Initial Environmental Examination

October 2014

VIE: Urban Environment and Climate Change Adaptation Project
(Hoi An City, Quang Nam Province)

Prepared by Quang Nam Provincial People's Committee for the Asian Development Bank (ADB).

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Print Name	Dr Bernard YON	Dr Gary MOYS	Jim McNelis	Trevor O'REGAN	
Signature					
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ABBREVIATIONS AND ACRONYMS

ADB	Asian Development Bank
BOD5	Biochemical oxygen Demand (5 days)
CC	Climate Change
CCAP	Climate Change Adaptation Plan
CES	Chief Environment & Social (PMU)
CPC	City Peoples Committee
DES	Director Environment & Social (Supervision Engineer)
DOC	Department of Construction
DONRE	Department of Natural Resources and Environment
DPI	Department of Planning and Investment
EA	Executing Agency
EHSC	Environment, Health & Safety Coordinator (Contractor)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GDP	Gross Domestic Product
IA	Implementing Agency
IEE	Initial Environmental Examination
IPCC	Inter -Governmental Panel on Climate Change
LRAP	Local Resilience Action Plan
MOF	Ministry of Finance
OCR	Ordinary Capital Reserve
PMU	Project Management Unit
PPC	Provincial Peoples Committee
QNWSDC	Quang Nam Water Supply and Drainage Company
RP	Resettlement Plan
SE	Supervision Engineer
SEA	Strategic Environmental Assessment
UN	United Nations
URENCO	Urban Environment Company
WB	World Bank

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EXECUTIVE SUMMARY

The five sub-components of the Urban Environment and Climate Change Adaptation Project selected for Asian Development Bank financing will significantly improve the environmental conditions and quality of life of the population in Hoi An through the following results:

- Improvement of the water supply security for Hoi An and nearby secondary centers through using and increasing the water storage capacity of the Lai Nghi reservoir; reduction of the risk of brackish water distribution in the network as observed today during short periods of the dry season; adaptation to climate change particularly sea level rise;
- improvement of public safety and adaptation to long term climate change, particularly flooding, through the raise of road 608 which will secure evacuation of population to safer areas in case of major flood;
- Reduction of flood impact on the ancient city by improving storm water drainage and storage through increasing Phap Bao reservoir storage capacity;
- Improvement of wastewater collection with beneficial effects on public health and on surface and groundwater quality;
- Contribution to Hoi An economic development through the development of new urban areas taking due consideration of prevailing climate change risks (sea level rise and flooding) and direct effects on the quality of life of future residents.

A screening carried out during the Interim phase of the Project confirmed that impacts raised by the project were mainly related to land acquisition while impacts on natural environment were all very limited, mainly related to the construction phase and easily controlable by appropriate and conventional mitigation measures. Consequently, the proposed categorisation of the Project was B, involving the preparation of the present IEE. Under GOV regulations, the Subproject is classified as Category "I" and will require a full EIA Report to be appraised and approved by the Quang Nam Province People's Committee through the Department of Natural Resources and Environment (DONRE). Based on the draft IEE and its EMPs, the full EIA Reports for this Sub-project will be completed by end of February 2014 and submitted to the DONRE for appraisal during March 2014. It is estimated that DONRE appraisal will have been done by mid-May 2014 (or in 30 working days from submission of a complete and valid dossier for appraisal) at the latest; and PPC approval, by first week of June (or in 15 working days from submission of a complete dossier for approval) at the latest

Hoi An is recognized as a World Heritage Site by UNESCO, the Ancient Town being an exceptionally well-preserved example of a South-East Asian trading port dating from the 15th to the 19th century. Quang Nam Province where Hoi An is located, is frequently hit by tropical storms and typhoons: From 1979 to 2010, 65 typhoons and 22 tropical depressions hit the Province, or an annual average of 2 typhoons and 0.7 tropical depressions.

The city is located along the Thu Bon estuary, a river draining a catchment area of 3,500 km^2. Due to the low and flat topography, the discharge in the river which drains almost 80% of the annual runoff during the rainy season from September to December, the occurrence of typhoons particularly in October and November, Hoi An is confronted to recurent floods almost every year, some years exceptional and devastating. Due to the Climate Change, the sea level rise is expected to worsen the flood situation in the coming decades.

Surface water quality in the Thu Bon shows moderate pollution (Category B1), with the exception of excessive salinity. At present, salinity intrusion is observed in the estuary, directly linked to the tidal regime and the discharge of the rivers. The lower the discharge is, the farther the salinity front moves upstream the river. Measurements show the salinity front in the river reaches about 15 km from the mouth.

The project zone mainly consists of urban areas and agriculture, dominated by paddy. The main natural area, the coastal dune system, has been long utilised for resort development and sand

production. Vegetation biodiversity is limited, with no forest and related fauna biodiversity is poor. However, a group of 4 islands, the Cham Islands, located about 16 km from the coastline are part of the Cu Lao Cham Marine Park, a nature reserve established since 1986, support a rich biodiversity but mainly aquatic.

By the end of 2011, population of Hoi An City was about 91,000 people. The city is considered as the most self-motivated in economic operation of Quang Nam province and one of the famous tourism spot of the country. With more than 10,000 beds, tourism is the leading activity of the place, complemented by agriculture and fisheries

Impacts related to project location will be mainly social and related to land acquisition. However, these impacts have been drastically reduced from the initial project design by the PPTA team during the mid-term mission. Road 608 doesn't involve land acquisition or building loss. Cua Dai Road requires 10.5 ha but all land acquisition is already completed and paid. Co Co UDA affects about 37 ha of land, half agricultural and half being fishponds, but no physical displacement is required. Dredging of the Lai Nghi and the Phap Bao reservoirs will only involve limited land acquisition, respectively 3.71 ha and 1.38ha. Impact on natural resources will be limited to the cut of few roadside trees mainly along road 608. A 1 to 1 replacement policy will be respected.

Main environmental impacts will happen during the construction activities. Because of the project located in an urban environment, risk of nuisances is higher: traffic congestion, temporary alienation of access, community facilities temporary disruption, noise, engine gas and dust release may temporary disturb the nearby communities. However, recommendations formulated in the EMP combined with a solid environmental contractual framework and an effective inspection of construction sites will definitely reduce these risks to an acceptable level. The status of World Cultural Heritage doesn't impose any prior authorisation and approval for the works as far as the activities do not affect any of the protected buildings, which is the case.

Dredging of both reservoirs, but mainly Lai Nghi will generate a large volume of sediment of about 600,000 m3. The initial FSR considers its disposal next to Lai Nghi reservoir without more information. This option may use another 10 ha of agricultural land for disposal. Sampling and analysis of sediment under the PPTA confirms the sediment is not contaminated by heavy metals and its grain size distribution, mostly sand, satisfies requirements for fill. It is thus proposed to reuse the sediment for the fill of the other project components, the requirements of which will easily absorb all the sediment produced. This option will avoid additional land acquisition but will impose an intense truck traffic between production and consumption sites and a close coordination and scheduling of activities. Recommendations regarding hauling routes are provided in the IEE.

No detrimental impact is anticipated after construction and during operation of the project sub-components on flood occurrence; Phap Bao will improve stormwater drainage in the urban area.

No impact is anticipated on Thu Bon salinity and Lai Nghi water intake will be kept upstream the salinity front on the long term and despite CC and sea level rise thanks to the flood management plan proposed in the PPTA.

The risk of Lai Nghi reservoir water contamination by the wastewater of surrounding residential areas will become more sensitive as water will be used for drinking purpose. The PPTA has already included in the Lai Nghi project as mitigation measure, the development of a sewerage system along the reservoir shores collecting sewage from households and discharging it in the existing sewerage system of Hoi An.

No particular impact on air quality is anticipated from road 608 which will be only raised, not widened, so traffic is not anticipated because of the project. Cua Dai road will be a new road mainly surrounded by agriculture and the progressive development of its traffic should not pose paricular issues regarding air quality.

Due diligence of EIAs was carried out as part of this IEE for 2 associated facilities to the proposed project: The Duc Ninh WWTP and the Nhat Le 2 bridge, both being under construction. No major issue rose from the environmental point of view.

The IEE provides a full EMP providing organization, roles and responsibilities of parties involved, detailed measures to implement during construction and operation, monitoring and cost estimate.

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1. INTRODUCTION

1.1. PROJECT RATIONALE

Climate Change (CC) is already happening and will affect all countries, with the most serious impacts being felt in developing countries, notably Vietnam. The most likely impacts of CC for Vietnam (those for which models converge) are increases in average temperature, drier dry seasons, wetter wet seasons, an increase of extreme climatic event frequency and an increase in sea level by 2100 (from a baseline of 1980–99) of somewhere between 25 cm and 1 meter, but very possibly toward the higher end of this range.

The government of Vietnam adopted its National Target Program to Respond to Climate Change (NTP-RCC) in December 2008 to determine the consequences of climate change and establish national priorities. The NTP-RCC is the country's guiding document for responding to CC in the medium term (2009–15). Vietnam's Socio-Economic Development Plan (SEDP), 2011–2015 accords high priority to construction of urban infrastructure, taking into account environmental protection, in which special importance is attached to (amongst others) sewerage systems, waste and water treatment facilities, facilities for collection, transport, treatment and burial of waste.

Linked to this, the impacts of climate change are becoming particularly severe in the coastal cities. Sea level rise delays the discharge from the drainage system in estuarine areas, reverses river flows during high tide and reservoirs are intruded by salt water, and causes serious damages on urban infrastructure facilities. Flooding is impacted by high downstream water levels, preventing the rapid evacuation of flood waters. With the increasing sea levels and potential changes in storm intensity, this situation is likely to become both more uncertain and most likely exacerbated

It is within this context that the GOV together with the ADB has placed the Urban Environment & Climate Change Adaptation Project within the current lending program. The project is in conformity with the Country Partnership Strategy (CPS) agreed between the GOV and the ADB. It can also be seen to represent a pilot project for the development of urban municipal services in the coastal cities, thereby providing a timely model for development in accordance with the GOV strategies for climate change.

In terms of project rationale, the selection of the two project cities, Dong Hoi and Hoi An is justified by the fact that both are located in the Northern/Central Coastal Region which has historically been one of the most disaster-prone in Vietnam, threatened repeatedly by floods and typhoons. Climate change is likely to make these disasters more frequent and severe (by changing the severity of the typhoon and by raising sea levels), posing particular risks to the majority of people whose livelihoods depend upon tourism, agriculture and aquaculture. Selection is also justified in relation to their significant activities in relation to climate change adaptation planning and green growth initiatives, particularly Quang Nam/Hoi An.

1.2. PROJECT CATEGORIZATION

A screening exercise of the proposed sub-components for Hoi An was presented in the Interim Report leading to the following conclusions:

- Projects components are not anticipated to affect water, soil or air quality on a long term.
- Most critical period will be construction, as part of the works will occur in urbanized areas (even inside the Old city registered as UNESCO World Heritage). For this reason, detailed EMP for construction, as well as detailed EHS specifications for construction contractors will be of highest importance, combined with a solid monitoring on site.
- Road projects, including Cua Dai Road and raising of Road 608, will involve significant land acquisition and resettlement. However, adjustment of the design of both sub-components has already minimized resettlement.

- Other sub-components of the project will have no impact on resettlement.

Considering (i) the anticipated limited impacts on the environment from all Project sub-components and (ii) the social impacts (land acquisition and resettlement) restricted to the two road sub-components, it was recommended to consider the classification of the Hoi-An sub-project as an ADB category B, requesting the preparation of an IEE.

However, this IEE will be complemented by a (i) full RP to address in details land acquisition and resettlement issues and (ii) by a full EMP focusing particularly on the construction period, recognizing that most of the implementation activities are located within sensitive urbanized areas.

Considering the Vietnamese regulations, the study level will satisfy the standard requirements for an EIA.

1.3. PURPOSE OF EIA/IEE

This report gives an account of the initial environmental examination (IEE) of the proposed Urban Environment and Climate Change Adaptation Project for the city of Hoi An. The IEE was conducted as part of the subproject preparation to primarily: (i) identify and assess potential impacts and risks arising from the implementation of the proposed Subproject on and to the physical, biological, socio-economic and physical cultural environment; and (ii) recommend measures to avoid, mitigate, and compensate for adverse impacts, and enhance positive impacts. The present IEE was carried out following the Safeguard Policy Statement (June 2009) of the Asian Development Bank (ADB) and with reference to the Law on Environmental Protection (No. 52/2005/QH11) and its implementation guidelines, namely Decree No. 80/2006/ND-CP, Decree 21/2008/ND-CP and Decree No. 29/2011/ND-CP of the Government of Viet Nam (GOV).

1.4. REPORT ORGANIZATION

The Initial Environmental Evaluation follows a conventional layout for this type of report and integrates an Environmental Management Plan (EMP).In addition to this introduction, the reader will find the following Chapters in this report:

- The executive summary;
- The introduction with the project rational (Chapter 1)
- The applicable institutional and regulatory framework (Chapter 2);
- The description of the Project proposed components (Chapter 3);
- The baseline situation (Chapter 4);
- The impact analysis (Chapter 5);
- The alternative development options (Chapter 6);
- The public consultation activities (Chapter 7);
- The grievance and redress mechanism proposed (Chapter 8)
- The environmental and social management plan (Chapter 9)

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2. POLICY, INSTITUTIONAL & LEGAL FRAMEWORK

2.1. VIETNAMESE ENVIRONMENTAL LEGISLATION

The Vietnamese legal framework for environmental management continues to rapidly evolve. This section introduces the nation's relevant environmental policies. The key pieces of environmental legislation are followed by the environmental standards that apply to the Project.

- Law on the Protection of the Environment (LEP) was enacted in 2005. The LEP:
  - Identifies the responsibilities of the state center, provinces, organizations and individuals to prevent and remedy environmental deterioration and pollution and carry out specified environmental protection functions;
  - Provides for the development of environmental standards and submission of environmental impact assessment reports on new and existing facilities;
  - Provides for responsible parties to pay compensation for environmental damage;
  - Establishes the right of individuals and organizations to petition for enforcement of environmental regulations;
  - Calls for civil and criminal penalties for violations; and,
  - Encourages international environmental co-operation.
- Decree No. 80/2006/NS – CP promulgated on 09/08/2006 guides implementation of the LEP.
- Circular 08/2006/TT-BTNMT was promulgated in 2006 and provides guidance in setting up and appraising environmental impact assessment reports, strategic EIA and commitment to environmental protection.

To supplement the above key policies, there is a large range of decisions, regulations and standards that may also apply to the Project. These are:

- Decree 21/2008/ND-CP, February, 28, 2008, amending and supplementing a number of articles of the Government's Decree 80/ND-CP of August 9, 2006; detailing and guiding the implementation of a number of articles of the Law on Environmental Protection.
- Decree No. 29/2011/ND-CP, February, dated 18 April 2011 on strategic environmental assessment (SEA), environmental impact assessment (EIA) and environment protection commitment; The Decree 29 takes effect on June 5, 2011, and replaces Articles 6 thru 17 of the Government's Decree No. 80/2006/ND-CP of August 9, 2006, detailing and guiding a number of articles of the Environmental Protection Law; and Clauses 3 thru 10, Article 1 of the Government's Decree No.21/2008/ND-CP of February 28, 2008, amending and supplementing a number of articles of Decree No. 80/2006/ND-CP of August 9, 2006, detailing and guiding a number of articles of the Environmental Protection Law.(Article 40)
- Circular No. 26/2011/TT-BTNMT1 guiding in detail numbers of articles of Decree No. 29/2011/ND-CP, on strategic environmental assessment, environmental impact assessment and environmental protection commitment. The Circular No 26/2011/BTNMT replaced Circular No 05/2008/TT-BTNMT on September, 2, 2011.
- Decision No. 13/2006/QD-BTNMT, September 08, 2006, of the Ministry of Natural Resources and Environment, regarding stipulation of organization and operation of the assessment board for reports on Strategic Environmental Assessment (SEA) and EIA.
- Construction Law No 16/2003/QH11 issued November 26 2006. This Law shall apply to domestic organizations and individuals and to foreign organizations and individuals investing in construction of works and engaging in construction activities in the territory of the Vietnam.

- Law on Standards and Technical Regulations, No 68/2006/QH1, Issued June, 29, 2006. This Law provides for the formulation, announcement and application of standards; the formulation, promulgation and application of technical regulations; and the assessment of conformity with standards and technical regulations.
- Decree No.149/2004/ND-CP of July 27, 2004 on issuance of permits for water resources exploitation, exploitation and use, or for discharge of wastewater in to water source
- The Law on water resources No 17/2012/QH13, issued Jan 1, 2013
- Law No. 17/2012/QH13 dated June 21, 2012 of the National Assembly on Water Resources
- This Law to amending and supplementing a number of provisions on adjustment of policies to consider the water resources are the property of the state, the economic undertakings and use of saving water, efficiency and unified in management of the river basin management of combination with the local administration, the Law specifies the measures to prevent and combat pollution, degradation, depletion of water resources; the adaptation and troubleshoot the source of pollution water, protection and development of aquatic resources; corridors protect water resources and ensuring traffic flow. This Law takes effect from the date of January 01, 2013.
- Decree on Urban and Industrial –Park water drainage No: 88/2007/ND-CP, Issued May 28, 2007
- Decree No 67/2003/ND-CP of June 13, 2003 on Environmental Protection Charge for Waster Water
- Decision No: 48/2008/QD-TT, issued on 03/04/2008 by the Prime Minister, regarding Common General Guidelines on Feasibility Study Preparation for ODA Projects.
- MONRE's Circular No. 26/2011/TT-BTNMT dated 2nd September 2011 regarding guidance on strategic environmental assessment, environmental impact assessment and environmental protection commitment;
- MONRE's Decision No. 16/2008/QD-BTNMT dated 31st December 2008 regarding issuance of national technical regulations on environment;

The following are the environmental quality standards and regulations based on the Vietnam Standards promulgated in 1995 by the Ministry of Science, Technology and Environment (TCVN 5937, 5944, 5945).

- QCVN 01:2009/BYT: National Technical Regulation on drinking water quality
- QCVN 02:2009/BYT: National Technical Regulation on domestic water quality
- QCVN 03:2008/BTNTM: National Technical Regulation on the allowable limits of heavy metals in the soils
- QCVN 07:2009/BTNMT: National Technical Regulation on Hazardous Waste
- QCVN 05 : 2009/BTNMT : National technical regulation on ambient air quality
- QCVN 06:2009/BTNMT: National technical regulation on Hazardous substances in ambient air
- QCVN 07:2010/BXD: National technical regulation on Vietnam Building Code Urban Engineering Infrastructures
- QCVN 08:2008/BTNMT: National technical regulation on surface water quality.
- QCVN 09:2008/BTNMT: National technical regulation on ground water quality.
- QCVN 10:2008/BTNMT: National technical regulation on coastal water quality.
- QCVN 14:2008/BTNMT: National technical regulation on domestic wastewater
- QCVN 26:2010/BTNMT : National Technical Regulation on Noise

- QCVN 27:2010/BTNMT: National Technical Regulation on Vibration
- TCVN 6705-2000: Non-hazardous solid waste – Classification
- TCVN 6706-2000:Hazardous solid wastes – Classification
- TCVN 6774:2000: Freshwater quality guidelines for the protection of aquatic life.

2.2. VIETNAM ENVIRONMENTAL REQUIREMENTS AND FRAMEWORK

The Ministry of Natural Resources and Environment (MONRE) is the lead agency for environmental management in Viet Nam. At the provincial level, the MONRE operates through the Departments of Natural Resources and Environment (DONREs). In terms of administrative and technical matters, DONREs fall under the MONRE; in terms of operation, however, they are under the direct control of Provincial Governments through the Provincial People's Committees (PPCs).

Two types of environmental assessment reports are considered in Vietnam, an EIAR (Environmental Impact Assessment Report) or an EPC (Environmental Protection Commitment). In broad terms, an EIAR is required for project types listed in the Decree No. 29/2010/ND-CP and deemed to have potential for significant adverse impacts, as well as those located in protected areas or other environmentally sensitive areas. Project requiring EIAR is not necessarily equivalent to ADB category A project. A project requiring EIAR may be classified as environmental category A or category B according to the ADB's Safeguard Policy

In each Province the Department of Natural Resources and the Environment (DONRE) has established a Provincial Environment Administration (PEA). The PEA has an EIA Division specifically in charge of EIA related matters at provincial level and which also provides guidance to District and Commune level on these matters.

The EIAR is submitted to the Provincial Environment Administration (PEA) that provides certification on approval. The Provincial Project Management Units (PPMU) submits copies of the approved EIAR and certification to the Commune Peoples' Committees. The PPMU also prepares a summary of the report for public display in the relevant Commune People's Committee office.

The essential differences between preparation processes for an EPC and an EIAR are i) the level of field investigation, analysis and reporting required; and ii) the requirement for formalized consultation within the EIAR. By comparison, the scope and level of safeguard investigation required for an ADB IEE could be acceptable to prepare an EIAR.

Smaller projects without the potential for significant adverse impacts will be subject to a lower level of assessment in the form of EPC. EPCs are required to be submitted for appraisal at the time of Project Investment Report preparation. According to Circular No. 26/2011/TT-BTNMT which details the procedures for EPC, the authority which receives and certifies the EPC is the District People's Committee of the locality where the project is located. Decree No. 29/2011/ND-CP specifies procedures for projects implemented in two districts or more: the project owners can register the EPC in any of the district people's committee concerned, at their convenience.

The content and format of the EPC is detailed in an appendix to Circular No. 26/2011/TT-BTNMT. The EPC must include information on mitigation measures that will be taken. The EPC obliges the Provincial People's Committees (PPC) to ensure that the specified mitigation is carried out during project implementation.

The Government's environment approval process is described in detail in Decree 29/2011/ND-CP (notably articles 13, 18, 19 and 20). An overview of the different government approval mechanisms with respect to the most recent project implementation schedule is summarized in the following table.

According Article 18 of Decree 29/2011/ND-CP, this particular project requires a detailed EIA which will be appraised and approved by the PPC.

Table [1] THE GOV EIA REPORT PREPARATION, APPRAISAL, APPROVAL & IMPLEMENTATION PROCESS

STEPS IN THE PROCESS	RESPONSIBLE ENTITY	TIMELINE WITH RESPECT TO CURRENT PROJECT IMPLEMENTATION SCHEDULE
Preparation & submission of EIA Report	QN WSDC	2013-Early 2014
Appraisal of EIA Report: 30 working days, or 45 working days for rojects with complicated environmental impacts.	QN PPC (through an Appraisal Council)	February-March 2014
Approval of EIA report: 15 working days once EIAR has incorporated omments/recommendations of appraisal results):	QN PPC	May 2014
Disclosure of contents of approved EIA report concerned Ward/Commune eople's Committee/s	QN WSDC	Summer 2014
Implementation of approved EIA report, compliance with requirements or onditions stated in the decision on the approval of the EIA report, eporting of implementation and compliance, meeting environmental tandards	QN WSDC	Following Loan Effectiveness
Directing/organizing the monitoring of the implementation of approved IAR.	QN PPC	

The proximity of a UNESCO World Heritage Site does not impose any requirements for works being carried out on the public land, as far as they do not threat the integrity of buildings subject to protection. Indeed, the World Heritage Protocols for Hoi An impose that any works related to the protected ancient houses for repair or improvement do not affect the physical appearance or the architecture of the building. Rehabilitation of such buildings by their owners is partly subsidised by the government (up to 55%) which imposes a review of works anticipated and prior approval.

2.3. ADB ENVIRONMENTAL SAFEGUARDS POLICY

In 2005, the Asian Development Bank (ADB) embarked on a review process of its three safeguard policies on the environment, involuntary resettlement and Indigenous Peoples. The 2009 Safeguard Policy Statement is the result of this four-year process. NGO Forum on ADB's network members was heavily involved in monitoring and commenting the review process.

In July 2009, the ADB approved its new Safeguard Policy Statement (SPS), which became effective in January 2010. The new Safeguard Policy Statement replaces the ADB's previous separate policies on each of these areas: Policy on Indigenous People (1998), Involuntary Resettlement Policy (1995) and Environment Policy (2002). Key documents related to the new Policy include:

- ADB, 2009. Safeguard Policy Statement, Manila.
- ADB, 2012. Environment Safeguards, a Good Practice Sourcebook, Draft Working Document, Manila.

The standards contained in the ADB's Safeguard Policy Statement have far-reaching impacts. They determine the ADB's environmental and social obligations for its annual and rising lending volume and influence emerging national legal frameworks in Asia. Due to the Bank's increasing support for private sector operations, the Safeguard Policy Statement also determines how private financing, supported by the ADB, operates in Asia.

The overarching statement on ADB's Commitment and Policy Principles (Chapter V) says that the ADB's safeguards have the following objectives (SPS, p 15): i) avoid adverse impacts of projects on the environment and affected people, where possible; ii) minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

2.3.1. GENERAL REQUIREMENTS

The Policy Delivery section (Chapter V B, paras. 53–64) lists general requirements that the ADB is obliged to follow in regard to: project screening and classification, information disclosure, consultation and participation, due diligence, monitoring and reporting, local grievance redress mechanisms and the Bank's Accountability Mechanism.

- **Project screening and classification**: The Policy stipulates that the ADB will undertake project screening as early as possible to i) determine the significance of adverse impacts; ii) identify the level of assessment and institutional resources required; iii) determine disclosure requirements (para. 50).
- **Information disclosure**: In line with the ADB's Public Communications Policy, the Policy requires (para. 53) that for environment Category A projects, draft environmental impact assessments must be posted on the ADB's website 120 days before project approval. For draft environmental assessment and review frameworks, draft resettlement frameworks and/or plans and draft Indigenous Peoples planning frameworks and/or plans, the Policy only stipulates that these documents must be provided by the borrower/ client and posted on ADB's website before project appraisal, as follows: i) final or updated environmental impact assessments and/or initial environmental examinations, resettlement plans, and Indigenous Peoples plans upon receipt (by the ADB), and ii) environment, involuntary resettlement and Indigenous Peoples monitoring reports submitted by borrowers/clients during project implementation upon receipt (by the ADB).
- **Consultation and participation**: The general provisions on consultation and participation are mostly phrased as aspirations. The Policy states that the ADB "is committed to working with borrowers/ clients to put processes of meaningful consultation and participation in place." Meaningful participation is defined as: i) beginning early in the project preparation stage and being carried out on an ongoing basis throughout the project cycle; ii) providing timely disclosure of relevant and adequate information that is accessible to affected people; iii) being free of intimidation and coercion; iv) being gender inclusive and responsive; and v) enabling the incorporation of all relevant views of affected people and other stakeholders in decision-making (para. 54).
- **Due diligence and review of safeguard assessments and plans**: Due diligence refers to the ADB's process of assessing safeguard issues through field visits and desk reviews as well as through examining relevant safeguard documents (such as environmental impact assessments, resettlement plans, Indigenous Peoples' plans). Through its due diligence processes, the ADB confirms that all potential environmental and social risks are identified. If they cannot be avoided, it ensures that appropriate mitigation measures are identified (SPS, para. 56).
- **Monitoring and reporting**: The monitoring obligations are merely required to be "commensurate with the project's risks and impacts". For highly complex and sensitive projects, the ADB requires the borrower/client to engage an independent advisory panel" (SPS, para. 57).
- **Local grievance redress mechanisms**: The Policy requires the borrower/client to set up and maintain a grievance redress mechanism at project level (SPS, para. 59). This mechanism does not replace the ADB's accountability mechanism, but is intended to solve grievances at the local level. Affected people can also take complaints to the ADB's Accountability Mechanism. The Accountability Mechanism Policy merely requires complainants to demonstrate that they have sought to address their complaint with management.

2.3.2. ENVIRONMENTAL REQUIREMENTS

More precisely as environment aspects are concerned, the objective of the Policy is to "ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process" (SPS, p. 17). The main Environmental Safeguard requirements are the followings:

- **Categorization and information disclosure**: The Policy uses a categorization system to reflect the significance of a project's potential environmental impacts. "A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence" (SPS, para. 50). The following categories exist:
  - **Category A**: significant adverse environmental impacts that are irreversible, diverse or unprecedented. Category A projects requires a full-scale Environmental Impact Assessment (EIA). A draft EIA, including the Environmental Management Plan, must be made available on the ADB's website at least 120 days prior to Board approval.
  - **Category B**: less adverse environmental impacts that are site specific, few of which are irreversible, and mitigation measures that can be designed more readily than for Category A projects. Category B projects require an Initial Environmental Evaluation.
  - **Category C**: minimal or no adverse environmental impacts. Category C projects require further environmental assessment actions/documents.
  - **Category FI**: projects involving ADB funds to, or through, a financial intermediary. Category FI projects require an Environmental and Social Management System.

  Final or updated EIAs and/or initial environmental examinations must be made available upon receipt on the ADB's website.
- **Assessment process**: Environmental impacts must be determined in consultation with affected people and concerned non-government organizations (NGOs). For category A projects, the borrower/client is required to undertake an assessment of options that looks at alternatives to the project's location, design, technology and components. The options assessment will also examine the "no project" alternative. The borrower/client must present the rationale for selecting the particular project details, including a cost-benefit analysis that takes into account environmental costs and benefits of the various alternatives considered (SPS, Appendix 1, para. 4).
- **Type of impacts**: The types of impacts related to the environment include physical, biological and socioeconomic impacts. These can relate to occupational health and safety; community health and safety; vulnerable groups; gender issues; and impacts on livelihoods and physical cultural resources (SPS, Appendix 1, para. 5). For Occupational and Community Health and Safety aspects, the Policy
- **Project site/scope**: The project site covered by the environmental safeguard provisions in the Policy is defined as: "the primary project site(s) and related facilities that the borrower/client (including its contractors) develops or controls, such as power transmission corridors, pipelines, canals, tunnels, access roads, borrow pits and disposal areas, and construction camps". This definition also includes: associated facilities that are not funded as part of the project, but "whose viability and existence depends exclusively on the project"; "areas and communities potentially affected by cumulative impacts from further planned development of the project"; and predictable impacts caused by the project "that may occur later or at a different location" (SPS, Appendix 1, para. 6).
- **Transboundary impacts**: The environmental assessment process must identify potential transboundary effects, such as air pollution and increased use or contamination of international waterways. It must also identify global impacts, such as the impact of greenhouse gases and impacts on endangered species and habitats (SPS, Appendix 1, para. 7).
- **Environmental planning and management**: If environmental impacts are identified, the borrower/ client is required to prepare an environmental management plan describing how potential impacts and risks will be addressed (SPS, Appendix 1, para. 12).
- **Consultation and participation, grievance mechanism**: The consultation process and grievance mechanism process follows the same provisions as laid out in the general requirements (see above) (SPS, Appendix 1, paras. 19 and 20).

- **Reporting and monitoring**: The Policy states that "the extent of monitoring activities will be commensurate with the project's risks and impacts" (SPS, Appendix 1, para. 21). For Category A projects, the borrower/client is required to retain qualified external experts or qualified NGOs to verify its monitoring information. The minimum requirements are semi-annual reports during construction for Category B projects, and quarterly monitoring reports during construction for Category A reports. For projects with likely ongoing impacts during operation, annual monitoring is required. Monitoring reports must be posted in a location accessible to the public (SPS, Appendix 1, paras. 21 & 22).
- **Unanticipated environmental impacts**: If unanticipated impacts occur during project implementation, the borrower/client is required to update the environmental assessment and environmental management plan or prepare a new assessment and plan (SPS, Appendix 1, para. 23).
- **Biodiversity conservation and sustainable natural resource management**: This section (SPS, Appendix 1, paras. 24 – 49) contains requirements regarding the following issues: modified habitats; natural habitats; critical habitats; legally protected areas; invasive alien species; management and use of renewable resources; pollution prevention and abatement (resource conservation, energy efficiency, waste, hazardous materials, pesticide use and management, greenhouse gas emissions); health and safety (occupational health and safety and community health and safety); and physical cultural resources (SPS, Appendix 1, para. 24).

2.3.3. STRENGTHENING AND USE OF COUNTRY SAFEGUARD SYSTEM

The Policy states that the ADB is committed to strengthening and using country safeguard systems (CSS). This means that the borrowing country's legal and institutional framework would be applied in regard to the social and environmental impacts of a project instead of the ADB's safeguard policy requirements.

The approach taken by the ADB to using country safeguard systems has two key components:

- First, in order to apply the country system, the ADB must conduct an "equivalency assessment" which evaluates the country's provisions against ADB safeguard requirements. Only if the country's provisions are found to be equivalent to that of the ADB can the country system be applied.
- Second, the borrowing country must be found to have the implementation practice, track record, and the capacity and commitment to implement the applicable regulations. This provision is referred to as the "acceptability assessment".

The Policy states that "to the extent possible, the proposal for the strengthening and use of the CSS, together with its justification, is presented in the country partnership strategy or in country partnership strategy progress reports" (SPS, Appendix 6, para. 14). In addition, the Policy commits the ADB to hold in-country consultations with stakeholders, including governments and NGOs, on the equivalency and acceptability assessments. The final equivalency and acceptability assessments must be disclosed on the ADB's website upon completion (Appendix 6, para. 14).

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3. PROJECT DESCRIPTION

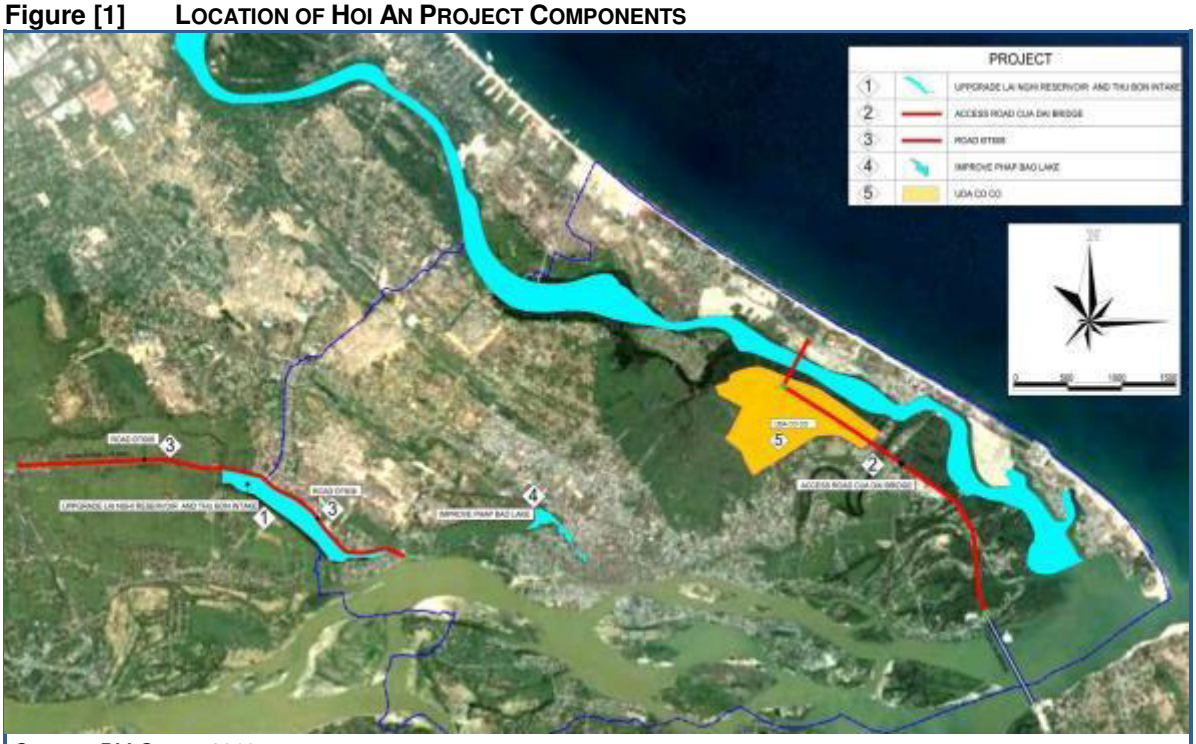
3.1. PROJECT LOCATION: HOI AN CITY

The Project is located in Hoi An city, in Quang Nam Province, a city which is home to approximately 90,000 inhabitants. The Project covers four Communes (Cam Ha, Cam Kim, Cam Thanh and Tan Hiep) and nine Wards, (Minh An, Tan An, Cam Pho, Thanh Ha, Son Phong, Cam Chau, Cua Dai, Cam An, Cam Nam).

Hoi An is recognized as a World Heritage Site by UNESCO, the Ancient Town being an exceptionally well-preserved example of a South-East Asian trading port dating from the 15th to the 19th century; this tangible heritage is a unique feature in South East Asia, amongst which the "Japanese Bridge" (16th-17th century) is the best known feature. The bridge (Chùa cầu) is a unique covered structure built by the Japanese, the only known covered bridge with a Buddhist pagoda.

The city economy is largely centered on tourism, which represents a high percentage of its overall GDP (17% from tourism per se and 65% from the tertiary sector as a whole). Its geographic location near to Da Nang favors international transport and the increased amount of local tourist attractions, notably the old city help promoting this development. Hoi An consequently has a large and growing tourist infrastructure which needs to be rapidly supported by improved urban environmental management and protected from the impacts of flooding and saline intrusion, both of which are likely to be exacerbated by climate change.

Figure [1] LOCATION OF HOI AN PROJECT COMPONENTS



Source : PM Group, 2013

3.2. PROJECT PLANNING

Hoi An wishes to become an eco-friendly city and to promote the country's Green Growth Strategy (PM Decision No. 1393/QD-TTg of 25/09/12), which seeks to ensure that cities are developed to at least an "average" level in the Asian Green City Index. This will require attention to 8 criteria, namely: Energy & CO_2 emission; Transport; Water; Air Quality; Land Use & Buildings; Waste;

Sanitation; and Environmental Governance. This approach is also a follow-up to the Quang Nam Green Growth Investment Forum which was held in Hoi An in June 2013 as included in the Hoi An Eco City Plan and in its associated masterplan/sector plans (see Section 4.11.2)

The Urban Environment and Climate Change Adaptation Project, covering improved urban environment and climate change adaptation for Hoi An City, consists of two sub-outputs:

- Climate proofed urban development (Hoi An Climate Change Adaptation Component)
- Improved water supply management and resilience for Hoi An.

The activities related to these components are described below.

3.3. PROVINCIAL ROAD 608 RAISING

The main objective of road 608 raising is to create a flood evacuation route on the south-west side of Hoi An town, as opposed to the Cua Dai new Road and bridge on the North-East side. The raising of Road 608 may give some local protection for people along and nearby the combined road/dyke, depending on the design level. However, there will be no effect on the water levels in Hoi An city itself as the road/dyke mainly protects the land north of the road.

At first instance the design plan was to raise and to widen Road 608. However, this option will create major resettlement issues. For that reason, the choice was made of only raising the road, not to widen it. The design level of the road depends on the selected design flood/design frequency for which Road 608 still must be functioning. In paragraphs 4.3.7 and 4.3.8 flood levels are given for the various frequencies/probabilities. If Quang Nam government, for instance, would decide to construct a flood-free road for the once per 5 year design flood/water level, the road level should be 2.85 m plus a reserve of say 0.5 m. In case of a selected design flood of viz. 1:10 years it would be 3.20 m plus reserve height of 0.5 m.

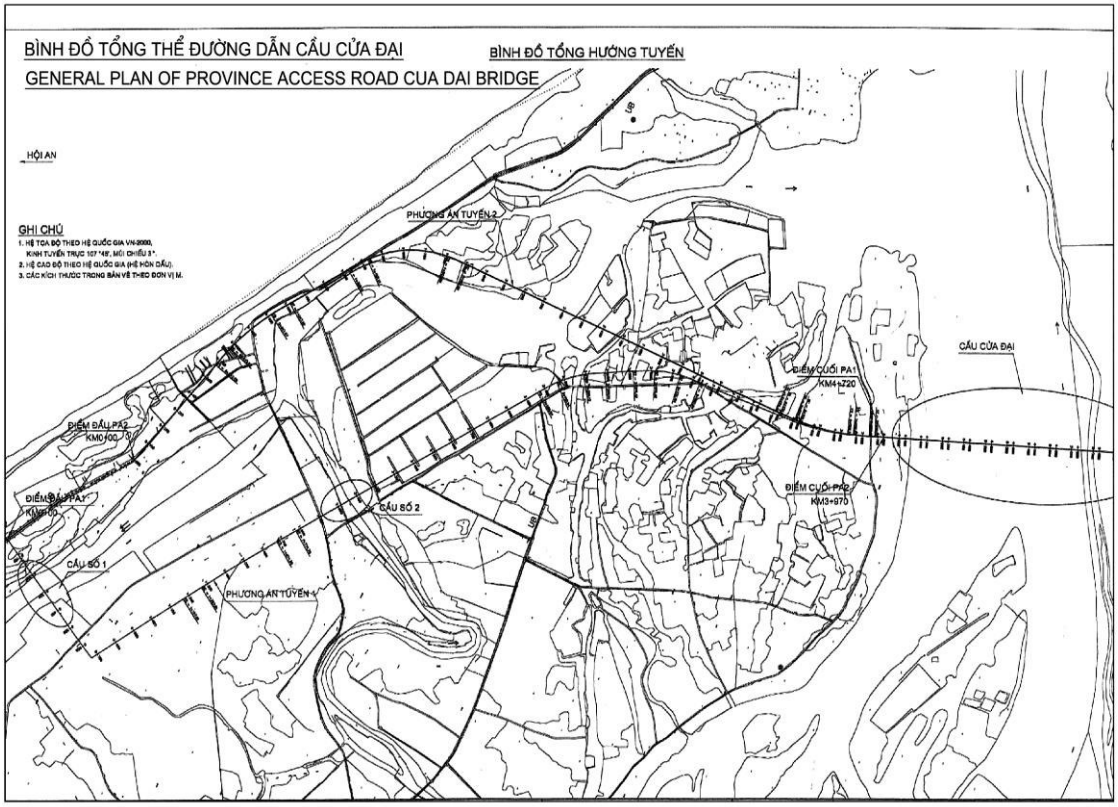
3.4. CUA DAI ROAD

Location: Starting point (Km0+00) is teh junction with Lac Long Quan street. The road crosses De Vong river at Km0+317, crossing with the planned road of Hoi An city, then turn with angle of 90° and goes to the southern and makes intersection with Cua Dai street (PR.608), then crosses CoCo river and goes along Pam until Cua Dai bridge. The total length of the road is 4.86 km.

Existing ground for the road is mainly agriculture areas and shrimp ponds with very low elevation. It will need large volume of earth works. The Cua Dai bridge is under construction. The southern approach road to Cua Dai bridge going to Tam Ky is planned with total width of 138 m, including 4 carriageway lanes of (4x3.5)m, shoulder of (2x2.5) m, median of 2.5 m, safety strips of (2x0.75) m, sidewalk of (2x7.5) m, and green tree belts of (2x50) m.

The Access Road to CuaDai Bridge includes two bridges, the DeVong and CoCo Bridges. The structure is reinforced concrete and pre-stressed reinforce concrete using the design standard of 22TCN272-05 with design load of HL-93. Cross-section of these bridges: Total width of 25m, including 04 carriageway lanes of (4x3.5) m, sidewalk of (2x3.0) m, median lane of 1.5 m, safety strips (4x0.75) m, handrail of (2x0.25) m.

Figure [2] ACCESS ROAD TO CUA DAI BRIDGE



Source : PM Group, 2013

3.5. CO CO NEW URBAN DEVELOPMENT

The proposed location for Co Co UDA is potentially a prime location at the junction of new major roads between the coastal tourism strip and Hoi An city as well as on the Co Co river with water transport opportunities (rounded by rivers of Thu Bon, Co Co and Do). Given the Master Plan (MP) projections, it is suggested that the area is promoted as a new urban development area (UDA) which takes pressure off Hoi An and can be developed as an out of town hub with large commercial/retail plots.

Based on the City Master Plan approved in 2005, the Co Co UDA should ideally support Hoi An's wish to become an eco-friendly city and would also promote the country's Green Growth Strategy. At the interference range of development belts and green belts of Hoi An, the Co Co UDA will create:

- Green belts of Hoi An City are consolidated by a large green buffer area along Co Co River side with Nipa palms to be planted on the river bank, serving soft embankment and a number of urban green areas/ parks;
- Co Co River and Do River will make a cycle waterway for flood/ urban drainage storage and water transportation purposes; Waterways will also be linked to other circulation systems, for both vehicles and pedestrians/cycles to enable the creation of linked networks between buildings;
- The planning option respects the existing villages, only renovated, mixed seeded homes in the possible places and minimize the resettlement needs;
- It will provide more accommodation for tourists and for residents, with new commercial centers;

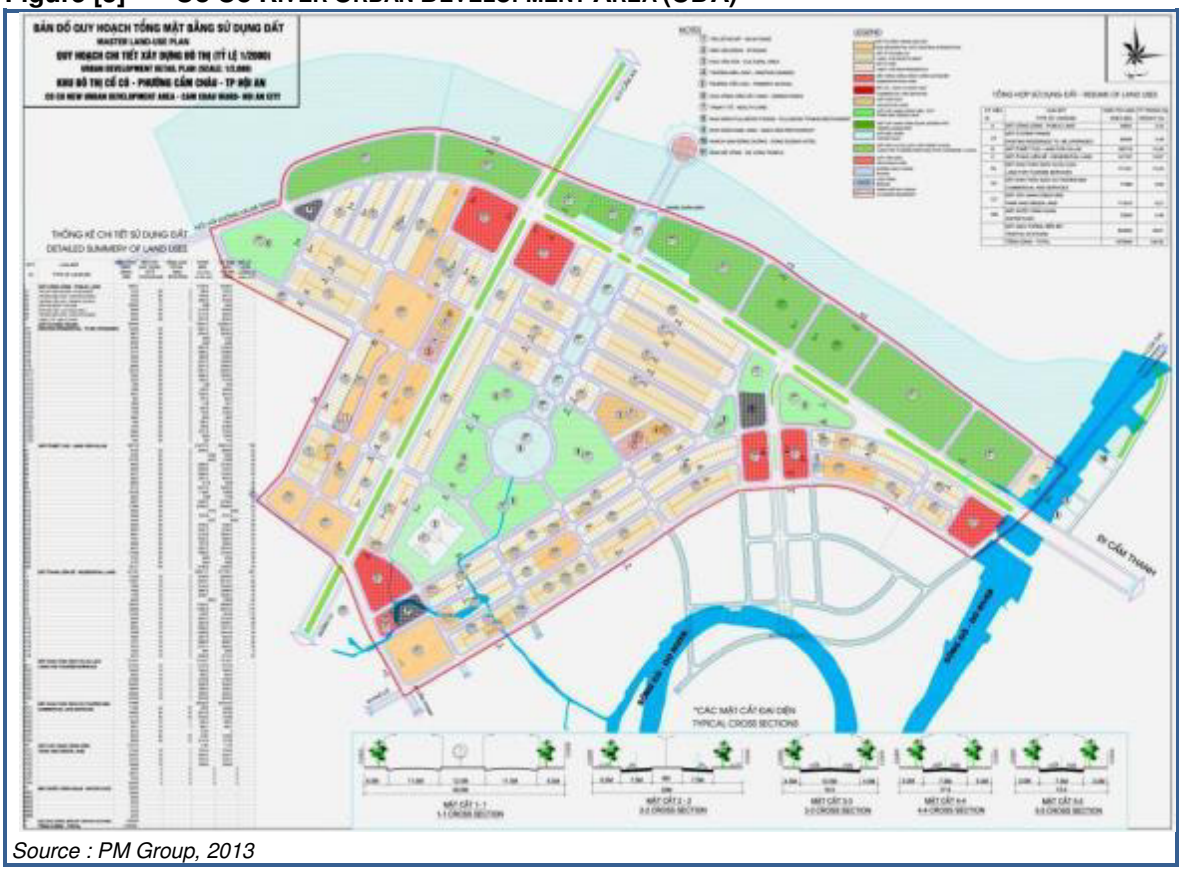
- It will be well connected at the regional level thanks to the proposed Cua Dai road, another sub-component of the project.
- Target population is 8,910 persons. Total planning area is138 ha (average 132 m²/person), in which 46.7 ha are used for residential purposes (average 52.4 m2/person).

Proposed land use and general layout of Co Co UDA are presented in following table and figure.

Table [2] SUMMARY OF CO CO UDA LAND USES

LEGEND	TYPE OF LAND USES	AREA (M2)	RATIO (%)
A	Public uses	43,084	3,12
CT	Existing residential to be improved	60,454	4,38
B	Villas	235,471	17,07
C	New residential	163,596	11,86
DL	Land for exploration of tourist services	171,341	12,42
DV	Land for exploration of commercial	87,858	6,37
CV	Green parks	113,313	8,21
MN	Landscape and waterface	33,945	2,46
	Roads and parking spaces	470,497	34,10
	TOTAL	**1,379,559**	**100,00**

Figure [3] CO CO RIVER URBAN DEVELOPMENT AREA (UDA)



Source : PM Group, 2013

3.6. LAI NGHI RESERVOIR IMPROVEMENT AND INTAKE

The activities to be accomplished under this component consist of

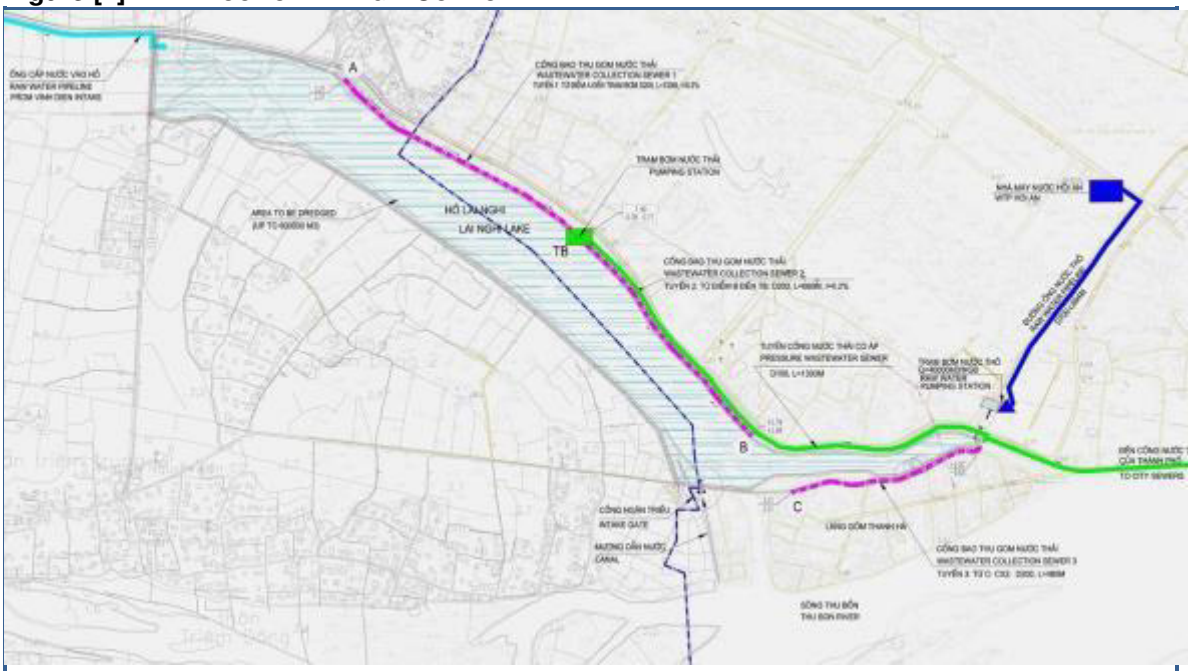
- Dredging of Lai Nghi reservoir;
- Reinforcement of the existing embankments and development of pathways around the reservoir;
- Replacement of the existing manually operated sluice gate with a motorized gate;
- Installation of a new raw water pumping station and associated pipeline connecting the reservoir to the new WTP;
- Installation of a wastewater collection system around Lai Nghi reservoir.

An overall usable volume of 1.2 million m^3 has been defined for the reservoir, requiring approximately 530,000 m^3 of dredging to a depth of -3m (representing an average depth removal depth of 1.4 m, with a maximum of 2.4 m in the north-west corner). As indicated in the cross sections this will be located primarily in the north west region of the lake and towards the entrance to the narrow section leading to the existing irrigation pumping station. Overview of this component is presented in the figure below.

One area located next to the reservoir has been identified as a potential site for disposal of this dredged material. However, this area being presently cultivated, other disposal options are under consideration, particularly the use of the sediment as fill for the other projects (notably the CoCo UDA project, the Cua Dai road) will require large amounts of fill. Tests undertaken on the Lai Nghi sediment show that this sediment is generally suitable for this purpose, although this will require further detailed testing during implementation.

In the basic design dated August 2013, the proposed inlet structure consists of a motorised sluice gate (with an opening from the bottom) of 2.4 m width and 3.0 m height. As there is a possibility that the salinity wedge could extend as far as the Lai Nghi inlet, it would be preferable to allow the opening to occur from the river surface only by using a submergible “taintor” radial gate, considering that the salinity survey carried out in the framework of this PPTA in July 2013 shows a decreasing gradient of salinity from bottom to surface.

Figure [4] LAYOUT OF LAI NGHI COMPONENT



Source : PM Group, 2013

A new raw water pumping facility will be installed near the existing irrigation pumping station on Lai Nghi reservoir communicating directly with the new water treatment plant. The pipeline will be able to transfer flows for the long term; pumping facilities able to provide 15,000 m^3/day will be provided in the short term.

Existing data show that the overall water quality of Lai Nghi reservoir is good. However, during focus group discussions problems of water quality in the lake were highlighted, likely to be due to the direct discharge of wastewater from nearby residents to the lake. To reduce these impacts a small wastewater collection system is proposed. This system will collect effluent from approximately 120 to 150 households and connect to the existing wastewater network constructed as part of the on-going French financed wastewater project.

3.7. PHAP BAO LAKE IMPROVEMENT

A major investment related to stormwater of the old city area, is the Phap Bao detention basin. This project relates not only to the detention basin itself, but to the upstream sewerage. The Phap Bao is subdivided into 2 pools which present respective estimated capacities of 5,000 m3 (7,000 m², 0.7 m depth for pool 1) and 36,800 m3 (5.26 ha area, 2.2 m depth for pool 2). Improvement of stormwater storage will require a deepening of the reservoir through the dredging of about 50,000 m3 sediment.

Figure [5] LAYOUT OF PHAP BAO DETENTION POND

Source : PM Group, 2013

3.8. ASSOCIATED FACILITIES (LINKED PROJECTS)

In accordance with ADB ESP, two on-going projects must be considered as associated facilities to the present project:

- The Cua Dai bridge over the Thu Bon river, without which the construction of the Cua Dai road would not be justified;

- The wastewater treatment plant without which the proposed sewerage of about 150 households along the Lai Nghi reservoir should not be recommended for environmental considerations (risk of pollution).

In compliance with ADB ESP, an environmental due diligence was carried out by the Consultant for each project in order to ensure environmental and social issues have been addressed in the EIA documentation and major impacts well mitigated. The results of these due diligences are summarized in the following sections.

3.8.1. CUA DAI BRIDGE

The Cua Dai bridge is developed with the assistance of the JICA, which also financed the technical studies as well as the EIA which satisfies international requirements. The EIA was approved in 2010 by MONRE under Decision No. 1951/QD.BTNMT Land acquisition was completed in 2011 in compliance with the applicable law in Vietnam and prior to the start of the construction. Today, the bridge is under construction and should be completed in 2015. The Cua Dai road component of the present project is thus fully complementary to the bridge program to provide this new and major link between both sides of the Thu Bon River.

CUA DAI BRIDGE OVER THE THU BON RIVER UNDER CONSTRUCTION

CLOSER VIEW OF A PILE

3.8.2. NEW WASTEWATER TREATMENT PLANT

The Wastewater Treatment Plant (WWTP) is a component of the Solid Waste and Wastewater Treatment and Environmental Protection for Hoi An City. The project is developed in the framework of a French Assistance Project, a 12 million € value loan. A separate wastewater system is now being constructed for built-up areas of the city (including the ancient quarters). The system consists of 42 km of small diameter sewer ranging in size from 110 - 500mm diameter, PVC, 0.7- 3.4m buried depth pipes, 21 lift pumping stations, 4 raising pumping stations and a 6,750m^3/day Activated Sludge WWTP.

Whereas the network has been largely completed (although it is understood there has not been sufficient funds to provide for improved house connections), due to changes in the master plan, the original location of the WWTP was no longer available and the location has been moved to near the resort area in Cam Thanh ward. The treatment plant is currently being implemented with a tentative completion date estimated as 2015 and consists of primary sedimentation, surface aeration activated sludge reactor, secondary sedimentation, sludge thickener and sludge drying bed.

Figure [6] LOCATION OF THE FUTURE HOI AN WWTP

Source : PM Group, 2013

A dedicated EIA for the WWTP in this new location was carried out by the Center of Environmental Monitoring and Analysis of Quang Nam Province. EIA was completed in July 2011 and approved by MONRE on September 23rd 2011 (Decision No. 1805/QD-BTNMT).

The EIA satisfies most of the requirement of ADB ESP, within the limits of the Vietnamese EIA obligations. A comparative analysis between both requirements shows that only minor aspects of the ADB ESP are not satisfied, mainly the fact that initial screening process is not formally required under Vietnamese law and that the EMP does not anticipate to disclose monitoring reports to affected communities.

The project does not involve impacts on areas of critical habitats, located at 10 km from the boundary of the Cu Lao Cham Biosphere Reserve. Treated effluent will be discharged in the Coco River, which is not usable for domestic water supply (brackish water).

Analysis of the sanitation sector shows that:

- only part of the wastewater produced in Hoi An will be collected by the network developed under the French loan, by the Japanese assistance and under the present project;
- the WWTP will satisfy the demand only for a limited period of time. As recommended by the present Project, an extension of the WWTP capacity should be immediately considered.

3.9. IMPLEMENTATION SCHEDULE

The schedule for project implementation is provided below.

Table [3] PROJECT IMPLEMENTATION SCHEDULE

	Activities	2013			2014				2015				2016				2017				2018				2019				2020			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Design & Monitoring Framework																																
Hoi An Water Resources/Supply Component																																
	Detailed Design & Engineering																															
	Acquire Land and implement resettlement																															
	Procure Works & Goods																															
	Construct & Commission Facilities																															
Hoi An Urban Area Development																																
	Detailed Design & Engineering																															
	Acquire Land and implement resettlement																															
	Procure Works & Goods																															
	Construct & Commission Facilities																															
Flood & Coastal Management																																
	Detailed Design & Engineering																															
	Acquire Land and implement resettlement																															
	Procure Works & Goods																															
	Construct & Commission Facilities																															
Management Activities																																
	Develop Contract Packages & Procurement Plan																															
	Consultant Selection Procedures																															
	EMP Activities																															
	Communication Strategy Activities																															
	GAP Activities																															
	Annual/Mid Term Review																															
	Project Completion Report																															

Source : PPTA Consultant

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4. BASELINE SITUATION

4.1. TOPOGRAPHY, GEOLOGY AND HYDROGEOLOGY

Hoi An city is located on late Pleistocene marine formations combined to more recent sedimentary deposits from the Thu Bon river. The whole area is flat, with a smooth slope of 0.015% towards the coastline oriented from northwest to southeast.

Most of the area presents low elevations. The most elevated areas are those concerned by the sand dune system: the areas along Road 607 with a part of Cam Ha ward from Dien Duong to the city's cemetery show an elevation ranging from 6.0 to 7.8 m. The average elevation drops to 4.5 m in Thanh Ha ward, 5.3 m in Cam Ha, 5.0 m in Cam An.

Lower areas are located in Cam Nam ward (1.80 m), along the river bank in Cam Chau ward (1.70 m), in Cam Pho ward (area from Tran Phu Road to Bach Dang Road, 1.50 m). The rice field areas in Cam Chau have an average elevation of about 0.5 m.

Wetland areas are distributed around the estuary and are mainly covered by Nipa palms. Main areas are located to the east of Hoi An township (in Cam Chau, Cam An, and Cam Thanh). They are also observed in stretches along the coast, south of the Thu Bon River that runs past Trung Phuong (Duy Xuyen district).

Soils are predominantly sandy to sandy clay loam with acceptable geotechnical characteristics regarding building construction. According to the Vietnamese Institute of Geophysics, the seismic classification of the area is grade 5 (medium risk).

The Quang Nam-Da Nang (QNDN) Company explored underground water resources in the Hoi An region. Superficial aquifer along the estuary and the coastline is brackish. However, deeper aquifer veins are observed along the Da Nang road with fresh water at depths over 10 m.

At about 16 km from the coastline and 19 km from Hoi An township, the Cham Islands (Vietnamese: Cù lao Chàm) constitute a group of 8 small islands belonging to Quảng Nam Province and which form a part of the Cu Lao Cham Marine Park, a world Biosphere Reserve recognized by UNESCO. The largest island is Hon Lao, with an area 1,317 hectares and characterized by two peaks reaching respectively 517 m and 326 m.

4.1.1. GEOLOGICAL HAZARDS

Vietnam consists of the following main tectonic units:

- The part of the territory from the Red River fault to the North of Vietnam belongs to the South Chinese active platform.
- From the Red River to Tra Bong fault is the North Vietnam folded system.
- From the Tra Bong fault to the Hau River fault belongs to the Indocini massif.
- Beside that, from the late Mesozoic division up to now the above mentioned regions are strongly reformed and divided into the Cenozoic basins: Hanoi basin in the North and Cuu Long basin in the South.

Vietnam has been classified as a low seismic region. In particular, Quang Nam Province can have low impact (or less) earthquake (on average one every 50 years), with strengths at <5 on the Richter Scale.

Results of the analysis of field survey data and historic literature documents in Vietnam reveal that there is evidence of past tsunami occurring along Vietnamese coast. The analysis on the seismic activities and structure of tectonic plates in the South China Sea (SCS) reveals that there are four areas in the sea with possibilities of having earthquakes which can then generate tsunamis. Based on the computed results by validated models, it was found that significant tsunami at Vietnamese coast could be generated by an earthquake with magnitude of larger than 7 at the fault along Central Vietnam shelf, and by an earthquake with magnitude of larger than 8 at the Manila Trench. If an earthquake with the magnitude of 7.5 happens at south Hainan Island, the maximum height of tsunami at Vietnamese coast can be more than 1.5m. The coast with the maximum tsunami height of more than 1m stretches about 1000km, from Quang Binh to Binh Thuan.

These events however can be considered to be extremely rare and of a lesser importance than risks related to tropical storms and typhoons (see sections below).

4.2. CLIMATE

4.2.1. GENERAL CLIMATIC CONDITIONS

Located in the tropical monsoon region of southern Vietnam, Hoi An shows high temperature year round and seasonal rainfall with the peak in October. Average monthly values of key climatic parameters are provided in the table below. Prevailing wind blows from the east in summer and from north and northwest in winter. Average wind speed is 3.3 m/s.

Table [4] MAIN CLIMATIC PARAMETERS

	JAN	FEB	MAR	APRIL	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	AVE/ TOTAL
Temp. Average °C	21.5	22.4	24.1	26.4	28.2	29.3	29.2	28.8	27.3	25.9	24.1	22.2	25.8
Rainfall Avge mm	80.8	30.5	24.1	39.8	83.4	81.1	64.9	128.4	340.8	611.2	489.1	232.4	2210
Humidity %	84	84	84	83	80	77	76	78	83	85	85	86	82
ETP mm	74	81	109	123	146	144	152	143	111	99	81	68	1331

Source : Hydrometeorological Data Center-MONRE

4.2.2. TYPHOONS & STORMS

Occurrence of typhoons and of subsequent floods is observed every year in Hoi An. From 1979 to 2010, 65 typhoons and 22 tropical depressions hit Quang Nam, or an annual average of 2 typhoons and 0.7 tropical depressions. September and November are the two months showing the highest occurrence of these events with 84% of the total storm recorded. During these events, maximum daily rainfall may reach 667 mm (Nov 3, 1999), with maximum wind speed of above 40 m/s.

Table [5] STORMS AND FLOODS IN QUANG NAM PROVINCE FROM 1979 TO 2010

YEAR	NO OF STORM	NO OF TROPICAL DEPRESSION	YEAR	NO OF STORM	NO OF TROPICAL DEPRESSION
1979	1	1	1996	2	1
1980	2	0	1997	1	0
1981	2	1	1998	5	3
1982	1	1	1999	2	1
1983	3	0	2000	2	1
1984	3	1	2001	2	1
1985	3	0	2002	0	0
1986	2	0	2003	4	0
1987	2	1	2004	2	1
1988	1	1	2005	6	2

YEAR	NO OF STORM	NO OF TROPICAL DEPRESSION	YEAR	NO OF STORM	NO OF TROPICAL DEPRESSION
1989	2	0	2006	4	1
1990	3	1	2007	4	0
1991	1	1	2008	0	2
1992	0	0	2009	2	0
1993	2	1	2010	0	0
1994	0	0	Total	65.0	22.0
1995	1	0	Mean	2.0	0.7

Consequently to these climatic events, Hoi An is facing recurrent flooding, with a total of 100 flood events or an average of 3.1 floods/year for the same period 1979-2010. This is discussed further below in this report.

The following pictures have been taken by the PPTA in Hoi An on 15 October 2013 after typhoon Nari hit the Da Nang-Hoi An area during the night.

4.3. HYDROLOGY

4.3.1. RIVER SYSTEM IN HOI AN REGION

The Vu Gia-Thu Bon watershed is one of 9 largest river basins of Viet Nam. The catchment area is 10,350 km^2 of which 5,800 km^2 consist in the Vu Gia river basin at Ai Nghia hydrological station and 3,510 km^2 which correspond to the Thu Bon river basin at Giao Thuy hydrological station, the remaining area of 1,140 km^2 corresponding to the Thu Bon river delta.

Both rivers originate from the Ngoc Linh Mountain (2,598 m) of the Truong Son range (Kon Tum Province and drain part of Quang Ngai Province and almost the totality of Quang Nam Province., The Thu Bon River reaches the South China Sea through the Dai River mouth while the Vu Gia River flows towards the Han River of Da Nang city.

The Co Co River originates from Thuan Chau and flows from north to West of Thien Thai Mountains and joins the Cam Le River. Co Co River length is 29 km.

PICTURES OF HOI AN AFTER TYPHOON NARI (15 OCTOBER 2013)

A MAJOR IMPACT RELATES TO THE FALL OF ROAD TREES

TOGETHER WITH TELEPHONE LINES

FLOODING OF LOW LYING AREAS IN THE CITY

OR ALONG THE MAIN ROAD LINKING THE CITY TO THE BEACH & RESORT AREA

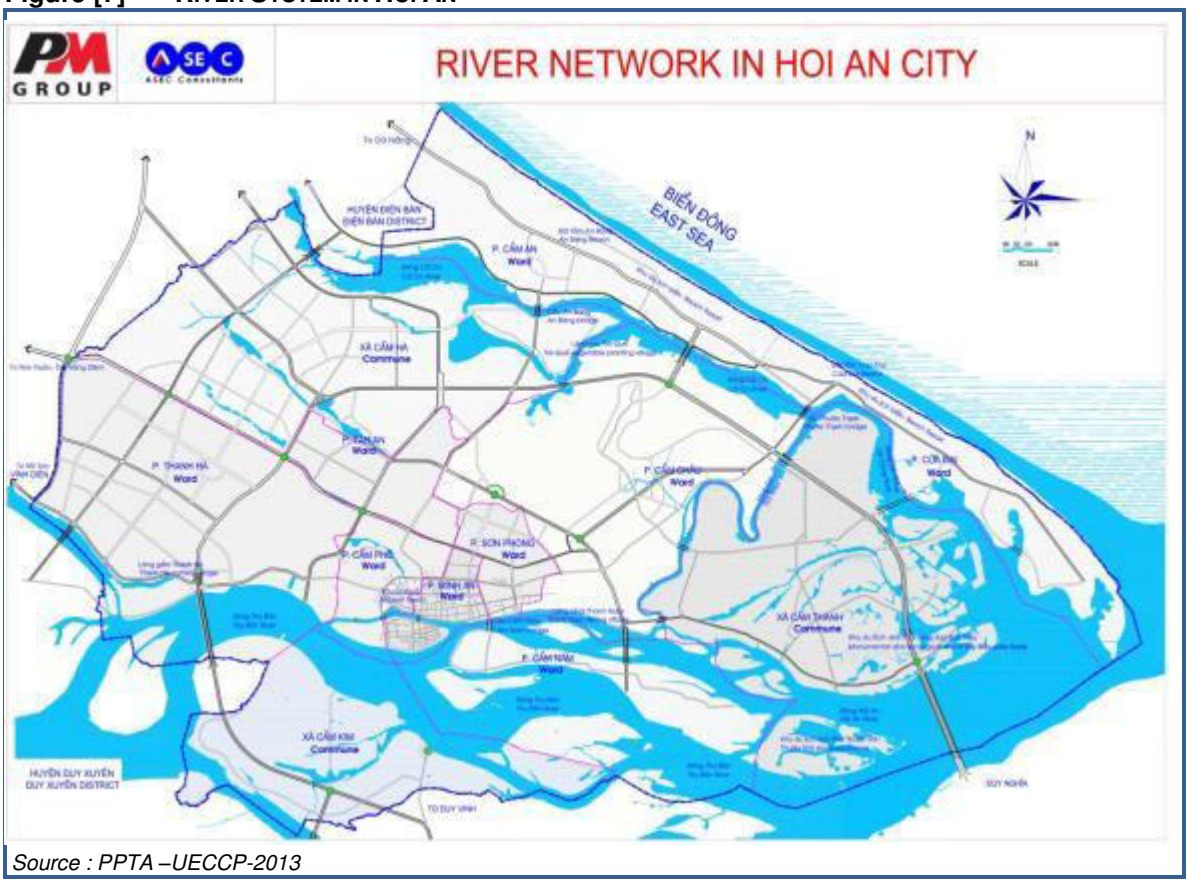
STREET FLOODING

CO CO RIVER WATER LEVEL IS ALMOST AT THE LEVEL OF THE ROAD

FLOODING OF THE THU BON SHORE (MARKET AREA)

IMMEDIATE CLEANING OF THE STREETS USING THE MUNICIPAL SOLID WASTE TRUCKS

Figure [7] RIVER SYSTEM IN HOI AN



Source : PPTA –UECCP-2013

4.3.2. FLOWS AND LEVELS

With an average annual rainfall of 2,780 mm in the watershed, the average annual flow in the Vu Gia-Thu Bon River is 568 m^3/s (specific discharge of 54.9 $l/s/km^2$), which corresponds to a mean annual flow of 17.92 BCM. This volume is unequally distributed in space and time, as 77% of the flow happens during the rainy season (from September to December). The lowest low flow was measured as 14.6 m^3/s (17-Aug-77) at Nong Son station on Thu Bon River and 8.7 m^3/s (3-Sep-10) at Thanh My station on the Vu Gia River.

Table [6] CHARACTERISTIC OF FLOWS AT SOME STATIONS ON THE VU GIA – THU BON RIVER BASIN

ELEMENT	UNIT	NONG SON FLOW STATION PERIOD (1976-2011) (	THANH MY FLOW STATION PERIOD (1976-2011)
Catchment Area	Km^2	3,150	1,850
Average annual Flow	(m^3/s)	284	129
Specific Flow	($l/s/km^2$)	90.2	69.7
Volume of Average annual Flow	(BCM)	8.96	4.07
Max Discharge	(m^3/s)	10,600	7,370
Date		11-Nov-07	29-Sep-09
Max Specific Discharge	($m^3/s/km^2$)	3.37	3.98
Max Volume of Flood for 7 days	(BCM)	3.226	1.461
Date		1÷7-Nov-99	20÷26-Oct-98
Lowest Flow	(m^3/s)	14.6	8.7
Date		17-Aug-77	3-Sep-10
Min Specific Discharge	($l/s/km^2$)	4.63	4.70

At Hoi An hydrological station, average annual water level is 1.91 m, maximum recorded of 3.28 m (12-Nov-2007) and minimum recorded of -1.19 m (23-Jun-05).

4.3.3. TIDAL EFFECTS IN THE ESTUARY

Average tide amplitude on the Thu Bon river estuary at Hoi An Station is 0.7 m and highest amplitude is 1.1 m. On the Thu Bon River, effect of the tide on the water level is observed up to Giao Thuy located 40 km from the estuary. On the Vu Gia river, effect of the tide is observed up to An Trach weir located 21.8 km upstream Han estuary.

4.4. FLOODS

The floods in the project area are generally faster than in the northern and southern deltas of Vietnam. The force of the floods coming down the mountain is great, the flood peaks are sharp and many floods occur every season again. As typhoons hit the coast of Central Vietnam regularly, and make landfall at several locations along the coast, floods happen more or less uniformly in the whole catchment, leading to the amplification of the flood currents which cause severe floods and landslides affecting human lives and production.

Whenever a large flood occurs, communities in coastal areas in central Vietnam like Hoi An, are usually flooded for 3 to 4 days. Agricultural production may be damaged, though long year plants like fruit trees and even rice will not be harmed severely due to the relative short flooding. However, with the increasing urbanization in specifically the coastal urban areas, together with the projected climate change, the potential flood damages are expected to increase rapidly.

Table [7] FLOODS IN QUANG NAM PROVINCE FROM 1979 TO 2010

YEAR	NO OF FLOOD	YEAR	NO OF FLOOD
1979	1	1996	4
1980	1	1997	3
1981	2	1998	3
1982	2	1999	2
1983	3	2000	4
1984	4	2001	4
1985	2	2002	3
1986	2	2003	4
1987	3	2004	2
1988	1	2005	6
1989	2	2006	4
1990	4	2007	9
1991	2	2008	8
1992	2	2009	5
1993	3	2010	2
1994	1	Total	100.0
1995	2	Mean	3.1

According to the table above, 100 flood events were recorded in Quang Nam from 1979 to 2010 and the frequency of these events shows an increasing trend:

- Period 1980-1989: 21 typhoons, 22 floods
- Period 1990-1999: 17 typhoons, 26 floods
- Period 2000-2009: 26 typhoons, 49 floods.

In Hoi An the most severe floods occurred in 1964 when the water level reached 3.4m above sea level, in 1998 (2.99 m asl) and in 1999 (3.21 m asl).

As presented in the following Table, damages from floods are significant:

Table [8] ANNUAL TYPHOON AND FLOOD DAMAGES IN QUANG NAM (PERIOD 2001-2010)

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Total number of typhoons	2	0	4	2	6	4	4	0	2	0
Floods affecting Quang Nam	4	3	4	2	6	4	9	8	5	2
Number of death (persons)					1				1	3
Number of injured (persons)					1	25	14		5	
Collapsed, flushed away houses (Units)					39	324	36		44	
Flooded houses (Units)	1743			5657			8235	1288	1500	
Affected schools (Units)	3			12	16					
Affected medical stations (Units)					1					
Damaged rice paddy fields (Ha)	2		20		3		4	293	135.5	
Damaged crops (sweet potato) (Ha)	53.5								10	
Irrigation damage, soil and stone (M^3)	2765	0	400	4606	250	0	0	350	20128	0
Traffic damage, soil and stone(M^3)	3280	0	126	375	938	0	0	0	759	0
Aquaculture damages (Ha)	25	0	0	70	262	223.2	0	30.002	0.0005	0
Damaged, sunk ships, boats (Units)	2	2	1	0	7	164	3	3	165	9

Source :

The hydraulic infrastructure in Hoi An city and surroundings consists of a variety of dykes, river embankments, coastal protection, artificial canals, as well as a number of reservoirs and retention areas in the upland catchment of the Vu Gia-Thu Bon basin.

The river dyke system in Hoi An city consists of 11.53 km of dykes, of which 3.0 km on the right bank of Da Vong river bank at the Cam Chau community, 0.8 km on the right bank of Co Co river at Cam Ha community, 6.53 km dykes on the left of Thu Bon river at Cam Thanh community, and 1.2 km of dykes on the right of Thu Bon River at Cam Kim community. Elevations of the dykes vary from 1.0 to 2.0 m, with a width of the dyke crest from 2.0 to 3.0 m. These dykes need to be upgraded.

The river and sea embankment system in and around Hoi An City has a total length of 10.163 km, of which 7.9 km on the right bank of Thu Bon river, 1.763 km on the left bank of Thu Bon river, and 0.5 km of sea embankments.

The dykes and embankments generally are in a reasonable state, but at many places in and around Hoi An, the dyke elevation is rather low. Moreover, many dyke sections have no specific protection or hard embankment and are therefore exposed to riverbank erosion. Where embankments exist, the quality seems to be questionable as maintenance seems to be lacking.

EMBANKMENT ALONG THE CO CO RIVER, WITH NEW DEVELOPMENT AREA

EXISTING CUA DAI BEACH EMBANKMENT

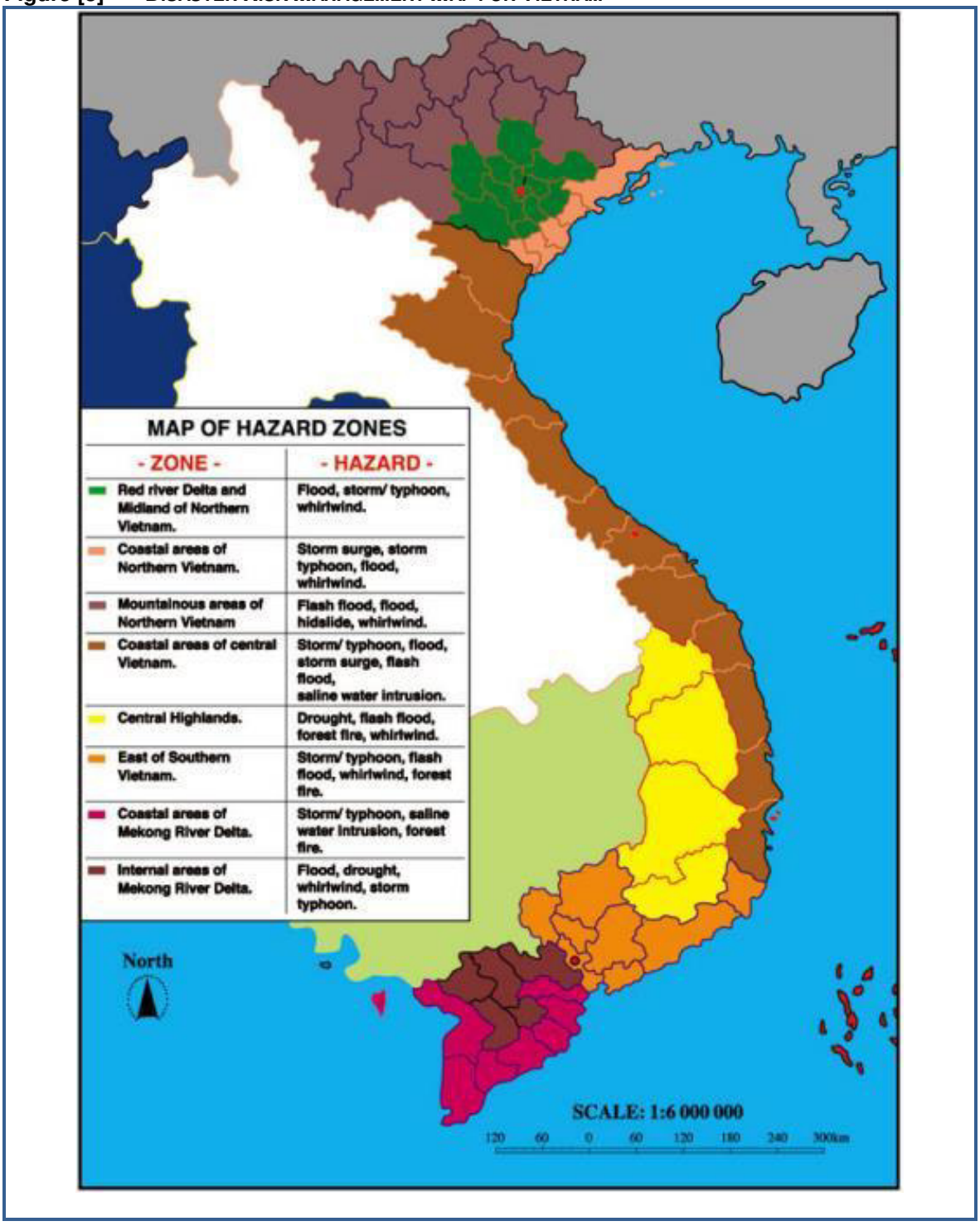
There presently are 72 reservoirs existing in Vu Gia-Thu Bon basin, of which five large scale reservoirs in operation, while two are under construction and another three are being planned. The large reservoirs are basically all operated for hydropower generation, while the medium and small size reservoirs are generally for irrigation and/or water supply purpose.

All the large reservoirs, operating, under construction, or in the planning are owned and managed by EVN (Electricity of Viet Nam) and have no primary flood management function. In addition, it has been observed that in some cases, flooding in Hoi An city is caused by flash floods from the A Vuong-Tranh River II hydropower plant, in one of the tributaries of the Vu Gia-Thu Bon rivers system (UN-Habitat Report on Climate Change Vulnerability and Adaptability Assessment for Hoi An City, 2011). Based on that assessment, one potential flood management option would be to optimize the operational regime of the complex of reservoirs in Vu Gia-Thu Bon basin to maximize flood control.

4.5. COASTAL EROSION

The coastal area of Central Vietnam is quite exposed to typhoons and other natural disasters. Apart from the rainstorms/ typhoons it has a high vulnerability for river floods, flash floods, storm surges, salinity intrusion and tsunami's.

Figure [8] DISASTER RISK MANAGEMENT MAP FOR VIETNAM



As a result, at many places along the coast, including Quang Nam province and Hoi An, severe erosion continually takes place. This specifically creates problems at or near coastal cities, coastal power plants or industrial developments, popular beaches and/or for

coastal resorts. Studies carried out by the PPTA have indicated a potential coastal erosion of 150 m in 8 years. The trend of coastal erosion affects specifically Cua Dai peninsula and the strip north of that. Presently both areas have many hotels already, but mainly Cua Dai which is rapidly developing into a high class tourist resort area. At many places along this coastal stretch heavy beach protection has already been constructed, consisting of a more or less random mix of flood walls, rip-rap protection, groyne or a combination of such elements. At some places, however, the beach is still unprotected and the coast has been receding due to heavy wave attack.

A study developed in parallel with the present PPTA has identified a number of hypotheses on causes of the recession of the Cua Dai beach, as follows:

- Loss of sand due to sand mining (legal and illegal) on the Vu Gia and Thu Bon river for civil construction in the region;
- Loss of sand due to construction of a series of reservoirs upstream of the Vu Gia – Thu Bon river system;
- Construction of resorts and protection structures on the beach;
- The natural evolution of the river mouth and its flood tidal delta and ebb tidal delta;
- Dredging of navigation channel on the estuary area of the Vu Gia – Thu Bon river system.

The regression of the coastline is depicted on the following figure and pictures.

Figure [9] EROSION OF CUA DAI BEACH FROM 2004 TO 2012

Source: PM Group, 2013

UNPROTECTED BEACH RECESSION IN CUA DAI

VANISHED BEACH AT VICTORIA RESORT

RESORT CONSTRUCTION ABANDONNED DUE TO EROSION RISK

DIRECT DAMAGES OF EROSION

4.6. CLIMATE CHANGE IN THE QUANG NAM PROVINCE

Vietnam is likely to be one of the several countries most adversely affected by climate change. During the last 50 years, Vietnam's annual average surface temperature has increased by approximately 0.5 to 0.7°C, while the sea level along the coastline has risen by approximately 20 cm. Climate change has resulted in more severe and/or frequent occurrences of natural disasters, especially cyclonic storms, floods and droughts becoming more extreme.

Recognizing potential and long term spatial impacts of climate change, Vietnam has looked forwards to developing its long term policies on climate change mitigation and adaptation and has attached much more significance to the mainstreaming of climate change responsive solutions international socio-economic development strategies, policies and plans with a view of achieving the sustainable development of the country.

Together with the World's community, Vietnam committed to combat against climate change through the ratification the UNFCCC, the approval of the National Target Program to Respond to Climate Change and more recently the preparation of the Climate Change and Sea Level Rise Scenarios for Vietnam. The last up-dating of the simulations scenarios has been presented in 2012. These scenarios which provide projections by the middle and by the end of the present century provide applicable safeguards for any project with components relevant to CC aspects. As such, these projections are used as references by the Consultant during the present PPTA to design Project's components. The main conclusions of the last scenarios simulations are summarized below.

4.6.1. BASELINE SCENARIOS FOR GHG EMISSIONS CONSIDERED

The Inter-Governmental Panel on Climate Change (IPCC) published in 2000 a series of projected greenhouse gas emissions scenarios that could be used to assess potential climate change

impacts in the world. The Special Report on Emission Scenarios, known as the 'SRES scenarios', grouped scenarios into four families of greenhouse gas emissions (A1, A2, B1, and B2) that explore alternative development pathways, covering a wide range of demographic, economic, and technological driving forces:

- A1-scenario: the story line assumes a world of very rapid economic growth, a global population that peaks mid-century and the rapid introduction of new and more efficient technologies. A1 is divided into three groups that describe alternative directions of technological change: fossil intensive (A1Fi), non-fossil energy resources (A1T), and a balance across all sources (A1B).
- B1-scenario: it describes a convergent world, with the same global population as A1, but with more rapid changes in economic structures toward a service and information economy.
- B2-scenario: describes a world with intermediate population and economic growth, emphasizing local solutions to economic, social, and environmental sustainability.
- A2-scenario: describes a very heterogeneous world with high population growth, slow economic development and slow technological change.

The climate change and sea level rise scenarios developed and published for Vietnam in 2009 were based on the low (B1), medium (B2) and high (A2, A1Fi) scenarios. The average B2 scenario was recommended for all Ministries, sectors and localities to initially assess the impact of climate change and sea level rise and to build action plans to respond to climate change. Using results of previous studies as a basis, the 2011 updated climate change and sea level rise modeling selected the following greenhouse gas emissions scenarios: B1 (low scenario), B2, A1B (middle scenario), A2 and A1Fi (high scenario).

Climate Change scenarios for temperature and rainfall were developed for seven climate zones in Vietnam in 2009 Report (North West, North East, North Delta, North Central, South Central, Central Highlands, and South), and for each Province of Vietnam in 2012 Report. The baseline reference period is 1980-1999. The information provided below refers to the 2012 report.

4.6.2. SCENARIOS FOR TEMPERATURE CHANGE

- Low emission scenario (B1): by the end of the 21st century, annual mean temperature in most of areas of the Northern Vietnam (from Thua Thien-Hue back to the North) would increase by 1.6 to 2.2°C relatively to the baseline period (1980-1999). The increase in temperature in Southern zones (from Quang Nam to the South) will range from 1.0 to 1.6°C.
- Medium emission scenarios (B2): by the middle of the 21st century, annual mean temperature in most of country, would increase by 1.2 to 1.6°C. Areas from Ha Tinh to Quang Tri, including Quang Binh would increase by 1.6 to 1.8°C. By the end of the century, annual mean temperature would increase by 1.9 to 3.1°C in most of the regions, Temperature in areas from Ha Tinh to Quang Tri, including Quang Binh are forecasted to increase by 3.1 to 3.3°C. Number of days with maximum temperature higher than 35°C would increase by about 15 to 30 days.
- High emission scenario (A2): by the end of the century, annual mean temperature in most of the regions would increase by 2.5 to more than 3.7°C. The lowest forecasted change in temperature will be in a part of Central Highland and South West zones ranging from 1.6 to 2.5°C.

4.6.3. SCENARIOS FOR RAINFALL EVOLUTION

Rainfall in dry season is expected to decrease in most regions of Vietnam, particularly in the southern region. Rainfall during the rainy season and the total annual rainfall are forecasted to increase in all zones.

- Low emission scenario (B1): By the end of the 21st century, annual rainfall would increase in most of the country by about 6% relatively to the reference period 1980-1999. In Central Highland, the increase could be lower, less than 2%.
- Medium emission scenarios (B2): By the end of the century, annual rainfall would increase by about 2 to 7% in most of the regions. In Central Highland and South Central, including Quang Nam, forecast is an increase lower than 3% (2.7% for Quang Nam). In general, the dry season rainfall would decrease and rainy season rainfall would increase. Maximum dayly rainfall would increase in the North and North Central zones (including in Quang Binh) and decrease in South Central Zones (including Quang Nam) and in the Central Highland the South zones. However, extraordinary daily rainfall may occur in various zones with rainfall about 2 times higher than present maximum daily rainfall.
- High emission scenario (A2): By the end of the century, annual rainfall would increase by about 2 to 10 % in most of the country. In Central Highland, increase would be more limited, about 1 to 4% only.

4.6.4. SCENARIOS FOR SEA RISE LEVEL EVOLUTION

- Low emission scenario (B1): By the end of 21st century, highest sea level in zones from Ca Mau to Kien Giang will rise by about 54 to 72 cm. Lowest sea level rise is forecasted in areas from Mong Cai to Hon Dau by about 42-57 cm. In average sea level rise in most of coastal zones of Vietnam is anticipated to be about 49 to 64 cm.
- Medium emission scenarios (B2): By the end of the century, highest sea level rise will occur in the area from Ca Mau to Kien Giang, and would be about 62 to 82 cm. The lowest sea level rise is anticipated in the area from Mong Cai to Hon Dau, with 49 to 74 cm. In average for the coastal areas of Vietnam, sea level rise would be about 57 to 73 cm. In Quang Binh, the rise is forecasted to be 60 to 71 cm and in Quang Nam 61 to 74 cm.
- If the sea level rises by 100 cm, it is anticipated that about 39% of Cuu Long Delta, more than 10% of Hong river Delta & Quang Ninh, more than 2.5 % of Central Costal Provinces, and more than 20% of Ho Chi Minh City will be flooded. Approximately 35 % of the population of Cuu Long Delta Provinces, more than 9% of the population of Hong river Delta & Quang Ninh, about 9 % of the population of Central Costal Provinces and 7% of the population of Ho Chi Minh City will be directly affected. More than 4% of the railway network, more than 9% of the national road network and about 12% of the provincial road network will be affected.

4.6.5. EVOLUTION OF VIETNAM CC SCENARIOS

Climate change scenarios were initially prepared for Vietnam in 2009. The technical studies of the Project components already carried out for Hoi An integrate the CC previsions from these 2009 scenarios. However, significant changes have been considered by the Government of Vietnam when updating the information in 2012. The following table presents the 2009 and 2012 CC forecasts for Quang Nam Province and for two target periods, mid-century and the end of the century (2050 and 2099). All values are anticipated changes compared to the reference period 1980-1999.

Table [9] CHANGES IN CC SCENARIOS BETWEEN 2009 AND 2012

PROVINCE	QUANG NAM (HOI AN)			
TARGET PERIOD	2050		2099	
SCENARIOS	2009	2012	2009	2012
Temperatures Increase (°c)	+0.9	+1.4	+1.9	+2.7
Changes in annual Rainfall (mm)	+1.7	+1.9	+3.2	+3.6
Sea Level Rise (cm)	+30	+24-26	+75	+61-74

Source: Ministry of Natural Resources and Environment

By Comparison to the 2009 scenarios, the 2012 scenarios were formulated based on more accurate data and observations made in 2010 as well as more efficient statistical tools targeted only for Vietnam. Results are also more detailed, going up to the Provincial level and specific to coastal regions. The new scenarios are expected to help the Ministries and Agencies to work out plan of response, better adaptation and reduction of potential damages from climate change.

4.7. AIR QUALITY

Air quality was measured in December 2012 in 11 stations distributed in Hoi An city and representative of a variety of economic activities.

The results indicated levels of noise, dust (Total Suspended Particulates), lead, CO_2 NO_X, and SO_2 compliant with permitted standard as per QCVN 05:2009/BTNMT. Concentration of hydrocarbon in 8 stations exceeded permitted standard of QCVN 06:2009/BTNMT. This concerns particularly locations affected by transportation activities as Nhi Trung-Tran Hung Dao & Hoang Dieu-Phan Boi Chau cross road and the station located next to the solid waste treatment at Cam Ha landfill.

According to data from the "Status of the Environment 2006-2010 of Quang Nam" (DONRE, 2005-2009), the results of air quality measurements in 9 stations of Quang Nam Province, were mostly compliant with permitted standards, with some exceptions related to noise resulting from road traffic activities.

Figure [10] MAP OF AIR QUALITY SAMPLING SITES IN HOI AN

Source : From EIA, Dec 2012, PCO

Table [10] AIR QUALITY IN HOI AN CITY - DECEMBER 2012

NO	PARAMETER	UNIT	LOCATION											QCVN 05: 2009/BTN MT
			BAI LANG-CU LAO CHAM/CHAM ISLAND	KIM BONG-CAM KIM COMMUNE	LANDFILL IN CAM HA COMMUNE	FINE ART CULTURAL CENTRE	TRA QUE VILLAGE-CAM HA COMMUNE	CHUA CAU/ CAU BRIDGE-MINH AN WARD HOI AN	HOANG DIEU-PHAN BOI CHAU-CROSS ROAD	CUA DAI T-JUNCTION	CAM THANH CPC	NHI TRUNG-TRAN HUNG DAO CROSS ROAD	WASTE WATER TREATMENT PLANT OF HOI AN CITY	
			K1	K2	K3	K4	K5	K6	K7	K8	K9	K10	K11	
1	Temperature	0 C	30.6	29.5	30.5	31.0	28.5	29.6	29.5	27.5	31.2	30.2	30.7	-
2	Humidity	%	67.0	78.0	62.0	60.0	70.8	78.5	76.0	71.3	65.0	62.3	72.0	-
3	Wind speed	m/s	0-1	2-3	0-1	1-3	1-3	1-3	1-3	0-1	1-3	1-3	1-3	-
4	Noise	dBA	52-58	65-75	58-66	54-62	53-56	50-60	68-75	57-65	53-65	66-79	53-57	75
5	TSP	mg/m^3	<0.04	0.17	0.26	0.20	<0.04	0.19	0.11	0.16	0.08	0.12	<0.04	0.30
6	CO	mg/m^3	<1	1	1	3	<1	2	2	1	1	2	1	30
7	NO_X	mg/m^3	<0.002	0.026	0.042	0.048	<0.002	0.038	0.034	0.026	0.021	0.035	0.021	0.20
8	**SO_2**	mg/m^3	<0.007	0.021	0.034	0.037	<0.007	0.029	0.022	0.014	<0.07	0.021	0.018	0.35
9	Pb	mg/m^3	<0.0005	<0.0005	<0.0005	0.0011	<0.0005	0.0008	0.0006	<0.0005	<0.0005	0.0007	<0.0005	0.0015
10	Hydrocarbons (Ave 1 hour)	mg/m^3	5.10	4.58	20.50	28.37	1.06	6.52	15.01	8.57	15.51	89.21	1.96	5.0

Source: Analysis of groundwater quality in December 2012 – DEEC-PCO

4.8. UNDERGROUND WATER QUALITY

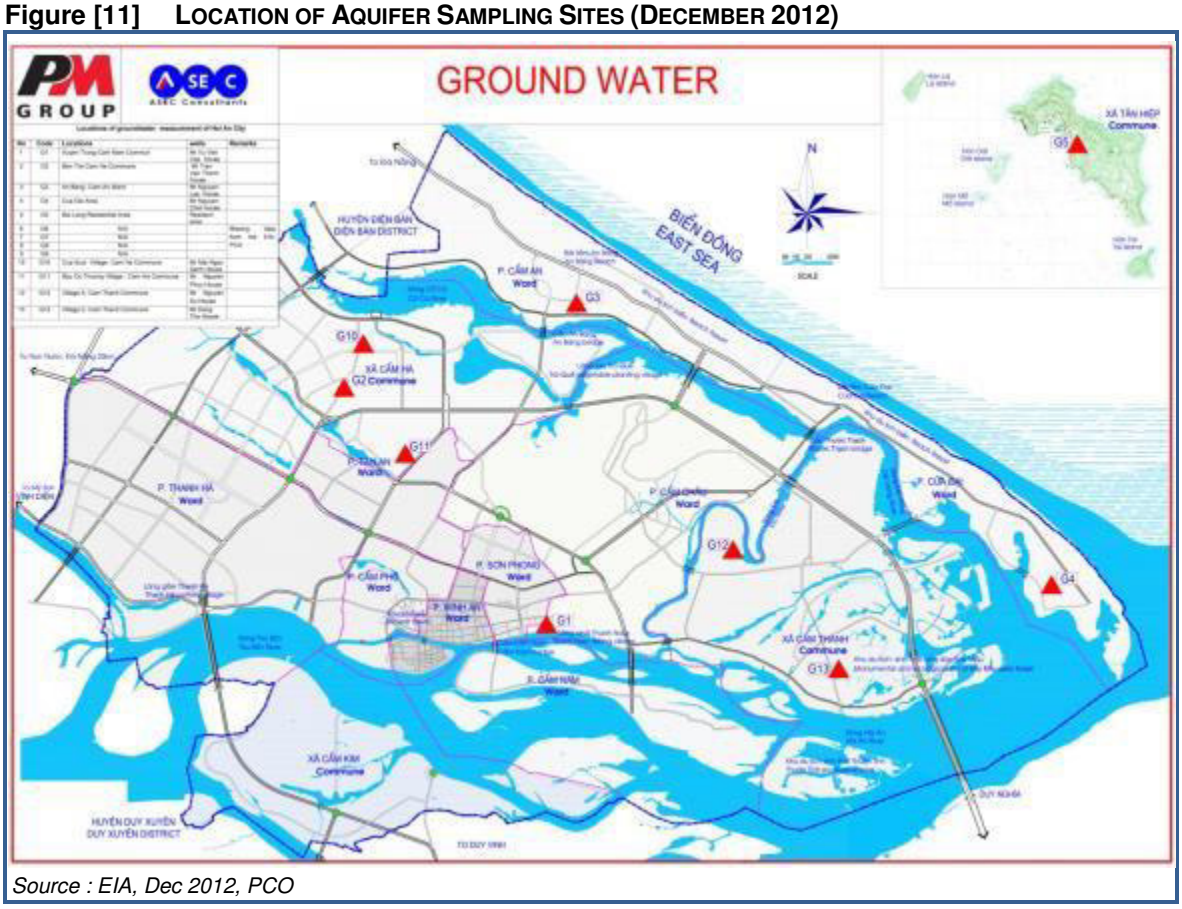
Assessment of the groundwater quality of Hoi An City is based

- on the results of water quality sampling and analysis carried out in December 2012 in 13 stations distributed among communes and wards of Hoi An City by Pacific Ocean Engineering Join Stock Company (PCO);
- on the results of groundwater quality surveys carried out by DONRE over the period 2006-2010[1].

Level of water quality refers to Standard QCVN 09:2008/BTNMT (National Technical Regulation on Groundwater).

Results of water quality surveys from 2005-2009 and from December 2012, presented in the following table, show that most of the measured parameters are compliant with the permissible levels, except for coliforms and ammonia in some samples from dense residential areas (Cua Dai, An Bang) which exceed the permitted value by only 1.2-1.3 times.

Figure [11] LOCATION OF AQUIFER SAMPLING SITES (DECEMBER 2012)



Source : EIA, Dec 2012, PCO

[1] Reports on the Status of the Environment 2006 to 2010 of Quang Nam, DONRE.

Parameter	Unit	Location									QCVN 09 :2008 Permissible Levels
		Xuyen Trung-Cam Nam Commune	Ben Tre-Cam Ha Commune	An Bang-Cam An Ward	Cua Dai	Bai Lang Residential Area	Cua Suoi Cam Ha Commune	Bau Oc Thuong- Cam Ha Commune	Village 5-Cam Thanh Commune	Village 2-Cam Thanh Commune	
		G1	G2	G3	G4	G5	G10	G11	G12	G13	
	Well Type	Dug Well		Dug Well		Dug Well		Dug Well		Dug Well	
Salinity	mg/l	300	100	100	1800	300	100	100	100	400	-
TDS	mg/l	311	89.5	129	1767	290	71.0	138.5	107.4	359	1500
COD	mg/l	0.54	0.62	0.58	0.48	0.52	0.54	0.47	0.32	1.88	4
NO_3^- -N	mg/l	1.2	1.4	2.3	1.8	1.2	3.6	2.1	2.7	4.2	15
NH_4^+ -N	mg/l	<0.06	<0.06	0.07	0.10	0.08	0.16	0.14	0.35	2.65	0.10
Fe	mg/l	0.76	0.63	1.23	0.86	0.76	0.76	0.98	1.32	0.80	5
Cd	mg/l	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.005
Cu	mg/l	0.0006	<0.0005	<0.0005	0.0012	0.0018	0.0006	0.0010	0.0008	<0.0005	1
Pb	mg/l	<0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	15
Zn	mg/l	0.0043	0.0021	0.0056	0.0038	0.0028	0.0036	0.0027	0.0036	0.0041	3
Hg	mg/l	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.001
As	mg/l	<0.0001	0.0003	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	0.0005	<0.0001	0.05
Coliform	MPN/100ml	0	0	4	4	0	0	0	0	0	3

4.9. SURFACE WATER QUALITY

Assessment of the surface water quality of Hoi An region is based:

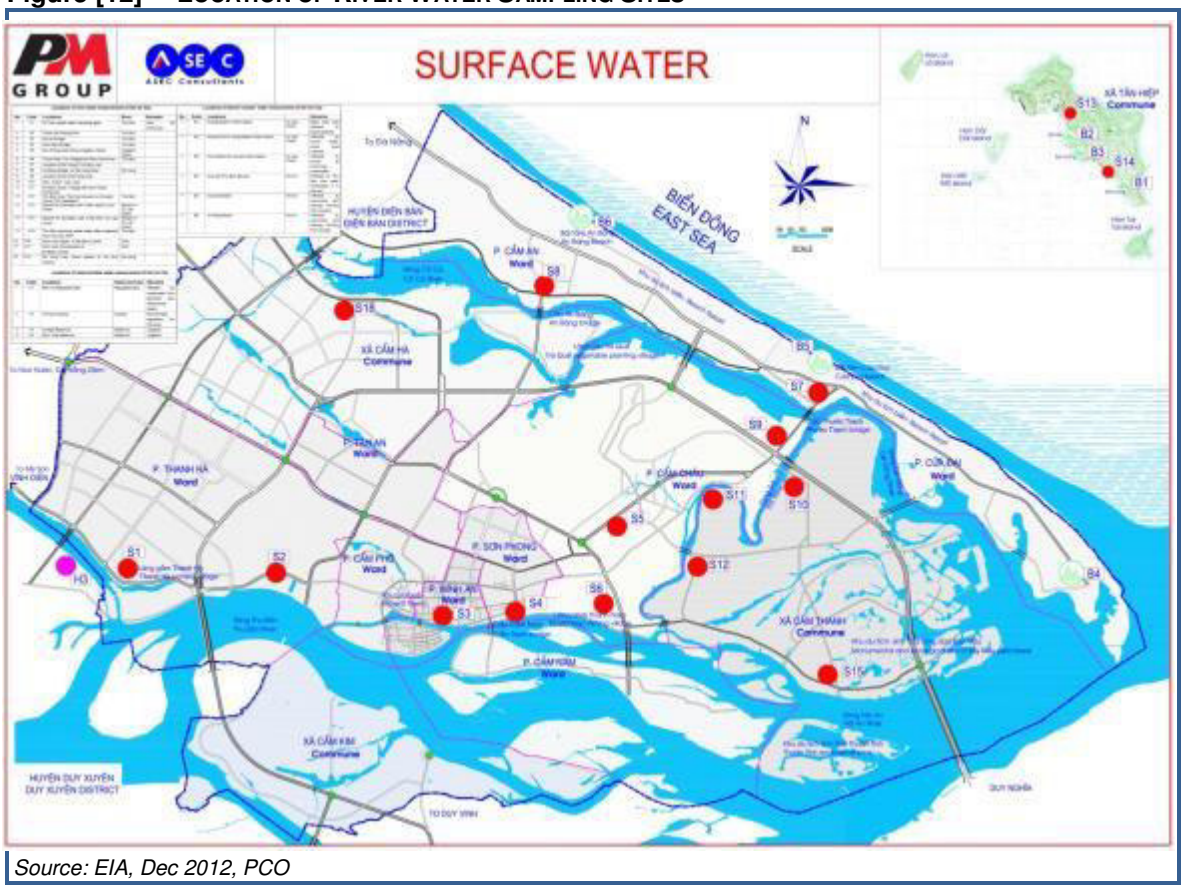
- on the results of water quality sampling and analysis carried out in December 2012, in 18 stations of the river system, 4 stations in reservoirs and 6 stations in coastal waters distributed in the Hoi An area, by Pacific Ocean Engineering Join Stock Company (PCO);
- on the results of surface water quality surveys carried out by DONRE over the period 2006-2010[2].

Level of water quality refers to Standard QCVN 08:2008/BTNMT (National Technical Regulation on Surface Water Quality for domestic use, for irrigation and for water ways and navigation) for inland waters, to Standard QCVN 10:2008/BTNMT (National technical regulation on coastal water quality) for coastal sea waters, on Standard TCVN 6774:2000 (Freshwater quality guidelines for the protection of aquatic life).

Standard QCVN 08:2008/BTNMT considers 4 water quality levels:

- A1&A2: Water suitable for domestic water supply with disinfection treatment (Col. A1) and with more elaborated treatment (col.2);
- B1: Water suitable for irrigation;
- B2: Water suitable for waterways and navigation;

Figure [12] LOCATION OF RIVER WATER SAMPLING SITES



Source: EIA, Dec 2012, PCO

[2] Reports on the Status of the Environment 2006 to 2010 of Quang Nam, DONRE.

River Water

Sampling included Thu Bon river (river course runs through Hoi An Town), De Vong (also called Co Co river), Do & Dinh rivers. These rivers are used for irrigation and are also the receiving environment for domestic wastewater raw or partially treated.

Results show that most of the samples taken in 2005-2009 and in December 2012 comply only with requirements of level B1. At Cau Nam bridge on the Hoai river, suspended solids concentrations in 2006-2009, were above B1 permissible limits, probably because of the fishing & vegetable market and boats activities located 100 m upstream.

Reservoir & Lake Water

Sampling stations for water quality included 4 main lakes /reservoirs: Minh An regulated lake (near Chua Cau), Tra Que Swamp, Lai Nghi Reservoir, Cam Kim Reservoir. Water quality of Tra Que swamp is good; Lai Nghi and Cam Kim reservoirs are slightly polluted by Fe (due to local geology); Minh An regulated lake is polluted by nutrient (values of NH_4, PO_4 exceed B1 permissible levels) because this site is receiving domestic wastewater from residential area.

Sea Water

Coastal water quality was measured in 3 stations in Cham Island and 3 stations along Hoi An coastline including one station in Cua Dai estuary, one along Cua Dai beach and one along An Bang beach.

Results of analysis are good both around the island and along the Hoi An coastline with no particular evidence of significant contamination by organic matter, oil and grease or coliforms. The only parameters above the permissible levels of Standard QCVN 10: 2008/BTNMT are iron (Fe) and suspended sediments (SS), but both independent from a direct human origin.

Table [11] RIVER WATER QUALITY IN HOI AN CITY, DECEMBER 2012

NO	PARAMETER	UNIT	LOCATION										QCVN 08: 2008	
			TOAN WASTE W. DISCHARGE GATE	THANH HA FISHING PORT	HOI AN BRIDGE	CAM NAM BRIDGE	SON PHONG-CAM CHAU IRRIGATION CANAL	THANH NAM TAY VILLAGE CAM NAM COMMUNE	DOWNSTREAM PROPOSED WWTP	UPPER OF DE BAM CULVERT	DOWNSTREAM OF DE BAM CULVERT	DOWN STREAM OF TRA QUE SWAMP	COLUMN A2	COLUMN B1
		CODE	S1	S2	S3	S4	S5	S6	S15	S16	S17	S18		
		RIVER	THU BON-	THU BON	THU BON	THU BON	CANAL	THU BON	THU BON	DINH	DINH	DE VONG		
1	pH	pH unit	6.7	6.9	7.1	7.2	7.0	7.3	7.2	7.1	7.3	7.2	6.0-8.5	5.5-9.0
2	DO	mg/l	4.6	3.9	4.5	4.4	3.8	4.7	4.3	4.2	4.2	4.4	≥5	≥4
3	EC	s/cm	0.02	0.02	0.45	0.6	0.4	0.4	1.47	1.15	1.50	1.16		
4	Salt	mg/l	100	100	2400	3300	2100	2000	8500	6500	8700	6600		
5	COD	mg/l	1.5	1.7	1.8	2.6	3.5	1.7	2.2	1.8	1.5	1.6	< 15	< 30
6	BOD_5	mg/l	0.64	0.76	0.82	1.16	1.61	0.70	0.88	0.80	0.65	1.18	< 6	< 15
7	SS	mg/l	36	30	40	24	16	12	30	26	24	28	30	50
8	NO_3^-	mg./l	1.1	1.3	1.8	1.4	2.5	1.7	1.9	3.0	2.6	2.5	5	10
9	NH_4^+	mg./l	<0.06	0.08	0.12	0.15	0.44	0.24	0.22	0.33	0.28	0.62	0.2	0.5
10	PO_4^{3-}	mg/l	0.04	0.04	0.05	0.04	0.09	0.07	0.04	0.05	0.05	0.20	0.2	0.3
11	Coliform	MPN/100ml	210	43	230	240	15	29	43	240	930	460	5000	7500
12	Oil & Grease	mg/l	N D	N D	N D	N D	N D	N D	N D	N D	N D	N D	0.02	0.10
13	Fe	mg/l	0.72	0.40	0.47	0.28	0.41	0.36	0.38	0.56	0.73	1.02	1.0	1.5
14	CN	mg/l	<0.002	<0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0,01	0,02
15	Cu	mg/l	0.0070	0.0063	0.0066	0.0063	0.0012	0.0106	0.0013	0.0032	0.0046	0.0088	0,2	0,5
16	Zn	mg/l	0.0230	0.0196	0.0172	0.0173	0.0088	0.0217	0.0026	0.016	0.0236	0.0386	1.0	1.5
17	Cd	mg/l	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	0.0032	0.0044	0,005	0,01
18	Pb	mg/l	0.0046	0.0043	0.0047	<0.0005	0.0019	0.0042	<0.0005	0.0016	0.0023	0.0063	0.02	0.05
19	Hg	mg/l	0.0004	0.0008	0.0005	<0.0001	0.0007	0.0003	0.0005	0.0007	0.0003	0.0005	0.001	0.001
20	As	mg/l	0.0018	0.0009	0.0013	0.0015	0.0008	0.0014	0.0016	0.0018	0.0012	0.0015	0.02	0.05

Source: Analysis of surface water quality in Dec 2012 –Deec-PCO

Table [12] LAKES & RESERVOIRS WATER QUALITY IN HOI AN CITY, DECEMBER 2012

NO	PARAMETER	UNIT	LOCATIONS				STANDARD QCVN 08: 2008	
			MINH AN LAKE	TRA QUE SWAMP	LAI NGHI RESERVOIR	CAM KHE RESERVOIR	COLUMN A2	COLUMN B1
		CODE	H1	H2	H3	H4		
1	pH	pH unit	7,3	7.4	6.8	7.3	6.0-8.5	5.5-9.0
2	DO	mg/l	3.9	4.4	4.1	4.3	≥5	≥4
3	EC	s/cm	0.15	0.25	0.04	0.24		
4	Salt	mg/l	600	1100	200	1200		
5	COD	mg/l	18	12	27	4	< 15	< 30
6	BOD_5	mg/l	8	5	12	3	< 6	< 15
7	SS	mg/l	53	12	10	18	30	50
8	NO_3^-	mg./l	3.6	2.1	1.7	1.1	5	10
9	NH_4^+	mg./l	33.8	0.39	0.40	0.08	0.2	0.5
10	PO_4^{3-}	mg/l	0.79	0.05	0.04	0.04	0.2	0.3
11	Coliform	MPN/100ml	430	40	40	150	5000	7500
12	Oil & Grease	mg/l	ND	ND	ND	ND	0.02	0.10
13	Fe	mg/l	1.76	1.08	1.66	2.03	1.0	1.5
14	CN	mg/l	< 0.002	< 0.002	< 0.002	0.002	0,01	0,02
15	Cu	mg/l	0.0466	0.0048	0.0021	0.007	0,2	0,5
16	Zn	mg/l	0.0503	0.0231	0.0206	0.046	1.0	1.5
17	Cd	mg/l	0.0008	0.0048	0.0027	0.0036	0,005	0,01
18	Pb	mg/l	0.0016	0.0033	0.0036	0.0053	0.02	0.05
19	Hg	mg/l	0.0005	0.0002	0.0002	< 0.0001	0.001	0.001
20	As	mg/l	0.0009	0.0011	0.0012	0.0001	0.02	0.05

Source: Analysis of surface water quality in Dec 2012 –Deec-PCO

Table [13] COASTAL WATER QUALITY IN HOI AN CITY, DECEMBER 2012

NO	PARAMETER	UNIT	LOCATIONS						***QCVN 08 :2008	
			HUONG BEACH-CHAM ISLAND	SHIPING PORT IN LANG BEACH-CHAM ISLAND	CORAL BEACH FOR TOURIST-CHAM ISLAND	CUA DAI/ THU BON ESTUARY	CUA DAI BEACH	AN BANG BEACH	COLUMN II FOR SEA SIDE/ BEACH	COLUMN III FOR OTHERS
		CODE	B1	B2	B3	B4	B5	B6		
		COAST	CHAM ISLAND	CHAM ISLAND	CHAM ISLAND	HOI AN	HOI AN	HOI AN		
1	pH	pH unit	8.0	8.0	8.1	8.0	8.0	8.2	6,5-8,5	6,5-8,5
2	DO	mg/l	5.0	5.1	5.1	4.9	4.8	4.9	≥ 4	-
3	EC	s/cm	4.66	4.63	4.65	1.6	4.63	4.82		
4	Salt	mg/l	30.,300	30,200	0,00	9,00	30,000	30,200		
5	BOD_5	mg/l	0.68	0.64	0.52	0.57	0.60	0.62	≤4	-
6	SS	mg/l	70	52	89	100	113	72	50	-
7	NO_3^-	mg./l	1.8	1.6	1.3	1.1	1.1	1.1		
8	NH_4^+	mg./l	0.04	0.02	0.02	0.01	0.01	0.01	0,5	0,5
9	PO_4^{3-}	mg/l	0.04	0.05	0.05	0.04	0.05	0.04		
10	Phenol	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0,001	0,002
11	Coliform	MPN/100ml	0	4	4	7	0	15	1000	1000
12	Oil & Grease	mg/l	N.D	N.D	N.D	N.D	N.D	N.D	0,1	0,2
13	Fe	mg/l	0.40	0.37	0.26	0.18	0.42	0.38	0,1	0,3
14	CN	mg/l	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0,005	0,01
15	Cu	mg/l	0.0026	0.0128	0.0103	0.0121	0.0166	0.0091	0,5	1
16	Zn	mg/l	0.0182	0.0206	0.0261	0.0183	0.0199	0.0184	1,0	2,0
17	Cd	mg/l	0.0041	0.0010	<0.0005	<0.0005	<0.0005	<0.0005	0,005	0,005
18	Pb	mg/l	0.0061	0.0047	0.0041	0.0038	0.0046	0.0047	0,02	0,1
19	Hg	mg/l	<0.0001	0.0008	0.0006	0.0004	0.0006	0.0008	0,002	0,005
20	As	mg/l	0.0005	0.0014	0.0009	0.0011	0.0012	0.0009	0,04	0,05

Source: Analysis of surface water quality in Dec 2012 –Deec-PCO

4.10. SURFACE WATER SALINITY & WATER RESOURCES

Available surface water resources for Hoi An have been previously identified as the Thu Bon River and the Vien Dien River (which connects the Thu Bon to the low reaches of the Vu Gia).

The Vien Dien River connects the Thu Bon to the Vu Gia river at the lower end of the Vu Gia when it becomes the Han River Estuary. During dry weather periods the Vien Dien is influenced by salinity and has low flows (Qmin reported as 3.88 m3/s). The river is currently used as the water resource for Hoi An and Vinh Dien town and also for irrigation of agricultural (paddy field) areas.

Salinity of the downstream river reaches is an important issue when considering climate change scenarios which anticipate the reduction of dry season flows as well as the sea level rise. Increased intrusion of sea water into the estuary may have far reaching impacts on the salinity of the river water and on the alluvial aquifer, with potential secondary consequences on urban water supply, irrigation and fish farming.

At present, salinity intrusion is observed in the estuary, directly linked to the tidal regime and the discharge of the rivers. The lower the discharge is, the farther the salinity front moves upstream the river. There has been previously a lack of information and data concerning the water quality, particularly salinity associated with the Vinh Dien River (where present water intake for water supply is located). This has led to misconceptions with regard to the origin of salinity at the existing water intake with indications that the origin of the salinity was from the Thu Bon river.

A detailed study of salinity in the Thu Bon/Vu Gia system has been undertaken by the VAWR under present condition without the impact of reservoirs and future conditions with climate change and the operation of reservoirs. The results of this work clearly confirm that (i) the major source of salinity for the Vinh Dien is from the Han River and not the Thu Bon (except perhaps under extreme low flow/high sea level conditions) and (ii) under the future conditions the front of salinity is pushed further down the Thu Bon downstream of the proposed Lai Nghi reservoir intake thanks to large hydropower projects in the catchment which sustain the dry season natural discharge of the river.

Figure [13] RESULTS OF SALINITY MODELLING VGTB BASIN: REFERENCE SITUATION

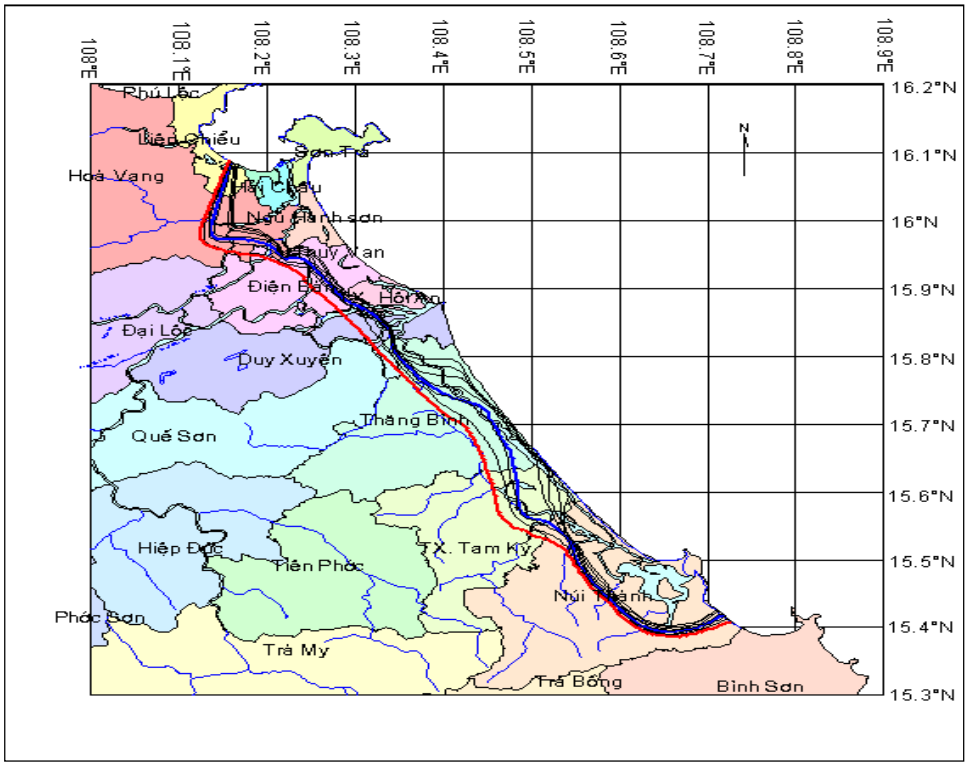


Figure [14] RESULTS OF SALINITY MODELLING VGTB BASIN: FUTURE SITUATION WITH OPERATION OF RESERVORIS

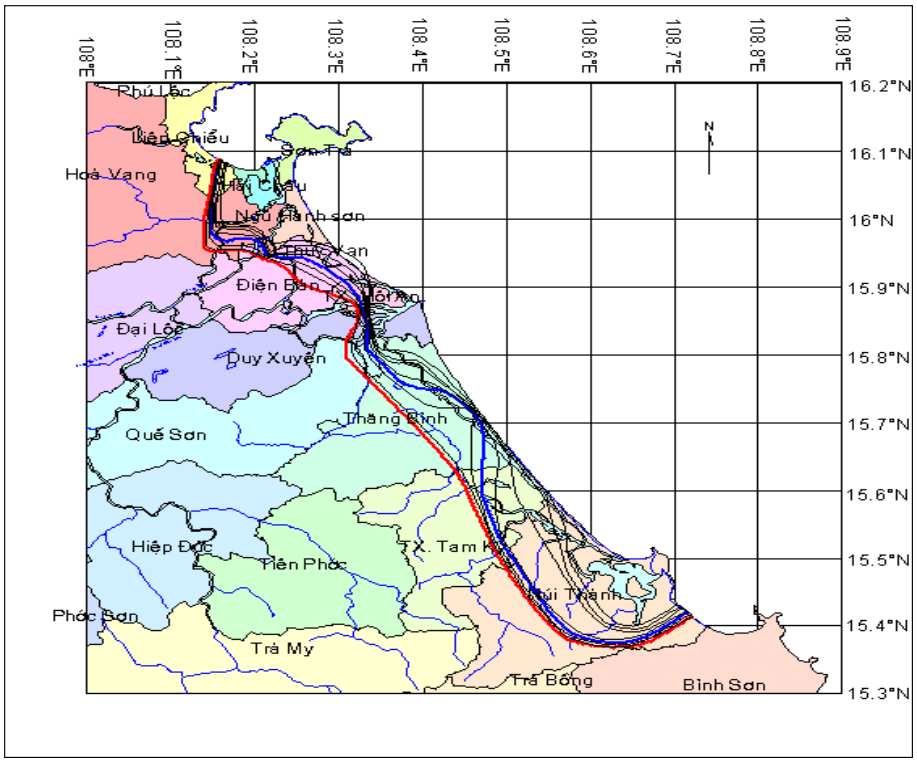
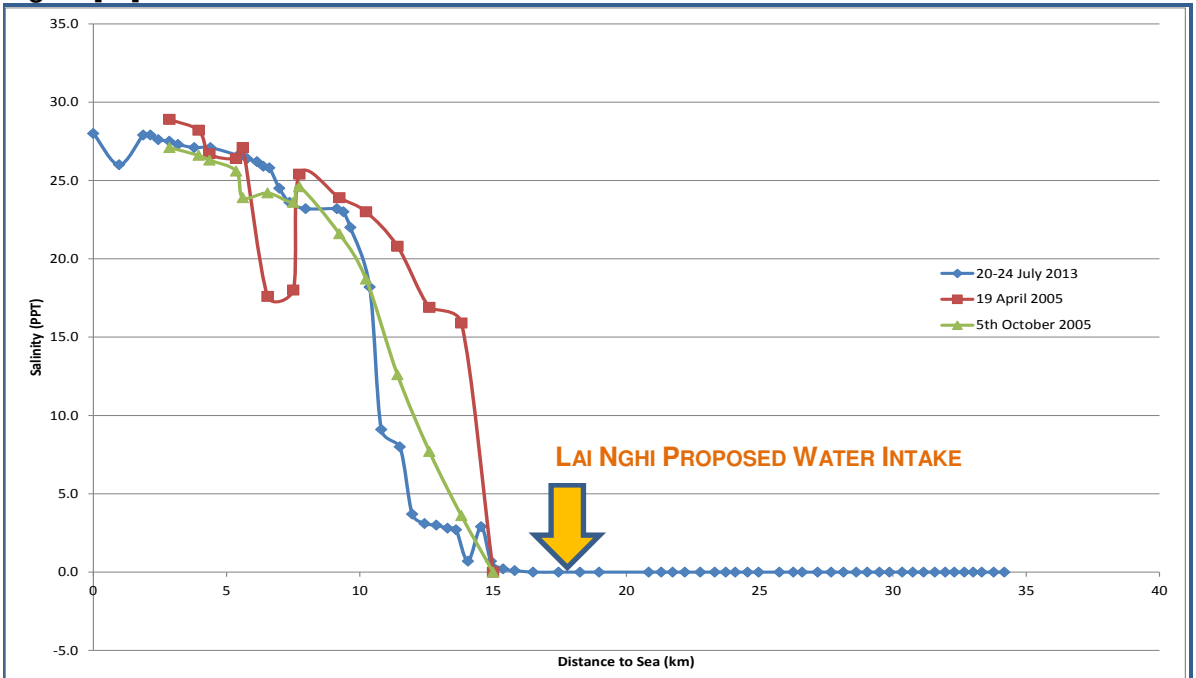


Figure [15] SALINITY PROFILE OF THE LOWER THU BON



Source : PMGroup, 2013

A salinity survey performed by the PPTA in July 2013 and former data collected in 2005 show that the salinity front in the Thu Bon estuary does not reach the proposed Lai Nghi new intake. The river salinity profile is presented in the above figure.

4.11. LAND USE

4.11.1. EXISTING SITUATION

Hoi An city shows a land use which associates intimately urban, agricultural and natural areas. The distribution of the various land uses is detailed in the following table.

Table [14] LAND USE IN THE HOI AN CITY (EXCLUDING CU LAO CHAM ISLAND)

NO	LAND USE	SITUATION 2010	
		AREA (HA)	%
	Total	4622.12	100,00
1	Residential	830.79	17.97
2	Administration	1.96	0.04
3	Medical	2.41	0.05
4	Sport-Culture	13.90	0.30
5	Trade & Services	19.77	0.43
6	Transportation	107.26	2.32
7	Agricultural land	1603.77	34.70
	• *Paddy fields*	*461.47*	-
	• *Annual crop, fruit & vegetable, ornamental trees*	*462.05*	-
	• *Protective forest*	*204.62*	-
	• *Aquaculture (ponds)*	*246.33*	-

No	Land Use	Situation 2010	
		Area (ha)	%
8	Parks & parks combined to services	10.00	0.22
9	Tourism	65.95	1.43
10	Rivers & streams	1066.52	23.07
11	Education	16.02	0.35
12	Religion	20.63	0.45
13	Army/National defense	10.88	0.24
14	Industrial zone & Trade centers	12.59	0.27
15	Technical infrastructure's head works	1.60	0.03
16	Tombs & cemetery	162.48	3.52
17	Unused land & other	490.75	10.62

Source: Statistical Yearbook 2011 for Hoi An City

This land use table reflects Hoi An character dominated by 3 major land occupation types which are residential (18%), agricultural (35%) and water (23%).

4.11.2. Development Trends

The government plans to increase the accessibility of Hoi An, both externally with new connections across major rivers and along internally through improved road and river access to existing and new development areas. This increased diversity could create the potential to encourage a larger number and wider range of visitors seeking a variety of attractions.

4.11.2.1. Quang Nam SEDP

On 17 June, 2005 Prime Minister issued decision number 148/2005/QD-TTg on the approval of the Social and Economic Development Plan (SEDP) of Quang Nam province to 2015. The SEDP had been prepared by Quang Nam PPC and submitted to Prime Minister in beginning of 2005. The SEDP established the social and economic trends and directions, focusing in particular on the development of the coastal zone of Quang Nam and on the targets for Hoi An which include services, industry and tourism development.

4.11.2.2. Hoi An SEDP

In 2012 Hoi An city established a Social and Economic Development Plan (SEDP) for 2020 and a vision to 2025. The first version of the plan had been submitted to Hoi An city People Committee (Hoi An PC) in the middle of 2012 and Hoi An PC decided to update the SEDP to meet better the reality of the city. The updated version would be approved by Hoi An PC in the end of 2013. The SEDP fixes the following targets:

- by 2020 Hoi An will become a grade 2 city, a center of national tourism and the main point of cultural tourism of the country;
- Tourism and services will provide the heart of the economic development, complemented by industry and handicraft, agriculture and fisheries;

The development of the city will be implemented according to 5 development sub-zones:

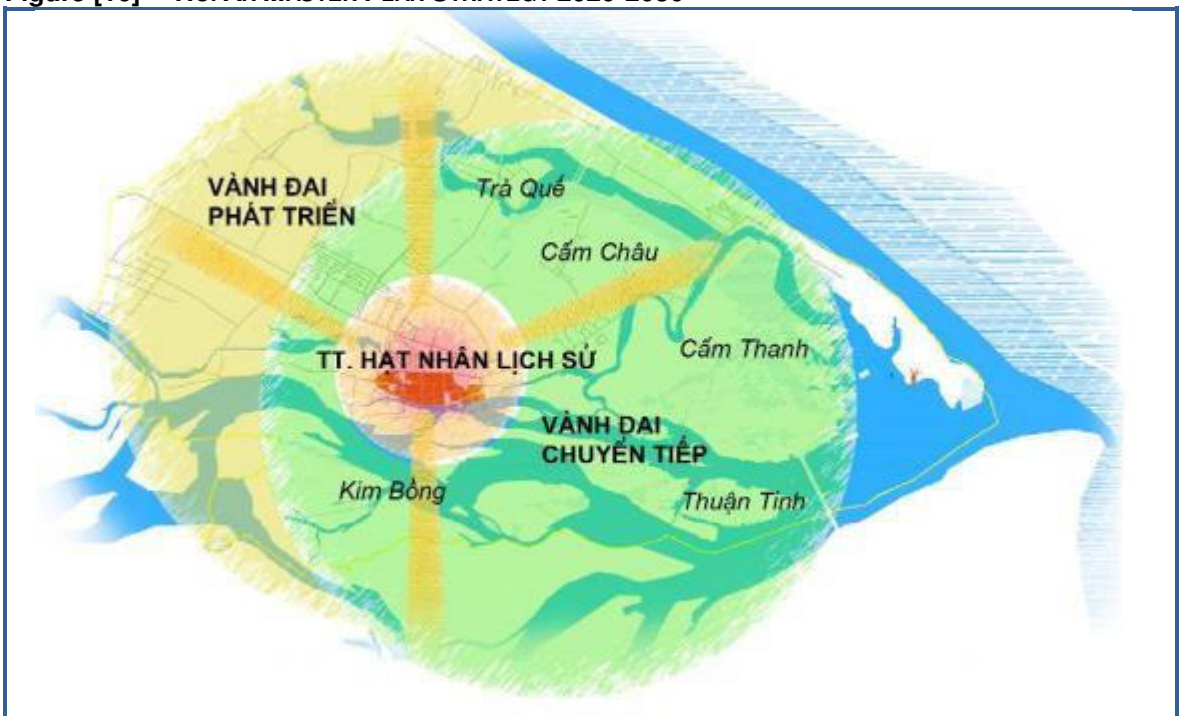
- Sub-zone 1: downtown sub-zone including the wards Minh An, Tan An, Cam Pho, Son Phong; it is core cultural heritage of the city, hence it will focus into tourism and trade & service operation and development;
- Sub-zone 2: Nearby downtown sub-zone including Thanh Ha ward and Cam Ha commune; it has a large area with good infrastructures and will be used for industrial and urban development:

- Sub-zone 3: Outskirt sub-zone with Cam Thanh, Cam Kim communes and Cam Chau, Cam Nam wards; it has large areas of agriculture and diversify ecological condition, which will be used for development of agricultural and aquaculture production as well as ecological tourism area;
- Sub-zone 4: New urban coast sub-zone with Cam An and Cua Dai wards; it will be a new urban area with development of sea tourism and trade & service activity;
- Sub-zone 5: Cu Lao Cham archipelago; with several islands and natural forest, it will be developed for ecological tourism and fishing.

4.11.2.3. HOI AN MASTER PLAN

The revised Master Plan for Hoi An is currently being discussed within government and is expected to be approved shortly. The Master Plan is based on a concentric ring concept as shown in the following Figure. The inner circle, with a radius of about 1 km consists of the Old Town and associated neighborhoods. The second circle moving outwards (consisting of parts of the Thu Bon river basin) is intended to be a green belt which is characterized by natural features such as gardens and parks which are designed to assist with flood control through water retention. New, mostly road (and improved river) infrastructure would pass through these areas to the third outer area which will contain new development areas along the coast and to the west of Hoi An.

Figure [16] HOI AN MASTER PLAN STRATEGY 2020-2030

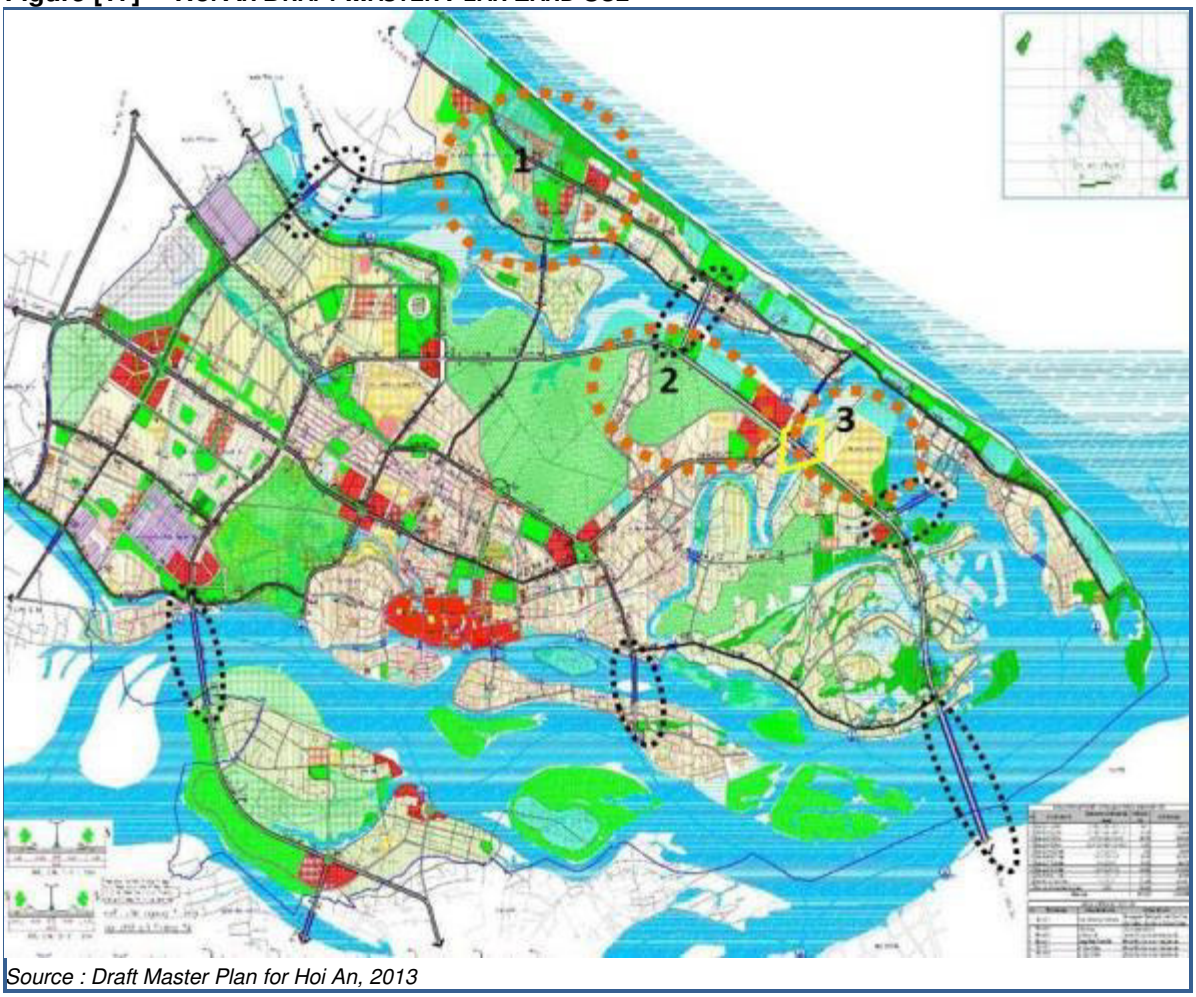


Source : Draft Master Plan for Hoi An, 2013

The future land use is characterized by an increased accessibility by building a number of new bridges over rivers. The Co Co River in the north would have three new bridges, one to the extreme west; and two more central to link with the Cua Dai Road (improvement and new construction sections) which is being partly funded by the Vietnam government. This road would link in the east to a new bridge over the Thu Bon river which is currently under construction. There would also be 2 new bridges over the Hoi An river in the south. All 6 bridges are shown (dotted black shapes) on the following Figure. A number of new interconnecting roads would link these bridges with the new development areas (areas 1 to 3 on the figure). In addition to the proposed roads it is intended that the river network should play a more important role in both transportation and tourism in the area. Improvement works on both the Co Co and Do rivers are intended to

provide the basis for operators to promote both leisure cruises and links between the old town and the coast.

Figure [17] HOI AN DRAFT MASTER PLAN LAND USE



Source : Draft Master Plan for Hoi An, 2013

4.12. TERRESTRIAL & AQUATIC ECOLOGY

Hoi An region, like many coastal areas, shows limited vegetation biodiversity. Forest types observed include mainly Casuarina on coastal sand dune relicts, Nipa palms along the estuary and rivers banks, Eucalyptus and Palm trees planted along the road network. Nipa palm was initially introduced and planted years ago for fiber production, but has since naturally expanded in the tidal zone of the Thu Bon and Co Co rivers. The main natural forest is observed on the Cham islands, were it benefits from the protection status of the natural reserve. The natural vegetation of the islands is lowland evergreen forest, although, at lower elevations, this forest has been heavily degraded and replaced by secondary scrub. Urban vegetation in Hoi An City is still low, about 26.1 ha, or an average green area of 2.9 m² per capita, concentrated mostly in the city parks and along streets.

Terrestrial fauna in Hoi An is very limited, due to the limited forested areas and the extensive agriculture activity around the city. Animal life observed is dominated by livestock and poultry.

Bird diversity is mainly located on the Hon Lao island (see next section on protected areas) with, in particular, *Collocalia fuciphaga* (edible-nest swallow). The swallow nest harvesting is an industry in the island, which provides important revenue to the state. The annual swallow harvest is reported to be about 1.4 tons, valued at US$ 4,000 per kilogram (2010).

No animal or vegetal protected species is reported from the project area located nearby Hoi An.

4.13. PROTECTED AREAS

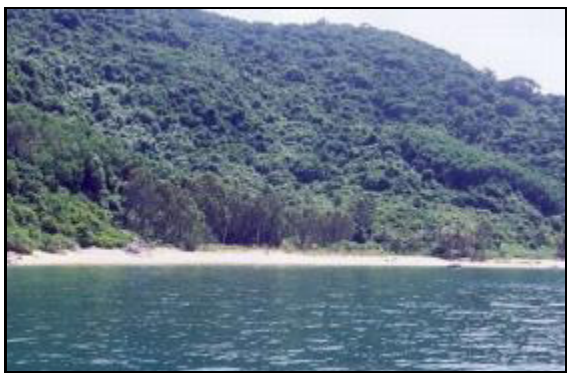
4.13.1. CU LAO CHAM NATURE RESERVE

Cu Lao Cham Marine Park also known as Cham Islands Biosphere Reserve is part of the eight islets of Cham Island, located in South China Sea under the administration of Tân Hiệp Commune and Hoi An town. It comprises an archipelago of one large island (Hon Lao) and seven smaller islands (the Cham Islands), about 12 km off the coast of central Vietnam. Cu Lao Cham was included on Decision No. 194/CT of the Chairman of the Council of Ministers, dated 9 August 1986, as a nature reserve (MARD 1997). An investment plan was prepared by Hoi An Town People's Committee in 1994 which defined a 1,544 ha nature reserve, comprising a strict protection area of 799 ha and a forest rehabilitation area of 745 ha. On 11 July 1994, the investment plan was approved by the then Quang Nam-Da Nang Provincial People's Committee, by Decision No. 1272/QD-UB. The terrestrial and coastal ecosystems of the islands have been recognized as a global Biosphere Reserve by UNESCO on 26 May 2009 under its 'Man and the Biosphere Programme' for its rich biodiversity value.

The largest island, Hon Lao, covers 1,317 ha. As the only island in the archipelago with permanent water, Hon Lao is the only island to have permanent human habitation; around 3,000 people live on the island in two main settlements. Natural forest (more or less degraded) covers 532 ha of the Nature Reserve, or 35% of the total area, while plantation forest covers a further 30 ha.

The rich aquatic resources of the islands consist of 165 hectares of coral and 500 hectares of sea weeds. 135 species of coral, four species of tiger shrimp and 84 species of mollusc are also found in the waters surrounding the islands. Medicinal plants have also been inventoried on the islands.

Because of their location close to Hoi An town, the islands have high potential for tourism development (ADB 1999). In fact, the first tourism infrastructure was constructed on the islands in 2003.



The Main Island – Cu Lao Cham Marine Park

Village on the islands

4.13.2. HOI AN WORLD CULTURAL HERITAGE SITE

Hoi An Ancient Town is an exceptionally well-preserved example of a South-East Asian trading port dating from the 15th to the 19th century. Its buildings and its street plan reflect the influences, both indigenous and foreign, that have combined to produce this unique heritage site. The city possessed the largest harbor in Southeast Asia in the 1st century and was known as Lam Ap Pho (Champa City). Between the seventh and 10th centuries, the Cham (people of Champa) controlled the strategic spice trade and with this came tremendous wealth. The former harbor town of the Cham at the estuary of the Thu Bon River was an important Vietnamese trading center in the 16th

and 17th centuries, where Chinese from various provinces as well as Japanese, Dutch and Indians settled. During this period of the China trade, the town was called Hai Pho (Seaside Town) in Vietnamese. Originally, Hai Pho was a divided town with the Japanese settlement across the "Japanese Bridge" (16th-17th century). The bridge (Chùa cầu) is a unique covered structure built by the Japanese, the only known covered bridge with a Buddhist pagoda attached to one side.

In 1999, the old town was declared a World Heritage Site by UNESCO as a well-preserved example of a Southeast Asian trading port of the 15th to 19th centuries, with buildings that display a unique blend of local and foreign influences.

Hoi An is reported to have a total of 1,360 historical relics including 1,068 ancient houses, 19 pagodas, 43 temples, 38 family temples, 5 assembly halls, 11 old wells, one famous Japanese bridge, 44 ancient tombs.

THE COVERED JAPANESE BRIDGE

RIVER SIDE IN THE OLD HOI AN CITY

4.14. SOCIAL AND CULTURAL BASELINE

4.14.1. ADMINISTRATIVE ORGANIZATION

The project area in Hoi An City covers nine Wards, namely Minh An, Tan An, Cam Pho, Thanh Ha, Son Phong, Cam Chau, Cua Dai, Cam An, Cam Nam and four Communes are Cam Ha, Cam Kim, Cam Thanh, Tan Hiep. The following map details this spatial organization.

4.14.2. POPULATION

According to Hoi An statistic year book, in 2011 Hoi An City had currently 91,367 people with 22,030 households. With growth rate 0.95% per year (of which natural growth rate 0.75% per year and mechanic growth rate 0.2% per year), the resident population of Hoi An city would reach 98,768 people in 2020 (according to prediction of Socio-economic Master plan of Hoi An city to 2020). Population in Hoi An City is detailed per commune and ward in the following table.

Table [15] POPULATION OF HOI AN CITY BY END OF 2011

NO	WARD OR COMMUNE	POPULATION			AREA (KM^2)	DENSITY (PERSONS/KM^2)
		TOTAL	MALE	FEMALE		
1	W. Minh An	6,529	3,074	3,455	0.650	10,045
2	W.Tan An	9,503	5,359	4,144	1.394	6,817
3	W. Cam Pho	10,084	4,816	5,268	1.180	8,546
4	W. Thanh Ha	11,461	5,660	5,801	6.406	1,789
5	W. Son Phong	4,433	2,045	2,388	0.744	5,958
6	W. Cam Chau	10,703	5,155	5,548	5.704	1,876

No	Ward or Commune	Population			Area (km^2)	Density (persons/km^2)
		Total	Male	Female		
7	W Cua Dai	5,530	2,733	2,797	3.156	1,752
8	W. Cam An	5,582	2,838	2,744	3.148	1,773
9	W. Cam Nam	6,291	3,112	3,179	4.549	1,383
10	Com .Cam Ha	7,256	3,578	3,678	6.132	1,183
11	Com. Cam Kim	4,023	1,958	2,065	4.204	957
12	Com. Cam Thanh	7,554	3,676	3,878	8.954	844
13	Com. Tan Hiep	2,418	1,277	1,141	15.491	156
	Whole City	**91,367**	**45,281**	**46,086**	**61.712**	**1,481**

Source: Statistical Yearbook 2012 for Hoi An City

The distribution of the population is 77% urban and 23% rural in Hoi An city.

Labor age is accounted from 18 year old to 60 year old. In 2011, the number of the city's labor was 58,204 people (female labor was 29,812 people), of which number of labor working in economic sectors was 33,586 people, number of labor is working in Agricultural sector was 8,206 people, in industrial and construction sector was 11,530 people and service & tourism was 13,580 people (were accounted for 24%, 34% and 41% respectively).

4.14.3. Poverty and Gender

Hoi An's population is evenly divided between males and females. The ratios in some of the wards/communes may vary (see table above). Income in Hoi An is relatively higher than in the rest of Vietnam. In 2012 the poverty rate was 2.15% or 451 households, a decrease from 613 HHs the year before. Figures from the city department of Labour, Invalids and Social Affairs indicate that 179 poor HHs from about 40% are female headed. Poverty rates range from a low of 0.00% in Minh An Ward, located in the Old Town of Hoi An, to a high in Cam Kim Commune, a wood carving and furniture making commune. The number of near poor HHs makes up an additional 2.02% of HHs.

4.14.4. Education

In 2011, 43 education establishments were registered, including: 1 University, 2 Colleges, 1 Boarding Ethnic School, 3 Upper Secondary Schools, 10 Lower Secondary Schools, 14 Primary Schools and 12 Kindergarten schools. In general, the education facilities available meet the basic requirements. Net enrolment rate at primary level in 2011 was 100%.

4.14.5. Public Health

According to the Medical Center, the number of patients in medical care is often only 70% of the actual questions, the rest usually heal at home. Diseases like chickenpox, hand, foot and mouth mostly children (100%), dengue fever, diarrhea, dysentery, flu, mumps, typhus affect both children and adults with 60% children and 40% adults. Data indicates that the number of people with water borne diseases linked to water pollution increased between 2011 to 2012, especially dysentery and dengue fever with increased rates of over 10%. Health care facilities and professionals serving Hoi An are presented in the following Table.

Table [16] Health Care Indicators

Indicators	2011		2012	
	State	Non-state	State	Non-state
Health facilities				
Hospitals	1	1	1	1
Health care base station	13	0	13	0
Nursing centers and rehabilitation		52	1	53

INDICATORS	2011		2012	
	STATE	NON-STATE	STATE	NON-STATE
Epidemic prevention team	1	0	1	0
Regional clinics	1	51	1	44
Total number of patient beds	210	NA	210	NA
Health care employees				
Total health care employees	268		346	
# of Doctors	47		56	
# of Nurses	57		62	
Other staff	164		228	

In 2012, water borne illnesses were dominated by Diarrhea (964 cases), Dengue fever (193 cases) and Dysentery (83 cases).

The medical staff is responsible to address diseases related to polluted food and water as a result of the flooding. After each flooding event there is concern about the quality of the water, sanitation, concerns for health. Drinking water is the most important factor, as floodwater is extremely polluted.

4.14.6. TRANSPORT, COMMUNICATION & ENERGY

Provincial Road No 607 A in the west of Hoi An city connecting to Da Nang is 5-6 m width and significantly degraded. This road is to be improved to 33 m width from Dien Ngoc to the center of Hoi An City. Provincial Road No 607 B and Road No 608, connecting to National Road No 1 at Vinh Dien have a length of 14.5 km and a width of 9 m (6 m width asphalted) is also facing degradation. Lac Long Quan Road (the coastal road) is 27 m width.

Cua Dai Bridge and Cua Dai bridge path on the south bank of Thu Bon river have a respective length of 1.48 km and 4.78 km.

4.14.7. ECONOMIC PROFILE

Hoi An city is considered as the most self-motivated in economic operation of Quang Nam province and one of the well-known tourism city of the country. The GDP of the city is accounted for 10.0% of total GDP of Quang Nam province (VND 1,012 billion over VND 10,207.8 billion in constant price), in which 63.94% is trade & service, 25.6% is industrial & construction and 10.46% is agriculture & fishery. The average growth rate of GDP was 11.42% in period from 2007 to 2011.

4.14.7.1. TOURISM

Hoi An is a famous tourism place in Viet Nam, recognized a cultural heritage of the world in December 1999 by UNESCO. Hoi An also is one of the 8 cities of world cultural heritage in Asia and Pacific selected to become the model for “developing tourism and preserving culture”. In August 2009, Cu Lao Cham and Cam Thanh low land area were recognized as the biosphere reserve areas of the world by UNESCO. The event opened good opportunity for expanding tourism scale with several unique tourism products to attract tourists to Hoi An and extend their stay.

Revenue of tourism activity was about VND 639 billion in 2007 increased VND 1,225 billion in 2011 (twice in 5 years), but in USD equivalent, the revenue was USD 39,695,776 and USD 59,356,769 which increased 149.53% in five years. The weather is seasonal and extreme which restricts the months suitable for attracting visitors. Popular activities such as visiting the Cham Islands are only guaranteed to be possible during the short season of end of May - end of August, which is the high season for domestic tourism.

The Province has shown an overall increase in visitors from 2007 - 2011, but this is made up from an increase in local tourists (up by 180,000) and a decline in foreigners (down by 141,000). The average stay of foreign visitors (2.5 days) is twice that of local tourists. Over this period occupancy

rates have also declined from 56 to 49%. However, the number of hotel beds has increased from 6,941 to 10,995. So it would seem that there has been a recent over-supply of accommodation in relation to current declining demand.

In 2011, Hoi An welcomed 1.4 million tourists, including 638,029 visitors using accommodation services. The province had 84 accommodation facilities with a total of 3,842 rooms and the occupancy rate of 50.5%. The revenue from tourism and services accounted for 58% of GDP of the city. The development of tourism industry has created the opportunities to develop new livelihoods and create jobs and income for 5,000 direct laborers and 12,500 indirect laborers.

4.14.7.2. AGRICULTURE AND FISHERIES

Agricultural area of the city is 2,147 hectares, of which 894.7 hectares are annual crop land, 740.6 hectares are forest land, 265.6 hectares are perennial crop land and 246.3 hectares are aquaculture land. Agricultural revenue is about VND 84,000 million (USD 4.5 million equivalent) but fishery revenue seems to be five times higher than agricultural revenue, with value is about more than USD 20 million. In 2011, the total production of shrimp from aquaculture ponds was 185.1 tons; the total aquatic product exploited from sea was 13,500 tons, of which 11,467 tons of fish, 685 tons of shrimps and 1,348 tons of other aquatic products (mainly mollusks).

Agricultural products include: crop production such as paddy rice, corn, sweet potato, cassava, peanut, sesame, bean, vegetable etc. fruits (coconut, cashew, etc.); animal husbandry such as cattle, buffalo, pig, chicken, duck etc. aquaculture products include fish, shrimp, etc. Livestock raising remains limited, estimated for 2011 in Hoi An City at 255 buffalos, 1,860 cows and 4,400 pigs (source: Statistical Yearbook 2012 for Hoi An City).

4.14.7.3. ACCESS TO WATER SUPPLY

The current water source for Hoi An is surface water from the Vinh Dien River at Vinh Dien Town, located approximately 10km from the Hoi An; water is transferred currently by pumping via a 300 mm diameter pipeline. In times of high salinity of the Vinh Dien source, Hoi An also uses underground water from 19 wells with an average depth of about 20 m. However, the quality of the underground water is reportedly poor due to high iron content and the daily flow that can be exploited is limited at 2,000 m^3/day only.

The original pipeline network in the city has a total length of about 32 km in diameter from 100-300 mm covering only for small part of the city, mainly the old town area. Water supplied from the existing water plant was only able to meet about 30% of domestic demand of the whole city. The majority of residents in Hoi An continue to use shallow well water which has become increasingly contaminated by domestic pollution and impacted by salinity. The population having access to water supply in Hoi An city is reported as more than 99%.

In 2012-2013, a new water plant is under construction in the city of Hoi An with a capacity of 15,000 m^3/day with raw water taken from the river at Vinh Dien town. A HDPE pipe of 500 mm diameter and 10 km long to convey raw water is presently being installed along the provincial road 608. The water intake in the Vinh Dien is now under upgrading by building a new raw water reservoir with a capacity of 12,000 m3 for the provision of water when water in the river has salinity.

According to Hoi An Water Supply and Drainage Enterprise, it is expected to combine the old water plant of 6,000 m^3/day with the new plant of 15,000 m^3/day. Therefore, up to 2020, total water supply capacity of Hoi An water supply system will be 21,000 m^3/day. This plant is planned to increase the capacity up to 40,000 m^3/day – 60,000 m^3/day in the future to supply potable water not only Hoi An City but also for the neighboring areas.

4.14.8. ACCESS TO SANITATION

The urban areas of Hoi An are currently served by a combined wastewater system consisting of masonry drains covered with concrete covers in most streets. The drains range in size from 0.4 to 1.m in width and .2 to .6m depth. The total length of the drains is about 40km draining to various nearby rivers and open water bodies in the city. In about 50% of the rural urban areas communes,

there are open drains or ditches. It is estimated that only about 20 -30% of households have connections to the drains; others drain directly to rivers, ponds, and open ditches or to the so called “leakage hole” made in the premises of the houses.

Most households (80 – 90%) have toilets connected to septic tanks. The septic tanks are of all forms, dimension, quality that people can afford. The efficiency of treatment is unknown but can be assumed to be low.

In the framework of French Assistance Project, a 12 M€ value separate waste water system is now being constructed for built-up areas of the city (including the ancient quarters). The system consists of 42km of small diameter sewer ranging in size from 110 - 500mm diameter, µPVC, 0.7- 3.4m buried depth pipes, 21 lift pumping stations, 4 raising pumping stations and a 6,750m3/day Activated Sludge WWTP (ref. Section 3.10. Associated Facilities).

4.14.9. SOLID WASTE MANAGEMENT

Solid waste is collected by PWC (Public Works Company). The PWC has a SW collecting team of 60 workers (including road sweeping workers) with 11 trucks (volume from 4 to 14m3). The PWC indicates a collection rate of about 80 – 90%of 6 0T/day of solid waste generated in the city.

The solid waste collected is transported to a SW processing (composting) plant (newly built in French assistance Project) and a landfill 5km away from the center of the city.

The plant is now in the period of trial operating. It has a capacity to process 50T/d. In the plant, waste is 2 stage hand classified to remove inorganic and foreign matters and organic matter composted to produce organic fertilizer. The inorganic matters are transported to the landfill. The fertilizer is now given free to farmers to encourage its use. The landfill has an area of 1 ha and was overloaded long ago; solid waste was then removed to Tam Ky landfill to make room for the new waste loads. Since then the situation has deteriorated and it is again overloaded with waste accumulated to a height of 2.5m. A new landfill is considered but not yet realized so far.

Septic tank emptying is done by private contractors coming from Da Nang city because the PWC is not allowed to do this due to lack of sludge dump site. An incineration furnace has been constructed in the hospital to burn medical hazardous waste.

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5. IMPACT ANALYSIS

5.1. METHODOLOGY

The impacts were identified by confronting the environmental and social baseline situation of the area with the activities related to each component and stage of the project. For every interrelation between Project activities and each pertinent environmental component, all probable impacts have been identified.

This identification was mainly based on:

- The technical information related to project components design and operation as presented in Chapter 3 of this report;
- Field visits conducted in June 2013 and October 2013 by the Consultant in the Project area;
- The Consultant experience of environmental impacts of a variety of projects including urban development, dredging and road construction;
- The checklists of potential impacts from various types of projects drawn up by international financial organizations (WB, ADB, AfDB).

The result of this analysis is presented in the following sections covering 1) impacts connected with the location of the projected facilities, 2) impacts connected with construction activities and 3) impacts connected with the actual operation of the facilities.

The potential impacts for each of these sections are presented in a summary table, followed by descriptions and analyses of the most probable significant impacts. These tables present, successively, the cause of the impact, the potential impact along with its risk level, the corrective measure along with the ease/difficulty of implementing it and the residual risk level after implementing the measure.

Each summary table shows, for each identified impact, an assessment of the overall risk level, taking three criteria into a consideration: the probability of occurrence of the impact as part of the project, the expected gravity of such an impact given no special corrective measures, and the difficulty of implementing the proposed corrective measures.

- The probability of occurrence reflects how often the impacts are observed during construction and operations: some impacts are inevitable (noise, dust, hydraulic changes downstream) whereas others occur only exceptionally (rockslide, explosion).
- The gravity of an impact incorporates various considerations of intensity of effects on the natural or human environment, its extent and its duration. All necessary efforts must be made to implement corrective and monitoring measures on impacts that are judged to be potentially serious.
- The overall risk relating to an impact, rated from 1 (low) to 3 (high) takes into account the abovementioned criteria.

Table [17] IMPACT ASSESSMENT CRITERIA

CRITERION	LEVEL 1	LEVEL 2	LEVEL 3
Difficulty for implementing corrective measures	Easy, inexpensive and generally effective	Demands special attention (monitoring or training, for example)	Difficult due to complexity or cost
Probability of occurrence of the impact	Low: can be seen in cases of negligence or accident	Medium: generally seen a few times during construction or during the operation of a hydropower facility	High: consistently seen if effective measures are not put in place

CRITERION	LEVEL 1	LEVEL 2	LEVEL 3
Gravity of the impact	Generally limited impact in terms of intensity, duration or extent	Significant environmental impact but without endangering human or animal populations	Major environmental impacts with risks to people or special-status animals
Overall Risk	Low: subject of routine monitoring but impacts are minor and easily manageable	Significant: merits special attention	Major: merits close monitoring and the implementation of effective measures

5.2. ANTICIPATED BENEFITS FROM THE PROJECT

The five sub-components of the Urban Environment and Climate Change Adaptation Project selected for Asian Development Bank financing will significantly improve the environmental conditions and quality of life of the population in Hoi An through the following results:

- Improvement of the water supply security for Hoi An and nearby secondary centers through using and increasing the water storage capacity of the Lai Nghi reservoir; reduction of the risk of brackish water distribution in the network as observed today during short periods of the dry season; adaptation to climate change particularly sea level rise;
- improvement of public safety and adaptation to long term climate change, particularly flooding, through the raise of road 608 which will secure evacuation of population to safer areas in case of major flood;
- Reduction of flood impact on the ancient city by improving storm water drainage and storage through increasing Phap Bao stormwater reservoir storage capacity;
- Improvement of wastewater collection with beneficial effects on public health and on surface and groundwater quality along Lai Nghi;
- Contribution to Hoi An economic development through the development of new urban areas taking due consideration of prevailing climate change risks (sea level rise and flooding) and direct effects on the quality of life of future residents;
- Improvement of public safety and public health as a result of the implementation of a flood early warning system.

5.3. IMPACTS RELATED TO PROJECT LOCATION

5.3.1. IMPACTS ON LAND ACQUISITION AND RESETTLEMENT

Road 608 improvement is a must regarding public safety. Indeed, the presently frequently flooded road is the main infrastructure for the evacuation of the population in case of major flood or typhoon event. The initial Project design proposed involved the raising and the widening of the facility. The project resulted in 204 affected households including the physical displacement of 96 households.

The mitigation measure proposed by the PPTA Consultant was to reconsider the widening of the road while keeping its raising up to a safer level. This option was accepted by QNPPC. As a result, anticipated impacts have been avoided as no land acquisition is required and no household affected or displaced.

Cua Dai Road land acquisition is already completed. No more land acquisition is anticipated.

Co Co New Urban Development Area (Co Co UDA) was initially involving the relocation of 200 households. Further to the revision of the project by the PPTA team, the new project design impacts only 37.6 ha of land; only one residential buildings will need to be demolished. Future refining of the development plan may further reduce the impact on land.

The dredging of Lai Nghi reservoir will only involve land acquisition of some areas within the reservoir boundary used for grazing and some recession agriculture. Total area required is only 3.54 ha. Only one building is affected.

The dredging of Phap Bao reservoir will involve only marginal land acquisition and no building demolition.

Impacts on land acquisition and resettlement are summarized in the following table.

Table [18] SUMMARY OF IMPACTS ON LAND AND BUILDINGS

PARAMETER	LAND ACQUISITION	LOSS OF BUILDING	RESETTLEMENT & COMPENSATION
Road 608	No land acquisition required	No building affected	No household faces physical displacement
Cua Dai Road	Land acquisition already completed (10.5 ha), no more land acquisition required	77 main housing structures	Small number of HH still discussing compensation level with authorities
Co Co UDA	Land acquisition totalizing 37.6 ha including 616 m² of residential land, 20.17 ha of agricultural land and 17.37 ha of fish ponds	1	Only 1 HH household to be physically displaced.
Lai Nghi Reservoir	Land acquisition limited to 3.71 ha of agricultural land located within the reservoir zone and 856 m² residential land	1	Only 1 HH household to be physically displaced.
Phap Bao Reservoir	Land acquisition of 1.38 ha of agricultural land	No buildings affected	Only 11 households to receive compensation for land acquisition

5.3.2. IMPACTS ON NATURAL RESOURCES

The project will not encroach on areas of valuable biodiversity. Some trees planted along road 608 may punctually need to be removed, but this situation may only be occasional as the road is not widened. Similarly, trees located in affected gardens will also be removed where land is acquired.

About 40 to 50 trees of variable size (3 to 10 m high) could be affected along road 608 and Lai Nghi reservoir, in the urbanized area. No trees along the road in the agricultural zone (paddy fields).

Some trees of small size may also be affected in the Co Co New Urban Development zone and along the corridor anticipated for the new access road to Cua Dai Bridge. The number should be below 30. No tree is anticipated to be cut for the dredging of Phap Bao reservoir, but few of them surrounding the reservoir, on the sidewalks, could need to be cut to facilitate the access of the backhoes and the trucks.

Although these trees are not considered to have biodiversity value, trees along roadsides in ancient Hoi An are large and mature specimens that have value in terms of landscaping, shade and visual amenity. In this part of the city as well as along road 608 a 1 to 1 replacement policy will be respected. For the Co Co area, this issue is not a concern as green areas will be part of the future development including tree planting for beautification. Much more trees will be planted than cut.

Deepening of Lai Nghi reservoir will remove large areas of aquatic weeds observed today (including water hyacinth *Eichornia crassipes*), because of the limited depth of the water which allows the plants to root. These weeds are transferred in the downstream irrigation system with the water, with risk of proliferation in the channels and consequently more maintenance needed for channels cleaning. With a deeper reservoir, the area of weeds will be reduced, limited to the shoreline, with more limited proliferation and risk for the irrigation scheme.

5.3.3. SUMMARY OF IMPACTS AND MITIGATION MEASURES

The following table summarizes the impacts relating to the location of the Hoi An Project Components.

Table [19] SUMMARY OF IMPACTS RELATED TO PROJECT LOCATION

COMPONENT OR ACTIVITY	POTENTIAL RISKS	POTENTIAL IMPACT	IMPACT ASSESS-MENT			CORRECTIVE OR SUPPORT MEASURE		OVERALL RISK AFTER CORRECTION
		DESCRIPTION OF IMPACT	PROBABILITY	GRAVITY	OVERALL RISK	DESCRIPTION OF MEASURE	EASINESS OF IMPLEMENTATION	
Road 608	Permanent and temporary land occupation	No land acquisition required No building demolition required	3	3	3	Mitigation measure implemented is modification of project design: PPTA revised initial project which involved 204 households. Road will only be raised, not widened as initially considered	3	2
		Impact on natural resources limited: 40 to 50 trees of medium size along roadside to be cut	3	1	1	Replanting trees along the road with a minimum of 1 planted for 1 cut.	1	1
Cua Dai Road	Permanent and temporary land occupation	10.5 ha have already been acquired and paid. No additional land acquisition required.	3	3	3	Implementation of good practices according to ADB safeguard requirements and Vietnamese applicable regulations. PPTA social team ensures fair procedures and ADB safeguards are complied with	3	2
		Insignificant impact on natural resources, only few trees affected, area is almost exclusively paddy fields	1	1	1	Beautification program including tree plantation along the road already included in the project. No particular measure required	-	-
Co Co New Urban Delopment Area	Permanent and temporary land occupation	Land acquisition 37.6 ha of land required including 20.2 ha agriculture land and 17.4 ha fishponds. 1 building to be demolished.	3	3	3	Implementation of good practices according to ADB safeguard requirements and Vietnamese applicable regulations. Fair compensation for losses Initial project intended to demolished buildings located in parts of the area. PPTA revised plan to integrate and preserve existing residential areas within the urban development program.	3	2
		Unsignificant impact on natural resources, only few trees affected, area is almost exclusively paddy fields	1	1	1	Beautification program including tree plantation along the road already included in the project. No particular measure required	-	-
Lai Nghi reservoir dredging	Permanent and temporary land occupation	Only small plot of land (3.7 ha) located within reservoir boundaries and used for grazing and recession agriculture	1	2	1	Implementation of good practices according to ADB safeguard requirements and Vietnamese applicable regulations. Fair compensation for losses	1	1
		Large areas of aquatic weeds to be removed and deepening of the reservoir will reduce the development of weeds	-	-	-	No particular action required	-	-
Phap Bao Reservoir Dredging	Permanent and temporary land occupation	Marginal land acquisition required (1.4 ha), no building affected	-	-	-	No particular measure required	-	-
		Areas of aquatic weeds to be removed; deepening of the reservoir will reduce the development of weeds				No particular action required	-	-

5.4. IMPACTS AND MITIGATION DURING CONSTRUCTION STAGE

5.4.1. UXO ISSUES

Unexploded ordnances may become a public safety issue in the Indochina peninsula when development projects involve extensive dredging and earthworks. In the present project, as Hoi An was not affected by bombing during the war, no particular risk is anticipated and no UXO survey is required as a prerequisite for dredging operations.

5.4.2. DISRUPTION TO COMMUNITY UTILITIES

Utility relocation poses only a short term concern to residents affected by construction activities. Interruptions to power and communication, disruption of water supply, discoloration of water from re-located pipes can be anticipated for road 608 component. To minimize impacts, the contractor shall implement the following measures:

1) Water supply pipelines, power supply, communication lines and other utilities shall be re-provisioned before construction works commence
2) Provisions shall be made to preserve the operation of current facilities in sufficient quantity and in agreement with the local community.
3) Re-provisioning shall be undertaken in coordination with the utility company.
4) Affected households and establishments shall be notified at least 3 days in advance of such disruption.

5.4.3. IMPACTS ON AIR QUALITY

5.4.3.1. MAJOR SOURCES OF IMPACT

The main sources of air pollution are machines burning fuel for digging, transportation and loading. Dust and waste gas from these machines affect air quality surrounding work place. Areas most affected are located in a range of around 100 m all around project sites, but also along the main access roads to sites which will be supporting the heavy truck traffic.

The production of dust is generally the most widely perceived nuisance generated by earthworks and transport on non-surfaced roads during dry seasons. Activities related to Lai Nghi reservoir and to Phap Bao reservoirs will involve the removal of significant volumes of sediment which, if temporarily stocked on site may dry and release suspended particulates under the wind. The risk is however limited to the dry period but could be significant considering the density of population next to the works. The same comment applies for the Road 608 which will be raised and which will involve extensive earthworks next to residential areas.

Another source of dust release is the mud collected by the truck wheels within the construction site premises and released on the public road where it dries and generates dust.

Carbon and other harmful pollutants may also be released through the burning of waste on construction sites, including plastics.

5.4.3.2. MITIGATION MEASURES

Best management practices will be adopted during construction to minimize dust and combustion exhaust emissions. Mitigation measures to be implemented by the contractor to minimize impacts on air quality are listed below:

1) Before site works commence, an Air and Dust Control Plan shall be prepared by the contractor and shall be approved by the Project Supervision Consultant (PSC). The plan shall provide details of mitigation measures, specific location and schedule where such

measures shall be implemented to minimize impacts to sensitive receptors (residential areas, schools, hospitals, etc.) due to construction works, sourcing and transport of construction materials, and other project-related activities.

2) Reduce pollutant emission at source: Wherever possible, use electrically-powered equipment rather than gas or diesel-powered equipment; Use only vehicles and equipment that are registered and have necessary permits; Construction equipment and vehicles shall be well-maintained and shall meet national TCVN emission standards; Undertake immediate repairs of any malfunctioning construction vehicles and equipment;

3) Burning of wastes generated at the construction sites, work camps and other project-related activities shall be strictly prohibited.

4) Position any stationary emission sources (e.g., portable diesel generators, compressors, etc.) as far as is practical from sensitive receptors;

5) Control the risk of dust release: Keep stockpiles moist and cover vehicles with tarpaulin sheets or other suitable materials to minimize dust emission and prevent spillage of materials (e.g., dredged sediment, cement, stone, sand, aggregates, etc.); Provide temporary covers (e.g., tarpaulins, grass, etc.) on long term materials stockpiles; Store dredged materials from Lai Nghi within the reservoir boundaries, but where there is no area, spoils shall be loaded and transported immediately; provide wheel cleaning facility for any truck/car leaving muddy construction site and accessing to public road; Clean daily road surfaces of debris/spills from construction equipment and vehicles;

6) Ensure availability of water trucks on site and if the works surface and access roads near sensitive receptors (i.e. residential areas, roadside tea and food stalls, schools, hospitals and other sensitive receptors) are dry and dusty, spray water on the exposed surfaces to reduce dust emission.

7) Impose compliance with speed limits on construction vehicles to minimize road dust in areas where sensitive receptors are located.

8) Provide prior notification to the community on schedule of construction activities which may generate some dust and Implement 24 hour community complaints hotline.

5.4.4. IMPACT ON NOISE AND VIBRATION

5.4.4.1. SOURCES OF IMPACT

The raising of road 608 could possibly be the most impacting site in terms of noise nuisances due to the operation of heavy equipment in immediate vicinity with residences located along the road. The dredging of Phap Bao reservoir surrounded by residential neighborhoods will also be a sensitive construction site regarding noise nuisance. Activities related to Cua Dai Road and Co Co Urban Development will be less noise impacting as the area is only partly populated at present.

Along the hauling roads for material and dredged sediment, the average noise will probably be increased because of the increase of truck traffic, but the peak level of noise should not be increased as these roads area already busy with noisy trucks.

The following table provides some typical noise levels measured at various distances from the emission point related to various construction machineries.

At night, construction noise would impose a severe nuisance on the residents in the vicinity, especially those located at less than 50 m. Night working and especially the use of the noisiest equipment during the night should then be strictly controlled in order to minimize the impact of noise on the surrounding residents. In particular for excavations, drills used outside at the beginning of tunnel construction should be forbidden at night.

Table [20] NOISE LEVELS OF VARIOUS CONSTRUCTION EQUIPMENT IN DB(A)

EQUIPMENT TYPE	15 M	30 M	50 M	100 M	200 M
Excavator	78	72	67	61	53
Bulldozer	78	72	67	61	53
Drilling machine	89	83	78	72	66
Air compressor	75	69	64	58	52
Vibrator	76	70	65	59	53
Mixer	75	69	64	58	52
Truck	76	70	65	59	53

Vibration generated during construction and operation has the potential to cause amenity and physical (structural) impacts at receivers. Construction activities anticipated in the Project should not generate significant vibration. The most critical activities will concern (i) probable sheet piling in Lai Nghi reservoir for isolating unit areas for dredging activities, but vibration should disperse quickly in the sedimentary underground and (ii) compaction of road 608, creating less intense vibrations but much closer to residential zone.

5.4.4.2. MITIGATION MEASURES

1) Before site works commence, a Noise Control Plan shall be prepared by the contractor and shall be non-objected by the supervision engineer (SE). The plan shall provide details of mitigation measures, specific location and schedule where such measures shall be implemented to minimize impacts to sensitive receptors (residential areas, schools, hospitals, etc.) due to construction works, sourcing and transport of construction materials, and other project-related activities.

2) Restrict noisy construction activities as well as the transport of materials to day time from 6:00 AM to 9:00 PM, and enforce the compliance during night time with Standards QCVN 26:2010/BTNMT (National Technical Regulation on Noise) and QCVN 27:2010/BTNMT (National Technical Regulation on Vibration).

3) Reduce level of noise for surrounding population through a set of measures: Position any stationary equipment that produce high noise levels (e.g., portable diesel generators, compressors, etc.) as far as is practical from sensitive receptors; whenever possible, completely enclose noisy equipment which can reduce noise level by 15-25 dB(A) and restrict use of noisy equipment (e.g.15 min for every consecutive 30 min period); erect temporary walls around the construction sites, as necessary, especially near sensitive areas such as schools, hospitals, houses, etc. Temporary noise barriers (3-5 meter high) can reduce noise level by 5-10 dB(A); all construction equipment and vehicles shall be well maintained, regularly inspected for noise emissions, and shall be fitted with appropriate noise suppression equipment consistent with applicable national and local regulations;

4) Train truck drivers: minimization of the use of horn, compliance with speed limitation particularly in residential zones.

5) Provide prior notification to the community on schedule of noisy construction activities and implement 24 hour community complaint hotline.

5.4.5. IMPACTS FROM THE GENERATION OF SEDIMENTS

5.4.5.1. SOURCE OF IMPACTS

The project will generate a significant volume of materials including inert construction waste and mainly sediments from dredging/excavations works to increase the storage capacity of Lai Nghi and Phap Bao reservoirs. It is anticipated the production of at least 530,000 m^3 for Lai Nghi and 50,000 to 80,000 m^3 for Phap Bao. These volumes are considerable and need to be appropriately managed as several impacts are potentially linked to sediment management:

Land occupation: if considering only Lai Nghi, to dispose the volume of sediment on a say a maximum of 6 m depth fill (limited height for safety reasons) results in the acquisition of about 10 ha of land with appropriate hydrological and drainage conditions. The first way to reduce land occupation is to increase the depth of the fill, but it is considered that above 6 m, the risk of instability increases and the design of the fill requires more sophisticated conception and geotechnical considerations.

The second way, the preferred one, is to reuse as much as possible the spoil for fill requirements of other projects and thus to reduce the eventual volume of disposable spoil. If the sediment quality is compliant for fill, most of the excavation products from Lai Nghi and Phap Bao should be re-used: Cua Dai road construction will mobilize almost 500,000 m^3 of fill, and Road 608 about 100 to 150,000 m3. Co Co UDA will require much more than these quantities. So it is expected that most of the excavation products will be reused. Only a part of the dredging products, too fine for fill, may be rejected as spoil. A potential area has been already identified by QNWSDC for the disposal of the spoils, located next to Lai Nghi reservoir. However, the area still requires the preparation of an EIA according to Vietnamese applicable regulations and to be approved by DONRE, both being prerequisite for starting works.

Soil and water pollution: this may be a risk when sediments are dredged from rivers receiving large amounts of wastewater, particularly untreated wastewater from industries, where toxics as heavy metals accumulate. A survey was carried out by the PPTA including sampling of sediments in Lai Nghi and Phap Bao for chemical and grain size analysis. Results are provided in Table [21] below. Results are good, none of the criteria measured being above permissible standard. The total organic carbon is also low, around 1.5% only. The sediment can be disposed without particular risk regarding soil or water contamination.

Table [21] RESULTS FROM LAI NGHI AND PHAP BAO SEDIMENT CHEMICAL ANALYSIS

	LAI NGHI 1	LAI NGHI 2	PHAP BAO 1	STANDARD*
PHYSICAL ANALYSIS (GRAIN SIZE)				
Coarse sand (0.5-1 mm) %	84.43	11.00	22.13	-
Fine sand (0.02-0.5 mm) %	13.53	66.80	65.79	-
Loam (0.002-0.0.2 mm) %	1.03	9.40	5.4	-
Clay (<0.002 mm)	1.01	12.80	6.68	-
CHEMICAL ANALYSIS				
Cadmium (mg/kg)	0.0112	0.0142	0.0122	3.5
Copper (mg/kg)	10.0853	2.2879	2.2879	197.0
Lead (mg/kg)	0.3984	0.6725	0.6725	91.3
Zinc (mg/kg)	0.3378	0.3787	0.3787	315
Total Organic Carbon (%)	0.082	1.505	1.505	6

Note: Reference standard is QCVN 43: 2012/BTNMT (sediment quality); Source: PM Group, 2013

Traffic increase with public safety and nuisances issues: this is related to the transport of the dredged sediment to its disposal site. For Lai Nghi, the removal of the 530,000 m3 corresponds to about 60,000 truckloads or 120,000 truck movements. With a disposal site at only 10 km from the reservoir, the transport will represent 1.2 million truck-km or almost 240,000 liters diesel required. This traffic increases the risk of accident, the noise and the level of air pollution in the residential areas crossed, and has to be minimized.

Potential re-use of the dredged sediment: According to grain size analysis presented above, sediment is mainly sandy with limited fraction of fine materials, which makes it usable for filling purposes. Fill will be required in significant quantities for 2 components of the present Project, the raising of Road 608 and the Co Co New Urban Development area. Assuming an average raising of the road by 2 m and 10 m width, this may represent a requirement of about 140,000 m3, or about 25% of the anticipated Lai Nghi sediment production.

The Co Co New Urban Development area mainly consists of fishponds and paddy fields at present, all requiring heavy filling before being developed and urbanized. The technical studies consider the filling of the area through dredging of the Co Co river located next to the area. However, the dredging of the Co Co river is no more considered in the Phase 1 of the Project but has been included as a Phase 2 component. Another constraint may be related to the salinity of the fill material as the Co Co river is brackish, which may impact eventually the foundations of the new buildings. The urban development area may easily absorb the total volume of sediments produced from Lai Nghi and from Phap Bao reservoirs.

5.4.5.2. MITIGATION MEASURES

The following measures are recommended to minimize impacts related to spoil management:

1) Before site works start, a Dredging and Sediment Management Plan will be prepared by the Contractor in charge of reservoir dredging operations, and shall be approved by PSC. The plan shall present the followings:

   – Method statement for dredging activity with obligation (i) to minimize sediment release in the water and (ii) to guarantee permanent flow to the pumping station in required quantities for irrigation.

   – Analysis of sediment quality (chemical and geotechnical) and appreciation of potential re-use for filling;

   – Estimation of sediment volumes produced and schedule of production;

   – Optimization of sediment re-use in particular for Road 608, Cua Dai road and Co Co New Urban development;

   – Estimation of spoil volume not reusable and identification of the required disposal area.

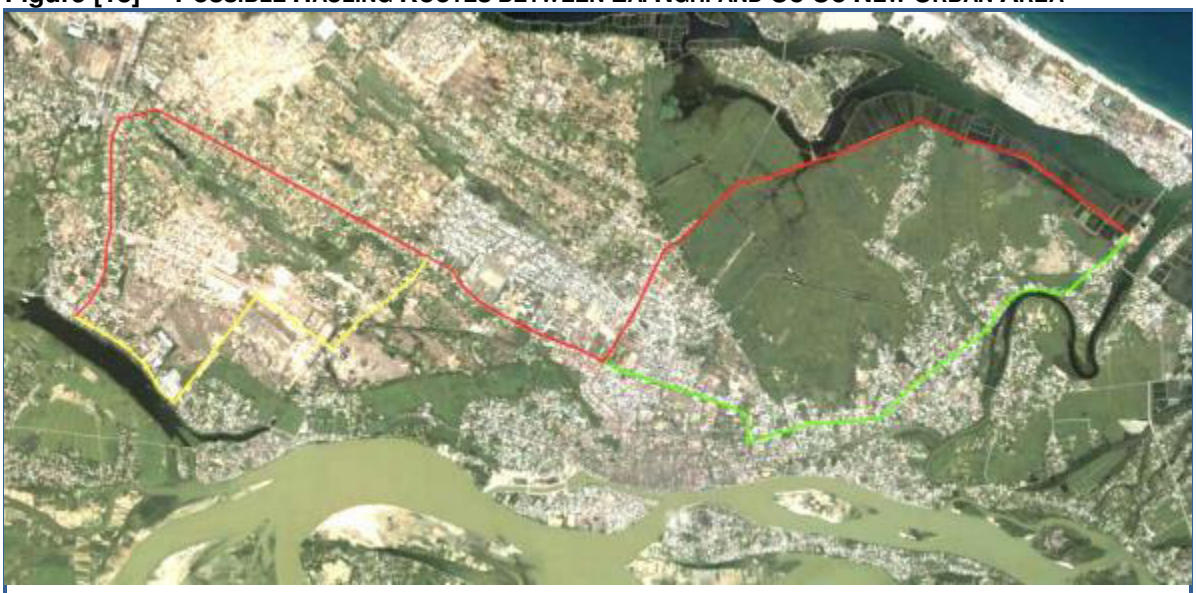
   – Method Statements for the temporary storage of sediment regarding stabilization of slopes, drainage, erosion and sediment control of sediment piles, measures against dust on and off sites, etc.

   – Designation of preferred hauling routes to limit the crossing of urban areas from the dredging site to the point of disposal. In the case the sediment is used in Co Co New Urban Area, only few alternative routes are available as presented in the following Figure [18] . In this case, route in red is preferred to yellow and green as it avoids residential areas on a significant part of its corridor.

2) Any temporary or permanent storage of spoil must be at least 50 m for any river. The stockpiles shall be constructed with smooth slopes and free drainage patterns. Temporary spoil stockpile will not exceed 3 meters and the slope will not be more than 2:3.

3) Wheel washing system shall be implemented on each site (dredging and disposal).

Figure [18] POSSIBLE HAULING ROUTES BETWEEN LAI NGHI AND CO CO NEW URBAN AREA



Source : PM Group, 2013

5.4.6. OFF-SITE PUBLIC SAFETY AND INCONVENIENCE

5.4.6.1. SOURCE OF IMPACTS

The raising of Road 608 and activities in Phap Bao reservoir located inside the city center will definitely reduce the accessibility to certain streets, reduce the number of usable lanes and create traffic congestion. The presence of population including children next to construction activities where heavy machinery is operating and with the presence of excavations and construction equipment creates additional risks of accident for the public.

Also, the working area may temporary alienate access to work sites, schools and community facilities. In addition, retail merchants will suffer economic losses if access id denied to their establishments. Construction activities in Cua Dai and Co Co areas will present the same type of risks but at a lower scale due to the lower density of population next to the sites.

The project will be required to take all the necessary measures in order to minimize the detrimental side effects of construction activities particularly regarding traffic and public safety.

5.4.6.2. MITIGATION MEASURES

The following measures shall be implemented by the contractor to address impacts to traffic flow and access to properties:

1) Before site works commence, a Traffic Management Plan for the construction phase shall be prepared by the concerned contractors and shall be approved by the PSC. The plan shall be designed to ensure that traffic congestion due to construction activities and movement of construction vehicles, haulage trucks, and equipment is minimized. The plan shall be prepared in consultation with local traffic police and discussed with people's committees at the district and commune levels. The plan shall identify traffic diversion and management, define routes for construction traffic from materials storage/parking areas to construction site and from construction site to waste disposal locations, traffic schedules, traffic arrangements showing all detours/lane diversions, modifications to signaling at intersections, necessary barricades, warning/advisory signs, road signs, lighting, and other provisions to ensure that adequate and safe access is provided to motorists in the affected areas.

2) Provide signs advising road users that construction is in progress and that the road narrows to one lane using cones.

3) Employ flag persons to control traffic at sites for safety reasons when construction equipment is entering or leaving the work area.

4) Lanes through the work site created by rope or flagging, shall be developed to minimize risks and injuries from falling objects.

5) Post traffic advisory signs (to minimize traffic build-up) in coordination with local authorities

6) Provide road signs indicating the lane is closed 500 m before the worksite and signs to indicate the proposed detour road.

7) Provide sufficient lighting at night within and in the vicinity of construction sites.

8) Regularly monitor traffic conditions along access roads to ensure that project vehicles are not causing congestion.

9) As much as possible, schedule delivery of construction materials and equipment as well as transport of spoils during non-peak hours.

10) Implement suitable safety measures to minimize risk of adverse interactions between construction works and traffic flows through provision of temporary signals or flag controls, adequate lighting, fencing, signage and road diversions.

11) Comply with traffic regulations and avoid, where possible, roads with the highest traffic volumes, high density of sensitive receivers or capacity constraints are not used as access to and from the construction areas and spoils disposal sites.

12) Install temporary accesses to properties affected by disruption to their permanent accesses.

13) Reinstate good quality permanent accesses following completion of construction.

5.4.7. IMPACTS FROM WASTE PRODUCTION

5.4.7.1. SOURCE OF IMPACTS

Quantities of solid waste will be generated by construction activities or by worker camps and canteens. Pollution risks are high if this waste is not managed appropriately, with secondary impacts on water and air quality, and the risk of developing disease vectors (mosquitoes, flies, rats) harmful to public health. A plan for managing all these types of waste must be put in place to avoid cross-contamination.

There are three categories of waste to consider: household waste, inert construction waste and hazardous waste.

The quantity of domestic waste, mainly produced by temporary or permanent camps set up for the needs of the project, can be estimated at 0.5 to 0.7 kg/person/day. This waste mainly includes waste from canteens, packaging, plastic bottles, glass bottles, paper and cardboard. As we are located in an urban area which may supply most of the manpower required, it is not anticipated large worker camps, but small camps on the sites to ensure a presence 24h and the protection of the equipment. Production of waste will be rather limited, nevertheless it is worth being properly managed.

Inert construction waste is generated on the construction sites in variable quantities. It consists mainly of wood, packing boxes, scrap, plastics and concrete debris (the later coming from the few buildings to be demolished). This waste is generally disposed of, and landfilled in appropriated sites or in permanent inert materials sites. They represent no direct danger to health. Scrap metal is generally collected for recycling. Wood and cardboard waste if burnt will produce fumes and nuisance for the neighborhood.

Hazardous waste such as vehicle batteries, oil filters, various containers that had held hazardous products (mainly paints and solvents) and other alkaline/lithium ion batteries is generated by construction activities, but in specific places and in limited quantities. This waste is very harmful to the environment and public health and must receive appropriate treatment so as to ensure it is eliminated safely. The main risk comes from used engine and hydraulic oil resulting from the

maintenance on site of heavy equipment (backhoe, bulldozer, levelers, etc.) and which may be produced in large quantities. If released on the ground, these hydrocarbons will involve surface and underground water pollution. It is not anticipated the maintenance of trucks on site, as the project is developed in an urban area garage facilities are available for trucks. Hazardous waste also includes sludge from temporary toilets and from chemical toilets to be installed on construction sites within urbanized areas.

5.4.7.2. MITIGATION MEASURES

To avoid such impacts, the contractor shall be requested the following:

Prior to the start of the works, to prepare a Waste Management Plan addressing the management issues related to all types of waste: anticipated production and schedule, collection system proposed, disposal methods and location. The Plan will reflect the following obligations:

For Non-hazardous Waste

1) Provide garbage bins and facilities within the project sites for temporary storage of construction waste and domestic solid waste and ensure that wastes are not haphazardly dumped within the project site and adjacent areas.

2) Implement an employee awareness program in waste management and site cleanliness.

3) Organize with Hoi An Municipal Services the regular collection of domestic waste in the project sites.

4) Identify recognized regional recycling companies to collect recyclable waste on a regular basis. Set up a storage center where the material is unloaded under supervision; the temporary storage facility will be implemented in an area at least 100 m from a residential boundary, with weatherproof flooring and roofing, security fencing and access control and drainage/wastewater collection system.

For Hazardous Waste

1) Sludge from septic tanks or chemical toilets temporary implemented on construction sites will be removed by a registered company and transferred to the existing disposal site used by the Municipality of Hoi An.

2) Waste engine oil and hydraulic lubricants from the maintenance of heavy machinery and the floating oily residue from oil separators will be collected and stored in tightly sealed containers to avoid contamination of soil and water resources. Transport and off-site disposal of such wastes shall be consistent with national and local regulations

3) Containers will be stored in a dry and covered area, the waterproof floor surrounded by a bund the height of which will ensure retention of a volume equal to at least 110% of that of the largest container stored in the area, and equipped with an oil separation system at its outlet, all above flood level.

4) The Contractor will identify an acceptable recycling point (refinery) or an industrial facility where the waste can be burned (as fuel substitute in a plant such as a cement factory or metal foundry). A register will be maintained to record all handling of used lubricants, for the purpose of monitoring wastes.

5) Used chemical substances: the principal action to limit the management of used chemical substances is to use ones with low toxicity values and use the minimum quantity of chemical substances required. Used chemical substances will be stored in containers or drums in the same storage areas as used oils, as long as these substances are compatible. Otherwise, they will be stored in a safe area protected from inclement weather. The possibility of reuse in situ will be evaluated; failing this, the materials will be returned to the supplier or to appropriate waste treatment installations.

6) Supplies: batteries, vehicle batteries, oil filters, printer cartridges from the site will be sorted and deposited in separate containers. The contractor will identify a circuit for elimination of these products and will submit his choice to the Supervision Engineer for non-objection.

7) Medical wastes from the First Aid stations on site will be placed in appropriate, secure containers and regularly delivered to the Hoi An Hospital equipped with an incinerator.

8) Metal or plastic containers that have contained hazardous or toxic chemical substances will be collected by a registered company for treatment and recycling.

5.4.8. HAZARDOUS MATERIAL MANAGEMENT AND ACCIDENTAL SPILL

According to the type of construction activities anticipated for the Hoi An components, it is not anticipated significant storage of hazardous products on sites, except some storage of fuel for refill of the heavy equipment and engine/hydraulic oil for maintenance. In case of accidental spillage, the risk of water pollution is significant, as well as the risk of fire if dealing with diesel. These impacts will be addressed through implementation of the following measures by the contractors:

1) Before site works commence, a Spill Response and Management Plan shall be prepared by the contractor and shall be non-objected by project supervision consultant (PSC). The plan shall provide details of procedures, responsibilities, resources, documentation and reporting requirements, training provisions for relevant staff, etc. to avoid spills of hazardous substances (either new or waste) and to effectively respond quickly and efficiently to such incidents, in case these occur.

2) Store fuel and hazardous substances in dedicated areas similarly equipped than those presented for hazardous waste (see above). If spills or leaks do occur, undertake immediate clean up.

3) Ensure availability of spill clean-up materials (e.g., absorbent pads, fine sand, etc.) specifically designed for petroleum products and other hazardous substances where such materials are being stored.

4) Train relevant construction personnel in handling of fuels and spill control procedures.

5) Ensure all storage containers are in good condition with proper labeling, regularly check containers for leakage and undertake necessary repair or replacement.

6) Store hazardous materials above flood level.

7) Equipment maintenance areas shall be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency. Discharge of oil contaminated water shall be prohibited.

5.4.9. IMPACTS ON WATER RESOURCES QUALITY AND USE

5.4.9.1. SOURCES OF IMPACT

The project does not include activities directly in river beds. However, activities related to Lai Nghi reservoir excavation may, if not appropriately managed, alter the quality of the surface water in the reservoirs and eventually the rice field irrigated from Lai Nghi. Similar situation may happen for Phap Bao, the Thu Bon river being the eventual receiver of the drained water. The main risks concerned include:

Increase of the suspended sediment in the reservoir water: Excavation or dredging activities will definitely increase locally the suspended sediment in the reservoir water. The impact is limited for Phap Bao as the work will be carried out at a time there is almost no water in the drainage system. Suspended sediment will definitely sediment back on site. Situation is different for Lai Nghi as the water in the reservoir is used for irrigation, and will continue to be used during dry season and excavation activities. It is necessary to avoid the transport of too much fine sediment to the intake of the pumping station which may fill and clog the intake. The filling of the Co Co New Urban Area concerns mainly paddy fields and partly fish ponds, with no direct contact with the Co Co river, so a limited risk.

Fine sediment re-suspended in the water may release some pollutants as heavy metals trapped into the sediment. The risk seems limited considering that results from sediment analysis carried out under the present PPTA and which confirm the level of contamination is far below permissible

standards (see table below). No risk regarding agriculture (for Lai Nghi) or the aquatic biodiversity of the Thu Bon (for Phap Bao) is anticipated.

Reduction of water availability for irrigation: The excavation works of Lai Nghi reservoir could temporarily threat the irrigation pumping station operation and affect the production of the paddy fields relying on the reservoir. Preventive measures shall be implemented to keep all these potential impacts under control and avoid interrupting irrigation water supply.

Pollution impact from hazardous material/waste accidental spill or leakages: the risk concerns mainly the reservoirs themselves but also the site related to the construction of the new water intake for Lai Nghi reservoir, located on the Thu Bon left bank. Such pollution event may happen in Lai Nghi or in Phap Bao considering the probable high number of heavy equipment operating and the flow of truck coming for loading, or near the water intake.

Pollution by wastewater and solid waste from construction facilities: This may happen if environmental control of the sites is not provided by the contractor. Also, pollution of water resources may result from the discharge of water from the washing of heavy equipment (hydrocarbon pollution) or from the concrete trucks (alkaline pollution).

5.4.9.2. MITIGATION MEASURES

The contractor will be required to prepare a Water Resource Management Plan to detail measures for the protection of water usage and water quality during the construction period. These measures and contractor obligations will concern:

1) The organization of dredging/excavation operations in both reservoirs in order to isolate working areas from the rest of the reservoir using sheet piles, to contain within a limited area the unavoidable increase of water suspended sediment during dredging.
2) The organization of Lai Nghi dredging to secure on a permanent basis the required flow of water to the irrigation pumping station;
3) All the water pumped during the dredging activity which will have high suspended sediment content will be discharged in a sedimentation facility before being returned to the reservoir.
4) All activity or camp sites located next or within the boundaries of the reservoirs will be provided with sanitation systems (mobile toilets or temporary septic tanks), solid waste collection facilities and dedicated storage areas for hazardous material or waste (fuel, oils) all above flooding level.
5) Implement a dedicated area for equipment cleaning/daily maintenance, involving full waterproof floor, peripheral drainage ending in a sedimentation pond followed by an oil-water separator. If concrete trucks are washed on site, water in the pond will be buffered to neutrality by acid before being returned to the environment.
6) Implement a procedure for spill/leakage control during refueling of heavy equipment on site.

5.4.10. IMPACTS ON CULTURAL AND HERITAGE RESOURCES

5.4.10.1. SOURCES OF IMPACTS

No identified sites of heritage significance will require removal or demolition as part of the construction works and there will be no land acquisition of any heritage sites. However, even if no valuable physical cultural resource has been identified from the project sites, impacts on archaeological relicts may happen particularly during dredging operations in the two reservoirs.

5.4.10.2. MITIGATION MEASURES

The following 'chance to find' procedure will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

1) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.

2) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.

3) If the site supervisor determines that the item is of potential significance, an officer from the Department of Culture and Information (DCI) will be invited to inspect the site and work will be stopped until DCI has responded to this invitation

4) Work will not re-commence in this location until agreement has been reached between DCI and QNWRC as to any required mitigation measures, which may include excavation and recovery of the item

5) A precautionary approach will be adopted in the application of this procedure.

5.4.11. HEALTH AND SAFETY OF WORKERS

The project will concentrate a number of workers which are mainly expected from Hoi An and surrounding areas. It is probable that only a limited number of workers is recruited outside the region and will live in camps. To ensure appropriate health and safety conditions for the workers, a Health and Safety Management Plan shall be prepared by the concerned contractors and shall be approved by the PSC. The plan shall be designed to ensure that Vietnamese labor regulations as well as international good practices related to health and safety are efficiently implemented on site and shall comply with the following obligations:

1) The Plan shall address health and safety hazards associated with construction activities (e.g., working at heights, excavations, etc.) establishment and operation of construction/worker's camps, use of heavy equipment, transport of materials and other hazards associated with various construction activities.

2) Appoint an Environment, Health and Safety manager to look after implementation of required environmental mitigation measures, and to ensure that health and safety precautions are strictly implemented for the protection of workers and the general public in the vicinity of construction areas

3) Conduct awareness training for construction workers regarding health and safety measures, emergency response in case of accidents, fire, etc., and prevention of HIV/AIDS and other related diseases.

4) Provide first aid facilities that are readily accessible by workers.

5) Provide fire-fighting equipment at the work areas, as appropriate, and at construction camps.

6) Provide adequate drainage in workers camps to prevent water logging/accumulation of stagnant water and formation of breeding sites for mosquitoes.

7) Provide adequate housing for all workers at the construction camps.

8) Provide reliable supply of potable water.

9) Provide separate hygienic sanitation facilities/toilets and bathing areas with sufficient water supply for male and female workers.

10) Establish clean canteen/rest area.

11) Ensure proper collection and disposal of solid wastes within the construction camps consistent with local regulations.

12) Provide fencing on all areas of excavation greater than 2 m deep.

13) Provide appropriate personnel protection equipment (PPE) such as safety boots, helmets, gloves, protective clothes, goggles, ear protection and ensure the equipment is effectively used.

14) Ensure reversing signals are installed on all construction vehicles.

15) Implement precautions to ensure that objects (e.g., equipment, tool, debris, etc.) do not fall onto or hit construction workers.

16) Implement fall prevention and protection measures whenever a worker is exposed to the hazard of falling more than two meters, falling into operating machinery or through an opening in a work surface. Based on a case-specific basis, fall prevention/protection measures may include installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area, proper use of ladders and scaffolds by trained employees, use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard, fall protection devices such as full body harnesses, etc.

5.4.12. SUMMARY OF IMPACTS AND PROPOSED MEASURES

The table below summarizes the impacts identified and the corrective measures proposed for the Hoi An Project Components during the construction period. For the meaning given to the evaluation of the impact, see Section 5.1: Methodology for Impact Assessment.

Table [22] SUMMARY OF IMPACTS AND MITIGATION MEASURES DURING CONSTRUCTION

COMPONENT OR ACTIVITY	POTENTIAL RISKS	DESCRIPTION OF POTENTIAL IMPACT	IMPACT ASSESSMENT			CORRECTIVE OR SUPPORT MEASURE		
			PROBABILITY	GRAVITY	OVERALL RISK	DESCRIPTION OF MEASURE	EASINESS OF IMPLEMENTATION	OVERALL RISK AFTER CORRECTION
Land preparation	Excessive destruction of trees	Limited impact for the whole project with only limited number of road trees affected: between 40 and 50 along Road 608 and few along Cua Dai Road.	3	1	1	Monitoring of tree cutting by SE, and maximization of conservation	1	1
						Greening program considering at least 1 tree planted for 1 tree cut	1	1
	Interference with compensation & resettlement	Construction works start while land acquisition is not completed, raising conflicts with concerned population	1	3	2	Procedure with issuance of a land acquisition certificate as a prerequisite for authorizing contractor to access the land.	2	1
						Monitoring by SE-DES of land acquisition progress and of issuance certificate		
Workers' camps (Main camps)	Pollution of surface water and groundwater	Wastewater discharged into the external environment	3	2	2	Wastewater receives treatment before being released outside premises (septic tanks/drains)	3	1
						Contractor to monitor the quality of effluents released outside the bounds of the camps	1	1
	Zones of stagnant water	Proliferation of water-borne disease vectors (mainly dengue fever and malaria)	2	3	2	Create and maintain ditches to ensure efficient drainage and drain all stagnant water zones in camp	2	1
						Regular treatment of living areas with pesticides	1	1
	Health risks	Development of diseases linked to deficit in hygiene	2	2	2	Systematic awareness sessions for all new arrivals at the camp: meetings, posters in circulation areas, monitored by the camp chief	1	1
		Risk of epidemics in the camps	2	2	2	Prevention by automatic medical check-up at hiring	1	1
						Monitoring of hygiene conditions at the camps	2	1
						Anti-malarial prophylaxis, including mosquito netting	1	1
						Communication with the surrounding populations and local authorities.	2	1
	Workers' living conditions	The most serious impact would be that the contractor does not provide acceptable housing and subsistence for all the workers.	2	3	3	Include detailed specifications for equipping and managing the camps in the tender documents.	1	1
Water supplied in workers' camps	Non-potable water supplied.	Impact on public health, risk of epidemics. Risk is limited as the project components are located within or next to urban areas, camps will probably be limited in number and size and easily connected to Hoi An water supply network	1	3	2	Supply packaged water (bottles, 20 litre tubs) for the small camps on sites (with few peoples sleeping on site)	1	1

Component or activity	Potential risks	Description of Potential Impact	Impact assessment			Corrective or support measure		Overall Risk after Correction
			Probability	Gravity	Overall Risk	Description of Measure	Easiness of Implementation	
						Contractor to regularly monitor coliforms	2	1
Workshops and garages	Water and soil pollution	Stormwater drainage contaminated by pollutants which flows to the reservoirs or Thu Bon river. Impact concerns all components of the project possibly more sensitive for Lai Nghi operating in an aquatic environment linked to irrigation water use	3	2	2	Drains of workshops and garages equipped with oil separators	2	1
						Properly store hazardous products (including hydrocarbons). See activity "Use and storage of hazardous products"	1	1
						Monitor and control used oil: Monitoring registers/logs and dedicated storage areas.	1	1
Sheet piling	Noise/vibrations affecting nearby population	Limited impact anticipated as only dredging of Lai Nghi and Phap Bao may require, from time to time, sheet piling to isolated dredging cells. Some nuisance expected for the surrounding population along shorelines.	2	2	2	Activity to be carried out only daytime	1	1
						Supply personal protective equipment (PPE) to workers and control effective use	1	1
Dredging	Water pollution	Impact mainly limited to the two reservoirs excavation. Suspended sediment is released in the water increasing turbidity and potential constraint for irrigation (Lai Nghi) Impact is less sensitive for Phap Bao (stormwater discharged to Thu Bon river)	3	2	2	Operating methods to be detailed in advance in the Dredging and Sediment Management Plan, highlighting method to confine suspended sediment to the smallest volume of water and to guarantee required flow to irrigation pumping station. Monitoring of activities by SE-DES	2	1
	Water resources	Dredging activities could stop water flow from Lai Nghi reservoir to irrigation pumping station	1	3	2			
	Loss of cultural resources	Low risk in this WR. However, the possibility exists of archaeological physical resource discovery during excavation work with the total loss of the relic if special measures are not taken.	1	2	2	Put in place a Chance to Find procedure aimed at halting work and warning the supervisors and the national authorities concerned so measures can be taken to preserve the discovery and restart work as quickly as possible. Ensure personnel are aware of the procedure.	1	1
Hazardous waste management	Water and soil pollution	Located in urban area, most truck maintenance will be done in private garages. Only heavy machinery will receive basic maintenance and refueling on site. Limited volumes of used engine oil and used hydraulic oil will be produced on site and will need appropriate storage to avoid soil and water pollution	3	2	2	Require the contractor to prepare a hazardous waste management plan	1	1
						Use storage sites that meet safety standards	1	1
						Identify the existing used oil recycling centres in the Province	1	1
						Contractor to maintain a log of production/recycling of used oil	1	1

Component or activity	Potential risks	Description of Potential Impact	Impact assessment			Corrective or support measure		Overall Risk after Correction
			Probability	Gravity	Overall Risk	Description of Measure	Easiness of Implementation	
Concrete production	Public health	Impact on the health of personnel handling cement	2	3	2	Supply personal protective equipment to the workers and check that it is used. Favor concrete from existing industrial plant	1	1
	Water pollution	Water pollution by the alcaline wastewater from equipment and trucks cleaning operation (particularly the cleaning of concrete trucks)	3	2	2	Require the contractors concerned to install sedimentation ponds with pH adjustment	2	2
						Contractor to monitor the quality of effluent released	1	1
Production of solid non-hazardous waste	Water and soil pollution	By domestic waste: Possible impact if the waste is not managed in line with best practices in the worker camps and construction sites Only small camps are anticipated which limits the magnitude of the impact..	3	2	2	Contractor to submit a Solid Waste Management Plan including methods and procedures for (i) Awareness training of residents, (ii) collection and storage of waste on project sites, (iii) selective collection and recycling of waste (iv) eventual collection and disposal of waste, (v) identification of service companies (as the Hoi An Public Works Company)	1	1
		By construction waste: Limited risk for inert products but high visual impact	2	1	2	Identify suitable landfill sites, if possible associated with spoil disposal sites for products such as concrete and plaster	1	1
						Encourage reuse and recycling especially of metals, plastics and glass	2	1
Sediment and Spoil Disposal	Landuse	Significant potential impact for Lai Nghi from where up to 600,000 m^3 of sediment will be excavated. Disposal as unused spoil may affect up to 10ha agricultural land	1	2	2	Optimize re-use of sediment for other components of the Project as both road projects (Road 608 and Cua Dai Road) will require almost this volume, and Co Co UDA much more	2	1
		Temporary disposal of reusable sediment before it is used may impact land use and agriculture	2	2	2	Contractor to detail sediment management in the Dredging and Sediment Management Plan including temporary disposal methods and sites	1	1
	Water pollution	Erosion of the deposit and sedimentation in the natural drainage and in fields	2	2	2	Good practices for erosion and sedimentation control to be detailed and implemented by contractor	2	2-1
	Public safety	Unstable excavations and slopes of spoil disposal may present risk of landslide	1	2	2	Respect geotechnical best practices (compacting of material, slopes). Choose sites far from sensitive structures and camps	1	1

Component or activity	Potential risks	Description of Potential Impact	Impact assessment			Corrective or support measure		Overall Risk after Correction
			Probability	Gravity	Overall Risk	Description of Measure	Easiness of Implementation	
Road Traffic	Public safety	Risk of road accidents related to truck traffic increase in urban zones particularly because of sediment transport estimated to more than 60,000 truck trips.	2	3	2	Selected hauling routes and preventive/monitoring measures to be presented by the contractor in the Road Traffic and Access Plan	1	1
						Monitoring of driver behaviors in relation with police department	1	1
	Risk of traffic disruption in urban zones	Most significant impact anticipated for road 608 works and Phap Bao reservoir components	3	2	3	Road Traffic and Access Management Plan will detail procedures for traffic management: coordination with police, public information, signs and safety etc.	2	1
	Air pollution	Excessive exhaust gas emissions	3	2	2	Keep engines serviced	2	1
		Production of dust	3	2	2	Speed control, regular sprinkling of sensitive urban areas and on construction sites	2	1
Handling of hazardous products	Fire risk	Related to the storage of flammable products: hydrocarbons, paints, solvents. Potential risk on most sites involving heavy machinery	1	3	2	Provide fire equipment at each storage site (extinguishers, fine sand) and safety posters displayed onsite.	1	1
						Set up a safety procedure and awareness/training for personnel concerned.	1	1
	Risk of accidents to personnel	Burning during handling operations, but risks reasonnably limited	1	3	2	Provide training for personnel plus personal protective equipment and onsite safety data sheets for the products concerned	1	1
	Water pollution	Potential risk of accidental spillage: Leak in a storage tank, accidental spillage when handling or refuelling engines, road accident when transporting hydrocarbons.	2	3	2	Contractor to prepare hazardous products management plan, in particular: Store using containment trays, measures for preventing and detecting leaks and accidental spills, register/log of hazardous products and their use, antipollution equipment.	2	1
						Emergency response procedure in the case of accidental spillage	2	1
						Special safety measures for refuelling engines onsite	1	1

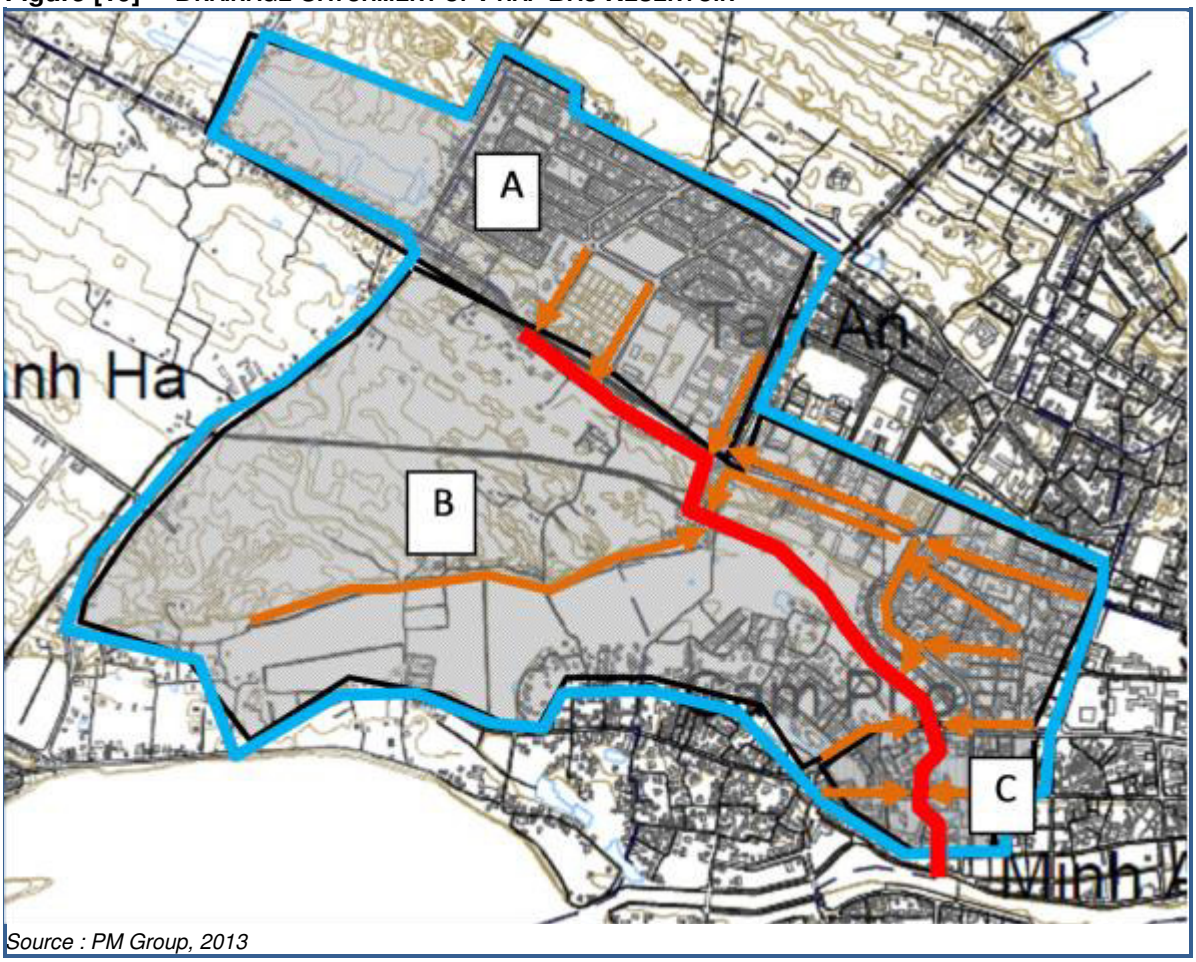
5.5. IMPACTS DURING OPERATION STAGE

5.5.1. IMPACTS ON FLOODS

The project will contribute to improve the general situation of Hoi An regarding flooding through three different approaches:

1) The excavation of Phap Bao reservoir will increase its capacity to drain water from its catchment during heavy rains. It will mainly improve storm water drainage from urbanized areas as presented in the following figure.

Figure [19] DRAINAGE CATCHMENT OF PHAP BAO RESERVOIR



Source : PM Group, 2013

2) The PPTA provides also recommendations for the implementation of a flood management system considering, in particular, the use of existing major hydropower reservoirs in the Vu Ghia-Thu Bon catchment for flood management which may hopefully reduce the duration and the intensity of floods which hit seasonally Hoi An.

3) Road 608 raise intends to strengthen Hoi An public safety under extreme event conditions by keeping the road above flood levels and allowing for the evacuation of the population when necessary.

None of the other project components shows detrimental impact regarding flood occurrence and management.

Raise of road 608 may create localized flooding of gardens or houses located along and at least one or 2 meters lower than the road surface if drainage is not adapted. It is thus a priority to ensure that the design to be finalized will include appropriate storm water drainage to avoid this impact.

This aspect will be closely monitored after the retrocession of the road to the Department of Transports and inform concerned population of the Grievance Redress Mechanism.

5.5.2. IMPACTS RELATED TO RIVER SALINITY

The purpose of the Lai Nghi reservoir component is to remove the present salinity constraint through (i) the implementation of a new water intake in the Thu Bon river and (ii) the use of Lai Nghi as a storage for water supply. Furthermore, the project considers also the increase of its storage capacity to insure up to 30 or 40 days of water supply security in case of problems.

The climate change and the subsequent sea level rise may in the long term put again a threat on the water intake with the sea water intruding further upstream the thu Bon estuary. The mitigation is the Flood Management Plan (presented as a recommendation of this PPTA) to use the watershed hydropower reservoirs (i) to mitigate floods and (ii) to sustain low flows in the Thu Bon in order to keep the salinity front downstream the Lai Nghi intake.

None of the other components of the Project will have any impact on the present pattern of salinity in the Thu Bon and Co Co rivers. Only the recommendations formulated for flood control will consider the possibility t use the existing hydropower reservoirs of the catchment to also help keeping the salinity front downstream the water intake in case of extreme climatic conditions (extensive dry period).

5.5.3. IMPACTS ON IRRIGATION & OTHER WATER USE

At present, the Lai Nghi reservoir is dedicated only to irrigation. In the future, its capacity will be increased in order to satisfy both water supply and irrigation. A clear agreement is required between QNWSC and the Department of Irrigation to ensure a dedicated water volume guaranteed for irrigation and conditions of resource sharing in period of exceptional conditions. The reservoir capacity will be increased through excavation of the bottom and deepening. The present water level of the reservoir will not be changed and will not have any impact on the surrounding paddy fields.

5.5.4. LONG TERM IMPACT ON WATER QUALITY

5.5.4.1. SOURCE OF IMPACT

Residential areas already exist along the Lai Nghi reservoir, mainly between the reservoir and road 608. None of the household is connected to any sewerage system and only rely on individual system (septic tank at best). With Lai Nghi reservoir used as storage for domestic water supply, the risk of water contamination is more sensitive than when only irrigation water is stored there. If this situation remains acceptable today, Lai Nghi water being exclusively used for irrigation, it may create contamination problems in the future, the water being used for urban water supply. Another point of potential pollution is represented by the boat restaurant located on the shoreline along road 608.

Similarly, the long term development of Co Co UDA will generate wastewater which, if not appropriately managed, may impact the Co Co river.

5.5.4.2. MITIGATION MEASURE

As a preventive measure, the PPTA has proposed (and included in the Project budget) the construction of a small sewerage network for the area between Lai Nghi and road 608 to be eventually discharged into the existing city sewerage network developed under a French loan but not yet operational. The additional discharge will be limited to few dozens of households only, and easily accommodated by the network. Also, a new WWTP will start construction soon and a due diligence of this associated facility has been presented in section 3.8.2 of this report. The boat restaurant will be connected to this network.

The PPTA also anticipated the connection of Co Co UDA to the new WWTP which will be located close to the development area.

THE BOAT RESTAURANT ON THE LAI NGHI RESERVOIR

5.5.5. IMPACTS ON FISHERIES

None of the project component will have impact on sea or estuary open fisheries. The Co Co UDA will affect a total of 17.37 ha of fishponds, thus reducing the global fish/prawns production capacity of the region. As detailed in the RAP, owners will be fairly compensated for the loss.

5.5.6. IMPACTS ON AIR QUALITY

The improvement of road 608 is anticipated to have 2 main impacts: (i) reduction of dust because of the improvement of the road surface, (ii) increase of air pollution (gas exhaust) and noise because of potential traffic increase (still uncertain as the road is not widened).

It is proposed to monitor the air quality during the first year after project construction completion.

5.5.7. SUMMARY OF IMPACTS AND PROPOSED MEASURES

The impacts discussed in this Section and the proposed corrective measures are summarized in the following table.

Table [23] SUMMARY OF IMPACTS RELATED TO PROJECT OPERATION

COMPONENT OR ACTIVITY	POTENTIAL EFFECT	POTENTIAL IMPACT	IMPACT ASSESSMENT			CORRECTIVE OR SUPPORT MEASURE		OVERALL RISK AFTER CORRECTION
		DESCRIPTION OF IMPACT	PROBABILITY	GRAVITY	OVERALL RISK	DESCRIPTION OF MEASURE	EASINESS OF IMPLEMENTATION	
Road 608 and Cua Dai Road	Impacts on flood resilience	The project components will not have direct impact on flood, but will improve the resilience of the city against flood. Raising road 608 and creation of Cua Dai road above the anticipated flood level will provide safe access for evacuation of population even during major floods or typhoons.	-	-	-	No measure required	-	-
	Impact on local flooding	Road 608 has been raised within urbanized areas. Inappropriate drainage system may impact punctually households by flooding during storms	1	2	2	Follow-up by Department of Transport and information on the Grievance Redress Mechanism provided to the population by PMU-CES by the end of construction of the road.	1	1
	Impact on air quality	Improvement of road 608 may favor increase of traffic with subsequent increase of air pollution for the residents	1	2	2	Montoring of air quality during first year of operation of the road (year 5 of the Project) under the SE-DES	1	1
Phap Bao Reservoir	Impact on local flooding	By increasing its storage capacity, Phap Bao will improve the drainage of a significant part of Hoi An city during storm events.	-	-	-	No measure required	-	-
Lai Nghi Reservoir	Impact on flooding	Reservoir will have no impact on flooding surrounding areas as increase of its storage capacity is not from a raise of its present water level but only excavation of its bottom	-	-	-	No measure required	-	-
	Impact on irrigation	Reservoir water will be shared between urban water supply and irrigation. Risk in dry periods is to have preference given to urban supply reducing irrigation allocation.	1	2	2	Clear water management agreement to be established between QNWSDC qnd Department of Irrigation.	2	1
	Impact on water quality	Population around the Lai Nghi are not connected to sewerage system with risk to contaminate reservoir water, a public safety risk when water is used for domestic purposes	2	2	2	PPTA already integrates the construction of a sewerage network along reservoir shore to collect waste water and discharge into existing Hoi An network. By the time the project is finalized, the new WWTP (associated facility) will have been completed.	2	1
Co Co UDA	General	The project will not have any direct operation impact as it is only preparation to urban development. Potential pollution of Co Co river by future discharge of UDA wastewater	-	-	-	Impact assessments of various urban development projects to come in the future. Connection of UDA sewerage system to new WWTP already considered.	-	-

6. PROJECT ALTERNATIVES

6.1. "NO PROJECT" ALTERNATIVE

The "no project" alternative will have the following impacts:

- The water supply of Hoi An city will remain as it is today, improved by a new treatment plant just inaugurated in October 2013, but still threatened by salinity peaks in the Vinh Dien river, which should in the future increase because of climate change (ref. section 4.6 of this report) and SLR.
- Flood occurrence will remain the same as it is, with no safe evacuation route for the population in case of an exceptional climatic or flood event, if road 608 is not raised as proposed.
- Storm water drainage issue in part of the old city will not be solved if Phap Bao storage capacity is not improved, affecting more frequently building and elements of the historical heritage of the city.
- If Cua Dai road is not implemented, a significant part of the areas of Cua Dai to be accessed through the Thu Bon Bridge (already under construction) will not be accessible for several years more, delaying their potential development and the socio-economic development of Hoi An city. Furthermore, the Thu Bon bridge will not achieve its goal to favor other road access to the coastline and to reduce existing traffic jam presently observed on the existing accesses.
- If the Co Co New Urban Development is not implemented, the area will remain predominantly rural, limiting the potential for the development of tourism which is a priority target for the city.

6.2. OTHER ALTERNATIVES

Several alternatives for the sub-components were proposed at the start of this PPTA, which have not been eventually considered because of their limited feasibility, their cost or/and their environmental and social impacts.

- Road 608: Its primary design included raising AND widening of the road. Considering the major impact on involuntary resettlement of this alternative, the PPTA recommended to keep the raising of the road (a priority for public safety) but to keep the road width to its actual size. This alternative was approved by the PPC.
- Lai Nghi Reservoir: the initial design of the project anticipated a double pipe line (D700 and D500) about 15 km long to reach a pumping station to be constructed on the Thu Bon river, to eventually ensure that salinity will not affect the intake. Such project had a high cost and major land acquisition issue along a 15 km corridor. The PPTA demonstrated the initial misinterpretation of data and the fact that a water intake at Lai Nghi was feasible without being affected by salinity. The project cost was seriously reduced by the proposed option and the resettlement impact simply cancelled. The option has been approved by the PPC.
- Phap Bao Reservoir: the initial proposal was more or less similar to the option eventually selected by the PPTA and approved by the PPC. From the environmental and social point of view, this subcomponent doesn't involve any significant impact.
- Cua Dai Road: This road is the logical complement of the Thu Bon Bridge under construction. However, the initial route was following an existing secondary road urbanized on both side. The necessary widening was resulting in a major resettlement program of all these houses. The PPTA proposed to relocate the proposed new road slightly east of the existing road, impacting mainly agriculture land and avoiding the demolition of the existing houses. This proposal was approved by the PPC.

- Co Co New Urban Development was initially proposed as a “hard” urban development type, with significant houses demolition for achieving a conventional project where everything starts from new. Discussions held by the PPTA and consultations on site by the PPTA team lead to promote a more “green” development, integrating existing urbanized areas, impacting mainly agriculture and paddy fields. The selected option reduces significantly the involuntary resettlement initially anticipated.

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7. INFORMATION DISCLOSURE AND PUBLIC CONSULTATION

7.1. CONSULTATION AND PARTICIPATION PROCESS

The public consultation and participation process during the Project Preparation Stage has involved the following activities:

Reconnaissance surveys of the Project site. On-site discussions with Hoi An City and town commune officials have provided information on the physical and biological resources, social-economic environment, opportunities and constraints relevant to the proposed Project.

Participatory meetings with stakeholders and representatives from Quang Nam WSC, Hoi An CPC, WPCs, the Centre of Health and the Women's Union Organization with the objective of collecting data and to present the Project (designs and locations), the main results from the draft IEE, and to ascertain social and environmental issues and concerns.

During the project implementation period, consultation and participation on environmental matters will be handled by the Environmental Management Staff who will be established within the Project Management Unit (PMU) based in Quang Nam Water Supply and Drainage Company (QNWSDC).

7.2. CONSULTATION MEETINGS

Nine public consultation meetings were held during the process of preparing the IEE and RP reports.

7.2.1. SCHEDULE AND PARTICIPATION

The Public Consultation Meetings were held in 9 places in Hoi An City and Dien Ban District – Quang Nam Province from 14 September to 4 October 2013. Participants were representatives from the Commune/ Ward People Committees, the Women's Union, the Farmers' Union at commune/ward level, and representatives from beneficiary and affected households in communes/wards affected by the project. The nice meetings involved total 343 participants (detailed in Appendix 1). Locations and number of participants is showed in the table below.

Table [24] SCHEDULE AND PARTICIPATION TO PUBLIC CONSULTATION MEETINGS

DATE	DISTRICT/ CITY	COMMUNE/WARD	MEETING LOCATION	NUMBER OF PARTICIPANTS		
				TOTAL	MALE	FEMALE
18 Sep 2013	Hoi An	Cam Pho	Meeting-hall of WPC	11	5	6
19 Sep 2013	Hoi An	Cam Ha	House of the village head Tra Que	10	7	3
20 Sep 2013	Hoi An	Cam An	House of the village head Tan My	10	6	4
20 Sep 2013	Hoi An	Cam Chau	Meeting-hall of WPC	130	105	25
22 Sep 2013	Hoi An	Thanh Ha	Culture House of An Bang village	14	13	1
26 Sep 2013	Dien Ban	Dien Phuong	Meeting-hall of CPC	76	55	21
26 Sep 2013	Dien Ban	Dien Nam Dong	Culture House of 7B village	13	8	5
4 Oct 2013	Hoi An	Cam Chau	Cultural House of Cam Chau Ward	39*		39
4 Oct 2013	Hoi An	Cam Chau	Cultural House of Cam Chau Ward	40*		40

7.2.2. INFORMATION DISCLOSED

- Objectives of the Projects;
- Location, designs and cost estimates of the Project;
- GOV and ADB environmental policies & procedures;
- The environmental category according to the ADB and GOV policies;
- Environmental issues related to Project location and design;
- Proposed mitigation measures;
- Grievance Redress Mechanism
- Environmental Management & Environmental Monitoring Plan

7.3. SUMMARY OF FEEDBACK FROM PARTICIPANTS OF THE MEETINGS

The feedback from the participants can be summarized as follows:

7.3.1. SOCIAL & RESETTLEMENT

- There is agreement on construction of infrastructure facilities of Urban Environment and Climate Change Adaptation Project in Hoi An City because the Project will contribute economic development, especially tourist - services sector and improve environment for Hoi An City
- Adequate Resettlement & compensation policy for affected households due to their agricultural land acquisition & replaced houses to stabilize life. In addition, affected households due to land acquisition and house replace wish to receive whole compensation cost once (compensation amount not paid by 2-3 times), if so It enough money to buy house, land to stabilize life
- Job training program for affected household's members, especially labor age young peoples is must be considered properly
- Job change program for affected household's middle – elderly age members, especially in Cam Chau Ward (affected by Co Co Urban Development Subproject) as most of local peoples in this area earning from their agricultural product. If they loss whole cultivated land, they could not find any job in Hoi An to stabilize life
- Construction time should be widely informed beforehand to affected household to plan agricultural produce & cultivation for acquisition agricultural land

7.3.2. ENVIRONMENT

- Agree with the consultants on existing environmental assessment, mitigation measures recommended by the project consultant
- Increase of dust & noise level in construction period will be occurred by any constructed works. However, through construction period of some old projects, implemented in their communes/wards, some contractors could not comply strictly with mitigation measures proposed in IEE. So that, reinforcement of supervision on implementation of mitigation measures is needed
- Traffic risks during construction is worries for participants , the contractor is requested to prepare and execute a Transportation Management Plan for the construction period, to mitigate traffic jams and public inconveniences, especially for Road No 608

- Works progress should be implemented timely, should not be delayed affecting the livelihood of people living along construction material & waste transportation roads
- Contractors need to make sure order and security and do not occur social evils during whole construction four-five years
- Avoid flooding situation partly occur during construction time, it may affect to environment and local people's living condition and agricultural product
- Avoid water surface & ground water pollution caused by the project both during construction and operation phases
- Contractors need to ensure hygiene sanitation in good conditions at construction sites and worker camps
- Measurement for irrigation water supply during construction phase is need to consider carefully to ensure agricultural production stability for the project area's farmers using water from Lai Nghi reservoir

7.3.3. CONCLUSION

- There is agreement on construction of infrastructure facilities of Urban Environment and Climate Change Adaptation Project in Hoi An City
- Agree with the consultants on existing natural and social-economic environment assessment, mitigation measures, environmental management and monitoring plan
- All comments from participants & stakeholders will be considered & studied fully in mitigation measures of the IEE and EMP detailed design in next phase

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8. GRIEVANCE AND REDRESS MECHANISM

A grievance redress mechanism (GRM) will be established in Quang Nam Province in compliance with ADB's SPS (2009) requirement to prevent and address community concerns and assist the project to maximize environmental and social benefits.

The GRM will be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Multiple points of entry, including face-to-face meetings, written complaints, telephone conversations, or e-mail, will be available. Opportunities for confidentiality and privacy for complainants will be honored where this is seen as important.

8.1. PROPOSED MECHANISM

The Quang Nam Provincial Water Supply and Drainage Company (QNWSDC) will establish a Project Public Complaint Unit (PPCU). The PPCU will instruct contractors and construction supervisors if people complain about the project. The PPCU will coordinate with Project Management Unit of Hoi An City Project (PMU), Quang Nam Department of Transportation (DOT), Hoi An City People Committee (CPC) and local DONRE offices if necessary, and will be supported by the environmental consultants of the Project Management Support Consultant.

When construction starts, a sign will be erected at each construction site providing the public with updated project information and summarizing the grievance redress mechanism process including details of the GRM entry points. The contact persons for different GRM entry points, such as PMU, community leaders, contractors, and operators of project facilities, will be identified prior to construction. The contact details for the entry points (e.g. phone numbers, addresses, e-mail addresses, etc.) will be publicly disseminated on information boards at construction sites and on the website of the local government.

The PPCU will establish a GRM tracking and documentation system. The system will include the following elements: (i) tracking forms and procedures for gathering information from project personnel and complainant(s); (ii) dedicated staff to update the database routinely; (iii) systems with the capacity to analyze information so as to recognize grievance patterns, identify any systemic causes of grievances, promote transparency, publicize how complaints are being handled, and periodically evaluate the overall functioning of the mechanism; (iv) processes for informing stakeholders about the status of a case; and (v) procedures to retrieve data for reporting purposes, including the periodic reports to the ADB.

8.2. TYPES OF GRIEVANCES EXPECTED AND ELIGIBILITY ASSESSMENT

Public grievances addressed by the GRM will most likely relate to environmental issues during the construction phase, as consultations with potentially affected people conducted during project preparation confirmed their basic support to the project. Grievances will most likely include damage to public roads due to heavy vehicle operation and transportation of heavy equipment and materials; disturbance of traffic and increased traffic congestion; dust emissions; construction noise; inappropriate disposal of waste materials; damage to private houses; safety measures for the protection of the general public and construction workers; water quality deterioration.

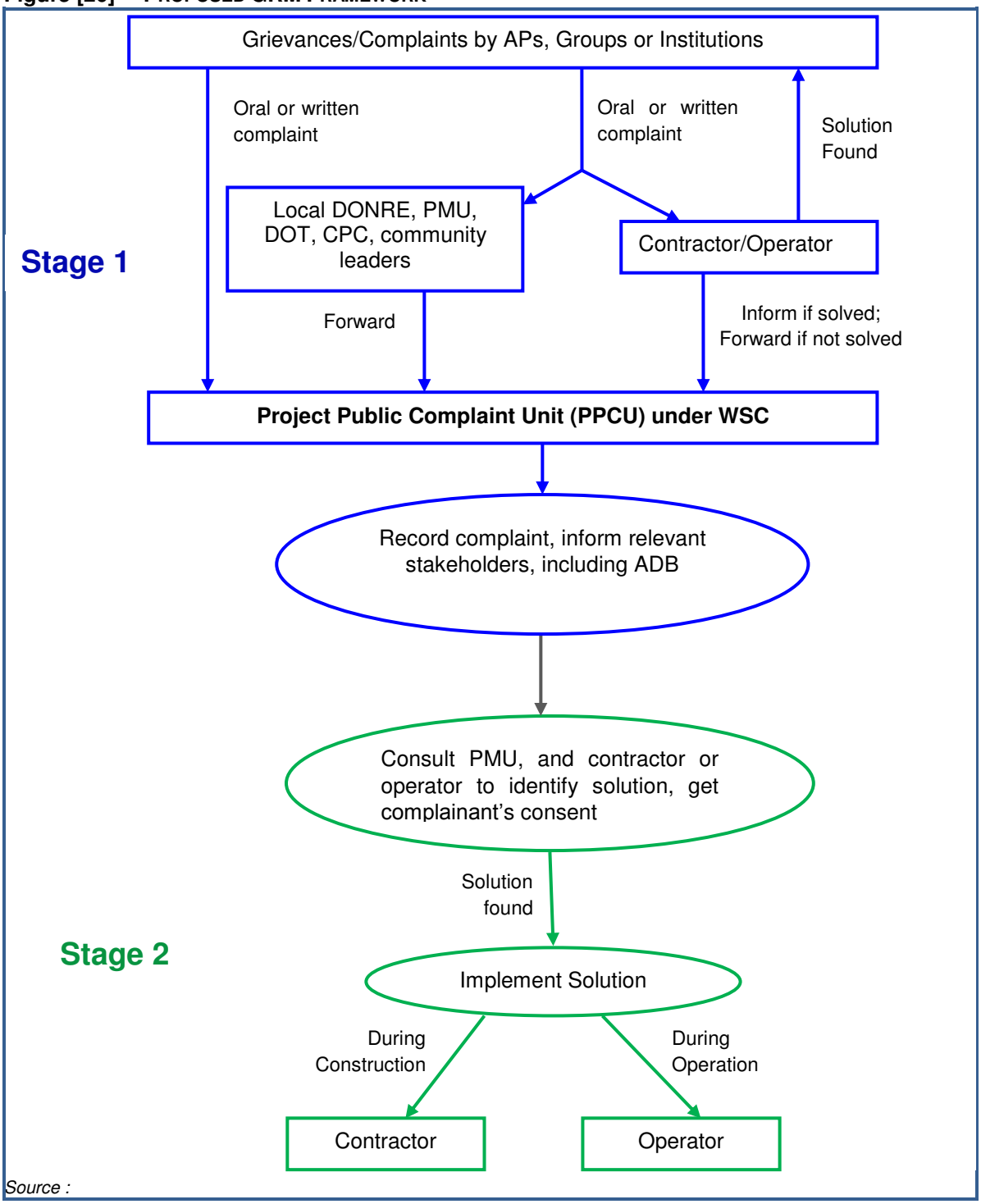
Additionally, the procedure available under the Civil Law and the Land Law 2003 (Article 138) and Decree 197/2004/ND-CP (Articles 63 and 64) remain an avenue for redress of grievances independent and separate from the Project GRM.

8.3. GRM PROCEDURE AND TIMEFRAME

The procedure and timeframe for the grievance redress mechanism are described as follows (see Figure VII.1). The two stages are represented by different colors in the flow diagram:

Stage 1: If a concern arises during construction, the affected person will submit a written or oral complaint to the contractor directly (the contractor's environment health and safety coordinator or any onsite construction personnel). Whenever possible, the contractor will resolve the issue directly with the affected person. The contractor will give a clear reply within one week. If successful, the contractor will inform the PPCU accordingly.

Figure [20] PROPOSED GRM FRAMEWORK



Source :

Stage 2: If no appropriate solution can be found, the contractor should forward the complaint to the PPCU within five (5) working days. The complainant may also decide to submit a written or oral complaint to the PPCU, either directly or via one of the GRM entry points (community leader, Hoi An CPC, Local DONRE, Hoi An City's Environmental Management Department.). For an oral

complaint, proper written records must be made at the time of the complaint. The PPCU will assess the eligibility of the complaint, identify the solution and provide a clear reply for the complainant within five (5) working days. The PMU will assist the PPCU in replying to the affected person. The PPCU will also inform the ADB project team and submit all relevant documents. Meanwhile, the PPCU will timely convey the complaint/grievance and suggested solution to the contractors or operators of facilities. The contractors during construction and the operators during operation will implement the agreed upon redress solution and report the outcome to the PPCU within seven (7) working days.

The PPCU shall accept complaints/grievances free of charge. Any cost incurred should be covered by the contingency of the project. The grievance procedures will remain valid throughout the duration of project construction and until project closure.

The above mechanism is specific to the Construction Works. Should the grievance not be resolved via this specific mechanism the complainant will have recourse to the overall GRM (consistent with the resettlement plan) as summarized below:

There here are four (4) stages in the resolution of grievances and complaints under the Project.

(First Stage: Ward People's Committee - An aggrieved person may lodge his/her complaint before any member of the Ward People's Committee through the Ward Chairperson or directly to the Ward People's Committee, in written or verbal form. It is incumbent upon the Ward Chairperson to notify the Ward People's Committee about the complaint. The Ward People's Committee will meet personally with the aggrieved affected household and will have 15 days to resolve the complaint. The Ward People's Committee secretariat is responsible for documenting and keeping file of all complaints that it handles.

(ii) Second Stage: District People's Committee - If after 15 days the aggrieved person does not hear from the Ward People's Committee, or if the affected person is not satisfied with the decision taken on his/her complaint, the complainant may bring the case either in writing or verbally to any member of the Center for Land Fund Development or the District People's Committee. The District People's Committee or Center for Land Fund Development will have 15 days to resolve the grievance or complaint. The District People's Committee is responsible for documenting and keeping file of all complaints and will inform the Center for Land Fund Development/PPCU of its decision. The Center for Land Fund Development or the PPCU will ensure that the AP is notified of the decision.

(iii) Third Stage: Provincial People's Committee – If after 15 days the aggrieved affected household does not hear from the District People's Committee, or if the affected household is not satisfied with the decision on his/her complaint, the affected household may bring the case either in writing or verbally to the PPC. The PPC has 15 days within which to resolve the complaint to the satisfaction of all concerned. The PPC is responsible for documenting and keeping file of all complaints and inform the APs of its resolution.

(iv) Final Stage: The Court of Law – If after 15 days the aggrieved affected household does not hear from the PPC after filing the complaint, or if he/she is not satisfied with the decision by PPC, he/she may bring his/her case to a court of law for adjudication.

The above grievance redress mechanism would be disclosed and discussed again with the APs prior to loan appraisal by ADB to ensure their understanding of the process. The designated entity (in this Project it would be Dong Hoi URENCO) and the Center for Land Fund Development (in the case of resettlement/land acquisition) are responsible for following-up the grievance process of the APs.

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9. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

9.1. PURPOSE & OBJECTIVES

The role of the EIA process is to identify the impacts which may be caused by the project and to develop a series of attenuating or mitigating measures which will be technically appropriate, financially acceptable and easily applicable in the context of the project. These measures are identified in Section 0 of the present ESIA.

The role of the EMP is to complement this analysis by defining the operational context in which these measures will be implemented. The present chapter therefore sets out the principles, the approach, the procedures and methods which will be applied to monitor and reduce the environmental and social impacts resulting from the construction works and subsequent operation of the components projected in Hoi An.

To this effect, the EMP includes 3 complementary Action Programs that are adapted to the phases of pre-construction, construction and operation of the Project components:

- The Preliminary Action Program (PAP), which includes all the measures recommended during the early stage of the Project, particularly before the construction works start. These measures essentially concern the organization and training of the teams which will be responsible for environmental and social management during construction and operation of the project, as well as all the complementary studies and investigations identified during preparation of the EIA and deemed to be necessary before starting the construction works.
- The Program of Actions adapted to the Construction period (PAC), which defines the principles of organization and the environmental inspection procedures for the construction sites. This PAC also defines the contractors' obligations in relation to environmental and social management of the construction sites and camps.
- The Operational Phase Action Program (PAE), which defines the environmental quality controls (water, air and noise) applicable during the period of operation of the structures and necessary to evaluate the environmental efficiency and performance of the corrective measures put in place.

The present EMP accordingly establishes and describes the context in which all the proposed corrective measures shall be implemented, under the following headings:

- the organization to be established to ensure effective implementation of the corrective measures and the associated environmental monitoring;
- the role and responsibilities of the various parties to be involved in the Project;
- the principal tasks to be undertaken during the phases of preparation, construction and operation of the project;
- the complementary studies deemed to be necessary;
- financial resources to be mobilized and their origin.

The various management plans proposed will be drawn up according to the current state of engineering design of the Project.

All the measures proposed in this EMP are based on the results of the analysis of impacts and corrective measures outlined in previous Chapter 0 of the present IEE. These aspects will not therefore be repeated here.

Table [25] ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

COMPONENT OR ACTIVITY	POTENTIAL RISKS	DESCRIPTION OF POTENTIAL IMPACT	CORRECTIVE OR SUPPORT MEASURE DESCRIPTION OF MEASURE
Land preparation	Excessive destruction of rees	Limited impact for the whole project with only limited number of oad trees affected: between 40 and 50 along Road 608 and few long Cua Dai Road.	Monitoring of tree cutting by SE, and maximization of conservation
			Greening program considering at least 1 tree planted for 1 tree cut
	Interference with compensation & esettlement	Construction works start while land acquisition is not completed, aising conflicts with concerned population	Procedure with issuance of a land acquisition certificate as a prerequisite for uthorizing contractor to access the land.
			Monitoring by SE-DES of land acquisition progress and of issuance certificate
Workers' camps	Pollution of surface vater and groundwater	Wastewater discharged into the external environment without reatment	Wastewater receives treatment before being released outside premises septic tanks/drains)
			Contractor to monitor the quality of effluents released outside the bounds of he camps
	Zones of stagnant water	Proliferation of water-borne disease vectors (mainly dengue ever and malaria)	Create and maintain ditches to ensure efficient drainage and drain all stagnant vater zones in camp
			Regular treatment of living areas with approved pesticides
	Health risks	Development of diseases linked to deficit in hygiene	Systematic awareness sessions for all new arrivals at the camp: meetings, osters in circulation areas, monitored by the camp chief
		Risk of epidemics in the camps	Prevention by automatic medical check-up at hiring
			Monitoring of hygiene conditions at the camps
			Anti-malarial prophylaxis, including mosquito netting
			Communication with the surrounding populations and local authorities.
	Workers' living conditions	The most serious impact would be that the contractor does not provide acceptable housing facilities and subsistence to the vorkers.	Include detailed specifications for equipment and management of camps in he tender documents.

COMPONENT OR ACTIVITY	POTENTIAL RISKS	DESCRIPTION OF POTENTIAL IMPACT	CORRECTIVE OR SUPPORT MEASURE
			DESCRIPTION OF MEASURE
Water supplied in workers' camps	Non-potable water supplied.	Impact on public health, risk of epidemics. Risk is limited as the project components are located within or next to urban areas, camps will be limited in number and size and easily connected to Hoi An water supply network	Supply packaged water (bottles, 20 litre tubs) for the small camps on sites with few peoples sleeping on site)
			Contractor to regularly monitor coliforms
Workshops and garages	Water and soil pollution	Stormwater drainage contaminated by pollutants which flows to the reservoirs or Thu Bon river. Impact concerns all components of the project possibly more sensitive for Lai Nghi operating in an aquatic environment linked to irrigation water uset	Drains of working facilities equipped with oil separators
			Properly store hazardous products (including hydrocarbons). See activity "Use and storage of hazardous products"
			Monitor and control used oil: Monitoring registers/logs and dedicated storage areas.
Sheet Piling	Noise/vibrations affecting nearby population	Limited impact anticipated as only dredging of Lai Nghi and Phap Bao may require, from time to time, sheet piling to isolated dredging cells. Some nuisance expected for the surrounding population along shorelines.	Activity to be carried out only daytime Supply personal protective equipment (PPE) to workers and control effective use
Dredging	Water pollution	Impact mainly limited to the two reservoirs excavation. Suspended sediment is released in the water increasing turbidity and potential constraint for irrigation (Lai Nghi) Impact is less sensitive for Phap Bao (stormwater discharged to Thu Bon river)	Operating methods to be detailed in advance in the Dredging and Sediment Management Plan, highlighting method to confine suspended sediment to the smallest volume of water Monitoring of activities by SE-DES
	Loss of cultural resources	Low risk in this WR. However, the possibility exists of archaeological physical resource discovery during excavation work with the total loss of the relic if special measures are not taken.	Implement a Chance to Find procedure aimed at halting work and warning the supervisors and the national authorities concerned so measures can be taken to preserve the discovery and restart work as quickly as possible. Personnel to be aware of the procedure.
	Water resources	Dredging activities could stop water flow from Lai Nghi reservoir to irrigation pumping station	Operating methods to be detailed in advance in the Dredging and Sediment Management Plan, highlighting method to confine suspended sediment to the smallest volume of water Monitoring of activities by SE-DES
Hazardous waste management	Water and soil pollution	Located in urban area, most truck maintenance will be done in private garages. Only heavy machinery may receive basic maintenance and refueling on site.	Require the contractor to prepare a Hazardous Waste Management Plan
			Use storage sites that meet safety standards

COMPONENT OR ACTIVITY	POTENTIAL RISKS	DESCRIPTION OF POTENTIAL IMPACT	CORRECTIVE OR SUPPORT MEASURE
			DESCRIPTION OF MEASURE
		Limited volumes of used engine oil and used hydraulic oil will be produced on site and will need appropriate storage to avoid soil and water pollution	Identify the existing used oil recycling centres in the Province
			Contractor to maintain a log of production/recycling of used oil
Concrete production	Public health	Impact on the health of personnel handling cement	Supply personal protective equipment to the workers and check that it is used. Favor concrete from existing industrial plant
	Water pollution	Water pollution by the alcaline wastewater from equipment and trucks cleaning operation (particularly the cleaning of concrete trucks)	Require the contractors concerned to install sedimentation ponds with pH adjustment
			Contractor to monitor the quality of effluent released
Production of solid non-hazardous waste	Water and soil pollution	Pollution by domestic waste: Possible impact if waste is not managed according to best practices in worker camps and construction sites Only small camps anticipated which limits the potential magnitude of the impact.	Contractor to submit a Solid Waste Management Plan including methods and procedures for (i) awareness training of residents, (ii) collection and storage of waste on project sites, (iii) selective collection and recycling of waste iv) eventual collection and disposal of waste, (v) identification of service companies
		By construction waste: Limited risk for inert products but high visual impact	Identify suitable landfill sites, if possible associated with sediment disposal site for products such as concrete and plaster
			Encourage reuse and recycling especially of metals, plastics and glass
Sediment and Spoil Disposal	Landuse	Significant potential impact for Lai Nghi from where up to 600,000 m3 of sediment will be excavated. Disposal as unused spoil may affect up to 10ha agricultural land	Optimize re-use of sediment for other components of the Project as both road projects (Road 608 and Cua Dai Road) will require almost this volume, and Co Co UDA much more
		Temporary disposal of sediment before it is used or transported to disposal site may impact land use	Contractor to detail sediment management in the Dredging and Sediment Management Plan including temporary disposal methods and sites
	Water pollution	Erosion of the deposit and sedimentation in the natural drainage or in low lying areas	Good practices for erosion and sedimentation control to be detailed and implemented by contractor
	Public safety	Unstable excavations and slopes of spoil disposal may present risk of landslide	Respect geotechnical best practices (compacting of material, slopes). Choose sites far from sensitive structures and camps
Road Traffic	Public safety	Risk of road accidents related to truck traffic increase in urban zones particularly because of sediment transport estimated to more than 60,000 truck trips.	Selected hauling routes and preventive/monitoring measures to be presented by the contractor in the Road Traffic and Access Plan
			Monitoring of driver behaviors in relation with police department

COMPONENT OR ACTIVITY	POTENTIAL RISKS	DESCRIPTION OF POTENTIAL IMPACT	CORRECTIVE OR SUPPORT MEASURE
			DESCRIPTION OF MEASURE
Road Traffic (Cont)	Risk of traffic disruption n urban zones	Most significant impact anticipated for road 608 works and Phap Bao reservoir components	Road Traffic and Access Management Plan to detail procedures for traffic management: coordination with police, public information, signs and safety etc.
	Air pollution	Excessive exhaust gas emissions	Keep engines serviced
		Production of dust	Speed control, regular sprinkling of sensitive urban areas and on construction sites
Handling of hazardous products	Fire risk	Related to the storage of flammable products: hydrocarbons, paints, solvents. Potential risk on most sites involving heavy machinery	Provide fire equipment at each storage site (extinguishers, fine sand) and safety posters displayed onsite.
			Set up a safety procedure and awareness/training for personnel concerned.
	Risk of accidents for the personnel	Burning during handling operations, but risks reasonnably limited	Provide training for personnel plus personal protective equipment and onsite safety data sheets for the products concerned
	Water pollution	Potential risk of accidental spillage: Leak in a storage tank, accidental spillage when handling or refuelling engines, road accident when transporting hydrocarbons.	Contractor to prepare hazardous products management plan, in particular: Store using containment trays, measures for preventing and detecting leaks and accidental spills, register/log of hazardous products and their use, antipollution equipment.
			Emergency response procedure in the case of accidental spillage
			Special safety measures for refuelling engines onsite

9.2. SUMMARY OF KEY IMPACTS

As detailed in the Section 5 of the report, the anticipated key impacts from the project components are summarized in the following table.

Table [26] SUMMARY OF KEY IMPACTS

COMPONENT	ANTICIPATED KEY IMPACTS
Road 608	Land acquisition, no physical resettlement (Issues covered in RP)
	Cutting of few trees
	Mainly risk of nuisances/impacts from construction activities
Cua Dai Road	Land acquisition, no physical resettlement (Issues covered in RP)
	Some risk of nuisances/impacts from construction activities
	No impact on natural resources
Co Co New Urban Area	Land acquisition, no physical resettlement (Issues covered in RP)
	Mainly risk of nuisances/impacts from construction activities, particularly fill transport for land reclaimation
	No impact on natural resources
Lai Nghi Reservoir	Land acquisition, no physical resettlement (Issues covered in RP)
	Mainly risk of nuisances/impacts from construction activities
	Management of large volume of spoil from excavation
	Potential impact on irrigation water supply and water quality
Phap Bao Reservoir	Land acquisition, no physical resettlement (Issues covered in RP)
	Mainly risk of nuisances/impacts from construction activities

As observed from this table, major impacts from the project mainly concern land acquisition and impacts related to construction activities. As land acquisition and resettlement are addressed in the Resettlement Plan (RP), this EMP will principally focus on construction activities supervision and monitoring activities during construction period and first few years of operation.

9.3. EMP ORGANIZATION AND RESPONSIBILITIES

9.3.1. OVERALL ORGANIZATION

At the present level of the Project preparation, it is anticipated that the project will be developed under the following conventional conditions:

- Public investment, with the Quang Nam Province People's Committee (QNPPC) as the Executive Agency (EA) and the Quang Nam Water Supply and Drainage Company (QNWSDC) as the Implementing Agency;
- Creation of a Project Management Unit (PMU) under QNWSDC and based in Hoi An. This PMU will receive the support of a Project Management Support Consultant (PMSC);

- Appointment of a Supervision Engineer to supervise design and construction of the Project components;
- Appointment of Construction Contractors.

The proposed organisation for the EMP is based on this general organisation.

Three levels of organization, fully complementary, will be set-up:

- The Government Implementing Agency (IA) through its PMU, which will have to provide for all aspects related to environment and social including (i) general supervision of activities carried out prior, during and after construction of the project and (ii) coordination with other stakeholders including other Government Agencies and IFIs involved;
- The Project Management Support Environmental Consultant (PMSEC) will assist PMU for all aspects dealing with environmental management preparation, provide environmental training to PMU staff and annual environmental audit of the construction sites.
- The Supervision Engineer Environmental Management Unit (SE-EMU), who is to provide coordination and supervision for all environment-related activities during construction, and to report regularly to the IA Project Director;
- The Construction Contractor Environment Health and Safety Unit (CC-EHSU), who is to provide resources for, and effective implementation of, all measures which are defined in the EMP and in the contract documentation in addition to health and safety aspects on site. There will be one CC-EHSU per Project component under the responsibility of the main CC for this component and covering the needs for sub-contractors.

Environmental staff in the PMU, SE and CC is intended to be independent of construction staff. Environmental staff will work alongside construction staff, however they will report through separate channels up to the Project Director for the SE and to the executive management level for each CC concerned.

9.3.2. STAKEHOLDER'S ORGANIZATION

The IA-PMU will have an integrating role at the top of the organisation. It will be responsible for (i) informing the political and financial agencies of the correct implementation of the EMP and (ii) ensuring effective compliance in terms of E&S obligations and procedures in the implementation of the Project. To do this, it will appoint a **Chief Environmental and Social (CES)**, whose role will be (i) to supervise the Project's environmental and social activities in the name of the IA and (ii) to ensure coordination with the international agencies (funding agencies, investors, panel of experts) and national agencies (other Government Ministries, NGOs). The PMU-CES will in particular follow up and ensure operations relating to compensation and resettlement of APs resulting from the implementation of the project components are progressing satisfactorily. The CES will be assisted in this supervisory role by the Project Management Support Environmental Consultant (PMSEC) which will work on a temporary but regular basis right from the start of the project and through to the first year of operation of the project.

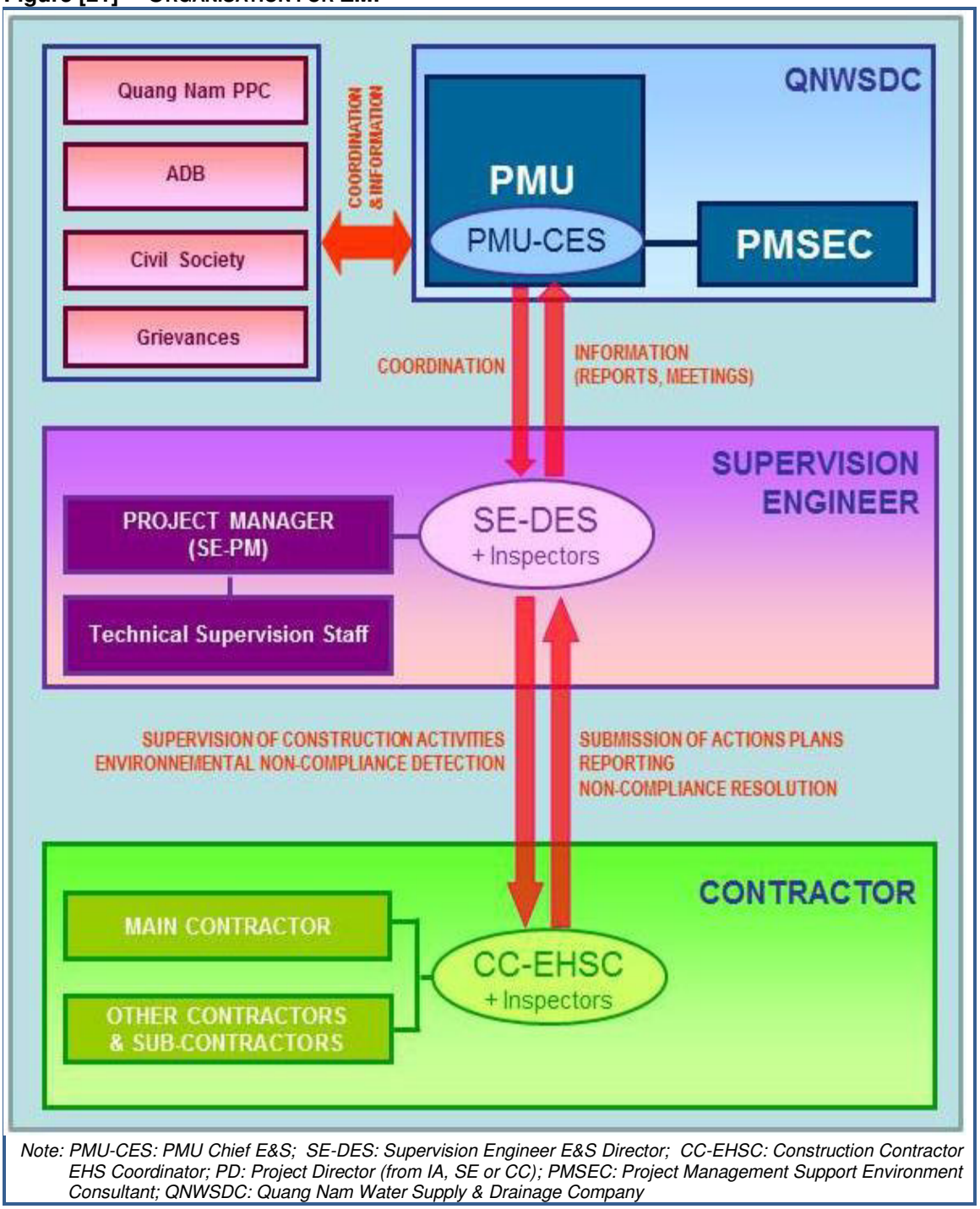
The SE will set up within its Engineering Team an **Environmental Management Unit (EMU)** which will monitor implementation of the environmental measures and their performance. This team will be under the responsibility of a **Director Environment and Social (DES)** assisted by engineers and technicians responsible for environmental aspects directly related to the construction activities and social aspects related to health and safety on the sites, complaints expressed by the population, any disturbances or harmful impacts they are subjected to, claims

for compensation for temporary disorders related to the construction activities and liaison with the traditional local authorities or representatives of the State. The EMU will include a team of Site Inspectors.

Each CC having responsibility for one of the main contracts will set up its own EHS Unit (EHSU) responsible for providing the interface with its construction team. Depending on how the contracts are distributed, certain contractors may group together to set up a common environmental team. Each EHSU will have an **EHS Coordinator (EHSC)** and Environment, Health & Safety (EHS) Inspectors.

Proposed organization is depicted on the following Figure [21] .

Figure [21] ORGANISATION FOR EMP



Note: PMU-CES: PMU Chief E&S; SE-DES: Supervision Engineer E&S Director; CC-EHSC: Construction Contractor EHS Coordinator; PD: Project Director (from IA, SE or CC); PMSEC: Project Management Support Environment Consultant; QNWSDC: Quang Nam Water Supply & Drainage Company

9.3.3. STAKEHOLDER ROLES AND RESPONSIBILITIES

9.3.3.1. ROLE OF THE PMU-CES (IMPLEMENTING AGENCY)

Project Preparation Phase

- Coordinate, with those concerned, the definition of the environmental measures at the level of detailed design and prepare the corresponding environmental obligations of the contractors as General and Particular Specifications in the Tender Documents;
- participate in the evaluation of the tenders and negotiation with the contractors for all the environmental and social aspects;
- ensure coordination with the financial institutions involved (ADB), in order to guarantee compliance with their specific environmental and social requirements;
- ensure, with those concerned, the monitoring and coordination of all consultations carried out with the local population prior to starting the construction works; this aspect is particularly important for the road and urban development components;
- coordinate with the Government Authorities concerned, the issues of land acquisition and compensation operations required to be completed before the start of construction works;
- prepare timeline for compliance with various national applicable laws and requirements including environmental obligations/permits/approvals.

Construction Phase

- Ensure coordination of activities with the Supervision Engineer-Environmental Management Unit (SE-EMU);
- participate in environmental coordination meetings with the representatives concerned from the staff of the Supervision Engineer and Contractors;
- directly refer results and problems encountered to the PMU-Project Director;
- contribute for E&S aspects to the monthly and/or quarterly Works Progress Reports prepared to the attention of the IA, of the EA and of the ADB;
- provide liaison with MONRE and DONRE;
- provide liaison with other Provincial and Communal authorities.

Operating Phase

At the end of the Project construction (5 years), the various components will come under the responsibility of various institutions: QNWSDC for Lai Nghi and the Co Co UDA, Department of Transportation for Cua Dai road and Road 608, City People's Committee (CPC) for Phap Bao. Each institution will need to be clearly informed about the environmental monitoring requirements and to have organized to follow up the environmental.

Except the Co Co UDA which construction will end by the end of the fifth year (end of the Project), all the other components will have already started their operation phase. So, the PMU-CES will be in a position to:

- Ensure coordination with agencies in charge of the components after their construction for environmental monitoring activities to be implemented;

- ensure monitoring of the environmental activities required on the site are efficiently implemented by the organizations in charge;
- ensure effective completion of the measures to rehabilitate the sites temporarily used during construction;
- organize directly the follow-up with the IA (QNWSDC) for Co Co UDA.

9.3.3.2. ROLE OF THE ENVIRONMENTAL PROJECT MANAGEMENT SUPPORT CONSULTANT (PMSC)

- At the start of the Project Contract, the PMSEC will provide training to PMU-CES and other staff of PMU regarding content of EIA reports and EMP obligations, organization of PMU for environmental management;
- Preparation of baseline template documentation required for PMU-CES activities: weekly, monthly report structure, template checklists for site inspection, etc.
- Assistance for ToR and contract preparation for effect monitoring (air, water) to be carried out by any registered laboratory appointed by PMU;
- During construction period, annual environmental auditing of all construction sites and preparation of annual environmental auditing report.

9.3.3.3. ROLE OF THE DES (SUPERVISION ENGINEER)

- Organize and control the work performed by the Environmental Management Unit (EMU);
- ensure coordination with the PMU-CES;
- ensure that all environmental plans and programs requested from the CCs (this generic term covering all the main Contractors) have been submitted and have been non-objected prior to the start of works;
- with his inspectors' collaboration, check whether the Contractor's environmental obligations have effectively been complied with on the sites, and refer to his manager (the SE-Project Manager) any detected case of non-conformity for formal action;
- report any observed case of non-conformity and ensure that it is remedied by the concerned CC within the imposed time limit;
- participate in the site monitoring meetings and prepare a monthly environmental monitoring report covering all project components;
- prepare the monthly evaluation report, recording the Contractor's environmental efforts, which may, if necessary, be used to justify a deduction on the monthly claim for payment presented to the IA-PMU;
- ensure the regular implementation of compliance monitoring programs (water and air quality) and present the interpretation of results in the context of the monthly report;
- provide liaison with the local communities concerned for any social aspect including health, respect of recruitment procedures, land use agreements, handling of complaints and compensation for unexpected damages to private property during construction activities;
- organize a database for storing all environmental documentation generated during construction of the project (letters, memos and technical notes, registers, site photos, non-compliances and resolution forms, etc.);

- prepare the documentation required prior to the project's environmental and social audits performed by the Project Management Engineer.

9.3.3.4. ROLE OF THE EMU-SITE INSPECTORS (SUPERVISION ENGINEER)

- Perform regular visits to the construction sites and the worker camps; frequency will be adjusted according to the environmental risks, the sensitivity of the environment and the contractors' performance);
- establish reports on all detected cases of non-compliance and follow up their resolution by the CC;
- regularly provide input to the environmental database, in particular the reports on non-compliance, the records of non- compliance correction and the supporting photographic documents.

9.3.3.5. ROLE OF THE CONSTRUCTION CONTRACTOR EHS COORDINATOR (EHSC)

The CE's activity must be devoted solely to the CC's environmental and social management. He must be sufficiently high-ranking in the organisation to be capable of imposing his decisions on the Works Supervisors and Foremen. In particular, the power to stop construction activity, for reasons of environmental protection or safety, is a fundamental prerogative to ensure efficient environmental management on construction sites.

The EHS, with the support of his team, will have the following responsibilities:

- adapting construction activities to ensure they comply with the environmental and social obligations defined in the Tender Documents and the Terms of the Contract;
- ensuring that all sub-contractors of his company comply with the same environmental and social obligations;
- preparing the environmental plans and programs specified by the Tender Documents, in particular the monitoring programs;
- supervising the environmental good practices for construction activities on all construction sites used by the Contractor or his sub-contractors, by calling on his inspectors to make regular inspection visits;
- treating cases of non-compliance notified by these SE-DES and instructing the construction teams to apply the necessary remedial measures immediately;
- preparing the weekly and monthly activity reports for presentation to the DES;
- organizing and performing E&S training of CC staff (management & workers).

9.4. KEY ENVIRONMENTAL MANAGEMENT PROCEDURES

9.4.1. COMMUNICATION PROCEDURES

9.4.1.1. INTERNAL COMMUNICATION

The efficiency of environmental and social management is dependent upon the clear organisation of communication among the stakeholders. In particular, there has to be a clearly

defined channel for handling rapidly all possible environmental disorders and implementing efficiently the necessary remedial actions, especially in emergency situations.

The following table presents the key links with regard to internal communication among the stakeholders during the construction period. This procedure must be laid down in greater detail before the start of the project in accordance with the Contractor EHS policy and the final Project organisation.

Table [27] PRINCIPAL PHASES OF INTERNAL COMMUNICATION

ORIGIN	RECIPIENT	FREQUENCY	SUBJECT
SE-Project Manager	SE-DES	Weekly	Updating the construction programme; specific construction activities in the coming period and their location
SE-Project Manager	PMU-CES, SE-DES	Ad hoc	Additional needs for land, or notification of a change in construction techniques
SE-DES	SE-Project Manager	Weekly	Weekly report on environmental events (EE) detected and their treatment; programme of activity of the SE-EMU for the coming week
SE-DES	SE-Project Manager	Ad hoc	Communication of EE of levels II or III
SE-DES	SE-Project Manager	Monthly	Monthly report on activity and results of monitoring for review and approval before forwarding to the PMU-CES
SE-DES	SE-Inspectors	Weekly	Updating the construction programme; specific construction activities in the coming period and their location, particular directives
SE-Inspectors	SE-DES	Weekly	Weekly activity report, list of observed EE of level I
SE-Inspectors	SE-DES	Immediate (same day)	Observed EE of levels II & III; particular problem requiring technical assistance; observation of construction activities outside specified areas
CC-EHSC	SE-DES	Monthly	List of training modules followed in the past month and the personnel concerned (list of attendence)
CC-EHSC	SE-DES	Fortnightly	Updating of new activity zones for the coming 2 weeks and operations presenting a particular risk for the environment; results of monitoring of the previous 2 weeks
SE-Project Manager	PMU-CES	Immediate (same day)	Memo to inform on any observed non-compliance on level III; proposal to suspend the works on the incriminated site if justified
SE-Project Manager	PMU-CES	Monthly	Transmission of the monthly activity report including environment as prepared by the SE-DES
SE-DES	SE-Project Manager	Quarterly	Summary report on significant environmental events (Levels II and III) observed, on the decisions taken, and on the measures implemented; proposal, if necessary, to modify certain mandatory thresholds or obligations of the Contractor
SE-Project Manager	PMU-CES	Quarterly	Summary report on significant environmental events (Levels II & III) observed, on the decisions taken, and on the measures implemented; request for approval of the proposed modifications
PMSEC	PMU-CES	Yearly	Annual audit of construction sites and submission of an annual environmental audit report
Note: PMU-CES (Chief Environment & Social from Implementing Agency PMU) – SE-DES (Director Environment & Social from Supervision Engineer) – CC-EHSC (Contractor's EHS Coordinator) - EE (Environmental Event = detected non-compliance)			

9.4.1.2. EXTERNAL COMMUNICATION

External communication for environmental and social subjects will be the prerogative of the IA through the intermediary of his PMU-CES, assisted by the IA's Director of Communication. This communication will essentially concern exchanges of information with the media, with NGOs and with Government representatives at Central and District levels. The SE-DES and the CC-EHSC will only intervene in these exchanges when expressly invited to do so by the IA.

The PMU-CES will regularly contribute for all E&S aspects to the activity report provided to ADB, various government organisations and NGOs in Vietnam.

9.4.2. PROCEDURE FOR HANDLING ENVIRONMENTAL EVENTS

An important element of the process of communication among the parties is the ranking of events which do not meet the obligations and environmental objectives assigned to the project. These situations detected on site by the SE-EMU must then be notified to a higher level but following procedures that are graduated according to the extent of the risk and the urgency of remedial action. These environmental events could be ranked according to the system of quality assurance applied to the construction works, in which case their subdivision would be variable according to the subdivisions taken into account for non-conformity of a technical nature. In the present EMP, considering the absence of information on the project's future quality assurance plan, preference is given to an evaluation system specific to environmental aspects, better adapted to the problems encountered and which represents a proven and reliable system, which can work satisfactorily even in the absence of an efficient quality assurance system.

Environmental events correspond to non-conformities (non-compliances) and are subdivided into three levels. The communication and handling procedures depend on the level of non-conformity. Level III represents the most serious incidents, while level I represents the incidents of least gravity.

Level I (Minor Incident): Situations on Level I are addressed on a day-to-day basis at the time of site visits and routine meetings; the recommended measures are generally discussed on the spot with the construction teams concerned. Formal communication takes place through the Environmental Event (EE) report prepared by the EMU Inspectors and handed to the SE-DES for official notification to the concerned CC-EHSC.

Level II (Moderate Incident): The EE of Level II is notified by the SE-DES to the SE-Project Manager and the CC Site Supervisor the same day as the situation is observed, and within three days to the PMU-CES. The PMU-CES informs the PMU Project Director of the situation and details the proposed corrective measures, which must be implemented as rapidly as possible.

Level III (Major Incident): The SE Project Manager and the PMU Project Director must be informed on the day an event is observed. The corrective measures must be applied within three days. Should more time be required to implement a corrective measure, or if the risk is imminent, the SE Project Manager may order suspension of the works concerned until the observed situation returns to normal.

Following Figure [22] below illustrates the principles of this non-conformity procedure and shows how the approach favours direct resolution on site of the less serious EE (Level I) by direct communication with the construction workers, and how the senior levels of responsibility are progressively involved in the processes to solve the more serious EE (Levels II and III). The

full arrows denote the decision processes, while the dotted arrows denote the reporting and information processes.

This procedure is often implemented on complex work sites, and generally gives satisfactory results. It also offers three advantages:

- a mechanism allowing the works to be stopped if the situation is deemed to be hazardous;
- provision for feedback so that the site inspectors monitoring implementation of the requested measures can ensure that the remedial action has been taken;
- the possibility of initiating an incident enquiry in order to determine the deep-seated causes of the incident and to assess whether they justify changes in the specifications, the requirements or the methods, to prevent reoccurrence of such a situation in the future.

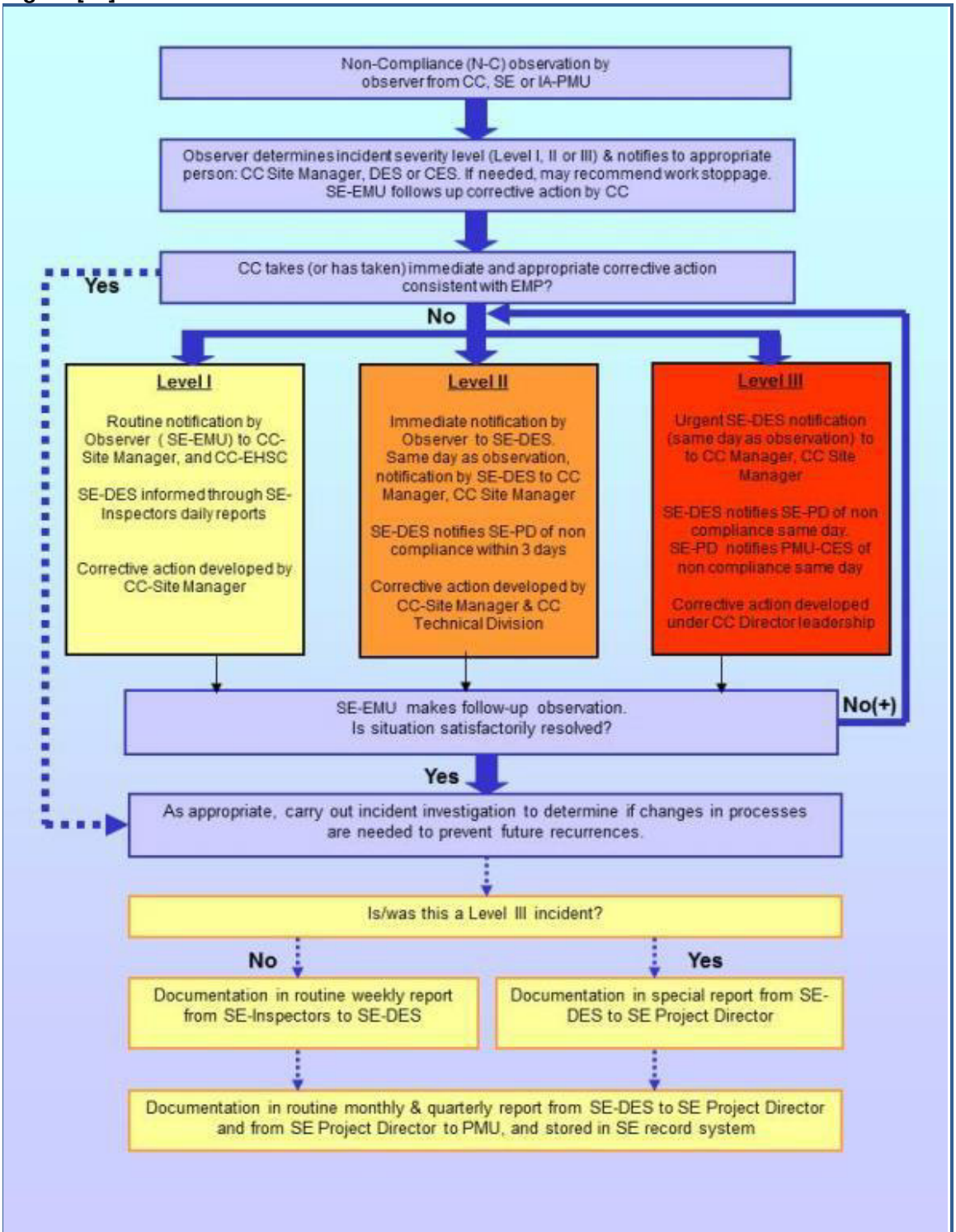
9.4.3. RECRUITMENT PROCEDURE

Recruitment will be made preferentially in Hoi An and its surroundings to minimize the requirement of worker camps in number and size and minimize attached problems.

Recruitment will include a systematic medical examination of each employee, covering the candidate's general condition and his or her hearing and visual capacities. To avoid any discrimination, the tests relating to infection risks (tuberculosis, malaria and other forms of parasites, STD) will be performed after the candidate has been recruited, in Hoi An hospital facilities.

The precise procedures to be put in place will be compliant with the obligations of the Vietnamese Labour Regulations regarding particularly work contract conditions, working time and minimum wages.

Figure [22] DIAGRAM OF PROCEDURES IN CASE OF NON-CONFORMITY OBSERVED



Note: PMU-CES: PMU Chief E&S; SE-DES: Supervision Engineer E&S Director; CC-EHSC: Construction Contractor EHS Coordinator; PD: Project Director (from IA, SE or CC)

9.5. ACTION PLAN PRIOR TO CONSTRUCTION WORKS (PAP)

All the elements described above reflect the main details of the organisation to be set up for supervision and monitoring in the construction phase. However, it is essential to ensure that the necessary means and references are available and totally operational from the time the works start. To this effect, a certain number of activities are to be undertaken before the start of construction works. These actions cover the aspects of recruitment, organisation and training for the PMU, and the performance of a series of complementary investigations aimed at defining the baseline situation more precisely. For these studies, the PMU will call on specialised consultants (either International or National). The main recommended actions, resulting from the EIA are detailed in the following paragraphs in the form of a Preliminary Action Programme (PAP).

The baseline situation is the reference state in comparison with which the project's impacts will be effectively evaluated in the course of construction and operation of the project. Some important aspects of this baseline situation need to be analysed in greater detail before the works are started. Following PAP-01 to 05 are proposed to strengthen the baseline situation knowledge.

9.5.1. PAP-01: ADDITIONAL STUDY OF WATER QUALITY

The PMU will be responsible for contracting a registered laboratory to perform, during the construction period, air, noise and water quality measurements in compliance with Vietnamese regulations. The first survey of the appointed laboratory will take place as soon as the Project starts, prior to the start of construction works in order to have a reference value against which to evaluate the impact of the construction activities.

Monitoring of water quality will be particularly required in Lai Nghi in order to ensure that dredging techniques proposed and implemented by the Contractor in charge are compliant with the protection of the water resource quality and its use for irrigation purpose.

The following points will be sampled:

- Lai Nghi in the most downstream part of the reservoir, in the pond in front of the irrigation pumping station;
- Phap Bao reservoir: at the outlet of the reservoir entering the channel which eventually flows to the Japanese bridge and the Thu Bon;
- In the Co Co river, downstream the Co Co UDA.

The following parameters will be measured during this first survey, in accordance with standard QCVN 08: 2008/BTNMT and QCVN 14: 2008/BTNMT:

pH, Total suspended solid (TSS), Dissolved oxygen (DO), COD, BOD_5, NH_4^+, Cl^-, Nitrite (NO_2), F^-, Nitrate (NO_3^-), Phosphate, Cyanide, As, Cd, Pb, Cr^{3+}, Cr^{6+}, Zn, Ni, Fe, Hg, Cu, oil & grease, Coliform.

These results will provide the opposable baseline during construction activities.

9.5.2. PAP-02: APPOINTMENT OF THE PMU-CES

The QNWSDC PMU will appoint its Chief Environment and Social (CES) early enough for this person to contribute to the selection of the Monitoring Laboratory to perform the effect monitoring and the baseline identification (see PAP-01) before construction work starts on the project sites. The CES will be assisted at the beginning of his mandate by the PMSEC who will deliver training to the CES and assist him (i) for the preparation of tenders regarding monitoring surveys, (ii) for the selection of the Consultants, (iii) for the follow-up of the studies.

9.5.3. PAP-03: TRAINING OF THE PMU-CES AND PMU STAFF

The PMS-EC will carry out training of the CES and other PMU staff at the early stage of PMU-CES recruitment. Purpose is to have the PMU-CES and his staff fully operational at the start for thr project construction. Training will be carried out in Hoi An and focus on:

- Review of impact analysis from the IEE
- Review of EMP Program of Action
- Organization for PMU for EMP implementation
- Basics for site inspection: organization of visits, frequency, control checklist;
- Basics for non-compliance process: reporting procedure and form, follow-up, procedure for resolution approval;
- Data management for PMU-CES: data base organization, registers;
- Structure and content of weekly, monthly reports.

9.5.4. PAP-04: PREPARATION OF COMMUNICATION INSTRUMENTS

In support and follow up to the public consultations carried out within this PPTA, it is important to prepare the appropriate communication material rapidly, allowing the PMU to present, before starting the works, clear information on the design of the project, on the phasing of construction work, on the recruitment procedures and on the environmental and social measures which will be implemented.

Preparation of proactive communication is indispensable, to ensure the widest possible circulation of information at the most critical time, since it is during this period prior to the start of works, when important decisions and negotiations are in progress, that information on the Project must be available in a completely transparent manner. The communication tools to be developed include:

- flyers and posters;
- articles in the press and radio or TV messages;
- making the technical documents of the EIA available for consultation by any person, at Provincial level and in Districts concerned.

9.5.5. PAP-05: PREPARATION OF THE CONTRACTOR E&S SPECIFICATIONS

Effective consideration of the environment during construction activities presupposes the production of a clear, complete and detailed contractual document at the time the contract is

awarded. This means including the specifications which will lay down the environmental and social obligations to be imposed on contractors by the Project Owner in the Tender Documents. These requirements dictated by the Owner will be presented in a document entitled 'Environmental and Social Obligations of the Contractors under the project, which will be prepared together with the Technical Specifications (General and Particular) of the Project. For that purpose, the PMU will request a specialized environmental Consultant to assist the Technical Consultant in charge of the Detailed Design and of the Tender Documentation.

The document will set out the measures that the contractors involved in construction will have to take to comply with the recommendations and measures identified in the course of the EIA and set out in the form of Action Plans. Without being exhaustive, these documents will include the EHS management directives for contractors and the directives concerning the process of classification, investigations and analysis related to the EHS events as well as general clauses concerning the overall incident prevention program for the construction sites.

These obligations will be articulated around the principal themes of environmental and social management for all construction activities related to the project components in Hoi An, which will lie down:

- the general specifications for good environmental management which will be applicable to the contractor at any point within the work site and at all times, covering areas such as: training/awareness of employees on protection of the environment, management of hazardous substances and waste, protection of biodiversity, prevention of water and air pollution, preservation of soils, rehabilitation of sites;
- the minimum conditions to be established in the contractors' camps and installations, covering aspects related to housing, catering, waste management, drinking water, sewerage and conditions of public hygiene;
- the minimum conditions to be observed by the contractor in the field of employees' health and safety;
- the minimum conditions to be observed by the contractor with a view to protecting the environment of the sites as well as that of the areas contiguous, most densely urbanized;
- the minimum conditions to be observed by the contractor in managing the social aspects of construction activity; this heading includes in particular the procedure which the contractor will be required to follow in case of damage to any private property.

A specific monitoring program will be set up to ensure that the contractors fulfill their environmental and social obligations, detailed in the following section relating to the Construction Phase.

In practice, the selected contractors will be asked to draw up a number of specific environmental plans, within a specified period of time after the contract is notified, describing how these contractors (and their sub-contractors) will be organised and how they will work together to meet their environmental and social obligations. In principle, the list should cover the following key fields:

1) Solid waste management plan,

2) Dredging and Sediment management plan,

3) Hazardous substances management plan,

4) Accidental spill response plan,

5) Erosion control and sedimentation management plan,

6) Camps management plan,

7) Workers health and safety plan,

8) Air pollution, dust and noise management plan,

9) Road traffic and access management plan,

10) Water quality monitoring plan

11) Cultural resources protection plan,

12) Environmental training plan

9.6. ACTION PLAN DURING CONSTRUCTION (PAC)

This action plan provided below is sufficiently detailed to provide the baseline information for further preparation of Contractor Environmental and Social Specifications to be included later into the Tender documentation.

The following Program of Action will be implemented during the construction phase:

9.6.1. PAC-01: WASTE MANAGEMENT

A waste management programme will be established and will be mandatory for contractors and their sub-contractors. The programme will include two waste management plans which will be prepared and implemented by the contractors following the common directives fixed by the Implementing Agency (QNWSDC). The first relates to wastes of the domestic type (essentially generated by the camps) and non-hazardous wastes generated on the construction sites, while the second is related to hazardous wastes. The objectives of the programme are:

- to minimize the generation of wastes by carefully considered use of raw materials;
- to sort and treat the wastes in order to limit their environmental impact;
- to raise awareness and train personnel in good waste management practices.

These plans will include procedures, in accordance with local regulations or with international best practice, concerning the handling, transport, storage, treatment and elimination of wastes according to their category:

- **Non-hazardous wastes (Group A)**: putrescible wastes from the camps and canteens, paper, cardboard, plastics, wood and vegetation, inert wastes from construction or demolition (concrete, scrap iron, bricks, breezeblocks, etc.);
- **Hazardous wastes (Group B)**: wastes that are corrosive, explosive, toxic, representing a degree of danger for humans or for the ecosystem. In the context of the present project components considered, this will essentially be engine oils and used hydraulic fluids, the residues of paints, solvents and resins, fluids from transformers, first aid medical wastes,

sludge from septic tanks and chemical mobile toilets, various concrete additives (but with a lesser degree of danger for the latter).

9.6.1.1. NON-HAZARDOUS WASTE MANAGEMENT

A system of waste segregation at source, ensuring separation of metal products (including drink cans or food cans), plastic products (bottles, cartons, wrapping, etc.), glass bottles, paper and cardboard, will be set up on the construction sites and in the camps. All these products will, as far as possible, be made available for collection by outside contractors responsible for recycling.

The workers' camp will be provided with two types of covered bins for selective collection of the various products listed above: putrescible in one, for recycling in the other. The contractor will carry out systematic awareness campaigns among residents of the camps to promote efficient use of these refuse bins.

On the construction sites, metal wastes that have not been polluted by hazardous substances (oils, acids, paints, etc.) will be collected in containers for recycling. The same applies to wood and cardboard and plastic packaging. It will be absolutely forbidden to burn plastic or lubricants.

Concrete and plaster debris that is not reused will be collected and dumped with excavation materials mainly from Lai Nghi and Phap Bao.

The Contractor will prepare a detailed Action Plan indicating the anticipated volumes of non-hazardous waste to be produced, the procedures for management, collection and disposal, the technical means implemented, the location and dimensions of the controlled landfill, the contact details of the companies involved in waste recycling, as well as the training programs to raise awareness among workers on this subject.

9.6.1.2. HAZARDOUS WASTE MANAGEMENT

Sludge from septic tanks will be placed in the basins for treating leachate from the controlled landfill or could be gradually injected into the waste water treatment system of the Operator's village.

Used engine lubricants from the maintenance of construction plant and vehicles and the floating oily residue from oil separators will be collected in 200 litre drums with a view to recycling. The drums will be stored in a dry and covered area, surrounded by a bund the height of which will ensure retention of a volume equal to at least 110% of that of the largest container stored in the area, and equipped with an oil separation system at its outlet. The contractor will identify an acceptable recycling point (refinery) or a plant where the waste can be burned (fuel for industrial use such as a cement factory or metal foundry). A register will be maintained to record all handling of used lubricants, for the purpose of monitoring wastes. Machine and plant maintenance operations will be centralised in appropriate areas allowing collection of the used oils and hydraulic liquids.

Used chemical substances: the principal action to limit the management of used chemical substances is to use ones with low toxicity values and use the minimum quantity of chemical substances required for efficient operation. Used chemical substances will be stored in containers or drums in the same storage areas as used oils, as long as these substances are compatible. Otherwise, they will be stored in a safe area protected from inclement weather. The possibility of reuse in situ will be evaluated; failing this, the materials will be returned to the supplier or to appropriate waste treatment installations.

9.6.2. PAC-02: DREDGING AND SEDIMENT MANAGEMENT

The technical studies (at the stage they have reached at the time of preparation of the present IEE) show that significant volumes of dredged/excavated materials will be produced, mainly from Lai Nghi and Phap Bao reservoirs. Also, other components as Road 608, Cua Dai Road and Co Co UDA will require even larger volumes of fill.

The Contractor(s) in charge of dredging operations will be required to produce a Dredging and Sediment Management Plan which will highlight the maximization of sediment re-use and the minimization of the eventual spoils to be disposed in a dedicated site. The Plan will respect the objectives set out in the Tender Documents which will include:

- Describe methods of dredging/excavation in order to confine suspended sediment and to guarantee water availability for irrigation in quality and quantity terms;;
- Assess total production of sediment expected volume re-usable for fill with anticipated schedule of production;
- Define location and size of areas intended for temporary storage of re-usable sediment for fill;
- Store material in conditions that will ensure security in terms of stability and erosion; to this effect, a maximum height of 6 m should be imposed, with a berm half way up the slope;
- Provide drainage at the foot of the stockpiled material and anti-erosion measures on the slopes;
- Define location and area required for the disposal of spoils not usable for fill;

9.6.3. PAC-03: HAZARDOUS SUBSTANCES MANAGEMENT

A plan for the management of chemical substances will be prepared by the Contractor, detailing the measures planned for minimising pollution risks. The programme will be applicable to all project activities involving the handling, storage and use of substances catalogued as hazardous. The information set out in this programme will cover the following aspects:

- procedure for registering and monitoring any substance of a hazardous nature including in particular the drafting of a safety data sheet per substance;
- procedure for identification of alternative and less hazardous substances;
- handling and storage conditions, including details on compatibility of the substances;
- emergency procedures in case of a spill;
- conditions for final treatment of residues or recycling.

Chemical substances will be stored in a locked container located on a watertight floor surrounded by a bund, capable of storing at least 110% of the volume of the largest receptacle placed there. Each storage site will be provided with a substance collection pit, absorbent products and extinguishers. Standard signs will warn of the presence of toxic substances.

The substances' safety data sheets will be available on the site and from the CC-EHSC of the contractor concerned. All chemical substances stores will be regularly inspected in order to detect any possible leakage or damage to the containers.

The largest volume of chemical substances anticipated under a project of this type concerns hydrocarbons (diesel, oil and grease). The programme will lay down the conditions to be respected for storage and refuelling of machinery.

The programme will specify the pollution control equipment to be installed by contractors at the storage sites: anti-pollution kits, extinguishers, substance description sheets, etc.

At each site, the employees in charge of handling chemical substances will be given special training relative to best practice and emergency measures in case of an incident (see PAC-04 below).

9.6.4. PAC-04: ACCIDENTAL SPILL PREPAREDNESS AND RESPONSE PLAN

An anti-pollution program will be established to define the intervention procedures in case of leaks or accidental spills of liquid hazardous substances. This programme will include a description of the organisation planned for such situations and the work stations of key people. Specific training will be given for the activities to be performed in case of emergency intervention, for all staff and workers involved in any stage of the procedure.

Spills of less than 200 litres may be managed at the local level by the CC-EHSC present on the site, as representing an environmental event (non-conformity) of Level I. For greater volumes, they will be considered as an EE of Level II and will therefore require consultation of a higher level in the organisation. The authorities and local departments to be advised in case of an emergency at the local and regional level will be identified and informed of the response procedure put in place. Such a situation may occur in case of large accidental spill into the Co Co river which could threat fauna or in Lai Nghi reservoir which may affect the irrigation of fields. In order to meet the objectives of this program, a Risk Response Plan will be prepared by the Contractor in conformity with (i) the emergency procedures and the response to major risks which will also be demanded by the Supervision Engineer and (ii) the principles of ISO 14001.

9.6.5. PAC-05: EROSION AND SEDIMENT CONTROL

Erosion control measures will be applied to all land that is stripped or excavated, all embankments and temporary or permanent deposits of materials in order to minimise and control the resulting sediment loads before they reach the storm water drainage and the river. This protection will involve, on one hand, the implementation of methods for stabilising slopes and, on the other, collection of surface water runoff.

Erosion control will include methods that are incorporated into construction practices, as the provision of temporary protection of a mechanical nature (geotextile covering sheets, sediment barriers).

Drainage of the entire area of any construction operations will be provided prior to the start of any other activity. Drained water will be channelled towards one or several sedimentation basins designed following accepted best practice and sized to contain the rainwater falling in 24 hours with a return period of two years.

The contractor will present a Drainage and Erosion and Sedimentation Control Plan setting out the applicable principles and practices adopted for the Project. For each site to be opened for construction activities, a detailed plan of the drainage system and the proposed anti-erosion measures will be prepared by the contractor and submitted to the SE-DES for non-objection at

least three weeks before starting works on the site. The drainage channel and sedimentation basins will be built as a priority before any other activity is carried out.

9.6.6. PAC-06: MANAGEMENT OF CAMPS

A permanent and temporary camp management program will be prepared by the contractor responsible. The various aspects covered by such a program will include:

- choice of location for the camp, proposed organization, controlled entry;
- installations proposed for water supply and sewerage, waste management, and drainage of storm water;
- equipment chosen for the sanitary facilities, collective equipment, bedrooms and dormitories;
- the anticipated catering and food supply services, particularly canteens; means for monitoring the quality of foodstuffs stored and distributed in the camp;
- the policies implemented with regard to prevention of drug and alcohol abuse.

The specifications of the Tender Documents will lay down the requirements regarding water supply and sewerage. In order to eliminate the risks of development of disease vectors, rainwater drainage will be provided. The ratios to be respected in terms of sanitation (number of toilets, showers and wash-basins) will also be defined. The standards applicable to bedrooms and their furnishing and fittings will also be detailed in the Tender Documents. In particular, the minimum floor space per person, the supply of impregnated mosquito nets, and mattresses, will be stipulated.

The procedures to ensure hygiene in all common facilities and in particular food hygiene procedures for storing and monitoring fresh products used by the canteens will be detailed by the contractor responsible.

In order to prevent the abuse of drugs and alcohol, measures to raise the awareness of employees and specific control measures will be set up by the contractor responsible.

9.6.7. PAC-07: PUBLIC HEALTH MANAGEMENT PLAN

The program requirements will be described in detail in the Tender Documents and will cover the following main areas of action:

- First aid facilities established on the construction or camp site; hospital facilities available in Hoi An;
- emergency intervention procedures in case of an accident;
- employee surveillance measures: medical check-up on recruitment, annual medical check-up;
- regular cleaning of the drainage system;
- regular cleaning of the sanitary facilities provided, in particular toilets and septic tanks;
- waste management and regular cleaning of refuse bins;
- systematic program to keep employees aware of good hygienic practices;

- monitoring hygiene in canteens;

9.6.8. PAC-08: MANAGEMENT OF AIR QUALITY, DUST AND NOISE

A program to limit atmospheric and noise emissions will be put in place in all areas likely to be affected by construction of the Project, in particular close to the construction sites and along the access roads.

Emissions of exhaust gases and fumes will be limited by the obligations regarding maintenance of construction plant and trucks, and by forbidding the combustion of any waste on the sites.

Dust caused by road traffic on unpaved surfaces will be subject to reduction measures in inhabited areas (close to the workers' camps), by requiring the contractor to water spray the ground at regular intervals, i.e. at least two to four times per day during periods without daily rainfall. All loads of fine materials potentially causing dust to be spread during transport will be covered by a tarpaulin. In storage areas, watering will be recommended for all materials likely to generate dust, in particular during periods of wind (frequent in Hoi An).

Noise will be the subject of regular monitoring by the SE-DES to ensure that the limits laid down for the site are respected or that the employees exposed to higher noise levels are appropriately equipped. Measures will be taken to reduce noise levels and the corresponding disturbance on the site and along the access roads: maintenance of plant and vehicles, use of soundproofed equipment, reduction of the hours of use of certain installations (crushing plant, blasting).

The Tender Documents will define the thresholds to be respected by the contractor in terms of gas, dust and noise.

9.6.9. PAC-09: MANAGEMENT OF ROAD TRAFFIC AND ACCESS

Road traffic is the prime cause of accidents during the construction phase of infrastructure projects. It is therefore essential to regulate traffic both on site and outside. This is particularly important for the present project as (i) components are located in urban area and (ii) the projects involve large volumes of excavation and fii which may generate heavy truck traffic. Various measures will be considered and adopted by the contractors:

- awareness-raising and training of drivers of light vehicles and trucks in the rules of elementary caution and on the risks encountered: driving under the influence of alcohol or drugs, excess speed, monitoring tyre wear, placing the load (stability), etc.;
- checking the eyesight of all recruited drivers, and their ability to drive;
- provision of parking places for trucks separate from the roadway next to sites;
- enforcing respect for speed limits;

Access to the construction sites will be indicated by appropriate signage.

The Tender Documents will set out all these obligations as well as the penalties that will be applied to contractors and their sub-contractors in case of infringement.

9.6.10. PAC-10: WATER QUALITY MONITORING (FOR CONTRACTOR)

The contractor will prepare a water quality monitoring plan which will be aimed at highlighting the quality of the environmental management implemented on the sites. This monitoring will verify discharge compliance, in other words it will concern all points where liquid effluents (waste water, drainage water) leave the limits of the work site concerned to enter the natural environment. The contractor concerned will be under the obligation to ensure conformity with the applicable Vietnamese standards.

The contractor will be responsible for monitoring the quality of all discharges leaving its sites or subcontracting a competent consultant or local agency to do so. The parameters will be defined according to the type of discharge and detailed in the Tender Documents:

- discharge of 'grey' water and stormwater drained off the camps;
- discharge of stormwater at the outlet from the sedimentation basins;
- discharge of stormwater drained from the areas for parking and maintenance at the outlet from the oil separators;
- discharge from wastewater in the worker camps.

Sampling sites and parameters may change in the course of construction in order to adapt to the areas of activity and the types of activity observed, most of the project components being linear (roads, long reservoirs being dredged).

The monitoring will be carried out on a monthly frequency.

This monitoring will be supervised by the SE-DES, who will incorporate control measurements at points identical to those surveyed by the contractor into his own water quality monitoring process (see the following section related to monitoring of the sites).

Compliance monitoring will concern at least the following water quality indicators:

- organic pollution: BOD_5, nitrates, phosphates, (particularly related to the camps areas);
- oils and grease, relating to drainage water from the areas used for mechanical activities, storage of hazardous substances (hydrocarbons) and wastewater from canteens;
- suspended solids in drainage water and used also as performance criteria for the dredging activities and for sedimentation basins;

9.6.11. PAC-11: PROTECTION OF CULTURAL RESOURCES

Hoi An is a World Heritage site. The IEE confirms that the project components are not affecting any cultural site or building. However, as some components involve extensive excavation works, the chance to find any physical cultural resource does exist.

The Tender Documents will define an emergency intervention procedure (chance to find procedure) in case a discovery is made or an interaction is observed during the works. This procedure will include aspects such as:

- immediate measures to stop work at the site concerned and mark out the area to be protected;
- information procedure involving the CC-EHSC, the SE-DES and PMU-CES;

- approval of the measures decided by the CES;
- organization of removal of the resource (if physical);
- closure of the incident and resumption of work.

9.6.12. PAC-12: ENVIRONMENTAL AND SOCIAL TRAINING PLAN

The objective of this plan is to ensure effective implementation of the measures proposed under the EMP on the construction sites. This Plan will define the general training programs (awareness-raising) for the attention of all personnel and the specialized training programs intended for the employees involved in particularly sensitive activities from the environmental standpoint (management and distribution of hydrocarbons, hazardous waste management, etc.). Each new recruit must participate in the awareness-raising program within 10 days following his recruitment. Each employee in charge of sensitive activities will follow a catch-up session every 6 months.

This training will be delivered by the CC-EHSC of the main Contractors or by a specialized consultant appointed by the contractors. All personnel will be trained. The sessions will be recorded in a register where the names of all participants will be noted.

The environmental management awareness program on the sites will cover the following priority subjects:

- the rules for waste management within the sites;
- the rules for management of hazardous substances and wastes, particularly their storage authorized exclusively in specially adapted areas;
- pollution control, in particular the response required in case of an accidental pollutant spill;
- protection of sites against fire;
- protection of sites against erosion and sedimentation;
- the procedure to follow in case of discovery of a physical cultural resource;
- the traffic safety rules on public roads and within the sites;
- the principles for saving energy and other resources;
- applicable penalties in case of infringement against the established rules.

Complementary provisions will be made relating to hygiene, health and safety under all aspects that are not covered by the Health and Safety Program and the corresponding training programs.

9.7. E&S SUPERVISION DURING CONSTRUCTION

The Supervision Engineer, through its DES and his team, is responsible for ensuring the Contractor complies with its E&S obligations. The SE is the one that certifies payments to the contractor and as such, he can therefore 'negotiate' the deployment of plant or labour initially allocated to the works in favour of specifically environmental measures.

9.7.1. PAC-13: MONITORING OF CONSTRUCTION ACTIVITIES (SUPERVISION ENGINEER)

Contractors' compliance with their environmental and social obligations will be the subject of a specific monitoring process, coordinated by the SE-DES. In order to ensure compliance with E&S requirements and efficient implementation of corrective measures an environmental monitoring program will be set up, including:

- E&S supervision of the contractors: Through regular site inspections the objective is to ensure that all E&S measures set out in the Obligations for Contractors and in the Action Plans prepared by the Contractors are effectively and efficiently implemented;
- Environmental quality monitoring: monitoring of changes in the quality of the environment in order to evaluate the efficiency of the mitigation measures applied and, if necessary, to modify acceptability thresholds or methods;
- Environmental compliance control monitoring: ensuring that all discharges from all project sites are compliant with environmental legislation or with related specifications in the Tender Documents (under the responsibility of the Contractor, see PAC-10 above). This monitoring will also confirm or not the validity of information supplied by the CCs on a monthly basis. Analysis will be performed on a limited number of parameters indicators of pollution from construction activities.

9.7.1.1. WEEKLY INSPECTIONS

Weekly inspection of the different work sites will be organised by the SE-DES and will be the subject of a report using a standard inspection sheet. This information sheet will check all the environmental specifications imposed on the contractor item by item, giving an immediate overview, during each inspection, of potential cases of non-conformity.

Each environmental event (EE) will be the subject of a standard record sheet to be filled in by the observer (Inspector) and submitted to the SE-DES for action. The record sheet signed by the SE-DES is handed over to the CC-EHSC who then completes the document by explaining the proposed corrective measure. If the solution is acceptable, the EE is closed after checking that the measure has been effectively and successfully implemented.

9.7.1.2. COORDINATION MEETINGS

Regular (weekly or semi-monthly) coordination meetings will be held between the CC-EHSCs (and their inspectors) and the SE-DES (and his inspectors), during which they will discuss the EE in progress, the remedial measures taken and any other subject of current concern such as the Action Plans presented by the CC-EHSCs.

9.7.2. PAC-14: AIR QUALITY AND NOISE MONITORING (SUPERVISION ENGINEER)

The most crucial problems will be caused by dust near the construction sites. No significant problem is seriously anticipated with exhaust emissions, except very locally along hauling routes.

There will be two types of sampling monitoring under the responsibility of the SE:

- ad-hoc controls for dust in residential areas at the boundaries of construction sites near residential areas and along the hauling routes used between the reservoir sites and the roads to be filled (road 608 and Cua Dai road). Action will be taken as soon as few complaints from residents have been collected for a particular location, or where visual inspection confirms that excessive dust is being generated. The DES will make spot checks of noise levels on the various work sites and in certain residential areas during daytime and night, in order to check that standards applicable within the boundaries of the work sites or in the surrounding residential areas are respected.
- regular monitoring for air quality and noise carried out by an external registered laboratory on a quarterly basis. Locations may vary according to progressive transfer of activities, particularly for the road works. Proposed Monitoring Plan is detailed in the table below.

Table [28] ENVIRONMENTAL EFFECTS MONITORING PLAN FOR CONSTRUCTION PERIOD

REFERENCE	PARAMETERS	LOCATIONS	FREQUENCY
Ambient air quality compared to criteria in QCVN 05:2009/BTNMT	CO, SO_2, NO_x, TSP, O_3, lead dust (Pb), (PM10), (PM2.5), benzene, petroleum hydrocarbon (HC)	3 sites: 1: Road 608 2: Cua Dai Road 3: Phap Bao	Quarterly
Noise level compared to criteria in QCVN 26:2010/BTNMT	Day time and night time noise levels dB(A)	3 sites: 1: Road 608 2: Cua Dai Road 3: Phap Bao	Quarterly

For the quarterly monitoring of air quality, the SE will appoint a registered professional laboratory to perform the task.

9.7.3. PAC-15: WATER QUALITY MONITORING (SUPERVISION ENGINEER)

The Contractor is imposed to carry out a monthly monitoring of all the effluent leaving its construction and camps premises. In addition, the SE will appoint a registered professional laboratory to carry out an independent monitoring of surface and underground water quality on a quarterly basis.

Proposed monitoring criteria and locations are presented in the following table.

Table [29] ENVIRONMENTAL EFFECTS MONITORING PLAN FOR CONSTRUCTION PERIOD

REFERENCE	PARAMETERS	LOCATIONS	FREQUENCY
Surface Water Quality compared to criteria in QCVN 08:2008/BTNMT	pH, DO, TSS, COD, BOD5, NH4, Cl, NO2, NO3, F, Phosphate, Cyanide, As, Cd, Pb, Cr+3, Cr+6, Zn, Nickel, Fe, Hg, Cu, Coliforms	3 sites: 1: Outlet Lai Nghi (irrigation pumping station) 2: Outlet Phap Bao(in channel to Thu Bon) 3: Co Co river downstream Co Co UDA	Quarterly
Underground Water Quality compared to criteria in QCVN 09:2008/BTNMT	heavy metals (As, Cr, Cd, Cu, Pb, Zn, Ni, Hg, Fe, Mn, Se), , VOC, TPH, Coliforms	3 sites 1: Well between Lai Nghi and road 608 2: Well along Phap Bao 3: Well next to Cua Dai Road	Quarterly

9.7.4. PAC-16: SITE CLEANING AND REHABILITATION PROGRAM

By the end of the construction activities, each contractor has to decommission the sites where its activities for Project needs have been performed, which includes:

- The demolishing of all structures/buildings developed for the purpose of Project construction.
- The removal from the site of all equipment and the safe disposal or recycling of construction and demolition waste and of construction material;
- The restoration of the land in order to restore it as close as possible from the initial state,
- The official handover of the site to its owner, signed by parties.

In order to ensure that this Site Cleaning and Rehabilitation (SCR) operation is successfully implemented, the Contractor will be required to prepare a Site Cleaning and Rehabilitation Plan (SCRP) which provides operational methods for (i) site assessment and (ii) cleaning and rehabilitation in compliance with Contractual obligation and international good practices. The Plan will respect the following:

Cleaning Stage

- All construction materials, equipment, buildings, facilities and residual waste will be removed from all sites, except if a site specific decision modifies this principle. This decision shall be, commonly agreed on by the CC, PMU and CPC.
- All waste collected on site will be treated in compliance with the requirements of the Tender Documents Environmental Obligations and the Waste Management Plan prepared by the CC at the start of the construction, depending on the classification of the waste product considered.
- Recycling of waste will be maximized.

The Plan will be submitted to the SE not later than 1 month before the start of decommissioning and include the methods for carrying out the following activities:

Identification of Materials and Waste existing on the site: Usable construction surplus, usable hazardous materials surplus, demolition and inert waste (wood, iron sheet, metal scrap, PVC and plastics, glass, tires, etc.), organic waste, hazardous waste, broken machineries etc.

- Evaluation of quantities regarding each group of materials/waste identified;
- Identification of registered companies for the recycling of materials and waste;
- Procedures for treatment and disposal of non-recycled material and waste;
- Schedule for cleaning operations;

Rehabilitation Stage

Rehabilitation will be carried out in immediate continuation or even in parallel with the cleaning stage, taking advantage of the presence of the manpower and the equipment. Consultation with concerned stakeholders will be carried out where necessary. The following principles will apply:

- Sites shall be rehabilitated in a way to restore, as much as feasible and reasonably possible, the original use of the land;

- All sites must be returned free of any buildings or infrastructures developed for the purpose of Project construction, except if specific request is made;
- All spoil disposal areas shall be rehabilitated according to the obligations of the Tender Documentation and the obligations of the Plan on Sediment and Spoil Management.
- Rehabilitation option will eventually be selected through consultation between CC, SE, CPC and any private party if the land is privately owned.

After completion of SCR works, the CC will inform the SE-DES regarding the final site status. After acceptance by SE-DES of the site conditions QNWSDC-PMU will be notified. To finalize the SCR process a joint site visit with all concerned parties will be organized by the SE-DES to sign SCR Completion Certificates as follows:

- For public land, the SCR Completion Certificate will be signed by SE, PMU and by CPC as witness;
- For private land, the SCR Completion Certificate will be signed by the land owner, CC, SE and PMU.

9.8. ACTION PLAN FOR OPERATION STAGE (PAE)

The implementation of environmental monitoring is necessary from the time the works are completed and commissioned, in order to ensure impacts and mitigation measures proposed have been efficiently implemented during the construction stage and show positive results as expected.

The start of the operation stage will vary depend the project components considered. The total project duration will be 5 years, but most of construction activities will start at the end of year 1 and be completed by the end of year 4. Year 5 of the project can be considered as the first year of the operation stage.

The following activities are proposed in this EMP.

9.8.1. PAE-01: AIR QUALITY AND NOISE MONITORING

Monitoring of air quality along road 608 and Cua Dai road will continue over a year after their completion, in order to appreciate changes regarding dust and air pollution. Improvement of suspended particles and possible increase of air pollution from traffic may be anticipated. Monitoring should provide some trend regarding these potential impacts.

Same parameters and location than those monitored during construction will be kept for year 5.

9.8.2. PAE-02: MONITORING OF WATER QUALITY

9.8.2.1. MONITORING OF RESERVOIRS

Works in the Lai Nghi and Phap Bao reservoirs should be completed at the end of year 4. Monitoring of water quality on a quarterly basis set-up for the construction stage will continue as it is, to follow up the progress of water quality after the completion of works. Water quality in Lai Nghi is anticipated to improve with time, at least regarding suspended sediments. Water in Phap Bao originates from stormwater and is not anticipated to change after the project completion;

just the storage capacity will change. The Co Co UDA filling will be partly completed by the end of year 4. However, urban development will continue to take place for several years and and the follow up of Co Co river quality in terms of operation stage is not realistic. The monitoring may continue at least to follow up the evolution of the suspended sediment in the river after filling operation is completed.

Same parameters and location than those monitored during construction will be kept for year 5.

9.9. COST OF ENVIRONMENTAL IMPACT PREVENTION, MITIGATION & MONITORING

The following table sets out the estimated budgets required for implementation of the corrective measures and monitoring activities during the 3 phases of implementation of the Hoi An Urban Environment and Climate Change Adaptation Project.

Table [30] EMP LIST OF ACTIONS AND BUDGET

NO	CORRECTIVE MEASURE / ACTION	RESPONSIBILITY		DURATION OF IMPLEMENTATION (MONTHS)	BUDGET (US$)
		FUNDING	IMPLEMENTATION		TOTAL
PROGRAM OF ACTION PRELIMINARY TO CONSTRUCTION START (PAP)					30,500
PAP 01	Additional Study of Water Quality	PMU	Laboratory	12	5,000
PAP-02	Appointment of PMU-CES	PMU	PMU	60	(1)
PAP-03	Training of PMU-CES & PMU staff	PMU	PMSC	0,5	12,500
PAP 04	Preparation of Communication instruments	PMU	PMSC	0,5	8,000
PAP-05	Preparation of Contractor E&S specifications	PMU	P	0,5	5,000
PROGRAM OF ACTIONS IN CONSTRUCTION PHASE (PAC)					188,000
PAC-01	Waste Management	Contractor	Contractor	60	(2)
PAC-02	Management of Sediment and Spoil	Contractor	Contractor	60	(2)
PAC-03	Hazardous Substances Management	Contractor	Contractor	60	(2)
PAC-04	Accidental Spill Preparedness and Response	Contractor	Contractor	60	(2)
PAC-05	Erosion and Sediment Control	Contractor	Contractor	60	(2)
PAC-06	Management of Permanent & Temporary Camps	Contractor	Contractor	60	(2)
PAC-07	Public Health Management	Contractor	Contractor	60	(2)
PAC-08	Management of Air Quality, Dust and Noise	Contractor	Contractor	60	(2)
PAC-09	Management of Road Traffic and Access	Contractor	Contractor	60	(2)
PAC-10	Monitoring of Water Quality (by SE)	Contractor	SE/Laboratory	60	(2)
PAC-11	Protection of Cultural Resources	Contractor	Contractor	60	(2)
PAC-12	Environmental & Social Training Plan	Contractor	Contractor	60	(2)
PAC-13	Monitoring of Construction Activities	PMU	SE	60	150,000
PAC-14	Air Quality & Noise Monitoring (SE)	PMU	SE	48	23,000
PAC-15	Water Quality Monitoring (SE)	PMU	SE	48	15,000
PAC-16	Site Cleaning & Rehabilitation Program	Contractor	Contractor	12	(2)
OPERATIONAL PHASE ACTION PROGRAMME (PAE)					10,600
PAE-01	Monitoring of Air Quality and Noise	PMU	SE	1	5,600
PAE-02	Monitoring of Water Quality	PMU	SE	1	5,000
	TOTAL	-	-	-	**229,100**

No	Corrective Measure / Action	Responsibility		Duration of Implementation (Months)	Budget (US$)
		Funding	Implementation		Total
	Contingencies 20%	-	-	-	**45,900**
	TOTAL	-	-	-	**275,000**

Notes: (1) Budget internal to PMU operation costs
(2) Related E&S expenses are included into construction costs of the CCs
(3) SE-DES appointed for 5 years
Abbreviations: PMU: Project Management Unit; PMSC: Project Management Support Consultant; SE: Supervision Engineer; CC: Construction Contractor

10. CONCLUSIONS & RECOMMENDATIONS

The five sub-components of the Urban Environment and Climate Change Adaptation Project selected for Asian Development Bank financing will significantly improve the environmental conditions and quality of life of the population in Hoi An through the following results:

- Improvement of the water supply security for Hoi An and nearby secondary centers through using and increasing the water storage capacity of the Lai Nghi reservoir; reduction of the risk of brackish water distribution in the network as observed today during short periods of the dry season; adaptation to climate change particularly sea level rise;
- improvement of public safety and adaptation to long term climate change, particularly flooding, through the raise of road 608 which will secure evacuation of population to safer areas in case of major flood;
- Reduction of flood impact on the ancient city by improving storm water drainage and storage through increasing Phap Bao reservoir storage capacity;
- Improvement of wastewater collection with beneficial effects on public health and on surface and groundwater quality;
- Contribution to Hoi An economic development through the development of new urban areas taking due consideration of prevailing climate change risks (sea level rise and flooding) and direct effects on the quality of life of future residents.

A screening carried out during the Interim phase of the Project confirmed that impacts raised by the project were mainly related to land acquisition while impacts on natural environment were all very limited, mainly related to the construction phase and easily controlable by appropriate and conventional mitigation measures. Consequently, the proposed categorisation of the Project was B, involving the preparation of the present IEE.

Hoi An is recognized as a World Heritage Site by UNESCO, the Ancient Town being an exceptionally well-preserved example of a South-East Asian trading port dating from the 15th to the 19th century. Quang Nam Province where Hoi An is located, is frequently hit by tropical storms and typhoons: From 1979 to 2010, 65 typhoons and 22 tropical depressions hit the Province, or an annual average of 2 typhoons and 0.7 tropical depressions.

The city is located along the Thu Bon estuary, a river draining a catchment area of 3,500 km². Due to the low and flat topography, the discharge in the river which drains almost 80% of the annual runoff during the rainy season from September to December, the occurrence of typhoons particularly in October and November, Hoi An is confronted to recurent floods almost every year, some years exceptional and devastating. Due to the Climate Change, the sea level rise is expected to worsen the flood situation in the coming decades.

Surface water quality in the Thu Bon shows moderate pollution (Category B1), with the exception of excessive salinity. At present, salinity intrusion is observed in the estuary, directly linked to the tidal regime and the discharge of the rivers. The lower the discharge is, the farther the salinity front moves upstream the river. Measurements show the salinity front in the river reaches about 15 km from the mouth.

The project zone mainly consists of urban areas and agriculture, dominated by paddy. The main natural area, the coastal dune system, has been long utilised for resort development and sand production. Vegetation biodiversity is limited, with no forest and related fauna biodiversity is poor. However, a group of 4 islands, the Cham Islands, located about 16 km from the coastline are part of the Cu Lao Cham Marine Park, a nature reserve established since 1986, support a rich biodiversity but mainly aquatic.

By the end of 2011, population of Hoi An City was about 91,000 people. The city is considered as the most self-motivated in economic operation of Quang Nam province and one of the famous tourism spot of the country. With more than 10,000 beds, tourism is the leading activity of the place, complemented by agriculture and fisheries

Impacts related to project location will be mainly social and related to land acquisition. However, these impacts have been drastically reduced from the initial project design by the PPTA team during the mid-term mission. Road 608 doesn't involve land acquisition or building loss. Cua Dai Road requires 10.5 ha but all land acquisition is already completed and paid. Co Co UDA affects about 37 ha of land, half agricultural and half being fishponds, but no physical displacement is required. Dredging of the Lai Nghi and the Phap Bao reservoirs will only involve limited land acquisition, respectively 3.71 ha and 1.38ha. Impact on natural resources will be limited to the cut of few roadside trees mainly along road 608. A 1 to 1 replacement policy will be respected

Main environmental impacts will happen during the construction activities. Because of the project located in an urban environment, risk of nuisances is higher: traffic congestion, temporary alienation of access, community facilities temporary disruption, noise, engine gas and dust release may temporary disturb the nearby communities. However, recommendations formulated in the EMP combined with a solid environmental contractual framework and an effective inspection of construction sites will definitely reduce these risks to an acceptable level.

Dredging of both reservoirs, but mainly Lai Nghi will generate a large volume of sediment of about 600,000 m3. The initial FSR considers its disposal next to Lai Nghi reservoir without more information. This option may use another 10 ha of agricultural land for disposal. Sampling and analysis of sediment under the PPTA confirms the sediment is not contaminated by heavy metals and its grain size distribution, mostly sand, satisfies requirements for fill. It is thus proposed to reuse the sediment for the fill of the other project components, the requirements of which will easily absorb all the sediment produced. This option will avoid additional land acquisition but will impose an intense truck traffic between production and consumption sites and a close coordination and scheduling of activities. Recommendations regarding hauling routes are provided in the IEE.

No detrimental impact is anticipated after construction and during operation of the project sub-components on flood occurrence; Phap Bao will improve stormwater drainage in the urban area.

No impact is anticipated on Thu Bon salinity and Lai Nghi water intake will be kept upstream the salinity front on the long term and despite CC and sea level rise thanks to the flood management plan proposed in the PPTA.

The risk of Lai Nghi reservoir water contamination by the wastewater of surrounding residential areas will become more sensitive as water will be used for drinking purpose. The PPTA has already included in the Lai Nghi project as mitigation measure, the development of a sewerage system along the reservoir shores collecting sewage from households and discharging it in the existing sewerage system of Hoi An.

No particular impact on air quality is anticipated from road 608 which will be only raised, not widened, so traffic is not anticipated because of the project. Cua Dai road will be a new road mainly surrounded by agriculture and the progressive development of its traffic should not pose paricular issues regarding air quality.

Due diligence of EIAs was carried out as part of this IEE for 2 associated facilities to the proposed project: The Duc Ninh WWTP and the Nhat Le 2 bridge, both being under construction. No major issue rose from the environmental point of view.

The IEE provides a full EMP providing organization, roles and responsibilities of parties involved, detailed measures to implement during construction and operation, monitoring and cost estimate.

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APPENDIX 1
INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

LOCATIONS AND NUMBER OF PARTICIPANTS IN THE PUBLIC CONSULTATION MEETINGS

DATE	TIME	DISTRICT/CITY	COMMUNE/ WARD	MEETING LOCATION	NUMBER OF PARTICIPANTS		
					TOTAL	MALE	FEMALE
18 Sep 2013	8.00 h -10.30 h	Hoi An	Cam Pho	Meeting-hall of WPC	11	5	6
19 Sep 2013	15.00 h-17.30 h	Hoi An	Cam Ha	House of the village head Tra Que	10	7	3
20 Sep 2013	10.00 h-12.00 h	Hoi An	Cam An	House of the village head Tan My	10	6	4
20 Sep 2013	8.00 h-9.45.00 h	Hoi An	Cam Chau	Meeting-hall of WPC	130	105	25
22 Sep 2013	8.00 h-10.30 h	Hoi An	Thanh Ha	Culture House of An Bang village	14	13	1
26 Sep 2013	8.00 h-10.00 h	Dien Ban	Dien Phuong	Meeting-hall of CPC	76	55	21
26 Sep 2013	14.00 h-16.30	Dien Ban	Dien Nam Dong	Culture House of 7B village	13	8	5
4 Oct 2013	8.30 h-11.00 h	Cam Chau	Hoi An	Cultural House of Cam Chau Ward	39*		39
4 Oct 2013	14.00 h-16.30 h	Cam Chau	Hoi An	Cultural House of Cam Chau Ward	40*		40

*Note : * Two meetings in Cam Chau Wards on 4 Oct 2013 : one for man & other one for woman, these meetings are combined with gender issues*

MINUTES OF PUBLIC CONSULTATION MEETINGS IN HOI AN

LOCATION	DATE	PARTICIPANT	SUMMARY OF PEOPLE'S OPINIONS
Cam Pho ward, Hoi An city	18 Sep 2013	04 Commune leaders and 11 people (5 Male and 6 Female)	This is a tourism city. Therefore, if the project would be implemented, it should have environment policy for local people. Assistance policy should be satisfactory, especially compensation mode, in order to help local people to stable their life, minimize negative impacts when the project is implemented. Focus group discussion: Currently, the ward has been considered as flood drainage, flooding frequency is not more 1 time / year during the rainy season and flooding is not long time (3-5 days). People only farm winter-spring harvest and summer-autumn harvest. However, on September – October the large amount of rain flowing into the drainage channel but has been stagnant, and plus water waste from residential area, so the canal has been polluted during the rainy season (especially area of Chua Cau canal). The ward proposed handling measures: split a canal to improve water circulation.
Cam Chau ward, Hoi An city	20 Sep 2013	03 Commune leaders and 130 people (105 Male and 25 Female)	Orientation of city planning is to maintain the status quo and does not impact on paddy area. With aquaculture land outside the dike in the planning of the project, Viet Land Estate Company invested to build the advanced Park. If agriculture land would be acquired, the project should have assistance policy for households in order to develop local tourism and tourism industry and services. When the project is implementing, it is necessary to minimize affected area to minimized negative impacts to households (if there is no land to farming, it will lack of food...). Living in the tourism city, so beside time for farming, they also work as part time job at restaurants and hotels with higher income. Regarding waste and environment issue, because the ward located low land area, so there are at least 2 -3 times / year with flooding in the ward. The restaurants, hotels directly wasted to residential area, and with stagnant water flooding for long time, so water source of water canal was be too polluted. Therefore, some women were be bacterial infection causes inflammation of skin (rashes limbs ...) due to touching polluted water. Some households said that farming is low productivity, low interest and hard. They support to implement the project and and they are willing to hand over land to the project, but request the project to provide reasonable compensation. If the urban is developed, infrastructure also will be developed, and they will have many new job opportunities from urban areas such as: Sanitation Worker, Construction Worker Developing hotel business Tailoring Handicraft items made from rattan, bamboo Souvenir Shop Business Travel Services, etc. Focus group discussion: Affected women by project include My An and Thanh Tay group, main income source of households is generated by agricultural activities. Women Union of ward has always supported to women, especially poor women or single women headed households. Loans with preferential interest

LOCATION	DATE	PARTICIPANT	SUMMARY OF PEOPLE'S OPINIONS
			rate of 0.65% with a loan of 20 million - 30 million VND and will be paid in installments within three years to address job issues immediately or in the future for women (some production activities: livestock, sales, and ornamental plants, flowers...) However, because the loan amount is too much, many households do not dare to borrow for fearing of not being paid, but they also do not want to participate in vocational training
Cam An ward, Hội An city	20 Sep 2013	03 Commune leaders and 10 people (06 Male and 04 Female)	Currently land area along estuary and river is under management of the State, local people only have implemented catching activities. Cua Dai breakwater embankment subproject will impact to the fishermen on inshore fishing as well as boats anchoring. Do not vertical embankments because when the sea runs high, boats anchored near the shore will be damaged due to in collision with the embankment. It should be 25-30 m distance with a path, because seafarer density is quite a lot. Dredging of Co Co River: More than half the populations in the working age of the ward have main income generated seafood catching and aquaculture farms. (for catching, mainly make "Lo", "Chuom" and fishing nets; aquaculture farm includes shrimp and pink fish farming). During dredging, fish catching of households would be affected and stopped. In addition, before dredging the river is not deep, there are many floating-water fishes, if dredging is implemented, the river will be deeper, and consequently many fish species will no longer exist. Therefore, it great impacts on the lives of fishermen. When carrying out dredging, it should be calculated carefully extent of damage to fishermen. Adequately compensation for fishermen in the affected areas, and assistance on economic for these households, the best way is to support employment for people if possible (Priority jobs in the service sector, tourism and hotels...). Currently, works of women are to assist her husband on fish catching, if dredging women is also affected. It's necessary to support women to find new jobs replaced fishing job in order to ensure income source. Expand and develop tourism services in ward.
Thanh Ha ward, Hoi An city	22 Sep 2013	03 Commune leaders and 14 people (13 Male and 01 Female)	Lai Nghi lake known as Dam river. According to the Province's new rural construction plan, the ward is planning new rural included 4 main roads entering into residential area. The ward expects that when the project is implemented, it will create urban landscapes and develop tourism. District selected commune as community tourism commune because there are traditional jobs in commune, such as: Phuoc Kieu copper casting, "Banh Trang", "Quang" noodle and pottery. However, the project would acquire partially land area of households, so it's necessary to compensate for land, as well as food assistance for a certain period of time (food assistance within 6 months) Women in ward mainly engaged in agriculture, if the project would acquire land of farmers, they do not know what to do to generate new sources of income Currently, "Banh trang" and Quang noodle making are suitable for women in the ward. It should be more attention to develop those local jobs more as the orientation to become a community tourist area.
Cam Ha commune, Hoi An city	19 Sep 2013	03 Commune leaders and 10 people (07 Male and 03 Female)	Currently, in commune there are about 80 households with aquaculture farm and many households participated in catching activities in 3 villages: Ben Tre, Dam Na and Tra Que. There are 2 shrimp harvests and 1 crab harvest for a year. In which, 2 shrimp harvests begin in early March and end on late September. If the weather is favorable, they will farm the 3rd shrimp harvest. If the weather is not favorable, they will transfer to crab farming. Water from the river is main source water to aquaculture farming. If carrying out dredging, aquaculture farming and conditions of households would be

LOCATION	DATE	PARTICIPANT	SUMMARY OF PEOPLE'S OPINIONS
			affected. In the last few years (2-3 years ago), shrimp farmers are facing difficulties because of mass dead shrimps. They found out the cause and they knew that the shrimp died due to pollution of water environment, not for diseases. Recommend: It should be having wastewater treatment system in residential area before discharging into the river, lake. It's necessary to consider supporting for each specific object when carrying out job support. In addition to compensation, the project should support for households on food to ensure their lives when they have not found a suitable job. The project should take advantage of local labors during project implementation. There is Trang Treo Residential area Planning Project in commune (Trang Treo village), with a planned area of 38 hectares, land acquisition has been carried out since 2012. Currently, women have assisted her husband in catching fishes. However, for few female headed households, women are primarily responsible for this task. If the project is implemented, it's necessary to create jobs for households. Currently, in commune there are some jobs, such as: Growing traditional vegetable, flower, ornamental plants. It is best to invest further expand these jobs to help women stabilize their lives.

SOME PICTURES ON PUBLIC CONSULTATION MEETINGS AT CAM CHAU WARD ON THE 4 TH OCTOBER 2013

Man Group Meeting at Cam Chau Ward in the morning of 4 th Oct 2013

Man Group Meeting at Cam Chau Ward in the morning of 4 th Oct 2013

Man Group Meeting at Cam Chau Ward in the morning of 4 th Oct 2013

Woman Group Meeting at Cam Chau Ward in the afternoon of 4 th Oct 2013

PPTA8171-VIE
URBAN ENVIRONMENT AND CLIMATE CHANGE ADAPTATION PROJECT
(Cam Chau Ward – Hoi An City)

LIST OF LOCAL PEOPLE OF CAM CHAU WARD
PUBLIC CONSULTATION MEETING
HOI AN
4 OCTOBER 2013, 8H30
ATTENDEES: MALE GENDER

No.	Name	Position	Quantity	Signature
I	**Representatives of Cam Chau Ward's Officials**			
1				
2				
3				
4				
5				
II	**Local People**			
1	Nguyễn Bếp			
2	Võ Việt Tùng			
3	Phan Hiền			
4	Nlg Hiền			
5	Võ Đức			
6	Lê Trừ			

1

7	Nguyễn Nam			
8	Lê Phương			
9	Đinh Nhung			
10	Lê Keo			
11	Ng văn Trí			
12	Trần Bường			
13	Nguyễn Cần			
14	Đinh Tú			
15	Lê Phi Châu			
16	Nguyễn Bình			
17	Võ Việt Đế			
18	Nguyễn Xa			
19	Lê văn Bay			
20	Lê văn Chung			
21	Lê văn Văn			

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22	Nguyễn Chè			
23	Đặng Diên			
24	Đặng Nhiên			
25	Võ Danh			
26	Ngô Đức Sau			
27	Lê Văn Tân			
28	Đinh Văn Thiệt			
29	Bùi Tấn Xuân			
30	Lê Văn Lợi			
31	Dương Bá Hiền			
32	Đặng Văn Thú			
33	Lê Mẫn			
34	Lê Thanh Tuấn			
35	Đinh Thanh Công			
36	Lê Thị Ba			

37	Lê Duy Hiệp			
38	Lê Ngọc Lân			
39	Lê Văn Na			
40				

PPTA8171-VIE
URBAN ENVIRONMENT AND CLIMATE CHANGE ADAPTATION PROJECT
(Cam Chau Ward – Hoi An City)

LIST OF LOCAL PEOPLE OF CAM CHAU WARD
PUBLIC CONSULTATION MEETING
HOI AN
4 OCTOBER 2013, 14H30
ATTENDEES: FEMAL GENDER

No.	Name	Position	Quantity	Signature
I	Representatives of Cam Chau Ward's Officials			
1				
2				
3				
4				
5				
II	Local People			
1	Trần Thị A			
2	Đinh Thị Mẹo			
3	Trần Thị Hường			
4	Nguyễn Thị Lung			
5	Lý Thị Thỏ			
6	Trần Thị Xuân			

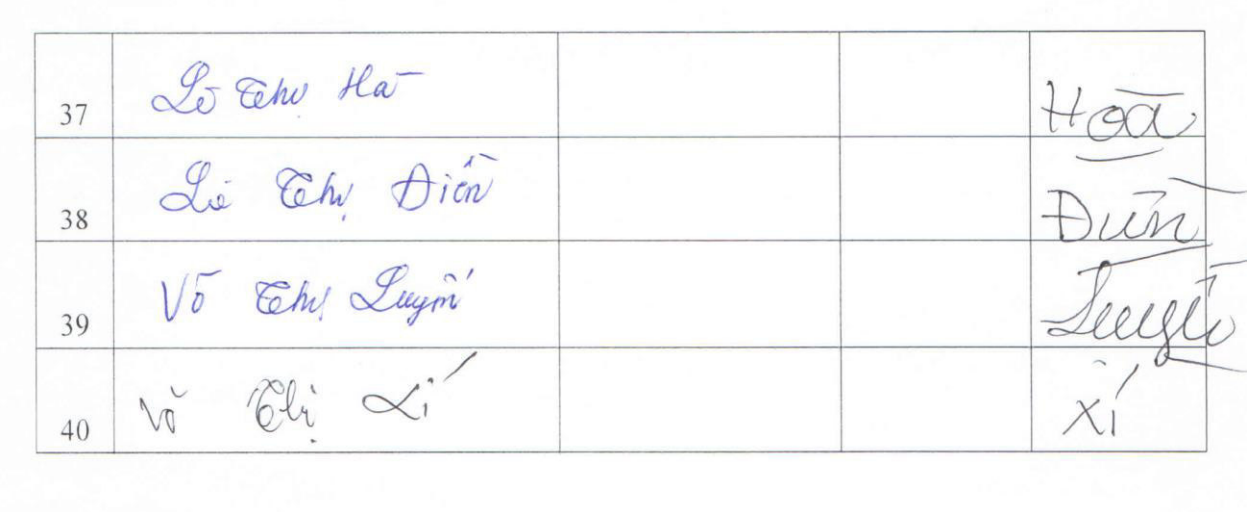
1

7	Danh Thị Anh			Anh
8	Huỳnh Thị Hết			Hết
9	Danh Thị Nhạn			Nhạn
10	Nguyễn Thị Bốn			Bốn
11	Lê Thị Gần			Gần
12	Nguyễn Thị Trâm			Trâm
13	Phan Thị Châu			Châu
14	Trần Thị Thuận			Thuận
15	Lê Thị Xuý			Xuý
16	Nguyễn Thị Mỹ			Mỹ
17	Lê Thị Quý			Quý
18	Phan Thị Bự			Bự
19	Nguyễn Thị Cẩm			Cẩm
20	Mai Thị Đào			Đào
21	Nguyễn Thị Châu			Châu

2

22	Trần Thị Vinh			
23	Lê Thị Quang			
24	Lê Thị Nhớ			
25	Đinh Thị Tâm			
26	Lê Thị Trần			
27	Trần Thị Thanh Lai			
28	Đặng Thị Tình			
29	Lê Thị Hoá			
30	Nguyễn Thị Mỹ			
31	Võ Thị Xuân			
32	Lê Thị Tuân			
33	Võ Thị Nhung			
34	Ngô Thị Lai			
35	Nguyễn Thị Dần			
36	Lê Thị Bon			

3



37	Lê Thu Hà			Hoà
38	Lê Thị Diên			Diên
39	Võ Thị Luyến			Luyến
40	Võ Thị Lí			Lí

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APPENDIX 2
DUE DILIGENCE OF ASSOCIATED FACILITIES

Due diligence –HOI AN CITY

ASSOCIATED FACILITY (LINKED PROJECT): HOI AN WASTEWATER TREATMENT PLANT

EIA OF HOI AN WASTEWATER TREATMENT PLANT (WWTP)

Name of the Project: " Building Hoi An City 's Wastewater Treatment Plant" under the Project " Solid Waste and Wastewater Treatment and Environmental Protection for Hoi An City "

Project Owner: Project Management Unit of Project of Solid Waste and Wastewater Treatment and Environmental Protection for Hoi An City

The Consultant for EIA Preparation : Centre of Environmental Measurement & Analysis of Quang Nam Province

Guideline used EIA preparation: Vietnam Government Regulations (Laws, Decrees, Circulars.)

Date of EIA Completion: July, 2011

The EIA was Approved by MONRE on the 23 September 2011, Decision No 1805/QD-BTNMT

SPS Policy Principles	Was Similar Principle Used in the Project? (Yes, No, Not applicable)	Specific Guidelines (i.e. decree, circular or office order/instruction) Used In the Project	Description of Equivalence/ Difference
Environmental Safeguards			
1. Use a screening process as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.	Not applicable/ No equivalence. There are no legal requirements specified regarding the timing of the screening process in relation to elaboration of an environmental assessment.	During preparation of Pre-FS & FS	ADB SPS (2009) Use a Environmental Screening /Rapid Environmental Assessment Guidelines Adopted in the Project Project location to be selected during preparation of Pre-FS Criteria based on Technical Standards Minimine number of relocated Households Minimine land acquisition Project area should avoid in Protected area/ wet land/ Sensitive area… Selection of Project Location for Hoi An City's WWTP Selection of project location is appropriate for land use planning Land acquisition : 6,865 ha which was aquaculture land & unused land No residential area in the project area
2. Conduct an environmental assessment to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.	Yes	Law on Environmental Protection, 2005 (LEP) Decree 80/ND-CP, August 09, 2006, of the Prime Minister regarding detailed stipulation and guidance on applying the Law of Environmental Protection. Decree 21/2008/ND-CP, February, 28, 2008, amending and supplementing a number of articles of the Government's Decree 80/ND-CP of August 9, 2006; detailing and guiding the implementation of a number of articles of the Law on Environmental Protection. Circular No. 05/2008/TT-BTNMT guiding strategic environmental assessment, environmental impact assessment and environmental protection commitment Biodiversity Law No 20/2008/QH12 Law on Construction No. 16-2003-QH11	Partial Equivalence. The EIA prepared by Centre of Environmental Measurement & Analysis of Quang Nam Province that the Owner hired The Centre for EIA Chapter 3 in EIA of Hoi An City WWTP : Environmental Impact Assessment included 3 stages Before Construction Phase During Construction Phase Operation Phase Environmental Assessment indentified potential impacts directly and risk to physical, biological, socioeconomic In addition, Environmental assessment indentified "Risk Impact & Emergency " as fire risk, the WWTP operation risk, Natural Disaster & Flooding , Chemicals leakage 3.2. Confidence level of EIA (documents, assessment..) Small difference Gender issues & Vulnerable groups , climate change are still not considered in Environmental Assessment Report However. Climate change is considered in the revised FS

SPS Policy Principles	Was Similar Principle Used in the Project? (Yes, No, Not applicable)	Specific Guidelines (i.e. decree, circular or office order/instruction) Used In the Project	Description of Equivalence/ Difference
		Law on forest Protection and Development , No. 29/2004/QH11) Law on Cultural Heritage	*Hoi An City's WTP is within Cam Thanh Commune- Hoi An City, it is Southeast 8 km to Hoi An City Centre . So,* *no potential transboudary and global impacts*
3. Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.	Yes	Circular No. 05/2008/TT-BTNMT	Partial Equivalence. Circular 05 requires that the Impact Assessment Report include as part of the project description any "variant for siting of the project (if any) and [the] selected variant" as well as an analysis and evaluation of the advantages and disadvantages (if any) of each planned location of the project to the environment." No equivalence. There is no requirement that the EA explain the rationale for selecting a particular alternative. Hoi An City's WWTP';s EIA *Lack of Chapter : " Project Alternative "*
4. Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an environmental management plan (EMP) that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle.	Yes	Circular No. 05/2008/TT-BTNMT	Full Equivalence. Both the LEP and Circular 05 require that projects seek to prevent adverse impacts in environmental management planning The LEP, Decree 21 and Circular 05 all impose detailed requirements for the minimization of impacts to the level of no significant harm to third parties. EMP in EIA of Hoi An City's WWTP EMP included *Environmental Management Program* : A matrix indicated project activities , potential impacts caused by the project, mitigation measures, Who have responsibility to carry out in 3 stages: Pre-construction. During construction, After construction/ Operation *Environmental Monitoring Measurement Program :* included : *During construction* Air & noise, Surface water of De Vong river in Construction Stage, and *During Post-construction/Operation stage* Dust, noise Monitoring Measurement Surface water quality Monitoring of De Vong river Ground water Measurement Wastewater Measurement Waste solid Measurement Sludge monitoring measurement Each element monitoring measurement included : Locations, Parameters, frequency, National Standards , and total estimated cost for whole Environmental Monitoring measurement program
5. Carry out meaningful consultation	Yes	Decree 80/ND-CP,	Full Equivalence

SPS Policy Principles	Was Similar Principle Used in the Project? (Yes, No, Not applicable)	Specific Guidelines (i.e. decree, circular or office order/instruction) Used In the Project	Description of Equivalence/ Difference
with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance.		August 09, 2006, Decree 21/2008/ND-CP Circular No. 05/2008/TT-BTNMT	Commune, ward or township Fatherland Front Committees shall represent communities in contributing opinions in the process of making environmental impact assessment reports of investment projects in their localities. The project owner shall send a document on the project's major investment items, environmental issues and environmental protection measures and request the commune-level People's Committee and Fatherland Front Committee of the place where the project is to be executed to give opinions. Within fifteen (15) working days after receiving a written request for opinions, commune-level People's Committee and Fatherland Front Committee shall give their opinions in writing and make them public to local people. Small difference There are no provisions in the legal framework that are explicitly intended to ensure women's consultation in the EA process. There is no expicit provision i the legal framework to eensure that stakeholder views and concerns are made known to and understood by decision makers and taken into account.." Public Consultation & grievance redress mechanism in EIA of Hoi An City's City *The project owner sent The EIA to Cam Thanh Commune People's Committee and Fatherland Front Committee of the place where the project is to be executed to give opinions; and sent to Management Board of Cu Lao Cham / Cham Islands Biosphere Reserve to give opinions as the project area is buffer zone of This Biosphere Reserve* *The project owner received " their opinions in writing with no objection* *General comments* *The project owner need to implement strictly mitigation measures as described in EIA* *Works progress should be implemented timely, should not be delayed affecting the livelihood of people* Grievance redress mechanism There is Law on Complaint No 02/2011/QH13. This Law regulates on complaints and settlement of complaints against administrative decisions or acts of state administrative agencies or competent persons in these agencies; complaints and settlement of complaints related to disciplinary

SPS Policy Principles	Was Similar Principle Used in the Project? (Yes, No, Not applicable)	Specific Guidelines (i.e. decree, circular or office order/instruction) Used In the Project	Description of Equivalence/ Difference
			decisions against cadres or civil servants; reception of citizens; management and supervision of complaint settlement work. *However . there is no Establish a grievance redress mechanism in The EIA to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance*
6. Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.	Yes	Decree 80/ND-CP, August 09, 2006, Decree 21/2008/ND-CP Circular No. 05/2008/TT-BTNMT	Partial Equivalence. Such a requirement is implicit in the requirement that t" the opinions of acceptance or not acceptance of the consulted organizations or individuals, must be summarized and described truly in the environmental impact assessment report." Law on Environmental Protection specifies that environmental information and data "must be made public in forms easily accessible by concerned organizations and individuals." Difference There is no explicit provision in the legal framework that requires disclosure of the draft environmental assessment There is no explicit requirement that the draft EIA be disclosed in a timely manner prior to action by the EA Appraisal Committee. There are no requirement on Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders Public Disclosure in Hoi An City WWTP EIA *No information in the EIA*
7. Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions,	Yes	Circular No. 05/2008/TT-BTNMT guiding strategic environmental assessment, environmental impact assessment and environmental protection commitment	Full Equivalence. The LEP specifies the responsibilities' of project owners to "supervise the implementation of, contents of environmental impact assessment reports," and to properly and fully implement environmental protection contents in environmental impact assessment reports and requirements stated in decisions approving environmental impact assessment reports." Difference The LEP and Circular 05 provide that monitoring reports and minutes of inspection be submitted to agencies concerned but does not specify whether such reports and minutes are to be disclosed to private affected communities or to the general public Implement of EMP of Hoi An City WWTP To be updated

SPS POLICY PRINCIPLES	WAS SIMILAR PRINCIPLE USED IN THE PROJECT? (YES, NO, NOT APPLICABLE)	SPECIFIC GUIDELINES (I.E. DECREE, CIRCULAR OR OFFICE ORDER/INSTRUCTION) USED IN THE PROJECT	DESCRIPTION OF EQUIVALENCE/ DIFFERENCE
and disclose monitoring reports.	No		
8. Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.	Yes	LEP, 2005	Partial Equivalence. The Article 6.1 of LEP provide Propagandizing, educating and mobilizing all people to participate in environmental protection, environmental sanitation, natural landscape protection and biodiversity conservation. Article 7: Acts to Be Strictly Prohibited Destroying and illegally exploiting forests and other natural resources; Intruding into natural heritage and natural reserves; Difference There is no explicit provision in the legal framework that Do not implement project activities in areas of critical habitats Scope of Hoi An City's WWTP area The project area not in areas of critical habitats Hoi An City's WTP is within Cam Thanh Commune- Hoi An City, it is Southeast 8 km to Hoi An City Centre, about 10 km to Cu Lao Cham Biosphere Reserve .

SPS Policy Principles	Was Similar Principle Used in the Project? (Yes, No, Not applicable)	Specific Guidelines (i.e. decree, circular or office order/instruction) Used in the Project	Description of Equivalence/ Difference
9. Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phaseouts. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.	Yes	LEP,2005	Full Equivalence. Article 5 of LEP : State Policies on Environmental Protection, in which Utilizing natural resources rationally and economically, developing clean and renewable energies; and promoting waste reduction, reuse and recycling. Improving the effectiveness of, and extending international cooperation in the field of environmental protection and fulfilling international environmental commitments; and encouraging organizations and individuals to participate in, and implement international cooperation in the field of environmental protection. Hoi An City's WWTP *Hoi An City's WWTP was built with investment in line with modern technology, advanced equipment in the world.* *Source to be received wastewater after treatment : De Vong river / Co Co river* *The Standards of wastewater after treatment : QCVN 14 : 2008/BTNMT Column B, water is not use for domestic water supply source, equivalence with Column B1 & B2 of QCVN on surface water or coastal water*
10. Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.	Yes		Hoi An City's WWTP *Base on the EIA, worker Camp to be built near by the project site* *Provide worker clean water for cooking & washing, septic tank & sanitation facilities*

SPS POLICY PRINCIPLES	WAS SIMILAR PRINCIPLE USED IN THE PROJECT? (YES, NO, NOT APPLICABLE)	SPECIFIC GUIDELINES (I.E. DECREE, CIRCULAR OR OFFICE ORDER/INSTRUCTION) USED IN THE PROJECT	DESCRIPTION OF EQUIVALENCE/ DIFFERENCE
11. Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.	Yes	LEP,2005 Law on Cultural Heritage	Full Equivalence. Article of-LEP - Acts to Be Strictly Prohibited Destroying and illegally exploiting forests and other natural resources; Intruding into natural heritage and natural reserves; Article 35 of Law on Cultural Heritage The principal investor in a project to improve or construct a structure in a place with influence on a cultural site has the obligation to coordinate with state authorities responsible for culture and information and create the conditions allowing them to supervise the construction process. . If an object is found during the construction process that may be a cultural site, relic, antiquity or national treasure, the project holder must temporarily stop work and inform state authorities responsible for culture and information. Upon receiving this report, the state authorities responsible for culture and information must take timely measures to settle the case in order to guarantee the progress of the construction. In cases that are considered to require suspension of construction in that location in order to protect the original condition of the cultural site, the state authorities responsible for culture and information must report up for the next level of authorities to decide Hoi An City WWTP's EIA Law on Cultural Heritage No 28/2001/QH10 is used for the EIA
Design Capacity : 6,750 m^3/day Network of wastewater collection is covered by 5 wards of Hoi An City: Tan An, Son Phong, Cam Pho, Minh An & Cam Chau with population of 43,200			

APPENDIX 3
OUTLINE CONTENTS OF EMP MONITORING REPORT

Draft Outline for the Environmental Monitoring Report

1. Introduction

(Purpose of report; order of submission of the report e.g., first, second….nth report; period covered; preparer; and structure of the report)

2. Component Description

(Briefly describes the component, its sub-component activities and their sizes/scales, locations, costs and implementation schedules. Remains the same in every reporting, unless there are changes in scope, size or details, locations. Include map showing locations of components.)

3. Physical Progress of the Component

3.1 Previous Reporting Period

3.2 Current reporting period

(target and actual, for each Sub-component, and for Component overall)

4. Compliance with GoV Environmental Requirements

GoV Environmental Regulatory Requirements	Compliance Status

5. Loan Agreement's Environmental Requirements (other than EMP compliance)

Loan Agreement Reference No. & Provision	Compliance Status

6. Compliance with the EMP

6.1 Implementation of Mitigation Measures

From EMP		Measures Undertaken				Necessary Corrective Action	Results
Impacts	Measures	What	When	How often	Effectiveness		

6.2 Conduct of Environmental Effects Monitoring

Monitoring Activity Stated in EMP	Undertaken?			Results	Remarks
	Yes	No	Date		

6.3 Observance of the Grievance Redress Mechanism

Complaint		Complainant		Action Taken	Result	Remarks
When Filed	What	Name	Address			

7. Performance Monitoring

7.1 Effectiveness of Instituted Mitigation Measures (suggested)

Assessment	Description	Scoring
Very Good	96-100% fully effective	5
Good	76-95% effective	4
Fair	51-75% effective	3
Poor	26-50% effective	2
Very Poor	0-25% effective	1

7.2 **Performance in EMP Implementation** (suggested assessment levels, descriptions & scoring)

A. Environmental Impact Mitigation

Assessment	Description	Scoring
Very Good	96-100% of the required mitigations carried out accordingly	5
Good	76-95% of the required mitigations carried out accordingly	4
Fair	51-75% of the required mitigations carried out accordingly	3
Poor	26-50% of the required mitigations carried out accordingly	2
Very Poor	0-25% of the required mitigations carried out accordingly	1

B. Environmental Effects Monitoring

Assessment	Description	Scoring
Very Good	96-100% of the required effects monitoring carried out accordingly	5
Good	76-95% of the required effects monitoring carried out accordingly	4
Fair	51-75% of the required effects monitoring carried out accordingly	3
Poor	26-50% of the required effects monitoring carried out accordingly	2
Very Poor	0-25% of the required effects monitoring carried out accordingly	1

7.3 Overall Environmental Performance of the Subproject

Impact (EMP)	Performance		Met Target Outcome?			Basis of Info	Remarks
	Indicator (EMP)	Value	Met	Failed			
				Frequency	Date/s		

8. Summary of Corrective/Follow Up Actions to be Taken

9. Lessons Learned

10. Conclusion