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AFRICAN DEVELOPMENT BANK GROUP

**PROJECT : PRAIA AIRPORT EXPANSION AND MODERNIZATION
PROJECT (PEMAP)**

COUNTRY : CAPE VERDE

SUMMARY OF ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

APRIL 2013

Summary of Environmental and Social Management Plan

Project Name	: PRAIA AIRPORT EXPANSION PROJECT (PAEP)	
Project Number	: P-CV-DA0-003:	
Country	: Cape Verde	
Department	: OITC	Division: OITC1

1. Brief description of the project and major environmental and social components

Project Description

The Praia International Airport is located in Cape Verde's administrative capital on the Island of Santiago. It is located 5 km east of the city of Praia and is easily accessible by a paved road which is actually the extension of the runway of the first Praia Airport (transformed into meteorological station). The airport is adjacent to the sea, with rapidly expanding urban areas to the South and South-west. The airport area is administratively part of Achada Grande or the Praia industrial zone, which also includes the commercial port and the fishing port on the island of Santiago. The PRAIA airport was opened to international traffic in 2005 and it is managed by the "ASA" (National Airports and Aviation Safety Corporation) responsible for airport development operations in Cape Verde.

The project is divided into two phases: the first which is priority and will be financed by the African Development Bank, and the second, which is optional, and for which the prime contractor reserves the right to a longer period of implementation.

Phase 1 components:

- Expansion of the passenger terminal and facilities through the construction of a terminal and the renovation of the current terminal;
- Extension of aircraft parking, various networks and signs and equipment; and
- The building of a sewage treatment plant;

Phase 2 components:

- Extension of the freight terminal;
- Construction and installation of a new security and fire station (SSLI) (undefined location);

The implementation of Phase 1 of the project will be according to the following schedule:

- Commencement of works in 2014;
- Final date for the acceptance of works in 2016; and
- Operation of new facilities scheduled for 2016.

Currently, the Praia Airport has the following facilities:

- a) A 6,960 m² passenger terminal comprising: (i) six check-in counters with a baggage conveyor belt at the departures section. The section's equipment comprises an electrical weighing scale with an X-ray machine, a security control mechanism for checked-in baggage and two for carry-on luggage; (ii) an arrival section with a baggage claim area (two carousels), (iii) two boarding areas (domestic and international) with a pre-boarding area. The two boarding areas occupy an area of 324m² and the arrival section covers an area of 216m²;
- b) A 36,225 m² aircraft parking which can hold 5 medium-haul aircraft, including two large carriers;
- c) A 2,105 metre long and a 45 metre wide runway;
- d) A freight terminal;
- e) A technical block and a 940 m² control tower;
- f) A building housing the Security service and Fire Station (SSLI)
- g) An aircraft hangar ; and
- h) A VIP lounge

To cope with projected traffic and enable improved passenger flow management during peak hours, the following operations have been planned:

- Expansion of the terminal to a total area of 10,700 m². The areas concerned are: a) the main lobby; b) check-in area; c) police entrances when passengers arrive; d) baggage claim area; and e) equipment (baggage system, airport access control and scanners);
- Expansion of aircraft parking bays; and
- Renovation of the cargo terminal.

Air passenger traffic which stood at 500,000 passengers in 2011 will reach 1.3 million passengers in 2035. However, freight volume remains quite limited, not exceeding five (05) tons per day for all segments and in both directions (arrival + departure). International freight traffic comprises mainly imports (70% of total international freight) consisting of goods and personal effects.

The Praia Airport Expansion Project cost is estimated at UA 27.14 million. The Bank's contribution is estimated at UA 24 million.

Major environmental and social components

The climate is dry and sub-tropical ranging from semi-arid to arid, with two seasons: dry and wet. It is characterized by an alternation of northeast trade winds, slightly humid, hot and dry from October to June and the "Monsoon", between July and September, the rainy season (sometimes torrential and intermittent). The wind pattern is clearly dominated by north and north-east winds (the trade winds) between October and June, and between July and September, there are southerly and westerly winds.

The Island's formation is the outcome of underwater volcanic activities in the area. Its relief is generally rugged, with high-altitude peaks such as Monte Pico da Antonia, which reaches 1,395m, in the centre of the island. The Island's geological material mainly comprises basalts, phonolites, slag, trachytes and andesites, lapilli and volcanic tuffs. The soils of the Island of Santiago are generally unsophisticated, superficial to shallow, stony and permeable. Ranging from neutral to alkaline pH, they are low in organic matter, but rich in minerals. They are usually heavily eroded. In the airport area, the soil is rocky and hard, and not much affected by erosion. Due to the Sahelian climate, there are no permanent surface watercourses. The existing watercourses only drain water during the wet period. The combination of orography associated with the aggressive rainfall and the Island's sparse vegetation explain the torrential surface runoff during flood periods, and thus the limited groundwater replenishment during heavy rains. These two factors, coupled with water evaporation make water availability rather critical factor. To compensate for scarce water resources, the Cape Verdean government has opted for the desalination of sea water which accounts for 85% of Praia's drinking water.

In addition to the desalination plant which provides 85% of Praia's drinking water, Electra operates other water resources in the Praia region and Grande Ribeira de Santiago (The galleries, boreholes and artesian wells). It should also be noted that the areas that not currently supplied by Electra networks are supplied by ADA (Water Distribution Agency) which has 73 standpipes and some water tanker trucks.

In the airport area, the fauna comprises farm animals and a rich avifauna: raptors, cattle egrets, grey herons, helmeted Guinea fowl and sparrows. The Island of Santiago is home to two national parks - Rui Vaz/Serra do Pico de Antonio and Serra Malagueta - which are 21 and 36 km from the Praia International Airport, respectively.

The land fauna is less diversified. Besides animals in captivity, there are a few monkey and rodent species, as well as several species of reptiles in the Santiago Mountains. For its part, marine fauna is exceptionally rich with a diverse mix of tropical and Mediterranean species.

The Island of Santiago's natural vegetation consists of several pastoral, medicinal and aromatic indigenous plants, highly degraded due to poor water resources, harsh climatic conditions and over-grazing.

The City of Praia has a population of 131,603 inhabitants; about 27% of the country's total population. The Praia Airport is located 2 km from the delimitation of the urban residential area and 3 km from the village of São Tomé. The Airport is 3 km from Achada Grande, which is an urban residential area included in zone U4 and 2 km from the village of São Tomé which belongs to the PRAIA NORDESTE (R1) rural or semi-urban area.

The village of Sao Tomé with a population of about 200 people (2012) is located at the foot of the cliff bordering the airport runway to the North East. With an area of 1,394 m³, Sao Tome has

a population mainly living off fishing activities. To the South of the airport, there are urban populations in industrial areas (Port of Praia, various industries): The Achada Grande Frente neighbourhood is the most heavily populated, with 2,851 inhabitants and a density of 3,858 residents / km².

The main causes of morbidity in the project area are malaria, hepatitis, diarrhoea (for children under 5 years) and acute renal insufficiency (5 years and over).

In Praia, HIV prevalence in 2009 was 1.7%. Urban areas had a prevalence rate of 0.9% against 0.6% in rural areas. The study area is one of the most affected by the epidemic. In terms of health sector personnel and resources, the Praia municipality has 74 doctors, 19 pharmacists, 125 nurses and 262 beds for 100,000 inhabitants. The number of health workers in Praia is 199 per 100,000 residents which exceeds the Millennium Development Goal (MDG) of 160 health workers per 100,000 inhabitants.

Praia is the city with the most infrastructure and resources allocated to education, with 135 schools (14% of Cape Verde's schools), about 38,000 students (25% of the country's total enrolment) and 22% of the total number of classrooms. 83% of students live less than a mile from their schools and 80% of students in secondary school are within 3 miles from school. In the village of Sao Tome, students cover about 6 to 7 km on foot to attend high school in the City of Praia.

However, Praia is one of the most privileged cities in Cape Verde with regard to cultural events: stage performances, exhibitions and shows. Therefore, Praia has several entertainment venues, a cultural palace (Palácio da Cultura), Ethnographic Museum (Museu Ethnographic) and a National Archives Centre (Arquivo Histórico Nacional).

In the Cape Verdean society, men and women have different activities and play distinct roles. The men have always played minor roles in household tasks, which have largely fallen to the women. This activity is in line with their role as productive economic agents. In the project's direct impact area, women are responsible for the sale of products (fish or agricultural produce in the Praia city market (4 and 6 km respectively from Achada Grande and Sao Tome). Also, in the airport area, most women are employed as cleaners.

Praia's urban transport services are provided by two private bus companies "Moura Company", with almost 56 buses and "Sol Atlântico" with 10 buses plying 11 lines of the network. Two lines (L6 and L9) cover the direct study area.

Praia Port of is an international port built in the sixties mainly to meet demand for handling operations.

The airport's current drinking water consumption is estimated at 150m³/d. Although the airport is connected to the City of Praia network, the residual pressure at the connection point is very low and does not ensure the supply of water to the airport. Given this constraint, the airport's water needs are met by tanker trucks. The Praia airport has a sanitation system connected to a sewage treatment plant.

Currently, the City of Praia's solid waste is transported to the uncontrolled municipal landfill located about 4 km from the city centre and 8 km from the study area. The City of Praia's industrial landfill is being developed. This new landfill will be located 12 km from the Praia

Airport. Its commissioning was scheduled for May 2012, but has been postponed to the end of 2013. The airport management authority outsources solid waste collection to a private company. This company empties the 8 trash bins at the airport twice a day.

The analysis of the human and socio-economic environment in the project area has revealed the following key facts:

- A very high unemployment rate (22%) with low rate of employment of the Sao Tome and Achada Grande population at the airport;
- Limited potable water supply coverage and low rate of connection to the sanitation system;
- Small number of NGOs working in the project area and lack of financial and technical means for the associations working in the project area; and
- The dominance of fishery product marketing in the project's direct area of influence and the near-absence of the crafts sector.

The national economic situation is characterized by the lack of natural resources. This explains why the economy is oriented towards services such as trade, tourism and transport. Agricultural activities are closely related to the Island's limited water resources and geomorphology. Rain-fed crops are characterized by very random production due to variations in rainfall patterns. The main crop is corn. Sweet potatoes, cassava and potatoes are cultivated alongside maize in more humid highlands. Irrigated agriculture is practiced on the Island of Santiago, with sugar cane as the main crop. Fruit farming consists mainly of banana grown using irrigation, alongside citrus fruits, mangoes and papayas. Cattle and goat rearing is dominant in the City of Praia and practiced extensively and over large areas. In the project's direct area of impact, animal breeding is not very developed. However, fishing is considered a priority sub-sector for the development of Cape Verde's economy. This activity plays a significant role given that the sea is Cape Verde's best natural resource. However, due to the use of traditional methods, fishing accounts for less than 5% of GDP. The artisanal activities in the project area are rudimentary. Despite the large number of craftsmen, their products are not competitive on the market because they are not refined, given the lack of specialized equipment. Frequent trades include carpentry, sewing and pottery.

According to the Industry Services Directorate, 60% of industrial units are located on the Island of Santiago. The City of Praia has some industrial units such as a soft and alcoholic drinks unit and building materials manufacturing and processing units. The Island of Santiago's most significant mineral resource is the stone extracted for construction and its derivatives such as basalts and phonolites. The closest quarry to the Praia Airport is about 6 km. The tourism sector is considered a pillar of Cape Verde's economic and social development. This activity is concentrated mainly on the Sal and Fogo Islands. With few hotels, the Island of Santiago has a diversified landscape and sites of great ecological and historical interest.

2. Major Environmental and Social Impact

2.1. Positive Impact:

Construction phase:

Job creation

With the setting up of project sites, an economic impetus will be created by new service markets and job demand. The project will therefore boost Praia's economic potential, especially in the construction sector and related activities, in an area where the unemployment rate is 22%. During the construction phase, a significant proportion of the works is usually carried out by local or regional companies (earthworks, supplies and materials, etc...). The most complicated works are carried out by specialized companies which employ mostly international experts for skilled jobs. The construction team usually comprises supervisors and operational staff who are mostly unskilled workers recruited locally.

Works implementation will therefore produce a significant positive socio-economic impact which will result in job creation and income growth.

Impact on economic activities

The works phase will create a commercial impetus in the project and surrounding areas. This phase will result in increased trade within these areas for the purchase and supply of construction materials. This will in turn increase economic activities in the business and services sectors. This impact is considered positive and significant, though temporary.

Construction works are considered as a vitalizing element of industrial activities. As part of this project, there will be significant contribution and purchase of construction equipment and materials, and recruitment of local sub-contractors.

Operational phase

Socio-economic impact

The Praia Airport Expansion Project was designed to contribute to the development of tourism on the Island of Santiago. In the operational phase, there are likely to be local recruitment opportunities in the short or long term. In addition, the project will indirectly increase housing, trade and service demand.

At the national level, the Praia Airport expansion project will:

- Increase trade between the different Islands and with other countries;
- Improve the supply potential of the air transport market; and
- Increase the supply of commercial services or housing.

Job creation

The jobs created by an airport complex can be divided into direct and indirect jobs. Direct jobs are those created by aviation activities in the airport. These mainly include services related to the airport operator, air traffic control, freight, ground handling, airlines, catering and commercial activities within the airport. Various socio-economic studies on airport projects show that the airport sector creates 1,000 direct jobs per million passengers.

Indirect jobs are those created by the positive impact of airport infrastructure on economic sectors other than aviation. These are, first and foremost, sectors heavily dependent on air transport: tourism, agricultural export industries, etc...

The knock-on effect (or catalyst) for the entire regional and national economy also leads to “indirect” job creation. Several studies show that an airport creates, on average, 2.5 indirect jobs for each direct job. In this regard, the project's impact on job creation is considered positive and significant, with a regional impact.

Impact on tourism

The expected increase in air traffic to 939,661 passengers in 2020 (2,206,063 in 2035), following the airport's expansion, will result in a 95% increase in tourism (international traffic will increase from 48,737 in 2012 to 94,784 in 2020). Therefore, the project's impact on the tourism sector is considered positive, permanent and regional. The significance of this impact is considered high. The increase in tourist activities will contribute to the development of ancillary activities such as transport, crafts, etc...

Impact on the industries

Improving airport services will promote the industrial sector as the new Praia Airport will increase and facilitate trade and link several destinations. Thus, the project will foster the creation of new industrial units and the expansion and development of existing units. The project's potential impact on industrial activities will be moderate positive.

Impact on transport

In addition to improving air services, the airport expansion will lead to an increase in annual air traffic. This will have a positive impact on the transport sector by increasing the number of scheduled flights to specific destinations and providing services to new destinations. The increased tourist flow will help strengthen urban and inter-urban road transport. The project's impact on air transport is positive, permanent and highly significant.

2.2. Adverse impacts:

Works phase impact

The construction phase is a transitional phase limited in time and space whose impact should not be overlooked. The typical effects of site operations are relatively linked to works set-up, operation of Praia airport's existing facilities, movement of construction equipment and implementation of expansion works.

Impact on air quality

During the works, several sources are likely to cause a decline in air quality, due primarily to the movement of materials and equipment, as well as construction works. These emissions and exposure of residents are short-term, especially as the urban fabric is less developed in areas close to the project site, and quarries are usually located outside urban areas.

Soil pollution

Sources of soil pollution on the project site during the works phase are generally the storage or transportation of hydrocarbons and oil used in construction works and equipment maintenance. In addition, some site operations, such as uncontrolled draining of oil from construction machinery outside specially designed areas, as well as the supply of equipment with fuel could cause leaks and spills. Such accidents have environmental effects that mainly stem from non-compliance with rules on storing hazardous products as well as mismanagement of the site and its equipment. The airport rain-water drainage system does not involve any treatment before discharge: any soil contamination by the oil is drained into the sea. The works site's impact on soil pollution is considered as high, with a local scope.

Erosion

At the airport site, the soil is hard with rocky outcrop which makes them less susceptible to erosion. However, the probability of large gullies in the borrow pit areas will be quite high during the rainy season. This, coupled with the land works, will intensify the risk of erosion temporarily during the rainy season. Taking into consideration this season's short duration and scanty rain-fall, the extent of the impact is moderate and over specific periods.

Pollution and deterioration of water quality

Since there is no permanent surface water flow, the works phase does not pose a direct threat of contamination to water resources. However, run-offs during the rainy season may alter the quality of marine water by spreading pollutants in rain-water drained into the natural outlet.

During the works, water needs will be significant (construction, watering / compaction, etc...). These needs will be met by the desalination plant which will be operational before the start of the airport extension works. The construction phase that will last 18 to 24 months will require the about 120 workers on-site without having a permanent camp. Water needs of the site are about 37 m³/day (construction, irrigation water / compaction needs, workers needs, etc.) that will be added to the 150m³/day of the current needs of the airport. During the construction work, water needs will be covered by the desalination plant that will be operational before the works. If necessary, the water needs will always be guaranteed by tanker till the operation of the desalination plant.

Impact on the flora

The terminal's extension will take place on the space currently occupied by a vehicle parking lot. The aircraft parking, for its part, will be built on the reserve area on the airport grounds. No natural terrain will be used for the project and the clearing of vegetation is not required.

Impact on the fauna

The identified avian fauna is not sedentary and has no permanent site on the airport grounds. The same is true for migratory birds which do not have nesting or resting areas identified around the airport. They will be little disturbed by the works.

The endemic and protected fauna is concentrated in national parks north of the island well beyond the project's direct impact area. The works' impact on birds and the fauna is considered minimal.

Impact with regard to population displacement

Given that the project is part of the existing airport area, there will be no population displacement. There will be no permanent or temporary impact during the construction phase on the project area.

Impact on existing infrastructure

During the works phase, the movement and supply of materials and construction equipment will generally be by road, especially through the national road that grants access to the airport area. The national road was not built to bear heavy vehicle traffic and machinery which will result in its degradation. This also applies to the roads to be used by construction material delivery trucks between the borrow pit areas and the airport. The project will therefore have a permanent negative impact, with a local scope.

Impact on health

The Praia Airport Expansion works will have potential adverse effects regarding public safety and workers. Given that the expansion works will be carried out without interrupting airport operations, the potential extent of the risk to health and public safety will depend on the population size and workers exposed and degree of exposure. Persons permanently working on the construction site will be exposed to air pollution throughout the construction period. This impact of medium intensity is limited in time and space.

The risk of work accidents during construction will be due to the presence and handling of equipment and materials. The risk of work-related accidents is considered high, but temporary and concerning isolated incidents.

Moreover, the lack of and non-compliance with minimum safety standards are a threat to the health of workers' who may be exposed to many diseases (diarrheal, water-borne diseases, etc.). The proliferation of hygiene-related diseases is expected to be moderate, temporary and specific.

Impact on mobility and road safety

The road adjacent to the one leading to the Praia Airport serves as an access road and a connection between the industrial area, Praia and the surrounding communities, especially the village of Sao Tome. The disruption of road traffic will mainly be due to traffic consisting of trucks transporting materials and the presence of heavy traffic on the road. Thus, a momentary disruption of the connecting roads can be seen as affecting access to the terminal and traffic on the roads between the homes and airport. This type of disturbance will be occasional and limited in time. Its intensity is rather low due to the limited traffic.

Impact on living conditions

In the project area and during construction, air quality can deteriorate due to dust and gas emissions. In addition to aircraft noise, noise and vibrations from equipment will be felt by airport workers and users. The noise made by aircrafts may be an awful source of nuisance and, in many cases, a factor constraining development around the airport. Although the Praia Airport is far from homes, the noise is already being felt in the village of Sao Tome. In addition to air traffic vibrations, the main sources of noise during the construction phase will be the mechanical equipment operated on site. The construction works will not cause any major nuisance as the works are confined to the airport. At night, the noise is negligible because air traffic is low and construction is stopped. The project's impact on the quality of life is local, temporary, and moderate.

Impact on the landscape

It is clear that any construction site has an impact on the landscape of its environment, but these effects vary greatly according to the environment close to the operation zone. Although the Praia Airport is located at the end of the industrial zone and close to urban areas and that the impact on the landscape is limited in time and space, it is still considered to be of average importance, because the site will be within an operational international airport.

Identifying the impact of airport expansion

Impact on air quality

The sources of air pollutants and precursor emissions are aircrafts, ground support equipment (hardware), auxiliary power units such as generators, cars, fuel storage facilities and fire training. A variety of equipment will serve large commercial aircrafts as they board and disembark passengers at the airport. These facilities include aircraft tugs, air conditioning units, and baggage trailers.

Sources related to the aviation industry contribute to a variety of major emissions. The pollutants considered are:

- Carbon monoxide (CO);
- Sulphur dioxide (SO₂);
- Nitrogen oxides (NO_x);
- Volatile organic compounds (VOCs) / Hydrocarbons;
- Respirable particulate matter (PM₁₀);
- Respirable particulate matter (PM_{2.5}); and
- Tropospheric ozone (O₃).

The global transport sector emits 14% of greenhouse gases; the aviation sector contributes only about 2% to greenhouse gas emissions. CO₂ emission rate due to road traffic as a result of Praia Airport activities will increase from 215 to 335 kg / km / day by 2020.

Emissions from aircraft engines are calculated according to LTO (Landing Take Off) cycle described in Annex 16 of ICAO. This cycle divides an aircraft passage at an airport into four phases: approach, taxiing, take-off and ascent. For each of these phases and each aircraft engine

type, there are NO_x, CO and unburned hydrocarbon pollutants. A knowledge of the fleet anticipated for a given period makes it possible to calculate emissions during this time. In 2020, the number of expected passengers is 939,661 emitting 150,970 tons of CO₂. An increase of 2,206,063 passengers at the Praia Airport in 2035 will generate an additional 350,970 tons of CO₂.

The impact on air quality due to road and air traffic is considered medium and permanent.

Impact on soil

During the airport's operational phase, the risk of soil pollution due to toxic or hazardous products accidentally or voluntarily spilled in liquid or solid form is related to the airport's daily operation and routine maintenance. The risk of pollution is higher during certain operations such as maintenance, draining airport equipment and refuelling. These operations can lead to leaks, spills or rejection of these hydrocarbons and their auxiliaries, such as oil hydrocarbon/lubricant/solvent, chemical waste, items containing hazardous heavy metal compounds. Given that all maintenance and refuelling operations currently take place in water-proofed areas and that these areas will not be affected by the airport expansion works, the impact on soil is considered low.

Impact on water needs

Given that the building of a desalination plant with a capacity of 250m³/d has been planned to serve the Praia Airport from the second half of 2013 and that production will double by 2017 to 500m³/day, the project will not put pressure on water resources used by the population because it will operate autonomously. The project's impact is considered minimal.

Risk of pollution and decline in water quality

During the rainy season, water run-off containing pollutants will carry the pollutants through an oil separator to the natural outlet which is the sea. It is assumed that 20% of the airport area (122ha) is impervious.

Impact on the fauna

During a bird species survey at the airport in 2011, no rare or endangered species were unidentified; the protected endemic fauna is concentrated in the two national parks in the north of the island. However, several bird species have been identified around the project site. The presence of birds is closely related to the presence of favourable conditions such as for food and resting places. Currently, the bird population around the airport is not affected by air traffic. However, with the increase in traffic, there will be a disturbance of species around the airport. The impact is moderate, local and permanent.

Impacts on urban expansion

The project is likely to lead to increased population. It is in this context that the Praia Municipality is taking into consideration the presence and expansion of the Praia Airport in its local development plans. There are plans to control unplanned housing in urban areas around the airport such as Achada Grande, and to define urban expansion zones which take into consideration the airport's overhead easement plans. The surrounding areas have already been designated as industrial zones for companies and other employment centres.

Odour nuisance

The odours associated with the airport under operation could be emitted from fuel reservoirs, a malfunctioning sewage treatment plant or poor waste management. The airport as currently managed does produce any odours and the waste management system is under control. The extension provides for the creation of a new treatment plant with tertiary wastewater treatment. The project impact can therefore be considered minimal.

Sound Nuisance

Road traffic is expected to be thrice the current figure in 2035, that is, more than 3,000 vehicles/day in 2035. The increase in road traffic and use of public roads to reach the airport will be a source of noise. However, the access road does not run through any urban area. The neighbourhoods close to the airport site are 3 km away. Therefore, the project impact is considered low and expected to occur on isolated occasions.

The increased number of flights will lead to air-traffic-related noise. Following the airport's expansion, there is a projected 6% increase in air traffic in 2035. The analysis has shown that, in the event of high traffic, residential areas close to the airport would be affected by noise levels below 65 dB. The village of Sao Tome which is adjacent to the airport is located in the area between noise propagation curves of 60 and 55 dB. Areas subject to noise levels above 65 dB are mostly located within the airport site. Therefore, the airport's operation is not expected to generate much noise. The project's impact on the acoustic environment will be permanent, with a specific scope, and average.

3. Improvement and Mitigation Programme

Measures to be carried out during construction

Taking into consideration, for the project work phase environment, a few measures- sometimes simple- concerning the conduct and scheduling of works can significantly reduce pollution.

The general measures that may be taken to reduce the adverse impact of works on the environment include:

- Improved management of works and their impact on the environment (water, soil, waste, safety, etc.);
- Rigor in drafting specifications and completing construction works;
- Using the services of an environmental expert; and
- Implementing measures outlined in the ESMP.

Special importance will be given to measures relating to works organization and implementation as key measures to reduce the construction phase nuisance. When selecting contractors, the Prime Contractor is expected to impose selective criteria in favour of those who provide the most environmentally friendly services. In addition, the Tender Dossier for construction works implementation should contain environmental clauses to guarantee the contractors' commitment to the respect and protection of the environment during construction and to include the budget

allocated for the implementation of environmental measures in the overall construction budget. These provisions must be binding and will be closely monitored.

The contractor will develop a traffic management plan as well as a solid and liquid waste management plan which will be submitted to the Prime Contractor for approval. In addition, the contractor will commit to:

- Medically monitoring construction personnel;
- Sensitizing construction workers on STD/AIDS;
- Providing staff with personal protective equipment: dust masks, gas masks, gloves, boots, helmets, etc.

The choice of borrow pit areas will be jointly made by the contractor and the prime contractor from the list of sites identified in the project's Detailed design (DD). This choice must take into consideration environmental issues in the borrow pit area and its distance from the airport. The contractor is required to design a programme for management of quarries and borrow pits and restore them after the works. Where the contractor uses a sub-contractor for the supply of materials, these conditions must be specified in its contract with the sub-contractor.

Works will go on without interrupting air traffic. Regarding the transportation of materials to and from the project site, the contractor will indicate truck itinerary and frequency with the aim of reducing pollution affecting the local population. The contractor will impose on all its drivers and sub-contractors a speed limit of 40 km/h in all the villages and settlements, as well as at intersections. Drivers exceeding this speed limit will face internal disciplinary action.

Companies will be required to submit within their technical proposals the itinerary of the works traffic in a spirit of minimizing impacts to local residents. It is noted that the companies considering the environmental and social management during the works will have an advantage.

The contractor's terms of reference must include:

- An occupational health and safety plan, as well as a traffic plan compatible with the level of risk posed by the construction site;
- An HSE engineer in its team to ensure the safety of all staff and local residents during construction;
- The sensitization of construction workers on safety, wearing of personal safety gear, as well as residents and other road users on the need to respect the highway code; and
- The availability of proper road signs at the project site, especially near road crossings and activity areas.

Under the prime contractor's supervision, the contractor will clean and remove any type of pollution resulting from its operations at its own expense. Thus, the contractor is required to rehabilitate the roads damaged due to project works at its expense.

A project coordination and programming unit will be established to optimize the project's technical organization and take into consideration environmental issues. This unit will comprise:

- At least one representative of the prime contractor;
- At least one representative of the contractor in charge of works; and
- A representative of the Directorate General for the Environment (DGE).

Mitigation and support measures during operation phase

As part of efforts to preserve water and soil resources, the airport must:

- Maintain the drainage systems to prevent overflow or spillage;
- Optimize human and material resources for waste collection and management;
- Sensitize staff on proper water management and use;
- Have enough disposal bins to cover the entire airport;
- Ensure the sorting and separation of organic and inorganic waste;
- Ensure that collected waste is transported to the municipal landfill, in accordance with the regulations;
- Ensure proper operation of the waste-water treatment plant;
- Avoid the spreading of pollutants during the rainy season, to prevent them from being washed and drained into the sea; and
- Install an oil separator to pre-treat rain water and water drained from roads and other impervious areas of the airport before release into the natural environment.

Solid waste management programme

The waste management system currently used in the airport can be maintained after the airport expansion: removal of organic and solid waste to the municipal landfill and collection of waste oil by a waste oil recycling company.

Monitoring of air quality and noise pollution

Aircraft noise measuring campaigns should help in updating the noise map that ASA already has and identifying vulnerable areas.

Noise levels will be recorded during cycles A/D for each type of aircraft, at village of Sao Tome, to determine the degree of nuisance suffered by the villagers.

Reinforcement of human security

From the project's technical design stage, several actions have been undertaken to enhance human security:

- putting up sign posts;
- marking parking areas;
- building protective fencing around the facilities;
- developing airport entry and exit speed control mechanisms; and
- marking pedestrian walk-ways.

Checking bird risks

The presence of birds at airports is a recurring problem which requires the availability and implementation of a clear plan to check risks posed by birds. The Praia Municipality has an important role to play beyond the airport site (checking landfill dumps, vegetation control and nest removal, prohibiting grazing in the buffer zone, etc...). Since November 2010, a database of incidents involving birds has been operated. The incidents are usually reported by pilots or airport staff. Since its inception up to May 2011, there have only been 15 incidents (collusion with birds), including 5 identified birds.

Energy consumption measures

During the operation of the airport, energy consumption will increase in terms of:

- Fuel for air and land transport, as well as the operation of certain equipment; and
- Electrical energy for lighting and supplying power to all electrical items.

The airport operator must engage in a process of rationalizing energy consumption. In this regard, consumption monitoring sheets must be established and regularly sent to the project sponsor. Rational and feasible objectives must be jointly set by the DGI and the airport operator, with the involvement of the relevant local services.

4. Monitoring programme and complementary initiatives

Monitoring plan

The monitoring is based on specific criteria and indicators:

- Level of maintenance of construction machinery and equipment (maintenance sheets);
- Hygiene and sanitation at the site;
- Use of personal protective equipment (PPE);
- Solid and liquid waste collection and management;
- Statistics on STD/AIDS;

- Statistics on work accidents;
- Statistics on persons hired from Sao tome and Achada Grande;
- Statistics on local workers compared to foreign workers;
- Number of complaints.

Monitoring programme

Environmental and social monitoring activities involve:

- The monitoring of water quality around the airport by water services or a private laboratory during the dry and rainy seasons. The parameters to be analyzed relate to concentrations of heavy metals (lead, copper, cadmium and zinc) and hydrocarbons in water.
- Air quality and noise level measurement campaigns: The air quality monitoring programme should include an initial pollutant measurement campaign that will serve as a benchmark. This campaign should take into account urban or semi-urban centres around the airport such as the Sao Tome and Achada Grande. The programme will ensure periodic monitoring at least through immediate assessment of concentrations of the following: NOx: as an ozone precursor, CO2: as the main contributor to climate change; PM10: Given the large quantities emitted. These campaigns will be conducted each quarter. The results will be published by AAC, DGA and Praia Municipality services.
- Annual monitoring of STD/AIDS prevalence and respiratory diseases in health centres and project dispensaries. The mastery of this trend should allow for timely feedback from all authorities and the targeting of the appropriate sensitization campaigns:
- Accident monitoring; and
- Monitoring bird hazards at the airport.

Complementary initiatives

A social support plan has been proposed as a complementary initiative to improve the project's environmental and social performance. During visits by the Consultant and the Bank mission, representatives of the Sao Tome population expressed their expectations and wish to have assistance from ASA through an academic assistance programme (school supplies, transportation).

A social support programme supported by ASA-, in consultation with the two associations present and active (Community Association for the Development of Sao Tome Patete (ACDSP) and the *Association Unidos para o desenvolvimento Achada Grande*), aims at socially supporting

women and strengthening technical means, as well as building the capacity of associations in the area.

Among other activities, ASA will support a training programme for women involved in crafts and making marmalade. The Praia Airport Management will have a small shop to exhibit finished crafts and marmalade made by women in the project area.

5. Institutional measures and capacity building needs

ESMP implementation monitoring will be under the responsibility of the monitoring unit and other competent authorities.

The Project Monitoring and Environmental Management Unit (CES): The Project Monitoring and Management Unit will be in charge of project supervision. It will optimize the project's technical organization and take into consideration environmental issues. Such a consultation framework should include all stakeholders (including local elected officials, especially Sao Tome and Achada Grande heads, representatives of several ministries, etc...) in order to consult them of the proposed measures and invite them to develop programmes and activities within their mandate.

The monitoring office's environmental expert will provide continuous supervision and constant monitoring of the natural and human environment preservation component during the Praia Airport expansion. It will provide monthly implementation status reports on environmental actions to DGI and will report on difficulties encountered.

Moreover, the Airport environmental expert's main responsibilities will be:

- Implementing the Environmental Management Plan in its operational phase;
- Ensuring the Airport's compliance with national environmental regulatory standards;
- Observing, reporting and recording cases of non-compliance and complaints;
- Communicating environmental information to DGI and DGA; and
- Preparing periodic environmental reports.

6. Public consultations and information disclosure requirements

As part of the project, public consultations were held with representatives of villages that are closest to the airport (Sao Tome and Achada Grande). In addition, meetings were also held with relevant technical services and stakeholders. The population's expectations and concerns relate to the recruitment of local labour for construction and operation, assistance to villagers (assistance to NGOs, provision of school buses, provision of fish conservation equipment, school canteen, etc...). Air traffic disturbance remains the local population's main concern.

According to local regulations, the Environmental and Social Impact Assessment (ESIA) report should be disclosed in 15 days.

As this operation is classified as Category 2, the ESMP summary will be published on the Bank's website for 30 days before submission to the Board of Directors.

7. Cost estimates

The ESMP cost is estimated at CVE 29,431,100 or about EUR263, 000, broken down as follows:

- 1- Preparatory Phase: CVE 14, 904, 400 or EUR 133,035.
- 2- Construction Phase: CVE 4, 485, 900 or EUR 40,052
- 4- Project Operation Phase: CVE 10, 022, 800 or EUR 89,489.

8. Implementation schedule and report production

- Monthly inspection reports to be prepared by the contractor's environmental expert: these reports will be made available to all stakeholders upon request. These reports contain all environmental actions carried out during the current month.
- Quarterly inspection reports: These reports are prepared by the monitoring office's environmental expert. The monitoring office will identify areas of non-compliance by the contractor and will make recommendations on corrective measures to be taken. The degree of non-compliance will also be noted for possible imposition of a fine by the DGI.
- Annual Reports: An annual report will be produced by the prime contractor, DGI, and will comprise:
 - A summary of the implementation status of ESMP environmental measures
 - A review of environmental indicators defined or any changes made during the year;
 - A summary of environmental monitoring programmes undertaken during the year, a discussion on results and conformity assessment; and
 - A discussion of any major environmental incident, as well as any amendments to ESMP procedures, to prevent the recurrence of such incident.
- An annual report (construction and operation phase) will be submitted to the AfDB.