AFRICAN DEVELOPMENT FUND

SENEGAL: DAKAR-DIAMNIADIO HIGHWAY CONSTRUCTION PROJECT

SUMMARY REPORT OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

INFRASTRUCTURE DEPARTMENT (OINF)
TRANSPORTATION UNIT (OINF.1) SEPTEMBER 2008
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ABBREVIATIONS

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<th>Full Form</th>
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<tbody>
<tr>
<td>AATR</td>
<td>Autonomous Road Works Agency</td>
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<tr>
<td>AIDS</td>
<td>Acquired Immuno Deficiency Syndrome</td>
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<td>APIX</td>
<td>National Investment Promotion and Major Projects Agency</td>
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<td>ARD</td>
<td>Regional Development Agency</td>
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<td>ARI</td>
<td>Acute Respiratory Infection</td>
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<td>ASC</td>
<td>Sports and Cultural Association</td>
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<td>BTP</td>
<td>Building and Public Works</td>
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<td>CCC</td>
<td>Communication for Behavioral Change</td>
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<td>DASS</td>
<td>Sanitation Department /MPHPA</td>
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<tr>
<td>DEEC</td>
<td>Department of the Environment and Classified Institutions</td>
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<td>DNH</td>
<td>National Hygiene Directorate</td>
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<td>DUA</td>
<td>Department of Town Planning and Architecture</td>
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<td>DWS</td>
<td>Drinking Water Supply</td>
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<td>EFP</td>
<td>Environment Focal Point</td>
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<td>EIA</td>
<td>Environmental Impact Assessment</td>
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<td>ESMP</td>
<td>Environmental and Social Management Plan</td>
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<td>GPF</td>
<td>Women’s Promotion Group</td>
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<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<td>IEC</td>
<td>Information, Education, Communication</td>
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<td>IREF</td>
<td>Regional Forestry Inspection</td>
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<td>LC</td>
<td>Local Authority</td>
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<td>MDG</td>
<td>Millennium Development Goal</td>
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<td>NEAP</td>
<td>National Environmental Action Plan</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>OCB</td>
<td>Grassroots Community Organization</td>
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<td>ONAS</td>
<td>National Sanitation Authority</td>
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<td>PRSP</td>
<td>Poverty Reduction Strategy Paper</td>
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<td>SDE</td>
<td>Water Company</td>
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<td>SENELEC</td>
<td>National Electricity Corporation of Senegal</td>
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<td>SONATEL</td>
<td>National Telecommunications Corporation</td>
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<td>SONES</td>
<td>National Water Corporation of Senegal</td>
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<td>STI</td>
<td>Sexually Transmissible Infection</td>
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<td>TOR</td>
<td>Terms of Reference</td>
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1. **INTRODUCTION**

1.1 Under its policy to ease the congestion in Dakar, the Government of Senegal has submitted a request to the Bank for the financing of construction works in connection with the Pikine-Diamniadio toll highway project. The Senegalese Government has entrusted APIX with the implementation of this important toll highway project between Dakar and Diamniadio. The construction of such a structure requires the displacement of populations living in the road area and their resettlement on another site. This would have considerable social impacts, leading to the loss of income and landed property.

1.2 The project is intended to provide a rapid link between the centre of Dakar and Diamniadio, which is the gateway to a new economic development pole, and to improve the living environment of the riparian populations.

1.3 With respect to the environment, the project is classified in category 1, in view of the nature of works to be undertaken, the location of roads in environmentally-sensitive areas, the number of properties to be expropriated, as well as the direct and indirect potential impacts it may generate. In accordance with the requirements of Bank policies and procedures (ESAP) relating to the environment and cross-cutting themes and with reference to the environmental policy and laws in force in Senegal, an environmental and social impact assessment (ESIA) has been conducted by a consulting firm. This report is a summary of the ESIA.

2. **PROJECT DESCRIPTION AND JUSTIFICATION**

2.1 The natural expansion of Dakar and the human concentration in relation to the geographical situation of the Cape Verde peninsular have consequences on the mobility of persons and goods. The trunk and arterial roads are congested, leading to traffic jams which seriously impede the mobility of persons and goods. National Highway 1 (RN1) is the main road linking the region with the rest of the country, and even with neighbouring countries. Losses linked to urban mobility are estimated at CFAF 100 billion/year.

2.2 The route is approximately 30 km long. It is subdivided into three sections: (i) the Malick Sy – Patte d’Oie section, which marks the commencement of the toll highway, with 7.6 km; (ii) the Patte d’Oie – Pikine section, 4.2 km long, which is the first section of the toll highway that is currently under construction; and finally, (iii) the 20.4 km-long Pikine-Diamniadio peri-urban section. This ESIA concerns the Pikine-Diamniadio section, which is 20.4 km long.

2.3 The construction of such a structure requires the displacement of populations living in the road area and their resettlement on another site. Part of this population (about 30,000 people) living in the road area will be displaced. About 3000 households will be displaced under the project. To mitigate the social impact of the displacement of these populations, APIX has identified a resettlement site in the Tivaouane Peul zone. The development of the site will take into account several basic premises, including the fulfilment of all resettlement requirements, while reserving a portion for future development. The programme for the development of this resettlement site was subject to an environment and social impact assessment. The assessment evaluated the current and future environmental impacts connected with the Mbeubeuss dump, particularly with respect to the project’s impacts on the health and security of many households, expected to be relocated to this area under the project.
2.4 In view of the estimated cost of this infrastructure, the Government of Senegal opted for the solution of innovative financing in the form of a “Design, Build, Operate and Transfer” (DBOT) Public-Private Partnership.

2.5 The proposed works for the overall route of the Dakar–Diamniadio highway concern the preparation and construction of the road way, the road network and related works. The road network concerns the construction of 2x2 lane roads (two lanes in each direction). The related works concern: five toll zones, five interchanges, a partition and security wall for houses built along the highway, 21 crossing infrastructures and 15 road passages to ensure continuity of a road link running across the highway along a 25.5 kilometers road length, with an average of one road passage after every 1.7 kilometres, sanitation structures, rest areas, a maintenance and service centre and stoppage areas.

2.6 The route of the Pikine-Diamniadio project comprises the following infrastructures: four toll zones, four interchanges (in Thiaroye, West Rufisque, East Rufisque and Diamniadio), a partition and security wall, 19 crossing structures, sanitation structures (storm water drainage), and related road areas (rest, service and stoppage areas).

2.7 The project provides for environmental and social measures in view of the following major issues: the water resource with the Niayes zones, the Thiaroye underground water table which supplies water to a substantial part of the population, noise nuisance, the classified forest of Mbao crossed by the highway, borrow pits, quarries and disposal areas.

3. POLITICAL FRAMEWORK AND LEGAL AND ADMINISTRATIVE FRAMEWORK

A. National Policy and Legal Framework

3.1 Senegal’s environmental sector policy letter seeks conditions for sustainable economic and social development, compatible with an ecologically rational management/utilization of natural resources and the environment. As regards transport, the Transport Sector Policy Letter is implemented through the Transport Sector Adjustment Programme (TSAP) which aims at modernizing land transport, rehabilitating and maintaining the road network.

Under this project, reference could also be made to the major international agreements and treaties on the environment ratified by Senegal, the Environmental Code, the Hygiene Code, and the Orders relating to impact assessments.


B. National Institutional Framework

3.2 In the environmental sector, the Environment and Classified Institutions Department (DEEC) and the Technical Committee in charge of carrying out and monitoring EIA procedures are the organs directly responsible for implementing the environmental policy.
As regards the EIA, the DEEC through the Pollution and Nuisance Prevention and Control Division in charge of environmental impact assessments is responsible for ensuring that the provisions relating to EIA are implemented. The DEEC also has decentralized services (regional divisions) at the regional level.

3.3 In the road sector, the following institutions are essentially responsible for the management, evaluation and monitoring of environmental issues:

- the Public Works Department (DTP),
- the Autonomous Road Works Agency (AATR).

3.4 As regards territorial development, the following institutions are essentially responsible for urban and solid waste management, as well as the evaluation and monitoring of environmental issues:

- the Environment and Classified Institutions Department
- the Department of Town Planning and Architecture
- the Department of Territorial Development;
- the Sanitation Department;
- the Department of Soil Occupation Surveillance and Control;
- the National Sanitation Authority of Senegal (ONAS);
- the National Hygiene Directorate

C. Policy and Legal Framework of the African Development Bank

3.5 The Bank’s environmental and social policies and procedures described in the project’s detailed ESIA are as follows:

**Crosscutting ADB policies applicable:**

- the Bank Group policy on poverty reduction (February 2004);
- the Environmental Policy (February 2004);
- the Environmental study procedures relating to private sector operations of the African Development Bank (May 2000);
- the guidelines for the integrated social and environmental impact assessment (2003);
- the Gender Policy (June 2001);
- the Population Policy and implementation strategies (January 2002);
- the Policy on involuntary displacement of populations (November 2003);
- Cooperation with civil society organizations –Policies and Directives (October 1999);
- ADB’s information disclosure policy.

D. Policy and Legal Framework of the World Bank

3.6 The relevance of each of the World Bank’s ten conservation policies was verified in relation to the entire project, which comprises three components. An analysis of the requirements and implications of the Conservation Policies for the environmental management of the highway project shows that five conservation policies are applicable to
Of the project: PO 4.01 – Environmental evaluation; PO 4.04 – Natural habitats; PO 4.36 – Forests; PO 4.11 – Cultural heritage; PO/PB 4.12 – involuntary resettlement. We observe that without any specific measures, the highway project is consistent with the following Conservation Policies: 4.09, 4.10, 4.37, 7.50 and 7.60. To meet the Conservation Policy requirements, specific measures and actions were proposed in the Environmental and Social Management Plan.

4. DESCRIPTION OF THE PROJECT ENVIRONMENT

A. Pikine-Diamniadio Highway

Environmental Framework

4.1. The resettlement site is in Dakar region and because of the latter’s position extending into the sea, it has a coastal micro-climate. There are several types of soils along the route. In the lowlands, the soils are blackish and very fertile. Market gardening activities are carried out on this type of soil. The depths of the water table range between 1.12m and 6 m. This limited water depth and the free nature of the aquifer show that the system is open to pollution from the surface. The water table is very sensitive to superficial pollutions and climatic conditions. Intensive flooding (lasting between 1 to 12 months) will be a major constraint on the construction of the highway on the two sections.

4.2. The following ecosystems are found in the road area on the Pikine-Diamniadio section: the Niayes (dunes and flooded lowlands between Pikine and Diamniadio), the classified forest of Mbao, the forest of Bargny low-plateau (essentially dominated by baobabs).

Socioeconomic and Cultural Framework of the Route Area

4.3. At the administrative level, the route of the Pikine-Diamniadio highway crosses Pikine and Rufisque Departments, and is subdivided into two major entities: the Pikine-Keur Massar section and the Keur Massar-Diamniadio section.

4.4. The total population in the project area is estimated at about 532,000 inhabitants, distributed in over 64,000 households. About 50% of the said populations are women. The administrative district of Diamaguène Sicap Mbao is the most populated area, with over 105,000 inhabitants, followed by Rufisque Nord (about 56,000 inhabitants). The highest densities are in Guinaw Rail Nord with over 43,000 inhabitants per km², followed by Guinaw Rail Sud (29,000 inhab./km²), and Tivaoune Diacksao (about 28,000 inhab./km²).

4.5. The housing units are not connected to the waste and storm water drainage system. Only council areas like Rufisque Est, Rufisque Ouest, and Sicap Mbao have limited systems. About 70% of the houses are connected to the electricity power supply system. 78% of the listed buildings have no access to safe drinking water. 18.8% are connected to the fixed telephone network. For unplanned districts without any connections, the level of consumption is 15 l/day/inhabitant, while in those connected to the water supply system, it is 40l/day/inhabitant. It is about 80l/day/inhabitant in planned districts. In the area covered by the toll highway route, there are at least 24 schools with more than 12,500 pupils. The health infrastructures identified in the project area are: the Rufisque and Thiaroye camp hospitals, 3
health centres and several health posts. There is no archaeological site, no cemetery, and no place of worship that would require to be transferred because of the works.

4.6 More than 65% of the adults found along the Pikine-Keur Massar route are economically active. The branches of activity in which the working population operates are trade (37%), private or government services (11%), domestic services (10%), construction (10%), transport (8%), manufacturing (4%), food/drinks/tobacco manufacture (3%) and fisheries (3%). There are many farms, especially for market gardening.

B. Resettlement Site

**Environmental Framework**

4.7 The resettlement site is in the Dakar region, and because of the latter’s position extending into the sea, it is has a coastal micro-climate highly influenced by maritime trade winds and the Monsoon. With respect to climate, the resettlement area has two distinct seasons: a rainy season from June to September, and a dry season from October to May. The average annual volume recorded for each station are 329.1 mm, 348.8 mm and 349.9 mm for Dakar Yoff, Thiaroye and Bambilor stations respectively. The temperatures are relatively stable in the Keur Massar area under study, and the annual range almost never exceeds 10°C. Temperatures fluctuate between 20°C and 30°C on average. Air humidity is rather high in the course of the year. The annual average is always above 50%.

4.8 The resettlement site is located in the lowland (or Niayes system) with a succession of dunes and lowlands going in the same direction as the coast. The highest points of the site are in the south, and the natural land slope is towards Lake Mbeubeuss. The growth of the plant cover is slowed down by the brackish and saline nature of the lake water. The Niayes are some of the most altered environments because of market gardening and fruit growing. The flooded lowlands have a lot of hydrophilic vegetation, mainly palm oil trees and ferns.

4.9 There is no water system on the site. The only surface waters found on the site are those of Lake Mbeubeuss, as well as Nébou and Tire basins. These lowlands dry up during the dry season.

4.10 The hydrogeological system of the resettlement site is part of the Niayes hydrogeological structure. Concerning underground water, the aquifer corresponds to a water table whose surface is at least 2 to 3 m from the natural land elevation. The analysis results show that the underground water is of very poor quality.

**Socioeconomic and Cultural Framework of the Route Area**

4.11 Even though they belong to the Rural Community of Sangalkam, the two human settlements that are closest to the site are Keur Massar and Tivaouane Peul village. The key human activities in Keur Massar administrative district are waste management, market gardening, and sand exploitation. Two villages with scrap dealers are close to the refuse dump.

4.12 Zebu breeding was also observed on the site. There are also unplanned residential building plots around the site. The main human activities of the area are refuse dump management, market gardening and sand exploitation.
C. Mbeubeuss Refuse Dump

4.13 The Mbeubeuss refuse dump is partly located in Lake Mbeubeuss area. Market gardening activities are mainly concentrated around Lake Mbeubeuss. There is a small lowland south-east of the dump in which Lake Khereup Keur is found. There is no vegetation. Half of the lake’s surface is located in this area. As with underground water, surface water has high concentrations of fecal coliform, iron and zinc, in addition to high concentrations of suspended particulate matters (SPM). The quality of surface water is also very poor, and potential sources of contamination are the same as those of underground water.

4.14 The average net annual income of market gardeners ranges from CFAF 700 000 to CFAF 1 000 000. Market gardeners will be particularly affected by the refuse dump management mainly because of the decline in crop yields which could have manifold causes (smoke, dust, water pollution, livestock loss following intake of plastic objects, etc.). Some of them would prefer to carry on their activities in another area.

4.15 The dump is an important economic activity area for scrap dealers, estimated at about 150. Their living conditions are difficult in terms of health and hygiene, as well as at the economic level. They work without protection, most of them eat on the dump site, and some of them use the water from neighbouring wells.

4.16 Some inhabitants are said to be very affected by the presence of the dump because of many nuisances it generates: noise, scattering of light objects, accidents due to heavy vehicle traffic, offensive odours when the wind blows in an unfavourable direction, etc.) and are concerned about the risks of infections due to the redistribution of salvaged products on the local market and the proliferation of flies and mosquitoes during the rainy season.

5. ALTERNATIVES TO THE PROJECT

Highway and Resettlement

5.1 In terms of alternatives, only the "without project” option was analyzed and compared to the implementation of the project as recommended. Maintaining the current situation ("without project” variant) is harmful for the environment of the area and for the national economy, in general. The “without project” situation has many disadvantages at the environmental and socioeconomic development levels.

Options concerning the Mbeubeuss dump

5.2 Three options have been envisaged with respect to the Mbeubeuss dump:

- Scenario 1 : Continue using the Mbeubeuss dump in the short-term, and close it without any rehabilitation action;
- Scenario 2 : Close the Mbeubeuss dump in the short-term, and implement a basic rehabilitation plan, i.e. covering the area with 60cm of clean soil to reduce spontaneous fires and improve environmental cleanliness as a whole;
• Scenario 3: Close the Mbeubeuss dump in the short-term, and completely rehabilitate it once and for all so as to guarantee adequate safety for the neighbouring populations (the final recovery and collection of biogas).

5.3 It should be noted that option 1 (continue using the dump) is still maintained for lack of a new dump. The “without project” situation which amounts to not doing anything is a “catastrophic" scenario. This scenario should be dismissed in view of the proposed development of the resettlement site for the people affected by the highway project works. Furthermore, the Technical Refuse Burial Centre (CEF) in Sindia, whose works are almost complete, will be used as a temporary measure. A study will be conducted by the Government for the creation of a new technical refuse burial centre on the Bargny site.

6. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. Pikine-Diamniadio Highway

Positive impacts

6.1 The construction of road infrastructure and the supporting highway structures make the traffic more fluid and travel less expensive, and thus facilitate access to administrative, economic, medical and tourist centres, while enhancing intra and inter-regional trade.

6.2 The project implementation will significantly improve the state of communication infrastructures, and thus provide the opportunity:

• to improve accessibility to the areas concerned;
• ensure more intense socio-economic development with the capacity to rapidly sell and develop local agricultural and industrial products and acquire equipment, inputs and other basic commodities;
• have better access to health structures outside the area, in case of evacuation;
• ensure the rapid transportation of human and physical rescue resources in the event of disaster;
• create jobs for the youths; and
• ensure the operation of SMEs specialized in road works.

Negative Impacts

6.3 During the preparatory phase, the expected impacts are inherent to the involuntary displacement of people and goods located in the project area, the felling of trees to clear the building areas and the conveyance of materials, including relatively significant quantities of waste. In addition to the waste, huge quantities of earth will be excavated during the construction of the road system and various networks. Concerning the human environment, the frequency of vehicles carrying equipment and building materials will generate noise and dust; the will also be risks of road accidents.

6.4 During the construction phase, the negative impacts will be various forms of pollution (waste dispersal), waste water produced on the different sites, the presence of machines using oils and greases with the risk of contaminating underground water through infiltration, especially in some council areas where the water layers are almost on the surface,
disruption of the populations’ living environment, loss of economic activities and disruptions of the network of dealers.

6.5 During the **operation phase**, the cumulative effects of the construction and use of the road will take the form of sound nuisance and atmospheric pollution (gas), accidents, physical separations and risk of flood, etc. More specifically, the following negative impacts are noted:

- **Freeing the road area:** Felling of trees, acquisition of land, and putting of signs for the works;

- **Mechanized land preparation works:** Demolition of houses, displacement of populations, loss of activities and sources of income, reduction of tree cover, soil erosion, disruption of habits and customs, propagation of STI/AIDS, disruption of riparian population’s activities, disruption of water drainage, separation of communities, traffic disruptions, and disruption of the network of dealers;

- **Opening and development of borrow pits and quarries. Deforestation, opening bypass roads, transportation of materials:** reduction of the tree cover, erosion of exposed soils, risks of accidents, dust emission, respiratory infections, occupation of private or farming sites, degradation of farmlands, and social conflicts;

- **Opening in the Mbao classified forest:** destruction of the tree cover and wildlife habitat, disruption of socio-economic (agricultural, etc.) activities, poaching in Mbao forest, social conflicts with the populations, and occupation of forest zones.

- **Installation of tar and grinding plants:** Occupation of farm/forest lands, noise, gas and dust emission, spilling of liquids and solids, proximity to residential areas, destruction of tree cover, destruction of wildlife habitat (Mbao classified forest), reduction of arable lands, atmospheric pollution, respiratory infections, and water and soil contamination.

- **Putting the highway into operation:** Physical barrier provided by the highway wall, risk of flooding of districts located on the right bank, physical interruption and disruption of the traffic, insecurity and risk of aggression, increase in traffic, build-up (siltion of road area), gas pollution and sound nuisance, risks of accident, and fragmentation of habitats.

A. **Resettlement Site**

**Positive impacts**

6.6 In addition to providing the new site with infrastructures and equipment, the resettlement programme will enable the displaced persons to: have access to land with a legal and permanent status, as well as appropriate housing, have guaranteed access to drinking water and sanitation, have access to basic services such as electricity (use of electric household appliances) and fixed telephone, enjoy improved security on the site because of
street lighting, reduce women’s workload because of the presence of drinking water in households, construct, rehabilitate or extension the road system to facilitate waste collection, have access to the site itself as well as between the site and other villages, and construct basic socio-educational and sports facilities, particularly health centres and green areas, mosques and churches, fire stations, and police station.

**Negative impacts in the preparatory and works phase**

6.7 The following negative impacts are common to all the project activities: the infrastructures, administrative equipment, public utilities, commercial facilities, etc. For all activities relating to development of the site, during the construction preparation phase, the expected impacts are inherent to the destruction of property (farms), the felling of a few trees and clearing of areas for constructions, generation of worksite waste, and conveyance of materials. In general, the following negative impacts are common to all the project activities: The impacts generated by the works are: loss of farming and market gardening activities, increased pressure on the land, increase in population density due to immigration which can bring about social problems like STI/AIDS, and problems of coexistence of different communities.

Concerning the impacts of the works: reduction of tree cover, disruption of the small fauna and avifauna, excessive exploitation of sand on the neighbouring dunes, temporary qualitative alteration of the superficial water table through introduction of a certain quantity of sediments, possibility of accidental spilling of oil products, high supply of the site with water from the local system could disrupt local supply, increase in sound and air pollution, change in outdoor air quality following the emission of dust from excavations, production of waste following the felling of trees and site cleaning operations prior to installation of sites.

With respect to impacts relating to the traffic of vehicles bringing supplies to the sites, there are risks of road accidents, emission of dust on the site, on the transportation route and construction areas, and disruption of free movement and socioeconomic activities.

**Negative impacts during the operational phase**

**Overall negative impacts:**

6.8 The development, use or operation of basic social infrastructures and facilities may have negative impacts on the biophysical and human environment. The use of these infrastructures will have the following major impacts: excessive water consumption and waste water disposal, consumption of materials/raw materials and generation of waste (common, special, ...), increase in the volume of household and local refuse (markets, health equipment, schools, etc.), sound nuisance, and risks of accidents during works.

**B. Mbeubeuss Dump**

**Negative impacts**

6.9 The following types of waste are received in the Mbeubeuss dump: septic tank mud, biomedical waste, industrial waste mostly from the agro processing, energy, parachemical, motor and heavy vehicle, paper manufacturing and metallurgy industries, and clandestine waste of unknown origin.
The main sources of exposure likely to impact on the health of the population to be settled on the area are as follows: biogas generation, production of leachate, and production of combustion products generated by the fire.

As regards the impacts of leaching water, the surface and underground water are contaminated by the fecal coliforms, zinc, iron, lead, nitrates, sulphates, chloride and suspended particulates matters (SPM). The contamination of the underground water of the resettlement site seems to come from various man-made sources, such as the potential use of mud from septic tanks or treatment plants for market gardening crops, the use of fertilizers and/or pesticides on these crops, or again non-localized pollutions from neighbouring villages (cleaning reagents, grease removers, solvents, coolers or dryers). The constant ingestion of these substances in low concentration increases potential risk for the population’s health.

Air contaminants emitted by the dump come from biogas and dump fires (smoke). Traces of about one hundred toxic substances are present in the biogas. The emission of these toxic substances in air is likely to affect the population’s health. The inhalation of volatile organic compounds (VOC) may induce various cancerogenic and non-cancerogenic effects (toxic effects). The possibility of direct contact with waste is considered probable since the dump is not fenced and is frequently visited by the neighbouring population to recover various products and materials. The dump also generally attracts pests, which are often vectors of various diseases and parasites.

Furthermore, explosions are more likely to occur in dumps and neighbouring sites unless they are equipped with a biogas collection system and the soil surface is deposited in pits (e.g. quarries).

7. **ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN**

7.1 This section describes the improvement measures and presents mitigation measures in common practices to be applicable to the project. The Environmental and Social Management Plan (ESMP) produced in this project comprises three categories of measures: (a) measures to be incorporated into the bidding and job specification documents as contractual measures (see Annex 3); (b) engineering control to be undertaken in the technical activities defined in the bidding and implementation documents, and (c) environmental and social measures.

a. **ESMP Management Measures**

7.2 The ESMP incorporates the following environmental and social measures concerning the management of the **Pikine-Diamniadio** highway:

- *Development of Mbao classified forest:* (a) development studies and closure; (b) compensatory reforestation of 20 ha of land; (c) expenses relating to the felling of trees (7,500 trees); (d) creation of internal firebreaks; (e) development of the Arboretum and ecology paths; (f) assistance and support to animal breeders' EIG; (g) assistance to farmers and market gardeners; and (h) information and monitoring programme
• Information and sensitization of actors and populations: (a) project’s social support

• Surveillance and environmental and social monitoring for 30 months.

The overall costs of these activities are estimated at **CFAF 370 000 000**.

7.3 The ESMP includes the following environmental and social measures concerning expropriations, as well as restructuring and additional measures:

• Freeing the road area: (a) freeing the Malick SY – PDO – Pikine road area; (b) further freeing of bare lands on Malick Sy – Pikine; (c) freeing of Diamniadio – Keur Massar road area; (d) freeing of the Pikine – Keur Massar road area; (e) freeing of Pikine Irregulier Sud road restructuring area; freeing of the Tivaouane Peulh resettlement site.

• Planting trees along the highway.

• Additional infrastructures (included in the restructuring): (a) health centre with equipment.

• Works in the Keur Massar resettlement area

• Pikine Sud urban restructuring works

• Closure of Mbeubeuss dump.

The overall costs of these activities are estimated at **CFAF 126 280 million**.

7.4 The ESMP includes the following environmental and social measures concerning the management of the resettlement site:

• Building additional infrastructures: (a) civil registry centre; (b) women’s centre; (c) youth centre; (d) day care centre for children; (e) handicraft gallery; (f) bus station and parking lots; (g) planting of roadside trees.

• Information and sensitization of actors and populations - Project social support.

• Surveillance and environmental and social monitoring for 36 months.

• Development of Mbeubeuss dump.

• Compensation for expropriated persons of the resettlement site.

The overall costs of these activities are estimated at **CFAF 3 880 000 000**.

7.5 The ESMP includes the following environmental and social measures concerning the management of Mbeubeuss dump based essentially on the following three scenarios:

• Scenario 1: Continue using the Mbeubeuss dump in the short-term, and close it without any restoration actions;

• Scenario 2: Close the Mbeubeuss dump in the short-term and implement a basic rehabilitation plan;

• Scenario 3: Close the Mbeubeuss dump in the short-term, and completely rehabilitate it (final recovery and collection of biogas)
Scenario 3 would be the best solution. However, it is very costly and difficult to implement rapidly, in the short-term; scenario 2 is an interesting solution, but scenario 1 is simply not viable.

7.6 The ESMP includes the following environmental and social measures concerning the resettlement site:

- The soils which are highly contaminated by dioxins and furans should:
  a. first be distinguished to confirm their quality;
  b. be restored in the residential areas by covering plots with clean soil to a depth of at least 30 cm;
  c. be restored by excavating the soils whose level of contamination exceeds the set reference criteria and replacing them with clean soil in the areas meant for farming.

7.7 Preliminary estimates of the cost of measures proposed for Mbeubeuss dump.

The overall cost of scenario 2 activities concerning the management of the dump would be about CFAF 2 880 000 000, exclusive of taxes and duties. In view of its complexity, the evaluation of scenario 3 costs goes beyond the framework of this study. Indeed, the evaluation would require a comprehensive study including field work, and should incorporate the technical details on the following points: (a) final impermeable cover; (b) digging biogas collection wells, (c) post closure management.

The costs of activities relating to the coverage of the entire resettlement area and works on Sindia site are estimated at CFAF 4 000 000 000, exclusive of taxes and duties.

8. ENVIRONMENTAL RISK MANAGEMENT

8.1 During the road construction and rehabilitation phase, the environmental risk will essentially concern: accidental spilling of hydrocarbons, bituminous products, explosive products and other substances used in road construction. There are also risks of accidents, both in the workplace and when crossing of water courses and rivers, as well as cases of fire for which security measures will be taken and training organized with the competent services, particularly the emergency alert division, the gendarmerie and forest guards, etc. These measures concern: sensitization and training of site workers and teams entrusted with specific tasks in rapid intervention techniques in the event of disaster, security measures to be observed in dangerous and high-risk area, the conclusion of contracts with health services and health centres, opening and stocking of local pharmacies, and sensitization of the riparian populations on prevention against health risks and security.

8.2 Other technical measures concern the development of secure maintenance areas for trucks and pollutant storage to avoid accidental spills likely to pollute natural resources. On-site measures will be taken to ensure proper retention around fuel, oil, bitumen storage tanks and also to dig pits to drain oil, grease and other pollutant liquids from the maintenance workshop, vehicle washing and equipment facilities, and loading areas. As regards the management of explosives, safety measures as defined by the national legislation will be implemented.
9. **MONITORING PROGRAMME**

A. **Environmental monitoring of the Pikine-Diamniadio Highway**

9.1 Under the project, the monitoring programme seeks to ensure that the proposed mitigation and improvement measures will be effectively implemented during each of the successive phases of the programme, namely the construction, rehabilitation and operational phases.

9.2 The said environmental monitoring is intended to ensure effectiveness of: (i) the measures proposed in the environmental and social study, particularly the mitigation measures; (ii) the conditions defined in the different legal and regulatory instruments; (iii) the commitments of the contracting authority and project manager; (iv) requirements relating to other laws and regulations on hygiene and public health, management of the populations’ living environment, environmental protection, natural resources, and sensitive and fragile areas.

9.3 The key objectively verifiable indicators to be used for impact monitoring are: the regeneration rate of deforested species, the success rate of sown species, the number of analyses and water quality, the number of socio-sanitary infrastructures established and operational, the number of expropriated families compensated (including the compensation time frame and the adequacy of the compensation received in terms of the actual value of the expropriated property), the rate of prevalence of diseases caused by dust and gas emissions, the number of cases of water-borne diseases or STI/AIDS and other infectious diseases reported by health centres since the commencement of the programme and their treatment; the number of cases of accidents, the number of reports of collision with wild fauna, etc.

9.4 The monitoring activity will be based on the following institutional arrangements: the Environmental and Social Monitoring-Evaluation Unit (CESSE) which comprises all the institutional actors involved in the environmental management of the project and the highway contractor. The implementation of measures will be supervised by external structures, notably the Dakar IREF services, the Regional Environmental and Classified Institutions Division, and the administrative districts concerned by the works. The Civil Protection Department (DPC) and the Fire-fighters will be involved in the surveillance and security of hydrocarbons storage areas.

B. **Environmental Monitoring of the Resettlement Site**

9.5 It is recommended that an environmental monitoring programme be prepared prior to the construction phase. Here, monitoring means all inspection, control and intervention activities aimed at ensuring that: (i) all requirements and conditions regarding environmental protection are effectively met before, during and after the works; (ii) environmental protection measures prescribed or scheduled are initiated, and facilitate achievement of the set goals; (iii) risks and uncertainties can be managed and corrected in a timely manner. Thus, environmental monitoring essentially deals with the implementation of environmental protection measures recommended in this environmental impact study. Surveillance makes it possible to control their effectiveness and efficiency. The publication of a follow-up report is part of this project’s environmental surveillance activities for which three phases have been identified, i.e. during the preparation, construction and operational phases.
9.6 The environmental monitoring programme is essentially intended to ascertain the validity and accuracy of the impact assessment conducted during the ESIA. The monitoring programme also allows for verification of the effectiveness of impact mitigation and environmental protection measures provided proposed in the impact assessment, particularly where major impacts with aspects of risk and uncertainty are identified. Where relevant, some proposed measures which have become useless may be discarded, while new ones can be implemented in order to overcome some undesirable impacts due to or generated by the project.

9.7 The monitoring programme presented below should be effective as soon as the works start and should be maintained throughout the project’s lifespan and way after the closing phase. It identifies the monitoring parameters and the technique that will be used for each type of nuisance or pollution.

9.8 The mitigation measures during the design, construction and guarantee period will be monitored by the Environmental Expert, who will prepare regular reports for the attention of the Contractor. The concerned institutions will be entrusted with the monitoring of specific measures: thus, IREF will supervise deforestation/reforestation activities and linear plantations; DREEC will supervise pollution-related activities and air pollution; the local authorities will supervise worksite waste management, the relocation of activities and potential resettlement, the use of local labour, etc. After the construction, DREEC and the highway contractor will be entrusted with the monitoring.

C. Environmental Monitoring of Mbeubeuss Dump

9.9. The increase and decline of water contamination, as well as identification of potential sources could be monitored on the basis of at least five observation wells round the resettlement site. The key monitoring parameters are: pH, conductivity, heavy metals (cadmium, chromium, copper; iron, nickel, lead, selenium, zinc; Chlorides; total hydrocarbons; Phenols; Ammoniacal nitrogen; Nitrates and nitrites; Total cyanide; Sulfide; Sulfate; Fecal coliforms; BOD5; and suspended particulate matters (SPM). The DEEC will implement the monitoring measures for the rehabilitation of the dump and follow-up some key parameters (soil, water and air pollution and other nuisances, etc.), in collaboration with the local authorities concerned and the hygiene and health services.

10. CONSULTATIONS WITH THE PUBLIC AND DISSEMINATION OF INFORMATION

A. Pikine-Diamniadio Highway

10.1 The methodological approach consisted in involving actors at grassroots level (administrative authorities, local authorities, opinion leaders, and the populations). The various consultations enabled actors to give their views on the project and its potential impacts, and propose mitigation measures.
10.2 At each of the meetings organized, the project content in terms of economic, social, environmental stakes, as well as the mitigation and improvement measures were presented to the consulted groups. This process was initiated at the project upstream stage with respect to the validation of terms of reference of the environmental and social impact assessment by the groups concerned and/or affected. Thus, the views and comments of the populations and target groups were incorporated in the ESIA.

10.3 The majority of actors encountered did not express any specific fears as regards the highway. The rare fears expressed relate to the fact that the districts crossed by the highway will be divided into two, and this would lead to inaccessibility. As regards the displacement of the populations and the resettlement process, the main fears expressed relate to the expropriation of farms without any substantial compensation.

10.4 Information dissemination mechanisms: The actors stated their preferences as regards the information channel and the participation/representation of beneficiaries. To that end, the administrative authorities, local authorities, district representatives, village chiefs, and opinion leaders could be involved in the sensitization and communication campaigns. Besides, this summary will also be published in the Bank’s Public Information Centre (PIC).

B. Resettlement Site and Mbeubeuss Dump

10.5 The various discussions provided relevant information on the constraints and opportunities of the site, the views, concerns, fears and suggestions for mitigation measures concerning the resettlement of the population in the implementation of the toll highway project. Furthermore, the discussions made it possible to prepare a socio-economic profile of the resettlement site, as well as collect data on good governance and gender aspects.

10.6 The following viewpoints were expressed:

a) The actors were generally informed about the resettlement project.

b) The population living near the resettlement site stated that the displaced populations will be most welcomed.

c) The processing of quantitative data collected with the help of an interview guide helped to identify a set of positive impacts at the socioeconomic level;

d) The main fears expressed relate to the expropriation of farms without any substantial compensation;

e) As regards mitigation and improvement measures, special emphasis should be placed on communication to avoid problems and appease the populations;

f) All information channels and the participation/representation of beneficiaries will be used during the sensitization and communication campaigns (community radios, televisions, posters, group activities in districts, etc.).
11. **GENDER SITUATION**

11.1 In the area concerned with the displacement, the following comments were made: **(a)** lack of health infrastructure worthy of the name and adapted to women's health needs; **(b)** systematic negative discrimination against women for the post of district representative (exclusively reserved for men); **(c)** gender parity not observed in decision-making bodies; **(d)** feminization of poverty and diseases (women are most affected by poverty); **(e)** difficult access to land and credit.

11.2 The following gender-related recommendations were made: **(a)** construct health infrastructures worthy of the name, specialized in maternal health; **(b)** promote and encourage the strict observance of gender parity; **(c)** develop a policy for medical assistance to women; **(d)** undertake affirmative action in favour of women in the allocation of land and credit; **(e)** taking into account the physically disabled when access ramps of crossing bridges are designed; **(f)** encourage the employment of local labour, particularly youths and women.

12. **ADDITIONAL INITIATIVES**

12.1 In addition to the measures contained in the ESMP, institutional, sensitization and good governance measures were proposed for both the Pikine-Diamniadio Highway and the resettlement site. These include: **(a)** preparing the local population for the arrival of persons affected by the project (PAP); **b)** APIX should support the process through information, sensitization, and training for behavioural change; **c)** APIX, in collaboration with the administration at the Rufisque Prefecture and Sangalkam Sub-Prefecture should set up a committee responsible for collecting complaints and grievances from persons affected by the project in order to better deal with the concerns of the PAPs.

13. **CONCLUSION**

13.1 The environmental evaluation conducted on all the components shows that the project implementation will certainly have negative impacts on the natural, human and socio-cultural environment. The most significant negative impact will concern the expropriation and resettlement of the populations. Furthermore, the potential negative impacts will not have major irreversible ecological impacts in the project zone and surrounding areas. Indeed, the potential negative impacts could be technically and financially limited (compensation and resettlement) by the implementation of the ESMP and Resettlement Plan. This summary of the potential impacts and mitigation measures of the project are submitted to the Board of Directors of the Bank for information.

14 **RÉFÉRENCES**

5. Mbaye Mbengue FAYE (2008), Environmental and social impact assessment for the development of the Tivaouane Peulh resettlement zone, Final Report, APIX

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