



ENVIRONMENT

Environmental Monitoring

ENVIRONMENTAL MANAGEMENT OF “ PARQUE DAS NAÇÕES”

PORTUGAL

ENVIRONMENTAL MANAGEMENT OF THE “PARQUE DAS NAÇÕES”

Client:
Parque EXPO, SA.

Environmental Management:
2005 /08

Studies undertaken in consortium

DESCRIPTION

The Environmental Management of the “Parque das Nações” has the purpose of monitoring the different environmental components of the area (a riverside zone in the North of Lisbon, occupied by residential areas, offices, casinos, health centers and marine) in order to ensure the environmental quality of the area. The environmental management calls upon the following components:

- Noise quality – assessment of noise levels with a view to preserving a noise level appropriate to a residential area;
- Air quality – evaluation and measurement of air quality;
- Meteorology – to ensure the normal operation of the meteorological station installed in the PARQUE EXPO;
- Surface and ground waters – following-up of the surface and ground water quality evolution, in accordance with the legislation in force and proposal of preventing/mitigating measures to be adopted;
- Monitoring of the pluvial and storm waters network;
- Sediments and surface waters – definition of periodical campaigns for the identification, follow-up and evaluation of eventual changes in the sediments and surface waters in the Tejo and Trancão riversides;
- Follow-up of the work fronts – actions to undertake in relation with the environmental assistance to provide during the different working phases.
- Beirolas Landfill – Biogas – to ensure the accurate operation and maintenance of equipments associate to the Biogas Control and Combustion Plant;
- Beirolas Landfill – Lixivated – to ensure the accurate operation and maintenance of equipments associated to the leaching extraction;
- Beirolas Landfills – Settlements.





**ENVIRONMENTAL IMPACT
STUDIES AND
ENVIRONMENTAL
MONITORING OF THE
CONSTRUCTION OF THE
VASCO DA GAMA BRIDGE**

Client: LUSOPONTE -
Concessionária para a
Travessia do Tejo, S.A

**Prelim. and Environmental
Impact Studies: 1993/94
Environmental Impact
Monitoring: 1995/98**



DESCRIPTION

The Vasco da Gama Bridge located across the Tagus River in the Lisbon Metropolitan Region is one of the largest civil engineering works in Europe. Environmental matters have received special attention during their design and implementation.

The New Crossing, that consists basically of a cable-stayed bridge (central span of 420m), various viaducts and several access roads has a total length of about 17 km. The section over the river is approximately 12 km long, this placing the new bridge among the largest in the world.

Environmental Impact Studies were carried out by COBA in order to identify the main environmental aspects to be taken into account in the design.

Very unusual types of mitigation or compensation measures were recommended, such as:

- Expropriation and recovery by the concessionaire of 400 ha of wetlands, for the creation of an Environmental Conservation Area;
- 12,000 ha expansion of the Tagus Estuary Bird Protection Zone;
- Creation of a large zone where land use is constrained, to control urban growth;

The works were approved after passing through the official process of Environmental Impact Evaluation (EIE) that included public audits. Besides this, the EIA process was subject to thorough analysis by the European Commission. The construction started during the first quarter of 1995 and ended in March 1998.

The project includes also unprecedented schemes to monitor and control impacts during construction and operation, such as the Environmental Studies and Monitoring Centre (Portuguese acronym: CEMA).

CEMA has been created by and in the realm of the concessionaire to monitor and control impacts during construction and operation, manage an environmental database, provide information to the public, and support environmental education actions. These activities are led by technical staff from the concessionaire with assistance from educational and research institutions, certified laboratories and environmental consultants.

COBA was responsible for the establishment of guidelines for the Environmental Monitoring Programmes (hydro-dynamics, water quality, bottom sediments quality, air quality, acoustic component of the environment, fauna and flora, built cultural heritage) as well as for the conception of CEMA's structure, organisation and general procedures. Besides this, COBA also acts as a permanent consultant of CEMA and environmental matters.

The works involve periodic site visits, analysis of current situations, study of solutions for unexpected situations, meetings and visits with the Works Monitoring Team and with LUSOPONTE, evaluation of the various specialists' reports and preparation of quarterly reports and other documents.





**MODERNIZATION OF THE
NORTHERN RAILWAY LINE**

**ENVIRONMENTAL STUDIES
OF SECTION BETWEEN THE
RING LINE / BRAÇO DE
PRATA, MAINTENANCE
DEPOT, AND SECTIONS OF
41 CURVES**

Client: FERBRITAS

Preliminary Design: 1991

Final Design: 1992/95

Technical Assistance:
1995/98

ENVIRONMENT

Environmental Impact Assessment

NORTH RAILWAY LINE

PORTUGAL

DESCRIPTION:

The major purpose of these studies was the identification of relevant environmental impacts and the definition of environmental control measures concerning the following works that are part of the Modernization of the North Railway Line:

- Quadruplicating of the Ring line between PK 8,600 (Chelas) and PK 10,200 (Braço de Prata);
- Braço de Prata flyover (viaduct and bridge);
- New Maintenance Depot;
- Improvements in some sections of the line including 41 curves between Setil e Entroncamento in order to increase to train speed.

The studies were developed in two phases:

- Preliminary Environmental Impact Study, for the collection of information necessary for the execution of Basic Design of mentioned railway sections;
- Environmental Impact Study at the level of Final Design to guideline the designs
- Environmental Management and Technical Assistance during the construction.





**OPORTO LIGHT METRO NETWORK.
ENVIRONMENTAL IMPACT ASSESSMENT**

Client: Metro do Porto, S.A.

Preliminary Study: 1997

Addendum to the Preliminary Study: 1998

Analysis of Environmental Incidences associated to Design alterations: 2000

DESCRIPTION:

The Oporto Light Metro Network crosses the municipalities of Porto, Gaia, Matosinhos and Maia and intends to make available a light suburban means of transport that allows the main connections from the greater Oporto Metropolitan Area into the city, as well as an efficient distribution within the city itself.

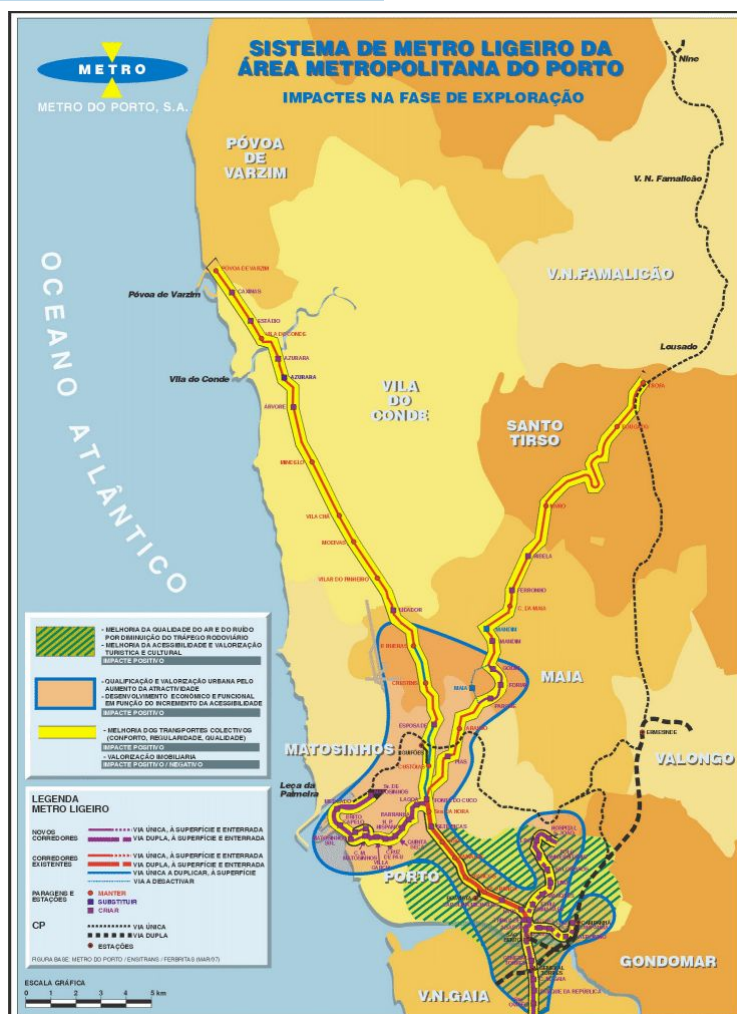
COBA's intervention in the Environmental Impact Study began in 1997 with the preparation of the Preliminary Study, which involved the following main aspects:

- Identification of the principal critical environmental aspects and sensitive zones and establishment of the principal control measures which are to be adopted during the construction and operation phases;
- For the construction phase, and according to the negative impacts foreseen, emphasis was given to the analysis of aspects such as location and operation of construction sites, due to noise and air pollution, among others, disturbance of access roads, structural vulnerability of buildings, etc.;
- For the operation phase, special reference is made to aspects related to safety and fluidity during the operation of this means of transport, as well as noise and vibrations;

- Note was made of the environmental benefits and increased life quality in the Oporto Metropolitan Area, associated to the operation of this transport network.

In 1998, due to alterations introduced to the design and construction characteristics of the Metro Network, an addendum to the Preliminary Environmental Impact Study was undertaken so as to contemplate these alterations.

During 1999 and 2000, in order to respond to several demands from the municipalities affected by this Undertaking, and also in order to render these works compatible with the works associated to the "Porto 2001 – European Capital of Culture" event, it was necessary to carry out alterations to the contractual design of the Metro Network, envisaging essentially a more suitable urban integration. It was thus necessary to analyse the Environmental Incidences associated to these alterations, which included proposals for minimization of negative impacts, namely those related to traffic constraints.





LIGHT METRO NETWORK OF THE MONDEGO REGION. BASIC NETWORK PRELIMINARY DESIGN. ENVIRONMENTAL INCIDENCES STUDY

Client: Sociedade Metro do Mondego, S.A.

Date: 2000

DESCRIPTION:

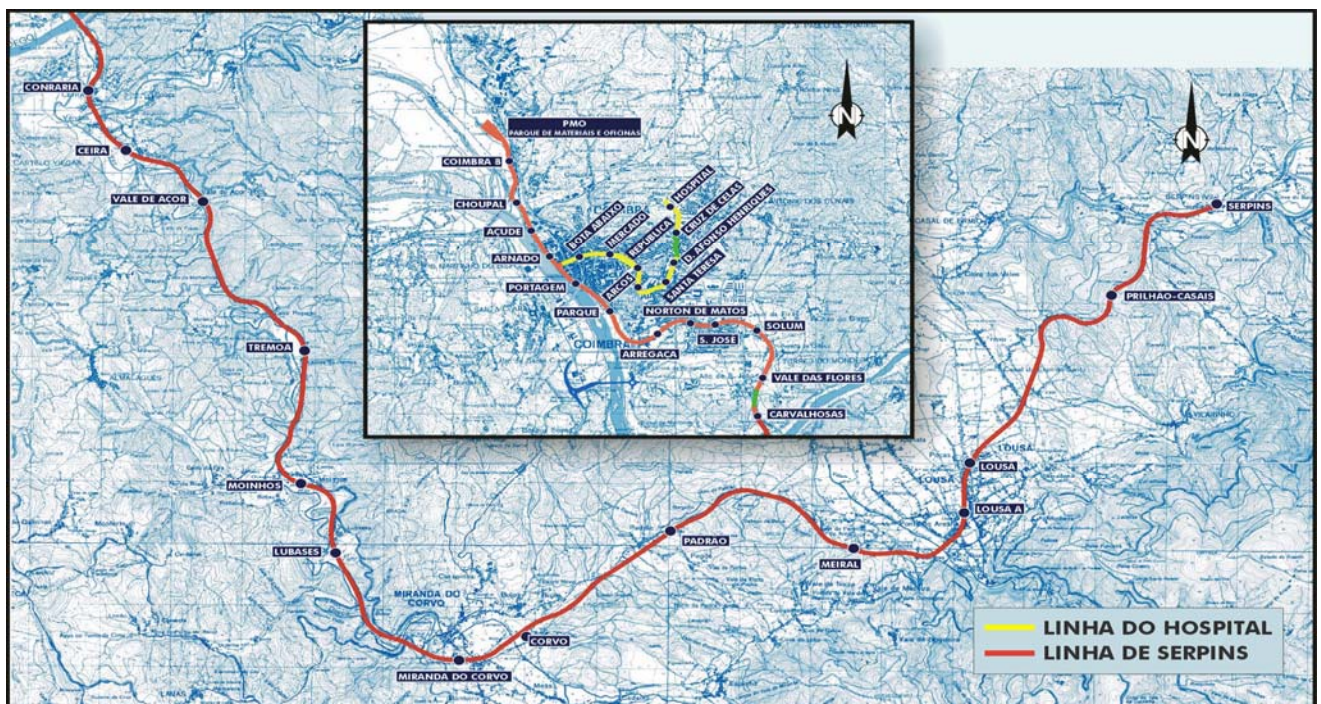
The Mondego Light Metro Network covers the municipalities of Coimbra, Miranda do Corvo and Lousã and it aims at providing a comfortable, safe and reliable means of transport to the population, ensuring the circulation within the city of Coimbra and between this city and its surroundings, thus re-qualifying the existing Lousã Branch.

For this purpose, two lines have been designed – the Hospital Line, with urban characteristics (linking the town centre to the Hospitals area), and the Serpins Line with sub-urban characteristics (that will link Coimbra B to Serpins). In the Serpins Line new stations have been created in order to serve the main population centres that are growing (Solum, Vale das Flores).

The metro lines run essentially at the surface, and there is a single stretch in tunnel in the Hospital Line that will link the D. Afonso Henriques and Cruz de Celas stations.

The Environmental Incidences study aimed at the analysis of the main following aspects:

- Identification of the main environmental components and sensible areas and indication of the most important control measures to be implemented either in the construction phase or during the project's operational phase;
- During the construction phase, and given the expectable negative impacts, emphasis was placed on the analysis of the aspects related with noise and atmospheric pollution in general regarding the location and construction method of the tunnel. The impacts associated to affecting the accessibility and mobility of the population have also been considered.
- For the service phase, emphasis was placed on the positive impacts related to the global improvement of the population's quality of life associated: to the decrease in the emission of toxic gases to the atmosphere and in the noise levels, to safety, comfort, reliability and fastness that this new means of transport will bring to the population of the three municipalities.





ENVIRONMENT

Environmental Impact Studies

PICO VERMELHO GEOTHERMAL PLANT – WELL CL.5

Açores, PORTUGAL

STUDY FOR MINIMIZATION OF THE ENVIRONMENTAL IMPACTS ASSOCIATED TO THE CONSTRUCTION OF WELL CL.5 OF THE PICO VERMELHO GEOTHERMAL PLANT

Client:
SOGEO – Sociedade
Geotérmica dos Açores, S.A.

**Environmental Impact
Assessment:
1999/00**

DESCRIPTION

This environmental impact study was undertaken for SOGEO – Sociedade Geotérmica dos Açores, SA, company whose activity resides in the use of geothermal resources for generation of electric energy. The 13 MW Ribeira Grande power plant is located on the S. Miguel Island, Azores. The construction of the geothermal well requires perforation up to a depth of approximately 1500 m.

The construction and operation of these types of geothermal wells generally rises apprehension as far as the following environmental aspects are concerned: eventual interference with the hydraulic conditions and subterranean aquifers, soil contamination, surface and underground water masses, as well as the air quality of the surrounding zones.

The studies undertaken involved the identification of the principal interventions which could eventually cause significant environmental impacts and survey of the most important environmental characteristics of the zone, which included site visits and contacts with privileged informers. The physical and biotic environments, as well as the socio-economic and cultural environments were studied.

Furthermore, an assessment of the relevant environmental impacts was made. Control measures to avoid, attenuate or compensate negative impacts were formulated and largely adopted in the design. The guidelines for the environmental monitoring plan to be implemented were also established.





ENVIRONMENT

Recovery of Degraded Areas

REHABILITATION OF THE JALES MINES SPOILS AREA

PORTUGAL

REHABILITATION OF THE JALES MINES SPOILS AREA

Client:

EDM – Empresa de
Desenvolvimento Mineiro, S.A.
(ex-EXMIN)

Final Design:
2001/02

Technical Assistance:
2002 / 2003

DESCRIPTION

The Jales Mine is located in the proximities of the Campos de Jales village, Vila Pouca de Aguiar district, and forms part of the Jales Mining Complex.

The primary objective of the studies included the rehabilitation of the Jales Mine Spoils Area, which contemplated mitigating and corrective solutions that enabled:

- to guarantee slope stability and control surface runoff, thus avoiding erosion;
- to control geochemical and hydrochemical dispersal of heavy metals in the zones surrounding the spoils area, provoked by runoff of storm water;
- to control resurgence of eventual leaching in the interface between the rock substratum and the base of the spoils area, as well as in the slopes themselves;
- to control geochemical dispersion of pollutants provoked by wind activity.

From the four solutions studies, it was considered wise to adopt the solution that foresees the isolation and confinement of the Jales Mine Spoils area, which included the following activities:

- Reshaping or modeling of the spoils areas configuration;
- Sealing or waterproofing of reshaped deposits;
- Redirection of natural drainage in the surrounding areas, through implantation of a peripheral surface drainage system;
- Implantation of a surface drainage system above the cover of the spoils area and sub-surface drainage on the covering layer;
- Implantation of a subterranean drainage system at the base of the spoils area, upon the waterproofing membrane, for gathering and runoff, on to monitoring wells, of eventual leaching formed inside the spoils area;
- Landscaping of the area, in order to optimize the location and avoid or attenuate erosive processes of the surface of the modeled area;
- Installation of adequate fencing and signaling devices around the treated area, as well as around buildings and units that may represent danger to the local population's safety, with appropriate informative and restrictive signaling.





ENVIRONMENTAL REHABILITATION OF TERRAMONTE MINING AREA

Client:
EDM – Empresa de
Desenvolvimento Mineiro, S.A.
(ex-EXMIN – Companhia de
Indústria e Serviços Mineiros e
Ambientais, SA)

**Basic Design and Final
Design:**
2004/05



ENVIRONMENT

Recovery of Degraded Areas

ENVIRONMENTAL REHABILITATION OF TERRAMONTE MINING AREA

PORTUGAL

DESCRIPTION

Rehabilitation of the E1 and E2 spoils areas of the Terramonte Mining Area, which suffer accentuated erosive processes that have led to the environmental degradation not only of the surrounding area, but also of the Douro River itself, since this mining zone comprises an affluent of this river.

The Terramonte Mining area is constituted by the old Terramonte and Ribeiro da Castanheiro Mines, which were part of a mining complex that integrated 7 concessions, totaling approximately 352 ha of concessionaire area. It explored lead, zinc and silver from the Terramonte / Serra de Montalto mineral seam.

A Geological and Geotechnical Study and an Environmental Impact Assessment were undertaken for Rehabilitation of the spoils area in order to assess the most significant environmental impacts associated to the implementation of the project, as well as to propose mitigating measures in order to contribute to an environmentally more favorable enterprise.

The rehabilitation solution includes:

- a) Cleansing and revegetation of the E1 and E2 spoils areas slopes;
- b) Cleansing of existing residues existing along the Terramonte river (downstream spoils area E1);
- c) Confinement and reshaping/modeling of the E1 and E2 spoils areas configuration;
- d) Sealing/waterproofing of spoils area E2
- e) Construction of perimeter ditches;
- f) Construction of surface and sub-surface drainage system;
- g) Landscaping

