DRAFT REPORT

Landell Mills
DEVELOPMENT CONSULTANTS

Rapid Environmental Assessment for the Industrial and Energetic Park's at Porto Romano, Durres, Albania

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CONTENTS

ABREVIATIONS

€	Euro
As	Arsenic
BOD	Biological Oxygen Demand
CARDS	Community Assistance for Reconstruction, Development and Stabilisation
Cd	Cadmium
CH	Bern Convention
CnHm	Aliphatic Hydrocarbons
CO	Carbon Monoxide
CO2	Carbon Dioxide
Cr	Chromium
Cu	Copper
DCM	Decisions of the Council Ministers
EC	European Commission
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
EU	European Union
H2S	Hydrogen Sulphide
ha	Hectare
Hg	Mercury
IPPC	Integrated Pollution Prevention and Control
LML	Landell Mills Ltd
METE	Ministry of Economy and Trade
MoEFWA	Ministry of Environment, Forestry and Water Administration
MW	Megawatt
N	Organic Nitrogen
NH4+	Ammonium
Ni	Nickel
NO2-, NO3-	Nitrate
NOx	Nitrogen Oxides
O2	Dissolved Oxygen
O3	Ozone
P	Total Phosphorus
PAH	Polycyclic Aromatic Hydrocarbons
Pb	Lead
ph	Acidity
PO43	Ortho Phosphate
PRTR	Pollutant Release and Transfer Register
QA/QC	Quality Assurance/Quality Control
REA	Regional Environmental Agency
SIDTDR	Sustainable and Integrated Development of the Tirana-Durres Region
SO2	Sulphur Dioxide
sq	Square
StEMA	Strengthening of the Environmental Monitoring System in Albania
ToR	Terms of Reference
UK	United Kingdom
UNDP	United Nations Development Programme
Zn	Zink

0 Executive Summary

0.1 Background and Site Characteristics

- The purpose of this report is to present a Rapid Environmental Assessment for an Industrial Park and an Energetic Park at Porto Romano, Durres for UNDP and the Government of Albania, represented by the ministries of Economy, Trade and Energy (METE) and Environment, Forestry and Water Administration (MoEFWA). The work has been co-financed by UNDP, Albania and the Delegation of the European Commission to Albania and conducted by a team of experts contracted by Landell Mills.

- The establishment of the Industrial and Energetic Parks is an important part of Albanian Government interventions aimed at developing the Albanian economy through the improvement of the investment climate, particularly for foreign direct investment (FDI).

- A previous review conducted by the EC/Landell Mills Sustainable and Integrated Development of the Tirana Durres Region (SIDTDR) identified the Tirana-Durres region as Europe's fastest growing region and as capable of driving the entire Albanian economy. It further proposed that the region seek to establish itself as a regional and Balkan 'Hub' for the provision of logistics and other services to the rest of Albania and neighbouring countries. The proposed Industrial and Energetic Parks at Porto Romano is considered a flagship project within this strategic development framework.

- The two parks envisioned together cover an area of approximately 1,720 hectares and are located to the north and east of the town of Spitalle. The area is mainly drained marsh land of low agriculture value. The parks have been planned in a way that allows for broad formalisation of existing informal settlements in the area.

- Once operational, the parks will provide the region with a combined total of approximately 40,000 jobs, a large proportion of which will be suitable for currently unskilled workers and women.

- The environmental quality of the area is at present poor, influenced by occasional flooding; uncontrolled waste deposits and incineration; and discharge of considerable volumes of municipal waste water. These factors threaten not only the physical environment but also human health in the area.

- The establishment of the two parks is therefore also an intervention aimed at improving both environmental and human health factors in respect to nearly all parameters, the only exception being that noise levels during the daytime will be increased.

0.2 Recommendations

Based on analysis of current situation and factors related to the proposed developments, the following key recommendations are made in order to minimise potential negative impacts and optimise improvements to the environment and human health arising from establishment of the parks:

- Primary traffic flows to and from the parks should be concentrated on one of the main roads leading to the area, or on a new road located in the middle of the parks.

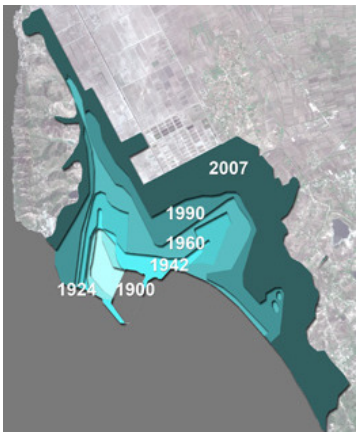
- The drainage system in the area, including the dams to the beach, should be rehabilitated and reinforced.
- A thermal power plant should be constructed as an oil or gas assisted multi-fuel installation, to resolve problems relating to municipal waste disposal and enable the use of renewable resources such as biomass for instance from the constructed wetland waste water treatment plant.
- Cooling water form the thermal power plant could then be used for greenhouse production.
- Surface elevation should be performed, combined with landscaping particularly for the industrial park in a way that might encourage biodiversity.
- An environmental monitoring programme should be established for the wider park area.

1 Introduction and Study Area

The Government of Albania is committed to strengthening the country's economy as a whole and in particular to establishing industrial parks complete with all necessary infrastructure and services. The study area has been identified from recommendations produced in the 2007 Outline Industrial Property Development Road Map for Albania, produced by the UNDP Trade Project (2006/47), which used land at Spitalle near Durres, the country's largest port, as a demonstration project.

Durres is a long established city, having been a major port in the Roman Empire. Today it is one of the main ports on the east cost of the Adriatic Sea and Albania's leading port, serving all of Albania as well as Kosovo and Macedonia and linking the Balkans with Italy via Italy's Adriatic ports, particularly Bari. The port itself has been improved over recent years and related improvements are ongoing.

Tirana-Durres, the region comprising Albania's capital city and main port, was identified as Europe's fastest growing region in demographic terms and one of its fastest growing in economic terms, with growth forecasts at over 65% over the next twenty years, by the recently completed EC/Landell Mills SIDTDR project.



Within this region, the city of Durres has grown rapidly since 1945 when its population was estimated at 40,000, spurring similar growth in adjacent communes recently through the construction of informal settlements.

The population of the urban area centred on Durres was estimated in 1989 at approximately 160,000 and in the 2001 Census at approximately 200,000. This latter figure includes Durres city and the Keneta illegal settlements (combined population of approx. 170,000) and rural areas surrounding the future Energy and Industrial parks (approx. 30,000). The SIDTDR projects growth to nearly 300,000 by 2027.

The port is a major transit point for people and goods within Albania and across the Balkan peninsular and Adriatic Sea, with imports of food, consumer durables such as televisions and refrigerators and building materials dominating. These goods may be stored and re-transmitted locally, stored and processed locally and shipped on immediately to end consumers, generating considerable economic development and sustaining a broad spectrum employment. The SIDTDR anticipates this role continuing and the region becoming a major hub for the Balkan region. The growth of Mother Teresa Airport, usually described as Tirana International Airport, but actually in Durres Qarku (County) will contribute to this scenario.

Further, tourist inflows to the city, especially to new residential areas along the beach to the south of the city centre, are expected to grow and the city will become an ever larger administrative centre: SIDTDR proposals suggest that the development of a major new university in the city is feasible and desirable.

The proposals for the Energetic Park and Industrial Park should therefore facilitate the development of a very broad economic base for the city encompassing heavy and light manufacturing and processing, construction, financial services, administration, public services in health and education and tourism.

The combined Energetic and Industrial Park comprises in all about 1,720 hectares of land, with the two parks being of nearly the same size (870 and 850 ha respectively). In this report the combined parks are referred to as a single study area, as they are similar in environmental characteristics.

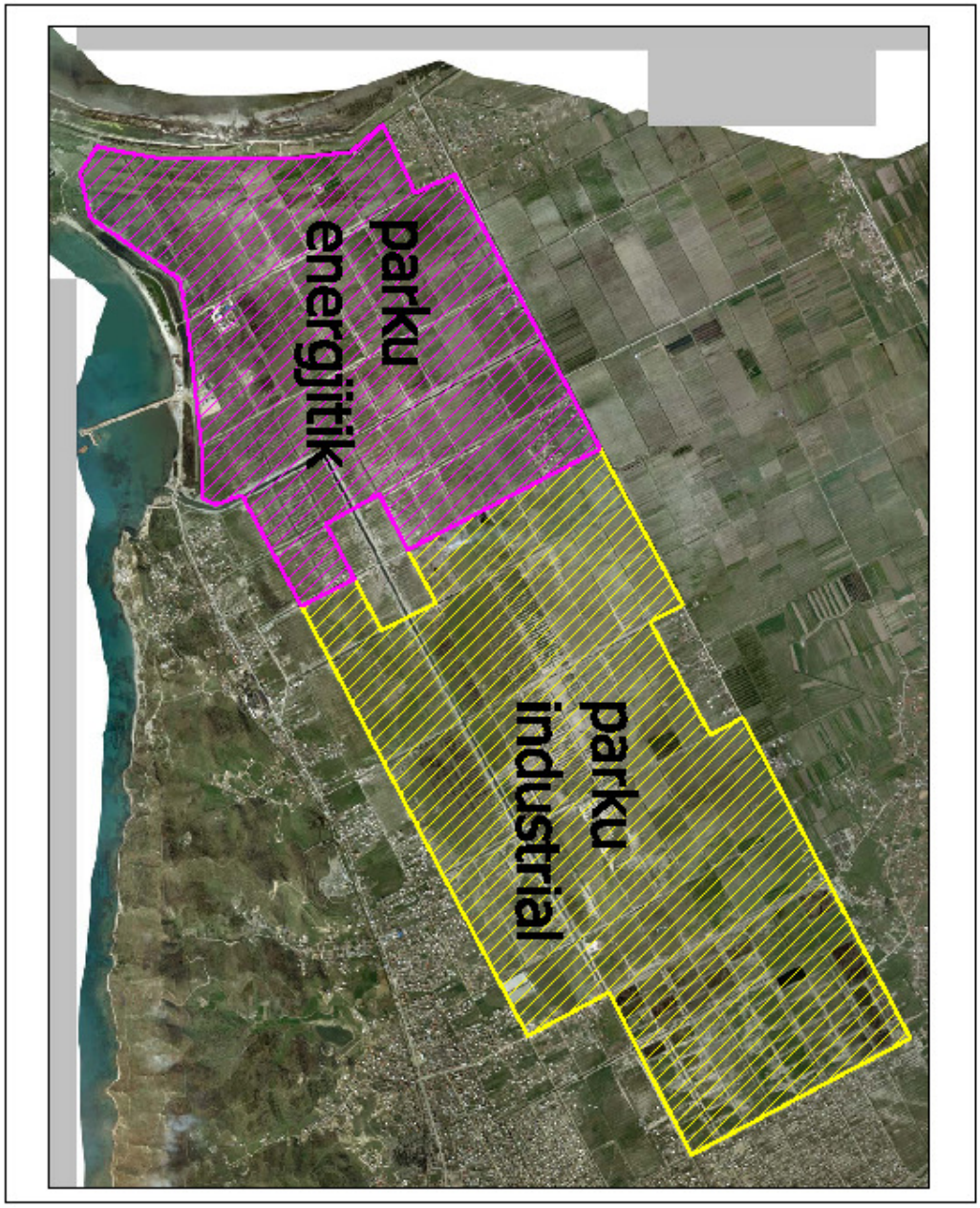
The study area is situated between the drainage channel bordering the settlement along the main road from the suburban town of Spitalle to Porto Romano at the West, and the road from Durres passing the suburban town of Vrinasi to Rinia to the East. The Northern border is primarily the ditch leading to the Bay of Lalzit, while the Southern border consists partly of the Southern perimeter of the abandoned fish hatchery, where the new wetland waste water treatment plant is currently under development, and the road from Spitalle to Vrinasi. The border between the Energetic and Industrial parks follow the road leading from the former pesticide factory towards Qerret-Fllaka. This is illustrated in the aerial photograph below.

The borders of the study area thus follow existing boundaries, with the exception of some small areas, excluded from the development sites because of established settlements. Indeed, areas excluded for such settlements also allow for their further expansion.

The purpose of the present study is to identify and analyse the potential environmental impacts, both negative and positive, of the construction of the proposed parks acknowledging what is currently planned for development within them.

The Energetic and Industrial Park at Spitalle north of Durres:

shtojce 1
plan-vendosja e Parkut Industrial, spitalle Durres



2 Legislative and Institutional Framework

The legal framework for the study comprises both Albanian national legislation and international environmental conventions to which Albania is party.

The most important and pertinent international conventions are as follows:

- Convention of Bern (CH) "For the Protection of Wild Flora and Fauna and Natural Environments in Europe", ratified by Albanian Law No. 8690, on 2 March 1998;
- Barcelona Convention "For the Protection of the Mediterranean Coastal and Marine Environment" and its protocols;
- Bonn Convention "On the Protection of Wild Migratory Fauna";
- Vienna Convention "On the Control of Boundary Passing of Hazardous Wastes and their Extermination". Ratified with Albanian Law No. 8216, on 13 April 1997;
- Vienna Convention "On the Protection of Ozone layer" and Montreal Protocol "On Substances Damaging the Ozone Layer";
- Aarhus Convention "On the Public's Right to be Informed, to Participate in Decision-making and to Approach the Court for Environmental Issues". Ratified with Albanian Law No. 8672, on 26 October 2000;
- Espoo Convention "On Environmental Impact Assessment in International Cadre". 4 October 1991;
- United Nations Convention on Climatic Changes, October 1994;
- United Nations Convention on Biodiversity, January 1994; and
- United Nations "Convent against the Desert Extension in Arid Countries, especially in Africa". 27 April 2000.

EU Directives considered of particular relevance are as follows:

- Directive On the Quality of Bathing Water 160/1976;
- Directive 61/1996 on IPPC;
- Directive 271/1991 On Urban Waste Water Treatment
- Directive 43/1992 On the Conservation of Natural Habitats and of Wild Fauna and Flora
- Directive 11/1997 On Environmental Impact Assessment;
- Directive 49/1997 On Protection of Birds
- Directive 31/1999 On Landfill (as amended);
- Air Quality Framework Directive 61/1999, with supporting directives 99/30/EC, 2000/69/EC, 2002/3/EC and 96/62/EC;
- Water Framework Directive 60/2000 (as amended), to be replaced in 2008 with new WF Directive 2;
- Directive 76/2000 On Waste Incineration (as amended);
- Directive 42/2001 On Assessment of the Impact of Plans and Programmes on the Environment;
- Directive 166/2006 On E-PRTR (as amended); and
- Seveso Directives 1 and 2.

Relevant Albanian environmental legislation is centred on Law No. 8934/2002 On Environmental Protection, as well as a series of laws approved in 1993.

Further Albanian laws and decisions of the Council of Ministers (DCM) are as follows:

- Law 7501/1991 On Land (as amended);
- Law 7623/1992 On Forests and the Forest Service Police;
- Decision 228/1992 On Protection of the Urban Environment from Pollution and Damage;
- Law 7665/1993 On Development of Areas with Tourism Priorities;

- Decision 88/1993 On Approval of Areas with Tourism Development Priorities;
- Decision 420/1993 On General Approval of the Agreement for the Program of Integrated Administration of the Coastal Area in Albania;
- Decision 599/1993 On the Establishment of Regional Agencies for the Protection of the Environment in the Prefectures;
- Decision 26/1994 On Hazardous Waste and Residues;
- Law 7917/1995 On Pastures and Meadows;
- Law 8093/1996 On Water Reserves;
- Law 8094/1996 On Public Removal of Solid Waste;
- Law 8102/1996 On the Regulatory Framework for the Water Supply Sector and Removal and Treatment of Polluted Waters;
- Decision 102/1996 On General Approval of the Strategy for the Implementation of the Project of Environmental Evaluation through Implementation of the Forestry Project;
- Law 8302/1998 On Administration of the Forest and Pasture Income as Public Property;
- Law 8405/1998 On Urban Planning (as amended);
- Decision 145/1998 On Hygiene-sanitary Regulations for Analysis of Drinking Water Quality and Design, Construction and Monitoring of Drinking Water Supply Systems;
- Instruction 1998 On Environmental Information Provision. The Public Right to be Informed;
- Law 8053/1999 On the Right to be Informed of Official Documents;
- Law 8652/2000 On the Organization and Functioning of Local Governments;
- Law 8897/2002 On Protection of Air from Pollution;
- Law 8905/2002 On Protection of the Marine Environment from Pollution and Deterioration;
- Law 8906/2002 On Protected Areas;
- Decision 103/2002 On Environment Monitoring in the Republic of Albania;
- Decision 364/2002 On Approval of the Administrative Plan for the Coastal Area;
- Decision 435/2002 On Approval of Norms for Air Discharge in the Republic of Albania;
- Decision 676/2002 On Determination as Protected Areas of Albanian Nature Monuments;
- Law 8990/2003 On Environmental Impact Assessment EIA;
- Law 9010/2003 On Environmental Treatment of Solid Waste;
- Law 9108/2003 On Chemical Substances and Preparations;
- Law 9115/ 2003 On Environmental Treatment of Polluted Waters;
- Decision 2003 On Temporary Norms for Air Discharge and their Implementation;
- Decision 249/2003 On Approval of the Documentation Necessary for Environmental Licensing and of the Components of the Environmental License;
- Decision 266/2003 On Protected Areas Administration;
- Decision 267/2003 On Procedures for the Proposal and Determination of Protected Areas and Buffer Zones;
- Decision 268/2003 On Certification of Specialists for Evaluation of Environmental Impact and Environmental Auditing;
- Decision 805/2003 On the List of Activities that have Impacts on the Environment for which Environmental Permits are Required;
- Law 2004 On Protection of Soil;
- Law 9298/2004 On Ratification of the Concession agreement of BOT type, for Construction and Exploitation of an Oil and its Products Pipeline in the Coastal Area of Porto Romano;
- Regulation 1/2004 On Participation of the Public in the Process of Environmental Impact Assessment;
- Law 9482/2006 On Legalization, Urbanization and Integration of Illegal Buildings;
- Decision On the List of Local Environmental Permits and the Mandate of Regional Environmental Agencies to Approve such Permits; and
- General Guidelines for the Preparation and Reviewing of Environmental Impact Assessments 2004.

Albanian environmental quality standards considered most relevant for the study's objectives are those relating to wastewater discharges (DCM of 01.04.2005) and drinking water standards (DCM No. 145 of 26.02.1998).

While national environmental policy and enforcement lies with the Ministry of Environment in Tirana, regional environmental agencies are the environmental enforcement institutions at the regional and local levels.

In accordance with applicable legislation and Ordinance No. 6 On the Methodology for the Preliminary Evaluation of the Environmental Impact Assessment of Activities, issued on December 27, 2006, an in depth EIA was carried out for the Project.

3 Project Description

3.1 Background

The Albanian Government has decided to designate the study area as an 'Economic Zone' comprising an Energy Park and an Industrial Park, with the development to be overseen by METE. UNDP is supporting the development by financing a Rapid Environmental Assessment (REA) of the proposals to inform the decision-making and planning processes.

3.2 Project Approach

UNDP contracted UK-based international development consultants Landell Mills (LML), which has considerable experience in strategic planning in Albania to deploy a team of international and Albanian experts to deliver the REA.

That team is required to produce a report to:

1. Provide an overview o f the current state of the environment, including:
    a. the current state of the environment at the Industrial and Energetic Parks (including health and social aspects) and the likely evolution thereof without an implementation of the proposed parks, taking into account the current state of development of the area;
    b. highlight the current state of the environment (including health and social aspects) within the parks that are likely to be significantly affected by the development of the parks;
    c. highlight any existing environmental problems which may have implications on the use of the land of the parks; and
    d. environmental instruments, obligations and regulations established at international, national and other levels that are relevant for the development of the Industrial and Energetic Parks;

2. Identify the environmental risks inherent in the development of the parks and suggest mitigation measures. In doing so:
    a. consider possible impacts on the population residing in the area, as well as others who own properties in the area and those who visit the area;
    b. consider strategic locations for different forms of economic activities in the parks that take account of their compatibility with the surrounding human settlements, which would assist future decisions on strategic land-use;
    c. consider:
        - reasonable opportunities for expansion and growth of settlements inside of and adjacent to the area;
        - facilities for the production, transportation and storage of goods;
        - potential needs for additional layers of gravel and other construction materials to raise the ground level of the flood-prone areas of the Parks;
        - areas that may require limited or no vehicular access;
    d. consider other possible impacts on air quality, human health, climatic factors; and
    e. propose indicators to measure and monitor the changes that the development may cause on the environment.

4 Baseline Data

4.1 Introduction

This Chapter provides and overview of the available baseline data for the study area including environmental and socio-economic data as well as some additional remarks on archaeological issues.

A brief introduction to the Porto Romano site is provided in this paragraph as an introduction to the environmental details on the area and their surroundings. Further information on the area is given in section 1.

The study area is laying between drainage channel bordering the settlement along the main road going from the suburban city of Spitalla to Porto Romano at the West, and the road from Durres passing by the suburban city of Vrinasi to Rinia to the East. The Northern border is mainly the ditch to the Bay of Lalzit, while the Southern border consist partly of the Southern border of the abandoned fish hatchery (where now the new wetland waste water treatment plant is being established) and the road from Spitalle to Vrinasi. The border between the energetic park and the industrial park follow the road leading from the former pesticide factory towards the Qerret-Fllaka area.

The area borders are following these "natural" borders, with the exception of some small areas left out because of already established settlements, even giving room for further extension of these.

A picture showing the area is given in section 1.

The main parts of the area consist of old sea-bottom (lagoon), turmed into salin-brackish swamp (the Durres Marsh) by natural processes, and finally drained during the communist area into mainly grassland for stockbreeding.

The areas are characterized by a network of drainage channels, with the main channels leading to the pumping stations running in the western part of the area. The main altitude of the areas 1.4 m a.s.l. with some part even under sea level down to -0.8 m. The area is loosing elevation over sea level with a velocity of about 1 cm/year. This calls for both effective drainage systems and for land profiling.

4.2 Geology and Hydrology

General Geologic Features

The area of Durrës belongs to the so called Ionian Geological-Tectonic Zone, which is characterized by the thick sedimentary deposits dating from the Low Triassic age. The central western parts of the Ionian Zone consists the Pre-Adriatic Depression, which includes also the wide Durrës area. The Pre-Adriatic Depression is characterized of some hilly chains which represents the anticlines and some flat areas which represent the synclines. This depression is filled up mainly of Neogene sediments consisting of clay, marls, conglomerate and sandstone often formed as flysch deposits.

Two significant geologic structures are identified in the area of investigation; the Durrës anticline and Spitalla syncline related to the Durrës hills and to the Durrës plain respectively.

An active longitudinal tectonic fault separates both structures and is responsible for the high seismological activity in the area. The expected maximum earthquake risk is set to 6.5-7.0 on the open Richter scale. However, at particular geotechnical, hydro-geological and geomorphologic conditions the basic earthquake intensity given is recommended to be increased with one degree. This is related to the areas constituted mainly by Quaternary unstable deposits like sands, fine sands and/or clay with shallow groundwater (less than 5 m below ground surface). That means that to the seismic intensity of up to 8 degrees (probability = 0.01) should be added one more degree. Hence, susceptible constructions are recommended to be performed for the earthquake intensity of 9 degrees o the open Richter scale MSK-64.

The Durrës anticline is constructed of Miocene formations and of Pliocene deposits which steeply deep to the east with angles of about 60 to 70°.
Miocene deposits are represented of Mesinian molasses (Albanian "N13m") and outcrop in the western side of Durrës hills, as well as in Bishti Palles hills. They consist of clay, siltstone, sandstone and and some gypsum and their total thickness is about 3000 m. These structures fall beside the actual area.

Helmesi Formation (Albanian "N21h") is the local name of the lower part of the Pliocene. They constitute most of central and eastern part of the Durrës hills and are separated on three horizons; the lower horizon (Albanian "N21h(a)") comprised of sandstone, conglomerate and clay, the middle horizon (Albanian "N21h(b)") and the upper horizon (Albanian "N21h(c)") constituted mainly of clay with some sandstone lenses. The total thickness of Helmesi Formation is about 1200-1300 m.

Thin Quaternary deposits represented mainly of diluvia sandy clay deposits, which maximal thickness is about 3.0 m, cover the old rocks of Durrës hills.

Spitalla syncline is filled up by Pliocene and Quaternary deposits. Pliocene deposits mainly represented of Helmesi Formation (Albanian "N21h") underlay the Quaternary ones throughout the Spitalla plain. As many deep water wells drilled in Spitalla plain testify, at depths of about 130 m to 260 m below groundwater surface, thick conglomerate layers up to 30 m separated by clay are tapped.

The Quaternary deposits, of old and recent Holocene fill up the wide Spitalla syncline. These deposits are of different genesis, like alluvial, marsh deposits and marine deposits. The total maximal thickness of Quaternary deposits in Spitalla syncline (plain) is about 130 m.

Alluvial deposits (Albanian "alQh") overlay on the Helmesi Formation deposits and at most of the Spitalla Syncline (plain) are tapped at depths below 50-60 m. They are represented of intercalations of gravel, sand, clayey sand and clay. Their maximal thickness is about 70 m; but the thickness of the gravel layers vary from 1-2 m to about 20 m.

Above the alluvial deposits lay the recent Holocene lagoon deposits (Albanian "lQ4h2"), which outcrop on the Spitall plain (ex Durrës Marsh). They consists mainly of fine grained sediments like clay, clayey loam, sand and organic matter. Their maximal thickness in the center of the former Durrës marsh (Spitalla plain) is about 50 m.

Recent Holocene marine deposits (Albanian "dQ4h2"), are developed along the Porto Roman Beach and Lalzy Bay. They are represented of sandy and sandy clay deposits which maximal thickness is about 20 m.

General Hydro-geologic Features

In hydro-geological terms, the area of investigation has scarce water resources and there are no perennially flowing rivers. The current lowlands used to be a marsh with temporary transgressions of the Adriatic Sea. Alter the construction of the road from Porto Romano to Bishti e Palles, the Durrës marsh was cut off from marine influence due to the damming effect of the road. The natural interchange between the marsh and the Adriatic Sea could no longer take place and the natural balance was interrupted.

The current lowlands were reclaimed in 1980's when an artificial drainage channel and a network of secondary drainage channels were constructed to lead the seasonal rain water (and waste water) from Durrës to the sea. The flow in the secondary drainage channels and main channel is driven by the Pumping station north of Porto Romano with 2 very voluminous pumps. A measured flow velocity during the centre part of the main channel was around 0.2 m/s.

Further, at the Northern part of the area, is another big pumping station discharging to the Bay of Lalzit. If this pumping station is still functioning is a little unclear.

The groundwater flows from the secondary reservoir are to the two sea parts. The groundwater is of relatively bad quality, mainly caused big high (1-2 %) Magnesium/Sodium/Sulphate/Chloride content, and pollution infiltrating from the surrounding cites waste water discharges and the big municipal waste deposits, though the general permeability of the upper clay layer covering the major part of the area are relatively low. The high salt content of the groundwater should be taken into consideration when constructing, being aggressive to normal concrete formulations.

The geological and hydro-geological data presented are mainly taken from the comprehensive analysis presented in Pranvera Dolke, 2008.

4.3 Air

There are no stations adequate for covering the situation in the area inherent in the Albanian Integrated Environmental Monitoring programme. In the permits given for some of the industrial interprices in the Energetic park is even demands on air monitoring activities, but it has not been possible to acquire any updated monitoring data from these measurements.

In connection with the construction of the Service Jelly and some of the Oil deposits was performed some measurements of selected air quality parameters:

	PM10	CO	SO_2	NO_2	H_2S	C_nH_m
Site 1 (Beach)	0.4	<0.5	<0.1	<0.1		
Site 2 (Beach - Jelly)[1]	10.8	5.1	0.8	2.3		
Site 3 (Oil tank area)	0.18	<0.5			0.8	140
Site 4 (Oil tank area)	0.16	<0.5			0.6	120
Site 5 (Oil tank area)	0.14	<0.5			0.6	160
Norms AL-VKM 435	50	100	60	50	10	300
Norms AL-VKM 803	0.25	10	0.12	0.2		

Concentrations in mg/m^3

1) Measurements during the construction of the service Jelly made at the road at the Jelly damn– influence of heavy traffic.

The Albanian norm figure refers to the norms for emission to the air (VKM No. 435, date 12.09.2002) and the norms for urban air quality (VKM No. 803, date 04.12.2003) respectively. It can be seen, that construction work like construction of the service jelly cause elevated figures, partly extending the norms. But the good air shift at the sea even contrived that the influence only was on point source character.

Unfortunately, there seems to be no measurements around the heaviest contributer to air pollution in the area, the un-controlled burning at the municipal waste deposit South of the border road between the Energetic and the Industrial area. Judging from our observations in the field, and form experiences with similar incidents this causes emissions of high concentrations of a.o. highly cancerogenic polyaromatic hydrocarbons like benz(a)pyrene and chlorinated aromatic compounds like polychlorinated dioxins and – furans.

Noise

No specific monitoring results on the environmental noise are available for the area. There are no significant point sources of noise emissions. Vehicular traffic and associated noise emissions are associated mainly with the local road connecting Porto Romano and the Energetic park to Durrës, and the traffic connected with the municipal waste landfill.

4.4 Surface Soil

The surface soil in the area consists mainly of fine grained sediments like clay, clayey loam, sand and organic matter. Their maximal thickness in the centre of the area is about 50 m.

There are no stations adequate for covering the situation in the area inherent in the Albanian Integrated Environmental Monitoring programme, and there seems to be no measurements of the chemical composition of the soil and possible pollution with substances of relevance to the project. The soil in the major part of the area is rather saline, and possible even polluted from the frequent flooding with a.o. wastewater.

The main use of the soil in the area is as pasture, only a minor part is used for different crops, mainly for self supply with vegetables and foodstuffs for the domestic animals.

An increasing part of the best soils (read: the most dry ones) is now being used for construction of illegal houses.

4.5 Surface Water

Water resources in Porto Romano - Bishti Palles as well as all in the Durrës are scarce, both considering surface and groundwater resources. No natural surface water course is located in the studied area. The only surface water bodies are the drainage channels of Durrës plain that were constructed with the amelioration of the area around 25 years ago. Due to the limited natural slope of the plain, that was the natural cause of the presence of marshlands, a huge pumping station was installed in the northern edge of Durrës Hills in order to force the flow of the channels into the Adriatic Sea. The huge open drainage system was constructed for the reclamation of the former Durrës Marsh, but is now even collecting the waste water of Durrës City. The flow direction in the main channel is in the southern part of the area to the Porto Romano pumping station, from the Northern part to the pumping station at Lalzit bay.

The central part of the Durrës plain is flooded during heavy rains, and in particular, when especially the Porto Romano pumping station accidentally stops pumping. The area where the especially the Industrial park is foreseen, but even at the North-Western part of the Energetic park area is characterized by frequent presence of stagnant water, probably linked with backwater phenomenon of rain water and/or run-off of surface water from the outside areas, and the malfunctioning of pumping activity from the pumping station at Lalzet bay, caused by general bad maintenance of the pumping stations, and by power breaks.

4.6 Biodiversity

The dominant habitats of the area are salty wet-lands on clay and drainage channels; in especially the northern part even salty and sandy soils. According to this and to the use of the main part of the area for grazing, the sparse vegetation of a typical marsh flora is limited to halophytic grasses and *Myricaria germanica*, and, on drier soils, vegetation with *Trifolium*, *Silene*, *Hordeum* and *Poa* species. The drainage channels are frequently covered with *Lemna* sp., and the vegetation along them consist of species like *Phragmites*, *Typha* and *Scirpus*. This area is even characterized by the presence of *Tamarix* sp., which is very resistant to humidity and salinity. This offers a shelter to *Egreta garzeta*, that is occasionally observed in the area.

A considerably richer vegetation is to be found in the settlement areas where excavation material from other areas has been used to improve the soil quality. But this vegetation is to a great extend not natural for area, but consist of anthropochoric species like *Urtica* and *Datura* sp. and other ruderat plants.

The fauna is mainly composed of reptiles and amphibians (turtles, snakes and frogs (*Rana dalmatica*). Small mammals are most frequently found in the bordering areas of the wetlands and in the more elevated dam paths. Snails are frequently found in the sparse vegetation. In the immediate project area the bird population is neither rich in number nor in species, which is basically due to the lack vegetation.

The beach outside the prospected area is very narrow in this portion of the coast and as a consequence the littoral vegetation and habitat is not significantly developed. This habitat is even threathened by the illegal settlements.

The sea areas around the prospected areas are heavenly influenced by the effluent of wastewater from the the drainage channel. Amongthe drifts on the bach *Ulva* is dominant, showing eutrophication of the sea water. *Poseidonia* seems not to be present in the area, even indicating eutrophication.

During a specific investigation programme which was carried out in the area of the outflow of the main drainage channel, that discharges the water pumped from the Durrës plain into the Adriatic Sea the absence of mussels was reported. Sampling made in the nearby beach showed the presence of endobenthonic mussels. Moreover shells and remains from crinoids (sea urchins, starfishes), crabs and snails collected at the beach near the pumping station prove that the species populating the area are typical of the Mediterranean autochthonous fauna.

4.7 Socio-Economic Data

Demographic data

In the last decade, Durres area has experienced a fast and uncontrolled population growth, mostly by immigration of people from northern Albania (especially from Tropoja and Merdita

regions) and other regions looking for work and income. Currently some 5,000 to 7,000 people have settled on the flanks of Durrës hills and on Durrës plain. No recent and actual population data are available for the area of Porto Romano since a large portion of the settlements there is reportedly unregistered.

An estimation of Porto Romano population was carried out in the Feasibility Study for the parks, based on figures from 2003:

Total 2,384
Children (age 0-1) 35
Children (age 1-14) 115
Adults 2,234

The data were calculated based on the number of houses observed on satellite images combined with an average number of inhabitants per house and age data, collected through a population survey on 86 households with 473 persons.

Beside the villagers mentioned there is also a significant number of people (primarily from the Roma minority) scavenging on the waste dump. It is unclear whether these people are also inhabiting the area.

A relatively big part of the local population are consisting of un-skilled labours, and especially the primarily construction works will offer good possibilities for employment of this segment. However, it could in the planning of the character of the enterprises be recognized that even this kind of labours could serve, and could be further educated. Even it could be planned to place enterprises with special affinity to the females, to assist in the gender policy in the area.

Demand for Jobs

Taking into account projections based on the 2001 Census, there could be up to 21,000 unemployed in Durres city and the Keneta informal settlements and a further 9,000 in neighbouring communes, small municipalities and the Durres beach area, bringing the total to approximately 30,000 unemployed in the region out of a total working age population of approximately 100,000.

The projected growth of 60,000 in the city's catchment area will probably mean it needs another 25,000 to 30,000 jobs over the next twenty years and a 2% annual improvement in productivity could reduce employment in existing enterprises by another 15,000 jobs by 2027.

All in all, the city and its nearby communes probably need to create 50,000 jobs in the next 20 years. The majority of these will be in retailing and services in the city centre and in residential areas, plus some within older established industrial areas. A good working estimate is that between 15,000 and 25,000 jobs could usefully be needed in the Spitalle site.

Health issues

The Ministry of Environment, Forests and Water Administration of Albania undertook a research project to evaluate the effects of the pollution on the on Public Health at Porto Romano, to define recommendations for preventing a further deterioration and for curing the affected people.

The overall conclusion of the report s that the findings confirmed that many inhabitants of the Porto Romano community suffer from the consequences of environmental pollution, however this particularly applies to the inhabitants of the immediate surroundings of the former industrial facilities. But even the wild burning from the uncontrolled waste deposit as well as the use and contact with the untreated wastewater in the surface water sites in the areas are though to contribute to the overall bad health situation in the area.

Even the report recommended that the water from wells in the area should not be used as drinking water for the residents nor for the household.

4.8 Waste

As mentioned, there is operating a municipal waste dump of approximately 15 ha size at the road bordering the Energetic park towards the Industrial park, going from Porto Romano to town of Qerret-Fllaka. This operation was approved by the Durres Prefecture in 1998, though limited to the size of 5 ha only. Waste dumping is indiscriminate and includes toxic chemical wastes of trades, waste oil, furnace dross and foundry wastes etc. No attempts of grading, compaction and sealing of refuse layers are made. The total volume of wastes comes to some 500,000 t, and wild burnings and scavenging are immense.

The municipalities of Durres and of Tirana are planning to commission a study on the joint treatment and disposal of urban wastes, in 2009. This project may result in a respective joint venture project for improved waste management, in 2011. In this connection, the urgency of a system for controlled management of special and toxic wastes must be emphasized. A sizeable abandoned waste dump was noted on both banks of the Main Drainage Channel, south of the bridge of the Vrinasi-Spitalla Road.

At the fish ponds, chicken excreta are dumped at large scale in one of the dried up ponds. Workers employed at this site claimed that this was an authorised operation. At the Durres Municipality, nobody was informed of these highly unsanitary activities.

Contractors use to dump demolition rubble and excavated earth along all road sections without frontage to residential plots. These spoil heaps are subsequently also used for illegal dumping of all kinds of wastes.

At Porto Romano, an old factory existed, which produced Lindan for pesticides. Production has been terminated and the plant closed down. However, field research in 2007 showed that this plant used to dump highly toxic wastes at three sites along the Spitalla-Porto Romano Road, i.e. outside the area designated for industrial development. These toxic dumps have been identified and will be remediated, in near future. A problem connected with this remediation (as set-up in ERM and SWS srl., 2008) is that obviously it don't take into account the possibility for the dispersion of super toxic persistent process malfunction products like polychlorinated dioxins and – furans to the area.

4.9 Archaeology

In the hilly area west of the area in question are several archaeological monuments (Illyrian-Roman), but it is anticipated that the actual constructions will not embarrass these interests.

5 Environmental Impacts

5.1 Air

Traffic and construction works

Overall for the area is to mention, that the functioning of the area will give rise to a increased traffic, partly with heavy trucks, and even with emissions from different machineries during the construction of the parks.

By far the major part of the engines will be diesel machines, and caused by the bad diesel quality and the average quality of the motors, the emissions can relatively high. The pollutants of interest will be:

- $PM_{10}/PM_{2.5}$
- O_3
- NO_x
- SO_2
- CO
- Benzene
- Lower Aliphatic hydrocarbons
- Polycyclic Aromatic Hydrocarbons (PAH)
- Lead

Even the noise level will be elevated, and it could be anticipated to try to concentrate at least the heavy traffic to the eastern road system to diminish the impacts on the dense populated areas at the western road system. It is even to be anticipated that the different efforts of the Albanian government to diminish the emissions from the car park will positively influence on the emissions.

Further, the situations near the sea will as mentioned even to a great extend lead to a rapid exchange of the air.

However, the situation should be followed by setting up an air monitoring system for diffuse pollution for the area.

Energetic park

The impact on air quality from the energetic park can derive from:

- The thermal power-plant
- The oil installations
- The gas installations

The impact from the *thermal power plant* depends to some extend on the type of the plant. In the present situation, the following four main types can be anticipated:

1. Gas heated power plant (P1)
2. Oil heated power plant (P2)
3. Coal heated traditional power plant (P3)
4. Oil or gas fire assisted, with burning chamber for solid waste/bio-mass (P4)

For all the different types, the following emissions of toxic compounds can be anticipated, although at different ratios:

- $PM_{10}/PM_{2.5}$ – Particulate matter less than 10 rsp. 2.5 µm
- O_3 - Ozone
- NO_x – Nitrogen oxides
- SO_2 – Sulphure dioxide
- CO – Carbon monooxide
- Benzene
- Polycyclic Aromatic Hydrocarbons (PAH)
- Polychlorinated dibenzo-p,p-dioxins and – dibenzofurans (Dioxin)
- Elements (As, Cd, Cr, Cu, Hg, Ni, Pb, Zn)

P1 emittes relatively less of the strong cancerogenes $PM_{10}/PM_{2.5}$, Benzene, PAH and Dioxins than the other types, but on the other hand higher amounts of NO_x. Produce small fly ash amounts, and requires little man-power for operation. However, gas is a rather valuable fuel to be used alone in a power plant, but can be at least partly supplied from national sources (?).

P2 is in the middle range with respect to emissions, and this goes even, together with P1, with respect to emission of greenhouse/ozone depleting gases, although P1 can give raise to higher emissions caused by possible emissions of NO_x. With respect to the emission of especially Benzene, P2 normally have the highest values. Produce relatively small fly ash amounts, and requires little man-power for operation. However, oil is a rather valuable fuel to be used alone in a power plant, but can be at least partly supplied from national sources.

P3 is in the upper range with respect to emissions, especially regarding emissions of PAH. Furthermore, it is the worst emitter of greenhouse gases (CO_2), produces relatively high fly ash amounts, and is rather labour demanding. However, coal is a relatively cheap fuel if the transport can be made by ships, but have to be imported.

The fly ash produced can even be recognized as a resource, used as landfill for e.g. road construction, or in cement production. However, both with respect to the storage of fly ash and the storage of coal special measures have to be taken to avoid dust to be blown over the area.

P4 is in many ways an interesting plant, assisting in solving some of the problems connected with the establishment of the parks, and even with the feature of reducing the net-production of greenhouse gases (CO_2). Beside being acting as a municipal waste incinerator for the bigger Durres area, and thus solving the major part of the problems described in section 4.8 by turning the waste into a resource, it can even use the net-biomass production (that have to be removed) from the constructed wet-land as bio-fuel. The waste burning can be supplied with a sorting of the waste for re-use of different fractions. However, with a design capacity at 250-500 MW the plant should be provided with assisting heating capacity from either gas or oil. The emissions from this type of plant are high with respect to all parameters, and it is, especially if combined with the waste sorting, rather labour intensive.

Nevertheless, if the plants are designed with proper flue gas cleaning methodologies and proper fuel and fly ash storage following EU standards, the problems with the emissions can be effectively solved for all the four types of plants. And with the P4 even the severe pollution of the area from the wild burning waste deposit (recognizable even from the satellite photos) can be stopped, and thus probably moreover net-improve the air quality in the area.

5.2 Soil and Groundwater

The possible impact from the activities in the two parks on the quality of the soil and groundwater is actually mainly positive, especially if effective measures are taken for avoiding air deposition from the different interprices.

The main possible negative impact from the activities in the areas will – besides a possible air deposition of toxic substances from especially the thermal power plant - be spill of oil and chemicals from stores at the different interprices. It is not for yet possible to forecast what kind of chemicals could be the risk, but this has to be taken into account in the permits given to the single interprice. In this connection, it is strictly necessary to take the risk for tectonic events as described in section 4.2 into consideration.

The prospected elevation of part of the area with soil from other areas will, presuming this soil is of proper quality, even improve the quality of the salty and partly polluted upper soil layer.

As mentioned in section 4.2 is the permeability of the upper 20 - 50 m surface layer very small, and no infiltration to either of the groundwater reservoir seems imaginable, even in a worst case scenario, However, the quality of the groundwater is so bad, that a possible impact will not have influence on the groundwater as a drinking water resource.

5.3 Surface Water

The possible impact from the activities in the two parks on the quality of the soil and groundwater is actually mainly positive, especially if effective measures are taken as planned with respect to the waste water treatment plant and the legal and illegal deposit of waste directly in connection with the surface water.

The main possible negative impact from the activities in the areas will – besides a possible run off of toxic substances from especially the fly ash and fuel deposits at the thermal power plant - be run off's from spill of oil and chemicals from stores at the different interprices. It is for yet not possible to forecast what kind of chemicals could be the risk, but this has to be taken into account in the permits given to the single interprice. In this connection, it is strictly necessary to take the risk for tectonic events as described in section 4.2 into consideration.
The drainage system should be properly managed, ad extended it to a landscape feature, involving even some constructed adjected ponds. These would improve the buffer capacity of the system, and even serve a clearing basins for the water from the constructed wetland. Further these measures will have a positive impact on both the scenery and the biodiversity of the area.
Further, it should be anticipate constructing separate systems for normal drainage run-off, and running off from the most trafficed roads in the area, to avoid pollution of the main surface water bodies with traffic related pollutants as mention in section 5.1.

For the safeguard of a good water quality in the area, it is even important to avoid flooding/infiltration with saline water from the outer environment.

The cooling water from the thermal power plant could serve for the establishing of greeneries in preferable the north-eastern part of the Energetic park, and improve the labour situation near the settlement of Rinia.

5.4 Biodiversity

The area should at least partly be formed into a natural park shape, to make it attractive for especially companies in the service fields (like the proposed technology park in the south-western corner of the area), but even for other companies, and for the public in general.

This means that some of the channels should be curved, some small hills be formed, and the areas along the channel partly planted with natural bushes and trees (like *Nerium*, *Tamarix*, *Salix* and *Populus* species). At small island in between the buildings and surrounding lanes should even be grown natural plants for the area.

To mention in this connection is even that the establishing and maintenance of these areas will be very suitable working places for the present population in the area.

These measures together with the improved water and soil quality will both ensure a pleasant looking environment, and even improved over the time the biodiversity of the area.

The holds even for the surrounding marine areas, where it has been shown that there to some extend outside the area impacted by the wastewater still remains a auchtothon flora and fauna, so a new colonization of the impacted areas should be possible.

The relevant natural area identified closest to the project area is the Rrushkull. Protected Area located in the Lalzi Bay, 10 km north from the project area.

No interference of the proposed activities on this area is foreseen, however the improved water, air and biodiversity quality will even as described above will even beneficial for this area.

5.5 Socio-Economic Data

Employment Capacity of the Area

A modern industrial estate in Western Europe probably has 1 job for every 100 sq metres of factory floor space and a plot ratio (building cover) of 25%. Plot ratios tend to be higher - nearer 50% - in countries like Albania but the floor-space per worker in new premises is likely to be similar because the technology used is similar). Assuming approximately 20% of the available land is needed for roads, services and open space then, at a plot ratio of 50%, this means that there could, in Spitalle, be [(100 x 100) x (0.5)/100*0.8] 40 jobs for every hectare of available land (to help the lay person envisage a hectare it is the sites of a football pitch). This estimate could be halved for a high tech logistics centre/warehouse or a major capital intensive activity such as a refinery or power station i.e. for the Energetic Park – or even be much lower than this level. The industrial area could, however, be developed for service activities such as laboratories and offices (this is now the norm in western Europe and other regions where service centre employment dominates) where floor space per worker is generally much lower at 10 sq m per worker and site cover can be higher with multi-story buildings, perhaps even as high as 1600 jobs per hectare at 50% site cover with four storey offices.

Thus, the exact mix of used on the site will determine its employment capacity.

- the proposed 870 ha Energetic Park has the capacity to house 17,000 jobs; and
- the proposed 850 Industrial park is half capital intensive logistics and half typical light industry it could house 25,000 jobs; but

- if it was 1/3 logistics, 1/3 typical light industry and 1/3 service sector jobs in offices it could accommodate hundreds of thousands of jobs

Clearly, as a mix of just the Energetic Park and an Industrial Park for light industry and logistics/warehousing, Spitalle has a total capacity of about 40,000 jobs.

Therefore, the site has a theoretical capacity in advance of the twenty year demand forecast. This leaves three options:

1. use part of the site for uses other than employment such as residential, open-space or leisure;
2. expect it to continue to grow well beyond 2028; or
3. both of these.

In practice, being such large piece of land, its is likely that Spitalle would use the third of these options

However, we would suggest that new terminology is used and that the concept of an employment area is defined broadly for the development of the site.

By the phrase 'new terminology' we suggest that what has been referred to to date as an Industrial park' should be renamed a 'Business Park'. Industrial parks or industrial estates were developed from the 1930s to 1980s and this nomenclature was associated with unpleasant heavy industry. Modern international investors tend not to build large smoke belching factories and therefore do not want to invest where such factories exist or where the name implies that is what their neighbours will be like. The phrase 'business park' has become the prevalent name for a large modern employment area populated with pleasant looking if somewhat bulky clean modern factories and offices. International investors locate in 'business parks' and that is what this area should be called.

The ToRs for this study described the government's proposals for the area as an 'economic zone'. This basically means that idea is for it to be a location for employment. But in many cities the biggest employers may be a stadium/sports complex or a university or a major hospital - sometimes with tens of thousands of jobs in them. In urban planning or land-use definitions these are seen as universities, hospitals or public services zones yet they are employers. For this reason we suggest broadening the activities that would be allowed in the site to include such large employers even if they are not 'industrial'. The SIDTDR study proposed that a few large single user sites of at least 30 hectares be found in the Tirana/Durres region. These were minimum sizes and should preferably have expansion space. Two could be located in the Spitalle area.

Relationships with Adjacent Areas and Internal Sub-division of the Site

Industrial areas are traditionally seen as unpleasant neighbours full of noisy, smelly activities going on in large dirty buildings with heavy lorries and workers coming in and out at all hours and needing 24 hour security and lighting and a risk of explosions and leakages of dangerous substances. The modern reality is often much better with factory buildings being well designed and quiet and offices that do not have many of the negatives but in an ideal world such employment accommodation would be separated from residential areas. For this reason we suggest that, unless Durres is or becomes short of land for residential development, the Spitalle area is used only for employment purposes.

More than this we suggest that the Spitalle site is developed in 'blocks' that form 'neighbourhoods' or areas for a particular type of use. Blocks would allow detailed phasing

and release of land over time. Neighbourhoods would allow land uses to be kept together or separated as need be and clever phasing of blocks would allow neighbourhoods to expand or contract if demand I greater or lower than forecast by switching blocks from one land use or neighbourhood to an adjacent one (see below for more precise proposals). Blocks should therefore be of about 25-50 hectares, typically housing jobs for around 1000 workers.

Then each 'neighbourhood' could be surrounded by green buffer zones that would protect views in from adjacent areas, which on the western, southern and eastern boundaries of Spitalle are residential. These areas should probably be 25 m wide for less intrusive or unpleasant neighbourhoods and 50m wide for more intrusive or unpleasant ones and the water treatment plant. They could be landscaped with mounds, trees and water features which could assist with surface water run-off and flood control and provide adjacent areas with open space, children's play areas and sports facilities and the region with small local sites for the conservation of species maintenance of bio-diversity. Many modern business parks have 'trim tracks' where workers can jog and do exercises and balancing reservoirs complete with fountains as landscape attractions (this enhances developers land values and usually attracts expensive overlooking offices developments).Thus, the business park could improve the amenities for local residents if local footpaths were developed to give access to these buffer zones. This effect would be doubled if a university, a hospital or a major sporting stadium were developed in the business park using the wider definition of employment area suggested above. The presence of considerable surface water channels would allow these buffer zones to be designed with water features. It follows that the use of these buffer zones will reduce the usable are of the site but it should still be able to accommodate over 30,000 jobs and satisfy all likely demand for over a quarter of a century, which is a very distant planning horizon for such a proposal (with 10-15 years being the norm)

Finally, large modern business parks create their own demand for services: banks< cleaning and security companies, restaurants, dentists, fire station, police station, even shops, hotels and health clinics. Modern commercial centres for such uses are integral parts of the initial designs for such business parks. Spitalle is large enough to need at least one such centre. Carefully located, it could also improve access to services and facilities for local residents.

Internal Zoning

From the above it is possible to identify a range of different neighbourhoods for the entire Spitalle development. The locations for each of these should probably be based on the following criteria:

1. heavy industry or potentially dirty or dangerous uses should be to the north of the site, away from the city and its more recent residential developments;
2. any commercial centre should be near the centre of the whole area;
3. activities such as warehousing or logistics should be close to the main access points to the site to reduce traffic movements;
4. one large single user site should be kept in reserve, and then eventually used as needed, in the south eastern corner of the site;
5. another large single user site should be kept in reserve, and then eventually used as needed, in a central part of the site;
6. the larger the buildings likely to be needed the further north and away from Durres they should be sited unless they have specific needs that counter this criterion.

We would suggest that the following zones or 'neighbourhoods' be set up within the Spitalle area:

1. Energetic Park - the top north west corner as currently designated for an energetic park for energy production (power station), fuel storage (gas tanks, distribution centre), fuel processing (refinery) and possibly an electricity producing rubbish incinerator for the Tirana-Durres region;
2. a heavy industry/heavy electricity using industries zone within the currently proposed Energetic Park's eastern half (the exact boundaries between this and the above zone could be flexible);
3. light industry south of the above comprising a band across the site's east-west dimension;
4. a commercial zone in the centre with
5. large single user site 2 adjacent;
6. a mixed area for light industry and offices immediately south of the above
7. a 'Logistics Park' for large warehouses, freight depots and haulage companies in the south east corner of the site above the water treatment plan with good fast access to the Tirana-Durres highway to facilitate delivery of goods to Tirana-Durres and wider afield, including Kosovo;
8. a 'Technology Park' in the south west corner of the site for prestigious occupiers
9. above large single user site 1.

It would be good to show this on a map but I don't have one in software that allows this. Any chance you can either send me a usable base map or get one drawn on the basis of what I've said above.

Other issues

Industrial areas have two specific environmental consequences which need not be problematic if planned for but can be serious if not. They are:

1. Large amounts of surface water run off; and
2. Heavy traffic movements, especially large lorries at unusual peak hours.

Each is addressed below:

Surface water run off

Employment areas house large buildings that often have large car-parks. When it rains this means that the water does not soak into the ground over a period of time but runs off all at once, very quickly. Design of individual premises will normally include a drainage system that can cope. Outside the plot boundaries the entire employment area needs a drainage system that is also up to the job. A small special engineering study, that maximises use of the existing surface water channels, is suggested.

Heavy traffic movements

Employment areas also generate large traffic movements with high peaks. Simply imaging 40,000 workers arriving in a 90 minute period If half of them come by car (leaving half to come by bus, cycle ort on foot) at a rate of 1.4 persons per car, that means 9,500 vehicles an hour in that peak just from this source. Add in bicycles buses and lorries delivering to and from the factories and the figure will be around 10,000 vehicles an hour in total. These will be slow moving vehicles and the air pollution will be a problem. This will require the main access roads to Spitalle to be wide and allow fairly steady travel speeds not slow one with

much idling and preferably that access is dispersed to three or four such roads not all channelled down one. Planting to absorb pollution would also be useful.

Of even greater concern is the fact that heavy truck movements can be both numerous and concentrated, with potentially quite significant adverse environmental impacts in theory and, in the case of Spitalle's particular conditions, very much in practice. Modern factories hold minimum stock of supplies overnight and rely on just-in-time deliveries to keep their production lines running. However, this production technique tends to see smaller load delivered early in the morning for use throughout the day, producing a early morning peak. It is not so well known that just in-time also rules the timing of many deliveries of finished products. In the case of Spitalle many goods will be despatched very early in the morning to reach the shops, markets and building sites of Tirana and Durres for the start of business. The returning lorries may coincide with the inward just-in time peak, albeit travelling in the opposite direction.

This can cause congestion at the gates of the factories, so good planning standards should be developed and applied. More importantly, it can mean literally hundreds of stationary vehicles queuing to get out of Spitalle unless the road network can cope with them. The current road network out of the site is woefully inadequate for this phenomenon. It is narrow goes through residential areas and has difficult junctions and awkward turns. Traffic will travel very slowly. The pollution and noise will be totally unacceptable. Accidents will increase and people will die. Roads, kerbs and pavements are likely to be damaged by the slow moving lorries and road surfaces, underground pipes and cables and even whole bridges may be destroyed by the shaking from stationary ones. Road maintenance budgets are as likely to be stretched, Except they won't because any international investor looking at the roads into Spitalle (as he will) will take his investment - and lorries - to another country, so the parks won't get developed and the lorries won't be there.

Human health

As mentioned in section 4.7

5.6 Waste

It can not be recommended to establish a landfill for solid waste in the area, both of hydro-geological reasons as well as for the attractiveness of the area for especially light industry and service/technology companies.

As mentioned in section 5.2 one solution could be to establish a facility for combined waste inceneration/heat recovery. This would even be capable of handling the majority of the waste fraction produced in the Industrial park, and could even serve for the remediation of possible organic polluted soils like soils with oil-spill. If a sorting facility is further established in connection with the facility, it could even served the park with possibilities for sorting for re-use.

This solution will greatly improve the general waste situation not only for the area in question, but for the whole Durres area as so. And seen be expandable for the future without extra costs, and built on safe and green technology.

But for dedicated hazardous waste, either liquid or solid, the treatment/deposition should be outside the area.

6 Proposed Environmental Monitoring Programme

As stated in the Albanian law on Environmental Permits, all companies who wants to start up activities, inhering a risk for negative impact on environmental and human health, shall have an environmental permit. Those permits are given by the local authorities. In the present area this mean the Qarku of Durres.

For nearly all this type of enterprises this will be connected with the demand on monitoring emissions and discharges to the outer environment. This monitoring programme is specific for the single enterprise, and is on the enterprise to conduct under the supervision of the environmental inspectors for the area.

But beside those monitoring activities it will be of normal procedure to establish a monitoring system to cover the possible impact from bigger conglomerates of possible impacting enterprises like the proposed combined Energetic and Industrial parks at Spitalle.

The data from this monitoring system can then even serve as background figures for the measurement performed at the single enterprise.

An adequate monitoring system for the area should as a minimum monitor the following compartments:

Air, Surface water, Soil, and Biodiversity, and both inhere possible impacted stations of special significance, as well as background stations with no impact from the parks.

The air programme should comprise 5 stations: One in Spitalle, one in Vrinias, one in Rinia, one covering the main road to the areas at the southern part of the constructed wetlands and one background station at the Bishti Palles.

The list of parameters to be measured is (beside the normalizing parameters like temperature etc):

1. PM10/PM2.5 – Particulate matter less than 10 resp. 2.5 µm
2. O3 - Ozone
3. NOx – Nitrogen oxides
4. SO2 – Sulphur dioxide
5. CO – Carbon monoxide
6. H2S – Hydrogen Sulphide
7. Aliphatic Hydrocarbons – CnHm
8. Benzene
9. Polycyclic Aromatic Hydrocarbons (PAH's – EPA list)
10. Polychlorinated dibenzo-p,p-dioxins and – dibenzofurans (Dioxin)
11. Elements (As - Arsenic, Cd - Cadmium, Cr - Chromium, Cu – Copper , Hg - Mercury, Ni - Nickel, Pb - Lead, Zn – Zink)

At the station on the main road the parameters 6 and 9 could be omitted, like the row of elements except Lead (Pb), but if the wild burning at the waste deposit will continue, it would even be advisable to include the whole parameter list at this station.

The monitoring will be performed with a combination of passive tubes and PM10/PM2.5 – filter samplers, where the parameters 8, 9 and 10 will be measured on pooled filters after the measurements for particulate matter. The monitoring equipment at the first three stations will be placed at the local sanitary units or other guarded official buildings. The placement of the

road station will be at the operation building at the waste water treatment plant, and the one at the cape at the marine station.

The frequency should be four times a year, in period's of sixteen days. The parameters 8, 9 and 10 will only be measured twice a year (summer and winter).

The costs for setting up this air monitoring programme (including one years measurements) will estimated be 8500 €, while the running costs will estimated be 4000 € a year, including reporting.

The surface water programme should comprise 5 stations: One in the main drainage channel near Spitalle, one at each of the two pumping stations, one at the coast west of Spitalle and one (background) at the coast outside Rhotull north of the area.

The list of parameters to be measured is (beside the normalizing parameters like temperature etc):

1. Elements: (As - Arsenic, Cd - Cadmium, Cr - Chromium, Cu – Copper , Hg - Mercury, Ni - Nickel, Pb - Lead, Zn - Zink)
2. Nutrients: (Ammonium (NH4+), Nitrate (NO3-), Nitrite (NO2-), Organic nitrogen (N), Ortho-phosphate (PO43-), Total phosphorus (P)
3. Dissolved Oxygen – O2
4. Chloroalkanes (C10 – C13)
5. Hexachlorobutadiene
6. Trichlorobenzenes
7. Hexachlorobenzene
8. Di-ethyl(hexyl)phthalate (DEHP)
9. Nonylphenole
10. Octylphenole
11. Polycyclic Aromatic Hydrocarbons (PAH's – EPA list)
12. Mineral oil
13. BOD – Biological oxygen demand
14. Chlorophyll-a

The parameters 2, 3, 12, 13 and 14 will be measured four times a year; the parameter 1 two times a year and the other parameters once a year.

The costs per year including reporting can be estimated to 8000 €.

The soil programme should comprise 5 stations: One in the centre of the Energetic park, one in the Industrial park, one at the fields east of the road to Rinia and one at the Bishti Palles.
The list of parameters to be measured is (beside the normalizing parameters like temperature etc):

1. Elements: (As - Arsenic, Cd - Cadmium, Cr - Chromium, Cu – Copper , Hg - Mercury, Ni - Nickel, Pb - Lead, Zn - Zink)
2. Nutrients: (Ammonium (NH4+), Nitrate (NO3-), Nitrite (NO2-), Organic nitrogen (N), Ortho-phosphate (PO43-), Total phosphorus (P)
3. Chloroalkanes (C10 – C13)
4. Hexachlorobutadiene
5. Trichlorobenzenes
6. Hexachlorobenzene
7. Di-ethyl(hexyl)phthalate (DEHP)
8. Nonylphenole
9. Polycyclic Aromatic Hydrocarbons (PAH's – EPA list)

10. Mineral oil

All parameters shall be measured once in two years; the estimated costs for one measuring round are (including reporting) 9000 €.

The biodiversity programme should comprise 5 stations: One in the main drainage channel near Spitalle, one at the sea outside each of the two pumping stations, one at the coast west of Spitalle and one (background) at the coast outside Rhotull north of the area.

The list of parameters to be measured is (beside the normalizing parameters like temperature etc):

1. Phytoplankton
2. Macrophytes
3. Macro-invertebrates
4. Birds

Parameter 1 shall be measured four times a year, the others once a year; the estimated costs for one year are (including reporting) 4000 €.

The establishing costs for the monitoring programme (including the first year of monitoring) can be estimated to 35.000 € (including workshops etc.), and the running cost will estimated be at 21.000 € inclusive a small post for contingencies.

The normalizing parameters for all the compartments in combination are:

Temperature, Hardness (mg CaCO3/kg), Conductivity, pH, Salinity, Suspended solids, Grain size distribution, Morphological conditions, Wind direction and magnitude, Humidity, General weather conditions, Waste

All monitoring activities (sampling and analysis as well as QA/QC measures) will be following the guidelines in the Integrated Environmental Monitoring System for Albania, as set up by the EU-CARDS StEMA project.

7 Conclusions of Public Consultations

(To be completed after the public consultation)

8 Bibliography

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