AFRICAN DEVELOPMENT BANK GROUP

PROJECT: DEVELOPMENT OF THE NATURAL GAS TRANSMISSION AND DISTRIBUTION NETWORK

COUNTRY: TUNISIA

EXECUTIVE SUMMARY OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

July 2013
Summary of the Environmental and Social Impact Assessment

Project Title: Development of the Natural Gas Transportation and Distribution Network
Country: Tunisia
Project Number: P-TN-FA0-003

1. INTRODUCTION

Pursuant to the strategic guidelines, and particularly the objectives of social well-being and improvement of citizens’ living conditions as contained in the natural gas development programme, supplying gas to the North-West region of the country (Tunisia) has become a necessity for the municipalities and for the Government in efforts to reduce petroleum imports and subsidy costs, as well as ensure environmental protection.

The programme requires the construction of the Feriana-Dehmani gas pipeline (24 inches in diameter and about 200 kilometres in length) and the supply of gas to 19 municipalities in Tunisia’s Northwest region belonging to Kef, Jendouba, Beja and Siliana governorates (between 8 inches and 10 inches in diameter and ranging from 8 to 13 kilometres in length each).

This document presents a summary assessment of the environmental and social impacts of the project. The assessment was conducted in accordance with the African Development Bank (AfDB) policies and procedures, as well as the applicable Tunisian national regulations. The assessment also took into account the demands and expectations of the project affected population, as conveyed during public consultation meetings.

2. PROJECT DESCRIPTION AND RATIONALE

2.1 Project Description

The construction project for the Feriana-Dehmani gas pipeline and distribution lines for 19 municipalities aims to supply natural gas to Tunisia’s North-West region.

The project will construct, lay and put in operation:

1. the FERIANA-KASSERINE-TAJEROUNIE-DEHMANI gas pipeline, 24 inches in diameter and 200 kilometres in length, covering Kasserine and Kef governorates.

2. gas supply pipelines gas from the FERIANA-DEHMANI network and the Tunisian Electricity and Gas Company (STEG) network to 19 municipalities; the diameter of the pipelines ranges from 8 to 10 inches and covering a length 7 to 13 kilometres.

3. The supply of gas to customers in the residential and tertiary sectors over a distance of about 404 kilometres for the primary polyethylene network 110 and 63 mm in diameter under 4 bars pressure.
Figure 1: Feriana-Dehmani gas pipeline map
2.1.1 Project Components

The FERIANA–KASSERINE–TAJEROUINE–DEHMANI gas pipeline will consist of the following components:

- main line: the pipeline;
- valve stations;
- valve and dispatching station sites;
- line markers;
- anti-corrosion facilities;
- station lighting systems.

The distribution lines connecting to the main line consist of the following components:

- pipelines;
- citygate stations at each municipality;
- line markers;
- anti-corrosion facilities;
- station lighting systems.

The distribution lines to customers are about 404 kilometres in length for the primary polyethylene network between 110 and 63 mm in diameter and under 4 bars pressure.

2.1.2 Location Categories

The locations of gas transmission facilities covered by Standard NT 109.01 relating to facilities to transport combustible gas through pipelines are divided into three categories according to type of land use:

- **Category A**: desert or mountainous regions, croplands, forests, grazing lands, pastures and rural areas with population densities of less than 6 inhabitants per hectare.

- **Category B**: rural areas with population densities between 6 and 30 inhabitants per hectare, in suburban areas of agglomerations, less than 75 metres from an establishment open to the public, within a public road, maritime or river system.

- **Category C**: urban areas or rural centers with population densities of more than 30 inhabitants per hectare.

2.2 Project Implementation

The project implementation is estimated to cover 15 months, with the following major phases:

- preparation of plans, designs, and implementation documents;
- implementation of the following operations:
- the use of rights of way;
- construction of roads;
- trenching;
- clearing of obstacles.

The project owner will also provide:

- security and protection for the project areas;
- hydraulic testing, in accordance with NT109.01 standard, under the supervision of a control agency approved by the Ministry of Industry. Paragraph 5 of the standard “Tests and verifications before putting into operation”.

2.2.1 HUMAN AND MATERIAL RESOURCES

The laying the gas pipelines (on shore) does not require the use of significant material or human resources, since the interventions are executed on a one-time basis and rarely exceed one week in the same location except in unusual circumstances (rocky soil, oued crossings, etc.)

For the laying the Feriana-Dehmani gas pipeline, 15 persons are expected to be mobilized, in addition to the backhoes and machinery required to bring supplies the worksite.

The works will be carried out by firms specializing in the field and supervised by code inspectors and STEG in accordance with the applicable regulations.

2.3 OPERATION OF THE PIPELINE

Once construction works and tests are completed and the works are accepted by STEG, operations will begin after various connecting lines are installed for the end consumers, which are household and commercial users.

2.3.1.1 Exceptional interventions

Local repair works may be performed on the pipeline from time to time, generally after several years of operation, or new connections may be made.

2.3.1.2 Monitoring of corrosion of the pipeline

Regular monitoring of internal and external corrosion along the pipeline will be conducted in accordance with NT 109.01 standard. Paragraph 6: Operation of Transmission Facilities (6.3: Monitoring of corrosive actions).

2.4 FACILITIES ABANDONMENT PHASE

The first scenario, which consists in removing the pipeline and disposing of all the components at a public landfill, was not accepted for the following reasons:

- Significant agricultural damage would be caused by the excavation and pipeline hoisting and cutting machinery, as well as machinery for filling the trench and transporting the components to a public landfill.
- The costs are quite high, comparable to the cost of laying the pipeline.

The second scenario, which essentially consists in abandoning the pipe in situ, offers the following advantages:

- It does not cause damage to agricultural lands.

- After several years, the pipes would dissolve completely into the soil through the process of corrosion. The ferrous minerals, far from altering the soil, will increase soil fertility. However, the polyethylene coating on the pipes does not dissolve quickly in the soil due to its neutral chemical characteristics. Abandoning the coating in the trench presents no risk for the environment because of the absence of chemical reaction with the surrounding soil.

The third scenario is to leave the pipe in place for possible reuse by another operator, particularly as the areas crossed by the pipeline form a right of way already used for the transportation of gas.

From an environmental standpoint, the project is classified in Category 1 in light of the nature of works to be undertaken, the size and scope of the project, and its potential direct and indirect impacts. In accordance with Bank procedures applicable to the assessment of environmental and social impacts and Tunisian environmental protection laws, an Environmental and Social Impact Assessment (ESIA) was undertaken as required, and includes an Environmental and Social Management Plan (ESMP). The assessment covers the construction and operation of the FERIANA–KASSERINE–TAJEROUINE–DEHMANI gas pipeline and the supply of gas to 19 municipalities.

3. PROJECT RATIONALE

This project falls within the 2009-2016 Natural Gas Transmission and Distribution Master Plan. It consists of an additional programme prepared for the same period and intended for the installation of the West main gas transmission and supply line to 100 additional municipalities. More specifically, the line should allow for the transmission of additional quantities of gas from the national fields located mainly in the South of the country. It will also facilitate natural gas imports from neighbouring countries: (i) Algerian gas imports to Feriana independently from the Trans-Tunisian pipeline; (ii) Libyan gas imports through the construction of the Mellita (Libya) - Gubes (Tunisia) pipeline. Finally, it will allow for natural gas development in the maximum number of regions, particularly in the interior regions of the country. The plan itself is consistent with Tunisia’s Twelfth Economic and Social Development Plan (2010-2014) adopted in July 2010. The project to supply natural gas to the North-West region of Tunisia is justified by the need to improve the gas infrastructure. The pipeline will supply natural gas to industrial plants and residential areas (individual and collective housing) located within the municipalities, including the tertiary sector (commercial activities, services, etc.). The project will also ensure continuity of gas supply to these regions, in contrast to the current mode of LPG supply that can be severely disrupted by unfavorable climatic conditions or road traffic problems.
4. POLITICAL, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 AfDB Policy and Procedures Framework

The AfDB will ensure application of the following Bank Group policies and procedures during project planning and implementation:

a) the Environmental and Social Assessment Procedures for Public Sector Projects;

b) the Involuntary Resettlement Policy;

c) the Gender Policy;

d) the Disclosure and Access to Information Policy;

e) the Policy and Guidelines on Consultations with Civil Society Organizations.

4.2 Tunisian Policy and Procedures Framework

From an institutional standpoint, the National Environmental Protection Agency (ANPE) is responsible for ensuring full application of the environmental assessment preparation, review and approval process in Tunisia.

Tunisia has a robust legal framework for environmental protection and human safety, and many of its instruments are applicable to this type of structure, in particular Tunisian NT 109.01 standard governing the transmission of liquid hydrocarbons through pipelines (Order of the Ministry of Industry and Trade, 17 September 1987).

NT109.01 STANDARD (1984), Tunisian safety standard for fuel gas transmission pipeline facilities. This standard has seven (7) chapters:

1. General provisions;

2. Factory construction of transmission facility components;

3. Factory control and inspection;

4. Installation of transmission facilities;

5. Testing and verifications before operation;

6. Operation of related transmission facilities;

7. Conditions for application of the standard

In these chapters, we refer mainly to:

- Paragraph 1.4: (Pipeline locations) describes three location categories on which gas pipelines can be installed;

- Chapter 4: (Installation of transmission facilities) describes the conditions under which gas pipelines can be laid. (In the public road land crossed by streams …)
5. DESCRIPTION OF THE PROJECT ENVIRONMENT

The study zone is in two areas, the North-West and the Centre-West of Tunisia.

5.1 MAIN NATURAL COMPONENTS OF THE PROJECT ENVIRONMENT

5.1.1 Relief

The territory is relatively elevated, ranging from 390 to 1,544 metres, the highest point in Tunisia (Djebel Chaambi). Over half of the study area lies at an altitude between 800 and 1,544 metres.

5.1.2 Geology

The relief is generally marked by the frequent steep slopes forming mini-mountain chains separating highlands and extended plains that become increasingly vast eastwards. The regional substratum is entirely from the secondary, tertiary, and quaternary age. It extends from the Triassic age to the historic.

The lithology is marked by the predominance of calcareous, marly and gypseous outcroppings. Gypsum occurs fairly frequently in marly formations, particularly those from the Triassic age.

Quaternary formations with fairly soft calcareous crust extend over the high and middle piedmont plains, while the more recent formations that make up the low slopes and terraces present no cementation. As regards tectonic aspects, the entire area was fractured by a multitude of geological faults running in the SE-NW direction that gave rise to rift valleys, such as the Oued El Htab valley.

5.1.3 Soils

The soils in Kasserine Governorate are divided into calcium-magnesium soils, alluvial soils, iso-humic soils, lithosols and regosols:

- On the mountainsides, fine pebbly and course-texture soils, ranging from rendzinas, brown calcareous soils to iso-humic soils.
- The calcareous layer includes a large expanse of brown calcareous soils: Sbeitla and Sbiba region.
- The clayey and marly formations contain little-evolved hydromorphic and vertic soils.
- The sandstone substratum is covered by a thick layer of brown iso-humic steppe soils.

In general, we note the tree and cereal-producing qualities of soils in the north of the governorate compared to the southern soils suitable for grazing and tree-producing qualities to the east.

5.1.4 Climate

From the South to the North-West, rainfall is variable with annual averages ranging from 150 mm to 500 mm per year. The rainfall varies significantly between seasons and years, with the intermediate, autumn and spring seasons receiving the most rainfall. In addition, heavy showers are frequent and account for one-third of the rainfall.
The high evaporation, coupled with great annual and daily amplitudes, is aggravated by frequent torrential rainfall.

Temperatures are low in winter, high in summer, and very irregular. As regards the bioclimate, more than half of the region belongs to the arid/cold winter climate category.

### 5.1.5 Flora

After Kroumirie, Centre-West Tunisia is the country’s most heavily vegetated area. Of the total 826,000 hectares, 151,000 are covered by forests.

Most of the plant cover consists of Aleppo pines or material from the trees’ decomposition. Due to tree cutting, crop expansion, fire and overgrazing, the forest cover is declining at a disturbing rate of 1% per year. Esparto grass is declining rapidly as a result of cereal cropping and overgrazing. The average decrease in Esparto grass is 1,500 hectare per year for Kasserine Governorate. Of the 179,000 hectares of Esparto grass, 72,000 hectares are at a very advanced stage of degradation. Kef forests contain very rich flora (cherry trees, carob trees, thyme, caper shrubs, Aleppo pine, etc.).

### 5.1.6 Fauna

The region’s fauna is quite diversified, and includes rabbits, striped hyenas, partridges, tourelles, wood pigeons, and wild boar.

Livestock and agricultural activities ensure food security for the population.

The principal species of livestock are cattle, goats, and sheep, as well as meat and milk production.

### 5.2 GAS PIPELINE ROUTE

The gas pipeline route passes through several geological features:

- The PKO.00 Feriana to PK 17 section passes through agricultural land and scattered grazing lands. It also crosses the Bouhaya Oued and National Road 15;
- The PK 17 to PK 25.5 section bypasses Feriana town;
- The PK 25.5 to PK 59.6 section will have four (4) citygate points, level cross RN 15 and pass at the foot of Chaambi mountain bypassing Chaambi national park;
- The PK 59.6 to PK 90.7 section will go across Hattab Oued to PK 65 and bypass Birinou mountain before reaching PK 90.5
- The PK 90.7 to PK 139 section will bypass Thela town and cross the national road linking Thela to Kalaa Khesba and pass through large agricultural land. In Kalaat Khasba town, the route does not run along P4 road but rather P17 road;
- The PK 139 to PK 200 section will pass through agricultural land and finally bypass Dehmani town and reach a citygate point which will link this pipeline to
the Dehmani-Jendouba-Beja-Tunis pipeline and close the North-West loop and link it to the STEG network;

The municipalities will be connected to the Dehmani-Beja pipeline by 8 and 10 inches diameter pipelines. The length of the pipelines range from 8 to 13 kilometres and will be connected to a valve station (76/20/4) 2 km from each town, and the station will be connected to subscribers.

The municipalities will be connected to the Dehmani - Beja pipeline through 8 and 10 inches diameter pipelines. The lengths of the pipelines range from 8 to 13 km and will be connected to a valve station (76/20/4) 2 km from each town, and the station will be connected to subscribers.

These pipelines will run along the roads of each region to which gas is supplied.

6. **PROJECT ALTERNATIVES**

There are no real alternatives to the project. Given the region’s major constraints, the relatively fragile state of the environment, vulnerability to climate change and food insecurity, the current lack of sustainable practices in the management of lands, farms such as irrigation areas, the management of grazing lands and fisheries, the population’s economic poverty, and the relatively minor anticipated impacts associated with the project, the option of not implementing the project would mean a missed opportunity to aid of the populations and participate in the economic and social development of the 19 delegations.

Some route alternatives have been abandoned for social and economic reasons (loss of land and crops, loss of forests, technical constraints, oued crossings, road crossings, etc.). Thus, the project owner has decided to bypass Telepte, Kasserine Thela Tajerouine and Dehmani towns, and use horizontal drilling when crossing roads.

Depth alternatives were chosen primarily on the basis of geotechnical considerations. Thus, the pipeline will be buried between 1 and 2 m deep as appropriate.

7. **POTENTIAL IMPACTS AND MITIGATION AND ENHANCEMENT MEASURES**

The project to construct the Feriana-Dehmani gas pipeline and supply gas to 19 municipalities has potential negative and positive impacts on the natural and human environment.

7.1 **IDENTIFICATION OF POTENTIAL IMPACTS**

7.1.1 **During the construction phase**

The potential impacts during this phase are exclusively negative. The first is irreversible and the other two could be mitigated through appropriate measures:

- The loss of land, crops, and property along the main pipeline corridor (16 metres during the construction works and permanent loss of 5 metres);
- Demolition of water supply and collective infrastructure (water towers, roads, etc.);
- Traffic disturbance and aggravation of road safety problems.
The other negative impacts during the construction phase that are of varying importance relate to the risk of degradation of natural resources and the threat to human health from all kinds of pollution (noise, dust emissions, waste, wastewater, waste oils, etc.), increased erosion and deterioration of the plant cover in the borrow areas, the threat to forest resources and biodiversity, and obstruction of the natural flow of surface waters.

7.1.2 During the pipeline operation phase

This phase will have two major impacts, one negative and the other positive:

- Risk of fire and gas leaks from the pipeline or gas distribution structures (citygate stations, valves, etc.);
- Opening up of the region and promotion of its development, and thereby improvement of the population’s quality of life. This is the project’s major positive impact, and the very reason for its implementation.

The gas supply will help improve the region’s development indicators, stop the use of greenhouse gas emitting fuels by industries, and minimize the felling of trees for heating in certain households.

7.2 Identification of Mitigation and Enhancement Measures

7.2.1 During the construction phase

During this project phase, specific measures have been identified to mitigate the major risks that could arise during this period.

- The people concerned will be compensated in accordance with compensation procedures and regulations and following discussions;
- The laying of the pipeline will comply with standard NT 109.01;
- The trees and crops will be identified, and compensation will be provided to those concerned following valuation of the trees and crops;
- Olive trees will be removed in accordance with the regulations in force;
- The risk of accidents during this project phase could be reduced by ensuring that the contractor’s machinery is in good condition at all times and the inspection certificates are current, marking out traffic routes, installing appropriate road signs, and keeping road users informed of the construction programme on a regular basis.
## Table 1

**Impacts and mitigation measures during the construction phase**

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Mitigation and Enhancement Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impacts on land use</strong></td>
<td>- The pipeline route crosses agricultural lands and therefore requires temporary use. A total of 6,800 ha over a month is estimated.</td>
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<tr>
<td>-</td>
<td>- The people concerned will be compensated in accordance with compensation procedures and regulations.</td>
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<td>-</td>
<td>- The compensation is estimated at TND 68,000</td>
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<tr>
<td><strong>Impacts on soil</strong></td>
<td>- Expropriation of about 20 hectares of land for the installation of valve and citygate stations.</td>
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<td>-</td>
<td>- Removal of earth during excavation of the trench.</td>
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<td>-</td>
<td>- Potential leaks of lubricants or fuel oil from construction equipment.</td>
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<td>-</td>
<td>- The people concerned will be compensated in accordance with Tunisian regulations and the procedures indicated in the resettlement study. The cost is estimated at TND 150,000</td>
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<tr>
<td>-</td>
<td>- The excavated earth will be re-used to bury the pipeline.</td>
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<td>-</td>
<td>- The lubricants or fuels and earth will be recovered and handled by specialized firms.</td>
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<tr>
<td><strong>Impacts on the public water supply property (DPH)</strong></td>
<td>- The installation of pipelines crossing certain oueds above ground.</td>
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<td>-</td>
<td>- The installation of pipelines within the DPH will be subject to prior consent and the conclusion of a preliminary agreement with the competent authorities, and will comply with standard NT 109.01 (4.8 Stream crossing)</td>
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<tr>
<td><strong>Impacts on surface water</strong></td>
<td>- Erosion and potential sedimentation of oueds during rainy seasons alternating with the construction period.</td>
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<td>-</td>
<td>- Pipelines will cross under oued riverbeds;</td>
</tr>
<tr>
<td>-</td>
<td>- Appropriate structures will be built in accordance with NT 109.01 (4.8 Stream crossing)</td>
</tr>
<tr>
<td><strong>Impacts on groundwater</strong></td>
<td>The groundwater will not be impacted by excavation operations or the laying of the pipeline, since the trench will not be deep enough to reach the groundwater.</td>
</tr>
<tr>
<td><strong>Impacts on fauna</strong></td>
<td>- The excavation of trenches will cause temporary disturbance to the animal life present in the areas along the pipeline route. The extent will vary from one area to another.</td>
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<tr>
<td>-</td>
<td>- The sectioning of pipes during in-line welding should be analyzed so as to preserve access, paths, and trails traveled by animals. Given the intervention period for each section does not exceed one month, the impact on fauna is negligible.</td>
</tr>
<tr>
<td><strong>Impacts on plant cover</strong></td>
<td>- The project works will require the removal of about:</td>
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<td>-</td>
<td>- 100 olive trees;</td>
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<td>-</td>
<td>- 100 fruit trees;</td>
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<td>-</td>
<td>- 70 forest trees;</td>
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<td>-</td>
<td>- Few crops will be affected during construction works.</td>
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<td>-</td>
<td>- The olive trees will be removed in accordance with the regulations in force. Law No. 2001-119 of 6 December 2001 prohibiting the feeling and removal of olive trees. This will be supervised and monitored by the regional authorities. The compensation estimates are as follows:</td>
</tr>
<tr>
<td>-</td>
<td>- Olive trees TND 50,000</td>
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<tr>
<td>-</td>
<td>- Fruit trees TND 70,000</td>
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<tr>
<td>-</td>
<td>- Forest trees TND 10,500</td>
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<tr>
<td>-</td>
<td>- Cereal crops TND 20,000</td>
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<td>-</td>
<td>- Vegetable crops TND 45,000.</td>
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<tr>
<td><strong>Impacts on infrastructure</strong></td>
<td>- The pipeline will cross roads.</td>
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<td>-</td>
<td>- Advance notice will be given to the various regional agencies concerned.</td>
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<tr>
<td>-</td>
<td>- Appropriate structures will be built in accordance with NT 109.01</td>
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<tr>
<td>-</td>
<td>- Repairs will be performed as work proceeds.</td>
</tr>
<tr>
<td>Noise</td>
<td>- During the construction phase, the level of sound produced by heavy machinery (excavators, loaders, bulldozers, etc.) will be below the permissible limit (60 dB), and exposure to such noise will be of short duration.</td>
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<tr>
<td>-</td>
<td>- The machinery will be maintained periodically and engines will be inspected.</td>
</tr>
</tbody>
</table>
WASTE

**Liquid waste**
- Liquid waste from hydrostatic testing.
- Risk of accidental engine fuel spills may threaten surface waters.
- Waste lubricant oils.
- The test water is from the drinking water network of the National Water Utility (SONEDE) and will be analyzed before being discharged in the National Sanitation Office (ONAS) network. The pipeline will be tested in 20 kilometre sections.
- The project owner has an emergency response plan which will be given to the contractor.
- Maintenance operations will be performed at specialized stations, and purge bays will be set up near the permanent camp. Lubricant oils and filters will be handled by a company approved by the Ministry of the Environment.

**Atmospheric waste**
- Dust emissions.
- Engine exhaust.
- Risk of accidental engine fuel spills may threaten surface waters.
- The areas will be periodically sprayed with water.
- The machinery will be systematically inspected and maintained.
- An emergency pollution response plan will be implemented.

**Solid waste**
- The solid waste to be generated will be household waste (packing materials, plastic bags and bottles, etc.), leftover polyethylene coating, scrap, engine batteries, etc.
- Hazardous solid waste will be handled by a specialized firm authorized by the Ministry of the Environment.
- Other waste will be handled by appropriate recycling companies or disposed of at the nearest public landfill.

**Risks**
- Risk of road or construction site accidents.
- The risk of accidents during the construction phase can be reduced by ensuring that the contractor’s machinery is in good condition at all times and the inspection certificates are current, and by marking out traffic routes, implementing appropriate road signs and keeping road users informed of the construction programme on a regular basis.

**Disruption of road traffic**:
- Pipeline crossing with roads
  - Intervention by the National Guard;
  - Passage by sinking;
  - Comply with the bearing capacity of roads;
  - Installation of signs indicating the presence of works and flashing lights;
  - STEG officials must maintain good relations with the authorities in the region and NGOs (GIM) so as solve any problems in a timely manner.

7.2.2 **During the pipeline operation phase**

The following measures will be taken during the pipeline operation phase:

- anti-corrosion measures; and
- statutory inspection and monitoring of the pipeline and corresponding facilities and equipment.

Detailed measures are proposed in an Environmental and Social Management Plan (ESMP). In addition, a risk analysis and emergency intervention plan are being prepared, and will be implemented for the project.
### Table 2

<table>
<thead>
<tr>
<th>Potential Impacts</th>
<th>Mitigation and Enhancement Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land use</strong></td>
<td>- The people concerned may use their land for major and vegetable crops, if possible.</td>
</tr>
<tr>
<td>About 205 ha will be occupied during the operation phase.</td>
<td>- Similarly, they will receive compensation at TND 40,000 per hectare over 30 years.</td>
</tr>
<tr>
<td><strong>Impacts on water resources</strong></td>
<td>- Anti-corrosion measures;</td>
</tr>
<tr>
<td>- Risk of leaks and contamination of waters.</td>
<td>- Periodic pigging of the pipeline;</td>
</tr>
<tr>
<td></td>
<td>- Statutory inspection and monitoring of the pipeline and corresponding facilities and equipment.</td>
</tr>
<tr>
<td><strong>Waste from maintenance activities</strong></td>
<td>- Implementation of a waste management and removal programme before project start-up. The programme will include the waste collection, management and final destination arrangements.</td>
</tr>
<tr>
<td><strong>Safety risks</strong></td>
<td>- Statutory marking along the pipeline;</td>
</tr>
<tr>
<td>- Gas leak</td>
<td>- Installation of warning signs;</td>
</tr>
<tr>
<td>- Fire</td>
<td>- Periodic gas corrosivity tests;</td>
</tr>
<tr>
<td>- Explosion</td>
<td>- Measurement of pipeline strength and pipeline-ground electrical resistivity at various points of the pipeline route.</td>
</tr>
</tbody>
</table>

#### 7.3 CUMULATIVE IMPACTS

STEG and SERGAZ, the trans-Mediterranean pipeline promoters, intend to juxtapose their rights of way over about fifteen (15) kilometres, from the regulator station to the entrance of the Telepet town so as to minimize the cumulative impacts of the two pipelines. A moderate cumulative impact is expected to be generated by the removal of vegetation and the resulting loss of habitat due to the clearing of land for the installation of the pipeline and associated infrastructure.

#### 8. ENVIRONMENTAL RISK MANAGEMENT

The works phase of the installation of pipelines and corresponding structures (valve and citygate stations) will not create a major environmental hazard. All the identified impacts, irrespective of their scope, will be accompanied by corrective and mitigation measures. During the operation phase, the major risks are mainly due to:

- Drilling, rupture of a gas pipeline;
- Explosion, fire at a gas station.

#### 8.1 SURVEILLANCE AND RESPONSE METHOD

The project owner has an emergency response plan that manages and controls the transmission of gas.

- Remote surveillance

The network is managed by a remote signaling and dispatching system that detects operational incidents in real time.

However, in case of an incident on the transmission network, the surveillance and intervention units are responsible for mobilizing the required resources as quickly as possible to ensure the safety of persons and property.
There are four phases of intervention:

- warning;
- acknowledgment;
- safety procedures;
- emergency repairs.

(b) On-site Monitoring

To prevent incidents that might occur on the network, STEG regularly conducts the following monitoring operations in accordance with established procedures:

- Monitoring of pipelines;
- Monitoring of stations;
- Monitoring of cathodic protection devices.

8.2 SURVEILLANCE AND RESPONSE FACILITIES

Internal STEG facilities consist of equipment required for emergency response and staff organized to at any time address various incidents that may occur on the natural gas transmission network.

Given the nature of gas transmission activities, it is necessary to use public facilities in case of major accident. The role of these public facilities is specified in the PIU.

In addition, STEG has lists of companies (earthworks, laying of pipes, radiographic controls) that can intervene in emergency situation to make any repairs.

9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Environmental and Social Management Plan (ESMP) includes various actions to ensure compliance with environmental protection regulations during the different project phases. This procedures system seeks to ensure safety and hygiene, as well as proper use of natural resources.

The ESMP has an environmental assessment objective in that it links the following aspects:

- the project impact activities;
- the potential impacts generated;
- the environmental protection measures;
- the actors responsible for implementing and monitoring these measures;
- the cost estimate for implementing these measures.
9.1 MONITORING PROGRAMME

STEG is responsible for monitoring the project in cooperation and partnership with all the project actors and participants. The monitoring is conducted periodically through the preparation of environmental and social monitoring reports.

Each project stakeholder is responsible for contributing to environmental monitoring. STEG, as project owner, will supervise the monitoring of changes in components of the natural and human environments affected by the project. The environmental authorities, acting through the ANPE, independently verify the implementation and compliance of the environmental measures. In addition, the local municipal authorities have the right to inspect the implementation of environmental measures, particularly those affecting their constituents. The populations may intervene through a claims register that is maintained by the municipalities, reviewed by the authorities and submitted for consideration to the works contractor the monitoring entity, and the project owner.

An environmental monitoring committee will be specifically established for the pipeline project to coordinate project monitoring activities. The committee will comprise representatives of the administrative services concerned, local technical services and local authorities.

### Table 3
Environmental and Social Monitoring Programme

<table>
<thead>
<tr>
<th>Emissions</th>
<th>Parameters</th>
<th>Frequency</th>
<th>Location</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Construction Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust</td>
<td>Total suspended particles (TSP)</td>
<td>Twice during construction</td>
<td>At the construction site and immediate vicinity.</td>
<td>Contractor/ STEG</td>
</tr>
<tr>
<td>Noise</td>
<td>Noise level (in dB(A))</td>
<td>Twice during construction</td>
<td>The site vicinity and all residential and sensitive areas.</td>
<td>Contractor/ STEG</td>
</tr>
<tr>
<td>Solid waste</td>
<td>Presence</td>
<td>Daily: inspections for presence of non-household waste</td>
<td>At the construction site and immediate vicinity.</td>
<td>Contractor/ STEG</td>
</tr>
<tr>
<td>Compensation</td>
<td></td>
<td>Twice during construction</td>
<td>At the construction site and immediate vicinity.</td>
<td>Contractor/ STEG</td>
</tr>
<tr>
<td>Construction nuisance</td>
<td>Various types of nuisance</td>
<td>Monthly meeting to solicit input from the people concerned.</td>
<td>The site vicinity and all residential and sensitive areas.</td>
<td>Contractor/ STEG</td>
</tr>
<tr>
<td><strong>Operation Phase</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual compensation</td>
<td>Satisfaction of parties concerned</td>
<td>During the operation phase Once per year</td>
<td>Vicinity of all areas concerned</td>
<td>(STEG) Safety and Environmental Manager</td>
</tr>
<tr>
<td>Gas leaks</td>
<td>Presence</td>
<td>During the operation phase Twice per year</td>
<td>Continuous measurement of gas flow rate and gas leak detection system; shutdown in case of leak</td>
<td>(STEG) Safety and Environmental Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Control and monitoring of corrosion of the different facilities</td>
<td></td>
</tr>
</tbody>
</table>
The environmental and social monitoring reports are as follows:

- environmental and social monitoring report at the end of the pipeline installation phase;
- environmental and social monitoring report throughout the pipeline operation project.

### 9.2 ENVIRONMENTAL PROTECTION COSTS

The table below shows an estimate of the costs of implementing preventive and mitigation measures, the Environmental and Social Management Plan, and the environmental and social monitoring programme. The costs shown in the table below are only indicative. However, in general, the costs are estimated at between 1 to 5% of the investment costs.

<table>
<thead>
<tr>
<th>Measures</th>
<th>Investment (TND)</th>
<th>Annual Maintenance and Consummables (TND)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mitigation measures during the construction phase</td>
<td>250 000</td>
<td></td>
</tr>
<tr>
<td>Mitigation measures during the operation phase</td>
<td></td>
<td>30 000</td>
</tr>
<tr>
<td>Monitoring programme during the construction phase</td>
<td>60 000</td>
<td></td>
</tr>
<tr>
<td>Monitoring programme during the operation phase</td>
<td></td>
<td>30 000</td>
</tr>
<tr>
<td>Appointment of Security and Environment Officer</td>
<td></td>
<td>45 000</td>
</tr>
<tr>
<td>Compensation for removal of trees and reforestation</td>
<td>130 000</td>
<td></td>
</tr>
<tr>
<td>Compensation for crops during the construction phase</td>
<td>65 000</td>
<td></td>
</tr>
<tr>
<td>Compensation for land use during the construction phase</td>
<td>68 000</td>
<td></td>
</tr>
<tr>
<td>Compensation for land use during the operation phase</td>
<td></td>
<td>270 000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>573 000</strong></td>
<td><strong>375 000</strong></td>
</tr>
</tbody>
</table>
10 PUBLIC CONSULTATIONS AND DISSEMINATION OF INFORMATION

The efforts and field investigations by all project managers were constantly guided by consultations with the population and NGOs conducted in coordination with the local authorities. The consultations took place at various meetings held in June 2013 with the people concerned to inform them of the project components, while soliciting their input to jointly identify the environmental and social characteristics of their surroundings and prepare the protection measures required for the project with the broadest possible consensus.

The population’s concerns primarily relate to the issue of compensation for the gas pipeline right of way, the conditions for compensation and the principles to be identified and applied to ensure full transparency and equity during the compensation phase.

The summary of the ESIA and Resettlement Framework will be published on the Bank’s Website 120 days before the project is presented to the AfDB Board of Directors.

11 CONCLUSION

The gas transmission line construction project will significantly help improve the living standards and conditions for the beneficiary populations of the project sites and areas.

If the necessary measures are taken, the project could generate considerable positive effects. The upgrade and expansion of the gas network will improve the availability of energy, develop production and service activities, and reduce poverty by creating income-generating activities that will increase household incomes and enable the population to cover their basic needs, including education for children, access to healthcare, etc.

In addition, the project implementation will stop the use of greenhouse gas emitting fuels by industries and minimize the felling of trees for household heating.

12 REFERENCES AND CONTACTS

The following documents were reviewed and served as basis for this summary:

1. EIA lot 2 Fériana Kasserine Tajerouine, 2011
2. EIA lot 3 Tajerouine-Dehmani-Jendouba-Beja, 2011
3. EIA for the natural gas pipeline for the town of Beja, 2011
4. Environmental and social impact study for the Feriana-Dahmani gas transmission pipeline and the supply of gas to 19 municipalities, July 2013.

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