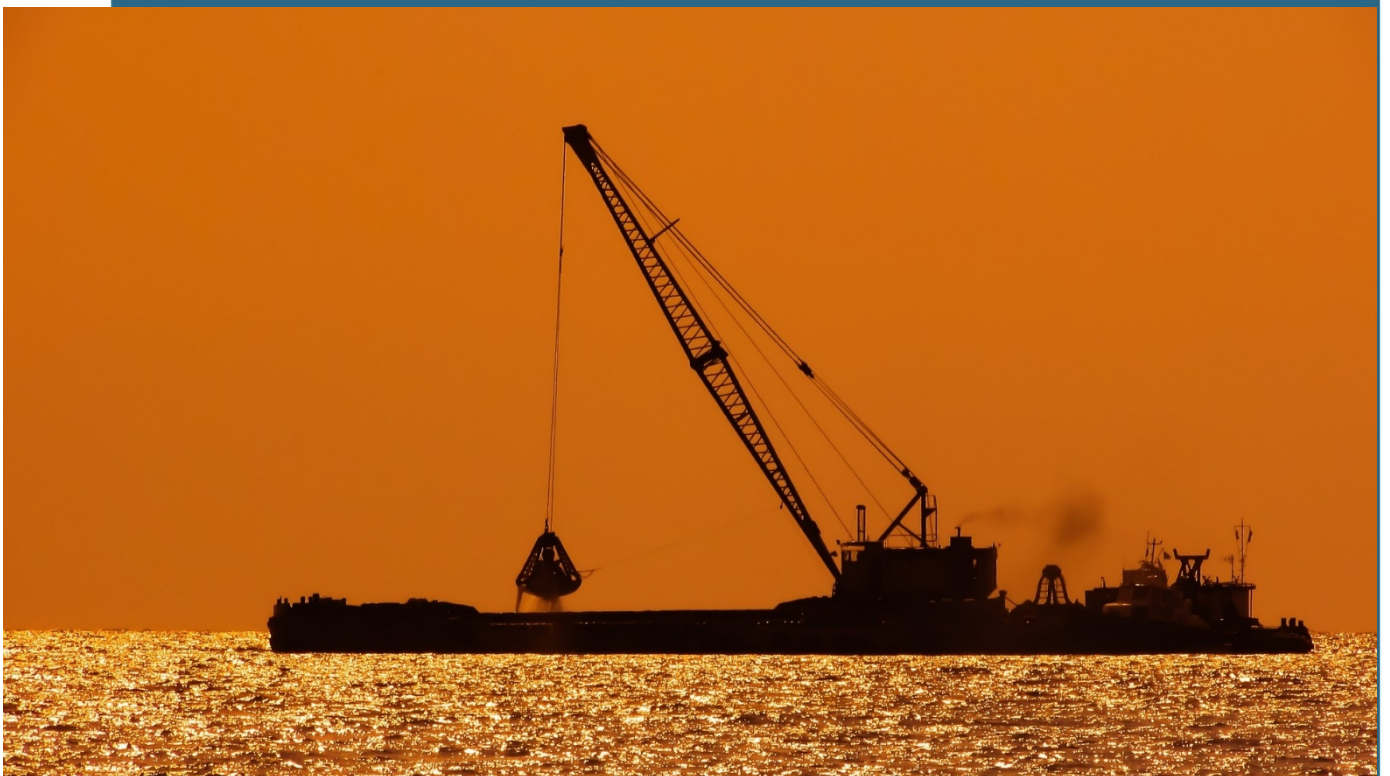




Netherlands Commission for
Environmental Assessment

*NCEA Review of **Términos de referencia para la elaboración del EIA en proyectos de dragado de profundización de los canales de acceso a puertos marítimos***

COLOMBIA



18 March 2021
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Advisory Report by the NCEA

Title	NCEA Review of Términos de referencia para la elaboración del EIA en proyectos de dragado de profundización de los canales de acceso a puertos marítimos
To	Ministry of Transport, Ministry of Environment and other relevant Colombian partners, and Netherlands Embassy
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Request by	Ms Gloria Rocio Botero Sanchez
Date	18 March 2021
From	The Netherlands Commission for Environmental Assessment
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1. Introduction

The National Plan for Maritime Dredging of Colombia establishes as one of its strategies the reuse of dredged materials in the multiple needs of the country's coastlines. In a series of webinars in October and November 2020, the experience and standing practice concerning the reuse of dredged material in both countries were highlighted. The Netherlands Commission for Environmental Assessment (NCEA) contributed to one of the webinars with case presentations on ESIA's for the Varadero Canal in Colombia and the Sand Engine in The Netherlands. Based on the issues as addressed in the webinars, 5 topics were suggested for further cooperation between Colombia and The Netherlands in 2021. NCEA advice on ESIA or SEA related to policies or projects related to dredging and reuse of dredged materials was identified as one of those topics.

The Government of Colombia, specifically the Ministry of Transport and the Ministry of Environment and Sustainable Development, has now requested support from the Government of the Netherlands as a follow-up to the 2020 collaboration. Colombia is currently working on Generic Terms of Reference (ToR) for Environmental Impact studies for dredging projects related to access channels of maritime areas and ports. The NCEA was requested to review these ToR and to advise on subsequent activities as part of the bilateral partnership on this topic, more specifically:

- Review and comment on the general content of the ToR document and specific lessons learned from other locations and projects the NCEA is active in.
- Participate in a virtual working session to present the comments and discuss these with experts from Colombia: the Ministry of Environment and Sustainable Development, Ministry of Transport, National Planning Department, ANI (infrastructure agency), INVIAS, Cormagdalena. The meeting is planned to take place on 24 March 2021.
- Draft a 1-page advice to the Netherlands Enterprise Agency (RVO) and the Netherlands Embassy in Colombia, summarizing the activities carried out and highlighting potential follow-up related to NCEA involvement and/or other actors from the Netherlands.

1.1 Approach taken

This report is prepared by an expert contracted by the NCEA, knowledgeable in the matter. The ToR have been reviewed against international best practices for environmental impact assessment (EIA) of dredging projects, as reflected in a number of published EIA reports of port and harbor development projects and a selection of relevant guidelines published by various organizations and (international) financing institutions. Whether or not the ToR meets the requirements as laid down in the Colombian laws and regulations has not been part of this review.

The next Chapter provides more general remarks on the various chapters and sections of the ToR, for detailed comments reference to the comments in the text of the ToR document (see separate document which should be read linked to this advisory report).

The 1 page advice (see third bullet above) will be provided after the virtual working session.

2. Comments per chapter of the ToR

2.1 Consideraciones generales para la presentación del estudio

This section states that *'el presente documento constituyen los lineamientos generales que orientan la elaboración y ejecución del EIA para proyectos de dragado de profundización de canales de acceso a puertos marítimos'* and that they are *'adicionales, complementarios y específicos a este tipo de proyectos'* to the Metodología General para la Elaboración y Presentación de Estudios Ambientales (MGEPEA).

In that respect it would be logical if the guidelines addressed the same items in the same order as the MGEPEA. This is however not the case: topics like Identification of potential significant impacts, Evaluation and comparison of alternatives, Multi criteria evaluation etc. are not covered. This leads to an imbalance in the ToR. There is very much emphasis on the description of the (a)biotic and socio-economic environment and no or limited attention for important elements of an EIA like identification of impacts, prediction of impacts, assessment of impacts, alternatives, mitigation (Environmental Management Plan) and monitoring. For many EIA elements a general reference is made to the MGEPEA, but this leads to a rather diffuse overall picture.

- It is advised to address all the steps to be taken in the EIA process in general terms with very specific reference to the MGEPEA, and complement these with information and guidance specifically relevant for dredging projects in a marine environment.

It is further stated that *'la elaboración del EIA debe contemplar los requerimientos de información que apliquen al caso particular, suministrando la información necesaria y suficiente para describir el proyecto y caracterizar el área que podría sufrir deterioro con su ejecución, así como para identificar, calificar y evaluar sus impactos, señalar cuáles no podrían ser evitados o mitigados y para establecer las medidas de manejo ambiental'*. Again, the description of the project and environment are rather well covered in the ToR, identification, quantification and evaluation of impacts, mitigating measures and the Environmental Management Plan much less or not at all.

Emphasis on data collection quite often leads to EIAs that produce voluminous reports with data, but lack the analysis to turn that data into information that is relevant for informed decision making and good environmental management.

- Keep in mind that an EIA report is a decision making tool and should therefore be concise and easy readable. The ToR document should give more attention to methods and procedures for the analysis of the collected environmental data so that relevant information on impacts and possible mitigation can be generated.

2.2 Resumen ejecutivo

In many EIA regulations it is explicitly stated that the Executive Summary must be well written and concise (often a maximum number of pages is given¹), and understandable for laymen. If this is also the case in the Colombian legislation, this should be mentioned. Generally the Executive Summary should at least provide a description of:

- The project and its setting (the environment);
- The results of public consultation;
- The alternatives considered;
- Impact prediction;
- Major impacts and their significance;
- Proposed mitigation measures;
- The environmental management plan; and
- Any other critical matters that are important for decision-making.

The specified minimum content of the Executive Summary in the ToR does not mention alternatives to the project, nor prediction, nor public consultation, nor mitigating measures. Also only the methodology for impact evaluation is mentioned, not the overview of relevant impacts itself.

- | |
|---|
| <ul style="list-style-type: none">• It is recommended to rewrite this part of the ToR, including items as mentioned above |
|---|

2.3 Metodología

This chapter is limited to remarks on the methods of data collection and processing. However, this is also the place where something should be said on the general approach of EIA to be followed as well as on methods to identify, predict and assess impacts.

Usually the EIA process starts with the collection and analysis of basic data on the project (including possible project alternatives) and on the environment as far as it is likely to be affected. The collection and analysis of the environmental data serves to provide a description of the baseline conditions. In defining the baseline conditions also the environmental effects of autonomous developments (trends), are taken into account.

Potential impacts are identified based on the information on baseline conditions and sources of impact. This identification involves an estimate of the order of magnitude of the impacts. Usually not all potential impacts are studied in detail. For the selection of the impacts to be studied in detail, criteria are used such as (i) Magnitude (the quantum of change), (ii) Extent (the affected area) and Significance (with respect to effects).

The process of selecting relevant alternatives and identification of the important (significant) impacts is commonly known as scoping.

The scoping concludes the first study phase, after which the actual study period with the preparation of the Environmental Impact Statement (EIS) starts. In this phase an assessment is made of the selected alternatives and impacts. Furthermore measures to mitigate undesired, adverse impacts are proposed and brought together in an Environmental Management Plan.

¹ See also: https://iaia.org/uploads/pdf/Fastips_9NonTechnicalSummary.pdf

- It is recommended to pay sufficient attention to sound scoping of the project. On the basis of the scoping a tailored data collection and impact prediction program can be made, which allows focus on the relevant impacts and prevents collection of too much data, thus saving time and expenses (see below).

2.4 Descripción del proyecto

This chapter makes a distinction between a Pre-operational phase and a Dredging phase. Commonly two more phases are described, the Operational phase, when the dredging is finalized and the new channel is in use. This phase may have impacts on its own (so-called induced impact), e.g. as a result of changes in hydro-dynamics, increased ship traffic, etc. A fourth phase, mentioned elsewhere in the ToR is the Decommissioning phase. However this phase does not seem relevant for this kind of projects.

The items given in the bullet lists in this chapter are not all pertaining to the project description, some would be better placed with description of the environment or impact prediction and assessment or even impact mitigation and environmental management. It is recommended to restrict the project description to the basic activities related to the project, the project location and the project layout and implementation schedule (in terms of the project cycle).

Information, in sufficient detail, has to be provided on:

- The type of project;
- The need for the project (objective and justification);
- The project location (maps showing general location, specific location, project boundary and project site layout);
- The size or magnitude of the operation including any associated activities required by or for the project; and
- A description of the project including drawings showing project layout, components of the project, etc.

2.5 Caracterización del área de influencia

This chapter is very elaborate and not limited to a description of the characteristics of the impact area that need to be described. In many places it also addresses how impacts should be predicted and the approach (e.g. modelling, at some places in very much detail) that should be followed. This was also the case in the chapter on Project Description, see 1 above.

- The ToR would be easier to adhere to for project developers if the chapters dealing with Project and Environment description would concentrate on the descriptive aspects only. Guidance on how to predict and assess the impacts could be given in separate chapters.

The ToR ask for a very exhaustive description of the environment. This could lead to a costly and time consuming effort which may not be needed. As stated above a two-step approach would be preferred: make a quick inventory of environmental values that could be affected by the project as well as an inventory of activities and project induced changes to the environment that could affect those environmental values. Such a scoping of the project will make clear which relevant (positive and negative) impacts of the project might be expected, and need to be studied (predicted) in more detail. Based on

this scoping a programme for additional data collection can be made, geared towards the relevant impacts only (see also paragraph 2.3 above).

- Checklists are available that can help in scoping a project. It could be useful to include such a checklist in the ToR as a guidance. Examples taken from the EIA guidelines of the Asian Development Bank are given in Annex 1.

2.6 Zonificación ambiental

Based on the data collected on the (a)biotic, biotic and socio-economic environment sensitive areas must be identified and mapped. The ToR is not very clear in how this has to be done. Reference is made to '*la normativa ambiental vigente*' and to '*criterios para la ponderación y la calificación cualitativa y cuantitativa de la sensibilidad ambiental.*'

- As no reference is made as to where this normative and those criteria can be, it is recommended to include this in the ToR, including how they have to be applied specifically for maritime dredging projects.

2.7 Demanda, uso, aprovechamiento y/o afectación de recursos naturales

This chapter describes in general terms the type of information needed (and the procedures to be followed) to get permits for use of renewable and non-renewable resources. It is not geared specifically to dredging projects and as such it is doubtful if this needs to be incorporated in this ToR. What should be part of an EIA is an overview of resources used by the project, e.g. amount of fresh water extracted, and what the impacts of such an extraction are for the environment, e.g. vegetation or the availability of drinking water for the local population. The same is valid for emissions, like waste water, CO₂. Amounts need to be established and impacts on the receiving environment have to be assessed. The procedure to do so is well described in 6.4 Permiso de vertimientos where a good description is given of the various steps to be taken to come to an assessment of the impacts of the discharge of waste water:

- 1- Identification of the location
- 2- Assessment of amounts
- 3- Assessment of the characteristics of the discharge
- 4- Assessment of the characteristics of the receiving water body
- 5- Determination of the dispersion over de receiving water body
- 6- Assessment of their impacts (water quality)
- 7- Assessment of impacts of changed water quality on the (a)biotic and socio-economic environment.

- This chapter is actually a mix of a general description of permitting procedures to be followed and assessment of impacts of natural resources needed for, or impacted by the project. It is recommended to remove the procedures to be followed from this chapter and/or put them in another chapter/appendix.

2.8 Evaluación ambiental

The with-project is only compared with the situation without the project. This implies that no alternatives to the project are taken into consideration. In international practice it is common to take various

project alternatives into consideration, to see if the project objective can be reached in such a way that harm to the environment is minimal, or environmental benefits are maximal.

- In this chapter mention is made of impact identification, impact description and impact valuation. This is the core of any impact assessment. Although reference is made to MGEPEA these elements of the impact assessment deserve much more attention and guidance in this specific ToR for dredging projects.

2.9 Evaluación económica en el proceso de licenciamiento ambiental

EIA elements like assessment of the relevance of impacts and design of mitigating measures are mentioned, however no specific guidance is given on how to do that, nor specific examples for dredging projects.

- It is advised to make a separate chapter that gives guidance to the design of mitigating measures, tailor-made to dredging projects

2.10 Planes y programas

The information given in this chapter is very general and does not give specific guidance for dredging projects. The Environmental Management Plan, Monitoring Plan and Contingency Plan are mentioned, but no details on specific requirements are given for dredging projects. The Decommissioning plan that is mentioned seems not very relevant for dredging projects.

- It is recommended to elaborate the requirements for these plans with emphasis on requirements specific for dredging projects.

3. Missing topics

A number of topics receive insufficient or no attention in the ToR document. Already mentioned are the general approach, project alternatives, identification of impacts, prediction of impacts, assessment of impacts and mitigation and monitoring. More attention could also be given to positive versus the negative impacts, cumulative impacts, project induced developments and their impacts, possible reuse of the dredge spoils (circular economy) and global impacts (climate change).

Annex 1: Checklists

Examples of general checklists (Source Asian Development Bank)

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Protected Area	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Wetland	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Mangrove	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Estuarine	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Buffer zone of protected area	<input type="checkbox"/>	<input type="checkbox"/>	
▪ Special area for protecting biodiversity	<input type="checkbox"/>	<input type="checkbox"/>	
A. Potential Environmental Impacts			
Will the Project cause...			
▪ encroachment on precious ecology resulting in loss or damage to fisheries and fragile coastal habitats such as coral reefs, mangroves, and seagrass beds?	<input type="checkbox"/>	<input type="checkbox"/>	

SCREENING QUESTIONS	Yes	No	REMARKS
▪ short-term increase in turbidity and sunlight penetration as well as changes in sediment pattern and flows at dredging site?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ removal and disturbance of aquatic flora and fauna at dredging site?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ deterioration of water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ alteration of bottom surface and modifications to bathymetry, causing changes in tidal bore, river circulation, species diversity, and salinity?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ changes in sediment pattern and littoral drift that may cause beach erosion of neighboring areas?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ modification of terrestrial habitat by upland disposal of dredged material or covering of potential archaeological sites with dredge spoil?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ short-term air quality degradation due to dredging-related operations?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ noise and vibration due to blasting and other civil works?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ dislocation or involuntary resettlement of people?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ other social concerns relating to inconveniences in living conditions in the project areas?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ social conflicts if construction depletes local fishery resources on which communities depend for subsistence?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ social concerns relating to local inconveniences associated with port operation (e.g. increased volume of port traffic, greater risk of accidents, communicable disease transmission)?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ deterioration of water quality due to ship (e.g. ballast water, oil waste, lubricant and fuel spills, sewage) and waterfront industry discharges?	<input type="checkbox"/>	<input type="checkbox"/>	
▪ increased noise and air pollution resulting from airborne emissions (e.g. gas, smoke, fumes) from maneuvering and berthing ships and the waterfront industry?	<input type="checkbox"/>	<input type="checkbox"/>	

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS										
Environmental Concerns		Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact			
							Small	Moderate	Major	
A	Environmental concerns related to project siting									
	1	Land acquisition	1	Loss of productive land and/or sources of income. Displacement of households, and/or economic activities. Social/ community disruption.	1	Avoid or minimize by careful design. If not possible, compensate for losses and provide assistance to relocate and/or restore living conditions/livelihoods. Prepare & implement participatory Resettlement Action Plan.				
	2	Encroachment on and/or damage to historical, cultural, religious or other sites and monuments that are important to the community and/or to social groups	2	Loss of valued sites. Disruption of social / community rituals. Indirect impacts: Loss of tourism potential. / income.	2	Avoid, minimise or offset activities by careful design and consultation with local communities. Compensate for damage to or displacement of sites, graves, etc.				
	3	Encroachment into or restricted access to forest/swamplands / wetlands	3	Loss of biodiversity, rare and endangered species. Loss of forest/swamp / wetland related production functions. Indirect impacts: Increased household expenditures for food, building materials, medicines, etc., that were harvested. Reduced strategies to deal with food shortages. Increased risks of poverty.	3	Avoid or minimize by careful design and consultation with local communities. Compensate and/or offset economic losses through replacement of resources, identification of alternative income sources, etc.				
	4	Loss of agricultural/aquaculture land	4	Loss of household income from sales and/or work as hired labor (with different impacts for men and women, landless HH). Loss of business revenues and wage employment	4	Consultation with affected communities and HH to identify and implement feasible alternative income sources. Training for new job skills, establishment of micro-enterprises. Compensation for economic losses.				

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS

Environmental Concerns		Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
							Small	Moderate	Major
			(commercial agriculture, agro- and fish processing, etc.) Indirect impacts: Increased HH expenditures for food; reduced food security. Distress sales of land and other assets. Increased risk of out-migration to look for work. Increased poverty.						
5	Impediment to movements of wildlife,, including obstruction of fish migration paths	5	Impediment of wildlife, reduction in biodiversity and fish stocks Indirect impacts: Loss of income from fishery	5	Careful planning, design, and operation, construction of fish passages				
6	Impediment to movements of people (e.g., navigation) and their animals	6	Disruption of economic activities and social movements.	6	Careful planning and design				
7	Loss of aesthetic, visual or recreational value of the areas	7	Loss of precious values, economic losses	7	Careful planning and design				
B	Environmental concerns related to project implementation and construction activities								
1	Soil erosion	1	Water quality impact, loss of productive soil, sedimentation problems Indirect impacts: Reduced drinking water quality; higher agricultural input costs / reduced productivity and incomes.	1	Minimise clearing activities, limit activities to dry season, optimise soil cover and apply soil management techniques to minimise soil loss				
2	Increased turbidity	2	Impact on flora and fauna, sedimentation problems. Indirect impacts: Reduced drinking water quality (stream/rivers & water supply systems)	2	Apply fencing, use silt screens in sensitive areas				

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS

Environmental Concerns		Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
							Small	Moderate	Major
	3	Sedimentation of river beds	3	Loss of habitat, problems with navigation Indirect impacts: Temporary restrictions on navigation/accessibility for economic activities, social networks	3	Remove deposited sediments			
	4	Loss of habitats	4	Loss of biodiversity, reduction in fish stocks Indirect impacts: Reduced incomes from fishing/fish processing (differential impacts on men and women); reduced food security	4	Careful planning and design of disposal sites			
	5	Loss of soil fertility	5	Loss of agricultural production Indirect impacts: Loss of income (potential differential impacts on men and women); reduced food security; increased poverty risks	5	Careful planning and design of soil movement, set aside fertile topsoil. Supply fertilisers			
	6	Worker accidents	6	Health impacts, economic losses due to injuries, loss of life; increased public health care costs	6	Implement safe working practices through training, site supervision and provision of safety equipment			
	7	Traffic accidents	7	Health impacts, economic losses due to injuries, loss of life; increased public health care costs	7	Identify alternative routes, limit & post driving speeds. Provide community awareness programs.			
	8	Disruption of access to productive land (e.g., farm land, fishing areas, forests) and/or to community facilities/services	8	Temporary loss of income from farming, fishing and processing activities (differential impacts on men and women); reduced food security. Temporary disruption of local businesses, business income, wage income for employees. Temporary disruption of community services (e.g., access to clinics)	8	Identify alternative routes to facilitate continued access; limit disruptions to periods of low economic activity, e.g. outside harvest periods Compensate for loss of business income and employee wages Assist to temporarily relocate community facilities/services to maintain access.			

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS

Environmental Concerns		Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
							Small	Moderate	Major
9	Obstruction to navigation	9	Temporary restricted access and/or extra costs for transport related to economic activities; restricted fishing activities Temporary restricted and/or more expensive transport to support social network.	9	Identify alternative routes, limit to periods of low economic activity, e.g. outside main fishing periods				
10	Disruption of utility services	10	Temporary disruption and/or extra costs for local businesses, economic activities (e.g., agricultural processing) and community facilities/services (e.g., health clinics)	10	Careful planning and quick repair in case of accidents. Provide community awareness and information programs.				
11	Noise/vibration/air pollution	11	Temporary reduced living conditions (dust, noise); temporary increased risks of health impacts (e.g., due to dust)	11	Limit working hours in populated areas, use proper and well maintained equipment				
12	Soil /water contamination related to leakage and inappropriate storage of fuels and other chemicals, dumping of construction wastes or improper sanitation	12	Loss of flora and fauna. Increased risks of health problems, e.g., skin rashes/eye infections from contaminated surface water, cuts, abrasions, etc., from unsafe dumping of construction wastes. Contamination of drinking water sources with related health risks (diarrhea, dysentery).	12	Containment of fuels stored on site and off-site refuelling, follow appropriate procedures, proper maintenance of equipment, collection and proper handling of construction wastes, provision of proper sanitation facilities				
13	Groundwater pollution related to leakage and inappropriate storage of fuels and other chemicals, dumping of construction wastes or improper sanitation	13	Contamination of drinking water sources with related health risks (diarrhea, dysentery).	13	Containment of fuels stored on site and off-site refuelling, follow appropriate procedures, proper maintenance of equipment, collection and proper handling of construction wastes, provision of proper sanitation facilities				

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS										
Environmental Concerns			Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
								Small	Moderate	Major
	14	Influx of non-local workers for project construction and other people attracted by economic opportunities	14	Social tensions due to competition for paid work and other economic opportunities related to FRM project, inappropriate behaviour of non-local people, lack of knowledge/respect for local customs	14	Contractor contracts specify (i) employment of local workers, (ii) local purchase of goods and services, (iii) awareness programs about local customs and appropriate behavior				
	15	Health impacts/disease hazards due to influx of workers and other non-local people	15	Increased risks of sexually transmitted diseases including HIV/AIDS; increased risks of other infectious diseases	15	Contractor contracts specify robust HIV/AIDS awareness and prevention program targeting workers and people in surrounding communities. Plan proper domestic and human waste management. Support local health clinics to meet new demands				
	16	Pressure on water supply and sanitation due to influx of workers	16	Increased health risks related to poor drinking water and sanitation conditions (diarrhea, dysentery) Possible loss of business income due to lack of adequate water supply/sanitation	16	Appropriate planning and design of water supply and sanitation facilities, including supplementary resources. Plan proper domestic and human waste management. Support for local health clinics to meet new demands				
	17	Employment opportunities for local people	17	Poverty reduction, improved welfare	17	Contractor contracts specify (i) employment of local workers, (ii) local purchase of goods and services, (iii) awareness programs about local customs and appropriate behaviour				

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS									
Environmental Concerns		Related Impacts		Recommended Feasible Mitigation Measures		No Significant Impact	Significant Impact		
							Small	Moderate	Major
C Environmental concerns related to project design, management, operation and maintenance									
		Project induced changes in hydrology/hydraulics: the timing, extent, depth and duration of flooding, resulting in:							
	1	Loss of agricultural production (loss of flood benefits)	Increased input costs and reduced yields; loss of business revenue and household incomes; possible loss of jobs for agricultural workers Indirect impacts: reduced food security, increased incidence of distress sales of land and other assets, increased incidence of out-migration to look for work, increased poverty risks		Allow sufficient flooding to safeguard silt and water supply and prevent pests Strengthen and provide agricultural extension and other technical assistance to enhance agricultural productivity, diversify crop production, expand livestock raising, etc. (including services targeting men's and women's agricultural activities)				
	2	Loss of capture fisheries production (loss of flood benefits)	Loss of household incomes Indirect impacts: reduced food security, increased poverty risks		Allow sufficient flooding to maintain fish migration patterns and fish spawning, breeding, nursing and feeding areas				
	3	Loss of wetland area/productivity (loss of flood benefits)	Ecological impacts; loss of biodiversity. Economic losses (loss of income, extra expenditures), decreased food security, increased poverty risks		Allow sufficient flooding to safeguard silt and water supply				
	4	Hindrance to navigation/ transport by boat (loss of flood benefits)	Economic losses due to reduced accessibility and/or higher transport costs for businesses, marketing and other economic activities. Social impacts due to reduced mobility / travel to maintain social networks		Allow water levels high enough to make navigation possible				

CHECKLIST OF ENVIRONMENTAL, ECONOMIC AND SOCIAL IMPACTS

Environmental Concerns		Related Impacts	Recommended Feasible Mitigation Measures	No Significant Impact	Significant Impact		
					Small	Moderate	Major
5	Reduced water availability in the dry season (loss of flood benefits)	Economic losses due to lack of water for agriculture, other economic activities. Social and health impacts due to lack of safe drinking water; decreased food security, increased poverty	Allow sufficient flooding to safeguard replenishment of groundwater and surface water storage				
6	Changes in river morphology	Economic losses due to hindrance to navigation, impacts on sand mining industry	Dredging, construction of bank protection works				
7	Changes in salt water intrusion	Damage to agriculture and aquaculture; loss of business revenue and household incomes; potential loss of jobs for agricultural/aquaculture workers	Maintain minimum flows				
8	Decline in delta growth	Reduction in economic opportunities due to decline in land accretion	Maintain minimum (sediment carrying) flows				
D	Positive impacts related to project design, management, operation and maintenance						
1	Increased safety	Improved well-being, reduced poverty					
2	Improved sanitation and health situation	Improved well-being, reduced poverty					
3	Decreased flood damage	Improved well-being, reduced poverty, improved food security					
4	Increased agricultural production	Improved well-being, reduced poverty, improved food security					
5	Improved mobility/transportation network	Social and economic welfare, reduced poverty					
6	Poverty reduction/improved food security	Improved well-being					