

ENVIRONMENTAL IMPACT ASSESSMENT OF THE SINES REFINERY CONVERSION AND LAND CONSOLIDATION PROJECTS

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The Portuguese official version should also be read in order to confirm and evidence these data.



SINES REFINERY CONVERSION AND LAND CONSOLIDATION PROJECTS

ENVIRONMENTAL IMPACT ASSESSMENT

VOLUME I — NON-TECHNICAL SUMMARY

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galp energia

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VOLUME I — NON-TECHNICAL SUMMARY

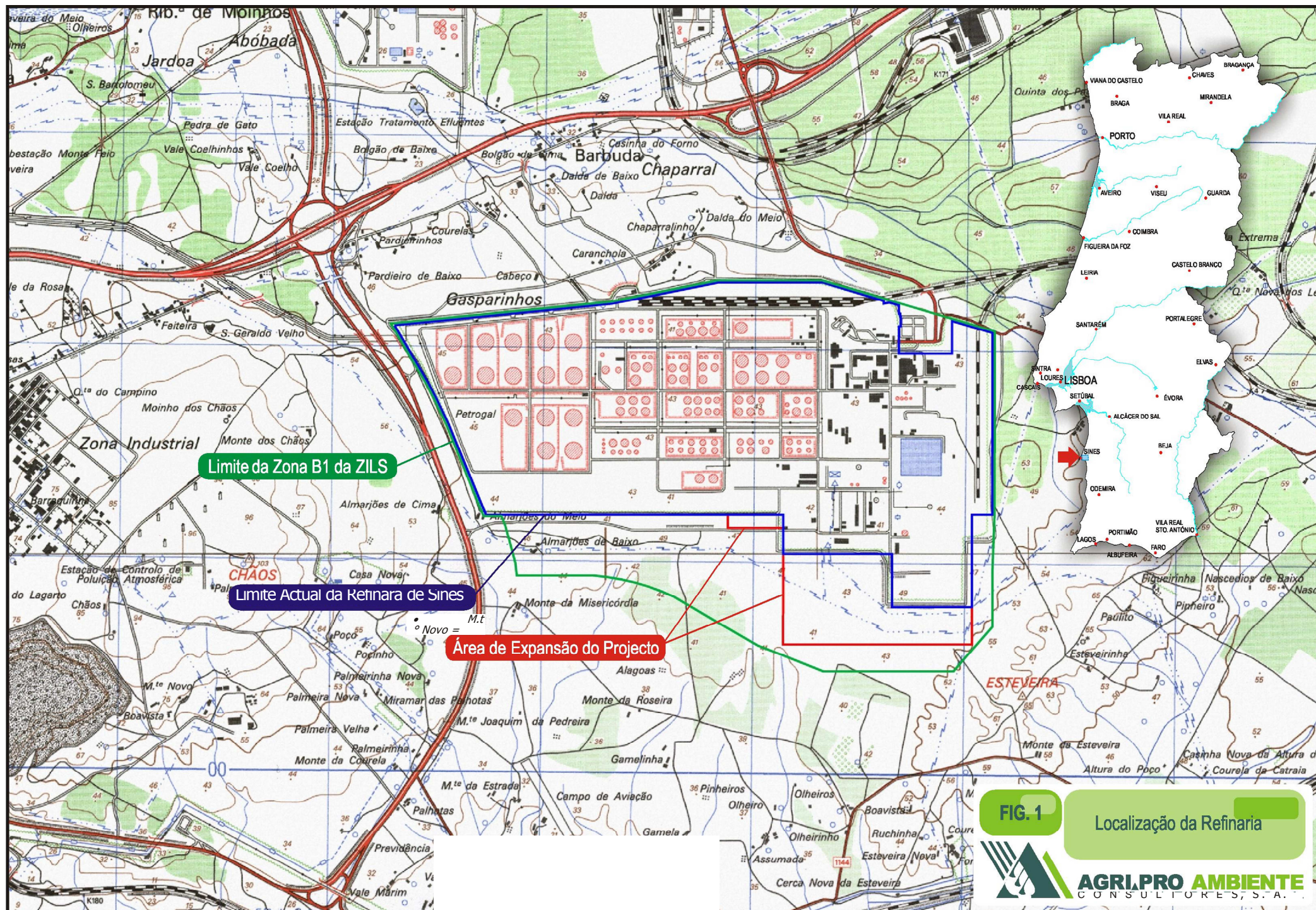
1. INTRODUCTION

This document is the non-technical summary (NTS) of the environmental impact assessment (EIA) covering the Sines Refinery Conversion and Land Consolidation projects. The conversion project will be sited in an area adjacent to the southern edge of the refinery and within its current boundaries (Fig. 1). Also visible in the same figure is the parcel that is to be created in the context of the land consolidation project by integrating the refinery's consolidated area with the area assigned for its expansion.

At the same time, the Land Consolidation Project aims to correct, assimilate and justify planning inconsistencies identified in the boundaries of the industrial facilities of the Sines Industry and Logistic Zone (ZILS), which have arisen due to prior use of obsolete mapping, inappropriate scales and/or technologies that have now been superseded. This project is in accordance with the land use and development plan for the ZILS, which defines the expansion area to be incorporated in the parcel as "Developed Land for Industry and Electricity Generation Purposes".

Sines refinery is located in Sines municipality, in the city of the same name, and began operating in 1978. It is a crude oil industrial processing facility that has an annual installed capacity of approximately 10 million tons and produces a wide range of refined commercial products, particularly liquefied petroleum gases, liquid fuels and bitumen's.

The conversion project aims at modernizing the production process so as to better meet the needs of the domestic market. Production of diesel will increase significantly, at the expense of a decrease in output of fuel oil.



(Fig1 : Location of the Refinery
Boundary of zone B1 of the ZILS
Current boundary of Sines refinery
Project expansion area)

The entity responsible for the conversion project is Petrogal, S.A., a member of the Galp Energia Group, which brings together businesses in the oil, natural gas and electricity fields.

As regards the land consolidation project, the promoter is Aicep Global Parques, the entity that manages the Sines Industry and Logistic Zone (ZILS), within which Sines refinery and its expansion area are located.

The entity responsible for licensing the conversion project is the Portuguese Directorate-General for Energy and Geology (DGEG); for the land consolidation project, it is Aicep Global Parques, the entity that manages the Sines Industry and Logistic Zone (ZILS).

Under the new legal regime governing planning and building, law no. 60/2007, of 4 September, and specifically article 7, number 1, subparagraph f of that law, development operations (including land consolidation projects) promoted by state-owned companies in relation to business parks and suchlike, in particular business location areas and industry and logistic zones, are exempt from licensing requirements. The project is subject to the non-binding prior opinion of the municipal council, which must be issued within 20 days of receipt of the corresponding application.

Assessment of the conversion project is carried out under the prevailing environmental legislation, which states that any alteration or enlargement of facilities of this type is subject to an environmental impact assessment (point 21 of Annex I to Decree-Law no. 197/2005, which amended and republished Decree-Law no. 69/2000).

Moreover, the fact that the land consolidation in question covers an area greater than 10 ha means that it is also covered by Decree-Law no. 69/2000 (subparagraph 10.a) of Annex II to that piece of legislation).

This non-technical summary provides, in a simple and concise manner the key information, conclusions and recommendations of the report on the environmental impact assessment of the Sines refinery conversion and land consolidation projects.

The studies undertaken within the scope of the EIA began in August 2007 and were completed in July 2008.

2. PROJECT RATIONALE

Sines refinery, has opened in 1978, is located in the municipality of Sines and covers an area of approximately 320 hectares. It has an annual capacity to process approximately 10 million tonnes of crude oil.

Development of new units at Sines refinery will require that it expands beyond the area currently occupied. Thus, in parallel, Aicep Global Parques intends to carry out a land consolidation operation, joining in a single unit those areas of the refinery already consolidated and the areas earmarked for its expansion.

As already mentioned, a number of inconsistencies are evident in the boundaries of the refinery, and therefore the aim of this project is to correct and assimilate them so as to render this industrial area more coherent from the planning viewpoint. Accordingly, combining this fact with the plans for expansion, this project seeks to create a single parcel that incorporates an unconsolidated industrial zone (which will be subject to rules, specifically development parameters and those defined under the development plan for the ZILS where applicable) and the refinery area already consolidated.

For logic reasons in planning this expansion and the industrial zone as a whole, it was deemed appropriate to organize the apportionable space as proposed. It should moreover be mentioned that the recently produced ZILS Development Plan favoured the same logic, and for this reason defined in its zoning a new industrial area adjacent to the grounds of Sines refinery, in such a way that necessary expansion of that industry should proceed in an orderly and planned manner.

For its part, the purpose of the conversion project is to equip the refinery complex with new units for conversion of heavy crude using the best available techniques. This will be achieved by a combination of thermal cracking and hydrocracking processes, to obtain “clean motor fuels”, namely diesel and petrol of high environmental quality, highly suited for use in internal combustion engines.

In this way, by increasing the conversion capacity of its refining base, GALP Energia will attempt to re-establish a balance between supply and demand, adjusting its production to the needs of the domestic market.

Production of diesel will therefore increase significantly at the expense of a significant decrease in production of fuel oil.

In fact petrol is produced in excess in Portugal and the surplus is regularly exported to the USA, while there is a diesel shortfall of around 0.7 million tons per year which is made up by way of imports.

Since the demand for fuel is expected to continue to grow while fuel oil consumption is likely to continue to fall as it is replaced by natural gas, the conversion proposed for the refinery is entirely justified, in order to adapt it to current and future market demands.

In fact, as environmental imperatives become ever more pressing, greater emphasis will be placed on using diesel in order to reduce emissions of carbon dioxide into the atmosphere.

As a matter of strategy, Galp Energia, just like other European refiners, has decided to refit its refineries with conversion units for diesel production from the heaviest fractions from crude, which until now were used as fuel oil, a product with little commercial value for which demand is falling as it is replaced by natural gas.

The project incorporates new units for producing high quality diesel. This type of processing also favours the handling of the more abundant and cheaper heavier crudes in Sines and Porto refineries. It is estimated that these two contributions (the increased distillate, in particular diesel oil, and the use of the heaviest crude) will cut Portugal's energy bill.

In 2011 total diesel production will rise from 4.9 million tonnes per year to approximately 7.4 million tonnes per year, virtually equalling the anticipated needs of the domestic market for that year, at the expense of a decrease in output of fuel oil of approximately 1 million tonnes per year.

3. PROJECT DESCRIPTION

3.1 Land consolidation project

As far as the land consolidation for the Sines refinery expansion is concerned, it will not be necessary to produce an urban development plan. As the parcel will include the area already consolidated and the area earmarked for expansion and will be entirely dedicated to Galp Energia's plant all the infrastructure is already in place.

Actually as regards the expansion of its facilities, extension of its various infrastructures will provide the whole area with the essential utilities network. Notwithstanding this fact, the planning operation in the context of the land consolidation that establishes a single parcel for all the areas (consolidated area and expansion area) will provide the whole of the parcel with access to the aforementioned utilities, as these are already built and connected to the consolidated zone.

Generally no urban development works will be carried out as the new parcel that will be formed by the consolidation is already equipped with infrastructure.

3.2 Conversion project

The Sines refinery conversion project is located in the city and municipality of Sines in the district of Setúbal.

The areas to be used for installation of the new processing units are located adjacent to the current boundaries of Sines refinery, which is part of the Sines industrial complex.

Sines refinery is situated approximately 3 kilometres east of the town of Sines. It is delimited on the west and north by the rapid access roads to Sines; the railway line passes on the north of the refinery zone.

Fig. 2 shows a general view of Sines refinery.



FIG. 2 – General View of Sines Refinery

Sines refinery is constituted by a number of processing units spread across two plants, known as Manufacturing I and Manufacturing II. It has a large storage area with a capacity of approximately 3 million cubic metres for crude oil, fuels and other final products and intermediate products.

Crude oil and other imported raw materials are carried by tankers to the port of Sines, which is connected to Sines refinery by a network of pipelines.

The products produced in the refinery are carried by tankers, tank cars, rail tankers and pipeline to Companhia Logística de Combustíveis (CLC) in Aveiras de Cima and to the Repsol petrochemical complex in Sines.

Fig. 3 shows where the new processing units and storage tanks will be installed and where revamping will be carried out on existing units.

Conversion of Sines refinery will involve six new processing units and revamping of two existing units, as follows:

- **New processing units:** hydrocracker, steam reformer, LPG splitter, deisobutaniser, sulphur recovery unit and sour water stripper;
- **Revamping of existing units:** atmospheric distillation unit and vacuum distillation unit II / visbreaker.

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KEY:

Existing refitted units

Interventions in the context of the conversion project

New refinery boundary

[Fig. 3 Location of the conversion projects to be installed at Sines refinery.]

The project will involve the installation of seven new storage tanks to provide the refinery with the necessary storage capacity. The new storage tanks and their respective storage capacities are as follows:

- One for LS atmospheric residue with a capacity of 45 000 m³;
- One for atmospheric residue with a capacity of 45 000 m³;
- Two for vacuum diesel with a capacity of 50 000 m³ each;
- Two for diesel and kerosene with a capacity of 27 000 m³ each;
- One for heavy naphtha with a capacity of 15 000 m³.

In addition, a new sulphur pelletizing unit will also be built, to handle the increase in liquid sulphur resulting from operation of the new units and the new sulphur recovery unit, along with a new flare (Flare III), a new water cooling tower, a natural gas measurement and pressure reduction station and a new nitrogen production unit.

Under this project, improvements will also be made to the refinery's liquid effluent pre-treatment system.

The main purpose of the Sines refinery conversion is to increase production of diesel, by conversion of heavy vacuum diesel produced at Porto refinery after completion of the conversion project foreseen for this facility and heavy visbreaking diesel produced at the Porto and Sines refineries, thus making full use of the processing capacity of Portugal's refining base.

It should be stressed that the project under review incorporates a set of best available techniques recommended for the refining industry. This will make it possible to minimize the impacts of the project and, at the same time will allow the plant to continue to comply with the emission limits defined in its environmental licence.

As a result of the conversion project there will be an increase in the production of industrial effluents and saline effluent.

Industrial effluent will be pre-treated in the refinery system before it is sent to the Ribeira de Moinhos waste water treatment plant, which has capacity to handle it.

As is currently the case with saline effluent, the additional one will be sent to the sea by way of the Aguas de Santo André pipework after passing through an oil separator.

The project calls for the construction of three new chimneys and there will be an waste production increase of similar nature to the currently produced; it will be handled by the Refinery's Waste Management System, thus ensuring it is disposed of appropriately.

The project is scheduled to come online in the first quarter of 2011. Eighty new jobs will be created, of which 55 correspond to direct employment and 25 to indirect jobs associated mainly with mechanical maintenance, electricity, instruments, etc.

As for maritime traffic, the project will result in an annual decrease of five tankers used to carry distilled products and vacuum diesel / residue between Sines and Porto refineries. No significant changes are expected in terms of tank car and rail tanker traffic.

The construction phase, which is expected to last a total of 26 months and will hire an average of 1614 people, will include the performance of a series of temporary tasks, among which are the following:

- earthmoving works;
- laying out and assembling the building yard;
- civil engineering works such as foundations, underground infrastructure, utility networks, surfacing, etc.;
- transportation of materials and equipment;
- building new processing units and storage tanks;
- refitting the atmospheric distillation unit and vacuum distillation II and visbreaker units;
- expansion of the utilities and fire fighting networks and building auxiliary infrastructure (electrical substations, pumping station, etc.);
- linking the new units and infrastructure to the existing plant.

The major construction works are to be carried out on the southeast part of the refinery, which will involve expanding part of the southern boundary, and where the new units, the new flare and other structures included in the project are to be installed. In the central area of the refinery, two new tanks will be built and work will be carried out on the units to be revamped.

The yard will be built in the expansion area, near the new steam reformer and hydrocracker units. The yard will consist of several distinct sections and structures, all located within the new refinery boundary, with the exception of a parking lot which will be set up outside, beside the new boundary, in an area of land with no current use.

Access to the yard will be via an existing road south of the installation area, by way of a tarmac road that connects the expansion zone to the IC4 highway. This road is on land earmarked for expansion of the refinery.

The various section of the yard will be suitably marked off and will for the most part be fenced and equipped with an access gate. They will be provided with all infrastructure necessary for their operation, in order to meet appropriate standards of health and safety.

Identification and information boards will be placed at the entrances with the main aim of preventing accidents involving traffic and cargo handling, and the use of safety equipment, etc.

The yard will be fitted with the necessary equipment to contain, treat and remove any effluent. It shall also be fitted with a temporary waste storage depot, having suitable containers properly identified for each type of waste.

4. DESCRIPTION OF CURRENT ENVIRONMENTAL SITUATION

The study and analysis of the project area current environmental situation covered the more significant physical, quality, ecological and human factors, taking into account the local and regional features.

The legal constraints, reflecting national and municipal regulations, were gathered, field surveys were conducted and contacts made so as to obtain a detailed picture of the area. No constraints were identified in the area of Sines refinery conversion and land consolidation projects.

The description given below covers the general features of the area in which the refinery and its surroundings are located and, particularly the area south of the facility where some of the new elements will be built. The area within the refinery boundaries, where part of the conversion project will be implemented, was also analysed. This corresponds to areas where other industrial units are already in operation and levelled open spaces, an example of which are the areas where the storage tanks are situated.

The refinery site is subject to a strong Atlantic influence, characterized by a markedly maritime climate, with a high frequency of fog and a fairly regular rainfall.

In geological terms, it is characterized by arenaceous formations in various states of alteration and covered with various land fill materials.

The soil is of a poor grade. The original soil has been greatly altered and is practically all paved. Mainly it is made of landfill materials, associated with buildings and roads. As a consequence, these are zones that have been rendered impermeable to a considerable degree, of no agricultural or ecological value.

The hydro graphic network of the project area is made of small watercourses that drain directly into the ocean. The most important in the proximity of the project area are Ribeira das Caraminheiras, on the north, and Ribeira da Junqueira, on the south, both of which display torrential flow in open channels. No watercourse is identified in the area of the refinery.

As regards air quality in the surrounding area, simulations of pollutants dispersion emitted by the refinery and by the other industries operating in the zone were conducted. The limit values defined in Decree-Law no. 111/2002 are met for all pollutants with the exception of sulphur dioxide, for which the established limit value is slightly exceeded.

However, it should be noted that this breach is recorded only in simulations in which all the industries are considered: the values recorded are considerably lower when only the refinery is simulated. It is nevertheless anticipated that these surplus will disappear thanks to the efforts that some industrial units have been making to reduce gas emissions.

In the course of its operations, Sines refinery produces various types of waste. This is conveyed to an appropriate final destination; priority is given to recycling wherever possible.

In regard to background noise levels, these are within the limits imposed by law.

The near surroundings of the refinery are dominated by agricultural and forestry use; there are few remaining natural features. The main pattern of land use is dry farming, spread nevertheless with small fields of pine and eucalyptus.

Thus, in terms of biological and ecological factors, the habitats in Sines refinery expansion area are very open, without large strips of dense vegetation. They have been subjected to considerable intervention and a constant human presence. They are not home to fauna valuable species, but are occupied by species with a wide distribution in Portugal.

The landscape in the area where Sines refinery conversion and land consolidation projects will be carried out is characterized by a low diversity degree, despite the fact that this is an open space that enables to see in the distance ahead. Because the refinery is at a significant distance from the main roads to the south, its visual accessibility is low.

From a heritage standpoint sites from different periods were identified in the vicinity of the refinery but none of them is within the projects' direct sphere of influence.

In socioeconomic terms, Sines municipality, where the refinery is located, is the most highly developed municipality on the Alentejo Litoral region and has increased its population in recent years. It is the municipality with the youngest and best qualified population in the region.

The projects in question comply with the relevant planning diplomas. One of these is worth to be highlighted, the Sines Industry and Logistic Zone Development Plan (PUZILS) approved at a meeting of the municipal council. This incorporates the new development master plan, which contemplates southward expansion of the Sines refinery.

There are no legal restrictions on the area where the projects are to be located. The only detail to be noted is the existence of three medium-voltage power lines to the south of the refinery, two of which will be diverted under the conversion project.

5. IMPACT ASSESSMENT, MEASURES AND MONITORING

The environmental consequences of the construction and operation of the new units and the revamping of the existing ones which constitute the Sines refinery conversion project were assessed and examined, as were the impacts of the land consolidation project.

Actually the land consolidation is a way of formalizing the future purpose to expand Sines refinery, setting aside the land for industrial use by that plant. Thus, bearing in mind the absence of intervention in land consolidation, its impacts are not considered significant.

And also any intervention in the remaining area of the plan, not subject to intervention but assigned to future expansions of the refinery, will undergo the legal formalities of impact assessment. This will ensure that any impacts will be duly assessed and the corresponding mitigation measures proposed.

Given the nature of the conversion project, the main negative consequences will be felt during the construction while positive consequences will arise in the operating phase.

The construction phase will have some local negative effects in terms of air quality, land use, noise, waste and landscape. However, with the exception of the impacts on landscape and land use, which are classified as moderate, the remaining impacts will be temporary and of little significance. No impacts on climate or heritage were identified.

Negative impacts during the construction phase have to do with occupation of the land to the south of the facility, operation of yards and transportation of equipment, and site activities that will cause temporary visual disorganization of space, emission of dust and production of waste water and rubble.

To minimize the negative impact of the construction phase mitigation measures have been proposed. Transportation of materials, which will be mainly between the refinery and the port of Sines, will use roads in the vicinity with very few sensitive elements or even none at all,

The waste water generated in the yard and on the site will be collected in dedicated and appropriate equipment and subsequently sent for treatment externally (domestic effluents) or discharged in a controlled manner into the refinery's pre-treatment system (industrial effluents).

In the case of noise, impacts will also be minimized with suitable management measures. As a result the impacts will not affect the general population.

The conversion project construction phase will have positive socio-economic consequences, thanks to population increase and employment creation, although these will be temporary impacts, and on land use, as the provisions of the relevant land management diplomas will be implemented.

To minimize the negative impact of the construction phase mitigation measures have been proposed that basically call for appropriate planning of construction work and works management procedures. These measures focus above all on preventing situations of water and soils contamination by spilled substances or degradation of air quality due to dust emission.

Therefore it is recommended that excavation works for the installation of equipment be performed, whenever possible, by mechanical means, that all noisy activities be reduced to a minimum, that waste water and waste produced in the yard be correctly handled and controlled, and that the yard be properly fenced.

The construction phase is required to have suitable environmental monitoring, so as to implement, oversee and control the measures laid down in the monitoring plans.

As for the operating phase, negative consequences of the new units and the revamped ones will be all minor or moderate.

The conversion project will cause an increase in the amount of effluent generated. The total increase will be 157 m³/h, of which 18 m³/h are saline effluent which will be sent to the sea via a pipeline and 139 m³/h are industrial effluent that will undergo pre-treatment and will then be conveyed to Ribeira de Moinhos waste water treatment plant, which has capacity for the appropriate treatment.

As regards surface water quality, as far as the watercourses present in the area of the conversion project are concerned, namely Ribeira de Moinhos, no significant changes in relation to the current situation are to be expected.

As regards air quality, simulations were also conducted for the future scenario, taking into account the refinery and the other industries present in the surrounding area. The results obtained show, once again, the major contribution to air quality, in terms of emissions of sources external to the refinery. Nevertheless in contrast to what was seen for the reference situation, in the future scenario the limit values defined in Decree-Law no. 111/2002, of 16 April, are met for all pollutants, due to the implementation of new projects that reduce emissions from current levels.

Sines refinery operation incorporating the new units brings positive impacts at the socio-economic level, compared with the current situation. As regards the Portuguese economy it will make it possible to reduce imports of diesel and meet the demands of Portuguese consumption with domestic production. Eighty new jobs will be created at local/regional level.

During the operational phase, negative impacts will be minimal and will consist above all of an increase in the output of waste water and waste, a slight increase in some atmospheric emissions and the production of a certain amount of additional noise, which will be confined to the area in the close vicinity of the new units and inside the refinery.

According to the risk analysis conducted, risks to employees and the general public associated with the planned new units are considered to fall within the limits of risk levels internationally regarded as negligible.

On the other hand, the conversion project will not lead to a significant increase in risk compared with the current situation.

During the operating phase and in relation to the risks involved, the main measures relate to:

- Updating the Internal Emergency Plan for Sines refinery, in order to incorporate the planned changes to existing units and the new units and storage tanks;
- Carrying out periodical drills to test the Emergency Plan and the human and material resources available;
- Drawing up operating and maintenance procedures appropriate to the features of the new units and storage tanks;
- Appropriate training of employees of Sines refinery, drawing attention to the risks associated with each of the new units and storage tanks;
- Drawing up strict and specific procedures to be followed by subcontracted companies that carry out work on the facilities;
- Strict control of vehicle access to processing areas.

The planned projects and measures will enable the new units and revamped units to operate efficiently, contributing also to the safety and environmental insertion of the whole Sines refinery.

The Zero Alternative, which corresponds to the non-performance of the conversion project, would have negative consequences that would be significant at the socio-economic level, as it would not be possible to meet domestic oil needs, resulting in an increase in Portugal's energy dependency, with major implications for the economy in general. It would also be negative for air quality in general, since it would mean not producing fuels of better quality that reduce the pollution generated by transport systems.

In this alternate scenario, a significant investment would not be made, with national and local repercussions, as the project non-accomplishment eliminates a potential opportunity for human and socio-economic development in the municipalities of Sines and Santiago do Cacém during both the construction and the operating phase.

6. CONCLUSIONS

The creation of a single area, incorporating both the expansion with the consolidated area of the refinery, is a way of formalising the intention to expand Sines refinery in the future, setting aside the land for the industrial use of that facility.

Thus, in view of the absence of intervention in the land consolidation, its impacts are not deemed to be significant.

What is more, any intervention in the remaining area of the plan, not subject to intervention but assigned to future expansions of the refinery, will undergo the legal formalities of impact assessment. This will ensure that any impacts will be duly assessed and the corresponding mitigation measures proposed.

Sines refinery conversion project constitutes a key element for maintaining and improving the environmental performance of this important industrial unit, ensuring compliance with the specifications of national and Community legislation, and consequently for the viability of the refinery.

Therefore, the conversion project is part of a strategy that will significantly and positively improve the current economic and environmental viability, at the regional and national levels.

It is in line with the planning documents approved for the region of Sines and does not carry any relevant environmental asset at risk.

It was possible to conclude that the project will be carried out in line with national and international standards applicable to this type of plant and use the most modern and up-to-date techniques of environmental protection and safety.

The new units and the revamping of existing units have been designed by international bodies with a great deal of refining experience and incorporate the best available technology, duly tested and approved internationally.