



THE SOCIALIST REPUBLIC OF VIETNAM  
MINISTRY OF TRANSPORT  
PROJECT MANAGEMENT UNIT OF WATERWAYS

World Bank



## NORTHERN DELTA TRANSPORT DEVELOPMENT PROJECT (NDTDP)



### CORRIDOR 3

Day – Ninh Co junction Canal and crossing bridge (DNC)

### ESIA

Environment and Social Impact Assessment  
Executive Summary



In association with



August 2016

## ABBREVIATIONS

### General Abbreviations

CEO:	Contractor Environmental Officer
CNR:	Compagnie Nationale Du Rhône
CSC:	Construction Supervision Consultant
CST:	Construction Supervision Team
DMDP:	Dredged Materials Disposal Plan
DONRE:	Department of Natural Resources and Environment
ESIA:	Environment and Social Impact Assessment
EMP:	Environmental Management Plan
HSO:	Health and Safety Officer
MDTIDP:	Mekong Delta Transport Infrastructure Development Project
MOH:	Ministry of Health
MONRE:	Ministry of Natural Resources and Environment
MOT:	Ministry of Transport
NDSO:	Nam Dinh Statistics Office
NDTDP:	Northern Delta Transport Development Project
NBSO:	Ninh Binh Statistics Office
NGO:	Non-governmental Organization
RRD:	Red River Delta
SEMP:	Site Environmental Management Plan
SEO:	Supervising Environmental Officers
OP:	Operational Policy
PEO:	Project Environmental Officer
PMU-W:	Project Management Unit of Northern Inland Waterway
PPC:	People Committee
QCVN:	National Technical Regulation
TCVN:	Vietnamese Standard
TOR:	Terms of Reference
UNICEF:	United Nations International Children's Emergency Fund
VIWA:	Vietnam Inland Waterway Agency
VIPO:	VIPO Trading and Investment Consultant JSC.
WB:	World Bank
WHO:	World Health Organization

## Technical Abbreviations

AAS:	Atomic absorption spectroscopy
BOD:	Biological Oxygen Demand
COD:	Chemical Oxygen Demand
DO:	Dissolved oxygen (mg/L)
DWT:	Dead Weight Tonnage
EC:	Electric conductivity ( $\mu\text{S}/\text{cm}$ ; $\text{mS}/\text{cm}$ )
ICP-MS:	Inductively coupled plasma mass spectrometry - Mass Spectrometry
IC:	Ion chromatography
GC:	Gas chromatography
m bgl:	Meter below ground level
m asl:	Meter above modern sea level
N, S, E, W:	North, South, East, West
NO <sub>x</sub> :	Nitrogen Oxides
PM:	Particle matters
SD:	Sediment
SS:	Surface Soil
SW:	Surface water
TDS:	Total dissolved solids (mg/L)
TOC:	Total organic carbon (mg/L)
TSS:	Total Suspended Solids
TSP:	Total Suspended Particulates
UW:	Underground water
UV-VIS:	Ultra Violet-Visible Spectrometer

General comment: Further chemical abbreviations are based on the nomenclature of the International Union of Pure and Applied Chemistry.

## **Note on Disclosure of Environmental Impact Assessment and Environmental Management Plan for Phase 2 Activities Under the Northern Delta Transport Development Project**

The Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for the second phase of implementation of civil works under the Vietnam Northern Delta Transport Development Project were approved by Vietnam's Ministry of Natural Resources and Environment (MONRE) in December 2013. Subsequently, in January 2014, these documents were disclosed locally in Vietnamese at all communes within the project area—namely, Truc Chinh, Phuong Dinh, Nghia Son, Nghia Lac, and Thinh Long communes in Nam Dinh province, in addition to Bich Dao ward in Ninh Binh province and Ben Got ward in Phu Tho province.

However, due to an unintended clerical error, the English version of these documents was not disclosed at the time through the World Bank's InfoShop, as required by World Bank policy. While this omission is unfortunate, it is noted that the most critical steps mandated by World Bank policy regarding preparation, approval, disclosure, and implementation of environmental safeguards instruments were successfully implemented: (a) during preparation there was extensive consultation with affected communities regarding the content of the documents and the nature of both the project in general and the proposed civil works in particular; (b) timely approval of the documents was obtained from the relevant line ministry at the national level, in this case MONRE; (c) the documents were promptly disclosed at project sites in Vietnamese upon formal approval; and (d) close implementation monitoring and supervision of the standards and practices set forth by these documents was conducted by both the Project Implementing Agency, Project Management Unit for Waterways (PMU-W), and the World Bank for the duration of Phase 2 works.

It is also confirmed that the environmental performance of Phase 2, as corroborated by the project's Construction Supervision Consultant, PMU-W, and the World Bank, has been consistent with good international practice, and that the EIA and EMP have been adequately implemented.

It is expected that the updated EIA and EMP documents for the proposed DNC canal subproject—which have been consulted with local communities and are available in English on the World Bank website at <http://www.worldbank.org/en/topic/opendevelopment/projects>—will be successfully implemented over the course of the subproject's implementation period. Close monitoring of this work will be undertaken by the project implementing agency and the World Bank, as was the case during Phase 2.

## I. INTRODUCTION AND PROJECT DESCRIPTION

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### 1.1. Background

The Red River Delta is a strategic inland waterway for the Vietnamese economy. According to statistical data, the inland waterway transports 67% of total transport in Northern Delta area and is equivalent to 17.500.000 tons of goods/year. Transported goods include rice, timber, cement, coal, building materials and fertilizer. The volume of shipped cargo is huge and the kind of cargos is diversified. However, the inland waterway transport condition in Northern Delta region is relatively weak and does not meet the demand of trade and economic developments:

- “Black spots” are sources of potential risks of waterway collision and accidents;
- Folded turning corners with curved radius of less than 550m, require vessels passing through this area to slow down, leading to the increase of time and transport costs;
- Waterway sections are too small and narrow to circulate in both directions causing waterway traffic congestion;
- The channel is insufficiently deep and limits the circulation of heavier forms of waterway transport.

Based on the above concerns , the Prime Minister has issued a decision No. 16/2000/QD-Ttg dated February 3<sup>rd</sup> 2000 on "master plan of river transport development in Vietnam until 2020" and a decision No. 13/2008/QD-BGTVT dated June 8<sup>th</sup> 2008 on "Approving adjustments and supplements of the master plan of inland waterway transport development in Vietnam by 2020."

The objectives of the World Bank-financed Northern Delta Transport Development Project (NDTP) invest in both training; and improvement and upgrade the waterway to reach the standard of channel class II and upgrade 2 main ports namely Viet Tri (Phu Tho) and Ninh Phuc (Ninh Binh).

The project’s initial scope concerned:

- Viet Tri port modernization,
- Mom Ro deviation channel and bend correction;
- Do Bui bend correction;
- Ninh Phuc port modernization;
- **A connecting canal and lock ship between Day River and Ninh Co River;**
- **A bridge over DNC canal;**
- A Channel access from the sea to the estuary and breakwaters in the Ninh Co estuary (Lach Giang estuary);
- Support marine through supplementing, repairing and improving aids to navigation in Red river, Day River and Ninh Co River;

**The Corridor 3 project (including DNC canal) was accepted as part of the project’s initial scope and the ESIA + EMP + RAP approved by WB and Vietnamese authorities (including MONRE) in 2013.**

The construction phases started in 2013 (land clearance) and were completed between 2014 and 2015 for the following areas:

- Viet Tri port;
- Mom Ro ;
- Do Bui;
- Ninh Phuc Port;
- Lach Giang estuary;
- Navigation aids steps of the project.

**However, the construction of DNC canal and ship lock was delayed due to the lengthy duration of discussions between MOT, Province, Districts and Communes with regard to the type of bridge (mobile or fixed) and for its air clearance (8, 12, 15 or 22 m). The alternative for the bridge over DNC**

canal was to have a fixed bridge of 15 m air clearance and this was approved by MOT in the letter No.14457/BGTVT-KHDT dated 14/11/2014.

This phase of the project includes:

- Construction of DNC canal and ship lock following 2013 detailed design;
- Construction of crossing bridge with 15 m of air clearance following 2015 preliminary design;
- Construction of the access road following 2015 preliminary design.

**The present report is an update of the 2013 ESIA, previously approved by WB and MONRE, and includes the evaluation of the additional impacts of the crossing bridge and access road based on the December 2015 preliminary design and 2016 on going Detailed Design of the bridge and road.**

The additional works also incorporate an innovative “Mixed bank protection scheme, based on ecological bank protection (vegetation capacity to fix the banks) and classical bank protection (rip rap), which will improve biodiversity and protect against the effect of waves and erosion. This alternative is not referenced by the Vietnamese standards but it is based on more than 20 years of experience on the Rhône and the Rhine Rivers as well as on other major waterways in Europe. This kind of ecological bank protections permits the planting of to plant adapted local plants into the rip rap holes and to create friendly habitats for birds, small mammals, reptiles, batrachians, terrestrial and aquatic invertebrates and also fishes. Depending of the choice of vegetation, local people can get some income from harvesting part of the vegetation and also by improvement of the fishing production due to the better habitats for fishes. In addition to the ecological interests, rip rap and ecological bank protection is much cheaper than the classical concrete plots usually used in Vietnam.

## **1.2. Basis of Law, Legislation and Regulation**

### ***From Vietnamese regulation:***

The project is required to comply with the prevailing environmental laws in Vietnam, which include the Law on Environmental Protection No. 55/2014/QH13 passed by the National Assembly on 23 June 2014 and in effect since 01 January 2015; Decrees, Circulars, Decisions, standards and regulations of Vietnam on Environment; Circular No. 27/2015/TT-BTNMT of 29 May 2015 of the Ministry of Natural Resources and Environment on strategic environmental assessment, environmental impact assessment and environmental protection plans and guidelines.

**The main project (Canal and Ship lock) was previously approved in 2013 by Vietnamese authorities, including MONRE, for the ESIA, EMP and RAP after independent reviewing by a Vietnamese group of environmental and social experts.**

**Regarding Vietnamese legislation and regulation, MONRE confirmed in January 2016 (Letter N°123/TCMT-TD – January 21st, 2016) that the bridge and the road access are considered as additional quantities to the DNC initial project. Adjusted quantities are smaller than the limits fixed by Decree 18/2015/ND-CP - Appendix II – N° 2 (additional land acquisitions) and n° 22 (road and bridge additional length) and it exempts the adjusted quantities/objects from the requirement to submit a new ESIA under Vietnamese law. Therefore, the ESIA from 2013 will be followed to control all the construction and operating phases, with reference to the following regulation and legislation.**

### ***From World Bank requirements:***

An updating of the ESIA, EMP and RAP is necessary to address the adaptations and additions to the initial civil works assessed for the DNC Canal and ship lock. An updated Environment and Social Impact Assessment (ESIA) report and a detailed Resettlement Action Plan (RAP) report (including compensation) have been prepared – based on the previous documents - to ensure the project will be implemented in accordance with the requirements of the World Bank (WB) and with the Vietnamese

legislation and regulations. The Environment and Social Impact Assessment provides an overview of the environmental and social baseline conditions on the direct impacted areas, identifies and quantifies the potential impacts associated with the proposed project and includes an Environmental and Management Plan (EMP) which sets out the management measures required to mitigate any potential impacts. The EMP will be used by the contractor(s) to be commissioned by PMU Inland Waterways Management Unit (Hanoi) and will form the basis of SEMP (Site Environment Management Plans) that will be prepared by the contractor(s) and sub-contractors as part of their construction methodology prior to works commencing.

Relevant World Bank environmental and social policies triggered by the Parent Project are:

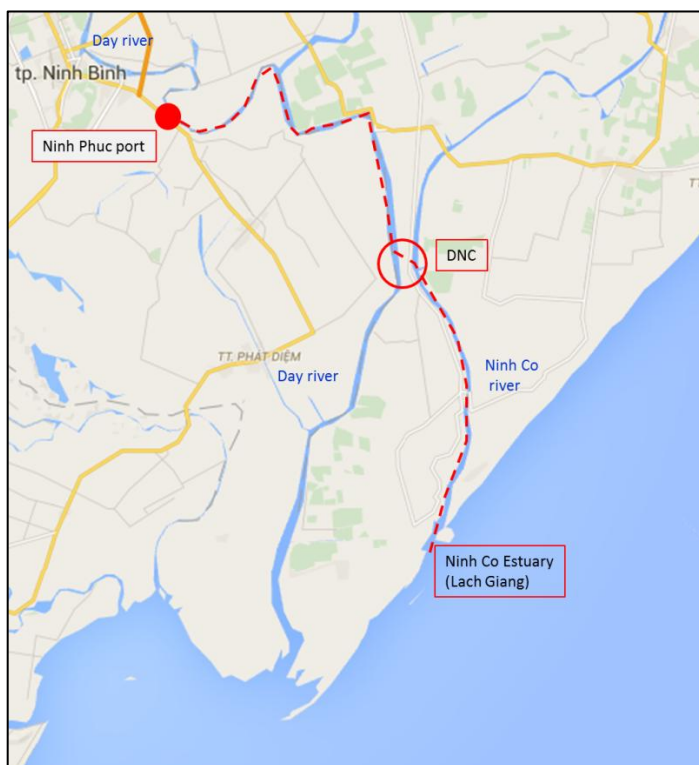
- Environmental assessment OP/BP 4.01
- Physical Cultural Resources (BP/OP 4.11)
- Involuntary Resettlement (OP/BP 4.12)
- Indigenous Peoples (OP/BP 4.10)
- Natural Habitats (OP/ BP 4.04)

The ESIA also applies WBG Environmental, Health, and Safety Guidelines known as the "EHS Guidelines". The EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP).

### **1.3. Project Description**

The actual inland waterway crossing the Red River delta from North to South covers 180 km from Hanoi (km 0) to Lach Giang (km 180). It traverses the Red River from Hanoi (km 0) to upstream Mom Ro Curve (km 125.000) and, downstream, the Ninh Co River from Mom Ro (km 125) to Lach Giang (km 180).

The corridor (called Corridor 3) from Lach Giang to Hanoi can be used for commercial navigation and is designed for Class II but due to the many shoals in the Corridor, part of it can only use for Class III. Near Hanoi bridges have insufficient vertical clearance during high water levels on the red river. However, the Day and Ninh Co river mouth are among the main constraints. Ships with a limited draught can only enter the rivers during high tide. Both river mouths are subject to sedimentation limiting accessibility.



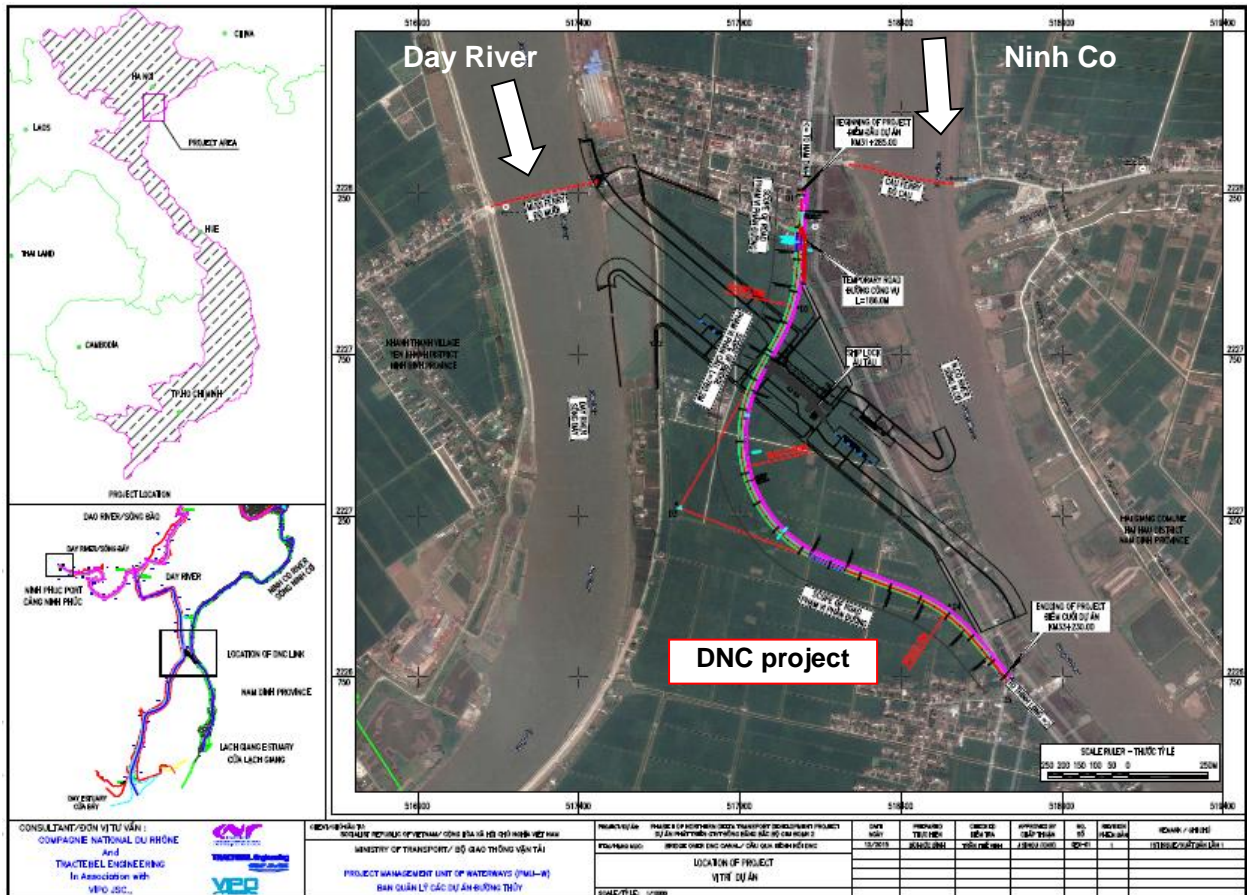
The other civil works sub-project under Corridor 3 is the construction of the connection canal between 2 branches of the Red River Delta which will connect the Day River (right side) to the Ninh Co River (left side). This connection canal – called DNC for “Day - Ninh Co – Canal” will be equipped with a ship lock and will require the construction of a crossing bridge and road access to restore the existing road connection cut by the canal.

The DNC canal will permit the junction between Day and Ninh Co rivers, permitting boats coming from the sea by Ninh Co River mouth (Lach Giang) to join the Day River upstream the downstream part of the Day river subjected to high levels of sedimentation, and then join the industrial ports located in the Day River (Ninh Phuc port) or continue to Hanoi using the Day River and Red River, with a shorter length and better navigation conditions.

**Figure 1: Location of DNC project under Corridor 3 from Lach Giang to Ninh Phuc port**

The connection being on the network of waterways of class I (Classification TCVN 5664), it has to allow also the transit of the pushed convoys 4 X 400 T.

In a 1st phase, only boats of 2 000 DWT (Draft of 4.5 m) or 3 000 DWT half loaded are expected, but the design of the lock has to take into account the final objective of transit of boats of 3 000 DWT full loaded (Draft 5.0 m).



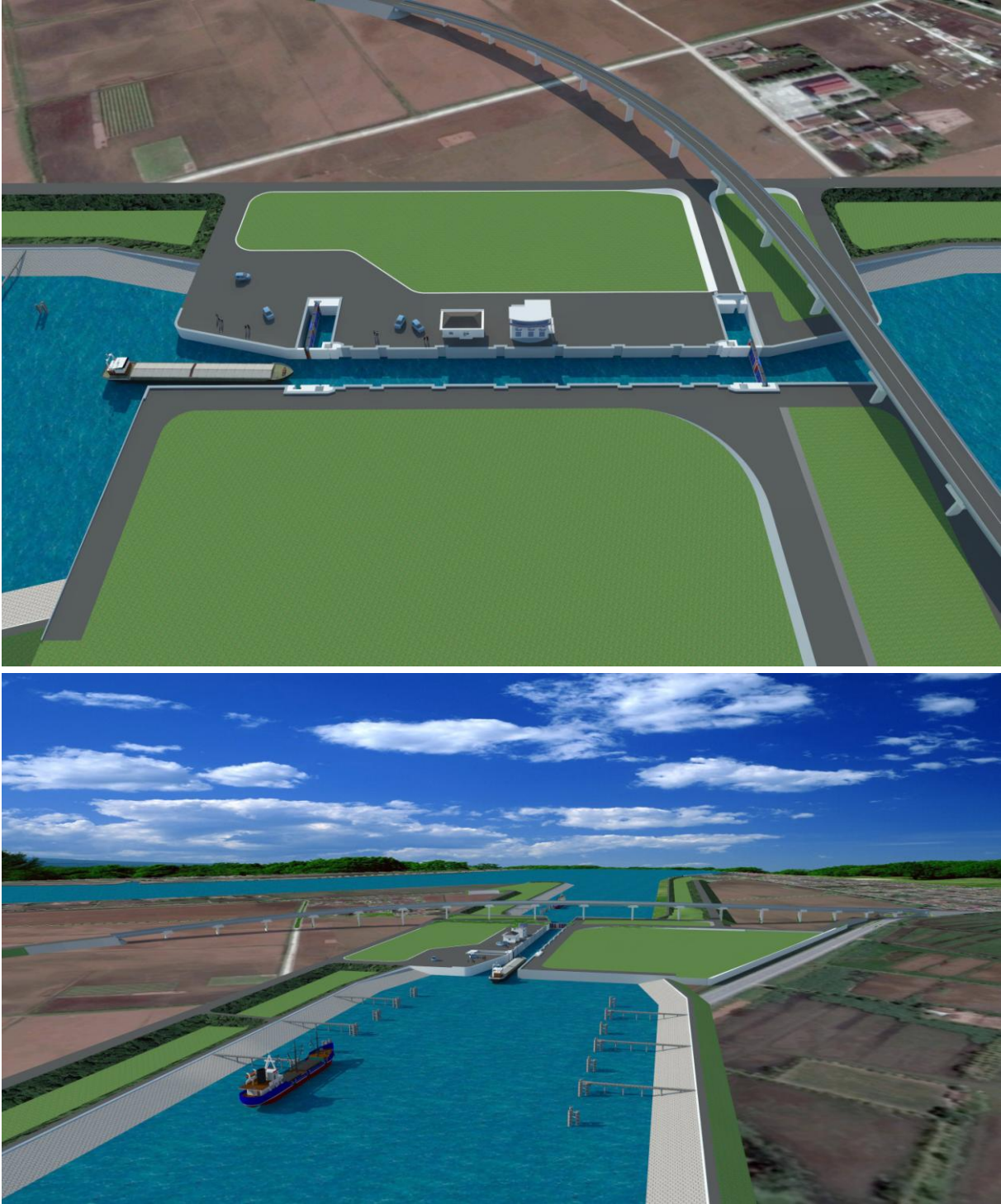
**Figure 2: Satellite view from DNC area and project**



**Figure 3: 3D view from DNC canal – ship lock and bridge project**



Channels on both sides of the lock can be constructed for 2 000 DWT by taking into account a margin for silting. In a second step, these stretches will be dredged to allow 3000 DWT full loads to use this channel. The project aims mainly at allowing the sea-river boats of up to 3 000 DWT capacity to link up with the Ninh Phuc port by using the works planned on the Ninh Co mouth (Lach Giang). According to the canal design, the ship lock connecting Day and Ninh Co rivers will cut through the provincial road DT490 (from Km32-Km33). In order to allow road traffic to pass the navigation lock a bridge has to be constructed.



**Figure 4: 3D view from DNC canal – ship lock and bridge project**

The total budget for the DNC project including Vietnamese counterpart is estimated at USD 110,000,000.

The components of the project items are described in tables 1 and 2 below:

**Table 1 : Scope and main quantities of items at DNC Canal**

Item	Unit	Scope	Amount	Note
Connecting canal and ship lock	Lock gate	gate	1	Dimension 9.2 m width x 7.8 m depth; Open and close two side door with angle of 45 <sup>0</sup>
	Lock ship	lock	1	Dimension: 160 m Length x 15 m Width x 5.5 Depth
	Drainage system	System	1	-
	Yards for ship	Yard	2	200m in length
	Lock operation house	house	1	
	Dredging/Excavations	m <sup>3</sup>		1.561.000
Road	General dimension			1195 m length x 12 m width
	Excavation / soil removal	m3	11 700	10 765 m3 for removal of not suitable soil below the road embankment The rest = excavation before concrete bridge piles/piers
	Soil filing / embankment	m3	27 800	Embankment of the road
Bridge	General dimension	780 m length x 12 m width x 19.05 m maximum high Air clearance max : 15 m for 5% highest water levels		
	Abutments		2	
	Piles/piers on ship lock		3	15 m high
	Ground Piles/piers		15	2 m to 15 m high

**Table 2: Synthesis of projects excavated and dredged material quantities**

Project Area	Main purpose	Works	Excavated/dredged materials management and quantities	
DNC	Link 2 rivers	Connecting canal Ship lock Dredging Bend cutting Bridge and road	<p>Direct reuse of materials for the access road (27 800 m3)</p> <p>Reuse of clay by bricks factories (200 000 m3) + capacity storage for later uses (400 000 m3)</p> <p>Use of all the “non-clay” materials for agricultural soils improvement by communes (maximum capacity 600.000 m3)</p> <p>Remaining soil/clay/sand can be evacuated to existing Lach Giang’s southern disposal area (maximum capacity 1 300 000 m3).</p> <p><b>Total maximum disposal &amp; reuse capacities: 2 530 000 m3</b></p>	<p>Ship lock: 300 000 m3 Day side: 636 000 m3 Ninh Co side: 613 000 m3 Road + Bridge : 11 700 m3</p> <p><b>Total excavation and dredging: 1 561 000 m3</b></p>

## **2. BASELINE CONDITIONS**

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### **2.1. Geographical and Natural Conditions**

DNC project area is located in the totally flat flood plain of the downstream south part of the Red river Delta, between 2 branches of the Red River: The Day River and the Ninh Co River. DNC area is at 165 km from Hanoi and around 30 km from the coast line.

It is an agricultural area (> 90 % of the surface is rice field) located between 2 important industrial areas and holds a key strategic position for the goods and materials transportation between the sea and the industrial ports upstream. The flood plain is flat and the elevation always less than 3 m above the sea and much of it is 1 meter or less. Most of the land is protected from century's floods by an important dykes' network.

The average annual rainfall is 1600-1800 mm, 85% of which occurs during the rainy season (April to October). The monsoon is an important factor of influence of this territory with heavy rainfalls and important flows and extensive floods from July to September. At the opposite end of the spectrum, the dry season from October to June registers the lowest flows. The prevailing winds are north and east in winter, and south and southeast in summer. From June to the end of September, the coast of the Red River delta is regularly affected by typhoons, which give rise to strong winds, heavy rainfall and storm surges, accompanied by high waves.

The area is under the influence of the tides – creating important fluctuation of water levels every day. The sea influence is also sensitive on the Ninh Co River with frequent salt intrusions, whereas the distance from the sea by the Day River is longer and the flow is stronger so that it preserved this section of the Day River from salt intrusion. The sea intrusion on the Ninh Co river can be the most important during the low flow period mixed with high sea water levels and strong winds (= waves) from the sea. During these days, the salt influence can reach to more than 20 km upstream DNC area.

The soils are sandy-clay sediments on more than 60 to 100 m of thickness covering a deep captive aquifer of fresh water with strong exploitation for agricultural irrigation.

### **2.2. Environmental Baseline**

From the results of monitoring implemented successively in 2008, 2012-2013 and 2015, it can be judged that the air environment quality in project site at the survey time is good. The concentration of pollutants in surrounding air is within the allowable limit of Vietnamese specifications on environment.

The surface and deep soil samples taken in surveyed areas are agricultural soils are characterized by a very low/absence of pollution. The Monitoring undertaken from 2012 and 2015 confirm that the heavy metals concentrations fall below the Vietnamese standards and can be used as agricultural soils. Arsenic is naturally present but within acceptable levels. Pesticides and petroleum hydrocarbons are also identified (un-natural pollutants) but also with acceptable concentrations.

The natural Suspended sediment concentrations are low (for this type of river) during the dry season (10 - 200 mg/l) but can reach very high concentrations during the rainy season (300 - 5000 mg/l) due to the significant flow of sediments eroded from the watershed and transported by the river and tributaries.

The water is fresh on the Day River in the sections near DNC area whereas, the Ninh Co River water can be fresh, brackish or saline depending on the flow and the sea elevation.

Biodiversity is very limited in this area. The habitats are mainly agricultural and/or urban. The very few remaining ecosystems in the DNC area are faced with heavy anthropogenic presence and interference with ecosystems and are deeply influenced by navigation and huge floods for aquatic ecosystems; and by agriculture and human activities for terrestrial ecosystems. So they are now adapted to these perturbation factors and can be estimated as resilient. There is no protected area within the Project areas of influence, nor endangered nor protected species identified in the area of influence of the project.

### **2.3. Socio-economic Conditions**

The project covers 2 communes (Nghia Lac and Nghia Son) on the Nam Dinh province. Nghia Son is a rural commune with an actual important industrial development with clothing manufacturing and tanneries. Its industrial zone has attracted the attention of many small and medium investors, had a few active investors in industrial parks, and much of the community works in the garment industry (Taiwan investors), mechanical engineering, furniture and fine art. With its position as one of the communes adjacent to two major rivers and waterway development potential, Nghia Son has a very good development shipbuilding industry, small and medium-sized boat for investors inside and outside the water transport in the business. A traditional agricultural economy (crop and livestock) with fertile characteristics fed by the two great rivers, Nghia Son is taking advantage of the great advantages in agricultural development.

Nghia Lac is a rural commune, focused on agricultural production (rice, potatoes, peanuts, jute, rush, ducks and pigs). Fishing and seafood processing and salt production are also important economic factors. Under the influence of the Nghia Son commune development, ship building is also becoming a new economic potential for Nghia Lac.

The 2 communes are located between the Day and Ninh Co River waterways and crossed by the provincial road DT490, following from North to South the dyke on the right side of the Ninh Co River. The road traffic is limited for the moment but industrial development projects by the province will increase the traffic flow and the MOT and province authorities are working on the extension of the road after the construction of the DNC Canal.

Local infrastructure includes irrigation/drainage systems, electrical lines, and telephone cables. For historical, religious and patrimonial items, 1 church and 2 cemeteries are identified as being affected by the project but the new design ensures that these will be preserved.

## **3. ALTERNATIVE ANALYSIS**

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Due to the investment items of the project, there are various technical options. Proposed design alternatives are analyzed based on their advantages and disadvantages of technical, economic, social and environmental aspects to choose the best option.

### **3.1. "Without project"**

The actual "no project" scenario will only concern the non-construction of the DNC canal & bridge. It will preserve the existing status of environmental impact versus benefit. "No new action" will mean that coastal shipping, even with the Lach Giang estuary channel already built will still be unable to pass from Ninh Co to Day Rivers and so will not permit transport from the sea to the Port of Ninh Binh. The distance of waterway route from the estuary to the Port of Hanoi and their hinterlands will not be reduced if no access to the Day River is provided. A large part of the Coasters will still have to call in on Haiphong and offload the cargo onto IWT vessels. A "No action" scenario will reduce near to zero the benefits from the already completed 200 Million USD investments on Corridor 3 and eliminate the economic and environmental benefits that are expected to be derived from improving the Day-Ninh Co Rivers.

### **3.1. "Only with canal and ship lock"**

If the canal is built but without road relocation or without a crossing bridge, it will isolate the downstream part of the area between Day River, Ninh Co River and the sea. It means that the land connections will be blocked and the population living there will be strongly disturbed. A no action plan for the road and bridge will block any economic development in this area and, most of all penalize the actual economic conditions based on the trade of agricultural goods. It will also block the industrial development of this area – in opposition with the national and local strategic purposes envisioned.

### 3.2. "With project"

The selection of alternatives for the DNC has taken into consideration, technical, economic, social and environmental factors.

▪ **1<sup>st</sup> alternative: Lock or no Lock and Gate or no gate for the lock?**

The alternative was based on 3 possibilities:

- No lock;
- Lock with gate open most of the time;
- Lock with gate open only when boats are present.

The difference of water levels between 2 rivers (until more than 1 m) will create velocity constraints for navigation with risk of damage to boats or difficulties for navigation in the canal. → **a lock is necessary.**

Because of the frequent salinity intrusions by the Ninh Co River, high flow of saline water from the Ninh Co will enter in the Day River when Ninh Co Level is higher than Day River → **a lock with gate opening only when boats need to cross the lock is necessary.**

The selected alternative (canal with lock and gate open only when boats need to cross) ensures adequate navigation conditions in the canal and prevents the high flow of saline water to intrude from the Ninh Co River to the Day River.

▪ **2<sup>nd</sup> alternative: which kind of crossing bridge?**

For the bridge, the initial option considered was a mobile bridge to permit the circulation of local traffic with low intensity, but stopping the traffic each time a boat passes through the lock. After 3 years of discussion between Vietnamese authorities, the alternative of a fixed bridge with 15 m of air clearance was decided by MoT, following the request of local population, Province and Districts: the future industrial projects planned downstream in this area will need access by road and waterway and a mobile bridge would lead to frequent traffic disruption to allow the passage of the boats. The fixed bridge will be able to absorb future expected traffic increase, both for the road and the waterway.

▪ **3<sup>rd</sup> alternative: Location of the canal?**

The initial location of the canal – fixed by the 2008 feasibility study - would have destroyed more than 50 houses, a church and a cemetery (out of 2 cemeteries in the project area). The Detailed Design phase has modified the location and angles of the canal with the 2 rivers permitting the boats to enter and exit the canal while minimizing the impacts on houses and preserving the church. The updated design of the project in 2015 identified 14 tombs that need relocation and will be included in the Resettlement Action Plan. The Detailed design of the road and bridge has also reduced from 12 to 5 the number of houses to be destroyed and relocated.

The surface of lands impacted by the project was estimated in 2013 at 62 ha, but the 2015 updated design, based on the detailed design of the Canal and the preliminary Design of the Road and Bridge reduces the impacted land to 47 ha. The final design proposed a solution to reduce from 62 houses to 31 the number of impacted houses and preserves the church and the cemetery from destruction. The project has been adapted from Feasibility study design to ensure that the works do not destroy or affect access to cultural and religious heritage sites. The church and the 2 cemeteries will be preserved and 14 tombs will be relocated.

▪ **4<sup>th</sup> alternative: Concrete bank protections vs. ecological/mix bank protections**

“Classical” Vietnamese concrete bank protections (concrete plots) designed in accordance with Vietnamese standards. The design following Vietnamese standards overestimates the magnitude of protection needed and the size of the elements that constitute the protection.

“Mixed bank protection”, based on ecological bank protection (vegetation capacity to fix the banks) and classical bank protection (rip rap) are proposed and will improve the environment biodiversity and protect against the effect of waves and erosion. This alternative is not referenced by the Vietnamese standards but it is based on more than 20 years of experience on the Rhône and the Rhine Rivers as on other major waterways in Europe. This kind of ecological bank protections permits the planting of adapted local plants into the Rip Rap holes and to create friendly habitats for birds, small mammals, reptiles, batrachians, terrestrial and aquatic invertebrates and also fishes. Depending of the choice of vegetation, local people can get some income from harvesting part of the vegetation and also by improvement of the fishing production due to the better habitats for fishes. In addition to the ecological interests, the alternative 2 (rip-rap + ecological bank protection) is much cheaper than the classical concrete plots usually used in Vietnam.

#### **4. SUMMARY OF ASSESSMENT OF IMPACTS**

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When the project is completed, the overall impact will be positive, particularly taking into consideration the ecological bank protection, if incorporated. Nevertheless, the project during pre-construction and construction phases will cause negative impacts (temporarily or permanently) on the local environment and the local population. Therefore, effective implementation of mitigation measures will be necessary.

##### **4.1. Main Positive Impact**

The positive impact during the construction phase (2 – 3 years) will increase the local incomes and the local employments.

The most important positive impacts which are expected to be generated by the project concern the operational phase:

- 1°) Increase the safety of navigation conditions along the waterway;
- 2°) Increase the size of the commercial ships able to join the sea to the industrial ports upstream;
- 3°) Reduce the duration of the navigation between the estuary and the industrial ports;
- 4°) Reduce the costs of transportation of goods by the waterway;
- 5°) Increase the economic development of the industrial areas along the waterway;
- 6°) Support the local economic development with better access to transport infrastructures;
- 7°) If the alternative of ecological bank protection is accepted by the Project owner and the authorities, it will be also a positive ecological impact – improving the natural habitats and the biodiversity in this area already strongly impacted by human activities.
- 8°) The ship lock can become an interesting place to visit – as industrial tourism – and can permit an moderate increase of the local activities around the ship lock (small shops, restaurants, souvenirs, etc.).
- 9°) The reuse of the clay material by bricks factories will reduce the cost of production and increase the local production capacity and their incomes.
- 10°) The low-land filling with non-toxic dredged/excavated materials are expected by the communes to increase the elevation of some fields and permit to improve the agricultural production in quality and quantity.

##### **4.2. Main Negative Impacts**

The main negative impacts will occur during the pre-construction stage and during the construction stage. These stages will strongly disturb the area of construction and the local people living on the area and in the close vicinity.

The **pre-construction stage** will cause land acquisition for construction of the DNC canal, ship lock, access road and bridge. It will also affect public infrastructures such as irrigation and drainage system, electrical lines, telecommunications, road and tracks, ferries, etc. (see details in item 4.6).

The **construction stage** will generate impacts from working sites and worker camps. They will generate dust, noise, vibration and gas emissions generated from construction vehicles and equipment. The construction area will also impact the vegetation and the local ecosystems on this area. Workers camps, if improperly maintained could generate improper disposal of solid waste, waste water, diseases and social problems caused by the concentration of workers in a peri-urban location.

The excavation and dredging will generate large quantities of material to evacuate. The management of the excavation/dredging phases as the phases of material transfer and disposal will be an important point and must be followed carefully to avoid unexpected environmental impacts. A soil disposal plan has been prepared for the project as follows:

In order to build the DNC inter-connecting canal and ship lock, the project will remove around 1,500,000 m<sup>3</sup> of soil from excavation and dredging. Of 1,500,000 m<sup>3</sup>, there are around 200,000 m<sup>3</sup> of clay which could be used as materials for 2 brick factories located at Nghia Son and Nghia Lac communes as well as materials for fill up the access road to the bridge (around 30,000 m<sup>3</sup>). The remaining non-clay soil of about 1,270,000 m<sup>3</sup> will be used to fill up the Lach Giang's southern disposal area which was prepared to keep dredging/excavation materials during construction of the Lach Giang complex under NDTDP but there was not enough soil material to fill it up to reach attitude as designed for planting trees. Therefore, it is not required to set up new disposal areas in order to keep 1,500,000 m<sup>3</sup> of soil as mentioned above for this project. The use of these locations as disposal sites has been approved by MONRE.



**Agricultural ecosystem:** There are rice fields and household gardens that are mainly located in the outer dykes although some of them are located in the inner dykes along the rivers, where local people plant, fruit trees, and seasonal crops such as rice, corn, beans, green vegetables, bananas). Most of the DNC project area is covered by agricultural land (> 95%).

**Wetland ecosystem:** The impacts of the DNC canal on the river bank eliminate a length of 250 m of river bank on Day River side and 650 m of river bank on Ninh Co River side.

**Operation phase:** the environmental and social and economic impacts during the operational phase are largely positive. However, negative impacts will concern the landscape modifications due to the presence of the ship lock and the bridge in a very flat area and the modification of the road and tracks access. Some negative impacts could occur if the Operation and Maintenance were not properly implemented: maintenance of the canal and ship lock can generate waste water, noise and solid waste emission.

The bridge and road access civil works will be managed by the local authorities already in charge of the road management with experience in the mitigation of impacts, and will not create specific negative impacts.

#### **4.3. Natural habitats impacts**

Most of the area is occupied by agriculture, road, dyke and urban area. The existence of vegetation serving as natural habitat is very limited and is only present along some parts of the 2 rivers. It can be estimated that the construction of the canal will destroyed 0.5 ha of bank vegetation. The bridge and road access do not destroy any natural habitats.

#### **4.4. Impacts on water resources**

The construction activities will include important quantities of dredging and excavation in a flat and low land area. If not properly organized, the construction phase could create strong impacts on the water quality.

The methodology proposed for the dredging and the excavation permit to avoid most of the impact on water quality: the canal and ship lock dredging/excavation will be disconnected from the rivers during the main duration of the works. The canal will be only open on the rivers at the end of the excavation and dredging activities. Following this organization, no polluted or turbid water will be rejected in the rivers. The final phases of canal junction with the rivers will mobilize dredging and earthwork equipment and can cause limited increase of Total Suspended Solids (TSS) during few weeks.

The bridge and access road construction will have no connection with the rivers. The piling activity for the bridge will avoid any groundwater pollution because the surface and deep soil quality (clay) will prevent the infiltration and protect the aquifer located 100 m deep in the ground.

The disposal phases for excavated and dredged materials will be managed following adaptive methods reducing the release of TSS by sedimentation in temporary ponds and through the frequent monitoring of surface and ground water quality.

According to the survey results, all wells in DNC area have a depth of more than 100m. Thus, during the works performed close to the surface the impact on Ninh Co and Day rivers can be considered as insignificant because the sedimentary layers underground have very low permeability (clays and sandy clays compacted) and do not allow the infiltration of suspended particles. These very fine sediments function as a natural filtration system.

#### **4.5. Impacts on Historical, Religious and Cultural Resources**

Most of the area is used for agriculture production (rice and crops). The only religious objects concerned on the construction area are the church and 2 cemeteries, and few isolated tombs. The modification of the project between the Feasibility study (2008) and the Detail Design (2016) had permit the preservation of the church and the cemeteries. The remaining impacts concern:

- The relocation of 14 isolated tombs,
- The landscape modification close to the Church.

No Historical or Cultural resource are identified nor impacted but all contracts will include a “Chance Finds Procedure clause” so that all the Contractors will be responsible for familiarizing themselves, their staff and their sub-contractors with “Chance Finds Procedures”, in case culturally or historical valuable materials are discovered during construction and especially during excavation phase.

#### **4.6. Socio-economic Impacts**

##### **Land Acquisition and Resettlement**

Land acquisition and resettlement are the main social impacts for the project. According to the inventory of loss conducted in 2012-2013 for the canal/ship lock and update in 2015 for the bridge and access road, the implementation of the project will affect 264 households, (1,061 persons) of which 30 HHs need relocation and 247 severely affected households (losing more than 20% of productive land). It includes 48 vulnerable HHs. The total acquired land for the project is estimated about 45 ha, in which permanent loss is estimated at around 37 ha for construction of the project and temporary loss is 8 ha



for temporary road construction track, construction office, temporary access road, worker camps, concrete plant, concrete laboratory, storage area, road and bridge construction track, canal construction track, delivery quay and port and access to main road.

Residential land loss represents about 0.7 ha, agricultural land loss is about 32.1 ha (24.4 ha permanent lose) and other land loss constitutes 12.0 ha. About 2,795m<sup>2</sup> of houses will be affected and 14 tombs will have to be relocated.

The severity of impact on the affected assets and the severity of impact on the livelihood and productive capacity of households were also determined. The summary of survey results on Land Acquisition Impacts is shown in the Table below.

**Table 3: Summary of Land Acquisition Impacts**

Main impacts	Unit	Affected quantity		
		Total	Permanent	Temporary
1. Affected households:	households	264	264	TBD
In which:				
+ Households whose residential lands are affected	households	41	41	TBD
+ Households whose agricultural lands are affected	households	259	259	TBD
2. Affected area	m <sup>2</sup>	448,483	368,819	79,664 (public land)
Of which:				
+ residential land	m <sup>2</sup>	6,915	6,915	0
+ agricultural land	m <sup>2</sup>	321,049	243,855	77,194
+ other land	m <sup>2</sup>	120,519	118,049	2,470
3. Number of affected persons	Persons	1,061	1,061	TBD
4. Number of relocated households	households	30	30	0
5. Area of affected houses	m <sup>2</sup>	2,795	2,795	0
6. Number of seriously affected households due to losing 20% or more of total agricultural land holding	households	247	247	0
7. Number of vulnerable households (poor households and women headed households)	households	48	48	TBD

**Temporary impacts on livelihood and employment:**

Beside of land acquisition and resettlement, impact on livelihood of the local people may occur around the dredging area (Ex.: They cannot fish or conduct aquaculture) in the short term duration. However, this impact is assessed as minor, temporary, local, and manageable.

**Impacts on public facilities**

Beside of Impacts on households, the project also affects public facilities as below:

- (i) temporary relocation of Do Muoi ferry to a different site, located about 50 m from the original site, to maintain transportation between Nam Dinh and Ninh Binh provinces during construction of the canal;
- (ii) relocation of two high volt transmission lines of 110 KV and 35 KV in area of DNC canal at Nghia Son commune, Nghia Hung district;
- (iii) cutting about 300 m of the road No 490 in the section of Nghia Lac and Nghia Son commune;

- (iv) cutting 260 m of dyke on Day's right bank and 260 m of dyke on the Ninh Co's left bank;
- (v) temporary impact on irrigation systems located along Day and Ninh Co Rivers;
- (vi) temporary impact on some inter-village roads at Nghia Son commune, especially the road connecting some villages of Nghia Son commune to the Church;
- (vii) relocation of 300m of the underground communication cable along the road No 490.

Mitigation measures, including compensation for all the above temporary and permanent impacts on households and publics have been proposed, consulted with different stakeholders and included in the resettlement action plan of the project for implementation.

Based on the principle and objectives set forth in the Parent Project's Resettlement Policy Framework and the RAP, all Displaced People (DPs) will be compensated for their losses at replacement cost and provided with other assistance and rehabilitation measures to assist them to improve, or at least maintain their pre-project living standards and income earning capacity. DPs will be adequately informed and consulted to enable their active participation in the planning and implementation of RAP. The DPs will participate throughout the various stages of the planning and implementation of the socioeconomic survey, inventory of losses, the detailed measurement survey and resettlement plan. The RAP implementation will be subject to both internal and external monitoring and evaluation. The estimated budget for RAP implementation, compensations and assistance is around 119,400,000,000 VND (~ 5,425,000 USD).

#### ***Other social impacts***

Other potential social impacts on local communities include road and public safety during construction, risk of HIV/AIDS infection during the construction period and conflict or violence between workers and local people, especially local youths. An HIV prevention training program shall be implemented during the construction phase for both workers and local people about sexual infections, measures of protections, health care and treatment.

#### ***Cumulative impacts***

Apart from the World Bank-financed activities under NDTDP, the Ministry of Transport or other government agencies at the Provincial and local level have no additional existing or planned activities in the Project area that would have a negative cumulative impact on Valuable Ecological Components relevant to Project activities – namely, water quality, aquatic biodiversity, and the quality of life of agricultural communities in the Project area and downstream.

The environmental impact of the DNC Canal Project itself has long term positive environmental impacts. The Project will adopt an innovative ecological engineering approach. A mixed bank protection scheme is proposed for the Project, based on ecological bank protection (vegetation capacity to fix the banks) and classical bank protection (rip rap), which will enhance biodiversity and protect against the effect of waves and erosion on the river banks and adjoining wetland, creating and/or restoring approximately 9 ha of aquatic and wetland habitats— an area 18 times greater than the lost habitat. Moreover, the transfer of a significant portion of dredged/excavated material to Lach Giang's Southern Disposal area will expedite the filling (and subsequent closure) of the disposal site, allowing for the plantation of income generating Casuarina trees on 30 ha of the disposal site. During the tree maturation period, this will provide favorable habitat for birds and invertebrates. It is anticipated that these ecological approaches to riverbank protection and disposal site closure – in providing examples of cost-effective and environmental friendly mitigation solutions – will lead to a positive cumulative impact on "green" construction practices in Vietnam.

All sub-projects under the Parent project are already completed and operational. As such, there will be no additional cumulative environmental or social impacts ensuing from these sub- projects.

## 5. PROPOSED MITIGATION MEASURES

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The mitigation measures proposed for the project include:

### Pre-construction phase:

- Mitigation of Land Acquisition and Resettlement impacts: To mitigate negative impacts of the project on local people a Resettlement Action Plan has been prepared for the project in compliance with the World Bank's Operational Policy on Involuntary Resettlement (OP 4.12) and Vietnam's laws and regulations. All mitigation measures including compensation, assistance and resettlement have been integrated in the RAP and implemented before commencing construction. The RAP needs to be approved by the Bank and PPC before implemented (see details in the RAP);
- Unexploded ordnance removal will be carried out in the construction area under PMU responsibility before any works would be done on site.
- Delineation and limitation of access (by fencing and information dissemination) to the construction area to prevent intrusion on land note covered by the RAP.

Regarding impacts on public/communities facilities, PMU-W has conducted a series of consultations with different stakeholders, including Department of Transport, Department of Agriculture and Rural Development, Power Company, Irrigation management Company, EVN NPT, local authorities and local people on the project impacts and mitigation measures to resolving project impacts. Following is summary of mitigation measures, including compensation:

- *Do Muoi ferry*: Related parties agreed to temporarily relocate the ferry 50m to the south along left bank of Day River. The relocation will be completed prior to construction to ensure the operating continuity of the ferry. After dyke construction completion, the ferry will be restored to its current location. All related works of relocation and construction of the temporary ferry will be done by the project's contractors. The cost for ferry relocation and construction will be financed under the project's cost, as it will be included under the contractor's civil works package.
- *High-voltage electric lines 110KV and 35KV on DNC*: Related parties agreed to relocate the electric lines before DNC construction. The relocation will be completed in the shortest time as possible to ensure power supply to factories and local communities. All costs related the electric line relocation will be covered by the project.
- *Provincial road 490*: Related parties agreed to construct a permanent, fixed-span bridge crossing the DNC canal to replace the lost road section before constructing the canal. All related costs will be covered by the project and the project will have no impact on the continuous connectivity of road 490.
- *Dyke on the left bank of Day river and dyke on the right bank of Ninh Co river*: Parties agreed that reinforcement of affected dyke section will be timely done before flood season to ensure no risk occurred due to the project impact. All related costs will be covered by the project.
- *Irrigation system*: Parties agreed that a temporary irrigation system will be timely built before construction of the canal to ensure agriculture production of the farmers. The irrigation system will be restored to previous or better condition. All related costs will be covered by the project.
- *Inter-village local road and domestic electric lines*: Local roads and domestic electric line damaged by the project will be timely recovered to ensure living condition and production activities of local people. All related costs will be covered by the project.
- *Underground communication cable a long road 490*: The cable line will be relocate before commencing construction of the canal. A temporary cable may be used during relocation and the relocation will be done for the shortest time as possible to minimize interruption of local communication.

**Construction phase:**

**Air pollution:** to minimize dust emissions the environment the trucks must have canvas cover crate and must not drop any materials or waste; the maximum velocity of the vehicles traffic on the dusty roads and tracks in and near the project area is 5 km/h, watering regularly in the construction area, especially in the construction site on the route during dry and windy period. Spraying water is one of measures to maintain certain moisture levels, and to prevent or minimize dust dispersion. The watering activities are proposed at least once a day during rainy season and twice a day during dry season. Storing the excavated soil storage areas must be placed in the designed areas far from any residential area, keeping a distant to the surrounding sensitive receptors and not allow to stay on site over 24 hours;

**Noise and Vibrations:** Setting up appropriate operational schedule of noise generate equipment; Use of modern and new construction machineries and equipment or old equipment but properly noise protected which generate lower noise level and strictly carry out equipment maintenance as regulated by the Government; Usage of machines generate noise level over >55 dBA at night (from 22:00 to 6:00) is strictly prohibited at the location nearby residential area; Heavy truck transportation, loading/unloading shall not allow to operate at night (from 22:00 to 6:00);

**Domestic waste:** Domestic waste generated by construction activities and workers camps on the site shall be managed as the following steps:

- Provide waste bins at work site;
- Sort waste by category (metal, plastic, glass, organic, papers, mineral) for reuse and evacuate in official waste landfills the non-recyclable waste ;
- Domestic waste and garbage from workers camps need to be temporary grouped and stored by hygienic manner and then collected through service provision of local companies with official agreements.

**Construction-generated solid waste:** when possible materials generated by excavations and dredging shall be recycled / reused. The project includes 3 possible reuses for these materials:

- Clay materials will be reused by local brick factories,
- One minor part of the remaining materials not adapted to brick production will be transfer to low land areas to increase the soil level and improve the agriculture production, following the requirements of the communes and farmers;
- The major part of the materials will be transfer by boats to Lach Giang's southern disposal area to complete its filling and permit the reuse of the new land for Casuarina trees plantation and wood production. It will concern a maximum of 1 million m<sup>3</sup> to be disposed on the 30 ha area already approved under Corridor 3 project.

**Water pollution:** to prevent surface and underground water quality pollution, the water outlet from the construction site will include:

- A physical separation of the excavating/dredging area from the 2 rivers during most of the construction phase. The connection between the canal and the 2 rivers will be operated only by the end of the excavation phase with the banks opening. This method will avoid surface water pollution during the most sensitive construction phase.
- The creation of temporary sedimentation ponds when filling the low land areas with excavated & dredged materials;
- The implementation of a frequent surface and underground water quality monitoring by independent laboratories, by contractors auto-control and by control from the consultant;
- Analysis of the sediments and materials before disposal and/or landfilling to confirm the non-contamination by pollutants;
- In case of presence of pollutants with concentrations above standards, the materials will have to be evacuated on regularly authorized storage or treatment areas and the contractors should manage the traceability of the materials evacuation.

- Hygienic Toilets connected to septic tanks will be installed to prevent contamination of surface and underground waters from the wastewater of the workers camps. Contracts will be made by contractors with authorized companies for periodic maintenance, suction and evacuation of waste into adapted/authorized landfill or for treatment (e.g. composting to convert it into fertilizer).
- The septic tanks rejects must be design to guarantee sufficient flow evacuation and avoid stagnant water because of sanitary risks.
- A survey will be undertaken at the closest well located at the downstream portion of the site. The quality of water here will be controlled weekly with a procedure included and fully detailed in the Environmental Management Plan.

**Aquatic life:** To mitigate possible impacts on aquatic life, it is proposed:

- Dredging close to the bank and on wetlands (most important places for aquatic life) and on spawning areas should be carried out between October to May, avoiding the peak of biological activity of the flood/rainy season.
- Dredging of the center of the channel can be done throughout the year but, during the dry season, contractors must take into consideration that the TSS/turbidity level downstream the dredging areas will be very lower than during rainy season.

#### **Ecological Bank protection for the DNC Project**

- The mineral or heavy bank protection based on rocks, concrete and similar technologies from civil works engineering can cause significant damage to the efficient ecological functioning of the river.
- Alternative technologies have been assessed based on the project's Environmental Management and Construction Supervision Consultant's thirty years of international experience in ecological engineering and use of the indigenous vegetation capacities to fix the river bank materials, stabilize soil and to protect riverbanks from erosion. On specific cases, these techniques can be mixed with classical bank protection to arrive at an economically feasible and ecologically sustainable solution.
- The project proposes to design some bank protections using ecological engineering. These techniques are based on the plant systems' root capacities to limit erosion. This approach can be used alone or mixed with classical bank protections techniques such as man-made blocks.
- For the DNC project, this approach to river bank protection will permit the restoration and/or creation of around 9 ha of natural habitats.

**Hazardous Wastes and Spillage:** spent solvents, used lubricants or used oils, oil and petrol storage, etc. will be stored in Government-approved containers and stored within beamed areas protected from the rain by a roof to limit dispersal of any spilled product. The services of an accredited treatment company will be employed when there is enough volume of such materials to be discharged. Possible water or soil contamination due to spillage of lubricants, fuel from equipment, repair yard and fuel depot will be prevented by providing impervious flooring and containment wall.

**Restoration of Land Occupied temporarily by Construction Camp / Staging Area:** The use of the construction camp/staging areas is only temporary, hence, at the end of construction period, the land will be returned to the landholder who can then resume the former productive use of the land. As such, the contractor will remove all equipment, structures, rubbish and obstructions and restore the land to its condition prior to use for construction. Contractors will be required to include the above mitigation measures in the EMP.

### ***Livelihood restoration programs***

Beside of compensation and allowances provided for households and individuals losing productive land and directly involving in agricultural production, a livelihood restoration program will be provided to severely affected households to help them have more opportunity to get new jobs to restore and/or improve their income and livelihood. This program will be prepared during project implementation by conducting a need assessment and consultation with affected households and other stakeholders in localities. The program should include specific rehabilitation activities, budget scheme, responsible agencies/persons, timeline and monitoring and evaluation. An agriculture extension program will be also provided for affected farmers who have the remaining agriculture land viable for continue cultivation. They also receive seeds, young trees, breeders, fertilizer and technical support, according to the Land law 2013. Support for vocational training and/or job creation for laborers whose land is acquired will be followed Decision no. 63/2015/QD-TTg of Prime Minister.

PMU-W will recruit livelihood specialist and social development specialist to conduct need assessment and prepare the LRP. The LRP needs to be reviewed by the Bank and updated in the RAP before implementation. Periodical monitoring on implementation of the programs must be included in internal and external monitoring reports and submitted to the Bank. All costs for above programs and supports are covered by the project.

#### **- Operation phase:**

***Navigation safety:*** In order to mitigate the impacts on transport activities during the operation of the project, the quantity of the existing navigation aids will be maintained with additional ones to be installed. Its objective is to improve the efficiency of the existing system and further enhance safety in the waterway following the Vietnam Waterway Signal Code - 22TCN269-2000.

***Air Quality:*** The MOT, PMU-W in coordination with the MONRE will strictly impose the Vietnamese Standards on Ambient Air Quality and the implementation of the existing policies relative to air emission control. Low-sulfur fuel is another option MOT could require the waterway transport owners/operators to use.

***Erosion and Deposition:*** the installation of navigation aids and advisory/signs should include speed limit and other public advisory for the protection of erosion and deposition. The Investor should allocate budget for the regular maintenance of soil erosion protection structures including tree planting. Trees / vegetation planting in the disposal sites, to river banks with no river training structures and other available areas will be considered.

***Water Quality:*** Discharge of oily bilge water and wash water from the vessels cause water quality degradation. The situation is aggravated by the disposal of solid waste in the river, which at the same time causes impairment of the aesthetic quality of the river. Propeller wash, specifically in shallow river ways, can cause re-suspension of sediments in the water column. To police such practices, the MOT, PMU-W in coordination with the MONRE should strictly impose the regulations relative to waste disposal in the water bodies. Operators and owners of water transport should be provided with seminars/training for them to be aware of the negative impact of such practice.

***Natural Habitats and Protected Areas:*** There are no protected areas within the vicinity of the Project.

#### **- Proposals to improve the Sustainable Development of the project:**

***Grassing and planting shrubs / small trees planting on Road Embankments and / or vegetation growing on bridge piles:*** To create opportunity for sustainable development: better landscaping, ecological integration and ecological corridor, CO2 catchment and O2 production, limitation of rain erosion on the embankments and at the base of embankments and use of trees that produce fruits will permit incomes for local people (harvesting fruit) and help to prevent tree cutting for wood. A similar approach can be imagined for the retaining wall of the road/bridge.

***Bridge Rainwater management:*** Improve the drainage, Infiltration and ground filtering system of the rainwater coming from the bridge. The benefits for sustainable development are improvement of the

water drainage from the bridge, reduction of the pollution dispersion by the rainfalls, ground filtration by infiltration of the rainwater to use the soil/ground capacity of biodegrading on oil/petrol pollutants, prevention / reduction of direct outlet of pollutants from road traffic into the fields.

## **6. ENVIRONMENTAL MANAGEMENT PLAN**

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Prepared as a part of the ESIA, an Environmental Management Plan (EMP) is a safeguards instrument that is typically used in many projects. It consists of information on, and guidance for, the process of mitigating and managing adverse environmental impacts throughout project implementation. Typically in Vietnam, an EMP comprises a list of typical mitigation measures to be carried out by contractors and others, an environmental monitoring program, capacity building, organizational arrangements and responsibilities, and the estimated cost of EMP implementation and monitoring. There is a comprehensive regulatory framework in Vietnam related to ESIA preparation, environmental standards, protection and management of forests and cultural property, and other aspects related to construction and operation of facilities and infrastructures in Vietnam. This EMP is consistent with these regulations.

To facilitate effective implementation of the EMP, the PMU will: (a) Establish an Environment Unit responsible for ensuring timely implementation of the EMP, including monitoring, reporting, and capacity building related to safeguards; (b) Assign the Construction Supervision Consultant (CSC) to also be responsible for supervision of the contractor's safeguard performance as part of the construction contract and this requirement will be included in the CSC's terms of reference; and (c) Hire qualified national consultants as the Independent Environmental Monitoring Consultant (IEMC) to assist the Environment Unit in performing its task.

### **6.1. Environment Management Plan**

The main objective of the Environment Management Plan is to ensure that (a) the potential negative impacts of the project are minimized; (b) the EMP is effectively implemented; and (c) the EMP is adequate to mitigate the potential negative impacts. Given that monitoring the implementation of the RP will be conducted separately, the environmental monitoring program will comprise (a) monitoring the safeguard performance of the contractor during site clearance and construction, (b) environmental quality monitoring, (c) monitoring effectiveness of the EMP. The EMP will include Monitoring programs from contractors (auto-control), from independent laboratories and from Consultant (Monitoring Control). It includes the requirements from the previous DMDP prepared in 2013 and will be updated when the Sites Environment management plans will be implemented by contractors.

### **6.2. Capacity Building Program /Environment technical assistance**

The scope of the technical assistance will cover support from experts and training that would cover both the knowledge on safeguards requirements and procedures for the project as well as training that covers both specific knowledge on safeguard procedures and requirement for the project staff, consultants, and national contractor would be important. This would include, for example, assistance in the preparation of documents and implementation of training program on environmental management and environmental monitoring for contractors, CSC and relevant staffs of PMU (environmental staffs and coordinators of packages) to do their tasks. It would also include assisting the PMU's environmental staffs with the review of contract documents on the bidding packages for construction items of the project to ensure compliance with environmental protection policies and impact mitigation and monitoring requirements as well as provide general environmental guidance as requested by the PMU to enhance overall project implementation and performance.

Given the nature, locations, and scale of construction, it is anticipated that the safeguard technical assistance support and training will be provided during the project implementation. The WB safeguard specialists will participate in the capacity building in particular in the training activities as appropriate.



## **7. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE**

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### **7.1 Objectives of Public Consultation**

The consultation with the participation of local authorities and local people in the project site during the preparation and implementation of RAP and ESIA is to provide essential information for further understanding about the project, impacts of the project implementation and potential mitigation measures for the project.

### **7.2. Implementation Methods**

This is a Category A project, thus public consultation were carried out twice during the ESIA and RAP process. The public Consultation is a part of Environmental and Social Impact Assessment and of the Resettlement Action Plan for the project. The public consultation is conducted with the cooperation of representatives of the Client, environmental consulting, local government and communities in the project area. Public consultation results will be used to evaluate design alternatives, proposed mitigation measures and express the support of the community during the process of project implementation. A first public consultation was organized in 2012 on the DNC initial project. After the preliminary & detailed design of the access road relocation and crossing bridge, an additional public consultation was organized in 2015 in the 2 communes concerned by the road and bridge. The purpose of these public consultations is:

- To listen to the community's comments and concerns on the project, especially the direct impact on community life.
- To resolve conflicts in recommendations from the community with environmental problems and delays in implementation of the construction plan of the government.
- To confirm the rationale and legality of the administration's decision to meet the legal requirements of the local people, to consider proposals from the community and local government.
- To understand the main problems that the project area people are interested in, to propose the most reasonable solutions.

### **7.3. Results of the consultations**

In 2012, a first consultation concerned 5 communes and mainly addressed the DNC canal and ship lock. In December 2015, an additional consultation was organized to include the evolution of the project to include the crossing bridge and the road access relocation and update the information. The consultation was held with 2 communes. The general opinion of the concerned stakeholders was that they agreed with the project and with the safeguards and means proposed to minimize the environmental impact of the project. The main comments concerned the water quality, dust and noise emission. The communes close to DNC care also about salinity intrusion risk in the Day River from the Ninh Co River. However, they were reassured that the project will strictly supervise and manage the implementation of the environmental protection commitments outlined in the project. In addition, the project will closely monitor the compensation plan, support for the relocation of public works and the local people lose their land in farming and agriculture.

### **7.4. Feedback and comments of Project Proponent**

The On the basis of comments of the People's Committee and Fatherland Front Committee of the communes traversed by the project. The project proponent has collected and analyzed the comments. For the key issues that the People's Committee as well as the Fatherland Front Committee of communes and towns is interested in, the Project Owner would have the answers and commitments as follows:

- Project proponent commits to implement in accordance with the contents stated in ESIA and the approval decision and minimize the negative impacts on environment of local people;
- Project proponent and contractors will strictly follow the environmental standards and reduce: minimize exhaust gas, dust, noise and construction equipment and machines in accordance with the Vietnamese regulated standards;
- Resettlement Plan is prepared by social/resettlement teams associated with provincial departments to solve the impacts reasonably, and problems are presented in a specific report.

**8. CONCLUSIONS, RECOMMENDATIONS**

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ESIA has been conducted by the PMU-W with support of the Environmental Management and Construction Supervision Consultant to identify potential positive and negative impacts on environment, socio-economic conditions and livelihood of local people, etc. The potential impact on land and livelihood of local people has been classified as significant impact, but could be mitigated and managed. Mitigation measures and management framework have been proposed and consulted with different stakeholders and included in the ESIA report and RAP in compliance with the Banks regulations for implementation.

Consultation, participation and a grievance redress mechanism have been also established in the ESIA report and RAP to guide PMU-W and related agencies on how to conduct consultations with different stakeholders, involve participation of affected people in the project implementation and monitoring, and resolve complaints of local people regarding land acquisition and resettlement.

Institutional arrangements for implementation of the project, including implementation of environment management plan and resettlement and strengthening capacity of the project implementation agencies, has been established in the ESIA report and RAP. A monitoring and evaluation on resettlement implementation has been also established in the RAP.

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