fuel hydrant) and other related aviation facilities as stipulated in the ECC.	
		Regular monitoring during regular site inspections and audits.	
		Spill prevention and response plan to be implemented during operation phase	
Geology, seismicity and natural hazards	Earthquakes causing site failure or structural failure and endangering site users Volcanic activity and seismic movements resulting to disruption to air traffic and possible hindrance to aircraft machinery	Earthquake monitoring and warning systems will be installed and proper evacuation procedures to be established. Such a system could also be used to shut down any sensitive equipment / machinery.	SMAI Bulacan PDRRMC PHILVOCS PAGASA
		Evacuation plans and escape routes will be put in place.	
		Alternative accessibility routes for people evacuation and materials will be established.	
		As per ECC requirements, regular monitoring of the geotechnical condition shall be undertaken to maintain ground stability and check the physical quality and integrity of the soil throughout the Project implementation.	
		Coordination with the Bulacan Provincial Disaster Risk Reduction and Management Council (PDRRMC) / PHILVOCS and PAGASA.	
		Visual monitoring during regular site inspections for structural cracks and damage.	
		EPRP to be implemented during operation phase and disclosed with municipal and province government units / PDRRMC	
		Volcano monitoring/ hazard management to be implemented within the EPRP.	

Impact	Source / activities	Recommendations / mitigation measures	Responsibility
	River and coastal morphology - Potentially destabilise surrounding infrastructure when more erosion along the riverbanks occurs	As erosion is expected in the Meycauayan River, bank protection and erosion control will be implemented	SMAI
		Establishment of gabions, retaining walls or sheet piles to reduce the amount of riverbank erosion due to increased mean current speeds in the river.	
		Soil bioengineering methods such as employing fascines or other vegetation can be used to stabilise the riverbanks, control sedimentation and reduce the likelihood of erosion. Temporary reinforcement in the form of soil erosion mats will also be deployed.	
		Other methods of reducing erosion on riverbanks include planting vegetation so that their roots can stabilise the river channel and the use of coir logs to support riverbanks. Tree revetments, where small fallen trees are anchored horizontally in place along the riverbank, can also be built to reduce erosion.	
		Sediment traps can be installed upstream to reduce the amount of sediments reaching the sea. River armouring can also be done to reduce the amount of finer sediments settling on the bed.	
		Visual monitoring of installed control measures during regular site inspections.	
		Sedimentation and erosion control management plan to be implemented during operation phase and reported within progress reports.	
		Deposition and erosion monitoring including river monitoring profiling works should be carried out on all rivers surrounding the airport, focusing on the Santa Maria River	
Air quality	Reduction in air quality due to airport operations	Develop and implement mitigation measures in accordance with the quantitative and qualitative assessment of the air quality during operation phase	SMAI
		Develop a future strategy for public transport, infrastructure to promote use of electric vehicles and provision for staff travel plans to promote vehicle sharing as part of the operation traffic management plan	
		Regular monitoring during inspections and audits.	
		Traffic management plan to be implemented during operation phase	
		Emission control plan to be implemented during operation phase	
	Increase pollutant concentrations as a result of LTOs, GSEs and APUs and other airside emissions	A detailed emission control plan will be developed, which will be broken down into sections relating to reducing emissions from different emission sources, such as ATMs, APU and GSEs.	SMAI
		Aircraft emissions and aircraft technical operations are in line with ICAO International Standards and Recommended Practices, Environmental Protection, Volume II - Aircraft Engine Emissions	
		Implement emission control and monitoring plan	
		Installation of air quality continuous monitoring stations. Records will be maintained with details included in quarterly / annual reports	
Greenhouse gases	Emissions from airport buildings and ground operations	Electrify on stand and airside aircraft services to deliver energy savings	SMAI
		Implement energy efficiency measures and a building management systems (BMS) to reduce the heating, cooling and power demands. Adoption of operational efficiency measures that reduce emissions on the ground, e.g. reduced engine taxiing, reduced delays on the ground.	
		Optimise on-site renewables (e.g. solar PV) use or purchase verified renewable electricity tariffs.	
		Minimise waste through reduction of resource use and optimising rates of recycling and reuse.	
		Complete regular maintenance of on-site equipment and vehicles to ensure optimal operational efficiency.	
		Measures can be put in place to use refrigerant gases with less potent global warning potentials where possible, and to regularly maintain equipment to reduce leakage.	
		Implement carbon management plan	
		Preparation of an emissions inventory and carbon reduction strategy. Consideration of GHG reduction in airport design. Consider joining the airport carbon accreditation scheme	
		Reducing APU times and air traffic control measures to reduce flight holding. Provision of infrastructure for more radical changes in aircraft technologies could be considered within the design of the Scheme.	
		Consider developing future energy and fuel infrastructure masterplans considering different rates of technology uptake.	
		Consider stress testing against different future passenger demand scenarios, to evaluate the resilience of the business model of the airport and this specific investment.	
		Engage with their stakeholders proactively to secure a network of low carbon solutions. This is also likely to safeguard against reputational risks that may arise if Scope 3 emission reporting for airports were to become mandatory.	
	Emissions from surface access	Support an increase in efficient and convenient sustainable transport use to, from and across the airport (for passengers and workforce).	SMAI
		Development of facilities to support zero- or low-emission hybrid or electric vehicle use (ultra-low emission vehicles) such as linking to public transport systems and providing charging facilities.	
		Consider an emissions-based access charge.	
		Promote and enable active travel to, from and around the airport, enhancing health and connectivity benefit.	
	Emissions from air transport	Although flights are not under the direct control of NMIA during operation, given the large impact of flights NMIA should look to assert their influence to: encourage the development and adoption of more fuel-efficient aircraft, up-take of biofuel by airline operators and landside equipment, improve efficiency of airspace (air traffic control to reduce stacking and delays).	SMAI
		Implement measures to measure and monitor GHG emissions annually in line with IFC guidance. Continual monitoring of GHG emissions performance will encourage informed carbon management and subsequently reduce associated emissions.	
Climate change	Increased surface flooding due to more frequent and more intense rainfall events including: possible heavier rainfall on wet days, possible	Flood management approach to consider the overall watershed management plan. Active collaboration with concerned governmental agencies (eg PDRRMC, PAGASA) and affected LGUs consulted to align short and long term flood management plans.	SMAI PDRRMC PAGASA
		Rainfall, river and tide gauges will be installed as part of non-structural measures to provide early warning for flood events.	

Impact	Source / activities	Recommendations / mitigation measures	Responsibility
	increase in number of wet days, increase in occurrence of 5 consecutive wet day events Increased ocean level (due to Sea level rise and wave setup and storm surge) leading to land loss and increased surface and groundwater flooding	Monitor slopes after typhoons and floods	LGUs
		Undertake proposed mitigation measures detailed in flood risk assessment (FRA)	
		Implement hazardous weather action plans for operations	
		Collection and use of climate and meteorological data to monitor meteorological trends and observed, ongoing changes in climate and to inform future maintenance planning and the need for further climate resilience mitigations.	
		Installation of rainfall and river gauges as part of non-structural measures for early warning system.	
		Early Warning System procedures and processes	
		Watching brief / programme of visual inspections and periodic surveys for site physical assets	
		Indoor temperature monitoring and planning for air conditioning inside site buildings.	
		Slope and river monitoring, particularly following extreme events (such as typhoons)	
		Climate change projections (that are periodically published based on updated and improved climate models) as well as observed trends using local meteorological data monitoring will be reviewed periodically and the risk assessment updated as necessary. Any findings should then be used to update any mitigations as necessary.	
	Sea level rise leading to groundwater contamination by salt water and risk of increased corrosion on buried pipes and cabling	Potential changes to deterioration and corrosion rates of any buried pipes or cabling will be built into any relevant design features (such as choice of duct-buried or direct buried cabling) and will also be considered when preparing inspection and maintenance regimes.	SMAI
		Additional mitigation measures to be identified and implemented after completion of detailed design, if necessary	
	Higher intensity of tropical cyclones and storms leading to damaged infrastructure	Building materials will be designed to as high a specification as possible in order to provide resilience against extreme events such as cyclonic storms and high winds. When conducting the detailed design, factors such as maximum wind loading and waterproofing will be considered under future climate conditions where such high magnitude events may be more frequent.	SMAI
		All vulnerable receptors will be subject to a watching brief, allowing for periodic checks such as visual inspections and site surveys. Fatigue and slow-onset deterioration as well as any sudden changes in receptor condition can be identified and appropriate action when necessary.	
		Increases in extreme weather events will also be taken into consideration when designing visual inspection schedules, for instance by provisioning for inspections following extreme events in case of sudden or extreme damage being caused. Early Warning Systems can be used to support in identification and planning of such works.	
		Any proactive maintenance regime will consider climate change and increased rate of deterioration into consideration when designing periodicity of maintenance works.	
		Additional mitigation measures to be identified and implemented after completion of detailed design, if necessary	
	Increased air temperatures and associated decrease in air pressure resulting in longer take-off distances required for airplanes.	Runway length will be considered at the appropriate design stage and will include the impacts of climate change on future average and extreme (high) temperature events within the runway design specification.	SMAI
		Additional mitigation measures to be identified and implemented after completion of detailed design, if necessary	
		Collection and use of climate and meteorological data to monitor meteorological trends and observed, ongoing changes in climate and to inform future maintenance planning and the need for further climate resilience mitigations.	
		Watching brief / programme of visual inspections and periodic surveys for site physical assets	
	Increased average daytime temperature and hot temperature extreme events leading to thermal expansion of structural steelworks	Climate change and higher future average and extreme temperatures to be incorporated into design for steelworks.	SMAI
	Increased average daytime temperature and hot temperature extreme events leading to melting and deformation of asphalt	Programme for renewal and replacement cycles (for example proactive maintenance works or planned re-surfacing) for runways and other surfaced areas to include consideration for climate change and higher future temperatures.	SMAI
	Increased average daytime temperature and hot temperature extreme events leading to electrical equipment failures or damage to telecommunication components	All buildings to be designed with appropriate ventilation and air-conditioning (AC) for present day temperatures, while ensuring that there is space available for future upgrades of air conditioning if higher temperatures lead to increased demand for AC in the future.	SMAI
		Monitoring will be conducted to identify and track increases in temperatures which can be used to review AC provisioning. Monitoring can identify temperature trends and identify when it is necessary for AC to be fitted or adjusted.	
	Increased average daytime temperature and hot temperature extreme events leading to increased staff and passenger discomfort and heat related health risks	All buildings will be designed with appropriate ventilation and air-conditioning (AC) for present day temperatures, while ensuring that there is space available for future upgrades of air conditioning if higher temperatures lead to increased demand for AC in the future	SMAI
	Increased minimum temperatures and reduced number of cold days and nights	Cold days are a relative term which are used to describe days where the temperature is in or below the fifth percentile of natural temperature variability. However, given the average temperatures of the Philippines varies between 33.5°C (April) to lows of 23.5°C (January) and because this is a negligible, beneficial impact, changes in minimum temperatures are not considered to require mitigation.	SMAI
	Increased average daytime temperature and temperature extreme events as well as increase in daily temperature range leading to increased speed of fatigue and deterioration of infrastructure and damage (e.g. deformation)	All vulnerable receptors should be subject to a watching brief, allowing for periodic checks such as visual inspections and site surveys. Fatigue and slow-onset deterioration as well as any sudden changes in receptor condition can be identified and appropriate action when necessary. Any proactive maintenance regime should consider climate change and increased rate of deterioration into consideration when designing periodicity of maintenance works.	SMAI
	Combination of prolonged dry periods, drought and increased temperatures leading to subsidence, resulting in damage to runway / roadside access or built areas	Programme for renewal and replacement cycles (for example proactive maintenance works or planned re-surfacing) for runways and other surfaced areas will include consideration for climate change and increased risk of subsidence.	SMAI
		All vulnerable receptors should be subject to a watching brief, allowing for periodic checks such as visual inspections and site surveys. slow-onset changes or warning signs (e.g. cracking) as well as any sudden subsidence can be identified and appropriate action when necessary.	

Impact	Source / activities	Recommendations / mitigation measures	Responsibility
	Changes in temperature and precipitation regime resulting in an increase vegetation growth rate. Such changes in habitats affects bird- deterrence and may increase maintenance requirements. Increase vegetation cover may also obstruct essential signage and lighting fixtures.	Vegetation levels should be subject to a watching brief, allowing for periodic checks such as visual inspections and site surveys and appropriate action may be taken as necessary.	SMAI
		Increases in extreme weather events should also be taken into consideration when designing visual inspection schedules, for instance by provisioning for inspections following extreme events in case of sudden or extreme changes to vegetation being caused. Early Warning Systems can be used to support in identification and planning of such works.	
Noise and vibration	Potential impact to communities at relatively long distances from the airport due to: ● Aircraft noise comprises intermittent noise events from LTOs and more steady noise from aircraft sources on the ground such as engines during taxiing and the APUs ● Noise from road traffic accessing the airport can also elevate the general background noise. Localised sources such as the operation of building services plant may also contribute. ● Noise emanating from the airplane landing and take off ● Increased noise levels associated with increase traffic Vibration due to operational activities	Noise preferred routes (NPR), preferential flight track or runway use	SMAI
		Concentrating flights over unpopulated areas or areas less sensitive to noise. Dispersion of flights overpopulated areas or noise sharing/arrival and departure path alternation (flying over certain areas on some days and moving the flights to other areas on other days)	
		Noise abatement for take-off procedures such as the management of engine power during departure (thrust-managed climb)	
		Approach procedures such as Continuous Descent Operations (CDO) and low power, low drag techniques such as minimising the duration of flap and wheel deployment) as well as Continuous Climb Operations (CCO)	
		Techniques for minimising the use of reverse thrust on landing	
		Moving the nominal take-off or landing points on the runway	
		Restrictions on engine run-ups and/or ground equipment use	
		Use of departure procedures that allow the aircraft to reduce power after reaching an altitude of 800 feet, gradually resuming full thrust after reaching 3,000 feet	
		Establishing noise quotas on airport operations, night time movement and curfews	
		Automated aeroplane tug	
		Maintaining aircraft taxi speed limits	
		Use of Ground Power Units (GPUs) where available	
		Installation of sound barriers and deflectors	
		Preference for quieter aircraft such as those with high bypass ratio jet engines	
		Response and receptor measures include continuous engagement with the affected community / identified NSR as well as future land-use planning. Appropriate compensation shall be considered, wherever applicable.	
		As per ECC requirements the Project must implement remedial measures or install noise barriers to address noise emission from airplanes based on the Civil Aviation Authority of the Philippine (CAAP) regulation during the airport operation.	
		Regular monitoring during regular site inspections and audits. An operational noise monitoring procedure shall be specified in accordance with the requirements of ISO 20906 (2009) 'Acoustics – Unattended monitoring of aircraft sound in the vicinity of the airports.	
		Ongoing monitoring noise related community grievances	
		Operation monitoring and reporting of any non-compliances observed, corrective actions and community grievances related noise	
Waste, materials handling and storage	Improper management of general non-hazardous waste from NMIA operations, airplanes, dredging vessels could cause impacts to the surrounding environment, airport users (including employees) and communities	A specific storage location will be designated on site and garbage bins will be provided for separating biodegradable, recyclable and residual wastes. Biodegradable materials will be used for composting, while recyclable materials will be sold to accredited recyclers in EMB R3.	SMAI
		An inventory of all municipal solid / non-hazardous waste generated will be recorded in the SMRs and submitted to EMB R3 quarterly.	
		Waste from vessels will be handled as per Vessel Garbage Management Plan (EQP-301). The project will facilitate the removal of waste from vessels upon request of the vessel. Upon removal of the waste, an official receipt or certificate will be handed over to the vessel for registration in the Garbage Logbook	
		Vessels will comply with applicable MARPOL 73/78 Annex V requirements.	
		All municipal solid / non-hazardous waste will be segregated, labelled and stored in accordance with RA 9003.	
		Any accidental release of foreign material from vessels into the marine environment that does not meet MARPOL discharge standards will be reported if recorded to relevant Authorities.	
		Visual monitoring during regular site inspections and audits.	
		Waste management plan to be implemented during operation phase	
		Spill prevention and response plans to be implemented during operation phase	
		Emergency Preparedness and Response Plan to be implemented during operation phase	
		The parameters to be monitored include the volumes of specified types of non-hazardous and hazardous waste generated, whether the waste was sent for recycling or disposal (non-hazardous waste only), the name of the DENR-accredited transporter, and the name of the waste disposal facility.	
	Hazardous waste from NMIA operations which could cause impacts to the surrounding environment, airport users (including employees) and communities	Municipal Solid and Hazardous Waste Facilities will be developed on-site.	SMAI LGU
		An inventory of all hazardous waste generated will be recorded in the SMRs and submitted to EMB R3 quarterly.	
		Spill prevention and control plans, and emergency preparedness and response plans to be developed and implemented.	

Impact	Source / activities	Recommendations / mitigation measures	Responsibility
		Set action levels for hazardous and non-hazardous waste per day	
		Associated management measures to be implemented upon the exceedance of action levels (eg provide separate disposal areas inside the Project Site for non-hazardous and hazardous wastes respectively.	
		All hazardous waste generated shall be properly segregated, labelled and stored in accordance with RA 6969 on proper disposal and treatment of hazardous waste. A specific storage location will be designated on site	
		Coordinate with Local Government Unit (LGU) and/or registered hazardous waste material transporters for final disposal of non-hazardous wastes ie only to coordinate with EMB accredited wastes haulers and treaters.	
	Hazardous waste from dredging vessels utilised for maintenance dredging of access channel and/or rivers	Spill response kits will be located in proximity to hydrocarbon storage/bunkering areas on vessels, and appropriately stocked/replenished as required.	SMAI
		General hazardous solid wastes generated from vessels will be managed in accordance with MARPOL 73/78 requirements.	
		Shipboard Oil Pollution Emergency Plans (SOPEPs) will be developed and kept on-board vessels (Regulation 37).	
		Chemicals and/or hydrocarbons on vessels will be handled and stored in compliance with the MSDS.	
		All chemical and/or hydrocarbon wastes generated on vessels will be segregated into clearly marked containers prior to onshore disposal by a licensed waste management contractor, as per the relevant MSDSs.	
		Visual monitoring during regular site inspections and audits.	
		Waste records to be maintained and reported within quarterly / annual reports.	
		Waste management plan to be implemented during operation phase	
	General materials handling and storage	Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs	SMAI
		Procedure for correct handling and storage of hazardous materials	
		Training requirements	
		Procedure for spill reporting and response	
		Re-use materials on site wherever possible	
		Procurement measures that recognise opportunities such as ordering the correct amount of materials to be delivered when needed and establishing a take back system with suppliers. Major supply requirements outside of what is sourced on-site (e.g. steel and concrete) should be sourced from certified sources or local sources for food	
		Seeking ways to reduce raw material consumption through efficiency audits in the operational phase	
		Substituting raw materials or inputs with less hazardous or toxic materials wherever economically and technically feasible	
		Identify opportunities for the Project to help and strengthen regional and/or local community capacity in waste management	
		Appropriate bunding and secondary containment measures for fuel storage tanks and areas	
		Materials handling and storage plan to be implemented during operation phase	

Source: Mott MacDonald, 2021

Table 5.3: Summary of human rights mitigation and monitoring measures

Source / activities	Recommendations / mitigation measures	Responsibility	HRIA for platform area	HRIA for access channel	HRIA for offshore disposal site	HRIA for SNS sand winning area
Rights to security of land tenure and sustainable livelihood	Implementation of actions according to the developed livelihood restoration plan (LRP; Document reference: 409686-07), to restore and diversify affected peoples' livelihoods and to remediate and mitigate past and future contraventions on human rights.	SMAI	✓[19]	×[20]	×	×
Rights to non-exploitative employment and working conditions	Good international practice for human resources (HR) policies, labour commitments and management measures.	SMAI Contractor	✓	×	×	×
	Supply chain risks to be managed through suppliers' due diligence and ongoing monitoring.		✓	×	×	×
Rights to safe and healthy workplaces and communities	Safety considerations will be incorporated into project design.	SMAI Contractor	✓	×	×	×
	Comprehensive construction health and safety plans.		✓	×	×	×
	Stakeholder engagement plan details future engagements and community health and safety awareness, as well as implementation of grievance mechanism		✓	×	×	×
Rights to privacy and data security	Good practice privacy measures with secure IT servers and privacy and data security software during construction and operation phases	SMAI Contractor	✓	×	×	×
Rights to safe and respectful security	Security Management Plan to be developed in accordance with IFC PS4 and IFC Good Practice Handbook on Use of Security Forces.	SMAI	✓	×	×	×
	Develop Security Policy to govern security issues with responsible hiring, training, methods and equipment, use of force, grievance mechanism and monitoring.		✓	×	×	×
Rights to accessibility	Provide orientation to security personnel with regards to upholding human rights and appropriate conduct during community engagements and interactions	SMAI Contractor	✓	×	×	×
Rights to participation and freedom of assembly	International good practice (refer to NMIA Volume IV on stakeholder engagement and participation)	SMAI	✓	×	×	×
Rights to accessing remedy	Adopt SMC group-wide whistleblowing and workers and community grievance mechanisms	SMAI Contractor	✓	×	×	×
Rights to take part in cultural life	Refer to NMIA ESIA chapter on cultural heritage	SMAI	✓	×	×	×
Rights to access essential services	Work with design consultants to ensure key services provision at borders, airport facilities and detention centres	SMAI Contractor	✓	×	×	×
Impact to workers' rights	Implement Boskalis' Human Rights and Labour Policy.	Contractor	×	✓	✓	✓
	Implement a Project specific Human Resource Management Plan.		×	✓	✓	✓
	Suppliers will be required to sign and adhere to Boskalis' Supplier Code of Conduct.		×	✓	✓	✓
	Implement Boskalis' corporate policies and procedures.		×	✓	✓	✓
	A local hiring plan is in place to drive local employment.		×	✓	×	✓
	Incorporate appropriate clauses in relevant contracts with suppliers and/or contractors regarding human rights.		×	✓	✓	✓
	Communicate to workers about their rights will be part of the induction process.		×	✓	✓	✓
	Develop an audit program to verify that the Human Rights and Labour Policy is effectively mitigating the potential impact.		×	✓	×	✓
	Provide contractors access to the Boskalis' workforce grievance mechanism.		×	✓	×	✓
	Systematically track grievance raised by workers and contractors.		×	✓	×	✓
	Where recruitment or labour hire agent are utilised, conduct appropriate due diligence before engaging an agent.		×	✓	✓	✓
Potential for child labour to occur	Implement Boskalis' Human Rights and Labour Policy.	Contractor	×	✓	✓	✓
	A local hiring plan is in place to ensure the hiring process is compliant.		×	✓	✓	✓
	An express commitment (in policy or plan) to not employ children.		×	✓	✓	✓
	Conduct age checks at the time of employment and retain evidence of this check.		×	✓	✓	✓

[19] ✓ denotes that the recommendation/mitigation measure has been proposed in the respective ESIAs.

[20] × denotes that the recommendation/mitigation measure has not been proposed in the respective ESIAs

Source / activities	Recommendations / mitigation measures	Responsibility	HRIA for platform area	HRIA for access channel	HRIA for offshore disposal site	HRIA for SNS sand winning area
	Ensure all contractors conduct an age check.		×	✓	✓	✓
	Auditing to sites to confirm age of employment.		×	×	✓	×
Potential impacts to workers' health and safety	Implement Boskalis' Human Rights and Labour Policy.	Contractor	×	✓	✓	✓
	Implement Boskalis' corporate policies and procedures.		×	✓	✓	✓
	Implement Security Management Plan.		×	✓	✓	✓
	Establish and monitor implementation of exclusion zones.		×	✓	✓	✓
	Ensure that the Accommodation Plan meets international good practice standards.		×	✓	×	✓
	Develop an accommodation checklist.		×	✓	×	✓
Potential loss of livelihood for those involved in the fishing industry	Develop and implement a livelihood restoration plan.	Contractor	×	✓	✓	✓
	Provide compensation for the affected fishers.		×	✓	✓	✓
	Implementation of the Grievance Mechanism.		×	✓	✓	✓
	Conduct ongoing engagement with relevant fishers throughout the life of the Project.		×	✓	✓	✓
Potential for an accident or injury to occur involving a local stakeholder	Implement Boskalis' Human Rights and Labour Policy.	Contractor	×	✓	✓	✓
	Establish and monitor exclusion zone around the access channel.		×	✓	✓	✓
	Traffic will be managed by a marine traffic control centre.		×	✓	✓	✓
	Establish navigation corridors in place.		×	✓	✓	✓
	Establish and monitor 500m safety buffer zone around the sand winning area.		×	✓	×	✓
	Implement the Project's Stakeholder Engagement Plan.		×	✓	✓	✓
	Implement the Project's Grievance Mechanism.		×	✓	✓	✓
	Implement Project specific plans.		×	✓	×	✓
	Implement the Social Management Plan.		×	✓	✓	✓
	Communicate the existing mitigation measures to stakeholders and reinforced via multiple engagement channels.		×	✓	×	✓
	Roll out the Grievance Mechanism, and continue to reinforce with stakeholders how to access.		×	✓	×	✓
	Grievances should be monitored.		×	✓	×	✓
	Engage with Project stakeholders to ensure they have adequate information on the Project schedule, activities and access restrictions.		×	✓	✓	✓
	Explore opportunities to employ local fishermen to help establish and monitor the exclusion zone.		×	✓	×	✓
	Arrange for relevant notices to be issued.		×	✓	×	✓
	Liaise with the Coast Guard and Navy in establishing exclusion zones and navigation channels.		×	✓	×	✓
Impacts associated with the employment of security personnel	Implement Boskalis' Human Rights and Labour Policy.	Contractor	×	✓	✓	✓
	Apply a Worker Code of Conduct.		×	✓	✓	✓
	Provide specific training regarding respecting human rights for security personnel.		×	✓	×	✓
	A security management plan is in place.		×	✓	×	✓
	Conduct a risk assessment to identify security threats.		×	✓	✓	✓
	Arrange for relevant notices to be issued.		×	✓	✓	✓
	Liaise with the Coast Guard and Navy in establishing exclusion zones and navigation channels.		×	✓	✓	✓
Inability of stakeholders to participate and/or access remedy (Project workers, fishing communities and surrounding communities)	Implement Boskalis' Human Rights and Labour Policy.	Contractor	×	✓	✓	✓
	Implement the Project's Stakeholder Engagement Plan.		×	✓	✓	✓
	Implement the Project's Grievance Mechanism.		×	✓	✓	✓

Source / activities	Recommendations / mitigation measures	Responsibility	HRIA for platform area	HRIA for access channel	HRIA for offshore disposal site	HRIA for SNS sand winning area
	Record grievance in a central database.		×	✓	✓	✓
	Ensure the methods used to engage with stakeholders are accessible to vulnerable groups.		×	✓	✓	✓
	Ensure all workers are aware of their role in the engagement and grievance management processes.		×	✓	✓	✓
	Ensure the stakeholders are aware of how to access the grievance mechanism.		×	✓	✓	✓
	Ensure that grievances are addressed in a timely manner.		×	✓	✓	✓
	Promote Grievance Mechanism within the communities.		×	✓	✓	✓
	Ensure vulnerable groups are informed of their rights and the ways in which they can communicate their grievances.		×	✓	✓	✓
Potential impact to workers' health associated with accommodation	Workforce accommodation provided by Boskalis will be fully compliant with the standards.	Contractor	×	×	✓	×
	Boskalis will provide toilets, washrooms and canteen facilities.		×	×	✓	×
	Accommodation on vessels will comply with Maritime Labour Convention requirements.		×	×	✓	×

Source: Mott MacDonald/ERM, 2021

5.2 Management plans

The Project Company will develop the following E&S management plans and assessments to meet both local and international requirements in line with the compliance reference framework.

Table 5.4: Plans to be developed by SMAI and its contractor

Aspect	E&S management plan	Objective
Biodiversity	Habitat removal and restoration plan (HRRP)	Management of flora and fauna to ensure they are not compromised during the construction of the airport. Additionally, ensuring that the overall habitat and biodiversity remains largely unaffected by construction.
	Habitat removal procedure (HRP)	Describe methodology, data collection and reporting for flora and fauna translocation, removal of invasive species
	Biodiversity action plan (BAP) including biodiversity management and evaluation plan (BMEP)	If a Project is able to meet the IFC Performance Standard 6 (PS6) requirements for developing in areas of critical habitat, a Biodiversity Action Plan (BAP) will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated. The BAP will serve as the overarching document governing other biodiversity management plans.
	Biodiversity offsets management plan (BOMP)	Achieve sustainable and effective management of offset sites to ensure no net loss/ net gains.
	Construction biodiversity management plan (CBMP) including invasive species and pest management plan	Management of temporary enhancement areas and detailing knowledge learned for implementation of offsets
	Operation invasive species and pest management plan	Using a sustainable ecosystem-based approach for managing pests, including invasive species. Typically including prevention strategies, manual/mechanical treatment methods, biological and cultural control.
	Traffic and transport management plan (includes Marine Traffic Safety Management Plan for construction)	A traffic management plan is a document that details the way activities in the road corridor and access channel will be carried out, so they minimise inconvenience, prevent collisions, and help ensure fauna, road users and workers remain as safe as possible.
	Aerodrome wildlife management plan	Define the risk that wildlife poses to air traffic (and vice-versa) and set procedures in place to manage that risk.
Social	Community health and safety management plan including COVID-19 management plan	A long-term, systematic effort to address public health and safety problems based on the results of community health and safety assessments
	Strategic community investment plan	Providing a clear business case and assessment of risks and opportunities for the community and their livelihood. This plan addresses both short and long-term objectives through a strategic mix of investments and support to the community.
	Livelihood restoration plan/ resettlement action plan	Where economic displacement has been identified, an LRP will be developed to compensate affected persons and/or communities and offer other assistance that meet the objectives of IFC PS5. Prevent and mitigate the potential adverse impacts to the vulnerable PAPs as a direct result of the resettlement process.
	Stakeholder engagement plan including a grievance mechanism for the community	The SEP will be scaled to the Project risks and impacts and be tailored to the characteristics and interests of the affected communities, so as to demonstrate effective ongoing stakeholder engagement. A grievance mechanism should also be established to allow the community to provide feedback.
	Corporate social responsibilities plan/ community development plan	A plan containing the strategies and development plans in which corporations or firms conduct their business – ethically, societally friendly, and beneficial to community development.

Aspect	E&S management plan	Objective
	Security management Plan	A major constituent of security strategies for organizations and entities.
	Influx management plan	Management of people who move to a project area for the purpose of project-related employment, economic opportunities and related reasons during project construction.
Social – employees	Occupational health and safety plan including COVID-19 management plan	Manage Health Safety and Environment (HSE) performance of the Project
	Code of Conduct	Written collection of the rules, principles, values, and employee expectations, behaviour, and relationships that are significant and fundamental to the Project
	Employment and recruitment plan / Local content plan	This plan is a strategy with prearranged goals, focusing on hiring of individuals in the local community. It acts as a timeline for companies to find qualified applicants without causing downtime for the company.
	Retrenchment management plan	Demonstrate that the termination and retrenchment activities will be in accordance with PS 2 and its guidance notes, as well as the IFC Good Practice Note on Managing Retrenchment
	Worker's accommodation plan	Ensuring that accommodation for workers is provided. The accommodation shall be appropriate for its location and be clean, safe and, at a minimum, meet the basic needs of workers.
	Contractor management plan	Details expectations of the client on their contractors and the monitoring of contractors to ensure implementation of project's commitment
Water	Water resource management plan including water quality monitoring program	Planning, developing, distributing, and managing the optimum use of water resources for the Project
	Spill prevention and response plan	Ensure all relevant parties are prepared to respond to emergency situations associated with the Project to prevent and mitigate any harm to people and/or the environment
	Sedimentation and erosion control plan	A comprehensive plan developed to address pollution caused by erosion and sedimentation of soil particles or rock fragments during construction
Waste/ materials	Waste management plan	Primarily to meet local regulatory requirements regarding minimising runoff waste form the construction site
	Materials handling and storage plan	Optimisation of the moving, packing and storing of substance in any form, and includes the preparation, placing and positioning the material to facilitate their movement or storage.
Geology and natural hazards	Emergency preparedness and response plan	Ensure all relevant parties are prepared to respond to emergency situations associated with the Project and natural disasters to prevent and mitigate any harm to people and/or the environment
	Disaster risk management plan	Ensure all relevant parties are prepared to respond to emergency situations associated with the Project and natural disasters to prevent and mitigate any harm to people and/or the environment
	Flood management plan	Managing and mitigating the risks associated with potential floods in the area. These include the 4 steps of mitigation, preparedness, response, and recovery.
Noise and vibration	Noise and vibration construction management plan including noise monitoring procedure	This management plan defines the measures to control and limit noise emissions and vibration levels, at residential properties and other sensitive receptors in the vicinity of the Project. The act of checking noise levels to ensure that the levels are within the set guidelines and that workers are protected from risk of hearing damage at their place of work.

Aspect	E&S management plan	Objective
Air quality and climate change	Air quality management plan including dust management plan	Managing dust emissions generated within the project area, so that the appropriate dust criteria is met during both the construction and operational stages of the project.
	Greenhouse gas mitigation plan including emission control plan	Manage and minimise the emissions generated by machinery and construction equipment, by finding alternatives, or through cleaning.
	Carbon management plan	A documented strategy and set of actions to meet carbon reduction objectives. Typically, it will include a summary of previous carbon footprint assessments, carefully identified carbon reduction targets and defined actions.
	Climate change adaptation plan	A document detailing appropriate mitigation measures, weather hazard actions, implications of climate change on airport design
Others	Chance find procedure	This procedure covers the actions to be taken from the discovery of a heritage site or item, to its investigation and assessment by a trained archaeologist or other appropriately qualified person
	Operation and maintenance manual	A comprehensive document that provides all the details necessary about a physical plant as well as individual pieces of equipment to help the maintenance staff keep everything running smoothly.
	Third party/ supply chain management plan (extent/scope to be identified)	This plan will provide sound policies/procedures for selecting suppliers and monitoring supplier E&S performance. This will also include SMAI commitments in addressing non-compliance issues, including requesting for a corrective action plan from the key suppliers as well as contract termination and exclusion from future works if non-compliance persist.

Source: Mott MacDonald, 2022

6 Key residual E&S impacts

With the implementation of mitigation and enhancement measures, the impact significance has been reduced. Table 6.1, Table 6.2 and Table 6.3 summarises the residual impacts arising from the Project during the construction and operation phase respectively. Most significant adverse (i.e. major and moderate) impacts have been reduced to at least minor with the application of appropriate management and mitigation measures. However, it is noted that there are significant residual impacts post mitigation measures:

Adverse:

- Significant moderate impact to biodiversity (e.g. habitat loss for migratory birds, accidental killing and injury of species) during construction and operation phases
- Significant moderate impact to social and socio-economics (e.g. reduction of local property prices and public health impacts) during construction and operation phases
- Significant moderate impact to water quality (e.g. due to spillages/leakages) during construction phase
- Significant moderate impact from natural hazards (e.g. high wave heights from tsunamis) during construction phase
- Significant major impact to air quality (e.g. due to fugitive dust emissions) during construction phase
- Significant major impact from greenhouse gases emissions during construction and operation phases
- Significant moderate impact due to noise annoyance (e.g. construction activities and increased traffic) during construction and operation phase

Beneficial:

- Significant major effect to social and socio-economics (e.g. local employment and increased tax revenue) during construction and operation phases
- Significant moderate effect to hydrology (e.g. reduced flood risk and polluted floodwaters) during operation phase

Table 6.1: Summary of construction phase E&S residual impacts

Impact	Source/Activities	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
Biodiversity	Degradation and loss of habitat due to construction works (terrestrial and coastal habitat)	Significant adverse (moderate) residual impact	NA[21]	NA	NA
	Degradation and loss of habitat due to construction works (marine habitat)	Negligible adverse impact	Minor	Minor	Minor
	Introduction or spread of non-native invasive species due to: increased movement of people, vehicles, machinery, vegetation, and soil; foreign vessels (terrestrial and coastal habitat)	Negligible adverse residual impact	NA	NA	NA
	Introduction or spread of non-native invasive species due to: increased movement of people, vehicles, machinery, vegetation, and soil; foreign vessels (marine habitat)	Minor adverse residual impact	Negligible	Negligible	Negligible
	Terrestrial, coastal and marine habitat ● Accidental killing and injury of species due to Project construction activities such as potential collisions with moving vehicles along access roads, and the operation of machinery within the project area ● Collisions during access channel development	Negligible adverse residual impact	Minor	Moderate	Minor
	Terrestrial and coastal habitat ● Disturbance and displacement of species due to light disturbance (nightworks) from construction activities ● Noise generated by construction; Vibrational and noise impacts underwater	Significant adverse (moderate) residual impact	NA	NA	NA
	Marine habitat ● Disturbance and displacement of species due to light disturbance (nightworks) from construction activities ● Noise generated by construction; Vibrational and noise impacts underwater	Negligible adverse residual impact	NA	NA	Negligible
	Dust emissions during construction activities could cause localised reduction in air quality from dust deposition around working areas affecting adjacent habitats	Negligible adverse residual impact	NA	NA	NA
	Dredging activities and river embankment modifications may cause changes in water quality, streamflow regime modification hydrological conditions and increased risk of localised pollutions	Significant adverse (moderate) residual impacts to terrestrial and coastal habitats is anticipated due to changes in water quality, streamflow regime modification hydrological conditions and increased risk of localised pollutions.	NA	NA	NA
	Workers may access current fishing grounds	Minor adverse residual impact	NA	NA	Negligible to Minor
	Turtle entrainment in suction equipment	NA	NA	NA	Minor
	Impacts to marine mammals, marine turtles, seabirds and shorebirds due to generation of sound from dredging	NA	NA	NA	No residual impact
Social and socio-economics	Physical and economic displacement of affected landowners by land procurement for the Project	Negligible adverse residual impact	NA	NA	NA
	Physical and economic displacement of informal settlers	Negligible adverse residual impact	NA	NA	NA
	Physical and economic displacement due to loss of fishing area and access to marine resources	Negligible adverse residual impact	Minor	NA	Minor
	Reduction of local property prices	Significant adverse (moderate) impact	NA	NA	NA
	Impacts on employment and economy	Positive and major beneficial effect is anticipated in general	NA	NA	NA
	Influx impacts on: Road infrastructure and congestion	Negligible adverse residual impact	NA	NA	NA
	Social and community services, facilities and infrastructure	Negligible adverse residual impact	NA	NA	NA
	Service prices for commodities, food and beverages	Negligible adverse residual impact	NA	NA	NA
	Host communities related to antisocial behaviour and social conflict with migrant workers	Negligible adverse residual impact	NA	NA	NA

[21] NA denotes that the information is not available in the respective ESIA/ not applicable to the specific area.

Impact	Source/Activities	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
	Community health and safety / public health impacts due to noise, dust and air quality impacts / Impacts on navigation and marine traffic	Minor adverse residual impact	Moderate	NA	Minor
	Flooding impacts on surrounding communities	Negligible adverse residual impact	NA	NA	NA
	Impacts on cultural heritage resources	Negligible adverse residual impact	NA	NA	NA
Hydrology, water and sediment quality	Impacts on water quality arising from release of sediment plumes / dissolved contaminants during dredging of the rivers and the marine access channel	Minor adverse residual impact	Minor	NA	Minor
	Impacts on water quality from offshore disposal of sediment	Refer to supplementary ESIA for offshore disposal for impact evaluation	NA	Minor	NA
	Major incidents causing spillages / leakage of dredged materials and hydrocarbon fuels	Significant (moderate) residual impact on water quality is expected from: large quantities of sediment and/or fuel released into the marine environment.	Minor	Minor	Minor
	Potential water quality impacts due to discharges from marine / river construction vessels / dredging activities	Minor adverse residual impact	Negligible	Negligible	Negligible
	Release of sediment during land formation construction activities	Minor adverse residual impact	NA	NA	NA
	Polluted runoff from the construction site	Minor adverse residual impact.	NA	NA	NA
	Contamination of groundwater from hazardous / non-hazardous waste and wastewater disposal	Negligible adverse residual impact.	NA	NA	NA
Geology, seismicity and natural hazards	Earthworks which could cause settlement, slope instability and liquefaction due to soft and weak ground conditions	Minor adverse residual impact, subject to implementation of design considerations.	NA	NA	NA
	Earthquakes / seismic activity causing site failure or structural failure endangering site users	Minor adverse residual impact	NA	NA	NA
	High wave heights from tsunamis causing damage to structures and endangering site users or storm surges during inclement weather / typhoons	Significant moderate residual impact from high wave heights from tsunami and storm surges is anticipated.	NA	NA	NA
	Volcanic hazards causing damage to structures and endangering site users	Minor adverse residual impact	NA	NA	NA
	Flooding due to ground settlement from earthworks and structural loading and endangering site users	Minor adverse residual impact	NA	NA	NA
	Contamination of groundwater due to pollution incidents	Significant adverse residual impact is not anticipated.	NA	NA	NA
Air quality	Deterioration of ambient air quality (due to fugitive dust emissions and notably PM_{10}) resulting from earthworks / land formation activities and operation of construction equipment	Significant adverse (major) impact to sensitive receptors located within 500m	Negligible	Negligible	Negligible
	Combustion related emissions from increased localised traffic, project vehicles, on-site diesel engines	Negligible adverse residual impact	NA	NA	NA
Greenhouse gases	GHG emissions: these emissions will principally occur through the use of materials, from the transport of those materials and waste to and from the site, and from the use of construction plant.	Significant adverse (major) residual effect from Project activities is anticipated.	NA	NA	NA
Climate change	NA	NA	NA	NA	NA
Noise and vibration	Noise annoyance to sensitive receptors adjacent to active construction areas: ● Construction of access roads ● Construction of project components and access roads ● Transport of materials, people and equipment to site ● Use of heavy/percussive equipment	Minor to moderate adverse residual noise impacts from daytime construction works is predicted at the following receptors: ● Dwellings within 45m of the site boundary Hospitals, nursing homes or places of worship within 310m of the site boundary	Negligible	NA	Negligible
	Vibration due to construction activities	Negligible adverse residual impact	NA	NA	NA
	Impacts to marine environment from storage, handling and transportation of dredged materials from access channel to offshore disposal site	Negligible adverse residual impact	NA	NA	NA

Impact	Source/Activities	ESIA for platform area	ESIA for access channel	ESIA for offshore disposal site	ESIA for SNS sand winning area
Waste, materials handling and storage	General construction waste could cause impacts on: ● Impacts on soil and water quality resulting from the improper waste storage on site, disposal of waste in unlicensed facilities or using inappropriate disposal methods. ● Impacts on local communities including loss of land, nuisance, disturbance through increased vehicle movements, indirect impacts as a result of negative impacts on the surrounding environment ● Health related impacts on workers as a result of improper handling, storage and disposal of waste.	Negligible to minor residual impacts	Minor	Negligible	Negligible
	General materials handling and storage	Negligible adverse residual impacts	NA	NA	NA
Seabed features / profile		NA	Negligible	NA	Negligible
Perception of erosion		NA	NA	NA	Minor
Marine navigation and transport/collision (vessels and marine users)		NA	Minor	Negligible	Negligible to Minor

Table 6.2: Summary of operation phase E&S residual impacts

Impact	Source/Activities	ESIA for platform area / airport operations
Biodiversity	Risk of collision due to aerodrome operations	Minor adverse impact
	Air, noise and light impacts on the adjacent and surrounding habitats	Significant adverse (moderate) impact
	Impact on migratory species	Significant adverse (moderate) impact
	Surface run-offs or accidental spillages from the airport	Minor adverse impact
Social and socio-economics	Employment generation	Significant beneficial (major) impact
	Community health, safety and amenity	Significant adverse (moderate) impact
	Socio-economic development from increased tax revenue	Significant beneficial (minor to moderate) impact
	Landscape and visual impacts	To be evaluated once measures in master planning and design are available
Hydrology, water and sediment quality	Change in river hydrology due to future river dredging maintenance works	Minor adverse impact
	Refer to supplementary ESIA for access channel for impact evaluation	Change in marine hydrology (due to access channel operations)
	Increased flood risk and polluted floodwaters	Significant beneficial (moderate) impact
	Increased water demand which could potentially impact surrounding communities	Negligible adverse impact
	Polluted runoff from airport site	Minor adverse impact
	Potential leaks and spills from sewage generated by the airport	Negligible adverse impact
	Accidental spills, leaks and discharges	Minor adverse impact
Geology, seismicity and natural hazards	Earthquakes causing site failure or structural failure and endangering site users	Minor adverse impact
	Volcanic activity and seismic movements resulting to disruption to air traffic and possible hindrance to aircraft machinery	Minor adverse impact
	River and coastal morphology - Potentially destabilise surrounding infrastructure when more erosion along the riverbanks occurs	Negligible adverse impact
Air Quality	Reduction in air quality due to airport operations	Negligible adverse impact
	Increase pollutant concentrations as a result of LTOs, GSEs and APUs and other airside emissions	Minor adverse impact
Greenhouse gases	Emissions from airport buildings and ground operations	Significant adverse (major) impact
	Emissions from surface access	Significant adverse (major) impact
	Emissions from air transport	Significant adverse (major) impact
Climate change	Increased surface flooding due to more frequent and more intense rainfall events including: possible heavier rainfall on wet days, possible increase in number of wet days, increase in occurrence of 5 consecutive wet day events	Minor adverse impact
	Increased ocean level (due to sea level rise and wave setup and storm surge) leading to land loss and increased surface and groundwater flooding	Negligible adverse impact
	Sea level rise leading to groundwater contamination by salt water and risk of increased corrosion on buried pipes and cabling	Minor adverse impact
	Higher intensity of tropical cyclones and storms leading to damaged infrastructure	Minor adverse impact
	Increased air temperatures and associated decrease in air pressure resulting in longer take-off distances required for airplanes.	Minor adverse impact
	Increased average daytime temperature and hot temperature extreme events leading to thermal expansion of structural steelworks	Negligible adverse impact
	Increased average daytime temperature and hot temperature extreme events leading to melting and deformation of asphalt	Minor adverse impact
	Increased average daytime temperature and hot temperature extreme events leading to electrical equipment failures or damage to telecommunication components	Minor adverse impact
	Increased average daytime temperature and hot temperature extreme events leading to increased staff and passenger discomfort and heat related health risks.	Minor adverse impact
	Increased minimum temperatures and reduced number of cold days and nights	Negligible adverse impact
	Increased average daytime temperature and temperature extreme events as well as increase in daily temperature range leading to increased speed of fatigue and deterioration of infrastructure and damage (e.g. deformation)	Negligible adverse impact
	Combination of prolonged dry periods, drought and increased temperatures leading to subsidence, resulting in damage to runway / roadside access or built areas.	Minor adverse impact
	Changes in temperature and precipitation regime resulting in an increase vegetation growth rate. Such changes in habitats affects bird- deterrence and may increase maintenance requirements. Increase vegetation cover may also obstruct essential signage and lighting fixtures.	Minor adverse impact
Noise and vibration	Potential impact to communities at relatively long distances from the airport due to: • Aircraft noise comprises intermittent noise events from Landing and Take Off cycles (LTO) and more steady noise from aircraft sources on the ground such as engines during taxiing and the Auxiliary Power Units (APU) • Noise from road traffic accessing the airport can also elevate the general background noise. Localised sources such as the operation of building services plant may also contribute. • Noise emanating from the airplane landing and take off • Increased noise levels associated with increase traffic	Significant adverse (moderate) impact
	Vibration due to operational activities	Negligible adverse impacts
Waste, materials handling and storage	Improper management of general non-hazardous waste from NMIA operations, airplanes, dredging vessels could cause impacts to the surrounding environment, airport users (including employees) and communities	Minor adverse impact

Impact	Source/Activities	ESIA for platform area / airport operations
	Hazardous waste from NMIA operations which could cause impacts to the surrounding environment, airport users (including employees) and communities	Minor adverse impact
	Hazardous waste from dredging vessels utilised for maintenance dredging of access channel and/or rivers	Minor adverse impact
	General materials handling and storage	Minor adverse impact

Table 6.3: Summary of human rights residual impacts

Source/Activities	HRIA for platform area	HRIA for access channel	HRIA for offshore disposal site	HRIA for SNS sand winning area
Rights to security of land tenure and sustainable livelihood	Severity: 3	NA[22]	NA	NA
Rights to non-exploitative employment and working conditions	Severity: 2	NA	NA	NA
Rights to safe and healthy workplaces and communities	Severity: 2	NA	NA	NA
Rights to privacy and data security	Severity: 1	NA	NA	NA
Rights to safe and respectful security	Severity: 2	NA	NA	NA
Rights to accessibility	Severity: 1	NA	NA	NA
Rights to participation and freedom of assembly	Severity: 2	NA	NA	NA
Rights to accessing remedy	Severity: 1	NA	NA	NA
Rights to take part in cultural life	Severity: 1	NA	NA	NA
Rights to access essential services[23]	Severity: 1	NA	NA	NA
Impact to workers' rights	NA	Medium	NA	Medium
Potential for child labour to occur	NA	Medium	NA	Medium
Potential impacts to workers' health and safety	NA	Medium	NA	Medium
Potential loss of livelihood for those involved in the fishing industry	NA	Medium	NA	Medium
Potential for an accident or injury to occur involving a local stakeholder	NA	Medium	NA	Medium
Impacts associated with the employment of security personnel	NA	Medium	NA	Medium
Inability of stakeholders to participate and/or access remedy (Project workers)	NA	Low	NA	Low
Inability of stakeholders to participate and/or access remedy (Fishing communities)	NA	Medium	NA	Medium
Inability of stakeholders to participate and/or access remedy (Surrounding communities)	NA	Low	NA	Low

[22] NA denotes that the information is not available in the respective ESIA/ not applicable to the specific area.
[23] Only applies to operation phase

7 Stakeholder engagement framework & grievance mechanism

7.1 Overview

Stakeholder engagement (including information disclosure, public consultation, and surveys) have been conducted throughout the Project development as part of the local EIA process and the ESIA process. The project leaflet can be found in Appendix A. A Stakeholder Engagement Plan (SEP) will be developed, which would detail the Project's future stakeholder engagement planning and events.

7.2 Planned stakeholder engagement activities

Planned stakeholder engagement activities will be split into four phases: pre-construction, construction, operations, and decommissioning. The grievance mechanism developed provides a means for local communities to log a formal grievance regarding Project-related concerns which would have to be addressed by the Project Company. These will be recorded in a grievance logbook for tracking.

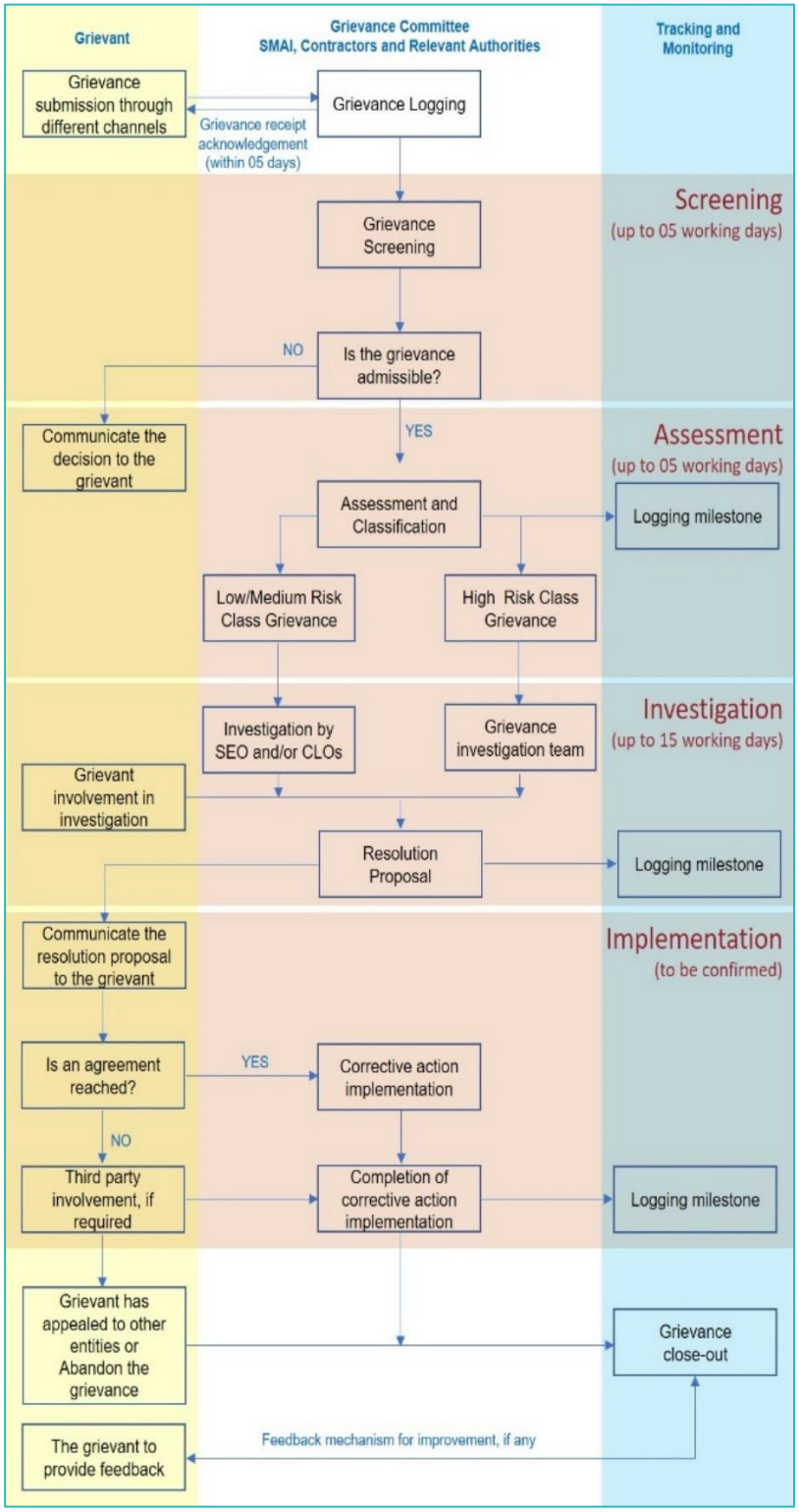
A brief outline of the SEP is as follows.

Table 7.1: Stakeholder engagement activities according to phase

Phase	Details
Pre-construction	● Training of personnel involved in stakeholder engagement ● Designate stakeholder engagement/community relations team ● Disclose international ESIA, relevant E&S management plans and frameworks, community grievance mechanism, and significant project updates ● Consult affected communities where there are any changes in the Project development
Construction	● Disclose international ESIA, relevant E&S management plans and frameworks, community grievance mechanism, and significant project updates ● Disclose and discuss local employment opportunities with village heads ● Identify new issues, concerns, or needs of affected communities ● Identify opportunities for Project's SCIP programs ● Disseminate grievance mechanism procedure, and address grievances via formal and informal meetings, grievance forms, etc ● Monitor the effectiveness of mitigation measures and the community's attitude towards the Project
Operations	● Disseminate Project updates through informal/formal meetings, distribution of leaflets and/or posting of notices at key locations, etc ● Disclose and discuss local employment opportunities with village heads ● Disseminate information about public safety and hazards ● Disseminate grievance mechanism procedure, and address grievances via formal and informal meetings, grievance forms, etc ● Implementation of the Project's SCIP programs ● Monitor the effectiveness of mitigation measures and the community's attitude towards the Project
Decommissioning	● Disseminate decommissioning plan, typically involving the removal of the existing infrastructure.

Source: SMAI, 2021

7.3 Community grievance mechanism



Source: Mott MacDonald, 2021

Appendix

A. Project leaflet

New Manila International Airport

The New Manila International Airport (NMIA) will be developed to meet the increasing demand for air connectivity in Metro Manila and its neighbouring region.

NMIA will be built and operated by San Miguel Aerocity, Inc (SMAI), and then transferred to the Government after the 50-year period for operations.

NMIA will be located in the Municipality of Bulakan, covering an area of 1,700ha

Key Project Components:

- Land development
- Airfield facilities
- Terminal facilities
- Airline support facilities
- Airport access and parking facilities
- Airport utilities
- Ancillary components and facilities

The Project will be developed in Phases:

1	2	3
Construction up to Q1 2026	Operations begin in Q3 2026 with an initial Capacity of 35 Million Annual Passengers	Ultimate capacity of 100 Million Annual Passangers

Environmental and Social Impact Assessment (ESIA)

The ESIA is currently in preparation, demonstrating SMAI's commitments to developing the Project in compliance with local Philippine regulations and international standards (Ie. International Finance Corporation's Performance Standards and Equator Principles). The ESIA is necessary for the project to apply for international finance. Here is the break down of assessments and approvals obtained:

2018 - 2019	14 June 2019	01 June 2021	Presently
Two regulatory Environmental Impact Assessments (EIA) studies for the land development and the airport complex were conducted.	Environmental Compliance Certificate (ECC) for the land development was obtained.	Environmental Compliance Certificate for the airport development was obtained. ECC Reference No. R03-04132021-5087	The Environmental and Social Impact Assessment (ESIA) is in the process of development.

As part of the ESIA, several specialist assessments have been undertaken to develop appropriate mitigation measures and monitoring activities within the Project's Environmental and Social Management Plan (ESMP), they include:

- Livelihood Restoration Plan (LRP)
- Strategic Community Investment Plan
- Employment and Recruitment Plan
- Stakeholder Engagement Plan (SEP)
- Community Development Plan
- Community Health & Safety Plan
- Community Grievance Mechanism (GM)
- Variety of Environmental plans

Grievance Mechanism

NMIA Grievance Mechanism (GM) is a process for community stakeholders to submit suggestions, concerns or grievances related to the Project.

There are multiple ways to raise a grievance; verbal communication with the Community Liaison Officer (CLO), verbally or through writing using the External Claim Form in the sites, during ongoing stakeholder engagement activities, by email: feedback@aerocity.sanmiguel.com.ph or by telephone or WhatsApp at 0945-520-6604

WHY A GRIEVANCE MECHANISM?

- Ensure transparency and engagement between SMAI and community stakeholders
- Provide community stakeholders an accessible and efficient process to submit concerns, suggestions and grievances that may emerge in relation to the Project
- Allow community stakeholders to raise grievances either named or anonymously

Grievance Mechanism Process