



AFRICAN DEVELOPMENT BANK GROUP

PROJECT : **PROJECT TO SUPPORT ROAD CONNECTIVITY IN NORTH-EAST TUNISIA**

COUNTRY : **TUNISIA**

SUMMARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

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SUMMARY ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

Project Name: Project to Support Road Connectivity in North-East Tunisia	Project Number: P-TN-DB0-016
Country : Tunisia	Category 1
Department : PICU	Division: PICU-1

1. Introduction

Considering its scope and the major environmental and social impacts identified, the project has been classified under Environmental Category 1, in accordance with the environmental and social assessment procedures of the African Development Bank (AfDB). An environmental and social impact assessment (ESIA) was conducted in 2015 and 2016 respectively for the permanent link and its extension and finalized in 2017. A full resettlement plan (FRP) was also prepared and finalized in 2017.

The ESIA reports were approved by the National Environmental Protection Agency (ANPE) and compliance opinions were issued on 31 December 2016 and 10 May 2017 for the permanent link and its extension respectively.

This document is the summary of the Environmental and Social Impact Assessment (ESIA) of the Project to Support Road Connectivity in North-East Tunisia. The summary was prepared in accordance with AfDB's environmental and social assessment guidelines and procedures for Category 1 projects.

2. Project Description and Rationale

2.1. Project Description

"Permanent Link between Motorway A4 and the town of Bizerte in Tunisia" is a 9.5 km-long urban expressway (reference speed of 80 km/h) permanently linking motorway A4 to the town of Bizerte, including the canal crossing through a viaduct. The new infrastructure is a peri-urban expressway with interchanges of varying heights. Pedestrian traffic is forbidden on the main road, including on the viaduct. The project is sub-divided into three lots, namely:

- **Lot 1: South Road:** "South road section. Interchange A4/ RN8 – viaduct". PK0+000 to PK4+659. This road layout mainly follows a corridor on the outskirts of urban centres, bypasses Zarzouna and crosses Menzel Abderrahmen. The layout comprises three intersection points with interchanges of completely different heights.
- **Lot 2: Viaduct:** "Viaduct with a mixed meshwork and combined double action deck". PK4+659 to PK6+729. Lot 2 is an imposing 2 070 m-long viaduct that crosses the canal with three spans, the main 293 m-long span supported by two v-shaped single piers directing the navigation canal.
- **Lot 3: North Road:** "North road section. Viaduct – RL348. PK6+729 to PK9+446" is a 2.7 km-long road extension of this link beyond the viaduct to the north of the canal, like a northern bypass of the town, to improve access to the town of Bizerte. The road layout extends beyond RN11 to RL438 with a roundabout.

2.2. Project Objectives and Components

The project's main objective is to improve the movement of people and goods within the Bizerte urban centre and in the country's North and East Regions. Locally, the project should address the increasing demand for traffic crossing the Bizerte urban area, thereby relieving congestion on access roads to the town centre and evening out the load on the road network. Regionally, it seeks to provide an intersection on the ground or through interchanges to be constructed for the municipalities and areas on the outskirts of the

town of Bizerte (Menzel Jemil and Menzel Abderrahmane to the south), thus fostering communication between these localities and Greater Tunis, and improving trade with the country's North and East Regions.

Specifically, the project seeks to: (i) enhance the competitiveness of Tunisia's economy by addressing the increasing demand for passenger and cargo traffic crossing the Bizerte urban centre, thereby relieving congestion on access roads to the three industrial zones and the port, and evening out the load on the road network, and (ii) foster movement and trade between the North and East Regions of the country.

Figure 1: Overview of Project Layout



In line with Bizerte's Urban Development Master Plan, the implementation of the project will help to direct traffic with a destination other than the Bizerte town centre and thus free transit through the existing movable bridge. The project will therefore contribute to promoting intra- and inter-regional trade and reducing social and regional disparities. Lastly, it will reduce accidents, improve the quality of life of the population and facilitate access to socio-economic centres by the population. To achieve these objectives, the project's actions have been grouped together under components summarized in the table below.

On 15 November 2016, the European Investment Bank (EIB) approved a EUR 123 million financing for the project. It was agreed that the Bank will provide equivalent financing (EUR 123 million) through two loans under its AfDB Window and from AGTF resources. The Government of Tunisia's contribution will involve: (i) the financing of expropriations, (ii) the costs of displacing concession holders' networks, and (iii) related facilities.

Table 1: Project Components

Component Name	Description
ROAD WORKS	<ul style="list-style-type: none"> 1.1. Development of a new South sub-urban two-lane dual carriageway express road from PK 0+000 to PK 4+639 linking A4/RNr8 to the Viaduct; 1.2. Viaduct with mixed meshwork and combined double action deck from PK 4+639 to PK 6+749 ; 1.3. Development of a new North sub-urban two-lane double carriageway express road from PK 6+749 to PK 9+446 linking the Viaduct to RL 348; 1.4. Control and supervision of road works and the Soit facility (three works supervision missions and three works technical control missions).
RELATED FACILITIES	<ul style="list-style-type: none"> 2.1. Infrastructure: construction on the South bank of a 2.4 km-long tarred road linking Zarzouna Sud estate to the Technopole at Zarzouna Nord and Menzel Abderahman + Park under the viaduct. 2.2. Rehabilitation of estates around the project, namely Etemouh and Binigrou estates to the south of the project, and Pécherie, Hafer Moher and Bir Msyougha estates to the north of the project. Construction of road networks totalling 14 km, together with the construction of sewerage, rainwater sewer and street lighting systems.
PROJET MANAGEMENT	<ul style="list-style-type: none"> 3.1. Technical assistance and project management; monitoring and evaluation of project socio-economic and environmental impacts; 3.2. Project accounting and financial audit; 3.3. Road safety audit; 3.4. Project technical audit; 3.5. Project communication.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 Legal and Regulatory Framework

Environmental protection is based on Tunisian standards and regulations. According to Tunisian legislation, the Town and Land Use Planning Development Code (Law No. 2003-78) requires that environmental and social impact assessments (ESAI) be prepared prior to the implementation of any development or infrastructure programme. The procedure for the application of the code is outlined in Decree No. 2005-1991 of 11 July 2005 relating to environmental impact assessments. It is the methodological procedure for reviewing the environmental consequences of a planned development project and ensuring that they are duly taken into consideration in the design, implementation and operation of the project.

Other instruments govern environmental protection in Tunisia. The main instruments relating to the project are: (i) Law No. 75-16 of 21 March 1975 enacting the Water Resources Code; (ii) Decree No. 82-1355 of 16 October 1982 regulating the recycling of used oils; (iii) Decree No. 85-56 of 2 January 1985 stipulating the conditions under which discharges are regulated or prohibited in receiving environments; (iv) Tunisian Standard NT109.14 (1988) relating to liquid hydrocarbons (Rules for the Development and Operation of Liquid Hydrocarbons Deposits of the First and Second Classes); (v) Order of the Minister of National Economy of 20 July 1989 approving Standard NT106.02 (1989) on environmental protection (sewage discharges into water environments); (vi) Decree No. 91-362 of 13 March 1991 issued by the Prime Minister's Office and published in JORT on 26 March 1993 instituting the conduct of environmental impact assessments; (vii) Law No. 95-73 of 24 July 1995 on public coastlands, which stipulates that environmental protection mainly covers the seaside, beaches, *sebkhas*, sand dunes, islands, cliffs and the various components of coastlands, with the exception of fortresses and other defence facilities; (viii) Order of the Minister of Industry of 13 April 1996 approving Tunisian Standard NT106.04 (January 1995) on ambient air; (ix) Law No. 96-41 of 10 June 1996 on wastes and control of waste management and disposal; and (x) Decree No. 2000-2339 of 10 October 2000 establishing the list of hazardous wastes;

Tunisia has made significant progress regarding the incorporation of the social component into the implementation of development projects. The terms and conditions for land use and expropriation of property for public purpose are now governed by Law No. 2016-53 of 11 July 2016 on expropriation for public purpose, which amends and supplements Law No. 76-85 of 11 August 1976 revising the law on

expropriation for public purpose. It outlines the rules governing land tenure and State property in Tunisia. It is considered today as a reference instrument.

3.2. *Institutional and Administrative Framework*

The project institutional and administrative organization can be summarized as follows:

- (i) **Ministry of Equipment, Housing and Regional Development (MEHAT)** which is the Project Owner through the General Directorate of Highways (DGPC), and which is responsible for implementing the road programme on behalf of the Government of Tunisia. It comprises a Management by Objective Unit established by Government Decree No. 2017-626 of 28 April 2017 to monitor Bizerte Bridge construction works. It also comprises a unit responsible for freeing the rights-of-way of motorways and road network projects which works with the General Directorate of Land Tenure, Legal Affairs and Litigation (DGAFJC) and the Directorate of Land Tenure (DAF), which liaises between MEHAT and the Ministry of State Property and Land Tenure (MDEAF). Lastly, Regional Delegations of Infrastructure (DREHAT) of the Ministry are responsible for works execution and supervision (project management). The DREHATs will each establish a Project Impact Surveillance and Monitoring Unit (CS);
- (ii) **The Ministry of Environment and Sustainable Development**, which is responsible for designing and implementing the national environmental protection policy. It will be involved in the project through institutions under its authority, notably the National Environmental Protection Agency (ANPE). Established in 1988, ANPE is charged with combatting pollution, especially industrial. Its duty is also to study and control the country's environment in order to eliminate all sources of degradation of the natural environment and quality of life. In this regard, it approves the environmental impact assessments of projects subject to this procedure;
- (iii) **Ministry of Interior through the Bizerte Governorate** which, as part of its powers, must take all the measures required to implement the ordinance of the President of the Court of First Instance having jurisdiction to take possession of expropriated property and ensure access to the property without disturbance.

3.3. *AfDB Safeguard Policies*

The Integrated Safeguards System (ISS) through its five operational safeguards (OSs):

- **Operational Safeguard 1** – Environmental and Social Assessment: this operational safeguard is triggered because the project is an investment project subject de facto to environmental and social assessment;
- **Operational Safeguard 2** – Involuntary Resettlement: this operational safeguard is triggered because the project will entail expropriations;
- **Operational Safeguard 3** – Biodiversity, Renewable Resources and Ecosystem Services: this operational safeguard is triggered because the project will be implemented in a marine environment having links with the Itchkeul park which is a sensitive site owing to its biodiversity or ecosystem service potential;
- **Operational Safeguard 4** – Pollution Prevention and Control, Hazardous Materials and Resource Efficiency: this operational safeguard is triggered in instances where there is a risk of various forms of pollution and nuisances during works;

- **Operational Safeguard 5 - Labour Conditions, Health and Safety:** this operational safeguard is triggered in instances of health and safety risks for the workers during site operations-related works.

Other relevant policies and guidelines are applicable once triggered under the ISS. They include:

- Bank Gender Policy (2001);
- Framework for Enhanced Engagement with Civil Society Organizations (2012);
- Disclosure and Access to Information Policy (2012) ;
- Handbook on Stakeholder Consultation and Participation in Bank Operations (2001);
- Bank Policy on Population and Implementation Strategy (2002);
- Environmental and Social Assessment Procedures for Bank Operations (2015).

It should be noted that Tunisia has ratified international environmental protection conventions and instruments that are therefore applicable to this project.

4. DESCRIPTION OF PROJECT ENVIRONMENT

4.1. *Definition of Study Areas*

To assess the project's environmental impacts, mainly during its construction phase, two impact areas have been identified:

- **Direct study area:** works will directly affect the rights-of-way of the roads and their immediate surroundings. This study area has undergone site investigation to establish a baseline situation that will be used in the environmental assessment: (i) the surface area permanently occupied by the infrastructure (right-of-way of the road and its dependencies, junctions, etc.); (ii) the area occupied temporarily (access roads under construction, the construction site, temporary dumps, etc.); (iii) the area affected by pollutants (heavy metals, etc.); (iv) the area concerned by compensation measures; and (v) all the itineraries used to supply materials (quarry products, backfill, manufactured bituminous products, etc.). Considering the impact on road traffic, these itineraries comprise all the paths between *djebel* Ressas, *djebel* oust, etc. quarries), backfill dumps, the black product plants of the enterprises that will execute the works and the project site;
- **An extended and larger area** covering the entire Bizerte Region and its surroundings where the direct and indirect project impacts will be felt, mainly during the operational phase. The Ichkeul Lake therefore falls within the extended study area.

4.2. *Timeframes*

The implementation timeframe is estimated at 36 months. The timeframe includes: (i) the feasibility study on the permanent link between motorway A4 and the town of Bizerte which will be conducted over an estimated period of 27.5 months starting from April 2013, including the specifications; (ii) the terms and conditions of calls for bids, bid analyses and contract award for a minimum period of 18 months; and (iii) works which will last 3 years. This phase includes preparatory works, link road and lagoon crossing facility (viaduct) construction works as well as related facilities (interchanges, roundabouts, etc.) and the installation of equipment (street lighting, traffic safety barriers, road signs, etc.).

4.3. Physical Environment

The main physical features of the study area can be summarized as follows:

Climate: the climate of Bizerte Region is of the Mediterranean type belonging to the quite homogenous sub-humid bioclimatic stage with a continental influence despite the closeness of the sea. It is characterized by prolonged summer drought and a winter-like rainy season. The average air temperature in Bizerte Region varies from 10 °C in January to 27 °C in August, with a 19°C annual average. The absolute maximums thus stand at 44.8°C in July, 45°C in September and 48°C in August. Average annual rainfall varies from 400mm to 650mm/year.

Wind: in Bizerte Region, the dominant winds on account of their force and frequency blow from the "chirch" North-West sector at an average speed of 6m to 8m/s and last for 200 days/year.

Air quality: measurements were taken in June 2017 at: (i) the interchange with A4/RN8, origin Lot 1-start of project; (ii) the technopole interchange; (iii) the Zarzouna-Menzel Abderrahmen interchange; (iv) the interchange with RN11; (v) the main part of Lot 3 where urban density is high; and (vi) the junction-end of Lot 3-project end. The findings of analyses show that NO2 and SO2 concentrations in the ambient air in the 12 samples comply with the guide values of Standard NT 106.04 and of the European Standard (Directive 2008/50/EC) relating to these two chemical pollutants. The findings of analyses conducted on dust samples show that PM10 concentrations are below the threshold limit for health, but above the threshold limit for well-being set by NT-106.04. This can be explained by the location of the measurement points in degraded land, roads in poor state, etc., which facilitates the raising of dust by the movement of vehicles. The 12 points show minimum values compared with the CO limit value set by Standard NT 106.04. Tunisia's law on sound pollution is being updated.

Sound: a sound measurement campaign was conducted in June 2017 in 12 stations along the project layout. The findings of sound recordings show that 1/12 values exceed the average level set by the World Health Organization (WHO), (except PB11) and 9/12 measurements comply with the Tunis municipal order.

Topography: Bizerte region is characterized by three morphological groups, namely:

- (i) *Heights:* morphological and bio-geographical data distinguish the following three groups of mountains around the town of Bizerte: Mogods, the environs of Bizerte, Menzel Bourguiba, Mateur, El Alia, Ras Jbel, Hedhil and Bjaoua.
- (ii) *Depressions and plains:* low-lying environments, which are synclinal structures or fault troughs, are the scene of significant fluvial accumulation which carries along materials from high altitude areas attacked by erosion.
- (iii) *Coastline:* Lake Bizerte communicates with the sea through a gully, which is a navigation channel linking the commercial port to the sea. The coastline in the Governorate of Bizerte is vast, at times difficult and under erosion. Such degradation is caused by two factors, namely a natural factor resulting from the aggressiveness of the sea and marine erosion, and an anthropic factor resulting from occupation of the coastline.

Geology: this project is located precisely in the area referred to as the "kechabta molasses basin" characterized by an outcropping of the Boudabbous formation (massive limestone) exploited in surrounding quarries. The other exposed formations are: marly-clays, alternating limestone and marly-limestone, and Ypresian limestone and marly.

Hydrology: the project is located in the far north of Tunisia, specifically in the north of the Bizerte lagoon which covers a surface area of about 128 km² (the maximum width is 11 km and the maximum length is 13 km) with an average depth of 7 m. The lagoon communicates with the sea through a 6 km-long and 12 m-deep gully. It drains into a watershed of about 380 km². Its western section is linked to a second water body, Lake Ichkeul, by the Tinja canal which is about 5 km long and a few metres deep (3 metres during floods). The canal is currently equipped with lock gates to regulate water flow between Lake Ichkeul and the Bizerte

lagoon. Prior to the construction of these facilities, the flow of water through the Tinja canal into the Bizerte lagoon was estimated for a normal year at 165 mm³/year. After the commissioning of dams (Joumine, Ghezala and Sejnene) and the installation of lock gates on the Tinja canal in 1989, the flow of water from Lake Ichkeul into the lagoon has dropped considerably, not exceeding 20 million m³/year.

Water tables and groundwater: (i) the Ben Hassine *wadi* water table: alluviums from Ben Hassine *wadi* are collected through a capture line, which supplies the town of Bizerte. This water table is considered as a small structure captured through 87 shallow wells, 45 of them equipped and 42 operated traditionally; (ii) the Guéniche *wadi* water tables are found in Porto Farina's Mio-Pliocene sandstones and in the Plio-Quaternary formations. The salinity of these water tables varies from 0.37 to 2.5g/l; (iii) the North Bizerte water table: encrusted in the limestone layers of the Capania region, this water table supplies drinking water to the town of Bizerte. Groundwater is of good quality, with salt contents of about 0.5g.

Surface water quality: two sampling points have been proposed for surface water, namely: (i) the downstream portion of the El Marj *wadi* project; and (ii) the downstream portion of the Abbes *wadi* project. The findings of analyses of water samples collected from the beds of the Abbes and El Marj *wadis* show that: (i) the water is of poor quality; and (ii) the water is polluted chemically and very polluted bacteriologically (high number of germs). Water quality does not comply with the standards of NT 106-002 (waste discharges in water environments), NT 106-003 (use of treated wastewater for agriculture) and NT 09.11 (physical, chemical and microbiological features of water intended for human consumption). Concerning eutrophication and pollution, the eutrophic nature of the water of *wadis* seems sustainable, while Abbes *wadi* stands out for its seriously polluted water with a COD of 205 mgO₂/l and a 0.3 hydrocarbons index.

Seawater quality: water salinity is really of the sea-type, always above 37psu and without noticeable stratification. Dissolved oxygen exceeds saturation level, varying from 8.12 to 9.21 mg/l. Bottom waters are well oxygenated, with the difference between bottom and surface waters varying from 0.12 to 1.09mg/l. Regarding eutrophication, nutrient contents are low, with less than 1mg of nitrate, less than 0.015 mg of nitrite and less than 0.005mg of phosphorus. The P1 station recorded a relatively high COD with signs of hydrocarbons pollution and the hydrocarbons index standing at 0.3 mg/l. Bacterial pollution is reduced, with total absence of faecal streptococci. The canal sediments trap nutrients, which are a source of continuous eutrophication for the environment, with 81 to 492 mg/kg of phosphorus and 246 to 1410 mg/kg of nitrogen.

Ecological importance of protected areas: there are many ecosystems of great ecological value close to the study area. The Ichkeul national park is considered as a priority area (10 km from the study area) and has been raised to a National Park covering 12 600 hectares. It has been selected for inscription on three international lists: in 1977 as a Biosphere Reserve (UNESCO MAB programme); in 1979 as World Cultural and Natural Heritage Site (UNESCO); and in 1980 as Wetland of International Importance (RAMSAR Convention). This natural area cannot be affected by project implementation.

Flora and terrestrial fauna: there is little natural vegetation on the project area. Most of the surface area on the North section is used for grain cultivation. Tree farming is practised on slopes which are sufficiently steep to encourage linear erosion. The two largest plantations are the olive tree and grape vine plantations with a 20% to 30% land cover. Natural vegetation can be found in quarry operation areas, mainly the Mediterranean scrub and small pine forests. Moreover, the study noted the presence of *acacia saligna*, a small invasive tree characterized by its rapid invasion of degraded surfaces. Terrestrial fauna is virtually non-existent in the project area except for small fauna, notably reptiles, rodents, avifauna, etc.

Flora and fauna of the Bizerte canal: the project will cross the canal of the Bizerte lagoon. In this area, the canal is about 1.3 kilometres wide and 15 metres deep. To sweep the canal in the project area, it was recommended that three sampling points should be established along the bridge crossing. The three points are 500 metres apart. The findings are as follows:

- The canal **phytoplankton** is quite diversified with 17 diatom species, most of them pinnates, and 12 dinoflagellates, some species of which are very harmful. Breakdown by

station is quite homogenous. Densities are low during this season (June 2017), or 32 000 to 170 000 cel./l;

- **Zooplankton** is represented by 5 fauna groups dominated by copepods, with 23 species of copepods, tintinnides, appendicularians, many crustacean, mollusc and echinoderm larvae, and various eggs. This animal population efficiently contributes to controlling phytoplankton and, hence, ensuring environmental balance;
- The observation of megaflora in the area through the three prospection stations reveals the presence of 7 species of macrophytes, including magnoliophyte: *cymodocea nodosa* and 6 macro-algae. Natural or man-made supports have facilitated the formation and development of macro-algae, especially dead *Pinna nobilis* shells.
- **Benthic megafauna** is observed notably at Station P1 where 52 species divided into 11 groups have been identified. Station P3 follows with 36 species, while the deeper main station shows a biological diversity of only 23 species. They are sessile or sedentary species adapted to hydrodynamic conditions and turbidity, in addition to sedentary gobies and blennies. *Vagile ichtyofauna* is represented mostly by sea breams.

4.4. Human Environment

The project impact area (PIA) comprises the Governorates of Bizerte and Beja, while the restricted area is the Bizerte urban centre located in the north tip of the country, at about 65 km north of Tunis. The main socio-economic features of the area can be summarized as follows:

- **Demography:** the project impact area has a population of about 180 000 (2014), of which about 50.2% women. The Zarzouna, Bizerte Sud and Menzel Djemil districts have a population of 24,793, 55,659 and 47,224 respectively, representing about 22% of the total population of the Governorate of Bizerte. It should be noted that the proportion of youth is quite high in the of Zarzouna, Bizerte Sud and Menzel Djemil districts, standing respectively at about 23 %, 26% and 23 % of the total population;
- **Access to basic social services:** the areas affected by the development of a permanent link are almost completely electrified (97.31% in Menzel Djemil district, against 95.69% in the Zarzouna district). The rate of supply of drinking water to the three delegations by SONEDÉ varies from 83.97% to 95.67%;
- Education: the enrolment rate in the study area is quite high, standing at 97.8% for the Menzel Djemil district, 96.9% for the Bizerte Sud district and 96% for the Zarzouna district. The enrolment rates of girls aged between 6 years and 14 years are 85% in the Zarzouna district, 82% in the Bizerte Sud district and 84% in the Menzel Djemil district;
- **Unemployment:** the rates of unemployment are 15.27%, 13.7% and 13.05 % in the Zarzouna, Bizerte Sud and Menzel Djemilet districts, respectively. The rate of employment is higher among women, standing at 20.87 % in Zazouna, 20/5 % in Bizerte Sud and 22.2 % in Menzel Djemil;
- **Economic activities:** the region's economic activity is centred on agriculture, industry and fisheries. The region has 368 industrial enterprises employing more than 50 000 people, with 248 of them being solely export enterprises. The enterprises mainly operate in the textile, leather, shoe-making, agri-food, mechanics and electronics sectors. There are 529 400 people resident in the extended project area, 181 033 of them working in the agriculture and fisheries (24.6 %), manufacturing industry (25.3 %) and services (19.8 %) sectors.

Archaeological site: there is an archaeological site close to the project right-of-way. It is the Remadia archaeological site covering a surface area of about 3 ha. Relics are not visible due to vegetation. However,

a few ruins have been identified, including a wall uncovered following clandestine excavation, dressed stones and pieces of ancient ceramics.

5. PROJECT ALTERNATIVE SOLUTIONS

The study conducted a comparative analysis of the “with” or “without” project options.

5.1 Comparative Analysis of the “With” or “Without” Project Options

In the “without” project option, the envisaged mobility growths are not possible without improvement of the road network. Part of such mobility demand will have to bypass Lake Bizerte, which implies an increase in: (i) vehicle operating costs; (ii) fuel consumption; (iii) gas emissions; and (iv) travel time, resulting in degradation of the quality of life of users.

5.2 “With” Project Option

5.2.1. Analysis of New Link Corridors

Two alternatives are analysed:

- Widening of the existing movable bridge to a two-lane dual carriageway: widening the bridge does not solve the problem, neither does it achieve the project’s objectives of reducing congestion in the Bizerte town centre, as it directs more traffic through the entry and exit sections of the movable bridge;
- New link: (i) Corridor 4 (more metropolitan in nature); (ii) Corridor 6 (more urban in nature).

The analysis was conducted on each of the corridors for a crossing facility option consisting of a viaduct as well as a tunnel. All the options that fulfil the design criteria are:

- Fast two-lane dual carriageway urban road layout linking motorway A4 to the town of Bizerte, with an 80 km/h reference speed and open to heavy vehicles. The speed was exceptionally limited to 60 km/h in more urban sections in the face of existing constraints;
- Compliance with navigation templates during canal crossing: air draught of 52 metres on a 250-metre navigation canal and a 13-metre draught.

The findings of the multi-criteria analysis led to the conclusion that the most favourable options for both the viaduct and tunnel crossing facilities were corridors 4 and 6.

5.2.2. Options Selected from the Multi-criteria Analysis

The options analysed are: (i) F4-V: Corridor 4 viaduct option; (ii) F4-T: Corridor 4 tunnel option; (iii) F4R-V: Corridor 4 option with bypass viaduct; (iv) F6-V Corridor 6 viaduct option; and (iv) F6-T: Corridor 6 tunnel option.

Corridor 4 is a peri-urban road layout, which bypasses Zarzouna through the west and crosses the canal at the level of the current limit between the cement factory and the military fields. The new link through this corridor connects to the existing road network at the level of RN11, thus enabling the direct servicing of industrial, logistics and port activity areas. The road layout enables direct connection to another bypass to the town, which will become an urban growth saturation point, by providing direct access to the town’s west and north neighbourhoods and redistributing traffic flow at the entrance to the town.

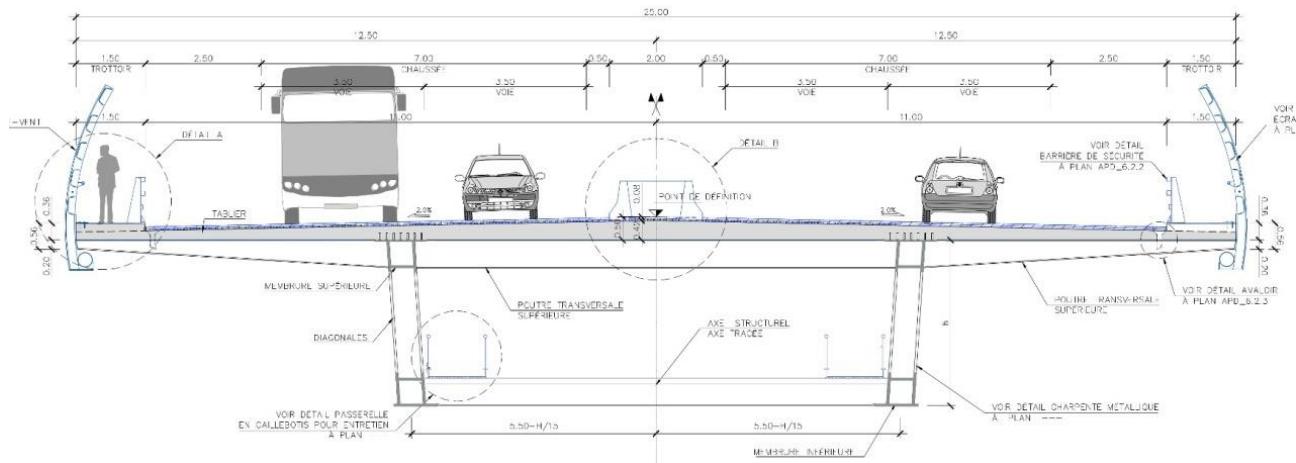
Although most of the stakeholders (civil society and Steering Committee members) support corridor 4, corridor 6 was also selected for development during the preliminary design study (APS) phase mainly due to its good economic rate of return.

Option *selected*

The preliminary design studies were concluded with an APS report submitted on 25 May 2014. The more in-depth multi-criteria studies conducted during the APS phase confirmed that the options with a viaduct crossing facility (with 3 main spans of about 270 metres on the canal) through Corridor 4 is the most appropriate solution. On 3 June 2014, the Ministry of Equipment and Regional and Sustainable Development launched a second public consultation. This consultation helped to confirm that the project was appreciated and well received by the population.

On 26 June 2014, the project Steering Committee met in the Ministry of Equipment. The selection of the layout option through Corridor 4 with a main viaduct engineering work of about 2,070 metres was selected for development during the APD phase. On 31 July 2014, the DGPC confirmed the selection of the layout option and issued its favourable opinion on the typological option for a viaduct with three main spans of about 270 metres and a steel-grid floor combined double action deck constructed through successive corbellings.

The APS concluded that the option to be selected and developed during the APD phase is the layout option through Corridor 4 with a main viaduct engineering work of about 2 070 metres. The layout of the new permanent link through corridor 6 is not in line with all project objectives. The figures below provide details on the standard cross-section.



Standard Viaduct Cross-section (two-lane dual carriageway).



6. MAJOR POTENTIAL IMPACTS

6.1 Summary of Positive Impacts During the Works Phase

The most important socio-economic impact during the construction phase is positive and concerns the creation of 500 to 800 direct jobs, most of them skilled jobs.

6.2 Major Negative Impacts

6.2.1. Site Preparation and Works Phase

6.2.1.1. Biophysical Environment

Atmospheric emissions and air quality: additional atmospheric emissions during the construction phase will be mainly generated by: (i): site preparation machinery; (ii) heavy materials supply vehicles (quarry products, asphalt, ready-to-use concrete, etc.); and (iii) the vehicles of site personnel. Site preparation and construction works will generate atmospheric emissions. These emissions will mainly result from fuel combustion in vehicles and in the camps. Dust emissions will be felt only temporarily near urban and semi-urban areas.

Sound- and vibration-related impacts: the scope and diversity of construction activities make it difficult to anticipate sound levels during the construction phase. According to the most common measurements and simulations, the construction phase will generate average sound levels of about 65 dB (A) some one hundred metres around the site. These levels will be lower within surrounding localities and houses. Vibrations will therefore be more frequently disturbing for persons than risky for buildings. However, some old poorly designed buildings, with inappropriate foundations or having suffered differential settlements, may be damaged.

Impacts on soil quality and stability: the use of site machinery and means of transportation leads to soil compaction. The development of storage areas, the deposit of loose soil, excavations and construction wastes, the opening of rights-of-way and the development of workers' camps also affect soil structure. This is all the more serious as some lands located close to the right of way are used for agriculture.

Impacts on surface and ground water: the quality of surface and ground water will be affected during the road construction phase because erosion generates suspended matters in surface water, and the accidental spill of hydrocarbons or hazardous substances can contaminate groundwater. Site effluents are estimated at 5 m³/day. The same applies for site wastes (domestic, industrial and inert wastes). Direct and indirect site activities will disturb natural or controlled rainwater drainage.

Impacts on fauna and vegetation: the project is located in a peri-urban area, with a blend between agricultural area and urbanized area. There is some natural vegetation of little importance in the quarry. However, the felling of 250 trees and the elimination of about 46 ha of grassland will affect small terrestrial and avian fauna, even if they are species without any special importance for fauna life. The project will not affect any protected area or species of special status.

Impacts related to Lake Bizerte crossing:

- **Impacts on soil and water quality:** site installation works will temporarily aggravate the erosion and destabilization of embankments in the most sensitive surrounding areas. The presence of this infrastructure will also lead to the artificialization of the lower part of the shores owing to the presence of riprap bank protection. The project's impacts on the water environment will mainly be the dreaded changes to the water and sediment systems of the Bizerte lagoon along the future viaduct. Considering the low restriction of water flow by the bridge piers, the water levels will not be affected during normal water flow conditions as well as during tidal periods. The construction of bridge piers will alter aquatic vegetation communities located immediately downstream of the works owing to the intake of suspended materials;

- The viaduct construction works can cause surface water pollution. Activities likely to cause such pollution are: (i) soil backfill will lead to increased water turbidity; (ii) the construction of piers will require the pumping of water from the sub-soil and the generation of surplus excavation water with high suspension matter content. Furthermore, as concerns perforation, it will be necessary to carry out simultaneous injection into bentonite slurry-containing land in order to reinforce the earth. According to the formula used by the manufacturer, the slurry may contain hazardous substances, thus posing the risk of pollution. There is also the risk of stagnation of polluted water pumped towards water stagnation areas;
- **Impacts on avian fauna:** during the construction phase, new structures will be built and they will become an obstacle to flying birds. This impact will increase in the night and during the migration of birds to and from the Ichkeul National Park, given that the Bizerte canal is among the main migration corridors. However, the impact will be low because of the height at which the birds concerned fly.

6.2.2. Human Environment

Nuisances for the population: first, the extension road construction works will inevitably generate additional traffic on urban roads leading to the project site. Such increase in traffic is explained by the movement of site personnel and the transportation of construction materials and quarry products. The main nuisances for the population are those resulting from the entire works execution.

Impacts resulting from the freeing of the right-of-way: expropriation assets (land, property and businesses) will be acquired or allocated for project implementation: (i) the total surface area to be acquired for this project is about 81.4 hectares; (ii) the surface area of cultivated and/or bare land to be acquired is about 80 ha; (iii) the total surface area of land belonging to the public or private property of the State, the refining company, the cement factory and the railway is 34.2 ha; and (iv) the surface area of land to be acquired from private owners is 47.1 ha. The number of persons interviewed stands at 319. This number represents PAPs presumed to be affected by the project. This number is broken down as follows: (i) 125 household heads identified/interviewed; (ii) 198 land owners and operators; and (iii) 11 traders. Moreover, the number of directly or indirectly affected persons stands at 1,309.

Impacts on cultural heritage: the possible impacts on cultural heritage would be generated especially during the works phase. In principle, protected or culturally important elements are not expected to be directly affected in the immediate project right-of-way. The National Cultural Heritage Institute informed us of the existence of only one archaeological site called Remadia covering a surface area of about 3 hectares, identified through a few ruins and a wall. It is located in the military zone and will not be directly affected by the works. In contrast, measures must be taken to avoid any indirect impact.

Impacts on public service infrastructure and business facilities: heavy and transport vehicles may damage road surfaces, leave trails of concrete, sand and sludge on construction site access roads. This can be a source of nuisance for and complaint from the nearby population. The construction phase is also likely to impede business and artisanal activities in this urban and semi-urban area if access roads and traffic are not well managed;

Health and safety: for site personnel and the local population, the entire construction site will be a source of accidents due to the movement of machinery and vehicles, and because of the handling of hazardous objects and products, falling objects, etc.

Impact related to Lake Bizerte crossing:

- **Health and safety:** there will be a large number of transport, supply and support ships in the project area. Generally, owing to the huge amount of materials and number of ships required to construct the facility, there is the risk of accidents occurring during the transportation of such materials between the two lake shores, as well as the accidental spill of stored materials, etc. Lastly, works in marine environments (diving, work at a height,

etc.) expose workers to the risk of drowning.

6.2.3. Impacts during the Operation Phase

6.2.3.1. Positive Impacts

The project will help to:

- Meet the growing demand for traffic in Bizerte's urban area, thereby rapidly absorbing the increasing number of vehicles that cross the canal, and increase traffic from 55% at the commissioning of the facility to 66% in 2028 and 75% in 2038);
- Relieve congestion on access roads to the already congested town centre and even out the load on the road network. The new road link through Corridor 4 serves as a south bypass, directing traffic to destinations other than the Bizerte town centre and, thereby, freeing transit to the movable bridge that directly leads to the town centre. Traffic on the movable bridge will reduce from 47,000 veh./day to 23,200 veh./day upon commissioning of the new road link;
- Address both urban and regional traffic needs, especially trade with Greater Tunis;
- Provide a structuring link for urban and socio-economic development. The new road link is in line with the town's urban expansion planning, notably in accordance with the guidelines laid down in the Bizerte Urban Development Master Plan. It bypasses the agri-food technopole and the Zarzouna and Menzel Jemil expanding urban areas in the south, and links up with the cement factory, the port area and the industrial expansion and planned infrastructure areas in the north;
- Reduce transport user costs, especially for heavy vehicles which provide more direct communication without passing through the town centre and avoid bypassing the lake;
- Increase time gain by users, especially by reducing average inter-canal travel time (11 minutes on average in the year of commissioning, compared with the situation without the new road link);
- Reduce the number of accidents by improving the road network and the service level of roads.

The project will generate significant environmental benefits, including: (i) land reclamation on the shores of Zarzouna and the creation of a 25,000 m² urban green space under the bridge; (ii) improvement of air quality in the project area by reducing atmospheric emissions (see section on Climate Change for details); and (iii) significant improvement of urban mobility while preserving the existing urban forests (Nadhour and Béchateur in the north and the Errimel forest in the south).

Air quality and GHG emissions: traffic studies show that project implementation will help to reduce GHG emissions by an average of 61,000 tonnes of CO₂ eq. annually. This impact will be enhanced by developing green areas and planting 9,750 trees under the project, thus contributing to increasing carbon sequestration.

6.2.3.2. Negative Impacts on the Biophysical Environment

Impact on the landscape: regarding the construction of a bridge over Lake Bizerte, given that the area has a low-to-average landscape vulnerability, it can be concluded that the project will have a low-to-average landscape absorption capacity. It is a humanized landscape unit that includes the entire territory that has been significantly transformed by man such as urban spaces with a low population density, industrial parks, agricultural zones, transportation corridors, weirs, vessel traffic in the lake, etc. Given the degree of human imprint, this zone can be considered as one with a low level of naturality and low fragility.

Risk of contamination of Lake Bizerte: during the operation phase, there will be a risk of contamination of Lake Bizerte by traffic pollution ensuing from the viaduct platform. This pollution will emanate from vehicles moving through the viaduct. There will be two types of pollution: (i) chronic pollution ensuing from surface water seepage causing damage to the carriageway; (ii) accidental pollution resulting from road accidents during which polluting or even harmful substances are spilled, with more or less serious consequences on water resources, depending on the nature and quantity of the product spilled. However, the Lake Bizerte Integrated Decontamination Study has identified rainwater discharge as one of the causes of the pollution of Lake Bizerte. Though this study does not consider traffic pollution as a major source of pollution, this risk is taken into account in this project and corrective measures will be proposed to minimize it.

Constraints on the movement of birds: the viaduct will be a potential barrier to the movement of birds. This impact will be significant particularly during migratory seasons and for birds flying very close to the ground as it is the case with *Anseriformes* and *Phalacrocoracidae*. However, consultations with the Tunisian Friends of Birds Association confirmed that this impact will be limited and does not concern any endangered species. Furthermore, the association recommended simple monitoring during the first years of operation to adjust mitigation measures, where necessary.

6.2.3.3. Negative Impacts on the Human Environment

Impact on cultural heritage: the corridor passes near an archaeological site discovered in Remadia, near PK 1 + 500, right after the refinery of the Tunisian Refining Industries Corporation (STIR). Although the site may not be affected directly, its proximity necessitates the conduct of further research to determine its scope in neighbouring zones. No cultural heritage element was identified on the rest of the road section after Lake Bizerte. There is no impact on architectural heritage.

Risks of road accidents and (sound and atmospheric) nuisances: sound and atmospheric nuisances will be exacerbated by the combined action of vehicles near surrounding areas, especially dwelling areas. The first road section that extends up to PK 3 + 500 stretches over a non-urbanized area with no difference between the various corridors. The risk of sound nuisances on the first road section is very low. At the Ezzouhour estate, the corridor passes near a multipurpose zone with a low construction density. The expected sound nuisance levels are not high. However, they may be higher in zones located no less than 50 metres from urbanized areas.

6.3. Cumulative Impacts

The mineralogical study of sediments and geochemical study of water reveal the complexity of physicochemical exchange patterns and anthropic interactions with the environmental components of these environments. The benchmarking of the environmental situation of the two basins, from Lake Ichkeul to the Bizerte lagoon, shows that elements such as iron and zinc found in the Bizerte lagoon have the highest values compared to those recorded in Lake Ichkeul. This is mainly due to a steady supply of these elements from industrial sources, particularly the Menzel Bourguiba Iron and Steel Plant. It also reflects the key role of the Tinja drainage channel in the transfer of matter (hydrology, mineralogy, environment, and geochemistry) at the confluence of the different constituent elements of Lake Ichkeul-Tinja-Lake Bizerte complex. Water pollution resulting from the road should be well managed to minimize its cumulative impacts with other sources of pollution.

The main positive cumulative impacts during the construction phase include job creation during works and subsequently an increase in the incomes of the population concerned. The addition of a major tourist attraction to the 'Bizerte destination' and its proximity to Ichkeul Park will enhance the development of ecotourism.

7 MITIGATION/ENHANCEMENT MEASURES AND SUPPLEMENTARY INITIATIVES

7.1. Normative and Administrative Measures

This concerns ensuring that the project complies with the applicable regulations and administrative and contractual requirements, in particular:

- **Compliance with environmental and social regulations:** the project should ensure compliance with the Tunisian national environmental and social regulations in force and AfDB requirements in the works and operational phases;
- **Compliance with land regulations:** since the project involves displacement, the Resettlement Plan prepared in accordance with the Tunisian land regulations in force and AfDB requirements should serve as a core document. The payment of compensation before works start-up will be required for each lot concerned;
- **Selection and commitment of contractors:** Environmental, Hygiene, Health and Safety (EHHS) clauses will be included in the bidding documents (BD);
- **Each contractor's commitments and deliverables:** the Contractor will prepare, implement and update the Worksite Environmental and Social Management Plan (WESMP) to be validated by the Project Supervisor. For each of the sites identified, the Contractor will prepare a Site Environmental Protection Plan (SEPP). The SEPP(s) will be attached to the WESMP, which is the Contractor's sole reference document that details all organizational and technical measures to be implemented to meet the EHHS requirements. The WESMP should at least indicate:
 - **The environmental and social management system:** (i) definition of the Contractor's environmental and social policy; (ii) human resources assigned to EHHS management; (iii) definition of actors' responsibilities in EHHS issues, including the organizational chart; (iv) internal regulations; (v) applicable standards and non-compliance management system; (vi) documents and reporting;
 - **The Environmental Protection Plan:** (i) the protective measures and construction methods to be used to avoid affecting vegetation, soil, groundwater tables, biological diversity of animal and plant species, natural drainage and water quality in zones adjoining the sites; (ii) selection of borrow or excavation sites for materials needed for construction or sites for depositing excess excavated earth or rubble; (iii) the effluents management plan in accordance with national regulations; (iv) works/construction method, minimizing atmospheric emissions and a related mitigation plan; (v) the construction/works method, minimizing noise and vibrations and a noise/vibration mitigation plan; (vi) the waste management plan; (vii) the tree felling plan; the erosion, drainage and sedimentation management plan; and (viii) the plan for the restoration of sites upon the completion of works;
 - **Hygiene, Health and Safety Plan comprising at least:** (i) implementation of measures defined in the plan (frequency of hygiene and safety meetings by site and type of activity); (ii) operating standards and equipment; (v) permit and authorization; (vi) management of dangerous substances; (vii) planning of emergency situations; (viii) on-site care centre, first-aid kit and medical personnel; (ix) medical care; (x) traffic and signs management plan.

7.2. *Summary of Specific Measures and Complementary Initiatives*

7.2.1. *Construction Phase*

7.2.1.1. *Biophysical Environment*

Atmospheric emissions, air quality and vibration: the Contractor will be required to ensure regular watering during works, particularly in inhabited areas. It will also be required to provide workers with dust

protection equipment, limit maximum vehicle speed to 30 km/h in towns, set up speed bumps, and ensure the maintenance of construction equipment to reduce exhaust fumes. The Contractor will use equipment and adopt construction and transportation methods that do not emit noise above the recommended thresholds. It will organize road traffic in such a way as to avoid periods of noise nuisance, high pedestrian traffic flow and rush hours, and provide workers in noisy workstations with protective gear. It will choose work schedules to ensure compliance with standards regarding noise levels (avoid zones located near dwelling areas) and mainstream noisy activities into the schedule of activities of the local population.

Soil quality and stability: the Contractor should adopt good worksite management practices (prepare areas for the storage of hydrocarbon products and maintenance of vehicles and machines, recycle used materials, etc.). To avoid soil pollution and, therefore water table and groundwater contamination, all liquid effluents will be collected and disposed of in accordance with Tunisian Standard (NT) 106.002 on wastewater disposal into receiving water bodies. Slopes will be protected by sodding or planting shrubs. Erosion-control devices will be developed. The Contractor will identify, collect, transport and treat all waste produced on sites by their workers and sub-contractors.

Measures related to the crossing of Lake Bizerte: the mitigation measures will include: (i) putting in place floating anti-pollution barriers: storage of elements used in the event of accidental spills; (ii) controlling water quality; (iii) designing an accidental spill response plan; (iv) controlling vessel navigation to minimize the risk of accidents; (v) controlling bentonite slurry collection to avoid spills; (vi) maintaining the concrete piping system to prevent spills; (vii) building sedimentation and neutralization tanks; (viii) designing a waste management plan; (ix) preparing cement mixer chute cleaning areas; and (x) locating secondary worksites in low-risk zones.

Measures to limit the viaduct's impact on birds: during the construction of the viaduct piers, it will be necessary to ensure the sufficient night time lighting of the viaduct piers to make them visible to wild birds. This measure could supplement the lighting envisaged to ensure maritime transport safety. Care should be taken to ensure adequate lighting to minimize the risk of wild bird collision against piers under construction.

Measures to protect plant life: measures will be taken to ensure the strict implementation of the actions described above in order to control air and water quality. The Contractor will ensure regular watering of worksites to avoid dust emission during dry weather. Proper chemical treatment of plants will be carried out during suitable periods (November to March). Tree felling will be reduced to a minimum. Quality trees will be planted to ensure a positive balance (more trees planted than felled). Natural vegetation will be improved through landscape architecture. Measures will be implemented to prevent the spread of invasive species (devitalisation of strains, grubbing before fruiting, burning of green waste).

7.2.1.2 *Human Environment*

- **Expropriation:** a Full Resettlement Plan has been prepared and will be implemented. PARC's objectives are to minimize project impacts on the local population through adequate compensation and resettlement and to enable them to improve their quality of life by adopting a suitable approach for implementing the main thrusts of the socio-economic development plans outlined in the Environmental and Social Management Plan;
- **Health and safety:** the Contractor should prepare a track plan and schedules defining the itineraries to be followed by construction vehicles (trucks and machines). This plan should be approved by the Project Supervisor and presented to Bizerte and Zarzouna municipal authorities. During works execution, special measures should be taken to prevent service interruption by avoiding electric power, gas and water supply outages. A traffic diversion plan should be designed. Load shedding and traffic diversion will be determined taking into account road safety as work progresses. Temporary road signs with corresponding panels and traffic lights should be installed. The worksite should be fenced and access (by vehicles and pedestrians) to the worksite area should be prohibited. Certified divers will be recruited to execute works that require diving.

7.2.2. *Operation Phase*

- **Impacts on water and soil resources:** containment bays will be constructed on both shores of Lake Bizerte, near access roads to the viaduct. The containment bays will collect all runoff from the viaduct using the longitudinal drainage system to reduce chronic roadway pollution caused by storm water discharges or to cut accidental pollution by up to 50 cubic metres in dry weather.
- **Measures to limit the impact of the viaduct on birds:** adequate viaduct lighting: the lighting system envisaged for the viaduct will make the deck and piers visible at night. Lights will be directed towards the deck and floodlighting will not be used. The Tunisian Friends of Birds Association has recommended the use of simple monitoring during the first years of operation. This will allow accurate evaluation to help adjust mitigation measures, particularly lighting, where necessary.

7.2.3. *Additional Initiatives and Related Facilities*

For the Full Resettlement Plan, see the related summary which complements that of the ESIA.

The project plans to: (i) rehabilitate the Atomouh and Ben Nigro neighbourhoods; (ii) rehabilitate the El Massida, Hafermahr and Birmasyougha neighbourhoods; and (iii) develop 2.4 kilometres of related tracks.

Lastly, there are plans to open a park and plantation on the bank of Zarzouna. The new spaces created on the banks of Bizerte canal will be integrated into the environment by planting indigenous and local species and common garden plants that are suitable for a maritime environment and using urban furniture elements to create a new space to be used by citizens. Under the bridge, on the bank of Zarzouna, on the left bank of the lake, there are plans to create a 25,000 square metre green space for leisure.

8. RESIDUAL IMPACTS AND ENVIRONMENTAL RISK MANAGEMENT

8.1. *Negative Residual Effects*

The main environmental impacts to be considered for residual effects analysis are: (i) industrial development which generates additional greenhouse gas emissions; (ii) increased industrial development of the area and its related effects; (iii) increased navigation traffic; (iv) birds and their habitat which may be affected during construction by loss of nests directly or due to discomfort caused by noise and habitat fragmentation due to death related to discoveries linked to the lighting of structures.

8.2. *Environmental Risk*

Frequency levels may range from low to very high and severity levels from low to dire: (i) fire and explosion risk; (ii) electrical risk; (iii) heavy vehicle, machine, equipment and tool risk; (iv) risk of injury due to mechanical action; (v) risk of falling; (v) underwater work.

The emergency plan provided for in the WESMP will cover at least the following emergency situations: (i) fire or explosion; (ii) structural failure; (iii) loss of containment of hazardous material; and (iv) security or malicious incident. The Contractor will ensure that all staff are informed and trained to respond to such situations and that responsibilities are defined.

8.3 *Climatic Risks*

The project has been classified in Category 2 in terms of climate risk. The main issues concern: (i) the presence of flood-prone areas (in the Abbes and El Marj *wadis* as well as in the Bizerte canal area), the absence of adequate drainage structures in urban areas, and the blockage of some of these structures by solid waste; and (ii) the reduction of greenhouse gas (GHG) emissions.

Concerning the first point, appropriate measures have been included in project design, notably: (i) boxing

up the road in the areas concerned; (ii) constructing well-sized hydraulic and drainage structures which will not only help to protect the road infrastructure, but also reduce flood hazards for the local population; and (iii) strengthening bank protection at the level of the canal. The second point is a major positive project impact. Traffic studies show that project implementation will help to reduce GHG emissions by an average of 61,000 tonnes of CO₂ eq. annually. This impact will be enhanced by developing green areas and planting 9,750 trees under the project, thus contributing to increasing carbon sequestration.

8.4. Seismic Risk

Tunisia is characterized by a context of superficial crustal seismicity. This has been established by numerous geological studies and confirmed by the shallow depth of the earthquakes recorded by telemetric networks (5 to 10 kilometres). For a 475 years return period (according to the definitions of NF EN 1998-2), the reference peak ground acceleration may be about 0.18 g. Other studies carried out within the framework of the project give similar acceleration values. The viaduct is regarded as a bridge of great importance (Class III). "Importance class III comprises bridges of critical importance for maintaining communications, especially in the immediate post-earthquake period, bridges where failure is associated with a large number of probable fatalities, and major bridges where a design life greater than normal is required." For each scenario, three types of spectrums are defined, two of them conventional type i and type ii with an acceleration of 0.23 g. (t = 1000 years) and the other horizontal spectrum corresponding to a higher acceleration, and a type ii spectrum.

9. ENVIRONMENTAL SURVEILLANCE AND MONITORING PROGRAMME

9.1 *Environmental Surveillance*

The aim of this activity, which should be carried out prior to the start-up of work, is to lay the foundations for environmental audit (and monitoring) during the execution of works and the implementation of operations, and ensure compliance (through worksite visits) with: (i) the necessary precautions and procedures set out in the ESMP; (ii) measures to protect the environment; (iii) laws and regulations; (iv) early detection of unforeseen environmental stress through environmental and social impact assessment; (v) provision of elements for reorienting or improving, where necessary, the execution of work, payment of compensation and displacement of the population.

Environmental and social impact assessment reports and environmental surveillance and monitoring tools: the section below seeks to define, for each environmental component identified for surveillance: (i) the targets and parameters to be monitored; (ii) the framework, that is the assessment basis; (iii) the type of analysis to be carried out; (iv) verifiable indicators and sources of verification; (v) action levels; (vi) types of intervention (measure to be taken) in the event of a problem; (vii) the officer in charge.

The objective of environmental surveillance is to ensure compliance with proposed environmental and social management measures. Environmental surveillance will concern the construction and operation phases. It will be carried out by the Works Control Firm (construction phase) and the Environmental Management Plan Monitoring Service of the National Infrastructure Directorate (operation phase).

Each month, the Contractor will submit to the Project Supervisor an EHHS progress report summarizing the EHHS actions implemented to ensure the smooth conduct of work during the previous year. The EHHS progress report should contain the following information: (i) status of EHHS staff at the end of the month; (ii) inspections carried out (location and frequency); (iii) cases of non-compliance identified in the course of the month and the corrective measures implemented; (iv) status of the register of hazardous materials and waste; (v) anti-erosion and anti-sedimentation activities initiated during the month; (vi) actions carried out together with actors outside the worksite: the local population, local authorities, government agencies; (v) key indicator monitoring results; and (vi) notification of incidents.

9.2. *Environmental Monitoring*

9.2.1. *Monitoring Arrangements*

The objective of environmental monitoring is to verify on the ground, the adequacy of the assessment of some impacts and the efficacy of the mitigation or compensatory measures provided for in the EIA. The Environmental Monitoring Programme describes: (i) the elements to be monitored; (ii) the monitoring methods/mechanisms; (iii) monitoring responsibilities; and (iv) the monitoring period.

The following institutions will be responsible for environmental management:

- The ESMP Implementation Team (Contractor);
- The international environmental expert of the works control firm;
- The PMU, including an environmental expert in charge of monitoring the Environmental and Social Component;
- Technical assistance to the PMU, including an environmental expert and a socio-economist to support the PMU Team.

9.2.2 *Monitoring Indicators*

Component to be Monitored, Targets and Parameters		Frame of Reference	Indicator, Source of Verification (SV)	Intervention Threshold	Types of Response in the Event of a Problem	Person in charge
Legal acquisition of easements, compliance		Laws and regulations, recommendations from the ESIA: public hearing	Compliance or non-compliance with the project implementation schedule, progress report, authorization notification, etc.	One-month delay	Analysis of the causes of delay; Launching of processes	Client
Compensation of people whose homes have been destroyed		Resettlement Action Plan	Manual of operations	Delay of more than 15%	Analysis of the causes of delay; Acceleration of the implementation of operations; Resettlement incentives	Client
Clearing of rights-of-way, access roads, construction sites – workers' camp; Clearing operations		The precautions and procedures listed above – detailed inventory of the property items to be removed	Compliance procedures	Any observation of non-compliance with procedures	Suspension of clearing operations, recap of procedures, and implementation of corrective measures	Contractors
Equipment: Smoke		According to the relevant standards	No asphalt mixing plant on the worksite. Compliance or non-compliance with technical control criteria. Tracking or technical control sheet.	Non-compliance	Revision within a week	Contractor ESMP/Service Head
	Noise	According to the relevant standards	Noise measuring data in dBA during working hours in homes or 100 metres from the emission source. Measurement report	Noise level above 85 dBA for more than 2 hours in homes	Revision within a week; Recap of noise limitation measures	Contractor ESMP/Service Head
Worksite, dust particles, visibility		Precautionary measures and related procedures	Observation of the amount of dust particles in the atmosphere. Report by the ESMP/Service Head.	According to the ESMP/ Service Head	Increase in watering operations. Reduction of works that generate dust particles.	Contractor ESMP/Service Head
Storage of hazardous substances; Storage conformance		Precautionary measures and related procedures	Findings by the ESMP/Service Head; Weekly report by the ESMP/Service Head	According to the ESMP/ Service Head	Reorganization of storage	Contractor ESMP/Service Head

Component to be Monitored, Targets and Parameters	Frame of Reference	Indicator, Source of Verification (SV)	Intervention Threshold	Types of Response in the Event of a Problem	Person in charge
Storage of hydrocarbon products: Soil tightness, confinement, distance to water bodies	Precautionary measures and related procedures	Observations: distance to water bodies SV: reports by the ESMP/ Service Head	According to the ESMP/ Service Head; Worksite situated no less than 50 metres from a sensitive point	Sealing, necessary; Relocation of storage site	where of Contractor ESMP/Service Head
Fuel and oil supply site: soil tightness, confinement, distance to water bodies	Initial soil condition; precautionary measures and related procedures	Observations: distance to water bodies; reports by the ESMP/ Service Head	According to the ESMP/ Service Head; Worksite situated no less than 50 metres from a sensitive point	Sealing, necessary; sampling polluted soils; Relocation of storage site	where of Contractor ESMP/Service Head
Forest and olive plantations; measures for protecting zones outside rights-of-way; protection mechanisms	Laws, precautionary measures and related procedures	Situation on the ground; incidents; complaints lodged by local officers in charge of the environment; local authorities or local residents; registration of complaints or incidents	According to the ESMP/ Service Head	Sensitization construction workers	of site Contractor ESMP/Service Head
Restoration of workers' camp sites	Specifications Contractors	Condition of soil and vegetation; Reports	Once every 3 months for 3 years	Decontamination and reforestation of worksites	Contractor ESMP/Service Head
Resettlement of the population	Abbreviated Resettlement Plan (ARP) and detailed inventory	Situation of project affected persons; Reports	Once a year for 2 years	Meet with authorities to ensure that resettlement complies with the ARP	Client
Bank protection	Erosion level	Revegetation Plan Reports	Once a year for 3 years	Reforestation to be repeated	Contractor ESMP/Service Head
Rehabilitation	Revegetation Plan	Reports and success rate	Once a year for 3 years	Reforestation to be repeated	Civil engineering firm within the framework of a construction contract
Reforestation	Reforestation financed	Reports and success rate	Once a year for 3 years	Reforestation to be repeated	The Client within the framework of a separate contract
Various accidents	Statistics	Reports	Once a year for 3 years	Meet General Management	Contractor ESMP/Service Head

9.3. ESMP Cost

The ESMP cost is presented in the table below.

Item	Lot 1 +Lot 3 TND	Lot 2 TND	Total TND
Cost of ARP			52 000 000
Environmental measures			
Cost of mitigation and enhancement measures	285 000	300 000	500 000
ESMP IMPLEMENTATION			
Technical assistance to the PMU: Environment and Social Component	1 500 000		
Control Mission: Environment and Social Component	1 000 000		
Related facilities (green spaces and furniture)	250 000		
Monitoring and supervision of ESMP implementation	110 000		
Total of ESMP rounded off (TND)	3 400 000		
Total cost of the Environment and Social Component (rounded off in TND)	55 00 000		

10. PUBLIC CONSULTATION AND INFORMATION DISSEMINATION

The ESIA, ESMP and FRP were prepared through a participatory approach involving the holding of working sessions and public meetings in the main localities covered by the project

10.1 National and AfDB Requirements

For a long time, specific stakeholder consultation within the framework of ESIA was not an explicit requirement in Tunisia. In recent years, significant progress has been made beginning with the enshrining of decentralization and participatory democracy in the new Constitution of 2014. The Tunisian Government has established a legal framework to facilitate the involvement of the population in local political life and to promote citizen's participation at the local level. This framework includes the new Constitution of 2014, the amendment of the Organic Law on Municipalities, the participatory formulation of communal investment plans and free access to information. Article 139 of the 2014 Constitution stipulates that "Local authorities shall adopt the mechanisms of participatory democracy and the principles of open governance to ensure broader participation by citizens and civil society in the preparation of development and land management projects and monitoring of their implementation, in accordance with the law."

According to the AfDB Integrated Safeguards System (ISS) adopted in 2013, the Bank ensures, throughout the environmental and social impact assessment process, that the Borrower or Client organizes transparent consultations with project affected communities, particularly vulnerable groups, to enable them to participate in a free, prior and informed manner in decisions relating to the prevention or management of environmental and social impacts: (i) Free: of intimidation or coercion; (ii) prior: timely in relation to the assessment process, allowing sufficient time to access and understand information and prepare responses; (iii) informed: advance provision of relevant, understandable and accessible information, in the appropriate language. As shown in the sections below, these requirements were fulfilled throughout the ESIA and Resettlement Plan implementation processes.

10.2 Public Consultations during ESIA/ESMP Design and Validation

The population of the project area was informed during the project preliminary design (APS) and final design (APD) phases. During the APS phase, consultations were held with the population from 6 April 2013 to 8 October 2013 at the Regional Department of Equipment in Bizerte and the Governorate of Bizerte. A public consultation took place on 3 June 2014 following the completion of the APS and the preliminary study phases.

During the conduct of environmental and social impact assessments (ESIA and ARP), focus groups first targeted the Zarzouna and Menzel Abderrahmane districts on 3 April 2016. Other focus group discussions were held at municipality level with project-affected persons (PAPs), representatives of the Regional Delegation of Public Works, Omdas, representatives of the two delegations and representatives of civil society on 13 May 2016. These meetings were held after the prior information of the population, in line with African Development Bank policy and national regulations.

Steering Committee meetings on the release of rights-of-way and social actions were held at the Governorate of Bizerte from 14 November 2016 to 26 May 2017.

It should be noted that most of these meetings took place at the public square of the town of Bizerte after the prior information of the population by the Governorate through a Facebook page (Nour News) and by Radio Oxygène, in accordance with African Development Bank policy and Tunisian regulations. Announcements were made through the print media.

Discussions focused on the following themes: (i) The Importance of the Project and its Impact on the Region (information on the project and sampling of the opinions of the target population on this point); (ii) Expectations of the Target Population, the Resettlement Process and Complaint Management Procedures (information on rights and nature of compensation, the laws in force and EIB and AfDB principles); (iii) Involvement of the Target Population in Project Implementation and the Resettlement Process

(establishment of a Project Monitoring, Mediation and Support Committee to create synergy between the target population, local authorities and civil society actors).

The population was widely consulted during public consultations and focus group discussions, and expressed their opinions on the role of the project in the priorities of the districts surveyed, the problems faced in the area, their expectations from the project and their fears with regard to expropriation. The table below presents a summary of the discussions.

Themes	Opinion	Expectations
Impact of the project on the region	<p>Project acceptance: the project will:</p> <ul style="list-style-type: none"> - generate economic flows; and - reduce unemployment. 	Improvement of the economic situation of Bizerte and breaking of its isolation through the construction of the new bridge.
Impact of the project on the target population: resettlement process (rights, the laws in force, EIB and AfDB principles).	<p>The target population did not feel any direct impact on their lives. They voiced their concerns about instability. They did not know when the construction works would begin and the resettlement plan would be implemented.</p> <p>They were afraid of not receiving compensation and being thrown into the street, especially as many of them had settled on land belonging to the public property of the State.</p> <p>They likened this project to similar projects where the target population did not receive compensation.</p>	<p>Be regularly informed about the project implementation status.</p> <p>Obtain information on the laws governing involuntary resettlement.</p> <p>Receive compensation before the commencement of work.</p> <p>Others people expressed their dissatisfaction because they expected construction work to begin and were not given a clear response in that regard.</p>

The expectations regarding compensation were reflected in the design of the Full Resettlement Plan. In addition, expectations related to the information of the population will be reflected in the formulation of the Stakeholder Commitment Plan.

10.3 Practical Arrangements for Consultation during the Remaining Stages and Complaint Management

10.3.1. Consultation during the Remaining Stages

A Stakeholder Commitment Plan covering all project phases has been prepared. It aims to ensure compliance with national regulations and international standards.

10.3.2. Complaint Recording and Processing System

The Public Projects Procurement Committee will establish a complaint management mechanism, in accordance with the regulations, to enable all stakeholders, particularly project affected persons, to voice their opinions on project proposals, channel their concerns, and, hence, access information or seek remedies or solutions. This mechanism must be effective, accessible, predictable, equitable, transparent, and compatible with human rights, based on commitment and dialogue, and enable all the parties involved, including the project promoter, to draw lessons from it.

Conflicts may arise during ARP implementation. Experience has shown that many complaints could be recorded. In practice, complaints and conflicts arising during the implementation of a resettlement and compensation programme may stem from: (i) errors in identifying and assessing assets, use zones, etc.; (ii) disagreements over the boundaries of plots/use zones between affected persons and the expropriation agency, or between two neighbours; (iii) conflicts over property ownership (two or more affected persons or villages claiming property ownership); (iv) disagreement over the assessment of a plot/use zone or other

property; (v) succession, divorce, and other family problems, causing conflict between successors or family members over property or parts of property or other specific assets; (vi) disagreement over resettlement measures, location of a resettlement site or type of compensation or housing proposed, or the characteristics of the plot or quality of the new use zones.

Other complaints related to environmental or social issues may arise during the construction and operation phases such as (i) the natural environment; (ii) dust particles generated by some construction activities, and crop-related damage; (iii) use of explosives and ensuing nuisances (noise, dust, vibration, and the cracking of buildings); (iv) employment and social issues; (v) recruitment-related problems, allegations of discriminatory practices in the recruitment of workers in construction sites.

In accordance with the law, the Public Projects Procurement Committee will receive and record complaints and objections in a register of complaints opened specifically for the project. It will conduct an investigation to ascertain the claims. In addition, any other person concerned may appear before the Monitoring, Mediation and Support Committee to record their observations in the register of acknowledgments opened for that purpose.

Amicable settlement is the preferred option for resolving the different complaints and grievances recorded and those that may arise within the framework of the ARP. At any rate, the Public Projects Procurement Committee will develop a conciliatory approach to protect the rights and interests of each party. Where all local remedies for amicable settlement have been exhausted, the complainant may refer the matter to the competent courts.

Complaints related to issues other than compensation will be recorded in the Office of the Project Management Unit (PMU). A specific complaint management file (Excel or related software) will be opened based on the complaint recording and follow-up form presented in Annex 2. The PMU will forward the complaint to the Ministry of Equipment, Housing and Regional Development (MEHAT) or to the Contractor, where applicable, depending on the nature of the complaint.

The procedure for handling complaints will include:

- Reviewing the complaint (within the Committee or by the Contractor, where applicable);
- Formulating a motion for resolution within 30 days following the filing of the complaint.

11. INSTITUTIONAL CAPACITY BUILDING

The institutions responsible for environmental management will be:

- The ESMP Implementation Team (Contractor);
- The International Environmental Expert of the works control firm;
- The PMU, which includes an Environmental Expert in charge of monitoring the Environmental and Social Component;
- Technical assistance to the PMU, including an Environmental Expert and a Socio-economist responsible for providing support to the PMU Team.

The main objectives of TA will be to assist the PMU in monitoring the implementation of the ESMP, including the FRP, in keeping with national and AfDB/EIB requirements. Specifically, it will build the capacity of key ESMP actors in: (i) AfDB's environmental and social safeguard policies (DGPC and ANPE); (ii) training in health, safety and environmental (HSE) issues before the start-up and during the execution of works (senior officers of PMU and the HRD of Bizerte); (ii) training in the noise impact assessment of infrastructure and acoustic monitoring (senior officers of PMU and ANPE); (iii) training in

ESMP implementation and monitoring (senior officers of PMU and the HRD of Bizerte); and (iv) training in the monitoring of work in marine environments (senior officers of PMU and ANPE);

12. CONCLUSION

Overall, the study has shown that the project will have significant positive impacts in terms of socio-economic benefits and may also produce negative impacts. However, all the potential negative impacts can be effectively mitigated through the proper implementation of the environmental and social safeguard measures set out in the ESMP. That is why, in keeping with national regulations, a certificate of compliance was issued on 31 December 2016 and 10 May 2017 for the permanent liaison and its extension respectively.

13. REFERENCES AND CONTACTS

The summary was prepared based on the following documents:

- ESIA Report on the North-East Road Connectivity Support Project. June 2017. 154 pages + annexes;
- ESMP Report on the North-East Road Connectivity Support Project. June 2017. 63 pages;
- FRP Report on the North-East Road Connectivity Support Project. June 2017. 169 pages + annexes

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