**REPORT**

# New International Airport of Cabinda (NAIC Project) - Angola

*Environmental and Social Impact Assessment - Chapter 12 - Impact Assessment_Social Components*

Submitted to:

**ASGC**
Level 3, Building 7, Bay Square, Business Bay
Dubai, United Arab Emirates

Submitted by:

**WSP ITALIA srl**
Via Banfo, 43 - 10155 Turin - ITALY

+39 011 234411

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**TABLES**

# 12.0 IMPACT ASSESSMENT – SOCIAL COMPONENTS

This section presents the results of the impact assessment on social components conducted according to the Impact Assessment Methodology described in Chapter 09. For each impact factor identified and considering all the social components they might affect, an impact analysis is presented, together with the related mitigation measures, and the residual impacts.

Monitoring measures are not described in this document, instead they will be listed as part of the Environmental and Social Management Plans (ESMPs).

## 12.1 Impact Assessment for Construction Phase

As described in Chapter 09 of this ESIA (IA Methodology), the Project actions carried out during the Construction phase can be primary generators of environmental or social pressures, which are identified as impact factors.

The potential social impacts that may be triggered by the identified impact factors during the operation phase are described in the following table.

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| Removal/degradation of soil and vegetation | Vegetation is an element that generally plays an important role in the perception of a landscape.<br><br>The removal of vegetation within the site will alter the current aspect of the site, however the facilities will be constructed mostly upon degraded habitats that do not have specific visual quality. Land clearing and levelling as well as dumping of excavated material will also cause for the alteration of landscape integrity in the Project area. The extension of the Project footprint is significant, considering the overall size of the runway and of the airport facilities. However there are no human receptors in close proximity to the site and no sensitive viewpoints or areas of landscape value were identified in the Project area.<br><br>From the baseline conducted, no known elements of tangible cultural heritage have been identified within the Project site have been identified and in the range of 2.5 km from the Project site. Considering this distance no impacts on known cultural heritage sites are expected due to Project activities and For this reason the impact assessment is not carried out for this component. Specific measures, outlined in the Chance Find Procedure, will be implemented in the case such elements are found during the construction phase. Considering the distance of the Project site from residential areas, it is unlikely that the Project may generate interferences with intangible cultural heritage elements such as celebrations and festivities.<br>Stakeholder engagement will continue throughout the construction period. Should aspects around cultural heritage be raised during this period they will be considered accordingly.<br><br>Based on findings to date a standalone / specific engagement process to identify specific measures to preserve cultural heritage does not appear warranted. If significant this issue should have become apparent, and any measures required identified during the ESIA stakeholder engagement process. | ■ Landscape and visual quality<br>■ Cultural Heritage<br>■ Ecosystem services |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | No priority ecosystem services were identified during the consultation and site survey in the Project area. | |
| Change in the local morphology and topography | Construction material pile up within the Project Site as well as construction vehicles and equipment, undisposed waste on site, including dust pollution, will reduce the aesthetic conditions of the Project environment and it will effect a visual change to the existing landscape character. As mentioned no specific receptors that could be particularly affected by visual impacts have been identified. | ■ Landscape and visual quality |
| Change in the local hydrology and surface water quality | Impacts on the hydrological regime and surface water quality could occur during the construction phase due to the discharge or introduction of pollutants into freshwaters, mainly due to the discharge of stormwater.<br><br>It has been reported that the surface rainwater drainage system may direct the runoff to natural courses, depending on technical and economic feasibility. If no effective filtration or treatment is applied before the stormwater is discharged, harmful pollutants may reach freshwaters.<br><br>Habitat modification has the potential to alter the availability of fresh and marine fish and potentially impact the fishing activities performed by the local communities. This might impact the ecosystem services around the area connected to fishery and use of water resources.<br><br>However according to the social baseline, no ecosystem services were identified during the consultation and site surveys in the Project area. | ■ Ecosystem services |
| Emission of dust and particulate matters | Dust comprises particles typically in the size range up to 75 micrometers (µm) in aerodynamic diameter. The larger dust particles fall out of the atmosphere quickly after initial release and therefore tend to be deposited near the source of emission. Any process that generates dust will also generate fine particulate matters (PM). Such particles can be inhaled and can result in health effects.<br><br>Construction activities associated with the Project that have the potential to generate and/or resuspend dust are likely to include:<br>- Excavation, levelling and loading activities;<br>- Movement of trucks and construction vehicles on and off-site;<br>- Materials handling, storage, stockpiling, and disposal;<br>- Generation of construction waste;<br>- Generator sets (in case they are used).<br>These emissions can have direct effect on the health conditions of people in proximity to the Project Site. The Project is performed in the designated industrial area; the closest human settlements are at a distance of 3-4 km from the Projects site, in the villages of Malembo and Bissassanha. However, at around 600 m from the Project site, an education facility called OMITC and an accommodation facility used for students and workers called MDC have been identified.<br><br>During construction, the emissions may affect mostly workers on site; however these activities are temporary and specific mitigation measures will be implemented. | ■ Community health, safety and security |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| Emission of gaseous pollutants | Construction activities will generally entail the emission of pollutants, which will be produced particularly by these activities that have the potential to release gaseous pollutants:<br>- Vehicles use, which generate air pollutants from engine combustion, such as CO, volatile organic compounds (VOCs) and lead emissions;<br>- Excavation, levelling and loading activities. Machinery such as the excavators and dump trucks used in the Project operate on diesel engines and release pollutants into the air. These include CO, CO2, NOx and hydrocarbons;<br>- Use of hazardous chemicals that may include paints, glues, oils, thinners, and plastics, which all produce noxious vapours, such as VOCs.<br><br>Several gases chemical species may lead to adverse health effects. Gaseous pollutants typically comprise sulphur dioxide (SO2), ozone (O3) nitrogen oxides (NO and NO2), carbon oxides (CO and CO2), and PAHs. Other air pollutants such as certain heavy metals and persistent organic pollutants, accumulate in the environment and can enter the food chain causing indirect exposure to them.<br>It is well established that pollutants can lead to episodic and chronic health problems in human receptors.<br><br>The impacts are similar to those related to Emission of dust and particulate matter and will affect particularly the surrounding communities and workers on the site. Furthermore, according to the social baseline, no human settlements have been found in the proximity of the Project area. The nearest settlement is the commune of Malembo at around 4 km at north west from the Project site. The closest human settlements are at a distance of 3 km from the Projects site, in the village of Bissassanha at north. However, at around 600 m from the Project site, in front to the Project entrance road, an education facility called OMITC and an accommodation facility used for students and workers called MDC have been identified. It should be noted that specific mitigation measures will be implemented. | ■ Community health, safety and security |
| Emission of noise and vibrations | The emission of noise and vibrations can have direct effects on the health of people, especially affecting sleep and concentration.<br><br>Construction activities such as vegetation clearance, earthworks, mobilization of vehicles, workers and equipment, transport of materials and waste (which will increase the amount of traffic), road works, buildings' construction and infrastructure construction are expected to generate noise and vibration.<br><br>The Project is performed in a designated industrial area not in proximity of human settlements; the closest human settlements are at a distance of 3 km from the Projects site, in the village of Bissassanha. However, at around 600 m from the Project site, in front of the Project entrance road, an education facility called OMITC and an accommodation facility used for students and workers called MDC have been identified.<br><br>It should be noted that construction activities, particularly the noisiest ones, will be performed for a limited period of time and that specific mitigation measures will be implemented. | ■ Community, Health and Safety |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| Emission of light | Artificial lights may have an effect on the overall landscape context and can be particularly visible in contexts where artificial illumination is limited. During construction it might be necessary to use artificial light. Working activities are not expected to be performed during night-time, therefore there will not be the need for lighting in construction areas. However, some material storage areas and the accommodation camp will require permanent artificial lighting for security reasons.<br><br>The emission of light will have impacts on the current landscape at night-time, considering that the presence of artificial lighting in the area is currently limited. As mentioned, limited receptors that could be affected are present in proximity to the site. In addition specific mitigation measures will be implemented to avoid glare and spillage of light outside of the Project site. | ■ Landscape and visual quality |
| Existence of new building/ infrastructures visual impact | During the construction phase, construction equipment will be used and will be visible from outside the Project Site. The most visible elements will consist of cranes, which, due to their height, can be visible from further distances. Moreover, the new buildings will be visible as the construction goes ahead. It should be considered that construction sites and the presence of construction equipment is common in industrial areas and therefore will not represent a particularly unusual visual alteration. At the end of construction activities, all equipment will be removed. | ■ Landscape and visual quality |
| Production of solid waste | Waste during construction will be managed in the Waste Management Centre (WMC), that will be built in the camp. Solid waste (carton, wood, metal, etc..) is collected at source from the Cleaning and Environment team and sent to the WMC. The waste that will not be recycled/ reused (plastic, solid waste, organic waste) will be disposed of in the existing area designated by the Municipal Administration of Cabinda (60 km from NAIC airport) called Yema dumpsite, not aligned with Lenders requirements. In the current conditions this dumpsite does not meet Project standards and should not be considered a waste disposal option for the Project.<br>Furthermore, the subcontractor has not been chosen yet, however it will be a duly licensed local/national company.<br><br>A sanitary landfill and waste collection and treatment centre is reported that will be built in the Subantando Village, however there is no scheduled date for the beginning of the construction.<br><br>Waste generated by the Project can add increased pressure on waste disposal systems and infrastructures, particularly in the context of Cabinda, potentially leading to an overall worsening of the Municipal waste management, if mitigation measures are not implemented. | ■ Mobility and Infrastructure |
| Production of wastewater | The presence of workers will generate increased amount of wastewater. Domestic wastewater (which originates predominantly from -among others - showers, toilets, sinks, washing machines, kitchens, floor cleaning in administrative areas, bedrooms, and bathrooms) and construction wastewater (-among others- site surface runoff, vehicle and equipment washing, wastewater from mortar production, washing of asphalt plant structures) will be produced during the construction phase. | ■ Mobility and Infrastructure |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | Additional wastewater produced during construction might increase pressure on the already lacking wastewater treatment infrastructure of the Project area. The Project has embedded mitigation measures to prevent additional pressure on infrastructures such the construction of an underground Wastewater Treatment Station – that will receive the domestic sewage of accommodations, bathrooms, offices, gyms and canteen, and the implementation of septic tanks that will treat the wastewater, while sanitary drains will send the effluents to the nearest water drains. The produced sludge will be collected by licensed operators and disposed accordingly (to the municipal sewage network or licensed sanitary landfills).<br><br>The final destination of effluents has not been indicated and knowing that the Province of Cabinda has no wastewater collection system in place, in case the effluent is discharged in surface waters, it is important to have in mind that although the main function of water treatment plants is the cleaning of polluted wastewater produced by human activity, their effluents can become a source of pollutants in rivers, leading to poor water quality and ecological degradation. Common impacts are due to the presence of phosphorus and nitrogen, elevated temperatures below effluent outfalls, dissolved oxygen levels, high nutrient levels which may increase algal biomass and water turbidity, among others.<br><br>The same applies to the sludge. While the sludge will be collected by licensed operators, its final destination is unknown.<br><br>It is relevant to take into consideration that the Province of Cabinda has no wastewater collection system in place. Therefore wastewater generated by the Project can add increased pressure on wastewater systems and infrastructures, particularly in the context of Cabinda, potentially leading to an overall worsening of the wastewater management, The Project is considering viable options including the use of mobile waste water treatment plants. | |
| Energy and fuel demand | All Project activities will require some type of energy to be performed, either through the combustion of fossil fuels for the operation of vehicles and machinery (and possible use of diesel generators in the case of power outages), or through the use of electricity for the workers accommodation (air conditioners), offices (air conditioners, notebooks, monitors, printers, etc.), laundry rooms, and kitchen (air conditioners, industrial kitchen equipment, refrigerators, etc.).<br><br>Regarding electricity needs, the construction will be connected to a power transformer station of the National Electricity Distribution Company (ENDE), as requested by the contractor to the Municipal Energy Network. However, as mitigation measure, as a backup, four generators of 500 kVA each and four of 60 kVA will be used. The power supply, as reported in the social baseline, is intermittently as most of the neighbourhoods in Malembo do not have electrical power from the grid.<br><br>The Project has embedded mitigation measures, such as – among others – that the Project will implement LED street | ■ Mobility and infrastructures |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | lighting luminaires at the access to the airport premises (NAIC access road, Sassa-Zau road and roundabout) which has lower energy consumptions, longer life and higher efficiency compared to conventional lighting.<br><br>However, the Project's energy need for construction activities may generate intermittency in the grid supply and generate increased pressure on the overall Municipal energy network and distribution system, particularly where it is not particularly developed. This therefore can create interferences to energy supply and access for local communities. | |
| Water demand | Water demand is estimated during the construction phase (48 months) to be 8.738 $m^3$. The activities that will require larger amounts of water are earthworks, production of concrete and asphalt, preparation of food and dust control.<br><br>Water is going to be sourced from an artisanal well that will be located in the water technical area and the Cabinda Water Supply Network that goes through Sassa-Zau road. Then the water will be treated in a water treatment station within limits specified by Law and then stored in surface tanks and pumped through pressurization system.<br><br>As underlined in the social baseline, in Cabinda Province, households that have access to safe drinking water is of 73% but in rural areas the percentage decreases to 38%.However, the Project will have two supply sources for water needs during construction therefore mitigating the pressure on existing infrastructures. | ■ Mobility and infrastructures |
| Influx of population | Influx of population will be generated by the need of workforce during the construction phase. The influx of population relates to relations between outsiders and newcomers, changes in social capital and other indirect changes on population and demographics. Since the Project will have a long timeframe, additional people, the so called "followers" which usually are - among others - family members of workers, others service providers, and persons in search of employment, might arrive to the area in addition to the labour force. Moreover, the planned arrival of new workers in the area may increase competition for resources and attract economic migrants or people looking for employment and new type of livelihoods. The migration of external persons can lead to social fracture or conflict between outsiders and the local community or between and within neighbourhoods or even towards the Project, if perceived as the source of unwelcome new households. The Project will create around 828 employment positions during construction therefore with an expectation of even more induced jobs.<br><br>Due to the influx of population from inside the country and outside the country, an increase in communicable diseases and burden on the local health services might occur in the area. This might occur due to an increase of in-migrants with undetected diseases and increased interactions between local communities and persons coming from other parts of Angola or from abroad. Baseline data reveals that typhoid fever, diarrhea and intestinal parasites are highly recorded in the Province, therefore these diseases could additionally increase due to the arrival of workers. Baseline data did not reveal the prevalence of HIV/AIDS and STDs in the area. However, it | ■ Population and demographics<br>■ Community health, safety and security<br>■ Ecosystem services<br>■ Cultural heritage |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | could occur that the presence of workers in the area might increase the risk of infection and prevalence of these diseases. Furthermore in the social baseline has been noted that the commune of Malembo and Cabinda Province are perceived relatively secure. However, with the arrival of workers, the rate of crimes (such as – among others - theft, prostitution, physical assaults) and perception of insecurity by the local community may increase.<br><br>To conclude, the influx of population might create disturbance to local communities for intangible cultural heritage such as – among others- social practices, rituals, and festive events. However no particular intangible cultural heritage has been identified in the Project area hence no significance is expected for this impact. | |
| Security management | The management of security of working areas and accommodation facilities, in large scale Projects, as the current one, often poses risks in terms of human rights of workers and local communities' safety and security. Tensions between community members, local businesses, sub-contractors and other stakeholders and security personnel may arise due to actual or perceived Project impacts as well as actual or perceived behaviour of security personnel. Moreover, if the behaviour of the security personnel is perceived threatening by local communities to their wellbeing, conflicts may arise.<br><br>Security on the site will be provided through security personnel and a security fence. The Contractor has provided the name of the local security service provider that will be used, named Lince Segurança S.A. According to "NAIC Safety Plan" provided by OEC, the company has not been identified to be involved in pastabuses or crimes and thus the security provider has been through the Contractor's safety check. Moreover, it has been claimed that firearms are prohibited to be used on site. | ■ Community, Health, Safety and security |
| Demand for workforce | Construction activities will generate both a direct and an indirect demand of workforce. Direct opportunities are those jobs with OEC, both permanent and temporary whilst indirect employment opportunities are those jobs with the contractors and suppliers; resultant induced employment is the employment arising from increased disposable income and demand for additional goods and services.<br><br>Workers to be used during construction, may be skilled, semiskilled and unskilled type. In addition, a number of workers will be necessary for associated activities, such as the catering, cleaning of the accommodation and security services.<br><br>The construction phase's workforce is estimated at 828 workers during peak construction time. 95% of the workforce is expected to come from Angola, due to local content policies, while 5% of the workforce will be foreign. Moreover, indirect workforce demand will be generated along the supply chain for the provision materials, goods and services. 1500 direct and indirect jobs are estimated to be generated. Both direct and indirect working opportunities will generate positive effects on | ■ Economy and employment |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | the income of the workers and on the overall livelihood conditions of their households; however it should be noted that most of these work opportunities will be of temporary nature. In addition to positive benefits from an economic standpoint, the Project will also generate the development of local workforce through training programs, which can then be useful to find future employment opportunities. Finally, the demand of workers and hence the presence of workforce in the area will likely generate informal economic opportunities linked to selling products to workers such as food and small everyday items. OEC will ensure that labour conditions applied to direct and indirect workers comply with Angolan legislation and meets ILO core conventions and PS2 key requirements.<br><br>With regards to the accommodation of the workforce, the facilities are under construction and will be provided to workers coming from other parts of Angola and from abroad. EOC is committed to provide accommodation compliant with the Guidance note by IFC and EBRD "Workers' accommodation: processes and standards".<br><br>As of now the accommodation has not been constructed and the currently employed 155 workers are being hosted in the ESS Village Hostel and as soon as other workers will be needed during construction they will be accommodated in other commercial hostels in the City of Cabinda, having positive effects on local economy.<br><br>A Labour Management Plan, comprehensive of worker's accommodation plan, will be implemented. | |
| Demand for raw materials and goods/supply chain | Construction activities will generate both a direct and an indirect demand of goods, materials and services. Direct demand consists in goods, materials and services directly procured by OEC.<br><br>The procurement of goods, materials and services provides an economic benefit to the companies involved and employment opportunities. The portion of goods, materials and services sourced locally will increase the overall economic benefits generated by the Project within the local community. Indirect demand consists of goods, materials and services sourced along the supply chain.<br><br>Materials for concrete, mortar and asphalt mixtures will be procured from close quarries in Cabinda Province, whilst other materials and equipment will come from Angola, but also other parts of Africa, and the rest of the world. Considering the nature of the Project, the procurement of goods, materials and services will be done according to high standards in terms of working conditions, quality and management of environmental and social aspects. This will encourage the adoption of these standards by companies (if not already adopted), improving their overall positioning and allowing them to participate in similar procurement opportunities also in the future. | ■ Economy and employment |
| Increase of road traffic | During construction, the Project will generate traffic of heavy and light vehicles due to the need to transport goods, materials and staff to the Site. Some Project phases, such as when concrete for foundations is delivered, will generate more traffic | ■ Mobility and infrastructures |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | than other phases. The roads that will be impacted the most are the E220 that arrives from the city of Cabinda and connect to the construction site and the new airport and Rua das Redes. Moreover, other business expansions in the area nearby (Port Caio and Refinery) will create additional traffic on these roads. The additional traffic can potentially increase congestions on these roads that are already face trafficked, especially in specific moments of the day. To avoid congestions, special personnel to direct vehicles to and from will be assigned. Moreover, a Traffic Management Plan will be implemented to identify specific mitigation measures and to ensure that the situation is monitored throughout all the construction phase.<br><br>Traffic may increase the risk of accidents with other vehicles and people along the roads used, with potentially significant effects on human health and safety. Significant mitigation measures will be required to ensure that construction work is carried out in a safety condition. Project-induced traffic and consequent impacts will be significant but kept under control with GPS and Quatenus system speed control. The implementation of road safety and traffic safety measures may have a significant effect in mitigating the impacts, thereby reducing the overall impacts generated by additional traffic.<br><br>Increase traffic can have potential impacts on children attending schools in proximity to the Project Site; as indicated in the baseline, most children travel to school by foot using the exiting roads. Also as pointed out in the social baseline, there is a low attendance rate at schools in the municipality of Malembo, due to the distance of children and families from the school infrastructures. Moreover, other impacts on education may be the effects of the changes in the volume of the traffic which may affect the ability of people to travel on roads safely and then even delays for pedestrians. The safety perceived in walking in the road might be affected by the size and the speed of vehicles as well. However, the Contractor has already posed limitations to speed for vehicles in the road and will implement a Traffic Management Plan to take into consideration safety of pedestrians during construction works. | ■ Community, health safety and security<br>■ Education |
| Improvement of road network | The Project foresees the following improvements to the road network:<br>- The contractor will upgrade Sassa Zau Road that is an unpaved road that connect the E220 to the airport entrance<br>- Construction of the new accesses to the airport<br>The constructions will overall improve the road infrastructure system benefitting the neighbourhoods nearby and the nearby economic centre of the Refinery. This should allow to mitigate the increased traffic that will be generated by the Project during the operation phase. | ■ Mobility and infrastructures |
| Interference with roads/infrastructures/services | There might be interference in the local educational infrastructure considering that the baseline already identified educational issues in the Malembo Commune, such as a high number of children out of school due to the distance from educational facilities. | ■ Education<br>■ Mobility and infrastructures |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | Two schools have been identified during the baseline study and site visit. Bissassanha school of a total capacity of 350 students has been identified during the noise monitoring campaign at the north of the site, reachable through the road EN 100, which is also the access road of the construction site. Furthermore during the site visit, a technical school called "Academia OMITC Angola" has been identified and it is located in Sassa Zau Road at approx.. 3 km from the site. The use of existing roads for construction purposes might create obstacles and dangerous situations to the communities (pedestrian) that are moving daily for their living activities.<br><br>Moreover, the increase of the population, represented by the labour force of the construction phase and people possibly attracted by the possibility of professional insertion in the activity, tends to increase the demand for public services such as: education, health, sanitation, transportation, etc., as well as tends to seek social interaction in the construction areas.<br><br>With respect to education, it might occur that some workers in the construction phase will migrate with their families. Those who migrate with children tend to increase the demand in education, either for basic education for their dependents or for their own technical training to improve the knowledge of the activity to be developed in the operation of the company. | |
| Damage of cultural resources | No direct impacts on cultural heritage are expected as no cultural heritage within 2.5 km from the Project site have been identified in the baseline surveys and for that the impact assessment for this component won't be carried out. A Chance Find Procedure will be implemented to ensure that appropriate measures are carried out in the case that unknown cultural or archaeological sites are found during construction activities. | ■ Cultural Heritage |

### 12.1.1 Mitigation Measures

The mitigation measures listed below follow the mitigation hierarchy and are proposed for the construction phase; these measures will be implemented in addition to the embedded Project mitigation measures which are a standard procedure applied by the Contractor and eventually, by ASGC to achieve compliance with legal requirements and regulations and alignment with good industry practice.

**Table 1: Mitigation Measures - Construction Phase.**

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| **Impact Factor: Removal/degradation of soil and vegetation** | | |
| | Avoidance | Avoid the unnecessary removal or degradation of soil and vegetation. |
| | Minimization | Prepare a Chance Find Procedure for the Project.<br>The Chance Find Procedure should be distributed to all workers and to be implemented if a finding of cultural or archaeological elements occurs during the site clearance. The Chance Find Procedure should involve authorities responsible for archaeological and cultural protection. |
| | Compensation | Compensate for the loss of vegetation.<br>Where possible, the Contractor will revegetate the affected area and revegetate/landscape projects site as per design specifications (utilizing native species ...)for compensating the loss of vegetation. |
| **Impact Factor: Change in the local morphology and topography** | | |
| | Avoidance | Avoid unnecessary morphology and topography changes.<br>The Contractor will ensure that unnecessary levelling and excavations will be avoided. The excavation rates will follow the Project design specifications, which will be designed based on the site-specific characteristics and on the natural state of the landscape. Likewise, even the creation of unnecessary high reliefs will be avoided. |
| | Minimization | Minimize the disturbance to the existing contour.<br>The Contractor will ensure that no excessive changes of the local morphology and topography will be generated and that – where possible - the general slope of site will be preserved. No unauthorized and uncontrolled piles and mounts of soil and rocks, debris or waste (although temporary) will be raised, and no digging of materials will be allowed. |
| | Restoration | Restore the excavated areas.<br>Perform the restoration within a short timeframe; restoring the excavated area will also have a positive effect on the overall visual impact of the construction site. |
| **Impact Factor: Change in the local hydrology and surface water quality** | | |
| | Avoidance | Avoid leaks and spills to surface water bodies.<br>Even though there are no lakes, rivers or ponds in the immediate vicinity of the Project area (the closest major river is the Chiloango, located about 5 km from the site, as already mentioned above) the goods and materials transportation will be a potential source of surface water bodies pollution. Pollutant leaks and spills potentially generated during transportation by road will be avoided. The moving vehicles (e.g., trucks meant for goods and materials transportation, dumper trucks, concrete mixers, bulldozers) will follow predefined paths and roads, will avoid crossing water bodies and will be regularly cleaned and repaired/maintained. For example, the Contractor will ensure that no dirty or damaged vehicles will leave the construction site, the goods and materials to be transported by road will be properly secured |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| | | for avoiding goods tripping, flipping and overflows and the moving vehicles transporting sludge, semi-solid and liquids will have perfect tightness and will be equipped with spills prevention kits, the drivers will be properly authorized and trained for properly behaving in case of accidental spills and leaks. |
| | Avoidance | Avoid discharging liquid, semi-solid or muddy materials into surface waters.<br>The Contractor will ensure that no intentional or accidental discharge of liquid, semi-solid or muddy materials into surface waters will be carried out. The proper supervision of materials quantities, paths and destination will help preventing such potential issue. |
| | Minimization | Minimize the potential pollution of surface water.<br>The potential pollution of minor surface water bodies (e.g., seasonal water channels eventually generated) will be avoided by avoiding pollutant runoffs with potential adverse effects. |
| **Impact Factor: Emission of dust and particulate matters** | | |
| | Avoidance | Prepare an Air Quality and Dust Management Plan.<br>Draft and adopt a Pollution Prevention Plan and an Air Quality and Dust Management Plan. Specific mitigation measures will be adopted on site for avoiding dust and particulate matter spreading. The Contractor will supervise the construction site for ensuring the proper adoption of the mitigation measures and the compliance to the Air Quality and Dust Management Plan by carrying out periodical visual inspections. |
| | Avoidance | Avoid the dust emissions from moving vehicles.<br>When the construction site dust will track out onto a road, passing vehicles will cause the dirt to become suspended in the air as re-entrained road dust. The Contractor will define rules, guidelines and indications within the Traffic Management Plan; such rules will be adopted on the construction site. The Contractor will periodically assess the site compliance to the management plan. |
| | Minimization | Minimize the dust emissions deriving from the construction activities.<br>Earthworks, excavation, soil stripping and earthmoving will generate dust and particulate matter, especially during the dry seasons. The Contractor will ensure that:<br>- the water available on site for the dust suppression will be enough;<br>- the construction activities will not result in exceedances of the air quality objectives/limit values for gaseous pollutants and for dust deposition;<br>- the dust control and mitigation measures provided in the management plans and described in the Project standards will be effectively applied;<br>- the excavation surfaces will be stabilized, covered up and/or re-vegetated as soon as possible;<br>- abatement measures and control systems (e.g., welding tents and barriers or mobile aspirators equipped with filters) will be adopted, when needed. Operations such as welding, cutting, grinding and sandblasting (representing major sources of airborne particles) will be carried out by using proper equipment and techniques compliant to the environmental and safety measures, especially when harmful construction materials containing silica (e.g., concrete or abrasives) are processed; |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| | | - where possible, hazardous and pollutant operations such as cutting will be avoided by preferring prefabricated materials;<br>- mobile plants for crushing, screening and grading the materials should be authorized by the appropriate local Authority and should be sited as far away from possible from sensitive receptors. |
| | Minimization | Minimize the dust emissions deriving from the trucks loading and unloading.<br>The Contractor will ensure that the trucks loading and unloading operations will be carried out properly and that limited amounts of dust and particulate will be issued. The workers appointed, when possible, will spray down with water the materials over dump trucks before the unloading. |
| | Restoration | Restore the highly degraded soil and excavated areas.<br>Where and to the extent possible, the Contractor will restore the roads and the construction area surfaces to their earlier conditions for preventing the continuous issuing of dust and particulate matter in time. |
| | Minimization | Develop and implement a Grievance Mechanism.<br>Ensure the implementation of the Grievance Mechanism for individuals and groups to formally communicate their concerns, complaints and grievances to the company and facilitate resolutions that are mutually acceptable by the parties in a timely and effective manner. |
| **Impact Factor: Emission of gaseous pollutants** | | |
| | Avoidance | Avoid leaving the vehicles, equipment and machinery turned on while not in use.<br>The Contractor will ensure that engines, vehicles, equipment and machinery are turned off while not in use. The onsite gaseous pollutants will be quarterly measured as described in the section above *"Minimize the dust emissions deriving from the construction activities".* |
| | Avoidance | Avoid using machinery, equipment and vehicles that don't undergo periodical control and maintenance.<br>For preventing the increase of the emissions and enhance the Project environmental impact, according to the Project standards the Contractor will carry out:<br>- regular periodical maintenance on equipment and machinery;<br>- periodical maintenance and control on the emission control systems (e.g., aspiration and filtration systems) serving the machinery, equipment and vehicles;<br>- periodical verifications on the fuel and oil types used and on their consumption;<br>- periodical control on the speed of moving trucks;<br>- periodical verification of the weight of the truckloads.<br>The Contractor will ensure that a specialized subcontractor will carry out the periodical maintenance and control activities and that such activities will be tracked by registering them on a dedicated log to be kept on site. |
| | Avoidance | Avoid improper management of chemicals.<br>The Contractor will ensure that the materials and chemicals used onsite will be properly stored in dedicated locations which will be locked-up and well-ventilated. The bulks, cans, bins and trays will be closed/sealed for avoiding pollutants runoffs. |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| Minimization | | Minimize the emission of gaseous pollutants by preferring low Sulphur fuels.<br>Considering that the Sulphur burning (because of its conversion into Sulphur dioxide) has high environmental impact, where possible, the Contractor will purchase low Sulphur fuels for feeding vehicles and engines. |
| Compensation | | Compensate the emission of gaseous pollutants.<br>Considering that the vegetation plays an important positive role in atmospheric purification and air pollutants reduction and that the phytoremediation has many potential advantages for contrasting the air pollution, the Contractor should plant native species and revegetate, where possible, the Project area. |
| **Impact Factor: Emission of noise and vibrations** | | |
| Avoidance | | Avoid emissions of noise and vibration during the night, at weekend and on national holidays. |
| Avoidance | | Avoid emissions of noise from unnecessary idling / revving of engines.<br>Equipment/engines should be switched off when not in use. |
| Avoidance | | Avoiding health damage to workers working on site.<br>- Workers should make use of noise and vibration control devices and techniques<br>- Indicate whenever devices are faulty or are in need of maintenance<br>- Be willing to undergo the prescribed medical surveillance<br>- Use the personal protective equipment provided |
| Avoidance | | Noise limits should be laid down as a function of the goal to be attained.<br>In particular — (a) to prevent a risk of hearing impairment; (b) to prevent interference with communications essential for safety purposes; and (c) to eliminate nervous fatigue, with due regard to the work to be done; |
| Avoidance | | Vibration limits should be laid down with due consideration to the aim to be achieved and to the degree of protection required especially for (a) vibration affecting the hands and arms (vibrating tools); and (b) whole-body vibration transmitted through the supporting surface.<br>Vibration limits should also be laid down depending on the work to be done and to avoid fatigue.<br>The limits should be reviewed from time to time in the light of new scientific knowledge, technical progress and possibilities of prevention. |
| Minimization | | Minimize as far as practicably possible, noise emissions generated from construction operations.<br>The Contractor will draft and adopt a Construction Environmental Social Management Plan (CESMP) which outlines how the construction phase will be managed to minimize the effects of noise and vibration on the surrounding environment. The CESMP will include the following general good practice measures:<br>- Keep internal haul roads well maintained;<br>- Use rubber linings for dumpers to reduce noise impact;<br>- Minimise drop height of materials;<br>- Start-up plant and vehicles sequentially rather than all together;<br>- Use of reversing alarms that do not have a tonal component (i.e. broadband), if applicable. In this type of alarm, the sound energy would be spread homogenously across the frequency spectrum minimising the possibility of acoustic feature in the reversing alarm; |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| | | - Sources of significant noise should be enclosed, as far as reasonably possible;<br>- Loading and unloading should be done away from noise-sensitive areas, where possible;<br>- Locate any stationary plant (i.e. pumps, compressor, concrete mixing, etc) away from noise-sensitive receptors, where possible;<br>- Ensure regular and effective maintenance for the plant and any sound-reducing equipment;<br>- Install temporary local noise barriers for noisy equipment.<br>- Electrically powered plant is to be preferred to mechanically powered alternatives.<br>- Program deliveries to avoid sensitive periods.<br>- Establish and maintain effective liaison with the local community throughout the construction period. Such measures could include provision of information on the on-going activities and provision of contact telephone numbers for the site for use during operational hours, as well as identifying a person with appropriate authority to resolve any identified noise problems.<br>- Appropriate training of construction site workers in noise minimization.<br>- Construction vehicles to use agreed routes only. Associated roads to be well maintained and free of irregularities. |
| **Impact Factor: Emission of light** | | |
| Minimization | | <u>Minimise the use of artificial lighting to necessary.</u><br>Artificial lighting will be used only when and where specifically needed for construction activities or for safety reasons |
| Minimization | | <u>Minimise the illumination outside the Project site.</u><br>Light spills and glare outside the Project site and outside areas that need to be illuminated will be reduced to the extent possible. |
| Minimization | | <u>Engage stakeholders.</u><br>Carry out the stakeholder engagement on potential impacts due to Project activities and planned mitigation measures throughout the Project<br>The engagement activities will be carried out in transparent, culturally accessible way and ensuring the inclusion of vulnerable groups, in line with the Stakeholder Engagement Plan prepared for the Project. |
| Minimization | | <u>Ensure the implementation of the Grievance Mechanism.</u><br>A grievance mechanism should be provided for individuals and groups to formally communicate their concerns, complaints and grievances to the company and facilitate resolutions that are mutually acceptable by the parties in a timely and effective manner. |
| **Impact Factor: Existence of new building/ infrastructures visual impact** | | |
| Restoration | | <u>Removal of site elements superfluous for the operation phase</u><br>Upon completion of the construction phase, all site elements not required for the subsequent operational phase will be removed and the areas will be restored to their original state. |
| **Impact Factor: Production of solid waste** | | |
| Avoidance | | <u>Avoid unnecessary waste generation.</u> |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| | | The Contractor will ensure that any type of unnecessary waste production will be avoided during the construction phase. Where possible, the waste will always be reduced, reused and recycled. An appointed eligible specialist, a contracted company or employees from the HSE team will develop systems and strategies for improving waste reduction, recycling and reuse (e.g., as by-products). For example:<br>- the organic waste will be composted and the final composted product will be used to recover areas degraded by construction;<br>- the plastic bottles will be reused in the seedling nursery and in decorative adornments, the metal scrap will be collected by local steel mills;<br>- the industrial oils will be sent to be used in outsourced brick manufacturing units in the region.<br>The recycling procedures will be completed both onsite and offsite at dedicated plants. The Contractor will prefer waste recycle or recovery plants – if available – to landfills. Waste which cannot be recycled, will be transported to the closest proper and suitable treatment or disposal site (compliant to the Project standards, the legal requirements and the international best practices). The waste management will be completed according to specific documents (e.g., Waste Management Plan or Solid Waste Inventory and Management) to be drafted and adopted on site and to the Project standards and the legal requirements. Moreover, according to national legal requirements, the Waste Management Plan/Solid Waste Inventory and Management will be certified by the National Waste Agency. Also, the construction waste will be managed and disposed in accordance with the Executive Decree nº 17/13, of January 22. |
| Avoidance | | <u>Avoid offsite unproper waste management.</u><br>The Contractor will ensure that:<br>- the waste will be reduced, reused and recycled, where possible;<br>- the potential contaminated soil, before its disposal, will be treated (e.g., bioremediation process);<br>- a licensed local/national waste management contracted company will be in charge of collecting the waste that will not be recycled/reused at the construction site and will transport it to proper landfills, recycling centres or recovery plants;<br>- no unproper dumpsites will be used (e.g., dumpsites like Yema one having serious management problems such as no planned deposition, no fencing, no paved areas and no lined cells or leachate control system).<br>For managing the waste which will not be reused or recycled, the Contractor will plan alternative solutions, such as:<br>- reduce the amount of waste generated (i.e., will implement innovative techniques for waste minimization);<br>- install a mobile incinerator (to be properly designed and authorized as per the Project standards and Angolan legislation);<br>- source and purchase materials which are easier to recycle and reuse, where possible;<br>- avoid single use items;<br>- practice onsite biological, chemical or physical treatment for decreasing the percentage/amount of unrecyclable and non-reusable waste; |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| | | - appoint an eligible technician/specialist from a contracted company or the HSE team who will research new practices for maximizing the recycling and reuse of materials;<br>- appoint an eligible technician/specialist from a contracted company or the HSE team who will research proper landfills – compliant to the Project standards, the legal requirements and the international best practices – within Angola or in bordering countries to use for disposing of the unrecyclable/non-reusable waste;<br>- install a waste compactor on site for allowing longer and more efficient waste storage and for decreasing the number of the potential shipment trips to landfills.<br>Moreover, ASGC will contact the proper entities and authorities within the Government of Cabinda for speeding up the construction of the new Subantando landfill (currently this landfill has only been planned and a site has been selected as eligible). |
| | Minimization | Prepare and implement a Waste and Hazardous Materials Management Plan. |
| | Minimization | Engage with local stakeholders on interruption of infrastructures.<br>Inform local authorities on the progress of activities and on the schedule of activities that will entail interruption of infrastructure networks; possible changes to limit impacts on local communities will be agreed and implemented. |
| | Minimization | Identification of waste strategies.<br>Identify strategies to ensure that waste is recovered and recycled to the extent possible, so to reduce the need of sending it to landfills. |
| | Compensation | Compensate the excessive production on waste by recycling and reusing as byproducts.<br>The Contractor will maximize, as far as practicable in terms of material properties (i.e., technical, and economic feasibility), the re-use of waste soils and aggregates arising from excavations and materials processing like cutting. |
| **Impact Factor: Production of wastewater** | | |
| | Avoidance | Avoid exceeding the estimated generation of wastewater.<br>The Contractor will ensure that:<br>- the construction site maximum monthly production of wastewater will be of 60,000 liters/day by measuring the discharges. An hydrometer and a flow meter (or a flow sensor) will be installed on the wastewater discharge outputs for measuring the amount of liquid waste and the flow rates;<br>- weekly quantitative data on wastewater will be collected for avoiding negative effects on the local groundwater;<br>- the wastewater amounts and data measured will be registered on dedicated logs and forms to be kept at the construction site offices;<br>- the monitoring campaigns will be completed as per the Project standards by appointed eligible specialists from the Contractor's HSE team or by a contracted company;<br>if the monitoring campaigns data will show any excess or peak values, the Contractor will immediately carry out an inspection on the equipment (plants, sensors and flow meters) and will appoint a subcontractor to carry out the repair and maintenance eventually needed. |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| Avoidance | | <u>Avoid discharging polluted wastewater.</u><br>The Contractor will ensure that:<br>- bimonthly qualitative and weekly quantitative data on wastewater will be collected;<br>- the monitoring campaigns will be completed as per the Project standards by appointed environmental specialists from the Contractor's HSE team;<br>- the tests will be completed on both the effluents from the WWTP and the septic tanks;<br>the food preparation areas will be equipped with special degreasers for separating the oil and grease from the wastewater flowing towards the sewage for the final discharge. The resulting amount of oil and grease waste will be properly collected and disposed of. |
| Avoidance | | <u>Avoid the uncontrolled discharge of civil wastewater.</u><br>Since there is no wastewater collection system in the Cabinda province, the Contractor will provide the construction site with chemical toilets and with a sewage system served by storage tanks. The Contractor will ensure that:<br>- the civil wastewater will be collected by local companies specialized and certified for the activity, which will then forward it to the municipal sewage network or licensed sanitary landfills;<br>- the civil wastewater yard collection system and the septic tanks are constantly properly functioning and in good conditions;<br>- periodical maintenance and control activities will be carried out for preventing malfunctioning of drains, pipelines, manholes, septic tanks, spills and leaks;<br>- periodical maintenance and control activities will be carried out for ensuring the storage tanks tightness and proper placement, under the tanks, of secondary containment systems;<br>- the inspections will be properly registered on a site log;<br>- the sewage sludge will be properly managed by licensed waste management companies that will send the sludge to the municipal sewage network or to licensed sanitary landfills (prior municipal authorization). |
| Minimization | | <u>Prepare and implement a Wastewater Management Plan.</u> |
| Minimization | | <u>Minimize the risk of environmental pollution deriving from the equipment and machinery cleaning and washing.</u><br>For minimizing the risk that the equipment and machinery cleaning and washing will generate environmental pollution, the Contractor will ensure that:<br>- the stations for washing the vehicles, the equipment, the machinery and the chemicals bins and trays will be equipped with leak-proof floor and proper wastewater collection system;<br>- the wastewater generated will be treated trough a degreaser and the resulting oils and lubricants will be properly segregated and managed as special waste;<br>- spills prevention kits and eyes washing stations will be installed nearby such locations. |
| **Impact Factor: Energy and fuel demand** | | |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| Avoidance | | <u>Avoid energy sources exploitation for preventing energy shortages in the site vicinity.</u><br>For preventing unnecessary energy wastes and consequent shortages in the site vicinity, the Contractor will ensure that:<br>- the construction site will not exceed the usage of 750 kVA for the administrative activities and of 1250 kVA for the operations;<br>- the energy use will be bonded to the effective issuing of the authorization for setting up the power transformer station (to be issued by the National Electricity Distribution Company of Angola);<br>- a Resource Efficiency Management Plan (including water and energy sources) will be drafted, according to the Project standards, and will describe the measures to adopt for optimizing the energy efficiency and enhancing sustainable construction management practices;<br>- a dedicated technician/team is appointed for regularly measuring, monitoring and registering the construction site energy uses (associated with plants, facilities, offices, construction vehicles and equipment, offices, food preparation, etc.);<br>- precise performance targets (e.g., energy consumption) will be defined and periodically reviewed;<br>- the effective energy consumption will be regularly compared to the performance targets so that the actions to be taken for reducing the consumptions can be properly identified. |
| Minimization | | <u>Minimize the energy use.</u><br>The installation of solar panels and other renewable sources of electricity is planned. Other than using renewable energy sources, for minimizing the energy use the Contractor will:<br>- train the construction site workers for raise their awareness on energy saving actions and encourage them to participate in eco-friendly practices onsite (e.g., switching off plants and equipment when not in use);<br>- constantly monitor energy consumptions;<br>- carry out plants, equipment and machinery periodical maintenance;<br>- prefer using machinery which powered by grid electricity to using diesel fueled portable generators;<br>- ensure that the construction activities will take advantage of natural light, where possible; |
| Minimization | | <u>Minimize the potential machinery and equipment breakdowns.</u><br>Part of the potential energy waste that will be generated on the construction site will be deriving from equipment and machinery malfunctioning. For preventing such events, the Contractor will ensure that:<br>- the equipment and machinery will always be in good running conditions;<br>- the equipment and machinery maintenance will be properly carried out by an eligible company;<br>- the repairing and maintenance operations will be registered on a dedicated log to be kept in the construction site offices;<br>- the old and inefficient equipment will be replaced with higher-efficiency models; |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| | | - the 8 diesel fueled portable generators will be periodically checked and placed on leak-proof near spills prevention kits for cleaning potential spills and leaks deriving from the equipment and machinery fuel injection/recharge. |
| | Compensation | Compensate for the energy use.<br>The Contractor is planning to install solar panels and/or other renewable sources of electricity. Once such sources are installed and on run, whether any excess of energy is generated, the excess of energy should be introduced into the electricity grid and made available to the surrounding communities. |
| **Impact Factor: Water demand** | | |
| | Avoidance | Avoid the exploitation of the water sources.<br>The potential excessive exploitation of the water sources (i.e., one artesian well and the Cabinda public mains which are supplied by surface water intake from the Chiloango River) will negatively impact the environment and the Project area surroundings (i.e., the community and the industrial and commercial receptors). The Contractor will ensure that:<br>- the maximum amount of water used during the 48 months of construction phase will not exceed the total amount of 8,738 m3 expected;<br>- the water intake from both the artesian well water and the water from the mains – that will be sent to a raw water tank – will be measured with proper sensors and equipment (e.g., flow meters);<br>- the water intake will be sent to a water treatment station for ensuring that complies to the Project standards and the Angolan law;<br>- the treated water will be stored in above ground storage tanks made of PVC;<br>- the water will be pumped from the tanks through a pressurization system into the underground network of HDPE pipes, to their destinations, without losses or wastes;<br>- periodical maintenance and control of the systems and structures will be completed by a licensed eligible company for ensuring the tanks and pipes tightness and the lack of water losses and wastage;<br>specific training will be completed for raising awareness of the employees on the proper water usage and consumption |
| | Avoidance | Avoid using freshwater for cleaning and washing of equipment or dust prevention measures.<br>Where possible, closed-cycle systems for avoiding water wastage will be installed. The Contractor will adopt proper measures for to decreasing the water consumption during the construction activities:<br>- the clean treated effluents from the water treatment plant, the backwashing of the water treatment plant filters and the degreaser water will be reused – for various purposes – in accordance with the Project specification and the Angolan legislation;<br>- the recycled water will be mainly destined to degraded areas in the process of recovery, to the soil wetting process and other non-noble purposes and to construction activities such as earthmoving, wetting aggregates, washing vehicles and concrete mixers, washing industrial plants, workshops and loading areas, wetting to control atmospheric emissions, irrigating vegetation, among others; |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| | | - prior using and spreading the recycled water, its quality will be assessed according to the Project specifications. |
| | Minimization | Minimize the risk of exceeding the maximum amount of water to be used.<br>The Contractor will appoint an HSE specialist who will periodically identify, regularly measure, monitor and register the water flows on site. The specialist will also define and regularly review performance targets which will be adjusted to account for the type of construction activity. The existing water flow data will be regularly compared with the performance targets for identifying potential actions to be taken for reducing water wastage. |
| | Minimization | Prepare and implement a Resource Efficiency Management Plan (including water and energy sources). |
| | Minimization | Liaise with water network company to discuss about water sourcing and availability, to avoid competition on water use with other users in the AoI; discuss with network company on potential measures to avoid reducing water availability to other users during periods of water scarcity. |
| | Compensation | Compensate the water usage.<br>The Contractor should design and eventually install a system, serving the artesian water well, for the reintroduction of the treated wastewater into the aquifer. Such process would require site specific studies and a proper authorization. |
| **Impact Factor: Influx of population** | | |
| | Avoidance | Employ local workers.<br>The Project aims at employing local workers to the extent possible. This will reduce the need of workers from other parts of Angola and from abroad, overall limiting the influx of external workers to the area. |
| | Avoidance | Develop and implement a Stakeholder Engagement Plan.<br>Engagement activities include regular meetings with authorities to minimise speculative migration by jobseekers to the area, including monitoring any demographic changes in comparison to baseline data, to limit the potential for in-migration and conflicts with communities living in the area. |
| | Avoidance | Perform health screenings of workers.<br>Pre-employment health screening for workers and on a periodic basis throughout their employment/contract; |
| | Avoidance | Provide health and safety induction training.<br>Provide health and safety induction for workers and awareness trainings on STIs and others communicable disease prevention; Implement trainings on raising awareness on healthy lifestyles on topics such as – among others- on alcohol, personal and food hygiene, communicable and non- communicable diseases. |
| | Avoidance | Restrict the access to the Project site<br>No local or informal traders will be allowed in the Project site |
| | Minimization | Ensure presence of law enforcement officers.<br>To minimize the risk of sexual harassment and gender-based violence due to the influx of male workers in the Project area, it will be important to mobilize and reinforce the presence of the local law enforcement in the area |
| | Minimization | Develop and enforce a code of conduct.<br>The code of conduct should provide indication of the behaviour that workers should adopt, particularly when interacting with local communities. The code |

| ID | Mitigation hierarchy | Mitigation Measure |
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| | | of conduct will be provided to workers at the hiring stage and will be covered during induction training. |
| | Minimization | Develop and implement a Grievance Mechanism.<br>Ensure the implementation of the Grievance Mechanism for individuals and groups to formally communicate their concerns, complaints and grievances to the company and facilitate resolutions that are mutually acceptable by the parties in a timely and effective manner. |
| **Impact Factor: Security management** | | |
| | Minimization | Develop and implement a Security Management Plan.<br>The Security Management Plan should include measures to ensure that security is managed so to avoid tensions and risks for workers and local communities. |
| | Minimization | Voluntary Principles.<br>Adopt the Voluntary Principles on Security and Human Rights for the management of security aspects. |
| | Minimization | Check reference of security workers.<br>Conduct reference checks to ensure candidates for security services do not have criminal records or a record of abuse of violation of human rights; |
| | Minimization | Develop and enforce a code of conduct.<br>Implement training on the Code of Conduct specific to security personnel, which outline appropriate conduct, engagement and use of force, and audits of the application of the Voluntary Principles on Security and Human Rights; |
| | Minimization | Develop and implement the Stakeholder Engagement Plan.<br>Carry out the stakeholder engagement to ensure that local communities are aware of how to raise a grievance about any security contractor behaviour, should this be necessary |
| **Impact Factor: Demand for workforce** | | |
| | Avoidance | Avoid forced labour.<br>Avoid any form of forced labour and any form of practice that can be considered a form of forced labour, such as requiring significant monetary deposits from the workers or retaining workers' identity documents. |
| | Avoidance | Avoid child labour.<br>Ensure compliance with national laws and international standards regarding the employment of minors. The age of all workers will have to be verified through official documentation and suitably recorded. |
| | Minimization | Set up a centralized hiring process.<br>Set up a centralized recruitment process and avoid recruitment at construction sites, to discourage persons moving to the construction site areas in search of employment positions. |
| | Minimization | Reduce impacts of retrenchment.<br>Develop and implement a retrenchment plan, using the principles in the IFC Good Practice Note No. 4: Managing Retrenchment, 2005, with the aim of reducing the impacts of cessation of employment contracts. |
| | Enhancement | Transparent and fair recruitment procedures.<br>Put in place transparent and fair recruitment procedures, that monitor non-discrimination and equal opportunities and that are clearly understandable and accessible to all potential candidates |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| Enhancement | | Develop and implement the Labour Management Plan.<br>Ensure that the Labour Management Plan is aligned with the requirements of PS2. These policies and procedures will be understandable and accessible to workers, and in the main language(s) spoken by the workforce. HR policies and management will monitor: - Non-discrimination and equal opportunities are provided for all workers, and - Compliance with national and international laws, conventions and lenders requirements on labour conditions are maintained through the life of the Project. |
| Enhancement | | Comply with IFC Performance Standard 2.<br>Adopt and maintain human resources policies and management systems or procedures aligned with the requirements of IFC PS2. These policies and procedures will have to be clear and accessible to workers, and in the main language(s) spoken by the workforce. |
| Enhancement | | Compliance with labour regulations.<br>Compliance with national and international laws, conventions, and lenders' requirements on labour conditions to be maintained through the life of the Project |
| Enhancement | | Provide clear and transparent information to workers.<br>Provide clear and transparent information on wages, benefits and working conditions during the hiring process. Information should be provided also in written form in the language of choice of the worker. |
| Enhancement | | Develop and implement a Workers' Grievance Mechanism.<br>Implement a grievance mechanism for workers. Monitor that all workers directly and indirectly employed are informed about this channel to submit grievances. Monitor that the grievance mechanism is managed in line with indications of the procedure and that appropriate budget and resources are assigned. |
| Enhancement | | Encourage employment of local workers.<br>Define a strategy for the employment of local workers. This strategy will be disclosed in line with the provisions included in the SEP to ensure that local communities in the proximity of the sites are informed on employment positions available and methods to express interest. Based on outcomes of this plan, the Company will implement a training programme for the local workforce to enable them to take advantage of the opportunity. Require contractors and subcontractors to maximise use of local workforce in the Project, in compliance with Angolan legislation and OEC local content policy |
| **Impact Factor: Demand for raw materials and goods/supply chain** | | |
| Avoidance | | Develop and implement a Supply Chain Management and Procurement Plan.<br>Develop and implement a Contractor, Supply Chain Management and Procurement Plan. The Plan will ensure that contractors and subcontractors along the supply chain will be compliant with IFC PS2 and national legislation. |
| Enhancement | | Encourage procurement of local goods, services and materials.<br>Aim to procure goods, services and materials from Cabinda Province or Angola companies to the extent possible. |
| **Impact Factor: Increase of road traffic** | | |
| Avoidance | | Avoid unnecessary traffic.<br>Avoid unnecessary traffic by carefully planning transport activities. Keeping in mind social and environmental constraints, so to use the less impacting routes available. Organize vehicle journeys so to optimize the transport of materials and reduce unnecessary trips. |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| Avoidance | | <u>Avoid exceeding the speed limits when transporting goods and materials onsite or offsite.</u><br>All drivers accessing the site will be briefed about the speed restrictions. Signs and labels showing the maximum speed allowed will be affixed at the site entrances and on the Project area roads. Any unsafe or irresponsible actions will be identified, corrected and reported to HSE department. |
| Avoidance | | <u>Avoid unsafe or irresponsible actions by drivers.</u><br>All the vehicles will comply with the site safety signs and will enter and exit the Project site in a predefined direction. Vehicles' maneuvering and U-turns will not be allowed on public roads. All drivers will be required to wear full PPE such as hard hat, safety shoes, safety glasses and visible vests when outside of their vehicles. |
| Avoidance | | <u>Avoid the traffic vehicles offroad, outside of the Project area boundaries and of the defined paths.</u><br>The trucks and moving vehicles will travel on predefined paths. The Contractor will ensure that no vehicles and trucks will leave the predefined road for shortening the travel time or because of roads interruption without proper authorization. |
| Minimization | | <u>Use a flagmen where necessary</u><br>The use of a flagmen might be needed mostly where trucks will turn form the EN220 to Sassa Zau Road (at the moment unpaved). |
| Minimization | | <u>Minimize the traffic-related risks, issues and hazards.</u><br>For minimizing the issues and avoiding the potential risks and hazards due to the increase of traffic, the Contractor will:<br>- Prepare and implement the Traffic Management Plan taking into consideration pedestrians delays and safety to reach the schools identified in the noise assessment and in the site visit.<br>- Ensure that traffic and transport management will be carefully planned considering the potential developments and the sensitive receptors in the vicinity of the Project site;<br>- define measures for preventing the traffic congestion and the accidents (e.g., indicating the maximum speed limits and the safety distance to be kept between the moving vehicles, carrying out maintenance and controls on trucks, forbidding the circulation during the peak hours);<br>- ensure that all trucks and moving vehicles will be labelled with serial numbers for properly and readily identifying the potential transgressors or the vehicles needing maintenance;<br>- ensure that periodical consultation will be undertaken with stakeholders for collecting grievances and issues related to the increase of the traffic;<br>- ensure that, for preventing accidents such as persons hitting, the whole construction site area will have a good road visibility and no obstacles on the roads;<br>- provide an onsite parking. |
| Minimization | | <u>Select most suitable transport routes.</u><br>When selecting the routes to be used for the transport of materials and products, identify roads that are likely to cause the lowest impacts to local communities, terms of disruption of access and disturbance to population. Plan transportation routes in consultation with local authorities. |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| Minimization | | Prepare and develop a Stakeholder Engagement Plan.<br>Inform local communities with due advance on the progress of activities and in particular on the schedule of activities that will entail interruption of infrastructure networks |
| Minimization | | Prepare and develop a Grievance Mechanism.<br>Ensure the implementation of the Grievance Mechanism for individuals and groups to formally communicate their concerns, complaints and grievances to the company and facilitate resolutions that are mutually acceptable by the parties in a timely and effective manner. |
| Compensation | | Compensate the public roads exploitation by carrying out their maintenance, repairing, and cleaning.<br>The Contractor will ensure that, even when not damaged or deteriorated, the public roads reaching the Project area will be properly maintained, repaired and renewed and periodically cleaned |
| **Impact Factor: Improvement of road network** | | |
| Restoration | | Restore damaged roads, damaged plots of lands and damaged fences.<br>The continuous riding of the trucks and moving vehicles reaching and leaving the construction area will generate deterioration of the road structures and will damage the roads paving. The Contractor will ensure that the damages will be periodically repaired. |
| **Impact Factor: Interference with roads/infrastructures/services** | | |
| Minimization | | Minimize the interference with educational activities.<br>Disseminate the existing options of educational institutions in the areas to workers who decide to migrate with their families, as well as to support, if possible, the competent educational bodies in the technical training of the population. |
| Minimization | | Minimize the exclusion of the population from Project activities.<br>Engage stakeholders on potential impacts due to Project activities and planned mitigation measures throughout the Project. The engagement activities will be carried out in transparent, culturally accessible way and ensuring the inclusion of vulnerable groups, in line with the Stakeholder Engagement Plan prepared for the Project. |
| Minimization | | Minimize limitations for the local communities.<br>Inform local communities about interruptions of roads and infrastructure networks. Within the context of the SEP inform local authorities, local communities on the progress of activities and in particular on the schedule of activities that will entail closures/limitations of roads and interruption of infrastructure networks; possible changes to limit impacts on local communities will be agreed and implemented |
| Minimization | | Select most suitable transport routes.<br>When selecting the routes to be used for the transport of materials and products, identify roads that are likely to cause the lowest impacts to local communities, terms of disruption of access and disturbance to population. Plan transportation routes in consultation with local authorities. |
| Minimization | | Reduce interferences with other water uses.<br>Monitor use and availability of water from the selected sources, to avoid interferences with other water uses within the local communities. |
| **Impact Factor: Damage of cultural resources** | | |

| ID | Mitigation hierarchy | Mitigation Measure |
|---|---|---|
| Minimization | | Should an artefact be identified, all works have to stop, and the Cabinda Municipality must be contacted |

### 12.1.2 Impact Value and Residual Impact Value Calculation

This section describes the Impact Value and the Residual Impact Values (after the implementation of mitigation measures) found for each impact factor on each social component.

The description of how the calculations is performed can be found in Chapter 09 of this ESIA.

#### *12.1.2.1 Population and demographics*

The impact factor that can affect population and demographics is listed in the Table **2** below.

As shown in the table below, the impact value calculated for *Influx and population* is **High**. According to the baseline study performed, the sensitivity of the Population and demographics component is **medium-high**. Considering the application of the mitigation measures, the Project's overall residual impact on the component Population and demographics in the construction phase is **medium** and of **negative** direction. The proposed mitigation measures with medium effectiveness are – among others- the monitoring of immigration to the Project area and a proactive stakeholder engagement that would allow local communities to report any issue of social conflicts with a proper grievance mechanism in place.

**Table** 2**: Residual impact assessment matrix for population and demographics during construction.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Influx of population | Duration: | Medium-long | Medium-high | Reversibility: | Mid term | **High** | Medium | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Beyond regional | | | | | | |
| | Intensity: | Medium | | | | | | |

#### *12.1.2.2 Land use and tenure*

No land use and economic activities have been reported to be present on Site. On the basis of these considerations, the Project is not expected to generate potential impacts on land use and tenure and the assessment on this component is therefore not performed.

#### *12.1.2.3 Economy and employment*

The impact factors that can affect Economy and Employment are listed in the Table 3 below.

As shown in the table below, the positive impact values calculated are **low** for both the factors *Demand for workforce* and *Demand for raw materials and goods/supply chain*. According to the baseline study performed, the sensitivity of the Economy and employment component is **medium-high**. Considering the application of the enhancement measures, the Project's overall residual positive impact on the Economy and employment component in the construction phase is of **positive** direction.

The residual positive impact has been assessed to be **medium** for the *Demand of workforce* whilst it remains low for *Demand for raw materials and goods/supply chain*. The **medium** residual impact depends on the continuity of the request for workforce that will last for 4 years during the construction phase, bringing positive

impacts to the economy of the Project area. The **low** residual impact of the second factor, is due to the low effects that the supply chain will have on the local economy, since it will involve also many companies operating abroad and hence will not improve significantly the economic situation in the Region.

**Table 3: Residual impact assessment matrix for Economy and employment during construction.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Demand for workforce | Duration: | Medium-long | Medium-high | Reversibility: | Short-term | **Low** | Medium-low | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Global | | | | | | |
| | Intensity: | High | | | | | | |
| Demand for raw materials and goods/supply chain | Duration: | Medium-long | Medium-high | Reversibility: | Short-term | **Low** | Medium-low | **Low** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Global | | | | | | |
| | Intensity: | High | | | | | | |

### *12.1.2.4 Education*

The impact factors that can affect education are listed in the Table 4 below.

As shown in the table below, the impacts have been assessed as **medium** for the two factors *Interference with roads/ infrastructures/ services*, and *Increase of road traffic.* According to the baseline study performed, the sensitivity of the component Education is evaluated to be **medium**. Considering the application of the mitigation measures, the Project's overall residual impact on the component Education in the construction phase is of **negative** direction.

The resulting residual impact is **low** for the all the factors. The low residual impact for the factor *Increase of road traffic* is due to the expected number of vehicle movements during construction that will be relatively low compared to existing traffic using the road network. Construction traffic is expected to use the EN220 which, based on baseline noise measurement data, appears to be a well trafficked road. Thereafter, construction traffic is not expected to pass noise sensitive receptors before entering the site and therefore not impacting on the educational centre.

The social mitigation measures, if followed, would reduce the risk to impact children and pedestrians' safety on the road when reaching the two schools identified during the site visits and the Noise assessment.

**Table 4: Residual impact assessment matrix for Education during construction.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Increase of road traffic | Duration: | Medium-long | Medium | Reversibility: | Short-mid-term | **Medium** | Low | **Low** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| | Duration: | Medium-long | Medium | Reversibility: | | **Medium** | Medium | **Low** |

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Interference with roads/infrastructures/services | Frequency: | Highly frequent | | | Short-mid-term | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |

### 12.1.2.5 Community health, safety and security

All the six impact factors that can affect community health and safety are listed in the Table 5 below.

The impact values calculated range from **high** to **medium**. With the application of the mitigation measures, the Project's residual impact on the Community Health and Safety component for the construction phase has been ranging from **medium to low** for all the impact factors.

As shown in the table below, the impact values calculated varies from one impact to another. The impact has been assessed as **high** for the factor *Influx of population*, as **medium** for *Emission of dust and particulate matters, Emission of gaseous pollutants, Emission of noise and vibrations, Increase of road traffic and Security Management.* According to the baseline study performed, the sensitivity of the component Community, Health and Safety is **medium-high**. Considering the application of the mitigation measures, the Project's overall residual impact on the component Community, Health, Safety and Security in the construction phase is of **negative** direction.

The residual impact is **medium** for the factors *Emission of dust and particulate matters, Emission of gaseous pollutants and Influx of population* and it is **low** for the remaining factors *Emission of noise and vibrations, Increase of road traffic and Security Management*, as shown in the matrix below. The medium residual impact for the factors of *Emission of dust and particulate matters and Emission of gaseous pollutants* mainly derives from the fact that the mitigation measures even if applied cannot completely mitigate the impact mostly due to the type of activities that will take place and how they will affect workers and local communities (i.e., earthmoving of loose sand by using heavy vehicles emitting exhaust gases throughout the 48 month of construction, changes in volumes and speed of vehicles).

Concerning the impact factor *Influx of population*, the residual impact value **medium** is mainly due to the continuous frequency of people coming to the Project area from different African regions and its long-term effects that might influence local health.

Emission of noise and vibration's residual impact evaluated as **low** it is derived from the proper application of the mitigation measures and from the fact that there are no noise receptors located less than 400m from the Project area. Moreover, the low residual impact value of the factor *Increase of road traffic* is due to the expected effectiveness of the planned mitigation measures and considering that construction traffic is going to increase on the EN220, which is already well trafficked thus the residual impact has been assessed as low. The residual impact for the factor *Security management* is also **low**, considering the implementation of the mitigation measures and its mid short-term reversibility.

**Table 5: Residual impact assessment matrix for Community, Health and Safety during construction**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Emission of dust and | Duration: | Medium-long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Low | **Medium** |
| | Frequency: | Highly frequent | | | | | | |

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| particulate matters | Geo. Extent: | Local | | | | | | |
| | Intensity: | Medium | | | | | | |
| Emission of gasseous pollutants | Duration: | Medium-long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Low | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Local | | | | | | |
| | Intensity: | Medium | | | | | | |
| Emission of noise and vibrations | Duration: | Medium-long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Medium | **Low** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Local | | | | | | |
| | Intensity: | Medium | | | | | | |
| Influx of population | Duration: | Medium-long | Medium-high | Reversibility: | Mid term | **High** | Medium | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Beyond regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Increase of road traffic | Duration: | Medium-long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Medium | **Low** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Security Management | Duration: | Medium-long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Medium | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |

#### *12.1.2.6 Mobility and infrastructures*

**Six** of the seven impacts on the component Mobility and Infrastructure in the construction phase are of **negative** direction and are shown in the Table 6 whilst **one** is of **positive** direction and it is shown in the Table 7.

The impact values calculated range from **very high** to **low**. With the application of the mitigation measures, the Project's residual impacts on the component Mobility and Infrastructure for the construction phase, has been assessed to be **high** for the *Production of solid waste* impact factor, **medium** for the *Production of wastewater*, **low** for the *Increase of road traffic, Interference with roads/infrastructures/services and Water demand* impact factors. To conclude the residual impact for *Energy and fuel demand* is **negligible**. According to the baseline study performed, the sensitivity of the Mobility and Infrastructures component is **Very high**.

The residual impact value for *Production of solid waste* is **high** because the waste that will not be recycled/reused at the construction site were supposed to be transported to the area designated by the Municipal Administration of Cabinda, the Yema dumpsite. Such area has not been considered adequate to Lenders requirements and to the international best practices, so an alternative has been proposed still to be confirmed by the Contractor. Even though proper mitigation measures will be applied (such as reduction, recycling and re-use, the selection of properly equipped landfills only, the onsite installation of a mobile incinerator and the official request to the Government of speeding up the construction of the new Subantando

landfill) there could be still pressure on those categories of wastes that cannot be managed in the Cabinda Province.

The *Production of wastewater* residual impact is **medium** due to the embedded Wastewater Treatment Plant that will be realised. However, for now the destination of effluents has not been informed and the Province of Cabinda has no Wastewater treatment collection system in place therefore the additional wastewater produced during construction will increase pressure on the already lacking wastewater treatment infrastructure of the Project area.

*The increase of road traffic*, *Interference with roads/infrastructures/ services* and *Water demand* have all low residual impact after mitigation measures that have medium effectiveness. The low residual impact for the first two impact factors is mostly due the original trafficked situation in the Project area that won't be that much modified by the increase in traffic and thus interfere with infrastructures during construction. For *Water Demand*, both the embedded mitigations in place ( the use of two water supply sources) and recommended mitigation measures, would ensure the water that the Project needs during construction.

The *Energy and fuel demand* residual impact value resulted as **negligible** because of the planned installation of a power transformer station, of a solar panels and/or other renewable sources of electricity and because of the expected mitigation measures with medium to high effectiveness. The residual impact values of the remaining impact factors range from **medium** to **low,** even though proper mitigation measures (from medium high to medium effectiveness) have been identified and are expected to be implemented.

**Table 6: Residual impact assessment matrix for Mobility and Infrastructures during construction**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Production of solid waste | Duration: | Medium-long | Very high | Reversibility: | Long term | **Very High** | Medium-high | **Medium** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Production of wastewater | Duration: | Medium-long | Very high | Reversibility: | Mid term | **High** | Medium-high | **Medium** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Increase of road traffic | Duration: | Medium-long | Very high | Reversibility: | Short-term | **Low** | Medium | **Low** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Interference with roads/infrastructures / services | Duration: | Medium-long | Very high | Reversibility: | Short-term | **Low** | Medium | **Low** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Energy and fuel demand | Duration: | Medium-long | Very high | Reversibility: | Short-term | **Low** | Medium-high | **Negligible** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Intensity: | Medium | | | | | | |
| Water demand | Duration: | Medium-long | Very high | Reversibility: | Short-term | **Low** | Medium | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |

The only positive impact on the component Mobility and Infrastructures is the *Improvement of road network* impact factor.

The positive impact has been assessed as **medium** for its midterm reversibility since it would take years before the road would need again maintenance. Moreover, since the enhancement measures are low in effectiveness the residual positive impact has remained assessed as **medium** value.

**Table 7: Residual impact assessment matrix for Mobility and Infrastructures during construction**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Enhancement effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Improvement of road network | Duration: | Medium-long | Very high | Reversibility: | Mid term | **Medium** | Low | **Medium** |

### 12.1.2.7 Ecosystem services

No priority ecosystem services have been reported to be present on Site and in the AoI. On the basis of these considerations, the Project is not expected to generate potential impacts on ecosystem services and the assessment on this component is therefore not performed.

### 12.1.2.8 Cultural Heritage

No cultural heritage elements have been reported to be present with the Project site and in its surroundings. Considering the industrial context and the previous land use, it is not expected that unknown cultural heritage elements may be present in the Project Area and may therefore be damaged by Project activities. On the basis of these considerations, the Project is not expected to generate potential impacts on cultural heritage and the assessment on this component is therefore not performed.

### 12.1.2.9 Landscape and visual quality

All the four impact factors that can affect Landscape and visual quality are listed in the Table 8 below.

The impact values calculated range from **medium to negligible**. With the application of the mitigation measures, the Project's residual impact on the Landscape and visual quality component for the construction phase, has been assessed to be **low** for the *Removal/degradation of soil and vegetation, Change in the local morphology and topography and Existence of new buildings/Infrastructures* impact factor and **negligible** for the *Emission of light*. According to the baseline study performed, the sensitivity of the Landscape and visual quality component is **medium-low**.

The residual impact values of the three impact factors that is **low** is due to its original sensitivity of the component. The Project area is indeed characterised by greenfield areas and industrial pots, moreover with other businesses in construction nearby. The *Emission of light* residual impact value resulted as **negligible** because the lights of the accommodation camp and the construction vehicles would be visible just from the surrounding of the Project area which has no settlements nearby, therefore it is expected a negligible impact.

**Table 8: Residual impact assessment matrix for Landscape and visual quality during construction.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Removal/ degradation of soil and vegetation | Duration: | Medium-long | Medium-low | Reversibility: | Irreversible | **Medium** | Low | **Low** |
| | Frequency: | Moderately frequent | | | | | | |
| | Geo. Extent: | Project footprint | | | | | | |
| | Intensity: | Negligible | | | | | | |
| Change in the local morphology and topography | Duration: | Medium-long | Medium-low | Reversibility: | Irreversible | **Medium** | Low | **Low** |
| | Frequency: | Moderately frequent | | | | | | |
| | Geo. Extent: | Local | | | | | | |
| | Intensity: | Negligible | | | | | | |
| Emission of light | Duration: | Medium-long | Medium-low | Reversibility: | Short-term | **Negligible** | Low | **Negligible** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Local | | | | | | |
| | Intensity: | Low | | | | | | |
| Existence of new buildings/ infrastructures, visual impact | Duration: | Medium-long | Medium-low | Reversibility: | Short-mid-term | **Low** | Low | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Project footprint | | | | | | |
| | Intensity: | Low | | | | | | |

## 12.2 Impact Assessment for Operation Phase

As described in Chapter 09 of this ESIA (IA Methodology), the Project actions carried out during the Operation phase can be primary generators of environmental or social pressures, which are identified as impact factors.

The potential environmental impacts that may be triggered by the identified impact factors during the operation phase are described in the following table.

**Table 9: Impact Assessment – Operation.**

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| Change in the local hydrogeology and groundwater quality | Change in hydrogeological regime and groundwater quality could occur during the operational phase due to the discharge or introduction of pollutants into the aquifer.<br><br>A change in local hydrogeology and groundwater quality can have significant impacts on ecosystem services; these changes can disrupt the delicate balance of ecosystems and influence the availability of essential resources.<br><br>Contamination of groundwater with pollutants, such as chemicals, heavy metals, or pathogens, can impair water quality and pose a threat to the health of aquatic ecosystems. This can result in reduced water availability and impaired aquatic biodiversity. Moreover, reduced groundwater availability can lead to soil desiccation, increased erosion, and sedimentation in water bodies. Changes in hydrogeology can exacerbate these effects, impacting water quality and aquatic ecosystems. Changes in hydrogeology, including reduced water availability and degraded water quality, can limit recreational activities and reduce the aesthetic appeal of natural areas.<br><br>However, no priority ecosystem services have been identified in the Project site in the baseline study. | ■ Ecosystem services |
| Emission of dust and particulate matters | Non-volatile particulate matter (nvPM), including ultrafine particulates (UFP) are found to be large sources of air pollutants in airports. Emissions from turbine engine aircraft, ground support equipment, and vehicle traffic all contribute to pollution levels in the vicinity of the Airport.<br><br>These particulate matters might produce health effects concerning especially outdoor personnel. Particle pollution can increase the risk of heart disease, lung cancer and asthma attacks and can interfere with the growth and work of the lungs.<br><br>The calculation of the quantity of emission of dust and particulate matters on the operational phase of the Airport has not been undertaken yet therefore the assessment has been carried out on the information available.<br>The Project is performed in an industrial area; the closest human settlements are at a distance of 3-4km from the Projects site, in the villages of Malembo and Bissassanha. However, at around 600 m from the Project site, an education facility and an accommodation facility used for students called MDC has been identified.. | ■ Community health, safety and security |
| Emission of gaseous pollutants | During the operational phase of the airport, it is expected that the largest source of gaseous pollutants would be generated by aircraft engine emissions. Emissions from fuel combustion can also come from motor vehicles used on the airport and ground transport surrounding the airport. | ■ Community health, safety and security |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | It is expected that the considerable traffic increase for passenger transiting to and from the airport will also contribute to the emission of gaseous pollutants.<br><br>Social impacts from air pollution can be significant on short-term and long-term people's health.<br>The calculation of operational emission of pollutants has not been undertaken therefore the assessment has been carried out on the information available.<br><br>The Project is performed in an industrial area; the closest human settlements are at a distance of 3-4km from the Projects site, in the villages of Malembo and Bissassanha. However, at around 600 m from the Project site, an education facility and an accommodation facility used for students called MDC has been identified. | |
| Emission of noise and vibrations | For the noise impact assessment during operations, there are still some data missing from the airport designer on characteristics of the noise sources inside the airfield.<br>Once these data are available, a noise model will be prepared, as an independent document that will serve to determine the impacts.<br>Therefore, the noise assessment for operation will not be described in this report. The proposed noise assessment and modelling approach is however described as follows.<br><br><u>Operational Aircraft Noise</u><br>An assessment of aircraft noise from use of the new runway will be undertaken. Aircraft noise will be modelled using the Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT). This model will be prepared using proposed operational information (flight numbers, aircraft types etc) and airport geometry details (runway layout, route structure etc) to be provided by the future operator.<br><br>The aircraft noise model will be used to generate noise contours for up to two scenarios (e.g. opening year and future year (e.g. 10 years after opening).<br><br>Noise contours representing average daytime aircraft movements will be produced. Noise contours will also be prepared representing average night-time movements where relevant.<br><br>Single Event Level (SEL) and / or $L_{AFmax}$ contours will be produced for a small selection of aircraft types that will use the proposed development.<br><br>The potential impact of aircraft noise will be assessed against appropriate guidelines based on Good International Industry Practice (GIIP) and other relevant guidance such as the World Health Organisation (WHO) Environmental Noise Guidelines (2018) and the following International Finance Corporation Performance (IFC) guidelines:<br><br>- International Finance Corporation Performance (IFC) Standards, Environmental, Health and Safety (EHS) Guidelines. General EHS Guidelines: Environmental. Noise Management. 1.7 Noise. 2007<br>- International Finance Corporation Performance (IFC) Standards, Environmental, Health and Safety (EHS) | ■ Community health, safety and security |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | Guidelines. Airports. Environmental, Health, and Safety Guidelines for Airports. 2007<br><br><u>Ground Noise</u><br><br>Due to the current stage of the proposed development it is unlikely that sufficient detail will be available to undertake noise modelling of ground noise sources associated with the airport operations (e.g. taxiing aircraft, use of Ground Power Units and Auxilary Power Units, engine ground running, support vehicles etc). Assessment of potential noise impacts from these sources will therefore be provided on a qualitative basis considering potential noise sources and distance from sensitive receptors. Assessment will be undertaken considering the noise level guidelines on environmental noise set out by the IFC EHS on noise management.<br><br><u>Surface Access Noise</u><br><br>An assessment of changes in road traffic noise associated with the proposed development will be undertaken based on available information on existing and future road traffic vehicle flows on the existing road network local to the proposed development. As some data on traffic baseline are still to be collected, the assessment is postponed. Assessment will consider the IFC guidelines and GIIP guidance including, but not limited to the following:<br><br>- Highways England, Design Manual for Roads and Bridges, Sustainability & Environment Appraisal, LA 111 Noise and Vibration, Revision 2, May 2020<br>- Calculation of Road Traffic Noise (CRTN). Department of Transport and Welsh Office. 1988<br><br><u>Operational vibration</u><br><br>Operational activities also have the potential to generate notable levels of vibration. Given that the distance between the boundary of the site and the nearest sensitive receptor is greater than 400m, significant vibration impacts are not anticipated. Assessment of operational vibration is therefore not proposed to be undertaken. | |
| Emission of light | Airports require extensive lighting for runways, taxiways, and buildings, which can create light pollution and affect the night sky's visual quality. Additionally, signage and advertising around airports can contribute to visual clutter.<br><br>The Project will entail the installation of prominent light sources compared to the otherwise dark setting, and these can influence the overall landscape context even extending these effects to the night landscape. It is expected the use of interior and exterior light such as the Approach Lighting System (ALS) that will be implemented to make the runway noticeable (it will be located at just one end of the runway), and interior lights at entrance of the building and in the internal offices (expected to be lit via local switches and occupancy sensors). Moreover, aircraft flights into and out the airport will emit lights.<br><br>However, the new airport will be located in an industrial area, with limited human receptors in its proximity, therefore even | ■ Landscape and visual quality |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | with an increase in light pollution it is not expected a high impact on visual quality. | |
| Existence of new buildings/infrastructures, visual impact | At the end of the construction phase, the Site will have a different aspect compared to the previous situation. The presence of the airport will introduce new architectural elements to the local landscape. Airports typically feature large structures like control towers, terminals, and hangars, which can be visually imposing and alter the skyline.<br><br>The Terminal building will be distributed on 3 floors with a built-up area of approx. 13,000 $m^2$ and an expected height of 10-15 m. The Air Traffic Control Tower will have a heigh of approx. 25-30 m.<br><br>Tall structures can disrupt the visual continuity of the landscape and may be perceived as intrusive by nearby residents. Furthermore, frequent aircraft overflights can disrupt the tranquillity and visual quality of the landscape. Low-flying aircraft may be particularly intrusive, affecting both the visual and auditory aspects of the environment.<br><br>However, the Project is located in an industrial area; therefore the introduction of a new infrastructure won't significantly alter the appearance of the landscape. | ■ Landscape and visual quality |
| Production of solid waste | The operation of the airport will entail the production of significant amount of waste, both non-hazardous and hazardous. Waste generated during the operation of the airport might add increased pressure on waste disposal systems and infrastructures, particularly in the context of Cabinda Province, where they are not well developed and already facing difficulties, potentially leading to an overall worsening of the waste management.<br><br>It is expected that the following waste streams are generated during the airport operations:<br>- Municipal solid waste from terminal and office-based locations, such as product packaging, cardboard, plastics, glass, plastic and aluminium bottles, paper items, food waste, etc. Deplane aircraft waste is also included in this category, which is waste originating from aircraft flights (bottles and cans, newspaper and mixed paper, plastic cups and service ware, food waste, food soiled paper, paper towels, etc).<br>- Hazardous waste, such as waste oils, oil contaminated filters and rags, batteries, tyres, chemical waste, waste electrical equipment (e-waste), metallic waste, solvents, and anything used for the repair and maintenance of aircraft.<br>- Medical waste. The type of medical waste generated during the airport operations has not been informed, however it is expected that it may include syringes, gauze and bandages, soiled gloves, lancets, soiled personal protective equipment, among several others. Medical waste is a special pollutant with infectious and toxic characteristics generated during medical diagnosis and treatment.<br>- Green waste from landscape maintenance activities.<br><br>According to the information received, a Solid Waste Collection Area is planned for the airport, where waste will be sorted in specific containers (organics / mixed dry recyclables | ■ Mobility and Infrastructure |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | / residuals). The storage area will have chemical resistant walls and floors, connections to the wastewater network, and air conditioning.<br><br>To date, information related to measures such as waste reuse and recycling has not been provided.<br>However, it is expected that a licensed waste company will be responsible for collecting all waste that will not be recycled/reused at the airport and transporting it to a suitable designated area.<br>Currently, no information has been provided on the final destination of waste during operations, therefore the assessment has been carried out on the information available. | |
| Production of wastewater | It is expected that during the operational phase, the airport will produce wastewater mostly from the operational domestic use (such as - among others - the use of airport buildings, kitchen and from airplane toilets (lavatory waste) and from airplane hangars or other maintenance facilities which may contain high amounts of oil or heavy metals; wastewater may contain suspended sediments and petroleum hydrocarbons.<br><br>It is foreseen that the airport will have a wastewater treatment plant (WWTP) to receive and treat domestic wastewater. As informed the treated water could be used for irrigation and that the sludge will be stored and aerated prior to disposal by tanker truck on a weekly basis.<br><br>According to the information received, the design of the WWTP will consider municipal wastewater characteristics in nature. As previously said in the report, the Province of Cabinda has no wastewater collection system in place therefore additional wastewater from the airport can become source of increased pressure on the wastewater treatment.<br><br>It is currently unclear how the wastewater from airplane hangars or other maintenance facilities will be handled, but according to information received it is expected that it will be pre-treated at source before discharging in the Wastewater network. The type of technology used for the pre-treatment is unknown until the present moment, therefore the assessment has been carried out on the information available. | ■ Mobility and Infrastructure |
| Energy and fuel demand | During the operational phase of the airport, a large consumption of energy is expected.<br><br>Regarding electricity consumption, the major consumption of energy would be connected to the airport terminal functioning (air conditioning, building lighting, ventilation, and a large number of miscellaneous sources, including check-in desks, escalators, conveyor belts, lifts, computers, cooking equipment) and the airplanes functioning ( such as – among others- runway lighting, auxiliary power units (APUs), hangars, ground vehicles)<br><br>It is foreseen that an electrical switching and transformer station will provide electricity for the airport, considered sufficient to supply for the Project's demand for the first phase. Moreover, space will be reserved in the airport layout plan to accommodate future expansion of this facility.<br><br>Electricity will be primarily supplied by the existing public network of Futila Thermal Power Station located around 1.5 km from the Project site. | ■ Mobility and Infrastructure |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | In addition, a 100% standby power is provided via 4 x 2500 kVA prime rated diesel generators.<br><br>It is reported that the airport supporting vehicles (such as refuelers, buses, tugs, container loaders, lavatory service vehicles) will be fuel driven. Impacts related to the use of fossil fuels are assessed in the sections of "Emission of gaseous pollutants", and "Emission of dust and particulate matter". | |
| Water demand | Airports are facilities having large water consumption. For the NAIC airport the expected water sources are the Cabinda Water Supply Network, which is supplied by surface water intake from the Chiloango River and the artisanal well within the NAIC site.<br><br>The surface water abstractions may change the flow regime modification and create morphological alterations therefore exacerbating water systems' pressure. Impacts of this nature are currently considered to be medium, considering the large amounts of water needed by the airport (130 $m^3$/day during the first phase and 300 $m^3$/day during the ultimate phase). Moreover, the social baseline has identified water supply's scarcity in the rural region of the Province, however if mitigation measures will be implemented, the risk will be well mitigated. | ■ Mobility and infrastructures |
| Influx of population | The influx of population resulting from the development of a new airport can have various impacts on population and demographics.<br><br>Once the airport will be completed, the number of people arriving to the airport and the Project area will increase. Based on the existing Cabinda Airport, the number of expected daily domestic and international passengers is assumed will be approx. 1,600 in the initial phase, forecasted to increase steadily in the next years, reaching 4,600 in the final phase. The operational phase of the airport will also lead to an increase in employees and hence persons potentially moving to the area due to new employment opportunities. Population influx thus can lead to increased demand for housing, potentially driving up housing prices and making it less affordable for some residents.<br>As already assessed for the construction phase, for the operation phase as well, the arrival of workers may create competition for resources and attract economic migrants which may cause social conflicts. Depending on the job created by the airport, income levels in the area may change, potentially affecting income inequality.<br><br>To date it is not provided the number of jobs that will be created during operation; on top of the workforce more induced jobs are also expected to be created. Moreover, the arrival of service providers, passengers, tourists and workers may increase the local rate of crimes, lowering the citizens' perspectives of safety of the area.<br><br>In the operation phase, it is expected an increase in communicable diseases and burden for local health services, due to the influx of domestic and international passengers. Increased interactions between persons can increase the risk of disease transmission, especially if proper public health measures are not in place, potentially leading to outbreaks of communicable diseases. | ■ Population and demographics<br>■ Community health, safety and security<br>■ Ecosystem services |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | Increase of population can lead also to an uptick in certain types of crimes such as traffic violations, property crimes especially if enforcement measures are not scaled adequately. High profile infrastructures such as airports can become targets for security threats therefore there might be the necessity to increase security resources to safeguard the airport and surrounding areas.<br><br>In addition, the influx of population may create impact on **ecosystem services** since newcomers may make use of local ecosystem services, increasing pressure on local resources. Higher demand for resources, such as water, timber, and wildlife, can lead to overexploitation and unsustainable resource management practices. Moreover, and influx of population may lead to greater demand for recreational services from natural areas, potentially resulting in overuse and degradation of these areas.<br><br>However, no priority ecosystem services have been identified during the consultations and the site visits in the Project area. | |
| Security Management | Security management for airports is fundamental to ensure the safety of passengers, staff and the public. Security measures at the new airport can deter criminal activities also in the vicinity of the airport leading to improved safety for local residents. However in rare cases, security related incidents or accidents can occur. These incidents can have a direct impact on community health and safety if they lead to injuries or disruptions in the surrounding area. Heightened security measures, including visible armed security personnel, may create anxiety or unease among members of the local community. Some security measures, such as advanced screening technologies, may raise privacy concerns among passengers and nearby residents. These concerns can lead to public debates and potential legal challenges.<br><br>However, to date no information is provided concerning the security management in the operation phase of the airport, therefore the assessment has been carried out on the information available. | ■ Community Health and Safety |
| Demand for workforce | The demand for workforce is diverse and multifaceted being airports complex facilities that require a wide range of skills.<br><br>Various categories of jobs might be required for the airport such as airport management (airport directors, strategic planning etc), human resources, air traffic control, airport security such as security personnel screen passengers' baggage, customer service, maintenance engineering team and so on. Moreover, it is expected a police station on the Project site and a Fire and rescue services thus firefighters and emergency responders which are essential for handling aircraft emergencies. To date no information is provided concerning the number of workforces needed in the operation phase of the airport.<br><br>During the meeting with SGA it was reportedly said that the workers currently employed in the existing Cabinda Airport will be transferred to the new airport. It was raised the point about how to check their comfort in changing the working place. Cabinda will become the second airport in Angola for number of passengers and based on the new Luanda international | ■ Economy and employment<br>■ Community, Health and Safety |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | airport experience (starting operation since November 2023), SGA intends to transfer the workers to NAIC when ready, at the same working conditions. People currently employed at Cabinda airport are 37 workers for SGA and 12 for ENNA. In addition a number of few workers from TAAG will be employed. As of today working conditions are managed through Angolan regulation. No EHS policies are available, and the working contract reported state that workers have clauses to accept moving to another working place. Overall such information are not complete and cannot be considered sufficient to ensure workers well-being and comfort. | |
| Demand for raw materials and goods/supply chain | The operational phase of the airport will increase the demand for materials/goods/ supply chain. Some of the materials and goods will be related to the daily operation of the airport such as -among others - spare parts and maintenance equipment, security scanners and other security-related equipment, retail products such as good for airport shops, restaurants, medical products for the infirmary. Many materials and goods may need to be sourced from international suppliers whilst other products might be sourced locally.<br><br>To date no information is provided or the suppliers chosen for the supply of materials and goods for the operational phase of the airport or any information is available on quantity and type of goods and materials needed. Therefore the assessment has been carried out on the information available. | ■ Economy and employment |
| Increase of road traffic | During operation there will be an increase in traffic on roads in the province, due to the new infrastructure available. Often airports attract many passengers, employees and visitors, leading to increased traffic in the proximity of the airport. This can result in congestion on nearby roads and highways especially during peak travel times. Airports may have a mix of transportation options including private vehicles, taxis, buses or shuttles and the interaction of these transportation modes can impact road traffic dynamics. If necessary, mitigation measures should be discussed and agreed with the local competent authorities.<br><br>Increased road traffic can lead to air pollution and have adverse health effects on community members, especially those with respiratory conditions. Poor air quality can result in increased rates of asthma and other respiratory illnesses. Moreover, more traffic can lead to an increased risk of traffic accidents which can results in injuries and fatalities. Increase of road traffic might be also connected to increased criminal activity such as thefts of vehicles or traffic related crimes thus community security might be compromised if not properly addressed.<br><br>Furthermore, pedestrians may navigate streets less easily due to an increase of traffic potentially leading to accidents and injuries. | ■ Mobility and infrastructures<br>■ Community health, safety and security |
| Interference with roads/infrastructures/services | The direct social impact of increased traffic nearby the airport would be increased commute times and inconvenience due to interference with existing infrastructures. Residence of the human settlements located 3-4 km from the Project site might experience increased commute time to and from home or to reach social infrastructures in the area such as schools, health care facilities. The degree of the impact might change on the | ■ Mobility and Infrastructures |

| Impact Factor | Impact Assessment | Components Affected |
|---|---|---|
| | basis of effective planning on the implementation of strategic transport to reach the airport from other areas of Cabinda.<br><br>Moreover, a larger population travelling from and to the airport, especially if families with school-age children can result in a significant increase in student enrolment in local schools and increased pressure in local infrastructures, including healthcare facilities. | |
| Availability of air transportation services | The long-term development of the airport for the region would result in economic benefits for the wider Cabinda Province. The presence of a new airport can stimulate economic growth in the region, leading to increased tax revenue. Moreover, a significant number of jobs opportunities may arise ranging from airline employees to service providers and so on, leading to a boost in the local job market. Benefits may extend to employees and businesses surrounding the airport site in industries such as -among others- utilities, transport, trade, tourism, construction. These benefits may also have a positive outcome on households' income and local communities' access to employment opportunities. The airport would also increase tourism to the area, improving local businesses such as hostel/ hotel/ restaurants' revenues.<br><br>The type and location of local growth will be shaped in the long term by regional planning.<br>Improved transportation access can also benefit communities by making it easier for them to travel and to relate to the rest of the Country and worldwide, considering that based on the current situation, connections between Cabinda and other countries are considered insufficient. | ■ Economy and employment<br>■ Mobility and infrastructures |

### 12.2.1 Mitigation Measures

The mitigation measures listed below follow the mitigation hierarchy and are proposed for the operation phase; these measures will be implemented in addition to the embedded Project mitigation measures which are a standard procedure applied by Airport operator (SGA) to achieve compliance with legal requirements and regulations and alignment with good industry practice.

**Table 10: Mitigation Measures - Operation Phase.**

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| **Impact Factor: Change in the local hydrogeology and groundwater quality** | |
| Avoidance | Avoid improper wastewater discharges.<br><br>Considering the existing lithology, improper wastewater discharges on the soil can lead to the groundwater contamination. The airport operator will properly manage and supervise the wastewater collection, treatment and discharging systems and no uncontrol discharge will be allowed (see the Impact factor *Change in the local hydrology and surface water quality* above and the Impact factor *Production of wastewater* for further details). |
| Minimization | Minimize the likelihood of the water well deterioration and disruption.<br><br>Given the local lithological conditions, the artesian water well can be easily clogged with sand, so the filtration system will be periodically checked and eventually replaced. Also, the airport operator will ensure that the well casing/secure cover will be resistant to the weather and to the infiltration of insects, oils and fuels, water and sand. The water well top (i.e., its casing/secure cover) will be always rising of at least 30 cm above the ground level and it will be well-visible for avoiding its potential disruption during the vehicles moving and crossing. |
| Minimization | Minimize the risk of groundwater degradation.<br><br>Even though the groundwater level is deep, there are various types of pollutants that can generate contamination because of their characteristics (e.g., highly movable and long-lasting pollutants). The airport operator will focus on the monitoring and control of the major pollutants that will expose the airport groundwater (and soil) to pollution:<br>– ethylene or propylene glycols, from de-icing/anti-icing of aircraft;<br>– urea, acetates, formates from de-icing/anti-icing of runways, aprons, and taxiways;<br>– oils, lubricants and fuels, from spills during refueling and leaks from pipes or tanks;<br>– fire suppressant chemicals and foams dispersed in firefighting exercises;<br>– dust, dirt and hydrocarbons from paved surfaces and engine leaks;<br>– herbicides and pesticides.<br><br>Considering that the medium soil permeability on site will facilitate the absorption, the flow and circulation of water containing potential pollutants, the airport operator will ensure that:<br>– no intentional or accidental discharge, spread or spill will be made on the airport area bare ground, in or nearby the stormwater drains or on the green/vegetated areas;<br>– groundwater sampling and testing will be periodically completed (i.e., groundwater monitoring campaigns) and will follow a specific monitoring plan which will include the frequency of sampling, the sampling locations, and the parameters to be sampled (according to the Project standards and the Angolan legislation); |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | – oils, fuels, liquid waste and other hazardous liquid or semi-solid materials will be properly stored in specific dedicated locations. Such locations will be equipped with spills prevention kits;<br>– the dangerous materials will be properly labelled and arranged on containment systems or waterproofing sheaths and – where necessary - under roofed areas (i.e., protection from washout and weathering);<br>– there will be no connection between the storage areas and the permeable surfaces, the green areas and the rainwater drainage channels;<br>– an inventory of all potentially polluting materials and chemicals will be kept and updated by the appointed eligible specialist/contracted company;<br>– the proper handling and storage of potentially pollutive chemicals and hazardous materials will reflect the indications on the corresponding Material Safety Data Sheets (MSDSs);<br>– the work areas and the equipment, machinery and moving vehicles will be periodically washed, cleaned and maintained;<br>– considering that airport rescue and firefighting equipment often uses fire suppressant foams containing per- and polyfluoroalkyl substances (PFAS), products having less contamination of soils or water potential will be preferred;<br>If a contamination of groundwater is suspected or confirmed, the cause will be identified, and the pollution will be managed. Specific evaluations will eventually take place and the local authorities will be consulted for identifying the responsible and the measures to be adopted (e.g., remediation) according to the Project standards and the Angolan regulatory framework. |
| **Impact Factor: Emission of dust and particulate matters** | |
| Avoidance | <u>Avoid dust and particulate matter emissions from equipment and machinery.</u><br>The airport operator will ensure that:<br>– the moving vehicles will be periodically checked and maintained for preventing unnecessary emission of larger dust particles from brakes and tyres or emissions of particulate matter from malfunctioning filters and engines;<br>– for keeping under control the fumes and particulate emissions from the engines, will be used the Ringelmann scale, to be combined with a monitoring programme (i.e., analyses of VOCs and PMx);<br>– the roads will be periodically maintained and cleaned for preventing unnecessary emission of larger dust particles from asphalt and soil;<br>– all moving vehicles moving within the airport will follow pre-defined routes and paths which will be all paved and maintained;<br>– the speed limit for the support fleet and the heavy vehicles within the airport will be restricted to 20 km/h;<br>– the unpaved surfaces of the airport or of its immediate surroundings will be covered with gravel or vegetation for increasing the surface strength and decreasing the particulate and dust emissions;<br>– the machinery, equipment and vehicles will be periodically washed/cleaned (during the dry season such operation will be more frequent).<br>– the organic ultrafine particles formed in aircraft and diesel engines due to incomplete combustion will be reduced by installing proper filters and completing the periodical maintenance and control; |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | – low sulphur content jet fuels will be purchased considering that abundant inorganic sulphate particles are generally emitted by aircraft engines (because of the high sulphur content in the jet fuels);<br>– diesel engines used for handling and loading will be replaced, where possible, with electrical engines.<br>- The airport operator will continuously supervise the area for ensuring the proper adoption of the mitigation measures by carrying out periodical visual inspections. |
| Avoidance | <u>Avoid dust emissions during the takeoff and landing.</u><br>The airport operator will ensure that the ground where airplanes land and takeoff will be clean so no sand, dust and dirt will be suspended in the air as re-entrained dust. The airport operator will define rules, guidelines and indications within an air traffic management plan and will ensure the operations compliance to the management plan. Below is reported a list of actions that will be implemented on the takeoff/landing ground for avoiding the dust spreading:<br>– proper maintenance of takeoff/landing areas ;<br>– water spraying of takeoff/landing unpaved areas when necessary.<br>The airport operator will continuously supervise the area for ensuring the proper adoption of the mitigation measures by carrying out periodical visual inspections. |
| Avoidance | <u>Avoid leaving the vehicles, equipment and machinery turned on while not in use.</u><br>The vehicles, equipment and the machinery, while not in use, will be properly switched off/turned off for avoiding unnecessary emissions of pollutants such as $CO_2$ (carbon dioxide), CH4 (methane), NOx (nitrogen oxides), $SO_2$ (sulfur dioxide), and fluorinated gases. |
| Avoidance | <u>Avoid using machinery, equipment and vehicles that don't undergo periodical control and maintenance.</u><br>For preventing the increase of the emissions and enhance the airport operation environmental impact, according to the Project standards, the airport operator will ensure that regular periodical maintenance on equipment, plants and machinery will be completed. Also, periodical verifications on the fuel and oil types used, and on their consumption, will be made. The airport operator will ensure that periodical maintenance and control activities will be completed and registered on dedicated logs and forms. All interventions will be registered on a dedicated log to be kept on site. |
| Minimization | <u>Minimize dust and particulate matter emissions.</u><br>The airport operator, for minimizing the emission of dust and particulate matter, will:<br>– ensure that the take-off times will be as short as possible (the aircraft engines will be turned off when possible);<br>– ensure that proper filters will be installed on equipment and machinery;<br>– ensure that engines are turned off during idle periods;<br>– provide a binding limit value for emissions and particles of engines and set a limit value to comply with;<br>– carry out periodical air quality monitoring campaigns;<br>appoint a team to be focused on air emissions for implementing specific and measurable targets with deadlines for reductions of ultrafine particles (i.e., investigate specific actions to limit the particles emissions and reducing the employees exposure). |
| **Impact Factor: Emission of gaseous pollutants** | |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| Avoidance | Avoid gaseous pollutants emissions.<br>See the mitigation measures listed for the Impact factor above *Emission of dust and particulate matter* in the sections "*Avoid dust and particulate matter emissions from equipment and machinery*" and "*Minimize dust and particulate matter emissions*". |
| Avoidance | Avoid leaving the vehicles, equipment and machinery turned on while not in use.<br>See the mitigation measures listed for the Impact factor above *Emission of greenhouse gases* in the section "*Avoid leaving the vehicles, equipment and machinery turned on while not in use*". |
| Avoidance | Avoid using machinery, equipment and vehicles that don't undergo periodical control and maintenance.<br>See the mitigation measures listed for the Impact factor above *Emission of dust and particulate matter* in the section "*Avoid using machinery, equipment and vehicles that don't undergo periodical control and maintenance*". |
| Avoidance | Avoid using non-compliant chemicals.<br>The airport operator will ensure that the materials and chemicals used onsite (i.e., paints, glues, oils, lubricants, detergents) will all be sourced and purchased according to the Project standards. The usage of non-compliant or unlabeled chemicals will not be allowed. The chemicals bins and trays will be properly labelled. The materials and chemicals' labels will show the product name and the hazard pictograms (e.g., Hazardous to the environment or Acute toxicity symbols). Each product will be equipped with its updated MSDS showing the productor name, the chemical formula/the components, the hazard pictograms, the warnings and the danger indications and the safety advice on the proper personal or collective protection equipment to be used for the handling. |
| Avoidance | Avoid generating hazardous products and chemicals gaseous emissions.<br>The airport operator will ensure that the hazardous products and chemicals used onsite (e.g., additives, lubricants, cleaning detergents) will be properly stored in dedicated locations - which will be locked-up and well-ventilated – and segregated per type of content/pollutants/hazard. The bulks, cans, bins and trays will be closed/sealed for avoiding pollutant gases runoffs. |
| Minimization | Minimize the emission of gaseous pollutants by preferring low Sulphur fuels.<br>Considering that the Sulphur burning (because of its conversion into Sulphur dioxide) has high environmental impact, where possible, the airport operator will purchase low Sulphur fuels or investigate strategies for significantly reducing the sulphur content in jet fuels. |
| Minimization | Minimize the cars-related gaseous pollutants emissions.<br>The airport operator will offer sustainable transfer services or will collaborate with the municipality's public transport entities for avoiding the passengers transiting to and from the airport by car. |
| Minimization | Minimize the fuel consumptions.<br>The airport operator will optimize the aircrafts routes by, for example choosing which aircrafts to use on specific routes, improving flights management, maintenance, and booking systems and operating a route plan optimizing software. The airport operator will periodically monitor the consumptions of resources such as gasoline and diesel fuel for airport vehicles and GSE, fossil fuel for electricity and heating and jet fuel for auxiliary power units that power aircraft at airport gates. For example, the airport operator can digitalize the fueling operations for find ways for decreasing the consumptions. |
| Compensation | Compensate the emission of gaseous pollutants. |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | Considering that the vegetation plays an important positive role in atmospheric purification and air pollutants reduction and that the phytoremediation has many potential advantages for contrasting the air pollution, the airport operator will plant native species and revegetate, where possible, the airport area and its surroundings. |
| **Impact Factor: Emission of noise and vibrations** | |
| Avoidance | Implement noise abatement procedures.<br>Encourage the restriction of night time flights or us quieter aircrafts during certain hours |
| Avoidance | Construction of noise and vibrations barriers.<br>Build noise barriers between the airport and the nearby residential areas to block sound transmission and ground-borne vibrations |
| Minimization | Collaborate with Aviation authorities.<br>Work with authorities in order to establish flight procedure and routes that minimize overflight of densely populated areas |
| Minimization | Implement pre established operating hours.<br>Reduce the night time airport operations to reduce noise impacts during sleeping hours |
| **Impact Factor: Emission of light** | |
| Minimization | Compliance with regulations.<br>Ensure that the airport lighting system adhere to local, national and international regulations and standards on aviation lighting and light pollution control. |
| Minimization | Reduce light spillage and glare.<br>Where possible use lighting design techniques that focus light downward. |
| Minimization | Use LED lighting technology.<br>Where possible in the internal part of the airport replace traditional lighting systems with energy efficient LED, which consume less and has longer lifespans. |
| Minimization | Install Timed and Motion Activated Lighting.<br>Use motion sensors and timers on lighting systems to activate lights only when necessary. |
| Minimization | Carry out stakeholder engagement and set of a grievance mechanism.<br>Engage with local communities and make sure the grievance mechanism is in place. |
| **Impact Factor: Existence of new buildings/infrastructures, visual impact** | |
| Minimization | Implement landscaping around the new airport facility.<br>Planting trees and other vegetation around the new infrastructure can help soften the visual impact for the new airport. A well-designed landscaping might act as a buffer, reducing the visibility of some parts of the new structure. |
| Mnimization | Implement fencing and screening techniques.<br>Use fencing and screening to obscure the view of certain facilities such as maintenance areas or parking lots from the public view. This can be done with natural barriers or decorative walls. |
| Minimization | Develop and implement a Grievance Mechanism.<br>Ensure the implementation of the Grievance Mechanism for individuals and groups to formally communicate their concerns, complaints and grievances to the |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | company and facilitate resolutions that are mutually acceptable by the parties in a timely and effective manner. |
| Compensation | Commission art installations.<br>Public art installations inside and around the airport can serve as a focal points of interest, distracting from the airport's infrastructure while adding artistic value to the area. |
| **Impact Factor: Production of solid waste** | |
| Avoidance | Avoid onsite improper waste management.<br>The airport operator, for avoiding any type of improper waste management, will ensure that:<br>– the waste management will follow specific guidelines and standards to comply with;<br>– proper temporary waste storage/accumulation areas will be installed;<br>– the temporary waste storage/accumulation areas will be properly ventilated, roofed and equipped with chemicals resistant waterproof paving or containment trays to prevent spills and leakages;<br>– the temporary waste storage/accumulation areas will be often checked and cleaned for preventing the problematic odors generation;<br>– the waste will be stored segregated per categories, and it will be labelled for its identification and classification by indicating the type of waste, the date of collection and its hazardous nature;<br>– the drains of the waste storage/accumulation areas will collect the water runoffs and convey them into the WWTP;<br>– no waste mixing, no storing on the bare land and no intentional or accidental waste burning will be allowed;<br>– the materials that can be recycled such as packaging paper, plastic and glass bottles will be sent to licensed recycling facilities, as far as practicable;<br>– the waste deriving from the equipment maintenance (e.g., dirty chemicals trays, filters, oily rugs and metal parts containing hydrocarbons, oils and lubricants residues) will be properly stored on a leak-proof flooring, covered with a shelter and then sent to recovery/disposal;<br>– the waste oils (both from food preparation and engines maintenance) will be collected in specific containers;<br>– the different kinds of waste oils will not be mixed for storage;<br>– a specialist will carry out regular site inspections and for verifying the spills and leaks containment systems conditions and integrity, the storage area adequate conditions and the proper waste labeling and segregation;<br>– the airport personnel will be trained for collection, safe handling and effective and correct disposal of both hazardous and non-hazardous waste. The training will include indications and best-practices for enhancing the waste reduction, reuse and recycling;<br>– trash bins will be installed all over the airport area for avoiding waste spreading, burning and burial. The bins will be emptied every day or more than once a day (if necessary);<br>– the general/domestic solid waste generated (flights/aircrafts general waste, food preparation, shops, restaurant, toilets, trash bins, etc.) will be properly collected, segregated, and managed as per the Project standards; |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | - the medical waste generated from the infirmary will not be mixed to the general waste but it will be properly segregated and it will be managed by a company licensed for managing medical waste. |
| Avoidance | <u>Avoid offsite improper waste management.</u><br><br>The airport operator will ensure that:<br><br>– the waste will be reduced (see *Minimize the waste generation* section below), reused and recycled, where possible;<br><br>– a licensed local/national waste management contracted company will be in charge of collecting the waste that will not be recycled/reused at the construction site and will transport it to proper landfills, recycling centres or recovery plants;<br><br>– no improper dumpsites will be used (e.g., dumpsites like Yema one having serious management problems such as no planned deposition, no fencing, no paved areas and no lined cells or leachate control system);<br><br>– materials which are easier to recycle, and reuse will be sourced and purchased, where possible;<br><br>– single use items will be avoided.<br><br>An eligible technician/specialist from a contracted company or the HSE team will be appointed for researching new practices for maximizing the recycling and reuse of materials (i.e., implement innovative techniques for waste recycling and minimization).<br><br>For managing the waste which will not be reused or recycled, the airport operator will plan alternative solutions, such as:<br><br>– provide the airport with an incinerator (to be properly designed and authorized as per the Project standards and Angolan legislation);<br><br>– practice onsite biological, chemical or physical treatment for decreasing the percentage/amount of unrecyclable and non-reusable waste;<br><br>– appoint an eligible technician/specialist from a contracted company or the HSE team who will research proper landfills – compliant to the Project standards, the legal requirements and the international best practices – within Angola or in bordering countries to use for disposing of the unrecyclable/non-reusable waste;<br><br>– install a waste compactor on site for allowing longer and more efficient waste storage and for decreasing the number of the potential shipment trips to landfills.<br><br>The Ministry of Transport will liaise with the Government of Cabinda and with the other Ministries responsible for waste management in order to seek solution at Cabinda for the correct disposal of solid waste and speed up the process for creating the new landfill system. Also, the Ministry of Transport will evaluate the voluntary adherence to the *Airport Sustainability Planning*, launched by ICAO and define a set of initiatives to improve the sustainable performance and reduce the carbon emissions. One major point for the initiative is the management of solid waste and the implementation of recycle. |
| Avoidance | <u>Use authorized companies for managing waste.</u><br><br>The airport operator will ensure that only properly licensed and authorized companies will manage the solid waste:<br><br>– the waste management operations will be all traceable and registered;<br><br>– the waste will be transported by licensed companies to licensed materials recovery plants (e.g., licensed waste recovery plant operating soil-washing or bio-treatment) or to waste disposal plants (e.g., licensed landfills or incinerators); |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | – recovery will be always preferred when technically feasible and if recovery facilities are available;<br>– the waste-related documents will be kept on site;<br>– the waste generated and shipped will be registered on specific logs/registers;<br>– an appointed eligible specialist/contracted company will periodically check the waste managers authorizations (license of drivers, trucks and plants);<br>- the airport operator should periodically visit the waste recycling/disposal selected facilities to ensure that proper disposal practices are implemented and that they operate in compliance with the local environmental standards. |
| Minimization | Minimize the waste generation.<br>The airport operator will attempt to minimize the waste throughout the airport buildings, on the flights and during the ground operations. The waste generation will be decreased by reducing the resources use and by optimizing the recycling and reuse rates. The appointed eligible specialist/contracted company will draft a waste management and reduction plan or a waste minimization strategy for setting ambitious waste & recycling targets which will be periodically monitored and re-assessed. Specific waste reduction policies (e.g., plastic bag charges, plastic bottle deposits and discounts for using reusable cups) will be introduced. The appointed eligible specialist/contracted company will also be in charge of raising awareness of the airport personnel (the flights crews, the security workers, the tenants of airport shops, etc.) on the waste reduction and recycle policies and best practices. The airport operator will ensure that materials and goods less wasteful will be sourced and purchased. Also, the periodical maintenance and control of equipment, plants and machinery will lengthen their life by keeping them efficient. |
| Restoration | Restore the areas where temporary waste deposits have been dismantled.<br>As the temporary waste storage/accumulation areas will be dismantled/decommissioned, these will be restored, cleaned and destinated to other purposes or revegetated. |
| Compensation | Compensate the excessive production on waste by recycling and reusing as byproducts.<br>The airport operator will maximize, as far as practicable in terms of material properties (i.e., technical, and economic feasibility), the re-use of waste. For example, the food waste should be turned into organic fertilizers by composting it. Also, exhausted/used oil can be re-refined into lubricants, processed into fuel oils, and used as raw materials for the refining and petrochemical industries. |
| **Impact Factor: Production of wastewater** | |
| Avoidance | Avoid generating excess of wastewater.<br>The airport operator will be measuring the wastewater discharges. A flow meter (or a flow sensor) will be installed on the wastewater discharge outputs for measuring the amount of liquid waste and the flow rates. The wastewater amounts and data measured will be registered on dedicated logs and forms to be kept at the construction site offices. If the data will show any excess or peak values, the airport operator will immediately carry out an inspection on the equipment (e.g., plants, sensors and flow meters check-ups) and will appoint a technician or a company to carry out the repairs and the maintenance eventually needed. Also, the quality of the wastewater discharge will be periodically checked (i.e., periodical wastewater monitoring campaigns) for avoiding negative effects on the quality and quantity of the local surface water and groundwater. The airport operator will ensure that the WWTP will collect and treat the civil/domestic wastewater (to be collected, treated and discharged to the sewage system installed onsite), the stormwater (to be collected through a drainage system) and the process wastewater deriving from the equipment and machinery repairing, |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | washing and cleaning. The discharges (both to the surface water and to the groundwater) will be authorized and completed according to the Project standards, the legal requirements and the environmental standards. |
| Avoidance | <u>Avoid discharging polluted wastewater.</u><br><br>The stormwater and the evaporation ponds will be managed as indicated in the section "*Avoid improper management of stormwater*" of the Impact factor *Change in the local hydrology and surface water quality.* The domestic wastewater from airport buildings, airport kitchen and from airplane toilets and the "process" wastewater from the airplane hangars or other maintenance facilities (e.g., equipment and machinery washing station and workshop) - which may contain high amounts of oils or heavy metals – will be properly managed. The airport operator will ensure that the collection and treating systems will be constantly checked and maintained (i.e., functioning and in good conditions) and that the effluents will meet the Project standards and the legal requirements (i.e., qualitative and quantitative). Specifically, the airport operator will ensure that:<br><br>– the wastewater collection and treatment systems will be always functioning properly;<br><br>– the WWTP will treat about 90 $m^3$/day, on average;<br><br>– the wastewater from airplane hangars or other maintenance facilities will be pre-treated at source before discharging it;<br><br>– the WWTP will be equipped with flowmeters and sensors for monitoring the flow and intervening immediately in case of losses and malfunctioning;<br><br>– periodical maintenance and control activities on the WWTP (e.g., verification of the flowmeters and sensors proper functioning, filters replacement) will be planned and completed as planned for preventing losses and runoffs;<br><br>– exclusively eligible appointed specialists, technicians and contracted companies - properly trained - will carry out qualitative and quantitative analyses and maintenance and control operations and will periodically review the data for assessing the rates;<br><br>– the filtration and treatment system serving the WWTP installed will be daily checked for ensuring its proper functioning;<br><br>– the reverse osmosis reject water will be properly collected and disposed of by pumping it to the external wastewater network (depending on its salinity);<br><br>– the pumping system serving the reverse osmosis will be periodically checked and maintained for preventing uncontrolled losses;<br><br>– the oily effluents (e.g., from workshop and food preparation area) will be equipped with special degreasers for separating the oil and grease from the wastewater flowing towards the sewage for the final discharge;<br><br>– the resulting amount of oil and grease waste will be properly collected and disposed of;<br><br>– where possible, prior treatment and control, the effluents will be always reused onsite;<br><br>- the odor control unit of the WWTP building will be properly working in continuous. |
| Avoidance | <u>Avoid the uncontrolled discharge of civil wastewater.</u><br><br>Since there is no wastewater collection system in the Cabinda province, the airport operator will ensure that:<br><br>– the civil/domestic wastewater will be collected onsite through a septic tank system; |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | – the civil wastewater collection system and the septic tanks will be constantly properly functioning and in good conditions;<br>– periodical maintenance and control activities will be carried out for preventing malfunctioning of drains, pipelines, manholes, septic tanks, spills and leaks;<br>– periodical maintenance and control activities will be carried out for ensuring the storage tanks tightness and proper placement, under the tanks, of secondary containment systems;<br>– the inspections will be properly registered on a site log;<br>– the sludge will be stored and aerated prior to disposal by tanker truck on a weekly basis;<br>the sewage sludge will be properly managed by licensed waste management companies that will send it to licensed sanitary landfills (prior municipal authorization) compliant to the Project standards. For further details on the proper management of the wastewater made by external contracted companies, see the section "Avoid unauthorized companies *for managing waste*" of the Impact factor *Production of solid waste.* |
| Minimization | Minimize the risk of environmental pollution deriving from the equipment and machinery cleaning and washing.<br>For minimizing the risk that the equipment and machinery cleaning and washing will generate environmental pollution, the airport operator will ensure that the stations for washing the vehicles, the equipment, the machinery and the chemicals bins and trays will be roofed, equipped with leak-proof flooring and with a proper wastewater collection system. The wastewater generated will be treated trough a degreaser and the resulting oils and lubricants will be properly segregated and managed as special waste (as already indicated in the section above *Avoid discharging polluted wastewater*). |
| Compensation | Compensate the excessive production on wastewater by recycling and reusing it.<br>The airport operator will maximize, as far as practicable in terms of technical, and economic feasibility, the re-use of wastewater. For example, the condensate water from the air conditioning system should be reused (after assessing its quality) for irrigation or for equipment and machinery washing. More details are reported in the section "*Minimize the water exploitation*" of the Impact factor *Water demand*. |
| **Impact Factor: Energy and fuel demand** | |
| Avoidance | Avoid energy sources exploitation for preventing energy shortages in the site vicinity.<br>For preventing unnecessary energy wastes and consequent shortages in the site vicinity, the airport operator will ensure that:<br>– energy will be supplied exclusively by the existing public network;<br>– the airport source from Futila power station will not exceed 5.49 MVA;<br>– the standby generator system serving as a 100% back-up electrical system that will operate automatically (i.e., the Switching Stain via 4 x 2500 kVA prime rated diesel generators) will be periodically checked and maintained;<br>– the grid electricity will be preferred to the use of diesel fueled portable generators;<br>– a dedicated eligible specialist/contracted company will be appointed for regularly measuring, monitoring and registering the construction site energy uses; |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | – precise performance targets, based on the effective and ideal energy consumption, will be defined and periodically reviewed;<br>- the effective energy consumption will be regularly compared to the performance targets so that the actions to be taken for reducing the consumptions can be properly identified. |
| Minimization | Minimize the energy consumption.<br>The energy consumption will be minimized by adopting proper energy saving measures such as:<br>– installing energy efficient LED lamps and local switches or occupancy sensors at the airport building (toilets, restaurants, shops, etc.);<br>– installing low-consumption lighting contactors in the lighting panels at the larger areas (waiting areas, gates, etc.);<br>– equipping the baggage handling system with low friction belts;<br>– training the airport personnel for raising their awareness on energy saving actions and encourage them to participate in eco-friendly practices onsite (e.g., switching off lights, plants and equipment when not necessary);<br>– benefit, when possible, of the natural light;<br>– avoiding excessive cooling or heating;<br>– installing energy efficient screens and devices (e.g., energy efficient LED screens at the departure gates);<br>assessing the benefit and incentivised the using electric luggage trucks and electric buses inside the airport. |
| Minimization | Minimize the energy losses caused by machinery and equipment breakdowns.<br>Part of the potential energy waste that will be generated will be deriving from equipment and machinery malfunctioning. For preventing such events, airport operator will ensure that:<br>– the equipment and machinery (including the small devices serving the food preparation area, the toilets and the shops) will always be in good running conditions and the maintenance will be properly carried out by an eligible company;<br>– the repairing and maintenance operations will be registered on a dedicated log to be kept in the construction site offices;<br>– the old and inefficient equipment and devices will be replaced with higher efficiency models;<br>- the diesel fuelled standby generators serving as back-up electrical system will be periodically checked and placed on leak-proof containment systems, near spills prevention kits for cleaning potential spills and leaks deriving from the equipment and machinery fuel injection/recharge. |
| Compensation | Compensate for the energy use.<br>Whether any excess of energy will be generated from the future potential installation of solar panels and/or the other renewable sources of electricity, such excess of energy should be introduced into the electricity grid and made available to the surrounding communities. |
| **Impact Factor: Water demand** | |
| Avoidance | Avoid the exploitation of the water sources.<br>A water quality monitoring programme needs to be established (indications form ICAO Water management at Airports, part of the Eco airport toolkit) will be considered. |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | The potential excessive exploitation of the water sources will negatively impact the environment and the airport area surroundings (i.e., the community and the industrial and commercial receptors). The airport operator will ensure that:<br>– the water intake from both the artesian well water and the water from the mains will be measured by a continuous monitoring system equipped with proper sensors and equipment (e.g., hydrometers/flow meters);<br>– the water intake will be sent to a water treatment station for ensuring that complies to the Project standards and the Angolan law;<br>– the treated water will be stored in above ground storage tanks made of PVC;<br>– the water will be pumped from the tanks through a pressurization system into the underground network of HDPE pipes, to their destinations, without losses or wastes;<br>– periodical maintenance and control of the systems and structures will be completed by a licensed eligible company for ensuring the tanks and pipes tightness and the lack of water losses and wastage;<br>- specific training will be completed for raising awareness of the airport personnel on the proper water usage and consumption. |
| Avoidance | Avoid using freshwater when not necessary.<br>Where possible, closed-cycle systems for avoiding water wastage will be installed. The airport operator will adopt proper measures for decreasing the water consumption and, where possible, will ensure that the effluents generated on site will be reused and recycled in accordance with the Project specification and the Angolan legislation. The recycled water will mainly consist of the clean/treated effluents from the water treatment plant, the backwashing of the water treatment plant filters, the degreasers, the HVAC (heating, ventilation, and air conditioning) condensate water.<br>Prior using the recycled water, its quality will be assessed according to the Project specifications. |
| Minimization | Minimize the water exploitation.<br>The airport operator will appoint an eligible specialist/contracted company who will periodically identify, regularly measure, monitor and register the water flows on site. The specialist will also define and regularly review performance targets which will be adjusted to account for the type of activities. The existing water flow data will be regularly compared with the performance targets for identifying potential actions to be taken for reducing water wastage. The data will be registered on a dedicated log. The airport operator will ensure that all over the airport, proper measure for saving water will be adopted, for example:<br>– the aircrafts dry wash will be conducted, when possible;<br>– the recycled water of good quality - in accordance with the Project specification and the Angolan legislation - will be used onsite for various purposes (supplying cooling towers, feeding the power washers used on curb fronts and arrival/departure roadways, washing down the airfield or service vehicles, irrigation, washing and cleaning the equipment and machinery, feeding the firefighting system etc.);<br>– low-flow fixtures and other water saving plumbing fixtures (e.g., faucets and toilets) will be installed to achieve water savings by having a lower flow rate of water or a smaller quantity per flush;<br>- native plants and species requiring little or no irrigation will be planted and the irrigation system will be automated. |
| Restoration | Restore the water well borehole.<br>The water well, once not anymore in use and if its usage is not needed in the future, will be dismantled for avoiding safety and environmental-related issues |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | (e.g., open borehole behaving as a fast path for pollutants spreading). The airport operator will ensure that the well dismantling will be carried out by removing the structure and then filling the borehole with proper, ad hoc, soil of good quality selected according to the local lithology. |
| **Impact Factor: Influx of population** | |
| Avoidance | Employ local workers.<br>The Project aims at employing local workers to the extent possible. This will reduce the need of workers from other parts of Angola and from abroad, overall limiting the influx of external workers to the area. |
| Avoidance | Develop and implement a Stakeholder Engagement Plan.<br>Engagement activities include regular meetings with authorities to minimise speculative migration by jobseekers to the study area, including monitoring any demographic changes in comparison to baseline data, to limit the potential for in-migration and conflicts with communities living in the area. |
| Avoidance | Perform health screenings of workers.<br>Pre-employment health screening for employees and contractors workers and on a periodic basis throughout their employment/contract; |
| Avoidance | Provide health and safety induction training.<br>Provide health and safety induction for workers and awareness trainings on STIs and others communicable disease prevention; Implement trainings on raising awareness on healthy lifestyles on topics such as – among others- on alcohol, personal and food hygiene, communicable and non- communicable diseases. |
| Avoidance | Enforce regulatory measures.<br>The Airport operator will collaborate with the proper entities and authorities within the Government of Cabinda in order to draft codes and regulations to maintain safety standards and prevent overcrowding and to monitor and regulate land use around the airport in order to avoid illegal settlements. |
| Minimization | Develop and enforce a code of conduct.<br>The code of conduct should provide indication of the behaviour that workers should adopt, particularly when interacting with local communities. The code of conduct will be provided to workers at the hiring stage and will be covered during induction training. |
| Minimization | Develop and implement a Grievance Mechanism.<br>Ensure the implementation of the Grievance Mechanism for individuals and groups to formally communicate their concerns, complaints and grievances to the company and facilitate resolutions that are mutually acceptable by the parties in a timely and effective manner. |
| Minimization | Contribute to the development of a comprehensive urban planning.<br>The Airport operator will collaborate with the competent entities and authorities within the Government of Cabinda for the draft of an *Urban Development Plan* in order to anticipate population growth and allocate land for commercial, industrial and residential purposes. |
| **Impact Factor: Security management** | |
| Avoidance | Conduct regular risk assessments.<br>The Airport operator will conduct regular risk assessment to identify potential threats to the airport's location and operations. |
| Avoidance | Implement stringent access control.<br>The security personnel will implement control measures to restrict unauthorized entry to secure areas. |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| Avoidance | Develop and Implement an *Emergency Preparedness and Response Management Plan.*<br><br>Develop a comprehensive Emergency Preparedness and Response Management Plan for various scenarios such as – among others- terrorist attacks, natural disasters and medical emergencies. |
| Minimization | Develop and implement a *Security Management Plan.*<br><br>The Security Management Plan should include measures to ensure that security is managed so to avoid tensions and risks for workers and local communities. |
| Minimization | Voluntary Principles.<br><br>Adopt the Voluntary Principles on Security and Human Rights for the management of security aspects. |
| Minimization | Check reference of security workers.<br><br>Conduct reference checks to ensure candidates for security services do not have criminal records or a record of abuse of violation of human rights; |
| Minimization | Develop and enforce a code of conduct.<br><br>Implement training on the Code of Conduct specific to security personnel, which outline appropriate conduct, engagement and use of force, and audits of the application of the Voluntary Principles on Security and Human Rights; |
| Minimization | Develop and implement the Stakeholder Engagement Plan.<br><br>Carry out the stakeholder engagement to ensure that local communities are aware of how to raise a grievance about any security contractor behaviour, should this be necessary |
| Minimization | Collaborate with law enforcement agencies.<br><br>Security information will be shared with law enforcement agencies and intelligence agencies in order to coordinate security efforts |
| **Impact Factor: Demand for workforce** | |
| Avoidance | Avoid forced labour.<br><br>Avoid any form of forced labour and any form of practice that can be considered a form of forced labour, such as requiring significant monetary deposits from the workers or retaining workers' identity documents. |
| Avoidance | Avoid child labour.<br><br>Ensure compliance with national laws and international standards regarding the employment of minors. The age of all workers will have to be verified through official documentation and suitably recorded. |
| Minimization | Set up a centralized hiring process.<br><br>Set up a centralized recruitment process and avoid recruitment at construction sites, to discourage persons moving to the construction site areas in search of employment positions. |
| Minimization | Maximise the employment of the old airport workforce<br><br>The operator will make an effort to offer employment solutions to the workers at the old airport. |
| Minimization | Carry out a survey with the old airport workforce<br><br>Carry out a pre-screening survey (at least one year before starting operation) through a dedicated questionnaire or a similar tool (possibly anonymous and free of any manipulation) to assess the current expectation from the workers about the transfer to NAIC and to understand under what conditions they are available to move. |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| Minimization | Reduce impacts of retrenchment.<br><br>Develop and implement a *retrenchment plan*, using the principles in the IFC Good Practice Note No. 4: Managing Retrenchment, 2005, with the aim of reducing the impacts of cessation of employment contracts, also considering the results of the survey. |
| Minimization | Transparent and fair recruitment procedures.<br><br>Put in place transparent and fair recruitment procedures, that monitor non-discrimination and equal opportunities and that are clearly understandable and accessible to all potential candidates |
| Minimization | Develop and implement the *Labour Management Plan*.<br><br>Ensure that the Labour Management Plan is aligned with the requirements of PS2. These policies and procedures will be understandable and accessible to workers, and in the main language(s) spoken by the workforce. HR policies and management will monitor: - Non-discrimination and equal opportunities are provided for all workers, and - Compliance with national and international laws, conventions and lenders requirements on labour conditions are maintained through the life of the Project. |
| Minimization | Comply with IFC Performance Standard 2.<br><br>Adopt and maintain human resources policies and management systems or procedures aligned with the requirements of IFC PS2. These policies and procedures will have to be clear and accessible to workers, and in the main language(s) spoken by the workforce. |
| Minimization | Compliance with labour regulations.<br><br>Compliance with national and international laws, conventions, and lenders' requirements on labour conditions to be maintained through the life of the Project |
| Minimization | Provide clear and transparent information to workers.<br><br>Provide clear and transparent information on wages, benefits and working conditions during the hiring process. Information should be provided also in written form in the language of choice of the worker. |
| Minimization | Develop and implement a Workers' Grievance Mechanism.<br><br>Implement a grievance mechanism open to for workers. Monitor that all workers directly and indirectly employed are informed about this channel to submit grievances. Monitor that the grievance mechanism is managed in line with indications of the procedure and that appropriate budget and resources are assigned. |
| Minimization | Encourage employment of local workers.<br><br>Define a strategy for the employment of local workers. This strategy will be disclosed in line with the provisions included in the SEP to ensure that local communities in the proximity of the sites are informed on employment positions available and methods to express interest. Based on outcomes of this plan, the Company will implement a training programme for the local workforce to enable them to take advantage of the opportunity. Require contractors and subcontractors to maximise use of local workforce in the Project, in compliance with Angolan legislation and the airport contractor's local content policy |
| **Impact Factor: Demand for raw materials and goods/supply chain** | |
| Avoidance | Develop and implement a *Supply Chain Management and Procurement Plan.*<br><br>Develop and implement a Contractor, Supply Chain Management and Procurement Plan. The Plan will ensure that contractors and subcontractors along the supply chain will be compliant with IFC PS2 and national legislation. |
| Enhancement | Encourage procurement of local goods, services and materials. |

| Mitigation hierarchy | Mitigation Measure |
|---|---|
| | Aim to procure goods, services and materials from Cabinda Province or Angola companies to the extent possible. |
| **Impact Factor: Increase of road traffic** | |
| Avoidance | Develop and Implement a Traffic Management System.<br>Provide dynamic signage to direct vehicles to the airport |
| Minimization | Improve public transport accessibility.<br>Collaborate with the competent entities and authorities within the Government of Cabinda in order to improve public transport options to and from the airport including bus, train and shuttle services. |
| Minimization | Prepare and develop a Stakeholder Engagement Plan.<br>Inform local communities with due advance on the progress of activities and in particular on the schedule of activities that will entail interruption of infrastructure networks. |
| Minimization | Prepare and develop a Grievance Mechanism.<br>Ensure the implementation of the Grievance Mechanism for individuals and groups to formally communicate their concerns, complaints and grievances to the company and facilitate resolutions that are mutually acceptable by the parties in a timely and effective manner. |
| Minimization | Expand airport parking, if necessary.<br>In order to accommodate increased demand the airport paring facilities will be expanded if necessary. |
| **Impact Factor: Interference with roads/infrastructures/services** | |
| Minimization | Inspect and maintain roads and utilities in the airport's vicinity.<br>If necessary, maintenance works will be carried out. |
| Minimization | Prepare and develop a Stakeholder Engagement Plan.<br>Inform local communities with due advance on the progress of activities and in particular on the schedule of activities that will entail interruption of infrastructure networks. |
| Minimization | Collaborate with local authorities.<br>Work with local government and transportation agencies in order to coordinate road maintenance that align with airport operations. Moreover collaborate on traffic management and congestion reduction |
| Minimization | Select most suitable transport routes.<br>When selecting the routes to be used for the transport of materials and products, identify roads that are likely to cause the lowest impacts to local communities, terms of disruption of access and disturbance to population. Plan transportation routes in consultation with local authorities. |
| **Impact Factor: Availability of air transportation services** | |
| Enhancement | Contribute to the development of local infrastructure development.<br>The Airport operator will contact the proper entities and authorities within the Government of Cabinda to draw attention on infrastructure investment in the Project area such as the already planned improvement of the road network but also in order to invest in utilities for accommodating the increased population or upgrade and expand the water supply and waste management systems. |
| Enhancement | Foster economic diversification and job creation in the Project area.<br>The Airport operator will engage with the Government of Cabinda and social NGOs in order to foster economic growth by attracting businesses and industries in the area, in order to diversify the local economy currently driven by oil production in the area. |

### 12.2.2 Impact Value and Residual Impact Value Calculation

This section describes the Impact Value and the Residual Impact Values (after the implementation of mitigation measures) found for each impact factor on each social component.

The description of how the calculations is performed can be found in Chapter 09 of this ESIA.

#### *12.2.2.1 Population and demographics*

The impact factor that can affect population and demographics is listed in the Table **11** below.

As shown in the table below, the impact value calculated for *Influx and population* is **High**. According to the baseline study performed, the sensitivity of the Population and demographics component is **medium-high**. Considering the application of the mitigation measures, the Project's overall residual impact on the component Population and demographics in the operation phase is **medium** and of **negative** direction. The proposed mitigation measures with medium effectiveness are – among others- collaborating with authorities in urban planning in order to anticipate population growth and proactive stakeholder engagement that would allow local communities to report any issue of social conflicts with a proper grievance mechanism in place.

**Table** 11**: Residual impact assessment matrix for population and demographics during operation.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Influx of population | Duration: | Long | Medium-high | Reversibility: | Mid term | **High** | Medium | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Global | | | | | | |
| | Intensity: | Medium | | | | | | |

#### *12.2.2.2 Land use and tenure*

No land use and economic activities have been reported to be present on Site. On the basis of these considerations, the Project is not expected to generate potential impacts on land use and tenure and the assessment on this component is therefore not performed.

#### *12.2.2.3 Economy and employment*

The impact factors that can affect Economy and Employment are listed in the Table 12 below.

As shown in the table below, the positive impact values calculated are **high** for the factor *Demand for workforce* and *Availability of air transportation services* and **medium** for *Demand for raw materials and goods/supply chain*. According to the baseline study performed, the sensitivity of the Economy and employment component is **medium-high**. Considering the application of the enhancement measures, the Project's overall residual positive impact on the Economy and employment component in the operation phase is of **positive** direction and assessed to be **high** for all the three impact factors. The high positive residual impacts depend on the continuity of the request for workforce that will last for more than 20 years during the operation phase and the long availability of the new airport infrastructure in the local area, which will bring positive impacts to the economy of the Project area. The residual impact for the *Demand for raw materials and goods/supply chain* has been assessed as **high** if the enhancement measure will be implemented, which would increase the procure of goods and services in the Cabinda Province, improving the economic situation in the Region.

**Table 12: Residual impact assessment matrix for Economy and employment during operation.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Demand for workforce | Duration: | Long | Medium-high | Reversibility: | Short-mid-term | **High** | Medium-high | **High** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Global | | | | | | |
| | Intensity: | High | | | | | | |
| Demand for raw materials and goods/supply chain | Duration: | Long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Medium-high | **High** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Global | | | | | | |
| | Intensity: | Medium | | | | | | |
| Availability of air transportation services | Duration: | Long | Medium-high | Reversibility: | Mid term | **High** | Medium-low | **High** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |

#### *12.2.2.4 Education*

To date there are not enough information to carry out the assessment for the component education. Further data on emission of noise and vibration might provide more information for the operation phase. On the basis of these considerations, the potential impacts on education and the assessment on this component is therefore not performed.

#### *12.2.2.5 Community health, safety and security*

All the seven impact factors that can affect community health and safety are listed in the Table 13 below.

To note that for the impact factor Emission of noise and vibration, the assessment has been carried out with the information provided at the present moment. As soon as the noise model will be prepared, this assessment will be revised.

The impact values calculated range from **high** to **low.** With the application of the mitigation measures, the Project's residual impact on the Community Health and Safety component for the operation phase has been ranging from **medium to low** for all the impact factors and it is of **negative** direction.

As shown in the table below, the impact values calculated varies from one impact to another. The impact has been assessed as **high** for the factors *Emission of gaseous pollutants, Influx of population* and *Emission of dust and particulate matters,* and as **medium** for the factors *Emission of noise and vibrations, Security Management and Demand for workforce.* The impact has been assessed as **low** for the factor *Increase of road traffic.* According to the baseline study performed, the sensitivity of the component Community, Health and Safety is **medium-high**. Considering the application of the mitigation measures, the Project's overall residual impact on the component Community, Health, Safety and Security in the operation phase is of **negative** direction.

The residual impact is **medium** for the factors *Emission of gaseous pollutants, Emission of noise and vibrations, Influx of population* and *Emission of dust and particulate matters,* and it is **low** for the remaining factors *Increase of road traffic, Security Management and Demand for workforce*, as shown in the matrix below. The **medium** residual impact for the four factors cited before mainly derives from the fact that the mitigation measures even if applied cannot completely mitigate the impact mostly due to the type of activities that will take place in the

airport and how they will affect workers and local communities in the nearby area (i.e., emissions of pollutants due to the operation of airflights, arrival of new people to the Project area and so on).

The **low** residual impact value of the factor *Increase of road traffic* is due to the expected effectiveness of the planned mitigation measures and that operation traffic is going to increase only on the EN220 road, which is already well trafficked, therefore the residual impact has been assessed as low. The residual impact for the factor *Security management* is also **low**, considering the implementation of the mitigation measures and its mid short-midterm reversibility. The low residual impact value of the factor *Demand for workforce* is due to the expected effectiveness of the planned mitigation measures which are to employ the old airport workforce as most as possible and to carry out surveys with previous employees to ensure their wellbeing and comfort in being moved to the new airport.

**Table 13: Residual impact assessment matrix for Community, Health and Safety during operation.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Emission of gasseous pollutants | Duration: | Long | Medium-high | Reversibility: | Mid term | **High** | Medium-high | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Emission of noise and vibrations | Duration: | Long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Low | **Medium** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | High | | | | | | |
| Influx of population | Duration: | Long | Medium-high | Reversibility: | Mid term | **High** | Medium | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Global | | | | | | |
| | Intensity: | Medium | | | | | | |
| Security management | Duration: | Long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Medium-high | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Project footprint | | | | | | |
| | Intensity: | Medium | | | | | | |
| Increase of road traffic | Duration: | Long | Medium-high | Reversibility: | Short-term | **Low** | Medium | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | High | | | | | | |
| Emission of dust and particulate matters | Duration: | Long | Medium-high | Reversibility: | Mid term | **High** | Medium-high | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Demand for workforce | Duration: | Long | Medium-high | Reversibility: | Short-mid-term | **Medium** | Medium | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Local | | | | | | |
| | Intensity: | Medium | | | | | | |

### *12.2.2.6 Mobility and infrastructures*

**Six** of the seven impacts on the component Mobility and Infrastructure in the operation phase are of **negative** direction and are shown in the Table 14 whilst **one** is of **positive** direction and it is shown in the Table 15.

The impact values calculated range from **High** to **low**. With the application of the mitigation measures, the Project's residual impacts on the component Mobility and Infrastructure for the operation phase, has been assessed to be **high** for the *Production of solid waste, Production of wastewater,* and *Water demand,* and **medium** for the *Increase of road traffic, Interference with roads/infrastructures/services, Energy and fuel demand.*

According to the baseline study performed, the sensitivity of the Mobility and Infrastructures component is **Very high**.

The residual impact value for *Production of solid waste* is **medium** because to date it is still not clear how waste will be managed during the operation phase of the airport, however if mitigation measures will be applied the risk might be mitigated.

The *Production of wastewater* residual impact is **negligible** due to the embedded Wastewater Treatment Plant that will be realised. However, for now the destination of effluents has not been informed and the Province of Cabinda has no Wastewater treatment collection system in place at the moment; however if mitigation measures will be followed, the risk will be well mitigated.

*The increase of road traffic*, *Interference with roads/infrastructures/ services* and *Water demand* have all a **low** residual impact after mitigation measures that have medium-high effectiveness. The **low** residual impact for the first two impact factors is mostly due the original trafficked situation in the Project area that won't be that much modified by the increase in traffic during operation. For *Water Demand*, the embedded mitigations measures in place (the use of two water supply sources) and recommended mitigation measures, would ensure the supply of water that the Project needs during operation.

The *Energy and fuel demand* residual impact value resulted as **negligible** because of the planned supply source that is the existing public network of Futila Thermal Power Station and because of the expected mitigation measures with medium to high effectiveness.

**Table 14: Residual impact assessment matrix for Mobility and Infrastructures during operation.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Production of solid waste | Duration: | Long | Very high | Reversibility: | Mid term | **High** | Medium | **Medium** |
| | Frequency: | Highly frequent | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Production of wastewater | Duration: | Long | Very high | Reversibility: | Short-mid-term | **High** | High | **Negligible** |
| | Frequency: | Highly frequent | | | | | | |

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Increase of road traffic | Duration: | Long | Very high | Reversibility: | Short-term | **Medium** | Medium-high | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | High | | | | | | |
| Interference with roads/infrastructures/ services | Duration: | Long | Very high | Reversibility: | Short-term | **Medium** | Medium-high | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | High | | | | | | |
| Energy and fuel demand | Duration: | Long | Very high | Reversibility: | Short-term | **Medium** | Medium-high | **Negligible** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |
| Water demand | Duration: | Long | Very high | Reversibility: | Short-mid-term | **High** | Medium-high | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Regional | | | | | | |
| | Intensity: | Medium | | | | | | |

The only **positive** impact on the component Mobility and Infrastructures is the *Availability of air transportation services* impact factor.

The positive impact has been assessed as **high** for its long duration since it would be in operation for more than 20 years, improving drastically the infrastructures of Cabinda Province and its connection to the rest of Angola and the world. Moreover, since the enhancement measures are medium-low in effectiveness the residual positive impact has remained assessed as **high** value.

**Table 15: Residual impact assessment matrix for Mobility and Infrastructures during operation.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Availability of air transportation services | Duration: | Long | Very high | Reversibility: | Short-mid-term | **High** | Medium-low | **High** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Global | | | | | | |
| | Intensity: | Medium | | | | | | |

### *12.2.2.7 Ecosystem services*

No priority ecosystem services have been identified in the Project site. On the basis of these considerations, the Project is not expected to generate potential impacts on ecosystem services and the assessment on this component is therefore not performed.

#### 12.2.2.8 Cultural Heritage

No cultural heritage elements have been reported to be present on Site and in its surroundings. Considering the industrial context and the previous land use, it is not expected that unknown cultural heritage elements may be present in the Project area and may therefore be damaged by the operation of the airport. On the basis of these considerations, the Project is not expected to generate potential impacts on cultural heritage and the assessment on this component is therefore not performed.

#### 12.2.2.9 Landscape and visual quality

The two impact factors that can affect Landscape and visual quality are listed in the Table 16 below.

The impact values calculated range from **medium to low**. With the application of the mitigation measures, the Project's residual impact on the Landscape and visual quality component for the operation phase, has been assessed to be **low** for the *Emission of light* impact factor and **medium** for the *Existence of new buildings/infrastructures, visual* impact factor. Both the impact factors are of **negative** direction.

According to the baseline study performed, the sensitivity of the Landscape and visual quality component is **medium-low**.

The residual impact values of the two impact factors are due to its original medium-low sensitivity of the component. The Project area is indeed characterised by industrial pots, moreover with other businesses in construction nearby therefore there are no big settlement of people living in the area and thus won't be much affected by changes in the landscape. The *Emission of light* residual impact value resulted as **low** because there are no mitigation measures that will completely minimise the lights originating from the operation of the airport (such as lights coming from airplanes, from the runway and so on). The reason applies to the impact factor *Existence of new buildings/infrastructures, visual impact* as well, whose residual impact value remains **medium**, due to the visibility of the new airport infrastructure, even after the application of mitigation measures.

**Table 16: Residual impact assessment matrix for Landscape and visual quality during operation.**

| Impact Factor | Impact Factor Features | | Component Sensitivity | Impact Features | | Impact Value | Mitigation effectiveness | Residual impact value |
|---|---|---|---|---|---|---|---|---|
| Emission of light | Duration: | Long | Medium-low | Reversibility: | Short-mid-term | **Low** | Low | **Low** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Local | | | | | | |
| | Intensity: | High | | | | | | |
| Existence of new buildings/infrastructures, visual impact | Duration: | Long | Medium-low | Reversibility: | Mid term | **Medium** | Low | **Medium** |
| | Frequency: | Continuous | | | | | | |
| | Geo. Extent: | Local | | | | | | |
| | Intensity: | High | | | | | | |

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