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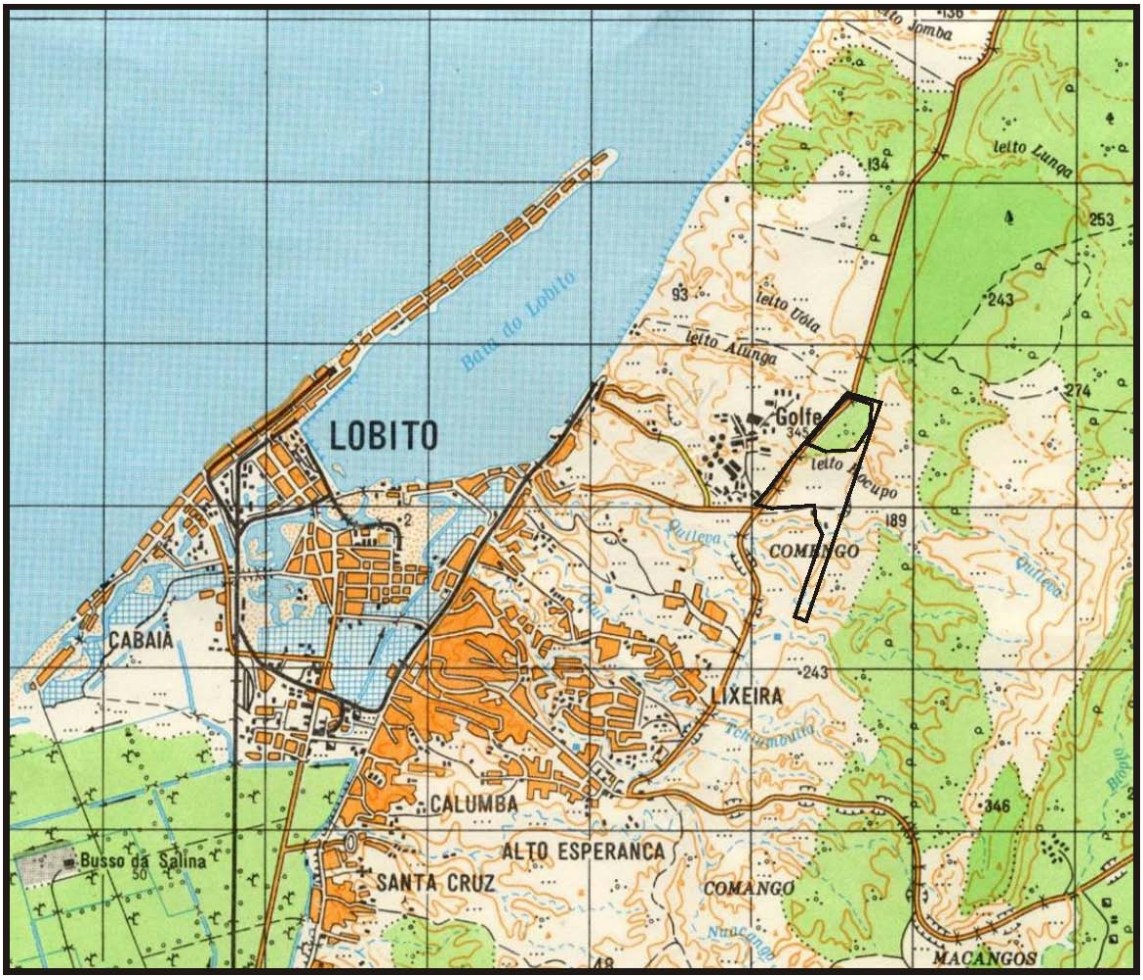
ENVIRONMENT IMPACT ASSESSMENT FOR SECIL LOBITO'S NEW CLINKER AND CEMENT PLANT



VOLUME I – NON TECHNICAL SUMMARY

SECIL LOBITO

New Clinker and Cement Plant
Secil Lobito

ENVIRONMENTAL IMPACT ASSESSMENT

Volume 1 – Non Technical Summary

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Luanda, January 2007

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New Clinker and Cement Plant
Secil Lobito

ENVIRONMENTAL IMPACT ASSESSMENT

Volume 1 – Non Technical Summary

1. INTRODUCTION

This document is a Non Technical Summary of the Environmental Impact Assessment (EIA) of Secil Lobito's new Clinker and Cement Plant.

The entity responsible for the project is Secil – Companhia de Cimentos do Lobito, S.A., which is a legal Angolan company based in the city of Lobito – Angola.

The studies carried out for the EIA began in July 2006 and were concluded in January 2007. The EIA was performed by AGRI-PRO Ambiente Consultores, S.A., in association with TECPROENG – Técnica e Projectos de Engenharia, Lda.

The EIA is intended to make an environmental analysis of Secil Lobito's new Clinker and Cement Plant and was performed according to the applicable legislation, namely the Decreto-Lei n.º 51/04 of July 23rd and the Lei n.º 5/98 of June 19th. To complement this study, specific work was undertaken regarding the quarries.

The main purpose of this study is to analyse the environmental implications of the project, presenting the main impact mitigation measures that can be implemented during the construction and operation phases.

The following environmental parameters were analysed for this study: climate, geology, soil, hydrology and water quality, waste, air quality, noise, ecology, landscape, heritage, socio-economics, land planning and land use.

The EIA is composed of the present Non Technical Summary and of the Synthesis Report and Annexes.

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2. PROJECT'S OBJECTIVES AND JUSTIFICATION

The present study refers to Secil Lobito's new Clinker and Cement Plant, which will be installed in a 40 hectares property located in Lobito, West of the Comengo quarry.

The industrial unit to be installed is intended to produce cement for the Angolan market and is justified by the need to meet the growing demand for this product with national production. This product is indispensable to the ongoing development process where construction has a leading role.

In the past few years, Angola has had a remarkable economic growth associated with a strong investment in infrastructures and the recovery of urban and suburban areas. This growth resulted in an unprecedented increase in demand for construction materials.

Currently, the *per capita* cement consumption in Angola is quite low, around 80 kg / habitant, when compared with neighbouring countries: Namibia, South Africa or Botswana or when compared with the potential resulting from the need for reconstruction.

Angola's current cement consumption is estimated at approximately 1.5 million tonnes per year, more than the national production can supply, and in the near future consumption is expected to become much higher.

According to "*International Cement Review*", the imported cement now amounts to 30% of the national production. This percentage will tend to increase since consumption is rising markedly while national production will not be able to meet this increase without new production units.

In the present situation, the national production is focused on two units, the Nova Cimangola and Secil Lobito.

In the year 2004, Nova Cimangola sold 750 000 tonnes of cement, a part of which was produced with imported clinker. Secil Lobito has a grinding capacity of approximately 270 000 tonnes of cement but it has no clinker production. Therefore, the cement production in this unit uses imported clinker.

The geographical triangle Lobito/Benguela-Huambo-Bié-Namibe has a very high potential for urban development and natural conditions adequate for the implementation of projects within the scope of agro-industries as well as industries integrated with Lobito's offshore oil wells.

This reconstruction potential is strongly connected with the "Caminho-de-ferro de Benguela" (a railroad), as well as the rehabilitation of the main roads.

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Based on the economical information available, several scenarios were elaborated to estimate the evolution of global demand for cement in Angola, as well as in the market involving the new Secil Lobito plant.

This evaluation estimated 2.5 million tonnes as the likely consumption of cement in Angola, by the year 2010. Out of this, about 470 000 tonnes would correspond to the internal market potential in the area of influence of the new plant. This value will be around 850 000 tonnes per year by the year 2015.

Based on the above mentioned scenarios, Secil Lobito intends to undertake the development of the new clinker and cement production plant project. The project will be developed in two phases, which will correspond to a cement production capacity of approximately 550 000 tonnes/year during the first phase and 1100 000 tonnes/year during the second phase of the project.

Therefore, the new factory aims to produce clinker using local raw materials and other local resources, and then use it to produce cement to supply the Angolan market.

With the new factory it will be possible to address the developmental needs of Angola's Central Region, ensuring that the employment and value-added of the productive process remain in Angola, while using available national raw materials and resources.

Regarding the location of the new Clinker and Cement Production Plant, several hypotheses within the national territory were evaluated and the Lobito area was chosen as the most favourable one since it had the higher number of advantages from a technical feasibility, economical and environmental point of view.

In fact, the site selected for the new plant has a set of characteristics that globally determined its selection and which can be listed as follows:

- It is located near a harbour capable of receiving and dispatching bulk solid materials and with capacity for large ships;
- It is located near two quarries (Comengo and Quileva Quarries), where the main raw material for the production process can be obtained (limestone and marl);
- It has good access to the gypsum quarry of Quericila located about 25 km away;
- It has good road connections and nearby railroad connections to the national transportation networks;
- It has a large enough available area for installing the new plant.

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The above mentioned conditions result in reduced environmental impacts related to the transportation of raw materials (limestone and gypsum) into the new plant and to the dispatch of the final product (cement).

In conclusion, the selected location for the new Clinker and Cement Plant is the most environmentally and economically favourable alternative.

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3. PROJECT'S PRESENTATION

3.1 Location

Secil Lobito's new Clinker and Cement Plant is located in the Quileva / Comengo area, which belongs to the Lobito municipality and the Benguela province.

The new industrial unit, which will occupy an area of roughly 40 hectares, is located in a land strip between the Anha road and the limestone and marly limestone Comengo quarry. In addition, it will occupy two areas in the Comengo and in the Quileva quarries to install the crushers.

Figure 1 shows the location of the present project.

3.2 General Description of the Project

Secil Lobito's new Clinker and Cement Plant aims to produce and subsequently commercialize portland cement, according to international specifications.

The new plant will be built according to the Best Available Technologies (BAT) defined for the cement industry, which include the adoption of pre-calcining technology in the clinker production and dedusting bag filters for gases.

The new plant will use coal or pet coke as main fuels. However, it will be equipped to operate with heavy fuel oil , should that be considered convenient.

The production unit will be connected to the Quileva and Comengo quarries' raw material extraction (limestone and marl), the first of which located 3 Km away while the second one located just East of the new plant. The gypsum will be extracted from the Quericila quarry, located approximately 25 km East of the new plant's site.

The industrial unit has equipment related to the productive process as well as the storage of the raw materials and cement.

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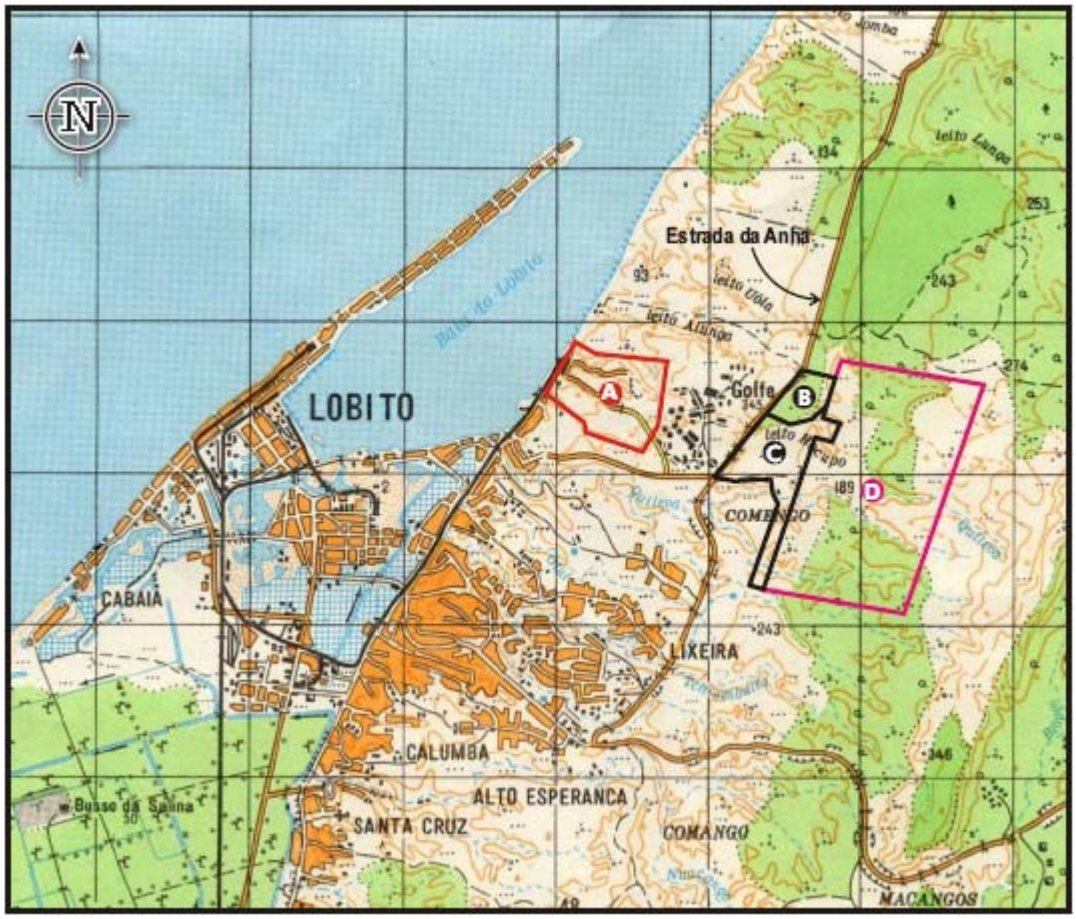

Figure 1 – Project's Location

Current Plant Área (Including Quileva Quarry)

Influence area for the new plant

Comengo Quarry

Na **Zona A**, com 140ha, localiza-se a actual zona fabril com moagem e ensacagem de cimento. Esta área inclui também a pedreira de calcário margoso e marga de Quileva.

A **Zona B**, com cerca de 40ha, a Oeste da pedreira do Comengo, inclui a área para instalação da nova fábrica. Esta engloba a área a ocupar pelos novos equipamentos fabris, edifícios e instalações sociais, assim como zonas de transição ou protecção ambiental e a zona de implantação situada na pedreira do Comengo.

A **Zona C**, com cerca de 110ha, corresponde ao restante terreno requerido para a implantação da nova fábrica

A **Zona D**, com cerca de 500ha corresponde à pedreira do Comengo - calcário margoso e calcário.

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In addition, Secil Lobito will establish contacts with the local authorities in order to define and implement a Construction Project for Social Facilities to be used by the local habitants living near the production unit. The exact scope, size and location of these equipments of collective use will be subject to an agreement to be established between the Local Authorities and Secil Lobito.

The capacity to be installed will allow for an annual cement production of between 1.0 and 1.2 million tonnes, depending on the actual type and quality of cements to be produced. The project will be implemented in two phases, with the installation of two parallel production lines of equivalent capacity.

For this EIA it was taken into consideration the final capacity after the 2nd phase, which corresponds to a nominal daily production of 3 000 tonnes of clinker.

During the 1st phase, which will last for 5 years after production starts, the production capacity (1 500 tonnes/day of clinker) will be half of the value for the 2nd phase.

Essentially, this industrial unit is composed of the following areas (Figure 2 – Plant Layout):

a) Raw material crushing;

b) Pre-homogenization and storage;

c) Raw material mill feeding;

d) Raw material grinding;

e) Raw meal homogenization silo;

f) Fuel preparation system (pet coke or coal grinding or fuel oil preparation);

g) Burning;

h) Cement mill feeding;

i) Cement grinding;

j) Cement storage and dispatch.

Besides the above mentioned processing areas, Secil Lobito's new Clinker and Cement Plant will have auxiliary buildings, electric transformer stations, centralised control room and laboratory, warehouses and workshops, administrative buildings, water supply and treatment system and liquid effluent treatment systems.

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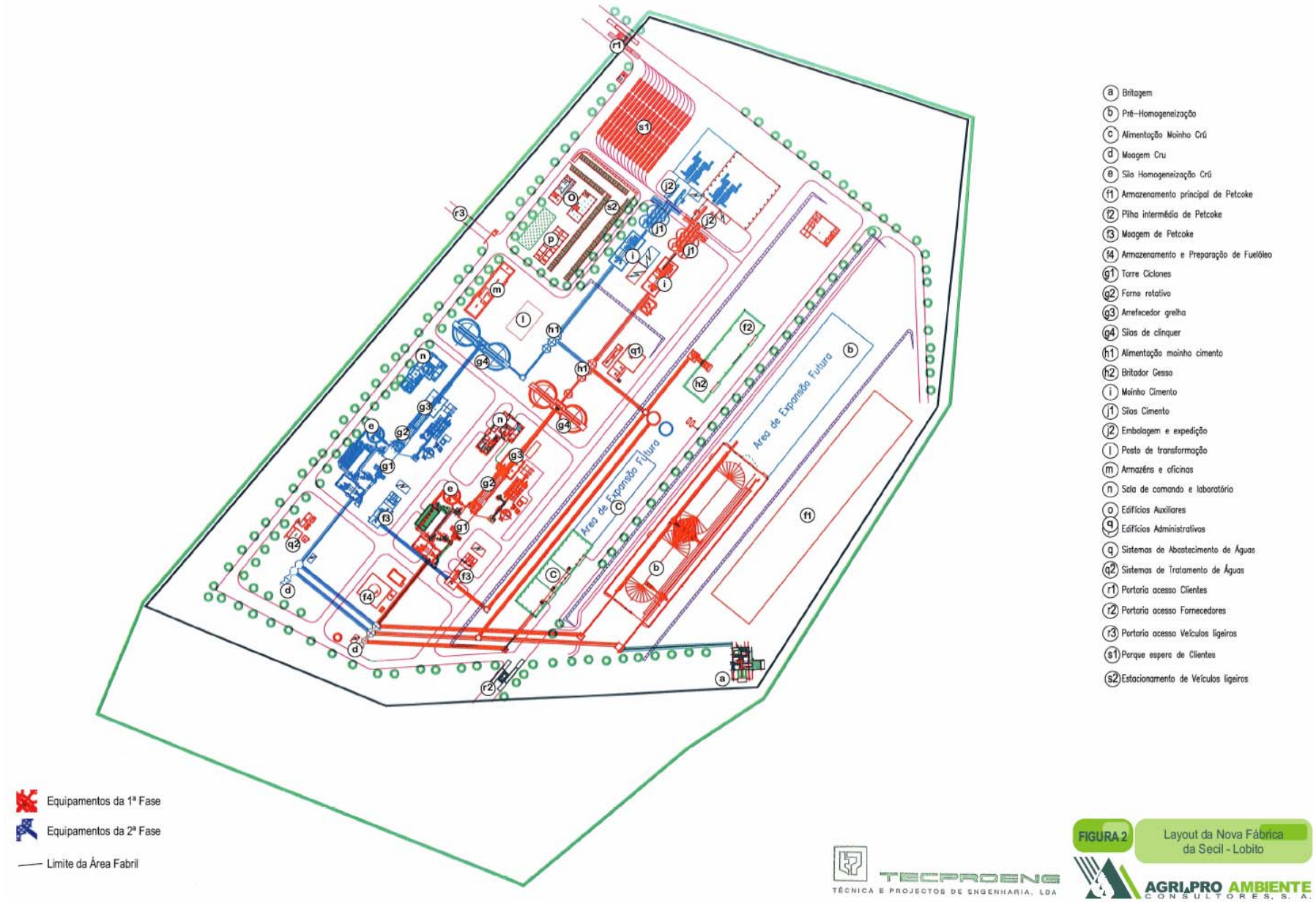

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FIGURA 2 Layout da Nova Fábrica da Secil - Lobito

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3.3 Construction Phase

During the construction phase there will be a number of temporary activities related to the relocation of the Anha road and the construction of Secil Lobito's new Clinker and Cement Plant, out of which the following are worth mentioning:

- **Relocation of the Anha Road**

The area allocated for the construction of Secil Lobito's new Clinker and Cement Plant includes a section of the Anha road between the crossroads with the Lobito road, located in South Comengo, and the Sonangol concession, located to the North.

Therefore, the erection of the new plant will involve relocating that section of the Anha road towards the West, in order to adapt the existing road network to the new reality.

The present Anha road possesses two driving lanes with a total width of approximately 8 m, which is thought to be insufficient for the future road traffic in the area, not only associated with the new plant's operation but also with future housing planned for that area.

Therefore, and in order to adapt the road network to future demand, the road will not only be relocated but its transversal profile will be altered as well and new roundabouts created, which will prevent traffic jams in the crossroads between the Anha road and the road to Lobito, and between the Anha road and the access to the plant's dispatch area with all its intense heavy road traffic.

This improvement of the road shall be undertaken in different phases, related to the perceived evolution of road traffic in the area, which is connected to the foreseeable expansion of the new plant as well as the local development. Therefore the description presented in this EIA concerns the final configuration of the improved road and it is thus essential that the necessary buffer areas along its axis are created to allow its gradual implementation of the project.

The relocation of the road will imply an intervention area of approximately 75 000 m2 and excavation and backfilling volumes of 19 000 m^3 and 41 000 m^3 respectively.

The land to be excavated is mostly landfills and farmable land, and it is expected that 20% of the soil excavated may be composed of clay with limestone, which could be used for the planned backfillings.

An estimated 25 000 m^3 of materials for back filling have been estimated to be obtained from local borrow land and gravel lands to the West and Northwest of the plant's site.

- **Erection of the New Plant**

The construction work on the site is expected to last for 28 months. Out of all the planned activities, the following are worth highlighting:

- Building site implantation;

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- Preparatory work on the project's implantation area;
- Material and equipment transportation;
- Construction works such as foundations, underground infrastructures, distribution networks, paved areas, etc…;
- Mechanical equipment assembly;
- Electrical equipment and instrumentation assembly.

The new plant's construction will be implemented adequately, taking into account all the inherent technical requirements and in strict observation of environmental and safety regulations, in order to avoid and/or mitigate eventual negative impacts on the quality of life and activities of the involving area.

A building site is planned, which will be confined to the area allocated for the new plant's installation, both during the first phase of the project as well as during the second phase.

The building site will have supporting buildings, such as offices and support workshops with varied machinery, as well as facilities for the construction workers and a park for the site's equipments.

The office buildings will be pre-fabricated and composed of offices, meeting rooms, copying centre, bar, toilets and support area properly adapted.

The social installations for the workers will include, among other things, dormitory, mess hall, recreational room, toilets and medical centre.

In addition, the building site will have temporary networks for water supply, sewage and electrical power to insure the yard's functioning and proper construction work.

In all of the building site's area, the above mentioned networks, despite temporary, will strictly abide by all applicable regulations and norms.

The land in the area allocated for installing Secil Lobito's new plant is at the intended level, and therefore it will not be necessary to make any significant relocation of soil.

It will only be necessary to prepare the soil and to open trenches for the foundations of the various buildings and equipments, as well as for the support infrastructures such as sewage systems, electrical network, etc...

During the construction phase, the project will involve between five hundred and seven hundred workers, the latter corresponding to peak periods.

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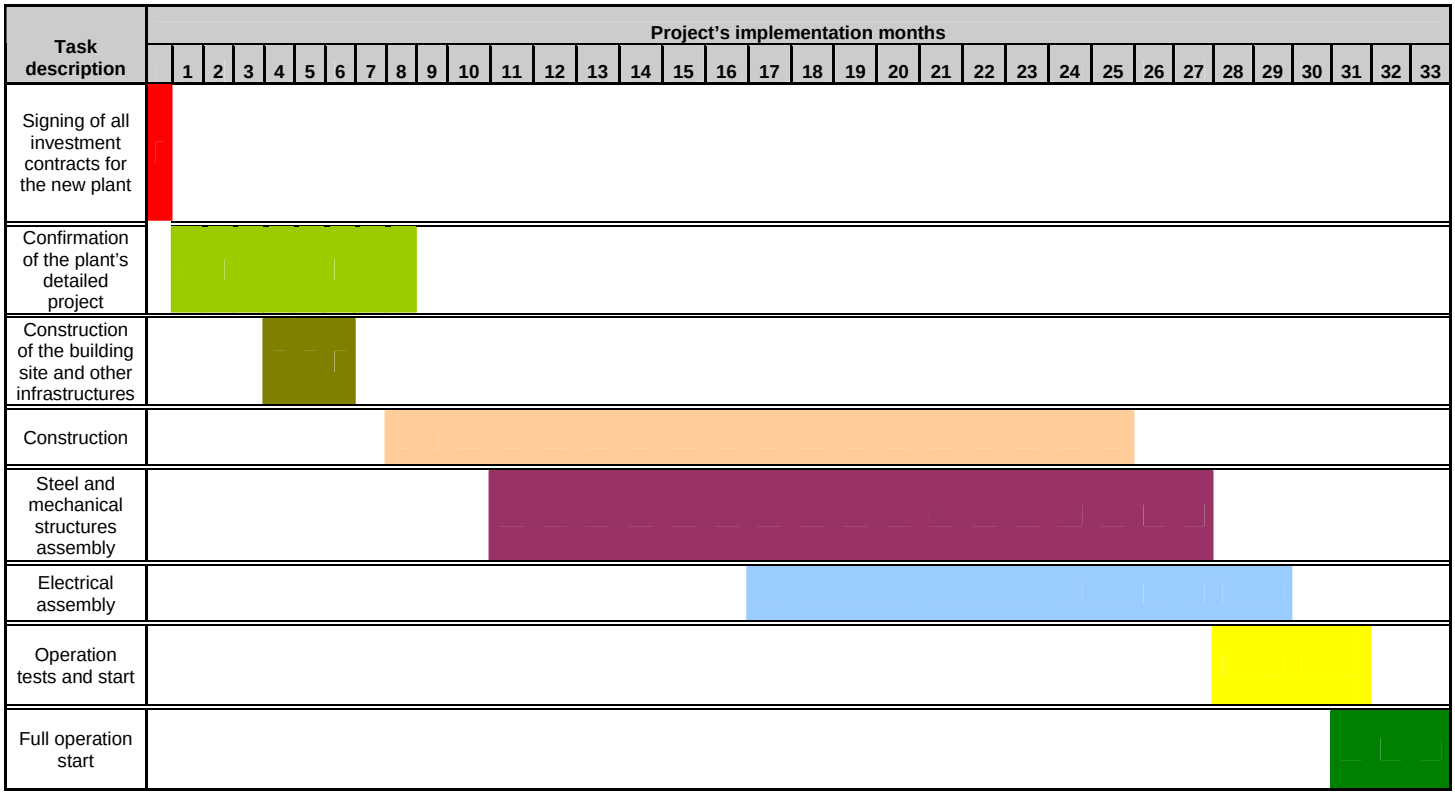
The project implementation is expected to last for 33 months, according to the chronogram presented in Table 1.

Table 1 – Provisional Chronogram for the New Plant's Construction



Source: Secil

As mentioned above, the 2nd phase of the project is expected to start 5 years after the start of the 1st phase and its construction is expected be quicker.

3.4 Operation and Maintenance Phase

The operation and maintenance of Secil Lobito's new plant will follow adequate procedures, including periodic inspection routines to check for the conservation status and working condition of the various equipments and process control systems and their repair or substitution if needed.

Secil Lobito's organizational structure is composed by a board of three administrators. The company's daily management is ensured by an onsite Delegated Administrator who commands the company's various functional areas and ensures the organizational and organic articulation.

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After the investment in the project's second phase, Secil Lobito expects to employ 360 permanent workers, the necessary to ensure the operation of the new plant.

In addition, the current project is also expected to create over 750 indirect jobs, mostly associated with the transport and maintenance activity sectors.

Secil Lobito's new Clinker and Cement Plant will operate continuously, i.e. 24 hours per day, 365 days per year, except for scheduled maintenance operations or forced stoppages. The administrative and commercial services will follow the general regime, stopping for weekends and holidays.

The useful life expectancy of an industrial project such as this is over 20 years. Throughout its useful life there will be a number of convenient technological upgrades and equipment replacements, in order to guarantee the working condition and modernity of the Plant.

Secil Lobito's new Clinker and Cement Plant operation will involve road traffic associated with the transportation of raw materials (limestone, marl, gypsum, sand, iron ore and bauxite), fuels (coal / pet coke and heavy fuel oil) and the dispatch of the final product (bagged and bulk cement).

It is noteworthy that the road traffic will mostly take place between 8am and 4pm, except for the transportation of limestone and marl from the Comengo Quarry to the crusher, which will take place, during the 2nd phase, between 8am and 12 midnight but out of public roads.

Secil Lobito's new Clinker and Cement Plant's main gas emissions, in the 2nd phase's two production lines, include suspension particles originated by the transportation of powdered materials (present in every chimney effluent, especially the ones from the kiln, the cement mills, the clinker coolers or in diffuse source effluents), the gases from combustion of pet coke / coal or fuel oil and the transformation of raw materials used in the production process (present in the kiln chimneys). Noteworthy among the latter are carbon monoxide, nitrogen oxides, sulphur dioxides and carbon dioxide.

In Secil Lobito's new Clinker and Cement Plant, the cement's production process will use a dry process without any resulting industrial waste water.

Therefore, the liquid effluents associated with the new plant's operation are domestic waste waters originating from the toilets, mess hall and workshops.

However, all the liquid effluents produced in the new plant will be directed towards Waste Water Treatment Plants before release, which will mitigate impacts on water quality.

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Therefore, all domestic liquid effluents created during construction will be directed towards a septic ditch and an oil and grease separator for primary treatment and later to a biochemical treatment unit. After treatment in the biochemical unit, the final domestic effluent will be directed towards a treated waste water storage basin, which will serve as a water reserve for fire fighting or irrigation or it will be released into an adequate discharge point.

The workshop and rain water effluents will also be directed to another treated waste water basin after going through an oil and grease separator, in order to satisfy specifications, and be reused in the process.

No significant waste is expected during the production unit's operation and it will be mostly composed of metallic scrap, used refractory bricks, mixed domestic waste, used mineral oils and lubricants, belt conveyors and packaging paper.

The produced waste will be directed towards an adequate final destination depending on its respective characteristics.

3.5 Decommissioning Phase

The decommissioning of Secil Lobito's new Clinker and Cement Plant will abide by environmental good practice principles, especially regarding the final destination of materials resulting from the installation's dismantling process and soil recovery.

This way, all materials and equipments resulting from the plant's dismantling will be separated according to its characteristics, cleaned and sent to an appropriate final destination.

The final destination will be defined according to the material or equipment's characteristics, always giving priority to recycling and/or reuse solutions.

Only in cases where this is not viable, will they be sent to landfills.

All the transport and deposit operations will follow the principles defined in international norms on waste.

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4. DESCRIPTION OF THE CURRENT ENVIRONMENTAL SITUATION

The description and analysis of the current environmental situation in the project's site looked into the most relevant physical components of environmental quality, ecology and population, and took into account the local and regional characteristics of the area.

Field surveys were conducted, as well as contacts with several national, regional and local entities, in order to get a detailed characterization of the area.

In the Lobito municipality, the annual average temperature is 23.6 ºC, with July being the coolest month and March the hottest. The study area already presents severe desertification, which increases towards the South as it gets closer to the Namibe desert. The dominant winds blow from the South and Southwest.

Geomorphologically, the project's area possesses a very flat landscape, with a slight inclination towards the Southwest. Geologically, the area is occupied by sedimentary formations with calcareous soil.

In the area allocated for the installation of the new plant there are small water basins, corresponding to torrential waterways, which flow directly to the sea. The water, which is of torrential origin, presents a murky look during the rainy periods.

Regarding waste, some metallic scrap and rubble from ruined / destroyed buildings was identified on the site.

According to the characteristics of the project's implantation area, the main source of atmospheric pollution is the road traffic in the areas around the Comengo and Quileva quarries, further away from the existing Secil Lobito cement plant. Taking into consideration the area's characteristics and the dominant winds, the project's implantation site presents favourable conditions for atmospheric pollutants' dispersion.

The area revealed low levels of noise and a quiet sound environment, typical of areas without relevant sound sources.

The project's implantation area has no relevant ecological value, in terms of conservation, and is composed of barren land dominated by patchy herbaceous vegetation with several clearings with some unirrigated crops.

The landscape in the project's implantation area is an ample and very flat plateau. There are hardly any trees or shrubs and the herbaceous vegetation is dominant, mostly grasses.

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No elements of heritage value were found at the project's site, both on an archaeological level as well as architectonic.

Lobito is considered the most important sea harbour in the Coast of West Africa. In terms of collective equipments and services, the municipal administration building, the harbour building, the railroad station, the municipal market, the post office, banks, churches, restaurants and hotels are noteworthy.

The city of Lobito has an estimated population of 850 000 inhabitants and is a young city.

In the study area, the Golf neighbourhood is the only population agglomeration, with an estimated 3 000 inhabitants, most of whom work in Lobito's street markets.

In terms of land use, the 40 hectares allocated to the project are rural land. The site is dominated by barren areas, unirrigated crop patches, small areas of low scrubland and some abandoned farming lots.

In the site there are two farms, used seasonally for gathering cattle, which will be transferred according to a decision by the land use Committee, who issued a favourable opinion regarding the issuing of the property's concession deed for Secil Lobito's new Plant.

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5. IMPACT ASSESSMENT, MEASURES AND MONITORING

The environmental effects generated by Secil Lobito's new Clinker and Cement Plant were analysed and evaluated, taking into consideration the present environmental status of the intervention area and the project's characteristics.

The main **Geological** and **Geomorphologic** impacts produced by the project's implantation will occur mostly during the **construction phase** and are related to the geotechnical characteristics of the soil and backfilling. The impacts during this phase are **small**, despite **negative**, since there will be no destruction or impact on geologic structures of important scientific interest. During the **operation phase** there will be **no impact**, since no interventions in the geological substratum will be done.

In order to mitigate impacts, during the construction phase, it recommended the use of mechanical means for the excavation works and to reuse the resulting soil in the construction, whenever possible.

In respect to **Soils**, the **construction** of the new plant and the relocation of the section of the Anha road will cause **moderately negative** impacts that may be mitigated considering that adequate measures shall be implemented in the building site and in the construction's management.

During the **operation phase**, the main effects on the soil are the potential contamination of the involving area's soil by airborne particles or by the uncontrolled release of waste but no significant contamination is to be expected and therefore the impacts will be **negative** but **small**.

The main mitigation measures during the construction phase are: defining routes for the circulation of heavy machinery and vehicles; restricting machines' movement to the strictly necessary area; ensuring the impermeability of all storage areas for fuel, lubricants and other chemicals. During the operation phase, the impermeable surfaces shall be subjected to periodic maintenance.

In terms of **Hydrology**, **no significant impacts** are to be expected during the **construction and operation phases**.

Potential effects on **Water Quality** during the **construction phase** can be mitigated by adopting adequate measures of control, collection and channelling of effluents. During the **operation phase**, and taking into consideration that the cement production will use a dry process, the only liquid effluents are domestic waste water coming from the toilets, mess hall and workshops.

All the liquid effluents will be directed towards Waste Water Treatment Plants and the final effluent will be reused, whenever possible, and therefore the impacts are **small**, despite **negative**.

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In order to mitigate hydrological impacts during the construction phase, it is recommended that the drainage components be of adequate size and that the circulation of equipments and machines be established to avoid compacting soil. During the operation phase, the drainage system, as predicted, should be of the separate type and the drainage should be kept clean.

During the construction phase, and in order to mitigate impacts on water quality, a waste water treatment system should be built for the building site, if possible, and the oils used by the construction's vehicles and machines should be collected, stored and transported to an adequate final destination.

The planned Waste Water Treatment Plants should be built for the operation phase and their final treated effluents should undergo periodical analytical control, according to what is indicated in the Monitoring Plan.

During the **construction phase**, the main **Waste** will be construction debris, used oils, packaging, absorbents and multiple residues generated at the building site. The waste impacts, though **negative**, are **small**.

During the **operation phase**, produced waste will be mostly metallic scrap, used refractory bricks, mixed domestic waste, used mineral oils and lubricants, belt conveyors and packaging paper. Taking into account the classification of the waste produced and the adequacy of the planned final destination, the impacts, in this phase, are also classified as **negative** but **small**.

The main mitigation measure is the implementation of a Waste Management Plan.

The impacts on **Air Quality** during the project's construction phase, result, essentially, from the emission of particles, which could amount to some significance, but considering the possibility of mitigation can be considered **moderately negative**.

During the **operation phase**, the impacts on air quality are related to gas emissions coming from the new plant's chimneys and also from the road traffic associated with the raw material and final product (cement) transportation.

Considering the good dispersion conditions in the area, the mitigation measures integrated in the industrial unit's project and assuming the recommended mitigation measures are applied, the **negative** impacts during this phase can be considered **moderate**.

Therefore, the main recommended mitigation measures for the construction phase are the rationalization of the vehicle and machines circulation, the use of building techniques and processes that reduce the emission and dispersion of atmospheric pollutants and the transportation of powdered materials in covered trucks. During the operation phase, it is recommended to monitor the chimney emissions according to Monitoring Plan.

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In terms of **Noise**, the main impact during the **construction phase** will be due to the use and movement of machines and the transportation of materials.

The most significant disturbances will be punctual and limited in time and space. Taking into account that there are no sensitive receptors in the area immediately adjacent to the project's site, the impacts will be felt in the houses located along the roads used by the heavy transport vehicles carrying the construction equipments and materials and therefore should be considered **moderately negative**.

During the **operation phase**, the cement production process involves a number of operations and equipments inherently noisy and the circulation of significant road traffic to carry the raw materials and the dispatch of cement. In order to reduce outward noise, the noisy equipment will be installed in closed buildings and will be equipped with noise attenuation devices. Impacts during this phase are classified as **moderately negative**.

In order to mitigate the construction phase's noise it is recommended that the noisiest labours occur as quickly as possible and according to applicable legal criteria.

It is also recommended: that each equipment's operation and maintenance procedures be followed; that all vehicles undergo periodic maintenance and inspection; that the less noisy construction techniques and processes be selected.

During the operation phase, Secil Lobito's production unit should abide, in terms of regular operation, to the environmental criteria defined by the World Heath Organization. Sound level measurements should be carried out at the industrial unit's operation start up.

The E**cological** impacts will be **negative** but **small**, taking into account the kind of existing occupation at the site under intervention, which has no vegetation of relevance value.

The main impacts present during the **construction phase** will continue into the **operation phase**, with an additional disturbance generated by the actual presence of the industrial unit and the increase in local road traffic, which could contribute to a degradation of the local air quality, but are not expected to be significant considering the good atmospheric dispersion conditions present in the area. In general, considering the small ecological value of the intervention area, the ecological impacts during this phase will be **negative** but **small**.

In order to mitigate the impacts on the terrestrial ecology, it is recommended the use of local plant species in the industrial unit's landscape embellishment and a recovery of all the areas under temporary intervention by planting native species.

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The impacts on the **Landscape** during the **construction phase** are related to the volume of the installation to be built and to the building site and other necessary volumes, which will affect the visual perception of the landscape, but which can be mitigated. Impacts during this phase are **moderately negative**.

During the **operation phase** the landscape will undergo a process of adaptation to the new reality, resulting from the introduction of the newly built elements, namely the plant's equipments and buildings, which will be of significant size. Impacts during this phase are **moderately negative**.

To mitigate impacts, it is recommended that the areas affected by the construction labours be recovered from a landscape point of view and that a Landscape Integration Project be implemented for the new plant, one which will create a tree line around, reducing visibility from the outside.

During the **construction phase** there will be **highly positive socioeconomic** impacts, although **temporary**, in terms of local employment and economical activities, although a few **negative** impacts are to be expected in the **quality of life**.

The **operation phase** will generate **very positive** socioeconomic impacts on the national and regional economy, since it will increase the current national cement production capacity, which is clearly insufficient, increasing national autonomy in terms of construction and supply capacity to companies, which is of great strategic importance.

The project will also have economic and environmental value-added on a national and regional scale, since it will allow cement to be produced instead of imported, through a productive process that integrates a set of environmental protection measures, enabling the production of cement with less environmental impacts when compared to less modern cement industries.

In terms of local economy, the effects on employment are noteworthy. During the **operation phase**, the new plant will employ approximately 360 workers mostly recruited locally and it is expected that approximately another 750 jobs will be created indirectly. Therefore, the **socioeconomic** impacts will be **highly positive** on the local and national economy.

In order to maximize the project's positive impacts during the **construction phase**, it is proposed that local and national workers be used as much as possible and also, whenever possible, local companies to supply the construction materials, therefore stimulating the job market and the local economic activities.

The operation phase measures are essentially the maximization of positive impacts, fulfilling the project's benefits and the emphasis on the social relationship between the local population and the production unit, namely through the implementation of an Environmental Management Manual for the new plant.

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6. CONCLUSIONS

The studies developed enabled a detailed characterization of all the environmentally relevant factors, and all the main impacts associated with the construction and operation phases of Secil Lobito's new Clinker and Cement Plant to be installed in Lobito West of the Comengo Quarry were evaluated.

Based on the evaluations carried out, it can be concluded that the Secil Lobito's new Clinker and Cement Plant is important and justified:

- To meet the **need to implement a production structure**, which enables the production on cement and clinker to address the national market's demand and at the same time contribute to the creation of wealth;

- By the simple fact that the **project is integrated in a "clean" technology frame of investment** since the new plant integrates a ser of environmental protection measures, namely pre-calcination during the clinker production process, bag filters on the chimneys, waste water treatment system, etc., which enable a mitigation of the environmental impacts of the new plant when compared to the typical impacts of this type of unit;

- By the project's **direct and indirect socioeconomic effects on the national economy** resulting from the creation of a significant number of jobs, contributing to the dynamising of economic and industrial activities, both on a local and regional level.

The project's impacts were evaluated in the EIA and it was concluded that the resulting residual impacts, that is, those that remain after the application of the proposed mitigation measures, are generally minor.

During the operation phase, when most of the project's positive impacts will occur, important positive effects are expected both socioeconomic and on the economic activities.

On the other hand, the effective implementation of the proposed mitigation and enhancement measures and of the monitoring plans will attenuate or even cancel the predicted negative impacts and augment the positive ones.

It is also noteworthy that according to the evaluations and studies carried out during this assessment, there are no foreseeable negative environmental impacts, which could in any way question the project's environmental viability.

Therefore, Secil Lobito's new Clinker and Cement Plant to be installed in Lobito is clearly positive and possesses environmental viability.

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