Supplementary Environmental and Social Impact Assessment Information

Final Report

Crucea North Wind Farm

S.C. Crucea Wind Farm S.R.L

April 2013

TABLE OF CONTENT

ABREVIATIONS LIST

ANIF	National Land Improvement Administration
CC	County Council
CP	Construction Permit
UC	Urban Certificate
D.T.A.C.	Technical Documentation for Construction Permit
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
ER	Environmental Report (SEA Report)
ESAP	Environmental and Social Action Plan
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESIA	Environmental and Social Impact Assessment
EU	European Union
G.D.	Governmental Decision
LEPA	Local Environmental Protection Agency
MAI	Ministry of Administration and Interior

M.O.	Ministry Order
NTS	Non - Technical Summary
Project	Crucea North Wind Farm 99 MW (extension to 108 MW as option)
PUZ	Zonal Urban Plan
SC	Special Committee
SEA	Strategic Environmental Assessment
SEP	Stakeholders Engagement Plan
SPV	Special Purpose Vehicle
TAC	Technical Analysis Committee (TAC)
UC	Urban Certificate
WG	Working Group
WTG:	Wind turbine generator

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE OF THIS DOCUMENT

ERM Environmental Resources Management SRL (ERM) was contracted by S.C. Crucea North Wind Farm S.R.L. to provide environmental consultancy services related to Crucea North Wind Farm, Constanta County, Romania (the Project).

SC Crucea North Wind Farm SRL, is a Special Purpose Vehicle (SPV), set up to implement the project and then operate the wind farm. The company has the following shareholders: STEAG GmbH with 90% and Monsson Alma with 10%.

Additional information to the Environmental Impact Assessment (EIA) completed for the Project as part of the national permitting procedure has been requested in the context of STEAG proceedings of securing international financing for the Project. This assignment represents an element of the Environmental and Social Action Plan (ESAP) agreed with the lenders and aimed at achieving compliance with the requirements for international project finance.

The project has passed the permitting stages as required by applicable national regulations in 2010 and currently is in the final revision stage for amending available permits to reflect certain project modifications.

Details on the permitting procedure performed for the project in the context of the applicable regulatory process in Romania is provided in *Annex 1* to this report.

The purpose of this document is to supplement existing EIA Study (Tudor Darie, Environmental Impact Assessment of Crucea North Wind Farm, 2010) with additional information and assessment, for achieving compliance with international ESIA standards. Therefore this report is not intended to provide complete information on the environmental and social impacts associated with the project and it has to be considered in conjunction with the EIA Study performed for the project in 2010.

Furthermore, this document is to be supplemented with information on potential cumulative impacts, currently under preparation.

Also the biodiversity impacts information available from the EIA Study performed in 2010 will be supplemented with impact and collision risk assessment based on a one year (2013 – 2014) monitoring data.

An Environmental and Social Management Plan is available for the project and will be updated to include any mitigation deemed necessary as result of subsequent studies and assessment results.

1.2 *BEST INTERNATIONAL INDUSTRY PRACTICE FOR PROJECT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT*

In the preparation of this report, the international standards, as reflected in the policies, safeguard procedures, and guidance of the World Bank Group (specifically the IFC Performance Standards which underpin the Equator Principles and the World Bank safeguard policies) have been considered.

Equator Principles are standards developed by the international finance community for application to the approval of lending for development. They are based on performance standards established by the International Finance Corporation of the World Bank and set rigorous requirements for the approach to and conduct of Environmental and Social Impact Assessments (ESIA). A brief summary of the Equator Principles is presented below.

Table 1.1 The Equator Principles July 2006 – A Summary

Principle 1: Review and Categorisation

Projects will be categorised based on the magnitude of potential impacts and risks in accordance with the environmental and social screening criteria of the IFC as:

- **Category A** – Projects with potential significant adverse social or environmental impacts that are diverse, irreversible or unprecedented;
- **Category B** – Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and
- **Category C** – Projects with minimal or no social or environmental impacts.

Principle 2: Social and Environmental Assessment

A social and environmental assessment must be carried out for Category A and B projects to address social and environmental impacts and risks and propose mitigation and management measures. Social and Environmental Assessment is defined as "*a process that determines the social and environmental impacts and risks (including labour, health and safety) of a proposed project in its area of influence ….*[comprising] *an adequate, accurate and objective evaluation and presentation of the issues*".

Principle 3: Applicable Social and Environmental Standards

The assessment will refer to IFC Performance Standards and Industry Specific EHS Guidelines and establish overall compliance or justified deviations from these and with host country laws and permits. IFC Performance Standards cover:

- Social and Environmental Assessment and Management Systems
- Labour and Working Conditions
- Pollution Prevention and Abatement
- Community Health, Safety and Security
- Land Acquisition and Involuntary Resettlement
- Biodiversity Conservation and Sustainable Natural Resource Management
- Indigenous Peoples
- Cultural Heritage.

Principle 4: Action Plan and Management System

The developer must prepare an Action Plan describing and prioritising actions and monitoring needed to manage impacts and risks and must establish a Social and Environmental Management System to ensure compliance with standards (see *Principle 3).*

Principle 5: Consultation and Disclosure

Project-affected communities must be consulted in a structured and culturally appropriate manner to ensure free, prior and informed consultation and facilitate informed participation so that the project adequately incorporates affected communities' concerns. The assessment documentation must be made available to the public for a reasonable minimum period in the relevant local language and in a culturally appropriate manner and the developer must take account of and document the process and results including any actions agreed resulting from the consultation. For projects with significant adverse impacts this must take place early in the assessment process and in any event before the project construction starts and on an ongoing basis.

Principle 6: Grievance Mechanism

The developer must establish a readily accessible grievance mechanism, to continue through construction and operation, so that concerns and grievances can be raised by individuals and groups and are adequately, promptly and transparently addressed.

Principle 7: Independent Review

An Equator Principles lender must undertake an independent review to assess compliance with these principles.

Principle 8: Covenants

The developer must covenant with an Equator Principles lender:

- to comply with relevant standards and with the Action Plan
- to report regularly on compliance
- to decommission the facilities where appropriate in accordance with an agreed plan.

Where non-compliance occurs the lender may exercise remedies to ensure compliance.

Principle 9: Independent Monitoring and Reporting

An independent monitor must be appointed to undertake ongoing monitoring during the life of the project and report on compliance.

Key aspects of the Equator Principles relevant to this assessment and the project are:

- The requirements to undertake social as well as environmental impact assessment– this assessment includes all aspects covered by the IFC Performance Standards referenced in *Principle 3*.
- The requirement to comply with Industry-Specific Guidelines– the relevant guidelines are the IFC Environmental, Health and Safety Guidelines for Wind Energy.
- The requirement to prepare an Action Plan and Management System – this Environmental and Social Impact Report includes an Environmental and Social Action Plan setting out all planned mitigation.
- The requirement for early consultation and disclosure and ongoing provision for management of grievances. Public hearings have been performed for the project during the permitting stage and additional consultation is going to be performed further based on a Stakeholder Engagement Plan available for the project. An "ESIA Disclosure Package" will be published and opportunity for public comment will be provided. All comments will be taken into account in further developing and implementing the management system and finalising the Action Plan. The Management System will include a Grievance Process accessible to all.

2 PROJECT DESCRIPTION

Crucea North Wind Farm will be located on fields within the incorporated areas of Vulturu, Pantelimon and Crucea Communes, in Constanta County.

The project location is represented in the figure below.

Figure 2.1 General Project location

The Crucea North Wind Farm 99 MW (extension to 108 MW as option) site covers an area of approximately 22.64 km² which includes the project footprint, the wind farm safety area and a development buffer area. The footprint comprises the total area that was rezoned to industrial use, namely 90.5 ha, which includes the wind turbine towers, permanent access roads, a substation, and permanent crane platforms. At the date of drafting present report, a new PUZ procedure is ongoing with the purpose of regulating the land use change (from agricultural to industrial land use) implied by extending the project with additional three turbines.

Overall, for constructing the Crucea North Wind Farm 99 MW (extension to 108 MW as option), 104,5 ha of agricultural land will be rezoned in total.

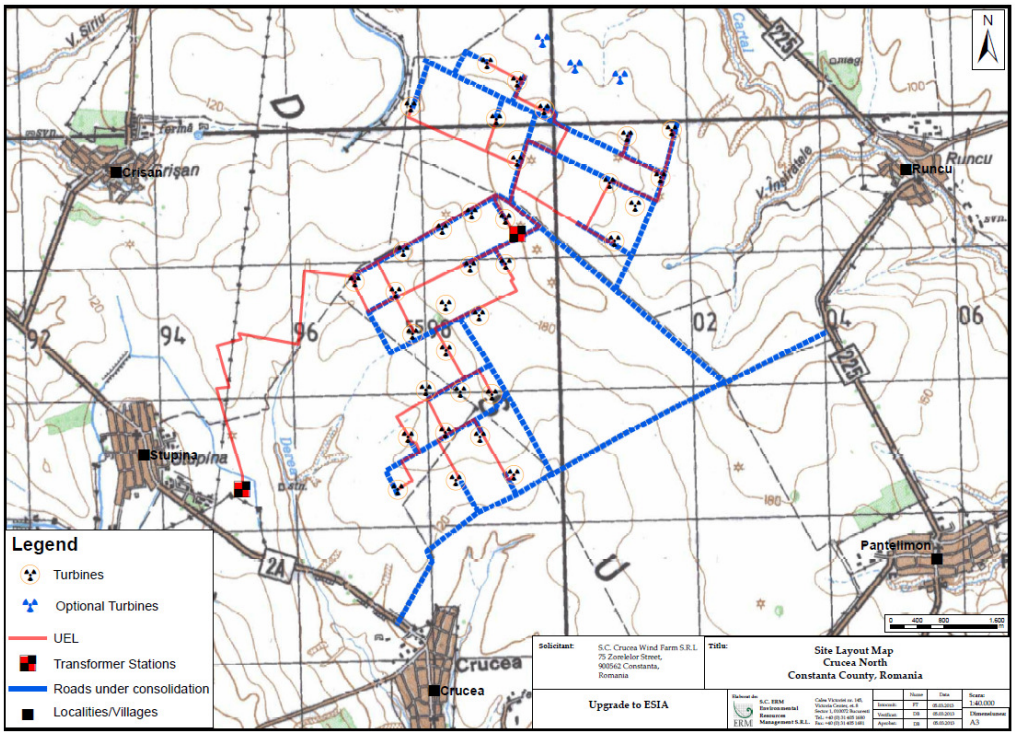
The area occupied by new roads will cover approximately 2.4 ha, while existing roads, after modernization will occupy an area of approximately 18.56 ha.

The main components of the Project are listed below:

- construction of 33 (after extension 36) horizontal axis Vestas V112 wind turbines, each with a capacity of 3 MW, total capacity of approximately 99 MW (after extension: 108 MW). The maximum height of a turbine will be 175 m, with a hub height of 119 m;
- construction of a Project Substation 33/110 kV to be located within the wind farm site boundary;
- construction of a 400/110 kV new Transformer Station Stupina 2 with one 250 MVA transformer, which will be connected to the existing Stupina 110/400 kV transformer station;
- organization of a temporary construction compound within the wind farm site boundary.
- construction of a permanent concrete platform at the site of each turbine which will be required for the installation and maintenance of the turbines;
- construction of permanent crane pads;
- upgrade of approximately 45 km of existing agricultural service roads and construction of approximately 6 km of new access roads to the turbines;
- construction and operation of approximately 43 km of underground medium-voltage (33 kV) electrical connection lines to link the turbines and the 33/110 kV Project Substation;
- construction and operation of approximately 8.8 km of underground high-voltage transmission lines (110 kV) from the 33/110 kV Project Substation to the 400/110 kV Stupina 2 Transformer Station;
- construction and operation of approximately 150 m of underground high-voltage transmission lines (400 kV) connecting the 400/110 kV Stupina 2 Transformer Station to the Power Distribution Grid owned by C.N.E.E. Transelectrica S.A. via the existing 110/400 kV Stupina Transformer Station.

The site location is represented in the figure below, while a more detailed layout map of the project is attached to this report as *Annex 2*.

Figure 2.2 Site layout map



3 PROJECT ALTERNATIVES AND SITE SELECTION

Alternatives analysis and selection process has been performed in the feasibility stage of the project and documented in the *Feasibility Study* performed by Monsson Alma for Crucea North Wind Farm. A summary of this process is provided below.

Romania's wind resources are well documented by numerous expert studies conducted by wind energy institutions and associations. Based on these studies, the highest wind energy potential was identified in eastern Romania, in the Dobrogea region in the south-east and the Moldavian Plateau in the north-east(1).

Since the Dobrogea region is an area with high potential for both wind and solar energy recovery (as stated in the Romanian Energy Strategy for 2007-2020), analysing the two energy sources and considering the high cost of photovoltaic panels in relation to income energy production and green certificates value, the investors have concluded that utilization of wind energy resource is more economically feasible.

In the wind farm location selection process several criteria have been considered, namely:

- to be located in a high area, on flat relief, without wind barriers;
- to be located at a distance of minimum 700 m from settlements;
- availability in close distance of an electrical transmission network able to receive the electricity produced by the project;
- the land to have a geological structure that allows construction;
- to meet the distance requirements on safety areas from power lines, substations, roads, canals, railways, radio antennas and telephone etc.

Selected wind farm site (unincorporated area belonging to Crucea, Vulturu and Pantelimon communes) offers favourable conditions for the project due to:

- excellent wind conditions;
- existence of available lands;
- sufficient distance from residential areas;
- existing access roads;
- proximity to high voltage power line;
- local community support for the project.

(1) Source: EBRD renewables site, http://www.ebrdrenewables.com/sites/renew/countries/Romania/profile.aspx#Wind

The Crucea North site area is characterised by intensive agriculture. The agricultural areas are rarely interrupted by groves but there are small villages and some houses along main roads in the area. The existing roads are partly tree-lined. The Danube valley is located approximately 12 km westward to the site, trees and bushes framing the river along of most of this section.

Due to the predominant agricultural use, the terrain has a very open character, which favours an undisturbed wind flow over distances of several kilometres.

There are no obstacles near the site, which influence the wind flow at the measurement sites or the wind turbine positions significantly.

Choosing as project location the unincorporated area of Crucea, Pantelimon and Vulturu communes was influenced by several variables of which the most important are:

- existence of weather measurements poles on site or near it;
- characteristics of wind correlated with the relief in the area;
- location outside Natura 2000 protected areas.

Prior starting any investment in the area, Monsson Alma has commissioned BBB UMWELTTECHNIK GmbH for the preparation of a Wind Study for the evaluation of the wind resource and the energy yield prediction at the site Crucea North, Dobrogea, Romania, including the calculation of the expected energy yield generated by 36 wind turbines, type Vestas V112 3MW with a hub height of 119 m.

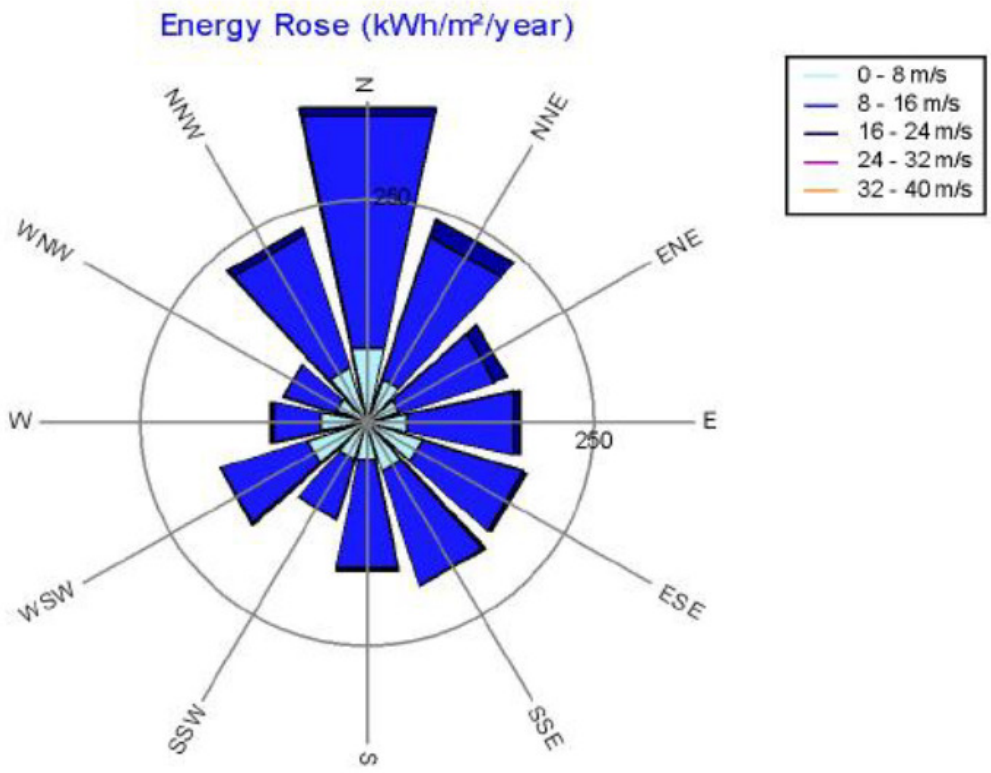
For the preparation of this report, five wind measurement locations (Tirgusor, Vulturu, Silistea, Mireasa and Fantanele) were considered providing data extended over approximately 9, 16, 24, 34 and 42 months respectively.

In Dobrogea region, maritime influence of the Black Sea and the Mediterranean Sea affect the level of climate. This results in warm summers and cold winters.

According to current climate models, initially changes of long-term means of wind speed are not expected. However the increase in extreme weather conditions incidence and consequently a change of the minima and maxima of the wind speeds is considered probable.

The main wind directions at the site region are located in the northern sectors at all heights above ground level. The roughness in connection with the terrain's orography leads to an important share of energy of nearly 34.6 % in the NNW to NNE directions.

Figure 3.1 Wind Energy rose at Crucea North in 50 m a.g.l .



The study was finalized in 2010, based on collected data from period 2006-2010 and, from a wind-climatologic point of view, the Wind Study assessor considers that the site Crucea North is **very well suited** for the technical use of wind energy.

4 SUMMARY OF PROJECT'S ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

4.1 PROJECT ORGANIZATION

SC Crucea Wind Farm SRL, a subsidiary of STEAG GmbH, is committed to high standards of environmental and social performance for its operations. This chapter provides an outline of how the Project is to be managed with respect to Environmental, Health and Safety issues. It presents an outline of the Environmental, Health and Safety (EHS) Management System that is being developed for the project and its associated design, construction and operational EHS management procedures.

EHS management issues at various stages in the life of the project from detailed design through to operation, will be governed or guided by a number of 'standards', including:

- those specified by applicable legislation;
- those established by industry codes of practice;
- those required by the EHS policy; and
- those that are specific to the Project including commitments made in the ESIA, commitments made during consultations, and measures as may be set out in environmental consents or licences for the project.

The Project "Crucea North Wind Farm" is owned by STEAG GmbH and Monsson Alma through the local project company (SC Crucea Wind Farm SRL).

SC Crucea Wind Farm SRL is a company registered in Romania, and having a local office in Constanta, 75 Zorelelor Street, postal code 900562, Constanta County

The management system implemented for the project is based on the management system procedure and practices of STEAG GmbH. Company's core competencies include planning, construction and operation of both large power plants and distributed energy facilities, along with asset-based power trading. The Group's generating capacities are based on both fossil and, for more than a decade, renewable sources of energy.

One of Germany's largest electricity producers, STEAG operates eleven power stations and more than two hundred distributed facilities to generate energy from renewable sources and supply power and heat on a contracting basis to industrial and other customers. STEAG has the following subsidiaries:

STEAG Energy Services GmbH

STEAG Fernwärme GmbH

STEAG New Energies GmbH

STEAG Power Minerals GmbH

STEAG Power Saar GmbH

The company's team consists of specialists with experience in the development and implementation of projects, starting from the phase of pre-planning and marketing to construction and commissioning and operation.

Partnership at the local level is an important element in the company's strategy, reflected at project level by the association with Monsson Alma.

Monsson Group develops, constructs, operates and performs service and maintenance for wind and solar farms in Romania, with main focus in Dobrogea and in the south-western part of Romania. Monsson Alma is the parent company of the Monsson Group, a main developer of wind farms in Romania. Until now, Monsson Alma is developing approximately 1,850 MW and obtained grid connection approval for 1,595 MW in Romania.

Based on a tri-party agreement, both STEAG Energy Services (handling EPC contracts) and STEAG GmbH (handling all other contracts) will act as "Owner's Engineer" on behalf of Crucea Wind Farm S.R.L.

The main contractors involved in project implementation are VESTAS (wind turbines provider), ENERGOBIT (provision of electrical works) and REIF (provision of civil works).

The project and the site team management organization are represented in the charts below.

Figure 4.1 Project Organization Chart

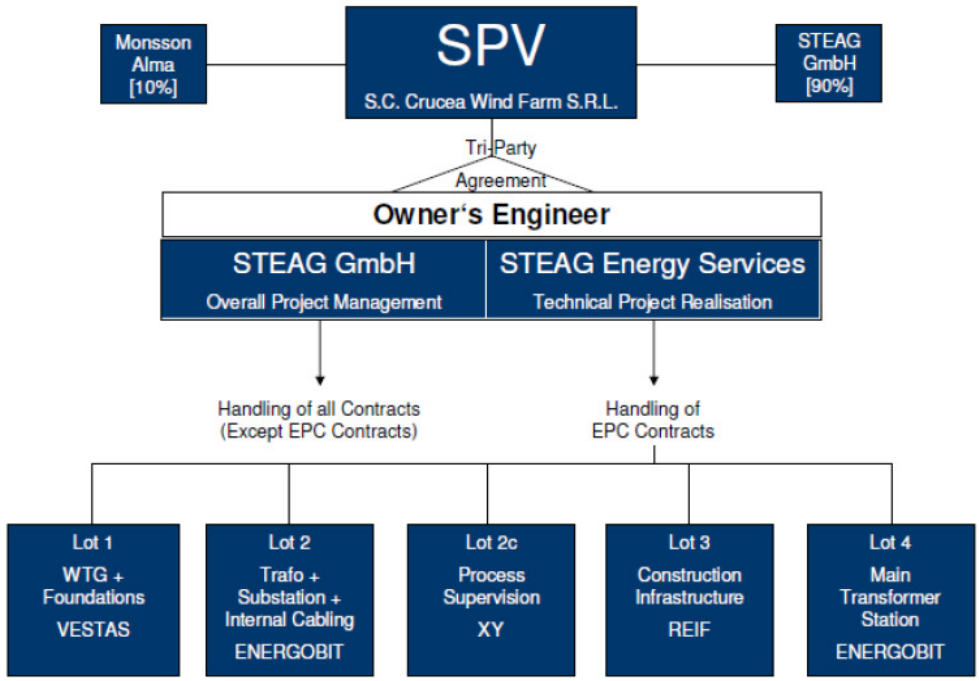
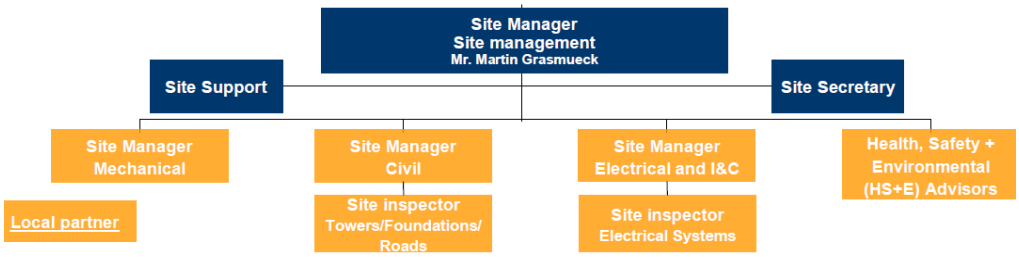


Figure 4.2 Owner's Engineer Site Team Management Chart



4.2 PROJECT ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT

SC Crucea Wind Farm SRL EHS Management

To enable effective management of environmental, health, and safety (EHS) Crucea Wind Farm SRL has defined and implemented procedures enabling inclusion of EHS considerations into project processes in an organized approach.

As an outcome of this process, the procedures and plans implemented for the project include:

- HSE Strategy
- Environmental Policy
- HSE Management Plan;
- Stakeholder Engagement Plan;
- Company Instructions
- Company Safe Work Instructions
- The following EHS procedures:
  - WCN-HSE-PRO-001 Emergency Response.
  - WCN-HSE-PRO-002 MEDEVAC
  - WCN-HSE-PRO-003 Safety induction
  - WCN-HSE-PRO-004 Job Safety Analyses
  - WCN-HSE-PRO-005 Work Permit System
  - WCN-HSE-PRO-006 Periodical HSE Meetings
  - WCN-HSE-PRO-007 Risk Assessment
  - WCN-HSE-PRO-008 HSE Reporting
  - WCN-HSE-PRO-009 Personal Protective Equipment
  - WCN-HSE-PRO-011 Waste management
  - WCN-HSE-PRO-014 Lifting Operations
  - WCN-HSE-PRO-016 Working at height
  - WCN-HSE-PRO-018 HSE Requirements Questionnaire and Agreement – Contractors
  - WCN-HSE-PRO-019 Management of Inspections
  - WCN-HSE-PRO-021 HSE Training
  - WCN-SIS-PRO-010 Event Reporting
  - WCN-SIS-PRO-012 Environmental Aspects
  - WCN-SIS-PRO-013 Operational Control
  - WCN-SIS-PRO-015 Fire Fighting
  - WCN-SIS-PRO-017 Safety Policy Statement and Procedures
  - WCN-SIS-PRO-020 Management of Changes
  - WCN-SIS-PRO-022 Guide of Transportation Safety

Roles and Responsibilities

Coordination of EHS aspects is ensured by an EHS Manager responsible for implementation and continuous monitoring of EHS procedures. His main responsibilities include:

- Identify the critical HSE activities and develop control strategies of identified hazards;
- Define roles, responsibilities, authority and provide resources needed to ensure that the company HSE-Management System (including Environmental Management System) are implemented and maintained at all project locations and operations;

- Ensure sufficient, appropriately trained and competent HSE staff;
- Assign ownership of and responsibilities for all critical EHS activities;
- Ensuring that all personnel receives required HSE training
- Follow up, revise and approve HSE program at suitable time intervals;
- Conduct regular reviews of the HSE management system to ensure its continuous adequacy and effectiveness and maintain regular and effective liaison with all levels of management as well as with the HSE authorities;
- Perform regular EHS compliance audits of contractors, subcontractors and own staff employed in different company disciplines;
- Maintain a systematic log of non-conformances and corrective actions;
- Ensure that a review of all incidents including near-misses is conducted,
- Recommend changes to HSE Policies as required;
- Ensure that contractor HSE performance reviews are completed;
- Act as Emergency Coordinator and Lead Emergency Coordination teams.

All company's supervisory staff has defined HSE responsibilities which are included in their job descriptions. These responsibilities include:

- Be familiar with HSE Policy and have a sound understanding of the company's HSE responsibilities;
- Set good example for the team by working safely by acting permanently in line with EHS Procedures;
- Make the team members aware of their responsibilities, and the importance of following the EHS Procedures and Work Instructions;
- Participate in HSE meetings and take every opportunity to talk to the team about HSE issues;
- Ensure and monitor that HSE training has been received by all team personnel as defined in the Mandatory Training Matrix;
- Supervise HSE procedures implementation with increased focus on activities posing higher risks;
- Make sure that all team members follow the job safety plans and the Work Permits' requirements.
- Understand the role in the event of an emergency and participate in emergency drills and exercises;
- Ensure that all HSE controls are in place before any initiating any activity; immediately stop any activity in case that required EHS controls are not in place or inappropriate;
- Report and follow-up on HSE incidents, near misses and non-compliances;

Contractors and Subcontractors management

Contractors, subcontractors, suppliers and all visitors are required to comply with the project HSE Rules

In addition, also all contractors and subcontractors are required to:

- Take reasonable care for the Health & Safety for themselves and for their staff;
- Co-operate with project HSE management in the performance of their duties.
- Comply with applicable regulations and implement environmental and social mitigation measures contained in the ESMP as applicable to their activity;
- ensure required EHS training to all their employees and attend any HSE training provided by the Owner's Engineer at Project EHS Manager's request;

All contractors and subcontractors appoint an EHS coordinator which is accountable to the Project EHS Manager and having overall responsibility for implementation of the Project EHS Plan and policies by all their staff.

In particular contractor's/subcontractor's EHS coordinator duties include:

- Regular review of the HSE Plan to ensure that it remains comprehensive, effective, up to date and reflects the prevailing requirements of the project.
- Report this to Project EHS Manager any significant change in the organizational structure, the HSE arrangements or employed controls, or on any new activities that would require amendment or adjustment of the EHS Plan.
- Establish and maintain appropriate HSE inspection procedures, including preparation and appropriate distribution of written reports detailing defects, weaknesses and recommendations for improvements.
- Establish and maintain adequate procedures ensuring that all accidents, incidents and near misses are thoroughly investigated and promptly reported to in appropriate parties including Project EHS Manager.

5 SUPPLEMENTARY ENVIRONMENTAL BASELINE CONDITIONS AND IMPACT ASSESMENT INFORMATION

5.1 AIR QUALITY

5.1.1 Introduction and Scope

This section of the Report considers the risk of adverse impacts on the atmospheric environment during construction and operation. Emissions to air from the project are generated mainly from the following two sources:

- dust during the construction phase; and
- combustion emissions from vehicles visiting the site during the construction and operational phases.

From air emissions perspective, overall the project induces beneficial impacts to air quality via the offset of emissions that would be generated from the equivalent electricity production using conventional power generation.

5.1.2 Sources of Information

ERM used the following sources of information for baseline data acquisition and for impact assessment:

- Posea Grigore, *Geografia Romaniei*, Volume V, Editura Academiei Romane, 2005, pp. 688-728;
- 2011 Annual Report on the State of Environmental Factors, Chapter 1, published by LEPA Constanta, available at http://apmct.anpm.ro/upload/74985_Cap%20I%20Raport%20Constanta%202011.pdf and accessed in January 2013;
- Offset emission reduction calculation guidance from of the British Wind Energy Association http://www.bwea.com/edu/calcs.html;
- Information from the European Wind Energy Association http://www.ewea.org; and
- Design Manual for Roads and Bridges, published by the UK Highways Agency, Volume 11, Section 3, Annex 1.

5.1.3 Methodology

A desktop assessment of air quality impacts was performed using the available information sources referenced, as well as drawing on ERM's previous experiences in similar projects around Europe.

5.1.4 Baseline Environment

5.1.4.1 Surrounding Environment

The site is located on the Northern Dobrogea Plateau in Constanta County, which is situated in south-eastern Romania. The nearest villages are listed below (distances calculated from the boundary of the Project site, which includes the 500 m safety buffer):

- Crucea - approximately 1.2 km south of the Project site;
- Stupina - approximately 2.5 km southeast of the Project site;
- Crişan - approximately 3.3 km east of the Project site;
- Siriu - approximately 3 km northeast of the Project site;
- Vulturu - approximately 2.4 km north of the Project site;
- Runcu - approximately 2.5 km east of the Project site;
- Pantelimon - approximately 5 km southeast of the Project site.

The Black Sea is approximately 41 kilometres to the southeast and the airport located in Mihail Kogalniceanu commune is approximately 27 km southeast. The Romanian-Bulgarian border is approximately 70 kilometres to the southwest. The surrounding vicinity is primarily agricultural (arable) in nature.

There are no national parks or RAMSAR wetlands within 10 kilometres of the proposed location. The nearest RAMSAR wetlands are:

- *Insula Mica a Brailei* located approximately 30 km west of the Project site;
- *Lake Techirghiol* located approximately 62 km southeast of the Project site.

The nearest Natura 2000 site is ROSPA0019 Cheile Dobrogei, which at its nearest point is approximately 2.5 km east-northeast of the Project site. Other Natura 2000 sites within 10 kilometres of the Project site are:

- ROSCI 0201 *Podisul Nord Dobrogean* north of the site;
- ROSCI0215 *Recifii Jurasici –Cheia* east of the site;
- ROSCI0053 *Dealul Alah Bair* south of the site;
- ROSPA0100 *Stepa Casimcea* northeast of the site;
- ROSPA0019 *Cheile Dobrogei* east of the site;
- ROSPA0002 *Allah Bair – Capidava* south of the site;
- ROSPA0101 *Stepa Saraiu-Horia* northwest of the site.

5.1.4.2 Climate

The climatic peculiarities of the Northern Dobrogean Plateau are under the direct influence of the air flow circulation present in Romania. All the area is characterized by a temperate-continental climate. Most of the areas in the Northern Dobrogean Plateau experience hot and dry summers and cold and snowy winters, often accompanied by blizzards(1).

The overall average annual solar radiation ranges between 125.0-127.5 kcal/cm^2 in the areas with an elevation above 300 m and between 130-132 kcal/cm^2 in the plain areas in the east.

The values of average annual temperatures range between 10°C in the northern and central parts of the county and above 11°C in the south. Multiannual variations do not exceed 4°C.

The absolute lows recorded in the region were: -26^{0}C in Babadag (seaside) on 16 February 1911 and - 25.4^{0}C in Mircea Voda on 25 January 1942.

The maximum temperatures recorded were +39.7^{0}C in Tulcea on 20 August 1945 and +39^{0}C in Mircea Voda on 13 August 1946(2).

(1) Source: Posea Grigore, *Geografia Romaniei,* Volume V, Editura Academiei Romane, 2005, pp. 688-728

(2) Source: Posea Grigore, *Geografia Romaniei,* Volume V, Editura Academiei Romane, 2005, pp. 688-728

Table 2 *Average monthly values of air temperature recorded in 2011 (^{0}C) [1]*

Meteorological Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Adamclisi	-0.9	-1.1	4.7	8.6	15.6	20.3	23.3	22.3	20.2	10.2	3.2	3.6
Cernavoda	-1.3	-0.9	5.3	9.4	16.5	21.1	23.6	22.8	20.7	10.6	3.7	3.6
Constanta	1.0	0.5	4.6	9.2	16.2	21.5	24.1	23.6	21.2	12.0	5.1	5.1
Harsova	-2.2	-1.9	5.0	9.6	16.7	21.2	23.8	22.6	20.5	10.2	3.2	3.1
Mangalia	1.8	1.0	4.3	8.9	15.6	21.0	23.5	23.1	20.5	11.9	5.2	5.4
Medgidia	-0.6	-0.8	4.9	9.0	16.1	21.0	23.3	22.3	20.3	10.8	3.8	3.9

[1] Source: 2011 Annual Report on the State of Environmental Factors, Chapter 1, published by LEPA Constanta, available at http://apmct.anpm.ro/upload/74985_Cap%20I%20Raport%20Constanta%202011.pdf and accessed in January 2013

The annual amount of rainfall varies between 400 mm and 500 mm. The lowest precipitations are at the seaside, with amounts below 400 mm. The predominant wind direction is to the NNE, causing a low humidity in summer and frost and blizzard in winter(1).

Table 3 ***Recorded values at meteorological stations in Constanta County***

Meteorological Station	2011 Precipitation (l/m²)
	Average of multi-annual amount of rainfall
Adamclisi	471,3
Cernavoda	453,1
Constanta	411,5
Harsova	412,1
Mangalia	412,1
Medgidia	443,1

5.1.5 Ambient Air Quality

5.1.5.1 Existing Sources of Air Pollution Near the Site

The area immediately surrounding the proposed site is agricultural, and as such, there are no existing industrial sources of air pollution within the immediate vicinity. There is a small stone quarry in Runcu (less than 5 km east of the Project site) and there are national and county roads (national road DN 2A, county roads DJ225 and DJ226B) less than 5 km east and west of the Project site. Therefore, some combustion related emissions and road dust would be expected from these sources.

5.1.5.2 Particulate Matter Baseline

The table below lists the sediment dust monitoring results for Constanta County according to the yearly report of LEPA Constanta for 2011. Sediment dust is defined as particulates with an aerodynamic diameter greater than 20 µm. The ambient air quality in the agglomeration of Constanta(2) is

(1) Source: 2011 Annual Report on the State of Environmental Factors, Chapter 1, published by LEPA Constanta, available at http://apmct.anpm.ro/upload/74985_Cap%20I%20Raport%20Constanta%202011.pdf and accessed in January 2013

(2) The agglomeration of Constanta includes Constanta city and the following localities: Mamaia, Palazu Mare, Navodari town, Eforie (Eforie Nord and Eforie Sud), communes Tuzla, Costinesti, Mangalia town and the seaside resorts Neptun-Olimp, Jupiter-Cap Aurora, Venus and Saturn

characterized based on the pollutant monitoring results from a network of 7 fixed monitoring stations in the following cities/towns:

- Constanta city (3 stations: traffic – CT1, urban – CT2 and industrial-CT5);
- Navodari town (2 stations: suburban-CT3 and industrial-CT6);
- Mangalia town (1 traffic station-CT4);
- Medgidia town (1 industrial station-CT7).

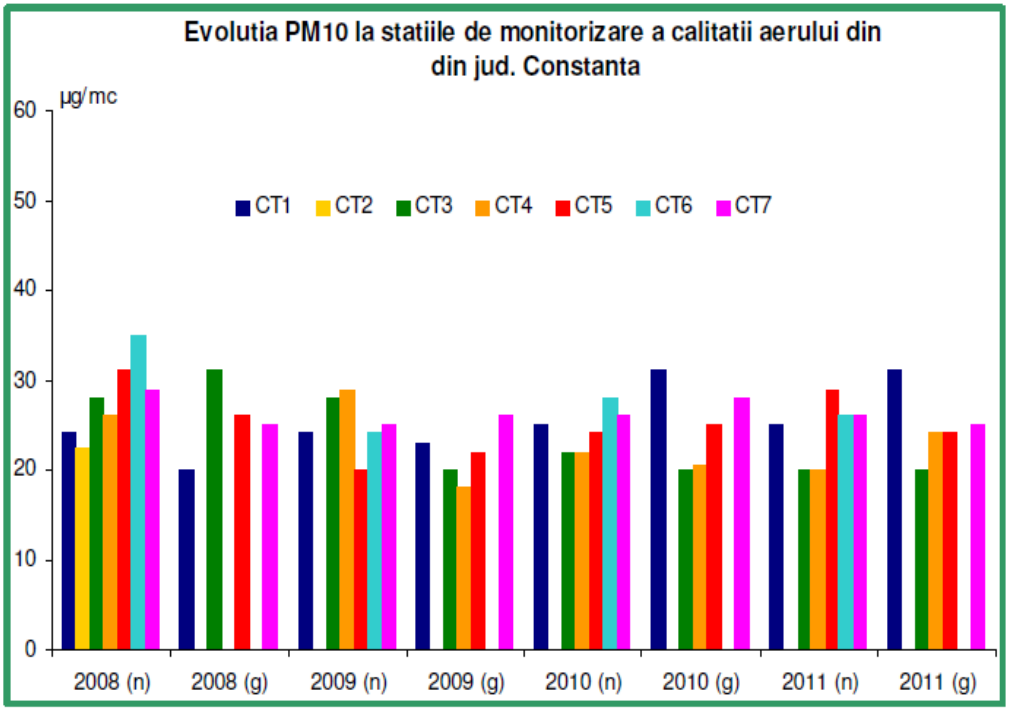
Table 4 Particulate matter concentrations recorded at the monitoring stations(1)

Pollutant	Type of station	Annual average concentration			
		2008	**2009**	**2010**	**2011**
PM_{10} (µg/m³) nephelometric/gravimetric	Industrial Constanta	31 / 26	20 / 22	24 / 25	29 / 24
	Industrial Navodari**	35 / -	24 / -	28 / -	26 / -
	Industrial Medgidia	29 / 25	25 / 26	26 / 28	26 /25
	Traffic Constanta	24 / 20	24 / 23	25 / 31	25 / 31
	Traffic Mangalia	26 / -	29 / 18	22 / 20.5	20 / 24
	Suburban background	28 / 31	28 / 20	22 / 20	20 / 20
$PM_{2.5}$ (µg/m³) nephelometric/gravimetric	Urban background	-	14 / 13	16 / 15	18 / 19

** For station CT6 there are only nephelometric measurements

(1) Source: 2011 Annual Report on the State of Environmental Factors, Chapter 1, published by LEPA Constanta, available at http://apmct.anpm.ro/upload/74985_Cap%20I%20Raport%20Constanta%202011.pdf and accessed in January 2013

Figure 2 *Evolution of PM_{10} at the air quality monitoring stations in Constanta County*



5.1.6 Construction Impacts

5.1.6.1 Introduction

During the construction period which is estimated to last until June 2014, air emissions will consist of dust generated from construction activities (e.g. land moving, dust from construction vehicles) and combustion related emissions from vehicles and construction equipment visiting the site.

5.1.6.2 Dust from Construction Traffic

If unmitigated, dust from construction sites can cause impacts on neighbouring properties and vegetation by causing soiling and blanketing of plant surfaces. In extreme cases, it can also cause respiratory problems through inhalation.

Dust can become airborne due to the action of winds on material stockpiles and other dusty surfaces, or when thrown up by mechanical action, for example the movement of tyres on a dusty road or activities such as sanding or drilling.

The quantity of dust released during construction depends on a number of factors, including:

- the type of construction activities occurring (e.g. crushing and grinding);
- the climate conditions (e.g. humidity);
- the volume of material being moved;
- the area of exposed materials;
- the moisture and silt content of the materials;
- distances travelled on unpaved surfaces; and
- the mitigation measures employed.

There are many types of particulate matter that are included in the definition of dust, varying in size and chemical composition. Dust released by construction usually has a broad size distribution but low compositional variability, being mainly soil-based. The size of dust particles will determine how long they remain airborne.

Large particles (i.e. greater than 100 µm in diameter) are likely to settle within 6 m to 10 m of their source under a typical mean wind speed of 4 m s^{-1}, and particles between 30 µm and 100 µm diameter are likely to settle within 100 m. Smaller particles, particularly those below 10 µm in diameter, can be transported further from their source. These particles can be small enough to be inhaled deep into the lungs and cause respiratory illness.

Dust emissions are exacerbated by dry weather and high wind speeds. The impact of dust emissions also depends on the wind direction and the relative locations of dust sources and receptors.

As part of this project, there will be relatively small areas of ground breaking or disturbance to land, relative to the site as a whole. Based on this, it is not anticipated that significant adverse impacts will arise. Agricultural activities presently being conducted would incorporate some soil management, such as ploughing, which would have generated dust from the area at certain times in the past. The receptors in the area would have experienced dusty episodes at these times.

The closest residential receptor to the wind farm is Crucea village located at 1.2 km south of the Project site. There may be minor impacts during construction of access roads but impacts to residents from dust are not anticipated to be significant.

There are several protected Natura 2000 sites within 10 kilometres of the Project site and the nearest is ROSPA0019 Cheile Dobrogei located approximately 2.5 km east-northeast of the Project site. However, given the

distance to these sites from the proposed construction activities, the likelihood of any construction dust travelling this distance is low.

To mitigate the impacts from dust, suitable dust control measures will be employed. These measures will be detailed in the site Construction Method Statement and are discussed in the sections to come.

5.1.6.3 Combustion Emissions from Traffic

No data regarding construction traffic, meaning number of vehicles, type of vehicles and number of vehicle movements was available at the time this report was prepared. Based on experience from previous similar projects, ERM has assumed a worst-case peak of approximately 965 one-way truck movements and 750 one-way car movements per month. Also, assuming Based on the construction schedule calculation a 6-day working week, it is estimated that there will be a worst-case peak of approximately 72 two-way truck movements per working day. Based on the same calculation methodology, it is assumed that there will be 55 two-way car movements per day, which is estimated to remain unchanged throughout the entire construction period.

The preferred access route to the site will be along national road DN 2A and county road DJ 226B to Pantelimon village followed by county DJ 225, with a total distance of approximately 75 km. If we assume all vehicles will travel this route, we can estimate total emissions from construction traffic using EC standard vehicle emission limits as follows:

*Emissions = Emission Limit * Route distance*

where:

2.72 g CO/km and 1.0 g NO_x/km are the emission limits assuming compliance with EU Directive 91/441/EEC for petrol engines;

4.00 g CO/km and 2.00 g NO_x/km are the emission limits assuming compliance with EU Directive 1999/96/EC for ETC vehicles used for the carriage of goods and exceeding 3.5 tonnes laden; and

the route distance is 75 km.

With these assumptions, the daily regional CO emissions during the construction phase will be 22.5 kg/day from passenger vehicles and 43.2 kg/day for heavy goods vehicles. For NO_x, the daily emissions will be 8.2 kg/day from passenger vehicles and 21.6 kg/day. Note that impacts from

CO and NO_x were evaluated because these are the pollutants with the largest emission rates from vehicle combustion.

As these impacts will be distributed across the travel route, and are not large in nature, these impacts will not likely impact regional air quality. They will also be offset by the significant emission reduction benefits for these pollutants achieved during the operational phase. As such, a more refined evaluation of these impacts is not considered necessary.

5.1.6.4 Dust Mitigation

Although significant impacts from dust are not expected to arise, the following measures will nevertheless be adopted during construction:

- water suppression or dust extraction equipment will be fitted to drilling and grinding equipment where necessary;
- measures will be taken to prevent the deposit of mud and dirt on public roads;
- containers for dusty materials will be enclosed or covered by suitable tarpaulins / nets to prevent escape of dust during loading and transfer from site;
- lorries carrying dusty materials to or from the site will be sheeted;
- speed limits will be set to minimise disturbance to exposed running tracks;
- all measures will be contained within the Construction Method Statement.

5.1.7 Operational Impacts

5.1.7.1 Potential Impacts

During operation, the wind farm will not have any source of pollution, so no pollutants will be released into the atmosphere. The traffic associated with the operational phase of the wind farm is estimated to be limited to approximately 5 light vehicle movements per week associated with scheduled maintenance activities and unscheduled visits for trouble shooting and repairs. Consequently, it can be concluded that the operational traffic impacts associated to the wind farm will be insignificant.

As a positive impact, the wind farm will ensure a decrease of carbon dioxide (CO_2), sulphur dioxide (SO_2) and nitrogen oxides (NO_x) emissions as is it showed in the following section.

5.1.7.2 Mitigation

No mitigation measure is required during operation of the wind farm.

5.1.8 Offset of Air Emissions from Other Energy Production

5.1.8.1 Avoidance of Emissions

Every unit of electricity produced by wind power has the potential to replace a unit of electricity generated by other means. As such, wind farm development reduces greenhouse gas emissions and other emissions, which can cause regional and local air pollution (mainly sulphur and nitrogen oxides). On the basis of the measured onsite wind data and long term wind statistics, BBB UMWELTTECHNIK ERNEUERBARE ENERGIEN GMBH(1) has calculated that approximately 99 MW (108 MW as option) of electricity will be produced annually by the *Crucea North Wind Farm*. The Project will produce approximately 280 million units of electricity annually which will be sufficient to supply the average domestic needs of approximately 60,000 homes.

The electricity potentially replaced by wind farm generation would typically have been supplied by coal-fired or other fossil-fuelled plants. According to the annual report performed by Romanian Energy Regulatory Authority (ANRE) in 2008, the average of the carbon dioxide released from the activities of the energy producers in Romania was 496 grams of carbon dioxide for every unit of electricity (kilowatt hour). Carbon dioxide is an important greenhouse gas implicated in climate change. The generation of power from fossil fuels also emits sulphur dioxide and nitrogen oxides, both causes of acid rain and local air pollution.

To ensure that the positive environmental aspects of *Crucea North Wind Farm* are recognised, the reductions in emissions brought about by the development of the project are presented below.

5.1.8.2 Impact Assessment

The potential reduction in carbon dioxide (CO_2) emissions as a result of operating a 108 MWh wind farm for one year and over a lifetime of 25 years can be estimated using the following formula and are presented in the table below:

CO_2 *(in tonnes)= (A x 0.3 x 8760 x B)/1000*

where:

A = the rated capacity of the wind energy development in MW;

(1) BBB Umwelttechnik erneuerbare Energien GmbH, Stadtmühlweg 9, 92637 Weiden, Telefon: 0961/3917280, Fax: 0961/3917281, k.bergmann@bbb-umwelt.de

0.3 is a constant, the capacity factor, which takes into account the intermittent nature of the wind, the availability of the wind turbines and array losses;

8760 is the number of hours in a year; and

B = 496 kWh, local factor for carbon dioxide from every unit of electricity.

Table 5.5 Estimated Emissions to Atmosphere Avoided

Pollutant	Annual Emission Reduction (tones)	Total Emission Reduction (25 years) (tones)
Carbon dioxide (CO_2)	140,776	3,519,418
Source: www.bwea.com/edu/calcs.html (Calculated in January 2013, using the local factor for CO2 as available for 2008)		

Additionally, emissions of sulphur dioxide and oxides of nitrogen, which contribute to acid deposition, will also be reduced. By reducing the regional emissions of these pollutants, impacts from acid precipitation can also be reduced.

5.2 WATER RESOURCES

5.2.1 Introduction and Scope

This section considers the impacts of the proposed wind farm upon groundwater and surface water resources existing in the project area. The following sections will:

- provide a summary of the baseline features of the project area;
- discuss impacts of the project and associated mitigation measures for construction and for operation.

This assessment is mainly based on information sourced as result of a desktop research and on the outcomes of a geotechnical study(1) performed for the project.

5.2.2 Methodology

For assessing the significance of impacts to water resources the following factors have been considered:

(1) Geotechnical Study,SC GTF Prospect SRL, August 2012

- the magnitude of the potential impact, as determined by its intensity and by its extent in space and time;
- the sensitivity and value of the surface and ground water resources in the vicinity of the Project, taking into account current groundwater flow characteristics, water quality and considering potential secondary impacts (e.g. within catchment areas and groundwater recharge zones); and
- the sensitivity of uses of the water environment (e.g. abstractions, and recreational users).

Impacts are described as being *not significant*, or of *minor*, *moderate* or *major* significance as follows:

- *Minor* impact: small, very short or highly localised changes in the quality or availability of resources of local importance; these may be considered to be of some significance but should not be given much weight in the project design and permitting process;
- *Moderate* impact: substantial changes in quality or availability of resources affecting beneficial uses of local importance, or lesser changes affecting resources of more than local importance; these should be taken into account in project design and decision making; and
- *Major* impact: substantial changes in the quality or availability of resources affecting beneficial uses of more than local importance, including any impacts which make existing beneficial uses no longer viable; these should be given major weight in project design and decision-making.

5.2.3 Baseline Environment

5.2.3.1 Groundwater

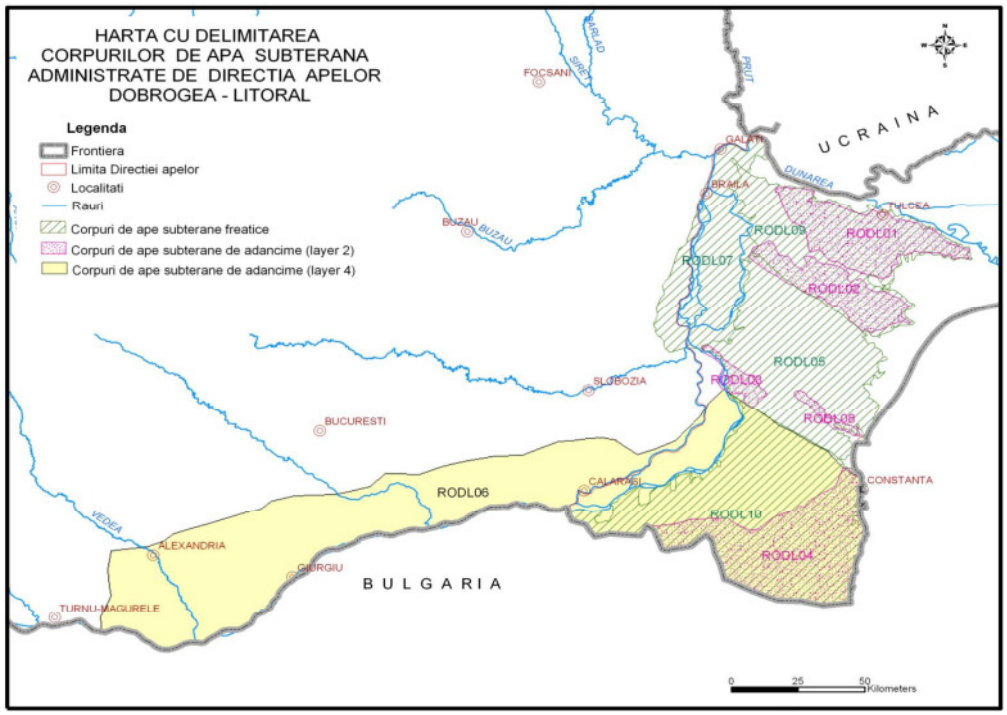
The groundwater resources corresponding to Dobrogea hydrographic basin (to the depth ranging between 0-300 m) make up in total approximately 3,172 million m^3/year (100.6 m^3/s), out of which 84.8 m^3/s – from the deep layers having a very good quality and 15.8 m^3/s – drinking water with a higher mineralization, coming from the shallow groundwater layer. Out of this total, in southern Dobrogea, the exploitable resource is 8.95 m^3/s of the deep layers and 0.2 m^3/s from the shallow groundwater, and in northern and central Dobrogea, the resources are 2.15 m^3/s from the deep layers and 0.85 m^3/s from the shallow groundwater(1).

(1) Management Plan of Dunarea River, Danube Delta, Dobrogea and Coast Water Hydrographic Basin, available at http://www.rowater.ro/dadobrogea/SCAR/Planul%20de%20management.aspx in February 2013

According to the information included in the geotechnical study[1], the general stratification of the foundation areas in the Project site includes: topsoil (down to depths ranging between 0.6 – 1.0 m), group B loess, clay dust, dusty clays and clay. The geotechnical study comprises two parts, each presenting the results of 21 geotechnical borings conducted. Some of the borings were executed at a depth of 15 m below ground level (bgl) while others were performed at a depth of 21 m bgl. The groundwater table was not encountered in any of the geotechnical borings. Therefore, the groundwater depth is estimated to be more than 20m bgl. The groundwater flow direction was not specified in the geotechnical study or the Management Plan of Dunarea River, Danube Delta, Dobrogea and Coast Water Hydrographic Basin. Generally, the groundwater flow direction follows the surface water flow direction. The Project site is located in a watershed and the surface water flow direction is towards the southeast on one side and towards the southwest on the other side. Therefore, it can be assumed that the groundwater flow direction in the Project area is the same as the one of the surface water.

[1]Geotechnical study which the Romanian company SC GTF Prospect SRL performed on the project area in August 2012

Figure 3 ***Delimitation of the groundwater basins included in Dobrogea Litoral hydrographic basin(1)***



As shown in the figure above, the main groundwater body located in the Project site is RODL05 – Central Dobrogea. In the area located north of Crucea, the shallow groundwater layer comprises fragments of lime and green schists.

The groundwater body is of a porous-permeable type, located in actual and subactual alluvial deposits (Holocene), in loessial deposits (Upper Pleistocene -Holocene), in loess (Middle Pleistocene –Upper Pleistocene), as well as at the boundary between the loess/loessial deposits and the terminal damaged side of the lime (Middle Jurasic, Upper Jurasic or Lower Cretacic) or the green schist (Upper Precambrian). Because of the lithological composition, this bode has significant variations in terms of both quantity and quality, horizontally and vertically. This groundwater body is the main source of water supply for most of the localities in Central Dobrogea.

During the past 50 years, construction works to set up irrigation systems and to develop transportation on the River Danube have had adverse impacts on

(1) Management Plan of Dunarea River, Danube Delta, Dobrogea and Coast Water Hydrographic Basin, available at http://www.rowater.ro/dadobrogea/SCAR/Planul%20de%20management.aspx in February 2013

the hydrology as well as hydrogeological regime of Constanta county[1]. During the former communist regime, Constanta had one of the most developed irrigation systems in the country, which included deep underground pipelines containing asbestos, aboveground metal pipes, pumping stations, irrigation channels paved with concrete tiles.

Potable water in Crucea village is supplied via a drinking water supply system. This system includes a water treatment station (de-chlorination) put into operation in 2006 and supplies approximately 90% of the local village population. The drinking water supply network is operated by the county water supply operator *Regia Autonoma Judeteana de Apa Constanta (RAJA) SA* and water is provided from 2 groundwater abstraction wells drilled at a depth of 15-20m. The remaining 10% of the population continues to use water from individual wells or fountains.

At present there is no water supply system in the other villages under the administration of Crucea Commune.

In Crucea village, the construction of the sewage system is currently in progress. Works were supposed to be finalized already but due to lack of funds they have been prolonged and there is no estimated deadline for their completion.

Future investment plans are focusing on constructing water supply and sewage systems in all the villages of Crucea Commune.

No information was available with regard to the supply of water and sewage systems in Pantelimon and Vulturu Communes.

5.2.3.2 Surface water

The Dobrogean valleys, which are tributary to the Black Sea have a general orientation from the west to the east. One of their main features consists of their length, the size of the water bodies decreases from the north to the south.

The hydrographic density of the Dobrogea basin is 0.13 km/km^2. In this hydrographic area, the Danube – Black Sea and Poarta Alba – Midia Navodari channels were constructed.

[1] Dănescu, F., Costăchescu, C., Petrila, M., Necessity study for installation of network shelterbelts for field protection in Constanta County, Forest Research and Management Institute (ICAS) Bucharest, Romania, ICAS Annals, 50:299-316, 2007

The Casimcea Plateau, where the Alah-Bair Hill is located, having the highest elevation in the Project area (300-350m), is the orographic junction from where the surface water bodies flow towards the southwest and southeast.

The closest permanent surface water body is Cartalu Creek, located approximately 1 km northeast of the Project site. This is tributary to Casimcea River. The second closest permanent surface water body is Darea Creek located 2 km southwest of the Project site and tributary to the Danube River.

According to Annex 5(1) of Law 575/2001 *Approval of the Spatial Planning of the National Territory – Section V: Natural Hazard Areas*, Crucea and Pantelimon communes are exposed to risks of flooding at times of very heavy rainfall which may cause sudden gushes of water to pour down from the neighbouring hills.

The decision on the type of construction materials and features of the foundations for the turbines, polls and project substation took the flooding risk of the area into account.

5.2.4 Construction Impacts

5.2.4.1 Groundwater

Groundwater is expected to be present at depths lower than 21m in the project area. There are however, two wells supplying water to Crucea village, drilled at depths between 15-20m.

In terms of groundwater vulnerability, the medium permeability of the overlying sediments (loess complex (B)) is compensated by the relatively deep location of the groundwater table (lower than 20 m bgl). Therefore, it could be considered that the groundwater vulnerability is medium. Given that the aquifer may be used for domestic and potable purposes by the population without connection to the potable water supply system, the groundwater sensitivity is considered high.

Potential impacts to the groundwater resource during the construction of the Project may occur from leaks or spills of diesel or lubricants on the site from equipment or machinery, from the reworking of contaminated material or from the works to cast the turbine foundations. In order to minimise any adverse impacts to groundwater from potential contaminants from

(1) Annex 5 lists the Romanian urban and rural settlements which may be affected by flooding from the water bodies or from gushing water.

construction activities, mitigation measures will be implemented. Cut off ditches will be used to prevent water from entering excavations. Any draw-down of groundwater during excavation works is expected to be localised and levels will normalise rapidly once pumping ceases. Where possible, cut-off drains will be used rather than pumping to control water levels. However, in either case the effects of dewatering will be short-lived and very localised, and no impacts on water resources are predicted.

No significant impacts to groundwater are therefore predicted to occur as a result of construction contamination or dewatering activities.

Given the predominant agricultural nature of the land in the project area contaminated material is very unlikely to be encountered. Consequently, no significant impacts on groundwater quality are predicted during construction.

5.2.4.2 Surface water

The surface water bodies identified within close proximity of the Project site is Cartalu Creek which is located approximately 1 km from the boundary of the Project site. Therefore, it is not anticipated that construction works will affected this water body.

Excavation activities will be restricted during periods of intense rainfall, and temporary bunding will be provided to reduce the risk of sediment, oil or chemical spills to the natural field drainage system.

5.2.5 Operational impacts

5.2.5.1 Groundwater

Overview

Turbine foundations could create a preferential pathway for contaminants to reach groundwater resources. However, no existing contamination has been identified. Turbine maintenance requires only minimal use of lubricants of other materials with groundwater potential.

Given that the concrete foundations depth will be limited to 1.5-2 m bgl and the aquifer was not encountered by the geotechnical boreholes advanced to 21 m bgl, the groundwater contamination risk can be considered very low.

Rotor bearing

During rotor bearing operation, grease may leak from the labyrinth seals in the rotor bearing. The grease flows into two drip trays, which are regularly emptied during maintenance.

Gearbox

The gearbox has non-abrasive, non-wearing sealing systems on both the drive shaft and the driven shaft. In the case of an accident, oil that emerges from the gearbox is collected in a drip tray beneath the gearbox. Any oil leaking from the oil cooling circuit is collected in the drip tray in the tower, which is emptied during maintenance.

Tower

The highest tower platform is designed as a drip tray. The volume of the drip tray is minimum 630 liters.

Electrical Transformer

The transformer is located outside the wind turbine in the transformer station. The transformer oil is usually not changed during the life time of the equipment. In case of an accident, any oil that emerges is collected in an impermeable concrete drip tray beneath the transformer.

Based on the above, no significant groundwater contamination impacts are anticipated during operation.

Whilst some localised effects on groundwater infiltration into the underlying bedrock may occur, the overall impacts are predicted to be minor given the area of the site (22.64 km^2) compared with the area affected by turbine foundations, crane pads, roads and Project substation (0.95 km^2).

5.2.5.2 Drainage patterns

During operation, the project will have no water demands and no discharges will be made. New access roads, turbine bases and other hardstanding areas will, however, increase impermeable areas on the site, and cause a reduced and localised, but still noticeable increase, in runoff rates and peak flood flows across the site. The proposed impermeable areas are small relative to the total site area. In order to reduce the potential impact on the drainage pattern, roadside drains will be designed to avoid disturbance to the natural hydrology. The depth of individual drainage ditches will be kept to the minimum necessary to allow free drainage of the tracks, and drain lengths will be minimised to avoid disruption of natural drainage directions. In addition, the drainage ditches will be backfilled with geotextile and gravel to

inhibit the movement of water flow through the channel. The overall magnitude of modifications to the drainage pattern is predicted to be minor. The roadside drainage design will aim to ensure that runoff percolates to the underlying ground rather than concentrates as channel flow.

Runoff from any large hardstanding areas (including the turbine bases, mast base and crane hardstanding) will be drained to the surrounding land which will act as a buffer zone to slow runoff, to attenuate the flood peaks, and allow sediments to settle out.

Overall no significant impact is anticipated to run-off rates or drainage patterns as a result of the wind farm operation.

5.3 SOIL

5.3.1 Introduction and Scope

This chapter considers the impacts of the proposed wind farm upon soil in the project area. The following sections will:

- provide a summary of the baseline features of the project area;
- discuss impacts of the project and associated mitigation measures for construction and for operation.

Impacts to land use are assessed in the *Social Chapter*.

5.3.2 Methodology

This assessment is mainly based on information obtained as result of a desktop study and on the results of a geotechnical study(1) performed for the project.

For assessing the significance of impacts to soil, the nature and quality of resources available within the proposed site boundary and the effect of the development on these in terms of loss, sterilisation or reduction in quality as a result of project construction or operation have been considered.

5.3.3 Baseline Environment

The project site is underlain by Chernozem soils, which are common in the Dobrogea region. These soils are characteristic for areas with a lower amount of rainfall than water losses through vaporisation.

(1) Geotechnical Study, SC GTF Prospect SRL, August 2012

Chernozem soils are very fertile and have a high production capability due to their well-developed, dark, humus horizons and rich nutrient content. They have a fine middle texture with carbonates in the topsoil. The humus layers range between 3 and 12 cm in thickness and total thickness of the vegetal soil may vary from 60 cm to 120 cm. As there is a limestone parent rock in the project area, the soil is alkaline and rich in calcium.

There is no history of soil contamination known at the project site.

5.3.4 Construction Impacts

Assessment of Impacts to Soils

The soils within the study area are considered to be fertile and of value to the local farming community. According to the geotechnical study, the soil will suffer compaction measures in the areas of the future foundations of turbines, platforms/pads and access roads.

Compaction to soils can also occur from the movement of heavy vehicles and machinery during construction, subsequently altering the soil structure. This can also cause deterioration in soil fertility due to the absence of oxygen (anaerobiosis). Stripped soil in storage alongside construction working areas will be vulnerable to degradation, dehydration, wind and water erosion and contamination by pesticides used to control weed invasion unless mitigation measures are implemented. Degradation may occur due to the breakdown of organic materials and biological structures binding the soils together. Best practice soil handling techniques will be implemented and detailed within construction method statement which will mitigate these potentially adverse effects. These will include the following measures:

- Topsoil stripping will be limited to the footprint of the turbine, platform and pads locations and the access roads.
- Topsoil will be stored carefully to one side of the construction working area, in such a way that it is not mixed with sub soil or trafficked on by vehicles.
- After the installation of the cable for the underground transmission line, the stored soil and topsoil will be used as backfill for the trenches and the area will be restored to its initial condition.
- Following reinstatement, any surplus (uncontaminated) soil will be spread over fields subject to agreement with the landowner/occupier and/or used for landscaping within the project area.
- Stockpiles will have a maximum of 2 m high to avoid compaction from the weight.

- The construction working area will be reinstated as far as practicable to the same condition as before.

Contamination of soil during construction could occur through direct spillage of materials such as fuels and lubricants from vehicles and generators.

In order to limit potential impacts associated with direct spillage of fuels and lubricants the following measures aimed to prevent harmful substances from reaching the subsurface will be implemented:

- Refuelling of vehicles or equipment will be restricted to impermeable hardstanding within the construction camp. Any maintenance or re-fuelling will take place only with implementation of appropriate secondary containment and spill controls.
- Transportation vehicles and construction equipment will be parked on paved surfaces during the night. The paved surfaces should be equipped with oil/water separators to treat storm water, if possible.
- Construction works will be executed so that subsurface contamination is avoided. Any oil or fuel spills will be immediately cleaned up, and any contaminated areas will be remediated and restored after construction.

The contractor will also develop procedures for emergency/spill response, and for the storage and handling of fuels, construction materials and wastes.

Contamination that may already be present in the soil from current or historical sources may also be encountered during excavation and this could impact the construction workforce via contact and associated ingestion, the land drainage network via surface run-off from stockpiles. However, given the agricultural nature of the project area, the presence of historical contamination is considered very unlikely and, if present, it is likely to be only as localised hotspots or low concentration.

The soils that will be directly impacted by the project are of value to local farmers. However, given the ability of the soils in the project area to respond well to reinstatement, and the mitigation measures to be implemented, it is predicted that there will be no significant impacts to soils during construction.

5.3.5 Operation Phase Impacts

During the operation phase, potential impacts may be associated with the minimal modification to run-off rates and drainage patterns due to the introduction of impermeable surfaces within the project area.

No significant impacts on soils are anticipated during project operation.

5.4 *RESOURCE EFFICIENCY AND POLLUTION PREVENTION*

In line with IFC PS3, technically and financially feasible resource efficiency and pollution prevention principles and techniques that are best suited to avoid, or where avoidance is not possible, minimize adverse impacts on human health and the environment are to be applied during the entire project life-cycle. The principles and techniques applied during the project life-cycle are to be tailored to the hazards and risks associated with the nature of the project and consistent with good international industry practice, as reflected in various internationally recognized sources, including the World Bank Group Environmental, *Health and Safety Guidelines (EHS Guidelines) and Environmental, Health, and Safety Guidelines for Wind Energy.*

Although during operation phase pollution effects associated with wind farms are rather positive as result of conventional power generation air emissions offsets, the construction and decommissioning impacts are similar with those emerging from any other type of the projects involving construction works and associated transportation activities.

Environmental issues associated with the construction and decommissioning activities may include, among others, noise and vibration, soil erosion, and threats to biodiversity, including habitat alteration and impacts to wildlife.

Any impacts arising during the construction and operation of the proposed project will be addressed through the proposed mitigation measures.

6 SUPPLEMENTARY VISUAL IMPACTS ASSESSMENT INFORMATION

Depending on the location and local public perception, a wind farm may have an impact on visual resources. Visual impacts associated with wind energy projects typically concern the turbines themselves (e.g. colour, height, and number of turbines) and impacts relating to their interaction with the character of the surrounding landscape. Prevention and control measures to address visual impacts include:

- consult the community on the location of the wind farm to incorporate community values into design;
- consider the landscape character during turbine siting;
- consider the visual impacts of the turbines from all relevant viewing angles when considering locations;
- minimize presence of ancillary structures on the site by avoiding fencing, minimizing roads, burying power lines, and removing inoperative turbines;
- avoid steep slopes, implement erosion measures, and promptly re-vegetate cleared land with native species only;
- maintain uniform size and design of turbines (e.g. direction of rotation, type of turbine and tower, and height);
- paint the turbines using a uniform colour, typically matching the sky, while observing air navigational marking regulations;
- avoid including lettering, company insignia, advertising, or graphics on the turbines.

Policy and Local Context

There are no specific regional and local plan policies or guidelines of relevance to the landscape and visual issues which can be applied to the study area. As part of the methodology the assessment of impacts on landscape and visual arising from the Project has been based on four reference documents:

- *Guidelines for Landscape and Visual Impact Assessment*, Second Edition, Landscape Institute and Institute of Environmental Management and Assessment, 2002;
- *Guidelines on the Environmental Impacts of Wind Farms and Small Scale Hydro-electric Schemes*, Scottish Natural Heritage, 2001;
- *Visual Representation of Wind Farms*, Good Practice Guidance, Scottish Natural Heritage, 2007; and
- *Environmental, Health, and Safety Guidelines for Wind Energy*, IFC, World Bank Group.

In 2010 as part of the EIA Study, a visual impact assessment was performed, using WindPro software.

The landscape and visual impact assessment was performed based on data gathered from the following sources: field surveys; computer generated theoretical ZVIs; computer modelled photomontages; and descriptions of landscape features in Dobrogea region included in literature papers.

The key steps in the methodology were as follows:

- two theoretical zones of visual influence (ZVI) were defined for Crucea North Wind Farm based on turbine hub (119 m) and tip heights (175 m);
- the landscapes within the area and within the project site were analysed taking into account the geology, topographical structure, vegetation, forms of landscape importance (*e.g.* archaeological, ecological, hydrogeological), existing conditions, quality and value (reflecting landscape designations). Drawing upon existing studies and the findings of site visits, and the sensitivity of each area, the development of the type and scale proposed was determined;
- in the absence of specific policy designations relevant to landscape and visual impacts other designations within land use plan were identified and used within the assessment;
- viewpoints across the ZVI were selected as representative of the range of views and types of viewer likely to be affected by the project (view to north-west and view to Movila Saragea);
- photomontage images of the development from various viewpoints were prepared;
- Environmental impact quantification and proposed mitigation measures were considered.

During the construction period, the impact on the landscape is temporary and is caused mainly by the following actions: temporary and permanent roads construction; removal of vegetation; site camps/site organization; excavations; turbines installation activities; temporary restrictions; building the substation; other construction works factors: workers, vehicles, equipment.

The routes that will be used by trucks for equipment transport can also impact on short term the landscape. It is to be mentioned that the impact is temporary and will end after finalization of the construction phase. Since the land is used for agriculture, the visual impact will only be limited to a short period, after which will decreases, as the vegetation will repopulate the lands.

After commissioning of the wind farm, the project will generate long-term effects on the landscape:

- Loss of vegetation, although restricted to the minimum required, will affect the agricultural land;

- Installing the turbines will establish a new landscape feature and a reference point for the landscape of the extensive area of the project;
- The construction of the electrical station and access roads will change the landscape of the area.

Taking in account above mentioned observations and the fact that visibility can vary depending on weather conditions, season, time of day, point and direction of observation, number of turbines and other constructions, it can be considered that the landscape will be changed due to the implementation of the project.

In Constanta County, and especially in the project area, in last few years, a large number of turbines were erected and the population has started to consider wind turbines as part of the existing landscape. Regarding the Crucea North project, the general impact to the landscape is anticipated to be moderate. Although the aesthetic appreciation of the landscape is a subjective process, varying from person to person, is generally considered that the contribution to the landscape due to the wind turbines is a pleasant one, which induces the idea of environmentalism and green energy.

Anyhow, the landscape analysis is subjective and the community of which the project is visible will play an important role in defining the effects of changing the landscape. These opinions might arise during the Stakeholder Engagement Plan Implementation process.

At the end of the operational lifetime of the wind farm, unless a new permission is sought, the turbines and other structures will be removed, returning the landscape and longer distance views of the site to largely their present condition. During decommissioning, there will be short term landscape and visual impacts from plant and activities on the site including:

- site compounds, offices and temporary fencing;
- machinery and material storage;
- plant and vehicle movements;
- tall cranes; and
- site lighting in winter months.

Decommissioning is expected to take less time than construction and to cause short term moderate impacts during its duration, reducing to minor over the period to completion of restoration.

Some evidence will remain in close views during the post-decommissioning restoration period, but as with the post-construction restoration, over time the site will return to a more natural appearance. Full restoration of replanted areas could take several years, particularly in areas of more sensitive vegetation. The only structures remaining on site will be the underground turbine foundations and these could have a minor impact as a result of the different appearance of surface vegetation in the longer term.

Special requirements of RCAA[1]

The Romanian Civil Aeronautic Authority (RCAA) required the following conditions[2] applicable to the project:

- The location of the wind turbines and of the heights declared in the documentation sent for endorsement should be respected;
- The tower, the nacelle and the blades shall be painted in white;
- During day time, the towers shall be marked by beacons installed at the maximum level and shall signal white light with a 20,000 cd in intensity, with lamps accepted by RCAA;
- During night-time and during weather conditions with limited visibility (fog, rain, snow), the towers shall be signalled at an intermediary level of 60 m through red colour lights of 10 cd in intensity and at the maximum level through intermittent white-red lights or red lights of 2000 cd in intensity. Only lamps allowed by RCAA shall be used.

Is to be mentioned that all the requirement afore mentioned are also described in the Directive on airports no. 2 - Marking and light beaconage of wind turbines and wind turbine parks, issued by the Romanian Civil Aeronautical Authority on October 23, 2008

The requirement for a white colour finish to all the above ground components of each wind turbine is unusual. Current best practice guidance suggests that grey (RAL 7038) is the most appropriate colour for minimising visual impacts. However, there are a few situations where the colour grey can be prominent for example against a very clear blue sky. Also when the sun is behind the turbines, the colour is irrelevant as all features will appear very dark. Therefore, it is considered that using white for the turbines will increase their visibility but not increase the degree of significance of impact already reported. In some weather conditions such as snow, the white turbines may be less visible than grey versions.

With regard to adding lights to the turbines, primarily this is to highlight the location of the turbines during the night time or when visibility is poor. On both these occasions, visibility of the turbines will not be an issue for sensitive visual receptors. The luminosity of the type of light fitting usually used to assist night time visibility does not normally cause nuisance or glare issues. The nearest residential receptors to the wind farm are approximately 1200 m

(1) Romanian Civil Aeronautic Authority

(2) Requirements set in the Approval no. 18555/13251/404 of 20-06-2012 issued by the RCAA for the Crucea North Wind Farm Project as part of the construction permit application documents

distance to the nearest turbine. Lux levels or degrees of luminance reduce considerably over distance as intensity decreases by a factor of ¼ as the distance is doubled.

At 2.8 kilometres distance it is considered that typical aeronautical light fittings whilst visible will not cause additional visual impact.

7 SOCIAL BASELINE AND IMPACT ASSESSMENT

7.1 BASELINE DATA COLLECTION

7.1.1 Introduction

The following sections present the results of a review of published information and research concerning social and health conditions in the project area (secondary data). These data have been collected from a number of sources (as cited throughout the text). However, the published sources have been supplemented by field based observations carried out in January 2013.

The collection of social baseline data (via review of published data and filling in of submitted questionnaires) enables the integrated social and economic assessment to achieve the following objectives:

- to develop an understanding of potential social impacts (both positive and negative);
- to develop appropriate mitigation and enhancement measures and incorporate them into the ESIA ESMP;
- to develop a foundation for the Project to build long-term relations with local communities and other stakeholders.

7.1.2 Social survey

This section describes the social baseline data collection activities carried out to date. Community engagement activities carried out to date were those which are required as part of the Romanian project permitting process (public announcements in the PUZ approval stage and public hearing in Crucea village as part of the EIA procedure).

The following sources of information were used for the collection of baseline information on the socio-economic environment, demographics, health and safety:

- A questionnaire was prepared and sent to the Crucea, Vulturu and Pantelimon communal authorities in order to collect socio-economic baseline data such as: the incorporated/ unincorporated land areas of the communes, types of crops grown in the agricultural fields, total population of the communes broken down by each village, age and gender structure of the population, religious and ethnic structure of the communes, presence of education facilities, number of pupils receiving

education, health care and entertainment facilities, main economic activities and features of the local infrastructure and utility supply. The questionnaire was sent to representatives of each Commune Mayoralty on January 16, 2012. Due to the large workload of the civil workers within the Mayoralty, a visit was conducted at each Commune Mayoralty on January 31, 2013 to discuss the questions asked and collect available information.

- Press release concerning the provisional results of the Population and Dwellings Census at national level dated August 24, 2012, available in January 2013 on http://www.recensamantromania.ro/;
- Press release concerning the provisional results of the Population and Dwellings Census in Constanta County dated August 24, 2012, available in January 2013 on http://www.constanta.insse.ro/phpfiles/COMUNICAT_RPL_CONSTANTA.pdf;
- Socio-economic statistical data publicly available on the website of the Local Statistical Office of Constanta County in January 2013;
- Provisional results of the Population and Dwellings Census conducted in 2011, available on the website of the Local Statistical Office of Constanta County http://www.constanta.insse.ro/main.php?lang=fr&pageid=596 in January 2013;
- National Report on the condition of environmental factors in 2011, published on the website of the National Environmental Protection Agency, Chapter IV – Land Use, available at http://www.anpm.ro/upload/82095_starea_mediului_2011.pdf and accessed in January 2013;
- *Romania in figures, 2011*, available on the website of the National Statistics Institute http://www.insse.ro/cms/files/publicatii/Romania_in%20cifre%202011.pdf and accessed in January 2013;
- Available statistics on international human development indicators published on http://hdrstats.undp.org/en/indicators/ and accessed in June 2012;
- UNICEF Romania Statistics, source: http://www.unicef.org/infobycountry/romania_statistics.html, accessed in June 2012 ;
- Strategic National Report regarding Social Protection and Social Inclusion (2008-2010), dated 2008 and available in January 2013 on the website of the Labour Ministry at www.mmuncii.ro;

- CIA World Factbook (Romania), updated on January 8, 2013, available at https://www.cia.gov/library/publications/the-world-factbook/geos/ro.html and accessed in January 2013;
- European Demography Report 2010, available http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KE-ET-10-001 and accessed in January 2013;
- Press release no. 14/January 10, 2013 on the Natural Movement of the Population in November 2012, published by the National Statistics Institute on http://www.insse.ro/cms/rw/pages/comunicate/arhivapopulatie.ro.do;
- Highlights on health in Romania 2005, available at www.euro.who.int/document/e88529.pdf and accessed in January 2013;
- Baba, Brînzaniuc, Chereches and Rus, 2008, Assessment of the Reform of the Romanian Health Care System, p. 18-19;
- Iorio M., Corsale A., 2010, Rural tourism and livelihood strategies in Romania, Journal of Rural Studies 26, p. 152–162;
- 2010 National Report on communicable diseases prepared by the National Centre for the Surveillance and Control of Communicable Diseases available on the website http://www.insp.gov.ro/cnscbt/index.php?option=com_docman&Itemid=11 and accessed in January 2013;
- Global Status Report on Alcohol and Health 2011 – Romania Country profile, available at http://www.who.int/substance_abuse/publications/global_alcohol_report/profiles/rou.pdf and accessed in January 2013.

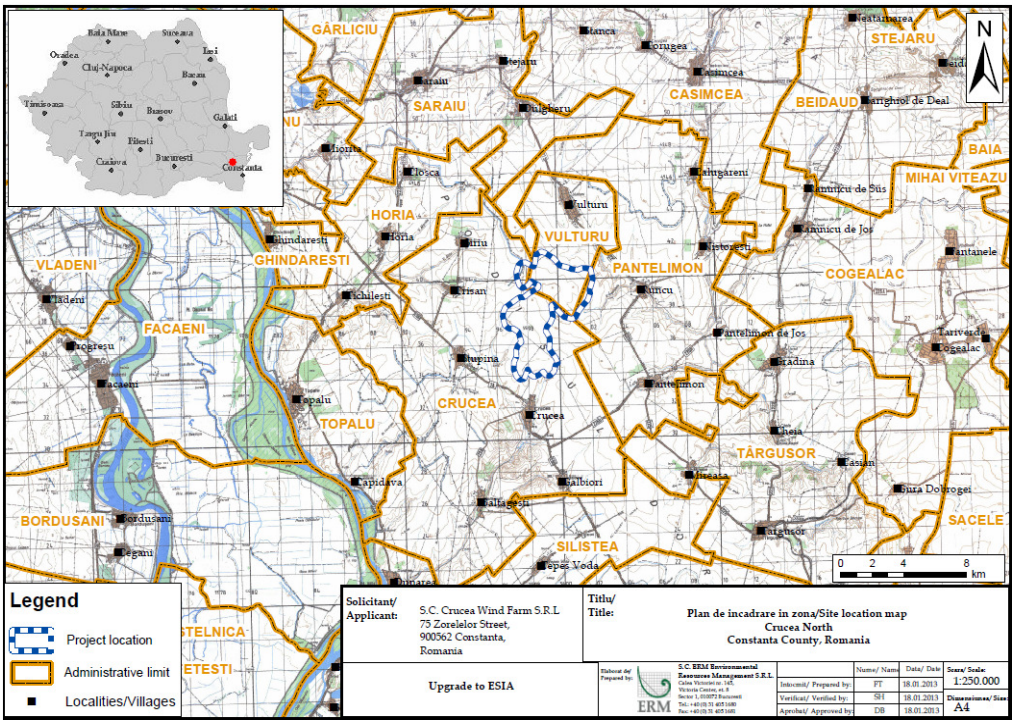
It is important to state that there is no consistency and no comparability between the data sets collected and/or publicly available regarding the three communes.

7.2 SOCIOECONOMIC BASELINE

7.2.1 Local context

The Project is located in Constanta County in the Dobrogea region, southeast of Romania. Each county in Romania is subdivided into towns and communes (comprising several villages). The Project site is located on the administrative territories of three communes, namely Crucea, Vulturu and Pantelimon, as shown in **Fehler! Verweisquelle konnte nicht gefunden werden.**.

Figure 4 ***Location of the Project on the territories of Crucea, Vulturu and Pantelimon Communes***



Constanta County Council is the local body which represents the government, coordinating the work of the Commune and Municipal Councils to carry out public services for the county. County Council members are elected by the inhabitants of the county. Each Commune is governed by a Mayor whose decisions are endorsed by the Commune Council. The number of members of the Commune Council depends on the total population of the commune and is established by the Romanian Law on the Local Public Administration no. 215/2001 republished in 2007 with all subsequent amendments and completions. This law regulates the number of Commune Counselors depending on the total population of each commune, as follows:

- communes with a population ranging between 3,001 and 5,000 inhabitants have 13 Commune Counselors (this is applicable for Crucea Commune);
- communes with a population ranging between 1,501 and 3,000 inhabitants have 11 Commune Counselors (this is applicable for Pantelimon Commune);
- communes with a population of up to 1,500 inhabitants have 9 Commune Counselors (this is applicable for Vulturu Commune).

The Mayor and the Commune Counselors are elected every four years by democratic vote of the commune inhabitants. The last national elections for the local representatives (mayors and local counselors) were held in June 2012.

7.2.2 *Demographics*

Population

According to the provisional results of the 2011 census dated August 24, 2012, Romania has a stable population of 19,043,767 people out of which 9.764.011 (51.3%) are women. At national level, the population density is 79.9 inhabitants/km^2. More than half of the men (51.8%) and women (53.7%) live in urban areas.

In 2007, the year Romania joined the EU, it was a country with 21.5 million inhabitants and ranked 7th by effective population size, of the total 27 EU countries. Also, in 2007, Romania was still a largely rural country as the percentage of rural population was 45% of the total, while, at present, it seems the trend is towards urbanization.

According to the Strategic National Report regarding Social Protection and Social Inclusion dated 2008, starting with 1990, the population growth rate has been negative (decreasing every year with an average annual rhythm of 0.2%) due to a negative migration increment as well as negative natural growth. According to the 2010 European Demography Report, in 2009, Romania had a natural growth of -34.8 thousands and a net migration of -1.6 thousands.

Table 6 ***Evolution of birth rates, death rates and population natural growth[(1)]***

	2007	**2008**	**2009**	**2010**
Natural movement of the population (thousand)				
Live births	214.7	221.9	222.4	212.2
Deaths	252.0	253.2	257.2	259.7
- deaths of babies less than one year of age	2.6	2.4	2.3	2.1
Natural growth	-37.3	-31.3	-34.8	-47.5
Marriages	189.2	149.4	134.3	115.8

(1) *Romania in figures, 2011*, available on the website of the National Statistics Institute http://www.insse.ro/cms/files/publicatii/Romania_in%20cifre%202011.pdf and accessed in January 2013

	2007	2008	2009	2010
Divorces	36.6	35.7	32.3	32.6
		Rates (per 1,000 inhabitants)		
Live births	10.0	10.3	10.4	9.9
Deaths	11.7	11.8	12.0	12.1
- deaths of babies less than one year in age[1)]	12.0	11.0	10.1	9.8
Natural growth	-1.7	-1.5	-1.6	-2.2
Marriages	8.8	6.9	6.3	5.4
Divorces	1.7	1.7	1.5	1.5

1) Per 1,000 live births

In 2008, the EU-27 Member States received nearly two millions migrants of other EU nationalities. Romanians were the most mobile (384, 000 citizens), followed by Poles (266, 000 citizens) and Bulgarians (91, 000 citizens).Therefore, although the majority of EU-27 Member States in 2008 reported more immigration than emigration, in Romania (among other countries) emigrants outnumbered immigrants.

Citizens of Romania are the second most numerous among the EU's non-national population (6.2 % of the EU total foreign population). The most numerous are the Turks (7.5 % of all non-nationals living in the EU in 2009). In the period 2001–2009, the number of Romanians outside their country increased most markedly: from 0.3 million in 2001 to 1.9 million by 2009(1).

According to the provisional results of the 2011 census dated August 24, 2012, Constanta County has a total population of 630,679 people (2), out of which 322,845 (51.2%) are women. The density of the population at the level of the county is 89.2 inhabitants/km^2. Vulturu and Pantelimon communes are among the top three localities where the lowest population densities were recorded. 66.8% of the men and 68.9% of the women in the county live in urban areas.

(1) European Demography Report 2010, available at http://ec.europa.eu/social/main.jsp?langId=en&catId=502&newsId=1007&furtherNews=yes and accessed in January 2013

(2) Source: Press release concerning the provisional results of the Population and Dwellings Census in Constanta County dated August 24, 2012, available on http://www.constanta.insse.ro/phpfiles/COMUNICAT_RPL_CONSTANTA.pdf and accessed in January 2013

Table 7 ***Natural movement of the population in Constanta County, 2009 - 2010 (the most recent years available)***

Years	Absolute figures						
	Live births	**Deaths**	**Natural growth**	**Marriages**	**Divorces**	**Stillbirths**	**Infant deaths (under 1 year of age)**
2009	8,398	7,509	889	5,262	773	51	80
2010	8,161	7,739	422	4,256	912	51	100
				Urban areas			
2009	5,534	4,993	541	3,953	573	32	40
2010	5,391	5,244	147	3,116	677	29	64
				Rural areas			
2009	2,864	2,516	348	1,309	200	19	40
2010	2,770	2,495	275	1,140	235	22	36

Table 8 ***Natural movement of the population in Constanta County, 2009 – 2010 – rates per 1,000 inhabitants***

Years	Rates (per 1,000 inhabitants)						
	Live births	**Deaths**	**Natural growth**	**Marriages**	**Divorces**	**Stillbirths per 1,000 births (live + still)**	**Infant deaths (under 1 year of age) per 1,000 live births**
2009	11.6	10.4	1.2	7.3	1.07	6.0	9.5
2010	11.3	10.7	0.6	5.9	1.26	6.20	12.3
				Urban areas			
2009	11.0	9.9	1.1	7.8	1.14	5.7	7.2
2010	10.7	10.4	0.3	6.2	1.34	5.4	11.9
				Rural areas			
2009	13.1	11.5	1.6	6.0	0.92	6.6	14.0
2010	12.6	11.4	1.3	5.2	1.07	7.9	13.0

Table 9 ***Natural movement of the population in Constanta County in the first quarter of 2012 compared to the first quarter of 2011***

Live births		Deaths		Natural growth		Still births		Infant deaths (under 1 year of age)	
2011	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**
3,390	3,525	3,794	4,056	-404	-531	11	12	33	45

No data were available on the migration increments for Constanta County or for the Crucea, Pantelimon and Vulturu communes.

According to the provisional results of the 2011 census, the population of the local communes is:

- Crucea commune: 2,785 inhabitants, out of which 1,450 men and 1,335 women;
- Pantelimon commune: 1,459 inhabitants, out of which 778 men and 681 women;
- Vulturu commune: 610 inhabitants, out of which 307 men and 303 women.

However, data made available by Crucea Commune Mayoralty in January 2013 indicate that the commune has a total population of 3,308 inhabitants, out of which 1,454 men. Available data indicate that in 2009 the structure of the local commune population by age groups was:

- 0 – 6 years: 352 people;
- 6 – 18 years: 756 people;
- 18 – 60 years: 1,285 people; and
- > 60 years: 909 people.

No further data were available with regard to the structure of the population in Pantelimon and Vulturu communes by age groups.

Ethnic minorities

The provisional results of the 2011 census published in the press release dated February 2, 2012 issued by the National Statistics Institute indicate that Romania's ethnic structure is as follows: 88.6% Romanians, 6.5% Hungarians, 3.2% Gypsies, 0.27% Ukrainians, 0.19% Germans, 0.15% Turks, 0.12% Russian Lipovans (also known as "Old Believers"), 0,10% Tatars and 0.3% undeclared.

The spatial distribution of the population by ethnicity shows that Romanians make up the majority of the population in Bucharest (96.6%) and in 39 counties (the share ranges between 98.5% in Botoşani and 52.6,% in Mures counties), while in other 26 counties Romanians make up more than 90% of the total population.

Hungarians are to be found mainly in Harghita (84.8%) and Covasna (73.6%) counties but also in Mureş (37.8%), Satu Mare (34.5%), Bihor (25.2%) and Sălaj (23.2%).

Approximately 90% of the Turkish population is located in Constanța (21.0 thousand people) and Tulcea (1.9 thousand people) counties and in Bucharest (2.4 thousand people).

Approximately 87.7% of the Russian-Lipovans are living in the following counties: Tulcea (10.9 thousand people), Constanța (3.5 thousand people), Iaşi (2.8 thousand people), Brăila (1.9 thousand people), Suceava (1.7 thousand people).

Many Turkish and Tartars moved into the Dobrogea region during the period of Ottoman rule (1396 – 1912). Hence, the largest share of the Tartar (Mongolian Turkish) population (19.7 thousand people), namely 96.4%, is still living in Constanța county at present.

The provisional results of the 2011 census do not provide information on the ethnic structure of the population living in Constanta County. According to the database available on the website of the Ethnocultural Diversity Resource Center[(1)] , data corresponding to the 2002 census indicate the following main ethnicities to be present in the structure of the Constanta county population:

- Romanians: 91.3%;
- Turks: 3.4%;
- Tartars: 3.24%; and
- Roma population: 0.84%.

In Crucea Commune, according to the data made available, there are 12 Turks and Tartars, 5 Gypsies, 1 Russian and the remaining are Romanians.

[(1)] Ethno-demographic structure by geographical areas, data corresponding to year 2002, available at http://www.edrc.ro/recensamant.jsp?regiune_id=503&judet_id=634&localitate_id=0 and accessed in January 2013

No data were available with regard to the structure of the population in Pantelimon and Vulturu communes by ethnicity.

All people belonging to ethnic minorities in the three communes understand and speak Romanian language.

According to the representative of the communes, minorities are integrated into society and co-exist in harmony. No conflicts have been reported between these ethnic minorities.

According to article 6 of the Romanian Constitution published in 2003, the Romanian State acknowledges and guarantees the people belonging to national minorities the right to keep, develop and express their ethnic, cultural, language and religious identity. However, the National Minorities Law has been a sensitive issue for most political regimes. It has suffered several amendments and, at present, it has not been passed by the Romanian Regulatory Body.

Moreover, as a member of the Council of Europe since October 7, 1993 Romania was the first country to ratify the Framework Convention for the Protection of National Minorities on May 11, 1995.

Religion

According to the provisional results of the 2011 census dated August 24, 2012(1), at national level, the structure of the population by religion shows that:

- 85.9% of the people are Christian – Orthodox;
- 4.6% are Roman-Catholics;
- 3.2% are Reformers;
- 1.9% are Pentecostals;
- 0.8% are Greek-Catholics;
- 0.6% are Baptists;
- 0.5% are Seventh-day Adventists.

People having another religion than the ones mentioned above make up 1.8% of the total population. Approximately 0.1% of the total population declared

(1) Source: Press release concerning the provisional results of the Population and Dwellings Census in Constanta County dated August 24, 2012, available on http://www.constanta.insse.ro/phpfiles/COMUNICAT_RPL_CONSTANTA.pdf and accessed in January 2013

themselves „without religion" and almost the same share declared they do not believe in any religion.

In Constanta county, the structure of the population by religion shows that:

- 90.5% of the people are Christian – Orthodox;
- 6.8% are Muslims;
- 0.7% are Roman-Catholics;
- 0.4% are Pentecostals.

Old Testament Christians, Seventh-day Adventists and Baptists each make up between 0.1% and 0.4% of the county population.

People having another religion than the ones mentioned above make up 0.4% of the total county population. Approximately 0.05% of the total county population declared themselves „without religion" and 0.09% declared they do not believe in any religion.

In Crucea commune there are five Christian-Orthodox churches, 6 Orthodox cemeteries and one Muslim cemetery(1). Most of the population is Christian Orthodox. There are 44 Catholics, 12 Muslims and 3 Baptists.

No information was provided by the Mayoralties of Pantelimon and Vulturu communes with regard to the structure of the population by religion and the number and denominations of the churches.

Language

Table 10 Preliminary stable population by mother tongue at the 2011 census, in Romania

Mother tongue	People (number)	%
Preliminary stable population	19,043,767	100.0
Romanian	17,263,561	90.6
Hungarian	1,268,444	6.7
Romani (Gypsy)	247,058	1.3
Ukrainian	49,547	0.3

(1) Data published on the website of Crucea Mayoralty http://www.crucea.judetul-constanta.ro/comuna-crucea.html?start=4 accessed in January 2013

Mother tongue	People (number)	%
German	27,019	0.1
Turkish	26,179	0.1
Tartar	18,143	0.1
Russian	18,971	0.1
Another mother tongue	73,169	0.4
Non-declared mother tongue	51,676	0.3

Table 11 ***Preliminary stable population by mother tongue at the 2011 census, in Constanta County***

Mother tongue	People (number)	%
Preliminary stable population	630,679	100.0
Romanian	582,804	92.4
Hungarian	407	0.1
Romani (Gypsy)	3,448	0.5
Ukrainian	42	0.0
German	110	0.0
Turkish	19,499	3.1
Tartar	17,620	2.8
Russian	2,897	0.5
Another mother tongue	2,881	0.5
Non-declared mother tongue	971	0.1

No data were made available about the structure of the population of the communes by mother tongue.

English is understood and spoken predominantly by people in the educated classes across Romania and within Constanta County. According to statistical data for 2007, the study of English, regularly as first foreign language, begins at the ages of 6-7 and continues throughout the entire education process. French, German and Russian are usually studied as second foreign languages starting at the ages of 10-11 during secondary education. Sometimes French, German or Russian may be included in the curriculum as the first foreign language rather than English.

In Crucea Commune, English is taught as a first foreign language starting in the second grade (primary schooling) and French is taught as a secondary foreign language starting in the fifth grade (secondary schooling).

No data were made available about the foreign languages taught in the schools existing in Pantelimon and Vulturu communes.

Social tension

According to the representatives of the three communes, all ethnic minorities are fully integrated into society. No tensions have been reported between ethnic groups for any reason be it political, ethnic, religious or of any other nature.

7.2.3 Livelihoods, subsistence and economic activities

Housing

The preliminary results of the 2011 census indicate that at national level, there are 7.1 million households in Romania and 8.5 million dwellings out of which 8.45 million conventional dwellings(1) and 8.1 thousand other dwelling units(2). There are in total 5.1 million buildings (5,117,777), out of which 5.1 million (5,104,662) buildings with dwellings(3).

In Constanta county, there are 227,922 households hosting 99.4% of the county population (the remainder being in institutions such as student hostels, elder or child care facilities or homeless). There are in total 126,826 buildings with 262,107 conventional dwellings having a total of 732,2 thousand dwelling rooms.

Table 12 Structure of the dwelling fund by categories of localities in Constanta County

	TOTAL	Municipalities and towns (urban areas)	Communes (rural areas)
Number of buildings with dwellings*)	125,275	57,043	68,232

(1) A conventional dwelling is a distinct unit from a functional standpoint, comprising one or several rooms for dwelling and generally provided with a kitchen, bathroom etc. and/or other service space (still room, limbo), independent of other dwellings or spaces, having a separate entrance, regardless whether it is occupied by one or several households or where it in unoccupied.

(2) Residential and non-residential buildings hosting conventional dwellings

(3) Residential buildings intended to provide collective dwelling space, hosting conventional buildings and non-residential buildings in which conventional dwellings are located

Number of conventional dwellings	262,107	189,301	72,806
Number of dwelling rooms	732,220	493,115	239,105

*) residential buildings, buildings intended to provide collective dwelling space hosting conventional dwellings and non-residential buildings hosting conventional dwellings

Although the number of buildings with dwellings in the urban areas makes up only 45.5% of the total number per county, these are formed of a larger number of dwellings. Therefore, the share of conventional dwellings in the urban areas (72.2%) exceeds the one in the rural areas.

Out of the total conventional dwellings in the county, 84.7% have water supply in the dwelling (95.3% in the urban areas and 57.1% in the rural areas). In Constanta county, 89.6% of the conventional dwellings have a kitchen in the dwelling (94.0% in urban areas and 78.1% in the communes). In Constanta city, 96.1% of the total number of conventional dwellings have a kitchen inside the dwelling. None of the communes affected by the Project are among those known to have high shares in terms of kitchens existing in the dwellings.

At county level, 92.2% of the dwellings in the urban areas have a bathroom inside compared to only 47.8% in the rural areas.

The urban areas of Constanta county are predominantly characterized by high rise apartment blocks, most of which were built in the period 1960 –1990. Some of these buildings are in an advanced state of decay and a relatively small share of the apartment blocks are newly built and observe modern building standards. The suburbs and the rural areas display a predominance of one-storey houses made of compacted dirt or bricks.

Figure 5 *Typical Apartment Blocks in the City of Constanta*

Table 13 *Population, dwellings and buildings in Crucea, Pantelimon and Vulturu communes*

Commune	Stable population			Number of households of the population	Average number of people per household	Number of buildings	out of which
	Both genders	Male	Female				Buildings for dwellings
1	2	3	4	5	6	7	8
Crucea	2,785	1,450	1,335	977	2.85	976	974
Pantelimon	1,459	778	681	495	2.95	500	500
Vulturu	610	307	303	202	3.02	203	203

Most houses in Crucea, Pantelimon and Vulturu Communes, as well as in the villages under their administration, are single storey and are built of

bricks on relatively small plots of land. A few apartment buildings were also seen in these communes most of which were rather neglected and decaying.

Figure 6 ***Typical house in the Project area***

Utility infrastructure in the local communities

"In 2008, only 33% of rural residents in Romania were connected to a water supply network, only 10% to a sewerage system and only 10% of rural roads were of adequate standard. Basic social infrastructure (health and education systems, finance and credit provision, etc.) were also much less developed than in urban areas. These factors hamper economic development, increase out-migration and exacerbate sanitary and environmental problems (Iorio, Corsale, 2010, *Rural tourism and livelihood strategies in Romania*, p. 152)."

Table 14 *Conventional dwellings in Constanta County and the communes of interest, by utilities and appurtenances available (according to the 2011 Census)*

County/ Commune	Total no. of conventional dwellings	out of which, conventional dwellings having the following available:								out of which, conventional dwellings having:			
		Water supply inside the dwelling		Sewage system inside the dwelling[1)]		Electrical installation		Central heating[2)]		Kitchen in the dwelling		Bathroom in the dwelling	
		Number	% of the total	Number	% of the total	Number	% of the total	Number	% of the total	Number	% of the total	Number	% of the total
	1	2	3	4	5	6	7	8	9	10	11	12	13
Constanta County	262,107	221,949	84.7	217,479	83.0	253525	96.7	160,153	61.1	234,779	89.6	209,044	79.8
Crucea Commune	1,053	248	23.6	244	23.2	1,015	96.4	31	2.9	710	67.4	193	18.3
Pantelimon Commune	515	91	17.7	87	16.9	501	97.3	29	5.6	422	81.9	87	16.9
Vulturu Commune	215	58	27.0	58	27.0	208	96.7	12	5.6	158	73.5	54	25.1

[1)] Dwellings with a sewage system connected to a public system, own system or other situation

[2)] District heating or own heating installation.The following information concerning the drinking water supply in Crucea commune (and villages under its administration) was taken from the website of the Mayoralty[(1)]. Crucea village has a central drinking water supply system taking water from two wells with a depth ranging between 13 – 15 m. The water is treated and submersible pumps direct it into a storage tank with a capacity of 250 mc from where it is pumped into the village supply system.

[(1)] http://www.crucea.judetul-constanta.ro/comuna-crucea.html?start=5 accessed in January 2013

The water supply system was constructed in 2004 and comprises 8,751 m of HDPE pipelines. Approximately 75% of the dwellings in Crucea village are connected to the water supply system and the remainder of the population uses water from individual wells.

Crisan and Siriu villages do not have a central drinking water supply system. The population living in these villages uses water from individual wells having a discontinuous availability of water. The works for the modernization and rehabilitation of the water supply system in Baltagesti started at the end of 2008. The works to supply water to the population in Stupina and Galbiori villages started in June 2009.

None of the villages in Crucea Commune has an operational sewage system. The works to construct a sanitary wastewater sewage system in Crucea village started in June 2009.

Future investment planned by the Crucea Mayoralty includes the construction of water supply systems in each of the commune villages.

All the commune is supplied with electricity. The supply system comprises overhead medium-voltage (20 kV) transmission lines, substations and low-voltage (0.4 kV) transmission lines serving consummers and street lighting.

There is no gas supply network in the commune. Gas bottles are used as fuel for cooking machines and most houses are heated in wintertime by burning wood.

Cable TV and mobile phone use is widely spread in the commune.

No information was available with regard to the utility infrastructure in Pantelimon and Vulturu communes.

Recreation and Community Facilities

Recreational facilities are typically sparse in Romanian rural areas. Communities usually have a community center which comprises a building under the ownership and administration of the Mayoralty. This is used to host local activities, events and meetings. There are four community centers located in Crucea, Gălbiori, Crişan and Şiriu villages, one library under the subordination of the Mayor and County Council and a festivity room in Stupina village with modern equipment.

In Vulturu commune, there are one library and one museum.

Subsistence and local economic activities

Table 15 ***Civil employed population, by branches of the national economy (at the end of the year), in Constanta County[1]***

Activity (by NACE codes second revision)	**2008**	**2009**	**2010**
		Thousand people	
Total	**309.0**	**295.7**	**291.6**
Agriculture, forestry and fishing	63.0	62.9	62.8
Industry	60.3	54.9	52.2
Extractive industry	2.0	2.0	1.6
Processing industry	45.9	40.5	39.7
Production and supply of electrical, thermal, gas, hot water and air conditioning	4.3	4.4	4.2
Water supply, waste management, land remediation	8.1	8.0	6.7
Constructions	35.7	33.5	34.2
En detail commerce, repair and maintenance of vehicles and motorcycles	45.7	44.2	44.2
Transport and storage	29.2	26.9	25.3
Hotels and restaurants	10.5	7.7	7.8
Information and communications	2.6	2.6	4.4
Insurance and financial intermediation	3.6	3.4	3.2

[1] Constanta County in Figures 2011, available at http://www.constanta.insse.ro/phpfiles/ANUAR_Constanta_2011.pdf and accessed in January 2013

Activity (by NACE codes second revision)	2008	2009	2010
		Thousand people	
Real estate transactions	1.7	2.0	1.5
Professional, scientific and technical activities	3.9	3.6	3.0
Administrative services and support service activities	10.4	10.4	10.4
Public administration and defense; social insurance in the public system	7.0	7.5	6.6
Education	12.8	12.1	11.6
Health and social assistance	14.1	13.4	13.4
Entertainment, cultural and recreational activities	2.4	2.7	2.2
Other activities of the national economy	6.1	7.9	8.8

According to the data published on the website of the Crucea Mayoralty in January 2013, there are several private capital agricultural companies and shops operating in Crucea Commune and employing a total number of 132 people in activities related to agriculture, commercialization of livestock, ecological agriculture, growing trees, milk processing, recovery of recyclable non-metallic waste.

In terms of agriculture, main crops grown in Crucea commune are wheat, sun-flower and maize. Two-row barley, peas, oat and rape are also crops which can be cultivated in the area.

Crucea commune does not have any economic operators involved in tourism.

No information about the local economy was available on the websites of the Pantelimon and Vulturu communes. Despite the face-to-face discussions with the two Mayors and their availability to provide the requested information in

the questionnaires, no feedback was provided by the time this chapter was prepared.

Land use

According to the National Report on the condition of environmental factors in 2011, published on the website of the National Environmental Protection Agency, in 2010, agricultural land had the biggest share in terms of land use at national level (61.39%). Table 3 below shows national level land use in 2010.

Table 16 Land use in Romania, 2010

Category of use	Area	
	thousands of ha	%
Agricultural land	14,635.5	61.39
Forests and other land covered by forestry vegetation, out of which:	6,757.6	28.35
• forests	6,354	26.65
Constructions	728.3	3.06
Roads and railways	388.8	1.63
Water and moors	833.6	3.50
Other areas (unproductive land)	495.3	2.07
Total	23,839.1	100

Source: Annual Report on the condition of the Environmental Factors in Romania, 2010, available at http://www.anpm.ro/upload/82095_starea_mediului_2011.pdf

According to the 2011 Report on the Condition of Environmental Factors in Constanta County, out of the total county area of 707,129 ha, the land used for agricultural purposes was 558,204 ha (approximately 80%). The table below shows the agricultural land use in Constanta County during 2007 - 2011.

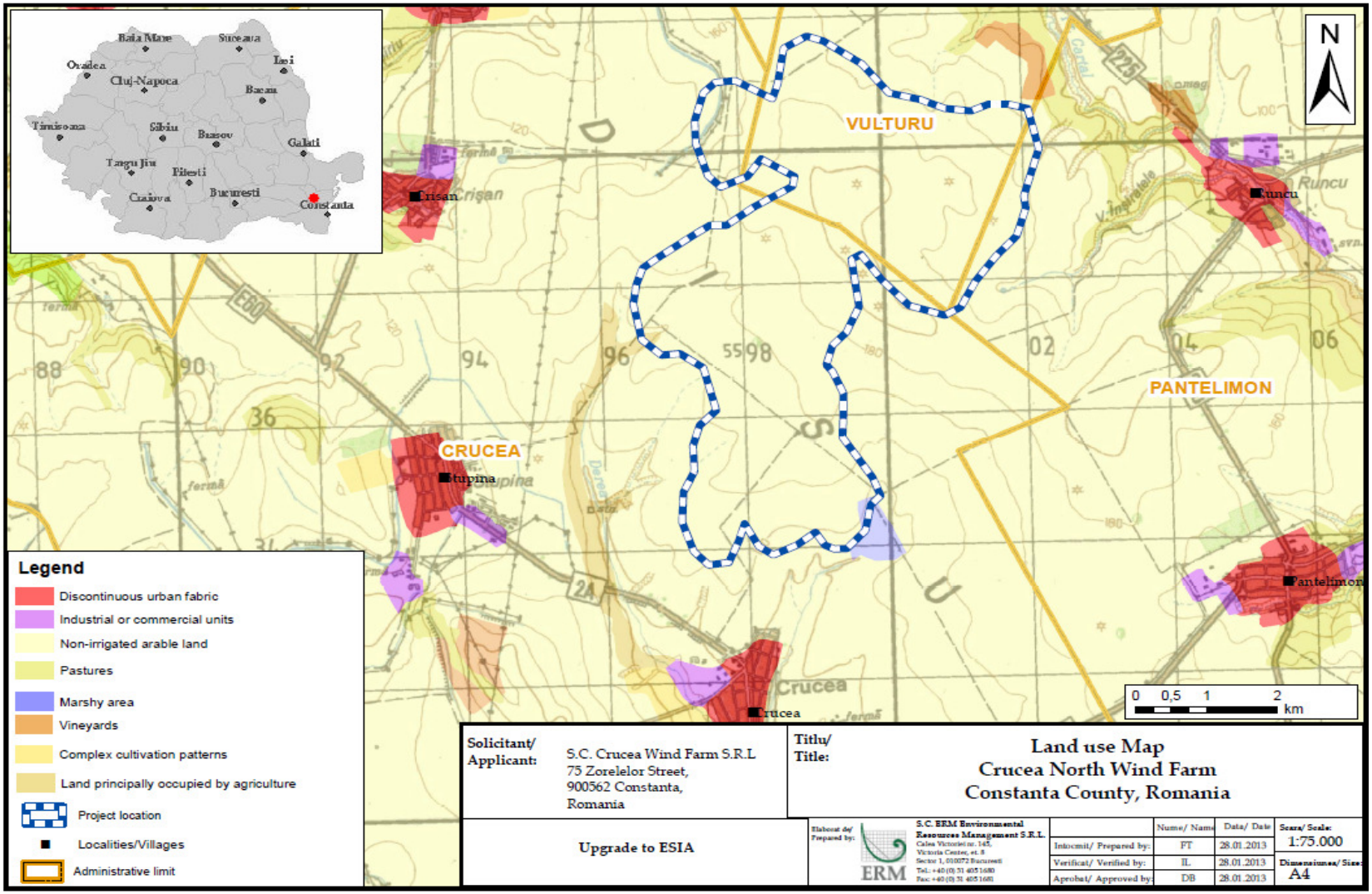
Table 17 Agricultural land use by category in Constanta county, 2007 - 2011

No.	Category of use	Area				
		2007	2008	2009	2010	2011
1	Arable	485,802	485,802	485,702	485,622	484,154
2	Pastures	61,779	61,779	61,779	61,779	58,693
3	Hayfield and natural pastures	-	-	-	-	-

No.	Category of use	Area				
		2007	**2008**	**2009**	**2010**	**2011**
4	Vineyards	13,343	11,541	12,048	11,549	11,563
5	Orchards	3,477	3,427	3,512	3,740	3,794
TOTAL agricultural land		564,401	562,549	563,041	562,600	558,204

The main land use of the South Dobrogea Plateau is agriculture as shown in **Fehler! Verweisquelle konnte nicht gefunden werden.**7.

Figure 7 *Land use map in the Project area*



According to the information included in the Crucea Commune Local Development Strategy (2006) made available to ERM by the representatives of Crucea Commune Mayoralty on January 31, 2013, the total land area of Crucea commune was at that time 24,944 ha, out of which:

- 681 ha – the total unincorporated area of all six villages under the administration of Crucea commune;
- 1,472 ha occupied by pastures;
- 480 ha occupied by forests;
- 576 ha occupied by orchards and vineyards;
- 250 ha occupied by the Research Institute for the Control of Soil Erosion;
- 75 ha occupied by the Commercial Company for the Operation of Land Improvement Works; and
- 623 ha occupied by roads, water bodies and unproductive land.

However, recent data (2011) indicate that the total land area of the commune is 18,000 ha out of which 16,000 ha of arable land. Main crops grown on the commune land are wheat (60% of the cultivated land area), sun-flower (30%) and maize (10%).

In 2012, a total area of 5.34 ha was permanently removed from agricultural use.

No information was provided with regard to land use and predominant crops in Pantelimon and Vulturu communes.

The Project site (Crucea North Wind Farm 99 MW - extension up to 108 MW as option), under the scope of this assessment, is approximately 22.64 km^2 composed of both the project footprint, the wind safety area and a development buffer area. The Project footprint is 0.905 km^2 (90,5 ha) and comprises the total permanent built-up area (turbine foundations, permanent access roads, a substation and permanent crane pads), which was rezoned to 'industrial use'.

The area occupied by the new access roads will cover approximately 0.024 km^2 (2.4 ha), while the existing exploitation roads, following modernization works, will occupy an area of approximately 0.1856 km^2 (18.56 ha).

The procedure applied for the purchase/lease of the land from the owners is described in a separate section of this report – *Information of the land acquisition process.* However, it is important to be mentioned that all the land required was purchased through fair and negotiated transactions. If an agreement

could not be reached with the owner, another plot was selected. None of the plot owners were forced into selling their land.

Land is a natural resource used by the local communities in the Project area for subsistence. Crops grown on their plots ensure the livelihoods of most local inhabitants.

7.2.4 Community health and safety

Health care system in Romania

Prior to the 1989 Revolution, primary health care was provided through dispensaries, secondary and tertiary care was provided exclusively by state health units (Baba, Brînzaniuc, Cherecheş and Rus, 2008, *Assessment of the Reform of the Romanian Health Care System,* p. 18).

"Between 1990 and 1995, the government issued a series of regulations in the field of public health, but none of them made any reference to the basic right of citizens to health care because this right was stated in the Romanian Constitution (European Observatory on Health Care Systems, 2000)." The goals of health care reform were better health status for the population, increased efficiency of healthcare provision and a better patient-physician relationship.

Starting in 1995, important laws concerning the structure and organization of the Romanian health care system started to transform this system from a state owned, centralized one to a more decentralized social insurance type, with "contractual relationships between health insurance funds as purchasers and health care providers" (Baba, Brînzaniuc, Cherecheş and Rus, 2008, *Assessment of the Reform of the Romanian Health Care System,* p. 18).

"In 1997, Romania adopted the Law on Social Health Insurance which regulated health sector financing – revenue generation, the redistribution process and allocation of funds. This law made insurance membership mandatory and linked it with employment - both the employer and the employee had to pay a certain percentage of the salary for health insurance, which is still valid at present" (Baba, Brînzaniuc, Cherecheş and Rus, 2008, *Assessment of the Reform of the Romanian Health Care System,* p. 19).

The mandatory health insurance scheme covers the whole population. Some categories are exempt from insurance contributions: the unemployed, persons doing military service or in penitentiaries, persons on sickness or maternity leave, persons entitled to social security benefits, children under 18 years, persons aged 18–26 years enrolled in any form of education, family members

of an insured person, persons persecuted by the communist regime or declared heroes in 1989 Revolution and war veterans(1).

"Starting with 1999, the financing of the system is done through County Health Insurance Houses (CHIHs), which are responsible for the revenues collection and for the reimbursement of provider within their respective counties. At the central level, there is a National Health Insurance House (NHIH) that sets the rules and regulations for the CHIHs" (Baba, Brînzaniuc, Chereches and Rus, 2008, *Assessment of the Reform of the Romanian Health Care System*, p. 19).

However, the reform of the Public Health Law has been a topic of debate for most political regimes in the past years. The draft of the Law concerning the *organization and operation of the sanitary system in Romania* has been revised several times. The current draft is currently subject to public comments on the website http://reformasanatate.info/proiect-legea-sanatatii-partea-1/.

Between 1990 and 1998 the funds allocated for health care varied between 2.4% and 4% of GDP. From 2000, there was a steady growth in absolute figures, but still they varied only between 3.6% and 4.2% of the national GDP (Baba, Brînzaniuc, Chereches and Rus, 2008, *Assessment of the Reform of the Romanian Health Care System*, p. 19).

In 2009 (most recent data available), expenditure on health in Romania was 5.4% of national GDP (Human Development Statistical Annex to the Human Development Report 2011) and total health expenditure on health per capita per year was approximately USD $773(2).

Health infrastructure

In 2010, key elements of the health infrastructure at national level comprised:

- 438 hospitals, 17 polyclinics, 386 specialty outpatient departments of the hospitals, 210 dispensaries, 285 nurseries, 6,686 pharmacies;
- 29,268 beds in hospitals – 6 beds per 1,000 inhabitants;
- a total of 52,204 physicians (without dentists) meaning 411 inhabitants per physician and 24.4 physicians per 10,000 inhabitants;

(1) *Highlights on health in Romania 2005*, available at www.euro.who.int/document/e88529.pdf and accessed in January 2013

(2) Source: http://www.who.int/countries/rou/en/ accessed in January 2013

- out of the total number of physicians, 14,510 family physicians meaning 1,477 inhabitants per physician and 6.8 physicians per 10,000 inhabitants;
- 12,990 dentists, 126,656 medium trained medical staff and 62,838 auxiliary medical staff.

At the end of 2010, the public and private health infrastructure in Constanta County comprised the following main facilities: 17 hospitals, 12 hospital and specialized ambulatory medical care facilities, 2 polyclinics, 6 medical dispensaries, 4 health centers, 3 SPAs, 1 diagnosis and treatment centers, 1 specialized medical center, 173 general medicine cabinets, 25 school and student medical cabinets, 385 family medicine cabinets, 601 dentists practices, 365 specialized medical cabinets, 296 pharmacies, 21 pharmaceutical warehouses, 10 nurseries, 2 medical centers, 72 laboratories and 11 other types of medical cabinets. Medical care was provided by 1,893 doctors, 580 dentists, 653 pharmacists, 4,266 trained medical staff and 2,066 auxiliary medical staff(1).

Heath infrastructure in Crucea commune comprises 1 dispensary with two family practitioner's offices, one pharmacy and one dentist's office which has not been operational since at least 2006. Medical care is ensured by 2 family physicians and one nurse.

No information was available with regard to the health infrastructure existing in Pantelimon and Vulturu communes.

The health infrastructure in Crucea Commune comprises one medical dispensary operated by two family physicians (general practitioners) and necessary sanitary staff and a dentist practice which is no longer operational(2).

Life expectancy

According to the European Demography Report 2010, life expectancy in the EU has been increasing in an almost continuous and uniform trend at the rate of 2-3 months every year. In 2008, life expectancy for the EU-27 was 76.4 for men and 82.4 for women. In 2009, Romanian females had an average life expectancy of 77.4 years and men 69.8 years(3).

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(1) Constanta County in Figures 201, available at http://www.constanta.insse.ro/phpfiles/ANUAR_Constanta_2011.pdf and accessed in January 2013

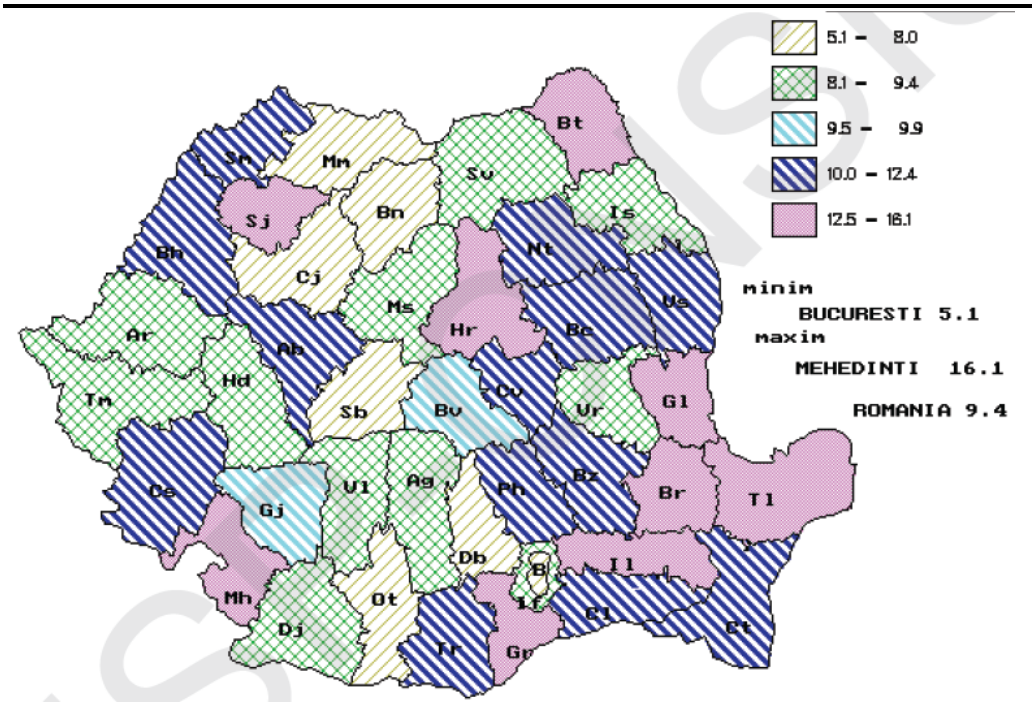
(2) Data published on the website of Crucea Mayoralty http://www.crucea.judetul-constanta.ro/comuna-crucea.html?start=4 accessed in January 2013

(3) European Demography Report 2010, available at http://ec.europa.eu/social/main.jsp?langId=en&catId=502&newsId=1007&furtherNews=yes and accessed in January 2013

Infant mortality rate

Another indicator of the level of health in a country is the infant mortality rate. This represents the number of deaths of infants under one year old in a given year per 1,000 live births in the same year. According to Newsletter no. 10/2011 on the Natural Movement of the Population published by the National Public Health Institute, in Romania the 2011 infant mortality rate was 9.4 deaths per 1,000 live births. According to the European Demography Report 2010, the 2009 infant mortality rate in Romania was 10.1‰, one of the highest in the EU-27(1).

Figure 8 ***Infant mortality rate in 2011, in Romania (per 1,000 live births)***



In Constanta County, there were 8,161 live births in 2010 (the most recent year available) and 100 deaths of infants under one year of age (2). The infant mortality rate was thus 12.3 per 1,000 live births.

(1) European Demography Report 2010, available at http://ec.europa.eu/social/main.jsp?langId=en&catId=502&newsId=1007&furtherNews=yes and accessed in January 2013

(2)Constanta County in Figures 201, available at http://www.constanta.insse.ro/phpfiles/ANUAR_Constanta_2011.pdf and accessed in January 2013

No data on infant mortality, birth and death rates were available for Crucea, Pantelimon and Vulturu communes.

Leading causes of death – non-communicable diseases

Overall, in Romania, the most important causes of death are cardiovascular diseases (62.1% of all deaths in 2006), cancer (17.6%), digestive diseases (5.5%), accidents, injuries and poisoning (4.9%) and respiratory diseases (4.9%). Romania has one of the highest levels of cardiovascular disease in the European Region(1).

According to Newsletter 11/2011 on *Main causes of death in Romania in 2011 compared to 2010*, published by National Public Health Institute – National Centre on Statistics and Information Technology in the field of Public Health, the leading causes of death are:

- diseases of the circulatory system (151,538 cases of death) and tumors (48,356);
- diseases of the digestive system (14,499);
- diseases of the respiratory system (12,460);
- traumatic injuries and poisoning (10,534).

By sex, the first two leading causes of death are the same. For males, deaths by accidents are higher in number than those caused by diseases of the respiratory system. For females, the order is the same as the overall one. Men die more frequently than women because of tumors, accidents, and diseases of the digestive and respiratory systems.

The table below shows the leading causes of deaths in Constanta County in 2009 - 2010(2).

Table 18 Number of deaths and specific mortality rates, by causes of deaths in Constanta county – 2009 – 2010 (most recent years available)

Causes of death	Number of deceased persons	
	2009	2010
TOTAL	**7,509**	**7,739**
Diseases of the circulatory	4,149	4,286

(1) Health Systems in Transition, Vol. 10, No. 3, 2008 – *Romania, Health care system review*

(2)Constanta County in Figures 201, available at http://www.constanta.insse.ro/phpfiles/ANUAR_Constanta_2011.pdf and accessed in January 2013

Causes of death	Number of deceased persons	
	2009	2010
system		
out of which		
Ischemic heart diseases	945	1,016
Cerebro-vascular diseases	869	958
Tumors	1,557	1,591
Diseases of the digestive system	499	516
Traumatic injuries, poisoning and other consequences of external causes	459	410
Diseases of the respiratory system	381	407
Endocrine, nutritional and metabolic diseases	100	105
out of which		
Diabetes	97	105
Infectious and parasitic diseases	74	102
out of which		
Tuberculosis	48	57
Diseases of the genitourinary system	84	98
Diseases of the nervous system	72	88
Other causes	66	68
Mental and behavioral disorders	22	10
Pregnancy, birth and confinement	3	5
Diseases originating in the perinatal period	28	36
Congenital malformations, deformations and chromosomal anomalies	15	17

No information was available regarding the leading causes of death in the three communes.

Communicable diseases

According to the 2010 National Report on communicable diseases prepared by the National Centre for the Surveillance and Control of Communicable Diseases (most recent year available), reported food-borne and environmental-borne diseases in Romania are: food-borne botulism, acute diarrhea (cases recorded in Constanta County), trichinellosis, leptospirosis, typhoid and paratyphoid fever, brucellosis, acute upper respiratory infections, pneumonias, influenza and severe acute respiratory infections (SARI), Q fever, legionellosis, rabies and anthrax. There was no information available about cases of such diseases in the three communes.

According to the 2010 National Report on communicable diseases prepared by the National Centre for the Surveillance and Control of Communicable Diseases, the vector-borne diseases reported in Romania are: malaria (only imported cases due to travel etc.), West Nile meningitis, tick-borne encephalitis (TBE) and boutonneuse fever (tick bite fever) and Lyme disease.

In Romania, no indigenous cases of malaria have been registered as malaria was eradicated more than 60 years ago. However, imported cases are present and their occurrence at national level increased in 2010 (0.08%0000) compared to 2009 (0.05%0000). Most of the cases were people travelling for professional purposes in countries like: Burma, Cameroon, Guinea etc. There was no information available about cases of malaria in the three communes.

In 2010, Romania reported the highest number of humans infected with West Nile virus since the large outbreak in Bucharest in 1996. Cases in 2010 were not only restricted to the traditional viral circulation areas around the Danube Delta, but were widely spread throughout the country, including central Transylvania, the border with Moldova, and areas with altitudes of up to 600m. The most affected county was Constanta county with an incidence of 1.7 per 100,000 inhabitants. At national level, fifty-two cases of infection were confirmed as positive: 49 with West Nile encephalitis/meningitis, 3 with West Nile fever and 5 were classified as probable.

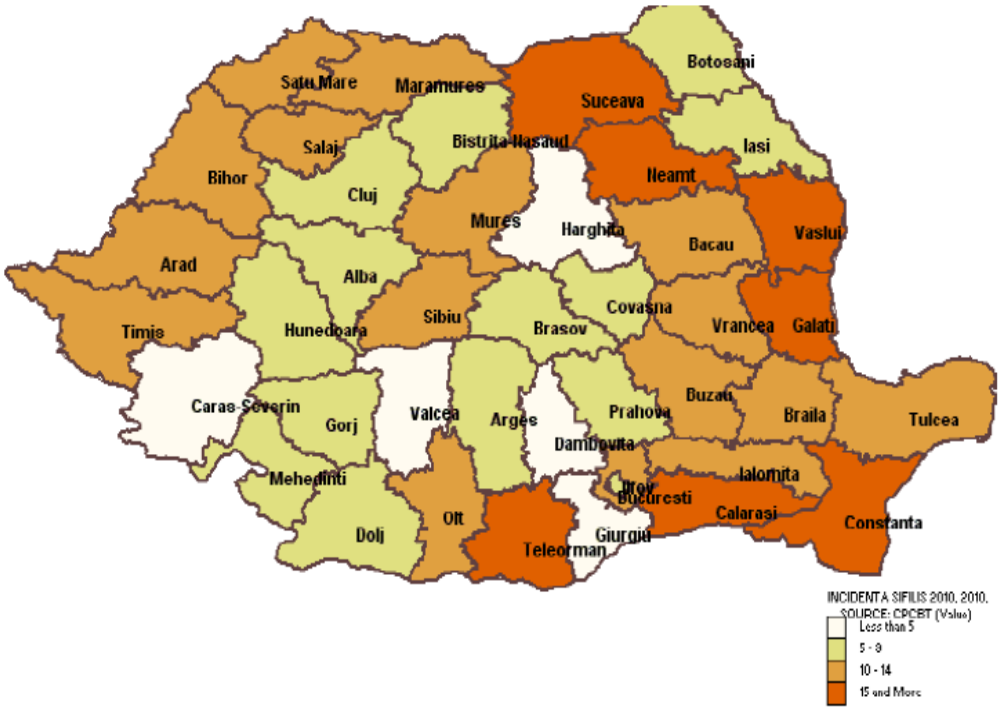
In 2010, 118 cases of boutonneuse fever were recorded at national level all occurring in the south and southeastern parts of Romania. Constanta county has the leading number of cases, namely 42 (35.6%). There was no information available about cases of boutonneuse fever in the three communes.

In 2010, 3 cases of TBE were reported at national level: 2 confirmed cases in Cluj County and 1 probable case in Harghita County. No case of TBE was found in the Project area.

As far as Lyme disease is concerned, in 2010, 263 cases were confirmed and 51 classified as probable. The number of confirmed and probable cases of Lyme disease was 3 times bigger compared to 2009. No fatalities were reported.

In terms of sexually transmitted diseases, reported diseases are gonococcus infections, syphilis and Chlamydia infections. In 2010, the incidence of the syphilis cases was 10.85 per 100,000 inhabitants compared to 15.07 in 2009.

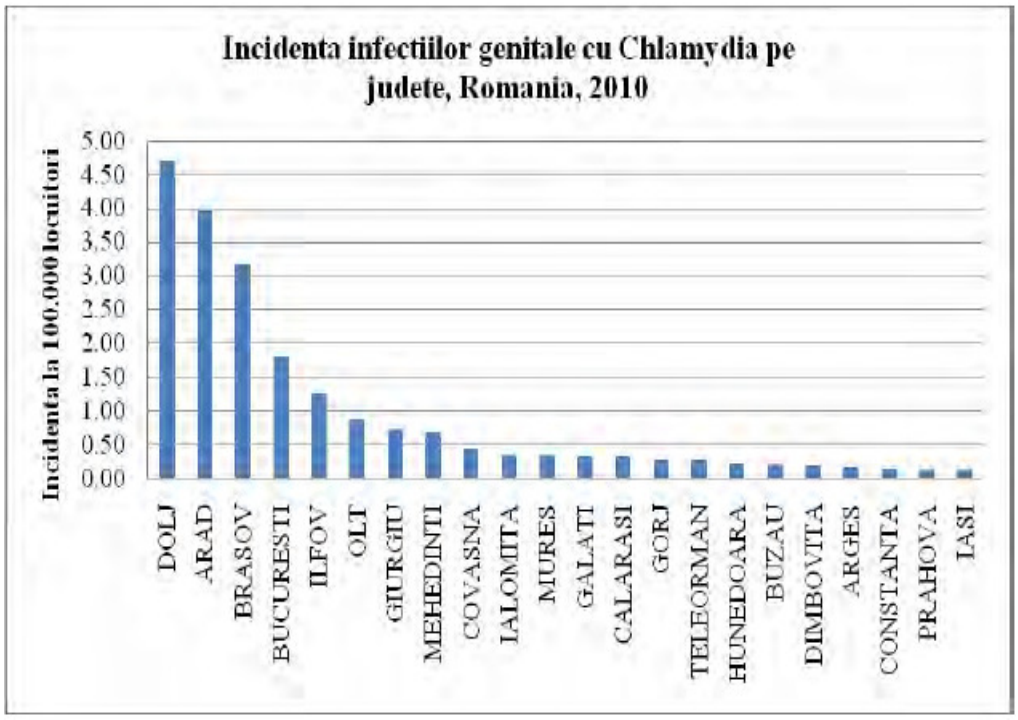
Figure 9 ***Incidence of the syphilis cases by counties, in 2010***



The incidence of cases of gonorrhea has a decreasing trend beginning with 2000, and in 2010 it was only 2.4 per 100,000 inhabitants. This places Romania among the countries with the lowest incidence in the WHO Europe and EU.

There were 133 cases of Chlamydia infections in 2010, meaning an incidence of 0.62% per 100,000 inhabitants. The incidence of these cases by counties is shown in Figure 10 below.

Figure 10 Incidence of Chlamydia infections by countries in 2010



Tuberculosis

The following information was collected from Newsletter no. 9/2011 (January-September) on the Main Indicators required to know the level of Health Conditions on the first 9 months of 2011 compared to 2010, published by the National Public Health Institute. During the first 9 months of 2011, the overall incidence of tuberculosis at national level was 87.5% per 100,000 inhabitants compared to 94.7% cases per 100,000 inhabitants during the same period in 2010. The incidence of new cases was 71.9% per 100,000 inhabitants compared to 78.2%000 in 2010. In 2011, there were 1,283 deaths caused by tuberculosis, out of which 3 infants under one year of age and 6 children aged 2-4.

In Constanta County, there were in total 568 cases of tuberculosis in the first 9 months of 2011, out of which 477 were new cases (the remaining 91 cases of relapses). In the same period of 2010, there were in total 662 cases, out of which 532 new ones. The overall incidence of this disease – for the period – in 2011 was 104.9% per 100,000 inhabitants compared to 122.5%000 in 2010. The incidence of new cases was 16.8% per 100,000 inhabitants in 2011 compared to 24.1%000 in 2010.

There was no information available about cases of tuberculosis in Crucea, Pantelimon and Vulturu communes.

Tobacco use

In Brussels on the occasion of the World No Tobacco Day, the results of a Eurobarometer survey were made public; as far as Romania is concerned, only 12% of its inhabitants quit smoking, which is well below the EU average of 21%.

"Romania ranks first in the EU depending on the percentage of people exposed to tobacco smoke in closed areas at work, as only 38% of its inhabitants have not been exposed to passive smoking, while 40% were occasionally exposed, 8% less than one hour a day, 6% from one to five hours and 8% more than five hours a day.

As for the percentage of smokers in the total population, Romania ranges around the middle of the classification, with 30%, near the EU average of 28%. A Romanian smokes in average 14.4 cigarettes a day, close to the EU average of 14.2%(1)."

The following data on tobacco use are based on the WHO Report on the Global Tobacco Epidemic, 2011:

Figure 7.11 Tobacco use data for Romania as of 1 November 2010

	Any smoked tobacco	
Adult prevalence, smoking (%)	**Current**	**Daily**
Male	40.3	34.5
Female	25.1	21.9
Total	32.4	27.9

According to the same source of information, in 2008 government expenditure on tobacco control was USD 7,940,100.

No information was available with regard to smoking habits at the level of the Constanta county and communes of interest for the proposed Project.

(1) Source: Online article published on June 18, 2012 on http://www.bucharestherald.ro/health/36-health/33770-only-one-in-10-romanians-quit-smoking-lowest-percentage-in-europe

Alcohol consumption

According to the Global status report on alcohol and health 2011, figures regarding alcohol consumption in Romania are as follows:

- recorded adult per capita consumption, average 2003–2005 (15+ years; in liters of pure alcohol): 11.30;
- unrecorded adult per capita consumption, 2005 (15+ years; in liters of pure alcohol): 4;
- total (recorded + unrecorded) adult per capita consumption, 2005, (15+ years; in liters of pure alcohol): 15.30;
- recorded adult per capita consumption (beer), 2005 (15+ years; in liters of pure alcohol): 4.07;
- recorded adult per capita consumption (wine), 2005 (15+ years; in liters of pure alcohol): 2.33;
- recorded adult per capita consumption (spirits), 2005 (15+ years; in liters of pure alcohol): 4.14;
- total adult per capita consumption among drinkers, males, 2005 (15+ years; in liters of pure alcohol): 31.80;
- total adult per capita consumption among drinkers, females, 2005 (15+ years; in liters of pure alcohol): 15.00;
- total adult per capita consumption among drinkers, both sexes, 2005 (15+ years; in liters of pure alcohol): 24.50.

Figure 7.12 Mortality rates related to alcohol consumption

ALL CAUSE MORTALITY

Age-standardized deaths rates, 15+ years (per 100,000 population)

	2000		2001		2002		2003		2004		2005	
	M	F	M	F	M	F	M	F	M	F	M	F
Liver cirrhosis	62.0	29.8	69.4	33.1	71.6	33.0	66.2	31.0	64.1	29.4	60.2	28.1
Road traffic accidents *(1)*	20.1	6.3	21.7	5.7	19.4	5.4	20.1	5.5	20.1	5.6	21.5	6.8

Data source: WHO Mortality Database, data as reported by countries *(1)* refer to transport accidents.

No figures on alcohol consumption were available at county and local level.

Obesity

The following data was collected from the Eurostat News Release 172/24 November 2011: for both women and men aged 18 years and over, the lowest shares of obesity in 2008/9 were observed in Romania (8.0% for women and 7.6% for men).

Table 19 ***Share of obese persons in Romania by sex and age group, 2008 or 2009***

Women					Men				
Total aged +18	**18-24**	**25-44**	**45-64**	**65-74**	**Total aged +18**	**18-24**	**25-44**	**45-64**	**65-74**
8.0	1.6	4.1	13.7	10.8	7.6	1.8	6.3	10.7	10.5

Health outcomes are influenced by various factors that operate at individual, household and community levels. Obvious factors are, for example, diet, health behavior, access to clean water, sanitation and health services. However, underlying health determinants of a socioeconomic nature also play a role in causing vulnerability to health risks. Some of the key factors are income, education and employment. These are discussed in the following sections of this report.

7.2.5 Poverty

"In 2010, 115 million people, or 23.4% of the population, in the EU27 were at risk of poverty or social exclusion. In 2010, the highest shares of persons being at risk of poverty or social exclusion were recorded in Bulgaria (42%) and Romania (41%).

In the EU27, 8% of the population were severely materially deprived, meaning that they had living conditions constrained by a lack of resources such as not being able to afford to pay their bills, keep their home adequately warm, or take a one week holiday away from home. The share of those severely materially deprived varied significantly among Member States, ranging from 1% in Luxembourg and Sweden to 31% in Romania" (Eurostat News release 21/2012 - 8 February 2012(1)).

(1) Source: http://europa.eu/rapid/press-release_STAT-12-21_en.htm and accessed in January 2013

Table 20 ***People at risk of poverty or social exclusion by age group (%), 2010***

	Children (0-17)	Working age population (18-64)	Elderly (65 years and more)	Total
EU-27	26.9	23.3	19.8	23.4
Romania	48.7	39.7	39.9	41.4

Source: Eurostat, Statistics in focus, 977/2010, Population and social conditions

No information was available concerning poverty levels in Constanta county and the three communes.

7.2.6 Income

The 1989 annual household survey on poverty in Romania, from the World Bank found that 5.4% of Romania's population lived on US$ 4.30 per day or less. A survey in 1994 found the rate jumped to 80.0%. By 2000, it had dropped to 67.5%. In the last survey, in 2002, 14% of the population reported to be living on US$ 2.15 or less per day (World Bank, 2005). In Romania, per person gross national income, adjusted for purchasing power parity (PPP), was US$ 7,140 in 2003, just above the Eur-B+C average of US$ 6842(1).

In 2009, when the country was hit by recession the GDP per capita was US$ 7,572.8 and the gross national income (GNI) per capita was US$ 7,516.0(2).

According to the data publicly available on the UNDP webpage(3), accessed in June 2012, in 2010 Romania had a GDP per capita of 5,903 euros and a GDP per capita adjusted at PPP of US$ 11.013.

"In the fourth quarter of 2011, Romanians' monthly income grew by 5.8 per cent compared to the third, whilst their average spending went up by 6.6 per cent on average in the respective period. According to the National Statistical Institute (INS), the average monthly spending of a Romanian household sums up to 90.9 per cent of its total income and salaries still represent the majority figure of the total income of RON 2,025 (some EUR 463) per month.

(1) *Highlights on health in Romania 2005*, available at www.euro.who.int/document/e88529.pdf and accessed in January 2013

(2) 2010 World Statistic Pocketbook Country profile: Romania http://unstats.un.org/unsd/pocketbook/PDF/Romania.pdf and accessed in January 2013

(3) Source http://www.undp.ro/profile_romania.php accessed in January 2013

In the fourth quarter of 2011, urban households' total income was divided into salaries (representing 62.9 per cent), state aids (22.6 per cent) and naturally traded goods (8.5 per cent), whereas the majority of rural households still live off agricultural production, which represents 44.3 per cent of their average income. The remaining income components of rural households are salaries (26.0 per cent) and state aids (22.4 per cent). Households in cities earned 16.5 per cent more than those in rural areas.

Total expenses were RON 2,311 on average a month per household (some EUR 528). Romanians spent money on food, non-food products, services and payments for social security" (http://www.romania-insider.com/romanians-income-ups-at-slower-pace-than-expenses-in-fourth-quarter/54932/ published on April 5, 2012).

In April 2012, the average net wage in Romania grew by 0.3 per cent over the previous month, to some EUR 365 (the equivalent of RON 1,498), but went up by 4.3 per cent compared to April 2011, according to data from the Romanian Statistics Institute (INS).

Table 21 ***Nominal monthly net wages by branches of the national economy, in Constanta county(1)***

Activity (by NACE codes second revision)	**2008**	**2009**	**2010**
		Lei (RON)/employee	
Total	**1,291**	**1,391**	**1,328**
Agriculture, forestry and fishing	787	914	844
Industry	1,413	1,612	1,676
Extractive industry	2,629	2,598	2,234
Processing industry	1,219	1,401	1,466
Production and supply of electrical, thermal, gas, hot water and air conditioning	3,098	3,475	3,697
Water supply, waste management, land	1,072	1,122	1,087

(1) Source Constanta County in Figures 2011, available at http://www.constanta.insse.ro/main.php?id=402 accessed in January 2013

Activity (by NACE codes second revision)	2008	2009	2010
		Lei (RON)/employee	
remediation			
Constructions	1,122	1,171	1,310
En detail commerce, repair and maintenance of vehicles and motorcycles	904	1,201	859
Transport and storage	1,685	1,728	1,769
Hotels and restaurants	775	809	781
Information and communications	1,436	1,644	1,681
Insurance and financial intermediation	2,346	2,217	2,134
Real estate transactions	1,035	1,041	1,056
Professional, scientific and technical activities	1,518	1,438	1,427
Administrative services and support service activities	772	784	789
Public administration and defense; social insurance in the public system	2,560	2,078	1,969
Education	1,576	1,594	1,386
Health and social assistance	1,210	1,250	1,114
Entertainment, cultural and recreational activities	906	926	932
Other activities of the national economy	699	794	802

No information was available regarding the income or wages earned by the inhabitants in Crucea, Pantelimon and Vulturu communes.

7.2.7 Education

According to the 2011 Human Development Report, Romania is considered to have a high level of human development and is ranked in 50th place out of more than 187 countries with comparable data. In 2011 Romania's Human Development Index (HDI)(1) was 0.781 as a result of years of reform.

2007 data on literacy rates in Romania published on the UNESCO website (http://www.unesco.org/en/efareport/ddm/) indicated:

- adult literacy rate: 98% of people over 15;
- youth literacy rate: 97%;
- adult illiterates: 439,000 out of which were 66% females.

According to the data available to the Human Development Report Office as of 15 May 2011, indicators in the educational field showed:

- adult literacy rate for both sexes 97.7% of the population over 15;
- public expenditure on education 4.3% of the GDP;
- combined gross enrolment in education (both sexes): 86.2%;
- education index: 0.831.

According to the 2011 Human Development Report, in 2009 public expenditure on education was 5.4% of the GDP. In the period 2001-2010 (data refer to the most recent year available during the period specified) the gross enrolment ratio was:

- primary enrolment ratio: 99.3%;
- secondary enrolment ratio: 93.5%;
- tertiary enrolment ratio: 67.1%.

Despite the enrolment ratio and the increase in the education index for Romania (compared to 0.781 in 2005), there is still a problem with absenteeism at schools in rural areas. This is generally due to low income levels and the need to gain employment at an early age (according to a World Vision study conducted in Romania in 2006 which focused on the access of rural children to

(1) HDI is measured by the following parameters: life expectancy; education – measured by adult literacy and enrolment at schools; and standard of living – measured by purchasing power. The HDI for Romania is specified in 2011 Report Human Development Statistical Tables available on http://hdr.undp.org/en/statistics/hdi/in January 2013.

high school education). Public schools offer free education, but textbooks and some school materials like pencils, notebooks and uniforms may need to be separately purchased. These costs are difficult to meet for some families. The study also found that there is a trend for children in rural areas to leave school after completing the ten-year compulsory education and help their families grow subsistence crops.

According to National Education Law 1/2011 and its subsequent amendments, the Romanian educational system consists of four levels of studies, namely: kindergarten, primary, secondary and higher education. Kindergarten is optional for children aged three to six. Formal and obligatory schooling includes primary (grades I-IV, beginning when the child is age six or seven) and secondary school until the tenth grade. High school education will become mandatory by the latest in 2020. The next phase of schooling is higher education and this is also an optional phase of education.

In 2012, the Romanian Government included a School Preparation Class into the primary and obligatory schooling system in addition to grades I-IV. This was formerly the last level for kindergarten meant for children aged 5 to 6. However, it was not offered in all kindergartens.

In general, primary schools are present in every community, even in rural areas where the school population is lower.

In Crucea Commune there is a School of Arts and Crafts hosting grades I-X, five primary schools (grades I-IV) – one in each village and six kindergardens with regular schedule under the subordination of the Constanta County School Inspectorate. The teaching staff comprises 34 professionals teaching 468 pupils(1).

The educational infrastructure in Vulturu commune comprises(2):

- one kindergarden having 2 teaching professionals and 35 enrolled children;
- one school hosting grades I – VIII, having 12 teaching professionals and 86 enrolled pupils.

(1) Data published on the website of Crucea Mayoralty http://www.crucea.judetul-constanta.ro/comuna-crucea.html?start=4 accessed in January 2013

(2) Data published on the website of Vulturu Mayoralty http://comunavulturu.ro/vulturu/educa%c8%9bie/ accessed in January 2013

No information was available with regard to the number of schools and child enrolment in Pantelimon commune.

7.2.8 Employment

In 2009, employment in the industrial sector represented 31.4% of employed people while employment in the agricultural sector was only 28.7 of employed people(1).

According to the Constanta Statistics Directorate, at the end of 2010 there were 169,984 people employed in the county's economy. Out of these, 4,013 were in the agricultural sector (including forestry and fishing) and 39,071 in the industrial sector.

7.2.9 Unemployment

According to the Eurostat regional yearbook 2011, the unemployment rate, at national level, in 2009 was 6.9%(2) compared to 5.8 in 2008(3).

Table 22 Unemployment rates in the regions of the EU and in Romania

	Total	Males	Females	15-24 years old	Long-term unemployment share
	2010	**2011**	**2011**	**2011**	**2011**	**2011**
EU-27	**9.6**	**9.6**	**9.5**	**9.8**	**21.4**	**43.1**
ROMANIA	**7.3**	**7.4**	**7.9**	**6.8**	**23.7**	**41.9**
Macro-region 1	**8.5**	**7.9**	**8.3**	**7.4**	**28.3**	**44.3**
North-West	6.8	5.2	5.4	5.0	20.9	43.1
Center	10.5	11.1	11.5	10.5	36.3	44.9
Macro-region 2	**7.1**	**7.0**	**7.4**	**6.4**	**18.9**	**47.1**
North-East	5.8	4.8	5.2	4.5	11.9	42.9
South-East	8.8	10.1	10.5	9.5	30.7	50.1

(1) 2010 World Statistic Pocketbook Country profile: Romania http://unstats.un.org/unsd/pocketbook/PDF/Romania.pdf

(2) Eurostat regional yearbook 2011 released in December 2011 and available at http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-HA-11-0001 - accessed in January 2013

(3) http://data.un.org/CountryProfile.aspx?crName=ROMANIA

		Total	Males	Females	15-24 years old	Long-term unemployment share
	2010	**2011**	**2011**	**2011**	**2011**	**2011**
EU-27	**9.6**	**9.6**	**9.5**	**9.8**	**21.4**	**43.1**
Macro-region 3	**6.8**	**8.2**	**8.5**	**7.9**	**29.3**	**31.7**
South-Muntenia	8.3	10.4	10.5	10.3	32.9	42.2
Bucharest-Ilfov	4.6	5.4	5.7	5.1	22.2	5.3
Macro-region 4	**6.9**	**6.4**	**7.4**	**5.1**	**19.7**	**47.1**
South-West Oltenia	7.5	6.9	8.4	5.0	19.2	49.4
West	6.0	5.7	6.2	5.1	20.3	43.6

Source: Eurostat regional yearbook 2011

Constanta county is part of Macro-region 2, Region South-East.

At the end of December 2010 (most recent year available), in Constanta County there were 17,910 (9,873 women) unemployed people compared to 20,198 (10,893 women men) at the end of 2009. The overall unemployment rate dropped from 6.4%% in 2009 to 5.8% in 2010. Male unemployment rate was 4.7% compared to 7.2% for women in 2010(1).

No data were available with regard to unemployment rates in the three communes.

7.2.10 Transport infrastructure

According to the National Institute of Statistics(2), at the end of 2011, the public roads in Romania were 83,703 km long. Out of these, 19.9% were national roads, 42.3% county roads and 37.8% commune roads. In terms of the surface cover, 32% of all the public roads were covered with tarmac, 26.2% were covered by light road coating and 41.8% were macadam and dirt roads.

(1) Constanta County in Figures 2011, available at http://www.constanta.insse.ro/phpfiles/ANUAR_Constanta_2011.pdf and accessed in January 2013

(2) Press release no. 92 dated 27 April 2012 issued by the National Statistics Institute

According to the public information published on the website of Crucea Mayoralty, the commune road network comprises 53 km of roads, out of which:

- tarmac (asphalt) roads: 12 km;
- macadam roads: 22 km;
- dirt roads: 19 km.

At present, works are in execution to cover with macadam all dirt roads in the incorporated areas of Galbiori, Baltagesti, Stupina, Crisan and Siriu villages under the administration of Crucea commune.

According to the public information published on the website of Vulturu Mayoralty, the commune road network comprises 19 km of roads, out of which:

- tarmac (asphalt) roads: 3 km;
- macadam roads: 1 km;
- dirt roads: 15 km.

No information was available concerning the transport infrastructure in Pantelimon Commune.

7.2.11 Data gaps and uncertainties

ERM's scope of work for the upgrade of the local EIA did not include conducting a detailed livestock survey.

No data were available on the number of employed people and/or unemployment rates in the local communes.

At the level of Crucea, Pantelimon and Vulturu communes, there were no data available to describe:

- clear distribution of the population by age groups, ethnicity and religion;
- leading causes of death and number of patients enlisted with a family physician;
- infant mortality, birth and death rates;
- natural growth and migration rates;
- income, employment and unemployment levels.

Despite the face-to-face discussions with the Mayors of Pantelimon and Vulturu and their availability to provide the requested information in the questionnaires, no feedback was provided by the time the social and economic chapter was prepared.

No consistency could be obtained between data sets publicly available and collected to present the baseline conditions existing in the three communes (Crucea, Pantelimon and Vulturu communes). Therefore, no comparison should be made between these data sets.

7.3 IMPACT ASSESSMENT METHODOLOGY

This section aims to identify and assess the potential impacts the proposed Project may have on socio-economic receptors such as people, community health and safety, worker health and safety and cultural resources. Impacts are assessed by comparing the baseline conditions (i.e. the situation without the Project) with the conditions that will prevail if the project is constructed and operated.

There are therefore four key stages in the assessment:

1. Identifying the baseline conditions without the project and the sensitivity and importance of the receptors and resources at risk (see Section 7.2).
2. Predicting the magnitude of impact on these receptors and resources, including the nature, scale, extent and duration of change and in the case of non-routine impacts, their probability or frequency of occurrence (see Section 7.3).
3. Evaluating the significance of impacts so that decision-makers understand the weight that should be given to them in reaching decisions about the Project (see Section 7.4).
4. Investigating options for mitigation of significant adverse impacts and agreeing measures to be incorporated into the project proposals with the proponent (see Section 7.4).

7.3.1 Types of impacts

The types of impacts which are generally considered in an impact assessment are listed below:

- Beneficial (positive) and adverse (negative) impacts.
- **Permanent** impacts arising as a consequence of the development of the site (e.g. loss of existing land uses), **temporary** impacts occurring during the construction period (e.g. noise from earthmoving), and **long term** impacts occurring during the operation of the facility (e.g. visual impacts on nearby residents).
- **Direct/ Indirect or Induced** impacts, defined as follows:

  - direct impacts that result from a direct interaction between the Project and a resource/receptor (e.g. between occupation of a plot of land and the habitats which are affected).;
  - indirect impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land);
  - induced impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g. influx of camp followers resulting from the importation of a large Project workforce).
- **Cumulative** impacts arising in combination across the project and cumulatively with other changes taking place in the locality at the same time.

7.3.2 Evaluation of Significance

The significance of an impact will depend on its predicted magnitude (scale, extent and duration), and on the value or importance of the affected receptors or resources. For the purpose of this assessment, the significance of a potential impact has been therefore assessed according to the following criteria:

Nature: The type of impact: either positive or negative and whether the impact is direct or indirect.

Duration: The temporal scope of the potential impact: permanent, short term temporary and long terms impacts, as described in Section 7.3.1 above.

Scale: The geographical coverage of the ESIA takes into account the following factors:

- the physical extent of the works to be undertaken within the project site boundary; and
- the nature of the baseline environment and the manner in which impacts are likely to be propagated beyond the site boundary.

The latter depends on the type of impact: so for example, effects on buried archaeology are likely to be confined to those areas physically disturbed by construction works, whilst effects of noise could extend to neighbours outside the site boundary and visual impacts to residents could impact over long distances.

Table 23 Impact Significance for Negative Socio-economic Impacts

	Magnitude

	Magnitude			
Sensitivity		Low	Medium	High
	Low	Negligible	Minor	Moderate
	Medium	Minor	Minor	Moderate
	High	Moderate	Moderate	Major

Table 24 Impact Significance for Positive Socio-economic Impacts

	Magnitude			
Sensitivity		Low	Medium	High
	Low	Negligible	Minor	Moderate
	Medium	Minor	Minor	Moderate
	High	Moderate	Moderate	Major

7.3.3 Mitigation and Management

This socio-economic assessment will aim to identify all potential impacts. For each potential impact key management and mitigation measures will be proposed. The objective of these measures will be to **reduce** the impact of any potential negative impacts and **enhance** the impact of any potential positive impacts on social receptors.

7.4 IMPACT ASSESSMENT

This section describes the social and health impacts associated with Project construction and operation activities. These may include the following:

- impacts to land use;
- impacts to employment generation: direct, indirect and induced;
- impacts to livelihoods, subsistence, economic activities and economic resettlement;
- impacts to health from the influx of migrant workers;
- impacts to revenue generation to local public authorities; and
- impacts to infrastructure, public buildings, archaeology and cultural heritage.

7.4.1 Impacts to land use

The Project site (Crucea North Wind Farm 99 MW - extension up to 108 MW as option), under the scope of this assessment, is approximately 22.64 km^2 composed of the project footprint, the wind safety area and a development buffer area.

The Project footprint is 0.905 km^2 (90.5 ha) of the total Project Site and comprises the total permanent built-up area (turbine foundations, permanent access roads, a substation and permanent crane pads), which was rezoned to 'industrial use' and will no longer be used for agriculture. This will be a long-term loss of land currently used for farming activities.

However, this represents only 4.2% of the 22.64 km^2 Project site so the actual area lost to agriculture will be small. The lands where the turbines and the project substation will be located are owned or leased by the Romanian company *S.C. Crucea Wind Farm S.R.L.* The rest of the project site includes privately owned (by natural and/or legal entities) and public land belonging to the unincorporated areas of Crucea, Vulturu and Pantelimon Communes. According to the Urban Certificate no. 4 dated 18 January 2010, issued by the Constanta County Council, the current land use is agricultural (arable).

During construction, a temporary construction camp will be constructed within the project site to host construction equipment and materials. It is estimated that the construction camp will be 3,000 m^2. No construction workers will be accommodated within this construction camp.

The area occupied by the new access roads will cover approximately 0.024 km^2 (2.4 ha), while the existing exploitation roads, following modernization works, will occupy an area of approximately 0.1856 km^2 (18.56 ha).

Temporary access restrictions are planned during construction to allow the upgrading of existing tracks and existing exploitation roads to allow permanent access to the site and to accommodate underground lines liking all the turbines and the anemometry masts.

Whilst access will not be actively encouraged through the site, these tracks will equally not be obstructed by the wind farm development during operation.

Land is a natural resource used for subsistence; however, people have not sold or leased all the land which ensured their subsistence. Given the agricultural use of the land for subsistence and the temporary access restrictions during construction, sensitivity of the local community is considered to be medium.

Table 25 Summary of impact characteristics

Summary	Construction	Operation
Project activity/component	Primary project activities related to purchase and use of land	
Impact Type	Negative direct, long-term, local, definite	
Stakeholders/ Receptors Affected	Crucea, Vulturu and Pantelimon communes	

The project will result in the following disturbances to land use:

- Reduction in available agricultural land including the project footprint, construction camp and other activities; and
- A restriction of or reduction in access to certain agricultural areas due to construction activities and road upgrades.

The total land used during construction and operation will only be a small portion of agricultural land in the area. However, construction activities will have an impact on those communes and villages using the land for agricultural purposes.

During the operation of the wind farm, farming will be possible on the land within the Project site (outside the safety area[1] of each turbine) which is not necessary for the operation and maintenance activities. No homes or businesses will be displaced by the Project.

Taking into account the relatively reduced land area which will be impacted by the Project, the magnitude is considered to be medium during construction and low during operation.

Table 26 Summary of impact assessment for all Project activities

Assessment	Construction	Operation
Sensitivity	**Medium**	**Low**
Magnitude	**Medium**	**Low**

[1] As defined according to Romanian Energy Regulatory Authority Order no. 49/2007 with all subsequent amendments

Mitigation measures

- Ensure the area impacted during construction is limited and that where ever possible access to agricultural land is not restricted. Where access to land is restricted those communes using the land are informed in good time of this restriction through the correct channels.
- Methods will be put in place to remove vegetation and soils whereby they can be stored and replaced during operation. Access by construction labourers to land not directly affected by the project will be restricted so as not to disturb arable land.
- Where possible, construction will avoid the crops growing season. However, should crops be damage during this period, compensation will be provided and land will be reinstated according to the provisions of the Compensation Action Plan.
- On completion of the construction works all equipment and construction related facilities will be removed and the area will be returned to its prior use.

7.4.2 Impacts to community employment

Direct Employment

Wind farm construction works (including turbine and cable layout) are estimated to be completed in 2014. Due to the technical nature of the project and the lack of skills levels in local communities this has not resulted in the creation of new job opportunities. Construction contractors will bring their own employees to the site, as follows:

- Vestas: supplier of the turbines, based in Constanta city, will use a team comprising 215 people;
- Energobit: contractor for the works related to the electrical grid and network, based in Cluj-Napoca city, will temporarily relocate and use a construction team consisting of 130 people;
- Reif: contractor for road construction and rehabilitation, based in Cluj-Napoca city, will temporarily relocate and use a construction team consisting of 80 people;
- Crucea Wind Farm (developer), based in Constanta city, will use a team of 20 people throughout all the phases of the project (construction and operation).

Consequently, a low percentage of unskilled and to some extent semi-skilled labour will be employed temporarily from the manpower available in Crucea, Vulturu and Pantelimon Communes or Constanta County.

It is estimated that a total construction workforce of 445 workers will be employed of which a small percentage is estimated to be local (guard positions). 2011 statistics indicated that Constanta County has a population of

630,679 inhabitants while the combined population of the three communes is 4,854. Therefore, the percentage of generation of local employment could not be quantified in relation to the total population of the three communes. Employment for locals will have a noteworthy effect on those who are employed; however, this will be an insignificant percentage of the total population.

During the operational phase, there will be 20 workers contracted by the developer S.C. Crucea Wind Farm S.R.L.

Indirect and Induced Employment

Indirect employment will be created through employment in the projects supply chain. This can be described as:

- in businesses providing the Project with goods and services (usually referred to as indirect employment); and
- in businesses supplying direct and indirect employees with goods and services (usually referred to as induced employment).

Induced employment will also be created through increased employee spending in the economy. There are no generic data from which to estimate levels of indirect and induced employment in Romania(1)and local effects will depend on the nature of the local economy, its ability to supply the needs of the Project and its employees, and the ways in which those employees choose to spend their earnings.

Crucea, Pantelimon and Vulturu communes are relatively small farming communities. Enterprises in these villages are likely to consist mainly of small and micro sized organizations that are unlikely to have experience in supplying these goods and services. All major construction supplies (such as turbine components) will be imported from Europe(2). This, in conjunction with the technical nature of procurement requirements and the construction timeframe, means that indirect and induced employment is likely to be extremely limited, particularly in the local area due to limited size and capacity.

(1) In a developed economy such as the UK it has been estimated than 1 direct job can yield up to 1.4 additional jobs in an area through indirect and induced employment, but this relationship is unlikely to hold true in less developed economies such as Romania (2009).

(2) The turbine components will be delivered by ship from Vestas, the wind turbine manufacturer, to Constanta Agigea harbour and transported to the site by Restricted Access Vehicles (RAV), longer than 19 m or heavier than 42.5 tons.

Any job opportunities for the locally available workforce will provide some level of benefit to the local economy, although this is likely to be very limited. This induced employment is likely to take the form of increased spending on goods and services. Due to limited local employment creation combined with the short construction period this impact will be small and is likely to include use of local companies for taxi and minibus services, catering, office supplies, travel agents and printing.

Table 27 ***Summary of impact characteristics***

Summary	Construction	Operation
Project activity/component	Employment of workers during the construction and operation of the project components	
Impact Type	***Positive*** minor direct, indirect and induced, local, combined, short term and probable	
Stakeholders/ Receptors Affected	Local and regional communities: Crucea, Vulturu and Pantelimon communes and Constanta County at a larger scale	

Taking into consideration that there will be a small percentage of local workforce employed, unemployment level is not significantly reduced although the local inhabitants may expect work opportunities out of the implementation of the Project, the sensitivity is considered to be high based on likely community expectations that cannot be met. The magnitude of the impact is also considered to be high.

During operation, there could still be some expectation of local population to job opportunities which would mean a medium sensitivity. However, having regard to the fact that the operation of a wind farm does not require a significant number of employees that magnitude of the Project impact on community employment is estimated to be low.

Table 28 ***Summary of impact assessment for all Project activities on community employment***

Assessment	Construction	Operation
Sensitivity	**High**	**Medium**
Magnitude	**High**	**Low**

Mitigation measures

- Prioritise employment of local labour by setting criteria for prioritising, firstly labour from Crucea, Pantelimon and Vulturu communes and secondly from Constanta County.
- Contractors will be encouraged to employ local workforce. Open positions are to be announced within local communities and future contracts should consider that a certain percentage of the employees are local if trained manpower is available. Non-skilled labor should be locally sourced to the extent feasible.
- Clearly advertise criteria for skills and experience needed for available jobs through local media.

7.4.3 Impacts to livelihoods, housing, subsistence, economic activities and economic resettlement

In order to assess the impact on livelihoods, subsistence, economic activities and resettlement, the following aspects have been considered:

- economic activities which communities depend upon;
- subsistence: activities on which communities rely for ensuring daily subsistence food; and
- other livelihoods: activities of which communities get any economic benefit for subsistence.

The project will not require any physical resettlement. People from the local communes are currently using the land required for the project for agricultural purposes either by renting or farming it directly. Loss of land rezoned to industrial use may have an impact on the livelihoods of those people who previously farmed the land, however due to the small area to be taken out of agricultural use and the availability of agricultural land in the area this is unlikely to be a significant impact. Additionally landlords receive payments for land lease which compensates the loss. This impact has already been assessed in the section referring to land use.

However, following the purchase of land, *Crucea Wind Farm S.R.L.* will pay annual taxes for the land it owns for the lifetime of the wind farm. These taxes will go directly to the budgets of the local communes and could be used to finance investments in the local communities (water supply system, sewage system, street lighting etc.).

A second effect the Project may have on livelihoods in the local area is through a potential increase in income generated through direct, indirect and induced income. This impact has already been assessed in the section referring to community employment.

In terms of living conditions, one-story houses are most common in the area. Most houses have gardens as well as some birds or small animals kept for domestic consumption. Water for gardening and rearing animals most commonly comes from wells and fountains. Not all localities have a drinking water supply system and/or a sewage system.

The housing of construction workers is the responsibility of the contractor by whom they are employed, and will therefore not be dealt with directly by *Crucea Wind Farm S.R.L.* It is estimated that any construction manpower to be employed locally will already have accommodation in the villages around the project site.

For workers employed from outside the area, the contractor will rent houses in Ovidiu town (located approximately 45 km of the project site) and ensure the transport of the workers to and from the construction site. The rented houses need to provide housing conditions complying with all applicable health and safety regulations and norms as identified in the technical construction documents. Any impact on the local housing situation in the local communities is expected to be negligible. However, an increased demand for accommodation (houses to be rented) may result in an increase in prices and demand for certain goods and services and a decrease in availability. Those disadvantaged and vulnerable households could be adversely affected by any price fluctuations and local procurement may therefore increase vulnerability.

According to the International Labor Organization (ILO), the accommodation for workers has to follow some basic health standards and any employer should try to offer proper accommodation by creating sufficient space for people, adequate facilities and environment for resting and spending spare time etc.

Table 29 ILO worker housing recommendations

- It is generally not desirable for employers to provide housing for their workers directly and employers should use alternatives where possible. If there are no alternatives, specific attention should be paid to renting arrangements, workers 'rights and housing standards. In addition, the possibility of workers-occupants acquiring, for a fair price, ownership of housing provided by the employer should also be examined.
- Renting arrangements should be fair. Adequate and decent housing should not cost the worker more than a reasonable proportion of their income and should never include a speculative profit.
- The employer should be entitled to repossess the accommodation within a reasonable time in the event of termination of the worker's contract of employment and the worker should be entitled to a reasonable period of continued occupancy when he ceases to exercise his employment.
- During the time workers spend in the workers' accommodation they should enjoy their fundamental human rights and freedom of associations in particular. Workers' accommodation arrangements should not restrict workers' rights and freedom.
- Housing standards should include special attention to the following:
  - minimum space allocated per person or per family (floor are; cubic volume; or size and number of rooms);
  - supply of safe water in the workers' dwelling in such quantities as to provide for all personal and household uses;
  - adequate sewage and garbage disposal systems;
  - appropriate protection against heat, cold, damp, noise fire, and diseases-carrying animals, and, in particular, insects;
  - adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting;
  - a minimum degree of privacy both between individual persons within the household and for the members of the household against undue disturbance by external factors;
  - the suitable separation of rooms devoted to living purposes from quarters for animals.
- Where accommodations are provided for single workers or workers separated from their families, additional housing standards should be considered:
  - a separate bed for each worker;
  - separate gender accommodation;
  - adequate sanitary conveniences;
  - common dining rooms, canteens, rest and recreation rooms and health facilities, where not otherwise available in the community.

According to the baseline information collected, there is no dependence on natural resources for subsistence in the local communities.

No new economic activities or facilities are planned to be created because of the Project.

There may be potential impacts to the communities in terms of restriction of access to agricultural land during the construction of the roads, potential damage to agricultural crops during construction and visual disturbance during the operational phase.

Table 30 Summary of impact characteristics

Summary	Construction	Operation
Project activity/component	1. Land use & potential restrictions during the project construction phase 2. Direct, indirect and induced community employment 3. Housing of construction workforce	1. Improved road infrastructure 2. Revenue generation to the local budget of the communes
Impact Type	1. NA (assessed under previous sections) 2. NA (assessed under previous sections) 3. Negative, indirect, short- term, combined, local and probable	1. Positive, primary, direct, long term, local and definite 2. Positive, primary, direct, long term, local and definite
Stakeholders/ Receptors Affected	1. Inhabitants of the Crucea, Pantelimon and Vulturu communes 2. Inhabitants of the Crucea, Pantelimon and Vulturu communes 3. Inhabitants of Ovidiu town	1. Inhabitants of the Crucea, Pantelimon and Vulturu communes 2. Inhabitants of the Crucea, Pantelimon and Vulturu communes

Table 31 Summary of Impact Assessment for all Project activities

Assessment	Construction	Operation
Sensitivity	**Low**	**Low**
Magnitude	**Low**	**Low**

Based on the above, the sensitivity and the magnitude of the impacts on livelihoods, subsistence, economic activities and resettlement are considered to be low.

Mitigation measure

In the objective of increasing the positive impacts the Project may have on livelihoods and on reducing any negative impacts, it is recommended that procurement of goods and services should be from those available locally, to the extent possible.

7.4.4 Impacts to community health and safety

In order to assess the potential impacts on community health and safety, the following aspects have been considered:

- community health: socioeconomic factors which may influence health issues, history of vector and non-vector borne diseases in the population and access to health care; and
- safety: exposure to risks which may cause accidents that may threaten life or health.

The introduction of temporary construction labour for development projects is usually associated with an increase in vulnerability and susceptibility of local communities to social pathologies, including drug and alcohol abuse, increased incidence of sex workers, teenage pregnancies, and domestic violence as well as the import of diseases.

The Project will involve an estimated construction staff of 445 non-locals. There is no evidence that migrant workers have introduced difficulties associated with import of diseases in the past and due to the relatively small scale of the project and construction staff to be present on site at a certain moment, it is likely that the impact on host communities will be limited. Smoking, alcohol and drug abuse are not generally considered to be significant problems in the area and the Project is not expected to have any impact on this issue.

There will be an increase in traffic and heavy vehicles during construction. This increase in traffic may result in an increase in road traffic accidents as local villages may not be aware of the associated dangers. This impact could be exacerbated if construction vehicles are on the roads after dark or during peak hour traffic.

Taking into account that health care resources are of medium to low quality and there is a low historical safety record available, the sensitivity is considered to be high. Health issues affecting a community may take at least five years to be cured. Diseases which may be present among construction workforce could affect the local population in Ovidiu town where they will be accommodated but it is unlikely that they will affect the population of the local communes. However, applying the precautionary principle the magnitude of the impact is considered to be medium.

Table 32 Summary of impact characteristics

Summary	Construction	Operation
Project activity/component	Construction of the project components and associated arrival of construction workforce	N/A
Impact Type	Negative, secondary, indirect, short to long term, local	N/A
Stakeholders/ Receptors Affected	Inhabitants of Crucea, Pantelimon and Vulturu communes	N/A

Table 33 Summary of Impact Assessment on community health and safety

Assessment	Construction	Operation
Sensitivity	**High**	**N.A.**
Magnitude	**Medium**	**N.A.**

Alternatives/Mitigation measures

In order to limit any health impacts on the local communities, especially with regard to sexually transmitted diseases, the developer could consider an investment such as a family planning clinic.

Safety issues may arise with public access to wind turbines (e.g. unauthorized climbing of the turbine) or to the wind farm substation.

Prevention and control measures to manage public access issues include:

- use gates on access roads;
- restrict access to turbines by having locked doors and camera surveillance;

- post information boards about public safety hazards and emergency contact information.

8 OCCUPATIONAL HEALTH AND SAFETY ASPECTS

Occupational health and safety hazards specific to wind farms during construction, operation, and decommissioning stages are generally similar to those of most large industrial facilities and infrastructure projects.

These primarily include physical hazards such as work at heights, work in confined spaces, work with rotating machinery and falling objects. This goes in line with the recommendations of the IFC Environmental Health and Safety Guidelines on Wind Energy.

A systematic approach has been applied for the project with the purpose of effectively addressing occupational health and safety hazards and risks, based on the following steps:

- Identification of EHS project hazards and associated risks as early possible
- Management of EHS aspects by experienced and competent EHS professionals
- Understanding of the likelihood and magnitude of EHS risks and of the potential consequences to workers, communities and environment
- Prioritizing risk management actions with the objective of reducing risks to human health and the environment and by incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences in case avoidance is not possible
- Preparing personnel to respond to accidents, providing needed resources to effectively and safely control emergency events
- Improving EHS performance through ongoing monitoring and accountability.

The EHS procedures implemented at the project are indicated within section 4.2 of this report.

Working at heights represents one of the main safety hazards during the construction phase of the project and is therefore detailed herein.

Work at heights may be required during construction activities, including the assembly of wind tower components and general maintenance activities during operations. Prevention and control of hazards associated with working at heights include:

- prior to undertaking work, test structure for integrity

- implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers;
- establishment of criteria for use of 100%fall protection (typically in case of work over 2 m above the working surface but sometimes extended to 7 m, depending on the activity). The fall-protection system should be appropriate for the tower structure and movements to be undertaken including ascent, descent, and moving from point to point;
- install fixtures on tower components to facilitate the use of fall protection systems;
- provide workers with an adequate work-positioning device system. Connectors on positioning systems must be compatible with the tower components to which they are attached;
- ensure that hoisting equipment is properly rated and maintained and that hoist operators are properly trained;
- safety belts should be of not less than 15.8 mm (5/8 inch) two in one nylon or material of equivalent strength. Rope safety belts should be replaced before signs of aging or fraying of fibres become evident;
- when operating power tools at height, workers should use a second (backup) safety strap;
- signs and other obstructions should be removed from poles or structures prior to undertaking work;
- an approved tool bag should be used for raising or lowering tools or materials to workers on elevated structures
- avoid conducting tower installation or maintenance work during poor weather conditions and especially where there is a risk lightning strikes;

In order to prevent and control work at height hazards, a specific procedure (WCN-HSE-PRO-016 – Working at height) is implemented for the project. The procedure clearly defines responsibilities and indicates step by step the actions to be performed.

The HSE Manager is responsible for ensuring the application of this procedure. It is the responsibility of all section leaders / team leaders to ensure that, within their area of competence, the operations involving working at height by means of personnel hoist are performed safely. They are responsible also to ensure that this procedure is thoroughly followed.

The person in charge with the operation ensures that all the safety measures are taken in account prior such operations take place and during this operation. The person in charge with the operation is also responsible to ensure that the involved personnel have well understood the risks and the individual responsibilities explained clearly during the Pre-Job Meeting.

The personnel involved in working at height activities are responsible to follow the procedure accordingly.

The activities of working at height by means of personnel hoist activities are subject to a Work Permit and only with certified and verified equipment.

Prior such operations take place, all the safety measures are to be taken in account by using the checklist corresponding to the type of operation (man riding, using in the working basket). This checklist shall be filled in the presence of all involved personnel, during the Pre-Job Meeting. All the items stipulated in the checklist are to be fulfilled. In case that, for any reason this is not possible, the operation will not be executed.

The involved personnel are to receive clear individual indications from the person in charge with the operation. The checklist is to be appended to the Work Permit issued for the operation and is to be approved by the Site Manager.

Appropriately trained staff is to be nominated for ensuring good communication between the hoist operator and the person(s) working at height. The signals are to be agreed in advance by all personnel involved.

The safety harness is mandatory to be worn by the personnel in the working basket in case work over the basket edges is to be performed during the operation. The hoist operator shall not leave the hoist by any means.

9 COMMUNITY HEALTH, SAFETY AND SECURITY, IN RELATION TO CRUCEA NORTH WIND FARM

Community health and safety hazards during the construction, operation, and decommissioning of wind energy projects are similar to those of most large industrial facilities and infrastructure projects. They usually include structural safety of project infrastructure, life and fire safety, public accessibility, and emergency situations etc.

As mentioned in the EHS Guideline issued by World Bank, Community health and safety hazards specific to wind energy facilities primarily include the following:

- Blade and ice throw;
- Aircraft and marine navigation safety;
- Electromagnetic interference and radiation;
- Public access.

Therefore, during project implementation, the following IFC recommendations should be considered and, if possible, be applied.

9.1 BLADE / ICE THROW

A failure in the rotor blade or ice accretion can result in the 'throwing' of a rotor blade or ice from the wind turbine, which may affect public safety, although the risk of ice throw is only relevant to cold climates and the overall risk of blade throw is extremely low.

For wind farms, blade throw management strategies usually include the following:

- establish safety setbacks, and design / site wind farms such that no buildings or populated areas lie within the possible trajectory range of the blade. This safety setback range is unlikely to exceed 300 meters, although the range can vary with the size, shape, weight, and speed of the rotor, and with the height of the turbine;
- equip wind turbines with vibration sensors that can react to any imbalance in the rotor blades and shut down the turbine if necessary;
- regularly maintain the wind turbine;
- use warning signs to alert the public of risk.

In case of Crucea North Wind Farm site area, there are no buildings in vicinity or between the turbines. All wind turbines comply to / with the safety distancies /area required under ANRE Order no. 4/2007 (e.g. distance to

other turbines: 7 x rotor diameter of the largest unit, when they are arranged on the prevailing wind direction, respectively 4 x rotor diameter of the largest unit, when they are perpendicular to the prevailing wind direction). The real minimum distance between the closest turbines is more than 500 metres.

Wind Turbines are equipped as standard with vibration monitoring as turbine protection. This will ensure shut down of wind turbines at defined vibration levels.

Regularly maintenance activities of the wind turbines will be undertaken according to service interval specified in turbines certification.

At certain points of the Crucea North Wind Farm site area, ice warning signs will be positioned to alert the public of risk.

For wind farms projects, ice throw management strategies usually include:

- curtail wind turbine operations during periods of ice accretion;
- post signs at least 150 meters from the wind turbine in all directions;
- equip turbines with heaters and ice sensors;
- use cold-resistant steel for the turbine tower;
- use synthetic lubricants rated for cold temperature;
- use black fluoroethane-coated blades;
- provide full-surface blade heating, if available, or otherwise use leading-edge heaters at least 0.3 m wide.

For Crucea North Wind Farm, curtail wind turbine operations during periods of ice accretion will be implemented only in case safety stop of the wind turbines. Ice warning signs will be positioned at certain points of the wind farm site area. Turbines will be equipped with standard ice sensors equipment and will with heaters and ice sensors.

Wind Farm's turbines are produced from cold-resistant steel. The design temperature of WTs is -40°C and is considered sufficient for Crucea North Wind Farm project conditions.

In case of icy weather conditions, will be used synthetic lubricants rated for cold temperature.

Standard blade design will be provided by the turbine's producer, since the Crucea North Wind Farm is not located in a cold climate area.

9.2 AIRCRAFT NAVIGATION SAFETY

Wind turbine blade tips, at their highest point, may reach more than 100 meters in height. If located near airports or known flight paths, a wind farm may impact aircraft safety directly through potential collision or alteration of flight paths.

Prevention and control measures to address these impacts include the following:

- consult with air regulatory traffic authorities before installation, in accordance with air traffic safety regulations;
- when feasible, avoid siting wind farms close to airports and within known flight path envelopes;
- use anti-collision lighting and marking systems on towers and blades.

In this sense, Crucea Wind Farm SRL obtained the approval from the Romanian Civil Aeronautical Authority (RCAA) no. 18555/13251/404 dated 20 June 2012 for the Crucea North Wind Farm project as part of the construction permit application documents. The requirements formulated by the RCAA are listed below:

- the location and height of the turbines included in the application documents shall be observed;
- turbine towers, nacelles and blades shall be painted in white;
- turbine towers shall be provided with light marking during daytime with white-coloured lights having a maximum intensity of 20,000 cd and lamps accepted by the Romanian Civil Aeronautic Authority;
- turbine towers shall be provided with light marking during night-time and during weather conditions limiting visibility (fog, rains and snow) at an intermediate height of 60 m using 10 cd red lights and at maximum height using white-red or red lights having a maximum intensity of 20,000 cd. Lamps used shall be those accepted by the Romanian Civil Aeronautic Authority;
- the developer shall send the RCAA a written notification informing the start of the construction works at least 60 days prior to the planned date and shall specify the estimated period necessary for the project elements to be installed to the maximum approved height;
- in case construction works do not start within the period of validity of the RCAA approval (one year since its issue – 20 June 2012) or if the developer changes or changes are made to the project design and layout, the developer is required to apply for a new RCAA approval.

9.3 *ELECTROMAGNETIC INTERFERENCE*

Wind turbines could potentially cause electromagnetic interference with aviation radar and telecommunication systems (e.g. microwave, television, and radio). This interference could be caused by three main mechanisms, namely near-field effects, diffraction, and reflection or scattering.
Near field refers to the potential of a wind turbine to cause interference due to electromagnetic fields emitted by the turbine generator and switching components. Diffraction occurs when the wind turbine not only reflects but also absorbs a telecommunications signal. Reflection and scattering occur when a wind turbine either obstructs or reflects a signal between a transmitter and receiver [(1)].

The nature and amount of EMI from each three mechanisms depends on:

- the location of the wind turbine relative to the transmitter and receiver;
- the characteristics of the rotor blades;
- the signal frequency;
- receiver characteristics; and
- the radio wave propagation characteristic in the local atmosphere.

Aviation Radar

Wind farms located near an airport may impact the operation of aviation radar by causing signal distortion, which may cause loss of signal and / or erroneous signals on the radar screen. These effects are generally caused by tower and rotor component reflection and radar chopping.

As already mentioned in section 9.3 above, Crucea Wind Farm SRL has consulted the RCAA and obtained approval no. 18555/13251/404 dated 20 June 2012 listing the requirements to be met by the Project (see Section 9.3). These requirements are mainly related to signalling the turbines and not to potential signal distortion issues which, given the project location, are unlikely to occur.

Television and telecommunication systems

According to good practice, prevention and control measures to address impacts to telecommunication systems and television broadcast include the following:

[(1)] IFC (2007) Environmental, Health, and Safety Guidelines for Wind Energy

- modify location of wind turbines to avoid direct physical interference of point-to-point communication systems;
- install higher quality or directional antenna;
- direct the antenna toward an alternative broadcast transmitter or relocate the antenna;
- install an amplifier to boost the signal;
- if a wide area is affected, consider the construction of a new repeater station.

SC Crucea Wind Farm SRL approached the communication operator Romtelecom Constanta during the procedure of obtaining required approvals for the Project construction permit application. The developer obtained the Principle Approval 203/04/07/01/BUC/CT/714 dated 13 July 2012.

According to this approval, Romtelecom has notified the developer that there are underground fiber-optic telecommunication facilities on national road DN2A, and underground cables on DJ 226B at a depth of approximately 0.6-1.2 m, according to the drawings of the site plan and these would be affected by the Project works.

Consequently, Romtelecom approved the Project provided the following conditions were met in order to protect the underground telephone networks:

- The works for which the approval was requested, carried out in the area of telecommunication facilities, will only be executed under ROMTELECOM technical assistance. For this, 48 hours before the beginning of works, the beneficiary/building contractor will apply for technical assistance.
- The site delivery regarding the current telecommunications network shall be materialized by signing a Site Delivery/Reception Report, which shall represent the annex to a Minutes / Convention, signed by both parties, beneficiary/building contractor and ROMTELECOM, at the site delivery.
- All the works designed by this documentation in the underground telephone cables area will be compulsorily executed manually and in the presence of Romtelecom delegates and, in the portions of parallelism with them, measures shall be taken in order to support the banks to prevent their collapse. Both in intersection areas and in parallelism areas of the urban networks proposed with underground telecommunication facilities, it is compulsory to comply with all the minimum distances and measures set out in the technical regulations in force.
- If failures of telecommunication facilities occur, due to the non-compliance with the provisions of this approval, the equivalent value of remedial works of the damaged facilities, as well as the damages claimed by

Romtelecom clients due to the interruption of service supply, will be borne by the one who caused the failure.

9.4 PUBLIC ACCESS

Safety issues may arise with public access to wind turbines (e.g. unauthorized climbing of the turbine) or to the wind farm substation.

Prevention and control measures to manage public access issues include:

- use gates on access roads;
- fences around the substation;
- restrict public access to turbines, use locked doors and camera monitoring for surveillance;
- post information boards about public safety hazards and emergency contact information.

10 MANAGEMENT OF TRANSPORT SAFETY DURING THE CONSTRUCTION PHASE

Crucea commune is at a distance of approx. 58 km to the city of Constanța. Although a route survey is not available to date, the possible main two routes for the transportation of the blades are following the National Road 2A and on an asphalt road with few curves and earth roads on the entrance on the site. There might be a need for a gravel fill or strong metal plate cover of a side ditch road for enough space to turn and some opposite way entrances on to the national roads at the exit from Constanta. Also the site entrances in Crucea will need to be connected to the main road.

The turbine components are planned to be transported by ships to Constanta port and subsequently transported to the project site by long-vehicle and oversized trucks according to specifications of the turbine manufacturer and under the responsibility of a specialized company.

The planning for the site access is not finalized yet. Based on the topographic situation, the heavy haulage of the turbine elements may require considerable works to improve the site access. Impacts associated with access road rehabilitation/construction are not part of this report.

During the construction phase, the vehicle traffic along the transportation routes has to be considered. Particularly the cars and trucks passing through the communes along the National Road may cause significant traffic noise. However, the noise generation is limited at an average traffic of 100 movements per day (about 10 movements/hour). Noise pressure levels of more than 55 dB(A) can be possible at roadside facades of buildings. Single trucks may cause a nuisance to the villagers. The envisaged construction period is one year.

Mitigation

SC Crucea Wind Farm SRL developed a Guide for transportation safety that will help employers develop work practices that will eliminate fatal crashes on our roads. Also, it's scope is to assists employers in developing a safe driving program and reminding employees of what to look for while driving for work. This guide is a part of the HSE Management plan developed by SC Crucea Wind Farm SRL for the project, including also the work instruction and procedures for people and heavy tools transportation.

In order to control avoidable noise nuisance along the transportation route, speed limits shall be implemented at village roads. The truck drivers have to be trained to recognize the villager's interests on the least possible nuisance.

The driver's behaviour shall be inspected regarding driving speed and safety, and shall be in compliance with the requirements of the HSE Management Plan developed by SC Crucea Wind Farm SRL for this project. Only well maintained equipment shall be used.

A Traffic Management Plan will be developed by the turbine manufacturer to set out general measures to mitigate traffic-related impacts associated to construction and include information on more detailed site specific measures as required.

Transportation of over-size loads will comply with all applicable regulations and conditions stipulated in the relevant permit and will be accompanied by appropriate safety vehicles.

Routes for abnormal loads will be arranged and agreed with the authorities, local police and emergency services. Where oversized vehicles require a police escort, local police dictate the timing of delivery. All abnormal loads will be suitably marked to warn other road users.

The developer will ensure a permanent consultation with landowners and users and access will be maintained at all times where required.

The developer/principal contractor will hold regular consultations with the local authorities regarding the management of construction.

In order to identify whether any damage has occurred the developer proposes a joint site inspection with the Administration for Roads and Bridges prior and after the project's transport activities to survey the existing road conditions on the selected route. The procedures and actions to be taken in case of damage to the local road infrastructure by construction traffic will also be detailed in the transport management plan.

11 *EMERGENCY PREPAREDNESS AND RESPONSE*

An Emergency Preparedness and Response Plan is setting out the measures to be taken to minimise the risk of an incident and the measures required to prepare for and respond in the unlikely event that an incident does occur during construction (such as a fuel spillage from vehicles) or operation (such as oil leaks from the gearbox or fire of the electrical components). The procedures will include provisions for incident reporting. SC Crucea Wind Farm SRLwill make provisions for keeping anti-pollution control/clean up materials on site in case of an incident.

The company has developed in 2012 an Emergency Response Procedure for Crucea North Wind Farm. As specified in the procedure, the scope of this procedure is to establish a method of reporting major accidents and near misses occurred at the company working site, the correct measures and actions to be taken in these cases and to establish the proper line of communications between all relevant parties to ensure that any emergency situation is resolved as quickly and safely as possible.

This procedure applies to all personnel involved in the Crucea North Wind Farm project, for the entire duration of the project, starting with the mobilization phase until full completion and demobilization equipment and personnel. All STEAG's Contractors and/or Subcontractors shall align their own emergency procedures in order to meet the principles and the lines of communications as set out in the Emergency Response procedure.

The procedure clarifies who will do what in case of emergency situations. As a summary:

- the Project Manager is the president of the Committee for Emergency Situations and has the following responsibilities: give the classification of incident and decides the necessary corrective measures; taking in account the gravity of the incident he is calling the Committee for Emergency Situations; allocating the necessary resources;
- the Site Manager takes over the responsibilities as the president of the Committee for Emergency Situations whenever the Project Manager cannot fulfil his responsibilities;
- the Committee for Emergency Situations will analyse the situation based upon the information received from the site and propose corrective actions; will decide the allocation of material and human resources for solving the situation; will Cooperate with other institutions who can assist

for solving the situation and will monitors continuously the situation until the situation is solved;

- the Site Engineers will inform immediately the Project Manager about the event; act according with the HSE Plan; informs the local relevant authorities through the Client Representative; issues and send the Event Report to the STEAG Energy Services GmbH Company and P-AGU (corporate).
- the Medical Coordinator, when required by the Committee for Emergency Situations, will ensures the continuous monitoring of the injured person(s); when required by the Committee for Emergency Situations he will ensure the medical assistance and continuous monitoring of the injured person(s); will give all the required medical information to the Committee for Emergency Situations.
- HSE Manager will have the following responsibilities: to inform the relevant authorities in any case of: fires, explosions, single and/or multiple personal injuries resulting in fatality, major pollution or immediate risk of pollution he informs; when asked to do so, he gives the required HSE documentation to the Committee for Emergency Situations; he periodically checks the validity of the emergency contact numbers of the institutions which have to be informed about the emergency situation: he is member of the Committee for emergency situations;
- Department of Public Relations will be responsible with the following actions: to receive information related to the event from the Committee for Emergency Situations; upon required to do so by the president of the Committee for Emergency Situations, prepare and release information about the event to the press. The information has to be checked and approved by the president of the Committee for Emergency Situations prior to be released; to checks the journals and informs the Committee for Emergency Situations about all the news referring to the event.

The procedure is specifying the main authorities to be announced /consulted in case of emergency:

- Local Environmental Protection Agency, County Commissariat of the National Environmental Guard and Water Authority for pollution situation;
- Fire fighting Inspectorate in case of explosions/fires;
- Labour Inspectorate, County Prosecuting Office, Police County Inspectorate and CNPAS in case of accidents;

- County Inspectorate for Emergency situations in case of natural hazards (earthquakes, landslides, flooding, snow blockage, other acts of God), radiation or terrorist attack;

The Emergency Response Procedure for Crucea North Wind Farm has annexed schematic steps to be followed for each of the categories above mentioned and contact details for all relevant authorities.

12 *INFORMATION ON THE LAND ACQUISITION PROCESS*

The Project is intended to comprise 36 turbines, the 33/110 kV Transformer Station, the 110/400 kV Transformer Station, cable corridors for 33 kV and 110 kV cables, road curves, road enlargement works, road consolidation works. For development of the Project, the company intend to rely both on Civil Code rights and on rights obtained on the basis of Electricity Law.

In addition, during the construction works, certain other plots of land will be used for site organization and other temporary works.

According with the information provided by STEAG and Monsson Alma, the SPV's shareholders, originally, the turbine positions were set by the design department, according to wind studies, topographic data, restrictions and other technical data.

Subsequently, the land acquisition department has identified, using the mayoralties databases, the landowners of the plots that were indicated by the designing department.

Depending on the legal status of these lands (unknown owner, lands with multiple inheritors, unknown heirs or inheritors working abroad etc.), there were selected the plots to be used for turbines and the adjacent lands

In connection with the erection of the turbines, with respect to plots of land, the SPV executed with the relevant owners assignment and superficies agreements. All the land locations are situated within the limits of Crucea and Vulturu Communes, Constanta County, Romania.

Discussions were held separately, with each landowner in part, based on open negotiation and market value.

Typically, the land agreements have been preceded by pre-agreements concluded between the SPV and the relevant owners, whereby the latter undertook to conclude further the land agreements.

The land agreements have been concluded on the basis of a standard form of contract. Under the land agreements, various rights are secured over the land locations, consisting in the superficies right, the right to build, the right of use, the pre-emption right and certain interdictions.

Pursuant to the sellers' documents, the land locations have undergone procedures for the removal from the agricultural circuit whereby certain surfaces, typically smaller than the entire surface of the respective land

locations, have been taken out of the agricultural circuit as requested under the current legislative framework regarding building requirements.

The land for the 33/110 kV Transformer Station is secured by the SPV under a assignment and superficies agreement similar in content with the agreements for the plots for turbines.

For the purpose of building the 110/400 kV Transformer Station, the SPV concluded with Elcomex Agroindustrial S.A. a superficies, use, easement and access agreement.

As concerns the location of the cable corridors along/under existing exploitation roads, the SPV has contracted easement rights through agreements concluded with Crucea, Pantelimon and Vulturu Communes.

As regards the rehabilitation of the roads, the SPV has been granted the right to perform road enlargement and rehabilitation works, in the name of the communed, through contracts concluded with Crucea, Pantelimon and Vulturu Communes.

The Project site organization is envisaged to affect few plots of land, in relation to which the SPV concluded a lease agreement.

If additional land plots, for potential project extensions, may be necessary, in the future, depending on the ownership rights, the procedures to securing the lands will be conducted similar to those described above.

13 CULTURAL HERITAGE ASPECTS

13.1.1 Archaeology and Cultural Heritage

Introduction

No museums or tourist attractions of international or national value are known to be located in the local communities. The baseline concerning archaeology and cultural heritage has been informed by conducting a desktop study of the Project site. The table below shows known historical and archaeological monuments located in the three communes and listed in the List of Historical Monuments located in Constanta County in 2010(1) and in the National Archaeological Repertory of Romania(2).

Table 34 Known historical and archaeological monuments in the local communes around the Project site

Code(3) in the List of Historical Monuments	Code in the National Archaeological Repertory of Romania	Name and short description	Location / Address	Date
CT-I-s-B-02588	61577.01	Rural settlement	Băltăgeşti village, Crucea commune, at the outskirts of the village and the crossroad of the Roman roads Capidava - Tomis and Capidava - Histria	centuries II - III C.E.(4), Roman Age
CT-I-s-B-02589	61577.02	Latène Necropolis	Băltăgeşti village, Crucea commune, at the hearth of the village	centuries IV - III B.C.E., Latène
Not listed	61577.03	Latène settlement	Băltăgeşti village,	La Tène

(1) Available on the website of the National Heritage Institute at http://inp.org.ro/images/LMI/LMI-2010_CT.pdf and accessed in January 2013

(2) Available at http://ran.cimec.ro/ and accessed in January 2013

(3) The code is assigned only to those monuments which are included in the List of Historical Monuments. Monuments which do not have a code have been identified by the archaeological experts in the baseline archaeological survey.

(4) Common era

Code[3] in the List of Historical Monuments	Code in the National Archaeological Repertory of Romania	Name and short description	Location / Address	Date
			Crucea commune	
CT-I-s-B-02643	61568.01	Rural settlement	Crucea village, Crucea commune	centuries I - III C.E.[1], Roman Age
CT-I-s-A-02644	61568.02	Tumuli[2]	Crucea village, Crucea commune – in the perimeter of the whole commune	Antiquity
Not listed	61602.02	Tumulus	Stupina village, Crucea Commune	Not available
CT-I-s-B-02663	61595.01	Roman rural settlement	Gălbiori village, Crucea commune, incorporated area	centuries I - VI C.E., Roman Age
CT-I-s-A-02664	61595.02	Tumuli	East of Gălbiori village, Crucea commune	Antiquity
CT-I-s-B-02756	61602.03	Fortified settlement	*"La derea"*, in the eastern boundary of Stupina village, Crucea commune	centuries IX - XII, Early Middle Ages
CT-I-s-B-02710	62636.01	Settlement	200 m north of Nistoresti village, Pantelimon commune	centuries I - VI C.E., Roman Age
CT-I-s-B-02711	62636.02	Settlement	1.5 km north of Nistoresti village, Pantelimon commune	centuries III - IV C.E., Roman Age
CT-I-s-A-02726	62618.01	Archeological site "Cetatea Ulmetum"	5 km west of Pantelimonul de Sus village, Pantelimon	centuries II - IV C.E.

(1) Before common era.

(2) A heap of earth or stones placed over a grave.

Code[3] in the List of Historical Monuments	Code in the National Archaeological Repertory of Romania	Name and short description	Location / Address	Date
			commune	
CT-I-m-A-02726.01		Ulmetum Citadel	5 km west of Pantelimon village, Pantelimon commune	centuries II - IV C.E., Roman Age
CT-I-m-A-02726.02		Castrum (earth)	5 km west of Pantelimon village, Pantelimon commune	centuries II - IV C.E., Roman Age
Not listed	62609.03	Tumuli	In the perimeter of Pantelimon village, Pantelimon commune	Antiquity
CT-II-m-B-02913		Sf. Nicolae Church	Nistoresti village, Pantelimon commune	1896
Not listed	62654.01	Latène settlement	Runcu village, Pantelimon commune	La Tène, Roman Age
CT-II-m-B-02919		Sf. Voievozi Church	Vulturu village, Vulturu commune	1888
CT-IV-m-B-02968		Obelisk honouring the heroes of the First World War	Centre of Vulturu village, Vulturu commune	1929

Source: National Heritage Institute: List of Historical Monuments (2010) – Constanta County, and National Archaeological Repertory of Romania

The main Romanian legislative documents which relate to archaeology and the protection of cultural heritage and a brief summary of the legal requirements are described in the table below.

Table 35 Archaeological and Cultural Legal Requirements

- Government Ordinance (GO) 43/2000 on the protection of the archaeological heritage and designation of certain archaeological sites as areas of national interest, republished;
- Law 378/2001 for the approval of GO 43/2000 on the protection of the archaeological heritage and designation of certain archaeological sites as areas of national interest;
- Law 462/2003 for the amendment of GO 43/2000 on the protection of the archaeological heritage and designation of certain archaeological sites as areas of national interest;
- Law 258/2006 for the amendment of GO 43/2000 on the protection of the archaeological heritage and designation of certain archaeological sites as areas of national interest;
- GO 13/2007 to complete art. 5 of the GO 43/2000 on the protection of the archaeological heritage and designation of certain archaeological sites as areas of national interest;
- Law 208/2007 for the approval of GO 13/2007 to complete art. 5 of the GO 43/2000 on the protection of the archaeological heritage and designation of certain archaeological sites as areas of national interest.
- Order 2483/2006 with regard to approving the list of areas having a priority archaeological interest;
- Order 2392/2004 on setting up Archaeological Standards and Procedures;
- Standards and procedures for archaeological research, set up by Order 2392/2004; and
- Law 150/1997 for the ratification of the European Convention on the protection of archaeological heritage, adopted at La Valetta on 16 January 1992.

Archaeological monuments in Romania are protected by Law 150/1997 as mentioned in the table above. The main restrictions required by the legal requirements regarding the protection of the archaeological heritage are as follows:

- Preliminary archaeological research is required for projects which require an EIA. This exercise should aim to identify, describe and assess the direct and indirect impacts of the proposed investment on the archaeological heritage.

- A construction permit is only granted following approval from the Ministry of Culture via Constanta County Directorate for Culture and National Heritage who enforces the preservation of archaeological features.
- Costs of archaeological investigations requested for the construction permit are borne by the project developer.
- Any chance finds during excavation works must be reported to the relevant authorities within 72 hours of discovery and fenced off from the area regulated by the construction permit and investigated/excavated (during this time it is protected as an archaeological site from disturbance). Once investigated, the land may be discharged as an archaeological site and return to its prior use. The certificate of discharge is issued after completion of the investigations by the Constanta Directorate for Culture, Religious Affairs and National Cultural Heritage of Constanta County.

13.1.2 Project Cultural Heritage Permitting

S.C. Crucea Wind Farm S.R.L. has concluded service agreement no. 280/5 October 2010 with Constanta Museum of National History and Archaeology. The scope of this service agreement was the surveillance of the excavation works to be conducted on the site of Crucea North Wind Farm 132 MW by archaeological experts of the Museum. The contract requires the developer to notify the Museum when excavation works are planned to be started and the timeline for their execution.

According to the contract conditions, in case certain monuments would be discovered during the excavation works, the developer had to accept the solutions proposed by the archaeological experts for the restauration, preservation, protection and recovery of these monuments and to finance the required works according to an addendum to be concluded to the respective agreement.

As part of the application documents required for the issue of the construction permit for the Project, the developer had to obtain an official statement (approval) from the Constanta County Directorate for Culture and National Heritage.

In April 2012, *S.C. Crucea Wind Farm S.R.L.* applied for an approval to be issued by Constanta County Directorate for Culture and National Heritage due to the fact that the technical specifications of the proposed Project had changed compared to 2010 and the construction permitting procedure had to be resumed accordingly.

Constanta County Directorate for Culture and National Heritage issued the approval no. 116/27 April 2012 provided the developer would conclude an

archaeological surveillance agreement with the Constanta Museum of National History and Archaeology and that this agreement would become an archaeological research service agreement should the excavation works reveal the presence of any archaeological monuments.

The Museum did not require a new surveillance agreement to be concluded and considered that the one concluded in 2010 as still valid. Constanta County Directorate for Culture and National Heritage then issued an official statement no. 1107/16 August 2012 according to which the approval no. 116/27 April 2012 had been issued on the basis of the archaeological surveillance agreement no. 280/5 October 2010 and no other agreement would be required.

The approval no. 116/27 April 2012 was used by the developer to obtain the construction permit for the current technical specifications of the proposed Project.

For the construction of the Stupina 2 400/110 kV Project Substation, *S.C. Crucea Wind Farm S.R.L.* concluded the archaeological surveillance agreement no. 102/19 July 2012 with the Constanta Museum of National History and Archaeology. Contractual clauses remained the same as for the agreement concluded in 2010.

However, up to January 2013 no reports were available to document whether the archaeological experts have conducted any archaeological surveillance activities or research works on the Project site as part of any of the two surveillance agreements concluded with the Constanta Museum of National History and Archaeology.

In summary, the developer has not performed an initial archaeological field survey on the Project site and none has been required by the regulatory authorities at the time of issuing the approvals.

According to international best practice, ERM recommends the developer to conduct such an initial archaeological field survey. The scope of such a survey would be to:

- *identify known and unknown archaeological and historic sites in the Project area;*
- *identify their value (local, national or international);*
- *map the sites identified (especially the unknown) against the location of the Project components to make sure they do not overlap;*
- *in case of overlapping, provide expert advice on the legal requirements and actions to be taken for the preservation and/or, depending on the case, discharge of archaeological value of the respective monument.*

13.1.3 Chance Finds Procedure

STEAG has developed and implemented an "Event reporting" procedure to be applicable for Crucea North Wind Farm project. This procedure became applicable in case of accidents (injuries, pollution, asset damages including cultural heritage values), near misses and non-conformities.

The scope of this procedure is to define a system for reporting and managing such events. In particular, this procedure explains how to:

- Define the event investigation methods;
- Determine the investigation methods;
- Define the criteria for report compiling;
- Determine event reporting methods;
- Ensure the necessary measures for avoiding re-occurrence of events;
- Find a common method for the statistical analysis of the events.

The main scope of this procedure is to avoid re-occurring of the undesirable events and to have a system capable to enable the management of each working site and the company top management to analyse the events and to find the preventive and corrective measures and, in general, to improve the implementation of the HSE Management System.

All the events having contractual implications shall be sent to the Client in order that this late approves the proposed corrective measures. Should the Client does not approve the proposed corrective measures, than these corrective measures shall be revised or discussed and agreed directly with the Client Representative at the working site.

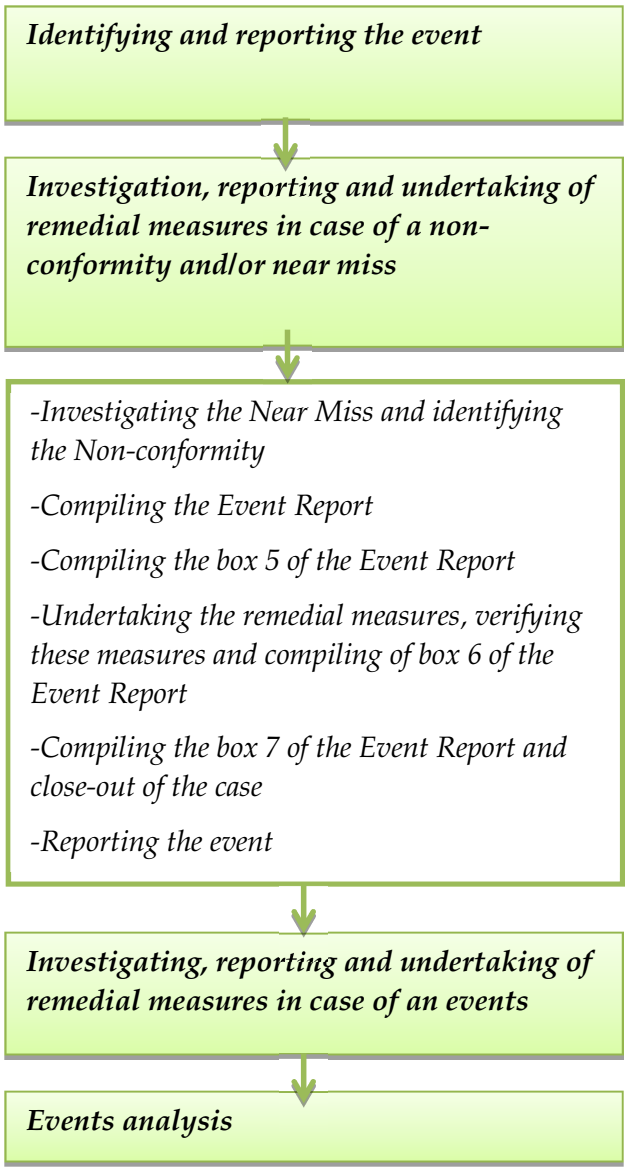
After taking the corrective measures, the Event Report shall be sent to the Client for informing him about the measures and to take the final approval.

The responsibilities for implementation of the "Event reporting" procedure is split between the following actors:

- The Technical Manager / Section Leader is responsible to ensure the application of this procedure within the site;
- The compartments/department leaders are responsible to ensure that any noticed event is reported to the Technical Manager / Section Leader and to participate, whenever is necessary, to the investigation of that event and for undertaking the corrective measures;
- The HSE Manager is responsible to monitor the application of this procedure on site for all companies involved in the project. He is also responsible to participate in the event investigation and to provide the necessary documents, following strictly the guidelines stipulated in this procedure;

- The Contractor HSE Supervisor is responsible to monitor the application of this procedure on his company. He is also responsible to participate in the event investigation and to compile the necessary documents, following strictly the guidelines stipulated in this procedure. The Contractor HSE Supervisor shall maintain updated the Event Report Register and shall notify the Site Manager/ HSE Manager / Section Leader when the due date for a remedial action / measure is overdue;
- All employees working into the site are responsible to report immediately to their direct superior any hazardous situation, non-conformity or event they notice / are involved in and to undertake immediately the necessary corrective measure/action for eliminating the hazard, where this is possible.

The procedure has the following steps:



Regarding the cultural heritage items, any chance finds during excavation works must be reported to the relevant authorities within 72 hours of discovery and fenced off from the area regulated by the construction permit and investigated/excavated (during this time it is protected as an archaeological site from disturbance).

Once investigated, the land may be discharged as an archaeological site and return to its prior use. The certificate of discharge is issued after completion of the investigations by the Constanta Directorate for Culture, Religious Affairs and National Cultural Heritage of Constanta County.

The company will make all the diligences for assuring of a proper training for all contracts and subcontracts (through entire contracting supply chain).

14 CUMULATIVE IMPACT ASSESSMENT

14.1 INTRODUCTION

EC Directive (85/337/EEC) (as amended) "The EIA Directive" requires that in addition to undertaking an Environmental Impact Assessment of the project in isolation, cumulative impacts that may arise directly or indirectly from interaction with other projects must also be considered(1). Reference to cumulative assessment is also made within the Habitats Directive (92/43/EEC) although this tends to be more strictly associated with appropriate assessment procedures.

It should be noted from the outset that the assessment of cumulative impacts is hampered by the lack of information available on other projects, although such difficulties are common throughout the EU, and are not specific to Romania(2).

To assist the analysis of cumulative effects the Local Environmental Agency Constanta provided a list with the locations of Wind Farms Projects within a 10 km radius of the Crucea North Project .Although we have requested to Constanta County Councill to provide support in refining the list with wind farms projects, by communicating which of the projects have already announced the intention to actually develop the projects (since is estimated that, due to the limited grid capacity, not all the projects from the region will be finalized), no answer was received to date. Therefore, all those projects at the agreement and/or permitting stage were included for consideration.

The European Commission (EC) has received a series of complaints concerning the impact of wind farm developments on certain Natura 2000 sites in the region of Dobrogea, Romania. This resulted in the initiation of infringement proceedings and preliminary investigations by EC for certain Natura 2000 sites allegedly affected by wind farms.

At the extent it could be ascertained in the frame of present assignment, these proceedings and investigations relate to potential impacts on ROSPA0073 Macin-Niculitel, ROSCI0123 Muntii Macinului, ROSPA 0031

(1) EC DG XI Environment, Nuclear Safety & Civil Protection. Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions. May 1999

(2) Cooper, L. M & Sheate, W.R. 2002. Cumulative effects assessment: A review of UK environmental impact statements. Environmental Impact Assessment Review Volume 22, Issue 4, August 2002, Pages 415-439

Delta Dunarii and Complexul Raxim-Sinoie, ROSPA0091 Padurea Babadag, ROSPA0100 Stepa Casimcea and ROSCI 0201 Podisul Nord Dobrogean.

None of these Natura 2000 sites are directly relevant to this cumulative impact analysis.

14.2 *DESCRIPTION OF PROJECTS CONSIDERED FOR THE SCOPE OF THE CUMULATIVE ASSESSMENT*

The Crucea North Wind Farm will consist of 36 turbines covering an area of 22.64 km^2 of which the operational footprint (i.e. the land required for the turbines and infrastructure) will be 0.95 km^2 (i.e. approximately 4.19% of the total wind farm area).

Dobrogea has some of the highest wind potential in Europe and consequently there has been a significant interest in wind generating capacity.

Within 10 km of the Crucea North Wind, there are 21 proposed wind farms and these are listed in *Table 14.1* and also in *Maps Agreement stage and Permitting Stage*.

Table 14.1 Wind farms within 10 km of the Crucea North Wind

No.	Location	Name of the developer	No. of turbines/ total power (MW)/ distance to the target site
1	Pantelimon*	SC.NEG PROJECT 1 SRL	2 turbines Approximately 3.5 km
2	Mireasa*	SC.ECO POWER WIND.SRL	4 turbines Approximately 9 km
3	Pantelimon*	SC.EOLIAN PROJECT SRL	2 turbines Approximately 8 km
4	Vulturu	SC.ROMWIND.SRL	9 turbines Overlapping
5	Vulturu	SC VULTURU WIND FARM SRL	29 turbines Boundary overlapping
6	Saraiu, Vulturu and Crucea	SC ENERGO WINDPROD SRL	36 turbines Approximately 5 km

No.	Location	Name of the developer	No. of turbines/ total power (MW)/ distance to the target site
7	Saraiu	SC RIG SERVICE SRL	13 turbines Approximately 5 km
8	Saraiu	SC.SARAIU WIND FARM SRL	40 turbines Approximately 7 km
9	Pantelimon	SC VULTURU POWER PARK SRL	38 turbines Approximately 4.5 km
10	Crucea and Pantelimon	SC CRUCEA POWER PARK SRL	40 turbines Boundary overlapping
11	Crucea	SC NEG PROJECT 1 SRL	2 turbines Approximately 3.3 km
12	Pantelimon	SC E-WIND SRL	55 turbines Approximately 3.7 km
13	Pantelimon	SC. GENERAL MASINE BUSSINES DIVISION SRL & ROMWIND SRL	5 turbines Approximately 4.7 km
14	Pantelimon	SC ROMWIND SRL & SC NEG PROJECT TWO	3 turbines Approximately 4.5 km
15	Pantelimon	SC WIND FACTORY SRL	2 turbines Approximately 7.3 km
16	Silistea and Targusor	SC ECO POWER WIND SRL	4 turbines Approximately 9 km
17	Silistea	SC ELCOMEX EOL SRL	22 turbines Approximately 8 km
18	Crucea	GENERACION EOLIACA DACIA	47 turbines Approximately 1.7 km
19	Crucea	SC.ALPHA EOLICA.SRL	36 turbines Boundary overlapping
20	Crucea	SC RAGGIO VERDE SA	11 turbines Approximately 8 km
21	Vulturu	SC ROMCONSTRUCT TOP SRL	11 turbines Approximately 6 km

No.	Location	Name of the developer	No. of turbines/ total power (MW)/ distance to the target site

*Projects passing environmental permitting phase for operation

Within the 10 km cumulative impact search radius, 21 additional wind farms will add a total of 411 additional turbines. Of these 8 turbines are already in permit stage at LEPA, signifying that can start operating and the rest are in agreement stage, and are currently in the process of construction. This will mean that within the 562 km^2 of the cumulative impact search area[1] there will be a combined total of 447 turbines (including the 36 turbines associated with the Crucea North project). An estimate of the combined land take arising from the other wind farms in combination with Crucea North is difficult. However, assuming a similar land requirement for turbines and associated infrastructure at the other projects to that required at Crucea North Wind farm (i.e. 95 ha or 2.6 ha per turbine) would suggest a total cumulative land take of 1162 ha (11.6 km^2). This is approximately 2% of the 562 km^2 search area within a 10 km radius of Crucea North Wind farm. Crucea North wind farm contributes 0.16% of this land take.

Turbines are likely to be between 2 to 3 MW output and therefore of similar design and height to that at Crucea North Wind farm, with a tower height of approximately 100 metres and turbine blades of 50 metres giving an approximate tip height of 150 metres. It should be noted that the Crucea North turbines will have a total height of 175m.

Detailed environmental information on other wind farms was difficult to obtain, and the only information available relates to the Generacion Eolica Dacia (GED) 47 turbine wind farm near Crucea. Information from this project included an appropriate assessment, a cumulative impact assessment and preliminary results from spring bird and bat migration studies.

[1] The search area is greater than the area represented by a 10km radius circle (314 km^2) as it takes account of the irregular footprint of wind farms, parts of which extend beyond the 10km radius.

14.3 SUMMARY OF EFFECTS OF CRUCEA NORTH WIND FARM IMPACTS IN ISOLATION

The ecological effects of the Crucea North Wind farm are described in the existing EIA[1] (together with the appendix *Biodiversity Impact Study*) and the Adequate Assessment[2].

The existing assessments concluded there would be no significant impacts on flora, fauna or habitats.

The Environmental Statement (ES) noted that only existing intensive agricultural areas would be built on and no protected areas were included within the wind farm boundary, the nearest site (Cheile Dobrogei SPA[3]) being 2.5 km from the nearest turbine.

In relation to migratory birds no geese were found to use the area as a wintering site, and it was concluded that relatively small numbers of migratory soaring birds passed through the wind farm footprint and the majority of these did so above collision risk height.

The spring migration survey was based on four vantage points (VP), one in each of the main clusters. It ran daily between 15th March to 30th May 2009 for approximately six hours per day. A total of 1775 birds of 16 species were counted. April had the most intense migration period, and the dominant travel direction was SE-NW. 65% of flights occurred above 150m.

Key species numerically were white stork *Ciconia ciconia* 950, honey buzzard *Pernis apivorus* 230, steppe buzzard *Buteo buteo vulpinus* 220. In addition 120 red-footed falcons *Falco vespertinus* (IUCN Near Threatened) and two pallid harriers *Circus macrourus* which have a global IUCN classification of Near Threatened and a European category of Endangered where counted.

The autumn migration was based on the same VP's and methodology with 12 days of survey in August and September, and ten days in October. Most birds passed to the east of the wind farm with 80% above 200m, and the

[1] Tudor , d., Hodor, C. & Sebastian, E. 2010. Environmental Impact Statement for the Crucea North Wind Farm Project

[2] Hodor, C. 2010. Evalurea Adecvata A Effectelor Potentiale Ale Proiectelor Eoliene Crucea Nord si Crucea Est Asupra Ariilor Naturale Protejate De Interes Comunitar Fin Vecinatata

[3] Special Protection Area. Designated under *Directive 2009/147/EC on the conservation of wild birds* as part of the Natura 2000 protected area network.

dominant flight direction was NNW-SE. One important caveat was that in poor weather birds flew lower, in smaller groups and flightlines were more variable.

Key species in autumn were similar to those in spring and included white stork 1218, honey buzzard 248, steppe buzzard 402, red-footed falcon 62, and pallid harrier 9-13[1],

The report did not exclude the possibility of a low number of collisions, and did note that small numbers of raptors associated with Natura 2000 sites were found within the wind farm area. No assessment of displacement or detailed collision risk analysis was undertaken and further work to address this is underway.

The surveys found small populations of Annex IV species (subject to strict protection at all times) associated mainly with the old irrigation channels and field margins. These were the Balkan wall lizard *Podarcis tauricus* ,sand lizard *Lacerta agilis,* and the European souslik *Spermophilus citellus.* Within Dobrogea all three species are widespread and common and no significant effect on favourable conservation status was anticipated.

Bat surveys recorded only 18 contacts with four species of bats during May-October 2009. These were serotine *Eptesicus serotinus,* noctule *Nyctalus noctula,* Kuhl's pipistrelle *Pipistrellus kuhelii* and Nathusius pipistrelle *P. nathusii.* Overall the open nature of the habitat, absence of roost sites within the wind farm boundary, and the low number of bat contacts led to the judgement that the area was of low conservation value for bats.

14.4 CUMULATIVE IMPACTS ON FLORA & HABITATS

As Crucea North lies outside of any protected areas and its entire associated land take is occurring in areas of intensive cultivation it makes no significant contribution to cumulative impacts on flora or on habitats.

[1] 4 birds were assigned as either pallid or Montagu's harrier *C. pygargus* . These have been added to the 9 definite pallid harriers to produce a range of 9-13.

14.5 CUMULATIVE IMPACTS ON ANNEX IV SPECIES (OTHER THAN BATS)

In the absence of detailed information from other wind farms an analysis of cumulative impacts relies largely on habitat assessment and an understanding of the ecology of the species impacted.

The three Annex IV species identified at Crucea North were sand lizard, Balkan lizard and European souslik. The three species are widespread in Dobrogea and likely to be present on most if not all of the other wind farms. European souslik is specifically mentioned as being present in the reports for the Generacion Eolica Dacia (GED) site. That survey found it in similar areas to those at Crucea North.

As the wind farms are primarily based on agricultural settings and have a limited footprint, cumulative impacts on these species are likely to be low. Concentrations of all species tend to be associated with less disturbed areas around field margins and old irrigation ditches. Short term losses in these areas due to construction are likely to be offset by the creation of less disturbed habitat around access tracks, turbines and sub-station infrastructure. One caveat to this would be if such infrastructure was deliberately targeted on the less productive parts of fields to minimize impacts on agriculture.

According to the Romania Red Data Book[1] the souslik population is estimated at 15,000 within Romania, the species having been much more common and widespread prior to the conversion of steppe to agriculture. Its stronghold is remaining steppe habitat.

Souslik populations can potentially recover from short term losses, although it should be noted that unlike many rodents they only breed once a year and have small litters of 2-9 young, but they are long lived with females capable of reaching 10-11 years old.

Similarly although both lizard species reproduce relatively slowly they have the potential to recolonise an area if the appropriate habitat is present. Populations of Balkan wall lizard are large (hundreds of thousands according to the Romanian Red Data Book). Sand lizard is not a red data species in Romania.

[1] Botnariuc, N & Tatole, V. 2005. Cartea Rosie a Vertebratelor din Romania. Muzeul National di Istorie Naturala "Grigore Antipa".

Cumulative impacts are therefore unlikely for any of these species although it is acknowledged that this assessment is based on little detailed information from other sites. The proportion of impacts arising from Crucea North would be low given the habitat and small proportion of the total wind farm resource it represents. This is similar to the situation reported at GED and it is not unreasonable to assume that losses at other sites will be similar-i.e. small numbers displaced or killed short term during the construction phase. An increase in undisturbed areas (e.g. protected from ploughing) during operation is likely to lead to increases in populations longer term.

14.6 CUMULATIVE IMPACTS ON BATS

Information on bats from other wind farms within the 10 km search area is limited. Additional monitoring for the GED site to the east of Crucea was undertaken in June 2012 on four nights and reported a total of five bats. These were two common pipistrelles *Pipistrellus pipistrellus* and three noctules *Nyctalus noctula.* These were all either associated with built up areas (pipistrelle) or wooded areas (pipistrelle and noctule).

Experience at other wind farms ERM have been concerned with elsewhere in Dobrogea has produced similar results, with low densities of mainly open or edge foraging species such as *Pipistrellus sp., Nyctalus* and *Eptesicus.* During these surveys bats were often associated with features such as urban areas, woodlands, waterbodies, and old irrigation ditches.

There has been increasing concern both in Europe[1] and North America[2] at the potential impact wind turbines may have on bat populations. Risk factors identified include season (the majority of turbine fatalities occur in August to September), proximity to woodland edge (Durr & Bach's[3] German study found 89% of bat casualties occurred where turbines were within 100m of a woodland), the susceptibility of bats to sudden changes in

(1) Rodrigues, L., L. Bach, M.-J. Dubourg-Savage, J. Goodwin & C. Harbusch (2008): Guidelines for consideration of bats in wind farm projects. EUROBATS Publication Series No. 3 (English version). UNEP/EUROBATS Secretariat, Bonn, Germany, 51 pp

(2) **Horn, J. W, Arnett, E. B, & Kunz, T. H. 2008. Behavioural Responses of Bats to Operating Wind Turbines.** ***Journal of Wildlife Management 72(1):123-132.***

(3) Dürr, T. & Bach, L. 2004. Bat Deaths and Wind Turbines - A Review of Current Knowledge, and of the Information Available in the Database for Germany. Bremer Beiträge für Naturkunde und Naturschutz, Volume 7, pp. 253-264

air pressure (death by bariotrauma)[1], and fatalities appear to be concentrated amongst a suite of bats adapted to open air foraging (*Nyctalus, Pipistrellus, Vespertilio* and *Eptesicus* spp.). Both European and North American data indicate fatalities increase during periods of low wind speed, particularly after the passage of weather fronts[2].

Various reasons for bats interacting fatally with turbines have been produced including searching out potential mating sites, tall turbines extending into the bat migration flyway, and turbines creating heat that attracts insects. Amongst the most recent theories, combining elements of much of the above has been that turbines interfere with insect migration and cause a build up of insects that in turn attract bats[3].

There is increasing evidence that open farmland areas, such as that occupied by Crucea North, have much lower fatalities per turbine than those in complex habitats or along natural mountain or river corridors or coastal sites. Rydel et al (2010) estimate mortality in such open farmland landscapes as 0-3 bats per annum per turbine. Research also indicates that bat migration is not broad front, but is related to features such as mountain ridges or coastal edges.[4]

Evidence of bat migration in Romania is sketchy, but 13 *Rhinolophus ferrumequinum* ringed in Hungary have been recovered in Romania, some travelling up to 80 km([5]). A small number of the bat migrations *(Nyctalus noctula, Pipistrellus nathusii. P. Pipistrellus, Vespertilio murinus)* recorded between different countries (Hutterer et al 2005) would seem to indicate bats may cross Romania at some point.

The Crucea North data did indicate a small increase in activity during August and September, but this could be equally due to volant

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(4) Baerwald, E. F., D'Amours, G. H., Klug, B. J. & Barclay, R. M. R. 2008. *Bariotrauma Is A Significant Cause Of Mortality At Wind Farms.* Current Biology 18 (16)

(5) Rydel, J., Bach, L., Doubourg-Savage, M-J., Green, M., Rodrigues, L. & Hedenström, A. 2010. Bat Mortality at Wind Turbines in Northwestern Europe. *Acta Chiropterologica* 12(2):261-274

(1) Rydel, J., Bach, L., Doubourg-Savage, M-J., Green, M., Rodrigues, L. & Hedenström, A. 2010. Mortality of bats at wind turbines links to nocturnal insect migration? European Journal of Wildlife Research. DOI 10.1007/s10344-010-0444-3

(2) Baerwald, E.F. & Barclay, R.M.R. 2009. Geographic Variation in Activity and Fatality of Migratory Bats at Wind Energy Facilities. Journal of Mammalogy, 90(6):1341–1349

(5) Hutterer, R., Ivanova, T., Meyer-Cordes, C. & Rodrigues, L. 2005. Bat Migrations in Europe: A Review of Banding Data and Literature. Federal Agency for Nature Conservation, Bonn

(independently flying) young appearing in the population and increases were only marginal.

The Recifii Jurasici Cheia SCI (approximately 7 km east) is the only SCI within 10 km that includes bats as qualifying features. These are Schreiber's bent wing bat *Miniopterus schreibersi*, lesser mouse-eared bat *Myotis blythii*, greater mouse-eared bat *M. Myotis*, Geoffrey's bat *M. emarginatus*, greater horseshoe bat *Rhinolophus ferrumequinium*, lesser horseshoe bat *R. hipposideros* and Mehely's horseshoe bat *R. mehelyi.* Despite the proximity of the SCI none of these qualifying species were recorded in the wider countryside either at North Crucea or GED. All but Schreiber's bat are species regarded as low risk from collision with turbines.

It is possible that those wind farms located in more complex habitats and/or closer to Recifii Jurasici Cheia SCI such as those clustered south and east of Pantelimon may pose a higher risk to bats, although in the absence of published information this is uncertain. What is clear is that Crucea North's contribution to cumulative bat mortality would be insignificant given the low numbers recorded and the nature of the site.

14.7 CUMULATIVE IMPACTS ON MIGRATORY BIRDS

In general, both Crucea North wind farm EIA and others for Romanian wind farms have tended to rely on desktop studies to assess migration impacts. The failure to carry out more detailed surveys of the kind routinely required in other EU countries (e.g. vantage point counts) has attracted growing criticism[1]. It also appears to ignore published information that refers to autumn raptor migration through the Dobrogean plain[2] or the presence of various migratory raptors and other migratory species within SPAs in the area, again many of these forming part of the qualifying features of such sites as Cheile Dobrogei.

It is difficult to undertake a cumulative impact assessment of migratory birds in the absence of such data, although even where surveys may have been carried out information does not appear to be readily available.

1 Birdlife International, Romanian Ornithological Society, & Eco Pontica Foundation. Dobrogea's Natura 2000 sites (including Danube Delta), Romania: Inadequate implementation of the EU Nature Directives is resulting in site deterioration and species disturbance November 5th 2009

2 Roberts, J. 2000. Romania: A bird watching and wildlife guide Burton Expeditions, Somerset

Despite this, there are general factors regarding these sites that do suggest that impacts will be limited, not least the fairly uniform terrain and the absence of significant features such as rift valleys and rocky outcrops. The total number and dispersed nature of the various wind farms means the total swept area is small in comparison to the airspace available, and their distribution is such that large gaps of several kilometres exist between them reducing any barrier effect.

Despite the attention given to wind farm related bird kills, the majority of installed wind farm capacity kills relatively few birds (the National Wind Coordinating Committee estimate that wind farms are responsible for 0.01-0.02% of all avian fatalities in the USA) compared to many other anthropogenic activities and structures. There is growing evidence that birds demonstrate high levels of avoidance of turbines(1) (although where avoidance becomes displacement this can be as important an impact as mortality through collision). Migration altitudes for many birds are well in excess of the height of turbines, and for passerines Newton(2) reviewed a number of radar studies and concluded that birds were flying 1.5-3 km above ground level. Extensive studies of raptors in Israel and the Middle East indicate that flight heights can be as much as 2.5 km above ground level, although early in the day, particularly if birds had roosted locally, they could be as low as 400m above ground level(3).

Work at Cape Kaliakra[4] benefited from access to a large scale independent data set gathered by the BSPB (Bulgarian Society for the Protection of Birds). Despite the large number of migratory birds counted by the BSPB at this site (including 196,771 white stork, 3081 white pelican, 2209 honey buzzard, 343 lesser spotted eagle, 260 pallid harrier) collision risk analysis using the widely employed Band model[5] indicated additional mortality remained well below the significance threshold of 1%. For example even using the worst case scenario BSPB data the % increase in background

(1) Whitfield, D.P. & Madders, M. 2006. Deriving collision avoidance rates for red kites Milvus milvus. Natural Research Information Note 3. Natural Research Ltd, Banchory, UK

(2) Newton, I. 2010. Bird Migration. New Naturalist. Collins.

(3) Shirihai, H., Yosef, R., Alon, D., Kirwan, G.M. & Spaar, R. 2000. Raptor Migration in Israel and the Middle East. Tech. Publ. Int. Birding & Res. Centre in Eilat, Israel.

4 RSK Environmental Ltd. 2008. Saint Nikola Kavarna Wind Farm. Supplementary Information Report

5 Band, W., Madders, M., & Whitfield, D.P. 2007. Developing field and analytical methods to assess avian collision risk at wind farms. In: de Lucas, M., Janss, G.F.E. & Ferrer,M. (eds.) Birds and Wind Farms: Risk Assessment and Mitigation, pp. 259-275.Quercus, Madrid

mortality for white stork was only 0.048% and for honey buzzard was only 0.001%.

More importantly monitoring programmes, including carcass searches have so far indicated actual collisions are significantly less than those predicted. Similar findings in the United Kingdom have led to the avoidance rates for species such as pink-footed goose *Anser brachyrhynchus* being raised to 99%.

Despite the considerable increase in installed wind power in Europe (from 12.9 GW in 2000 to 94 GW in 2011)[1] there is little evidence to date of population declines linked to increased mortality from collisions with turbines. Indeed the white stork population is reported as stable or increasing, as are Icelandic pink-footed goose populations, despite both having a high exposure to increased wind generation capacity.

Further vantage point surveys will be undertaken for Crucea North with a view to providing robust collision predictions based on the number of flights through the directional risk window at collision risk height. Early indications from the GED site are that they experience similar numbers and flight behaviour to that at Crucea North. Given the locational similarity of some of the wind farms within the 10 km buffer it may be possible to provide some generic assessment of cumulative risk.

There are significant caveats to such an approach however. Different wind farms pose very different risks to birds by virtue of their location (topography, habitat, layout, turbine type and size) and it is difficult to extrapolate a universal impact per turbine. For example the predicted collision rate for the Saint Nikola wind farm for white storks was 86 birds per annum. This equates to 1.6 birds per turbine and if applied to the wind farms within 10 km of Crucea North would give a combined annual mortality of 715 stork deaths (447 turbines x 1.6 collisions per year). This still remains below the 1% significance threshold for increase over background mortality which was calculated by RSK (2008) as 1782 birds per annum.

The concentration of birds at Cape Kaliakra and the number flying at risk height differs considerable from the more dispersed and higher flights observed at both Crucea North and the GED site and as such the above figure is almost certainly an overestimate of actual impacts. It remains the

[1] EWEA 2012. Wind in Power. 2011 European Statistics.

case that without access to the predicted collision rates for other wind farms cumulative impact assessment is largely a matter of extrapolation based on small amounts of data, with all the uncertainties inherent in such an approach.

14.8 CUMULATIVE IMPACTS ON PROTECTED AREAS

Crucea North has no presence in any protected area and as such will not contribute to any direct loss of protected areas.

Dealul Allah Bair SCI and Cheile Dobrogei SPA are the only Natura 2000 sites within five kilometres of the wind farm boundary. Where qualifying features of these sites such as bats and birds may suffer negative effects (e.g. displacement, increased mortality) by using the wind farm area a cumulative impact on protected areas qualifying species may occur.

The data suggests that impacts on bats are insignificant and Crucea North is unlikely to contribute to any cumulative losses likely to have a significant effect on Natura 2000 sites.

The original surveys for Crucea North did find small numbers of qualifying bird species, mainly raptors, present within the wind farm footprint. Further work to assess the level of displacement and/or increased mortality is underway, although the original Environmental Statement indicated that summer and winter use of the site was limited.

14.9 CONCLUSION

In general the land use, topography, and lack of proximity to protected areas suggests that Crucea North's contribution to cumulative impacts is unlikely to be significant for most features. Direct loss of protected areas will not occur and cumulative impacts on mobile features such as bats will be minimal. Further work on displacement and its effects on qualifying bird species is required although initial work suggests such impacts are minimal.

Information drawn from the literature, results from surveys and assessment work performed in Bulgaria, current positive population dynamics of species exposed to turbines, all indicate that actual collision impacts for migratory birds are low and below the level required to affect populations.

The original surveys for the Crucea North site suggested impacts in isolation on migratory birds would be insignificant. Further work to model collision risks is underway to improve the robustness of predictions. This data may allow some extrapolation to the impacts of similar wind farms within the 10 km buffer.

Data from other wind farms would be valuable in increasing the robustness of the cumulative impact assessment, but access and the quality of such data appears limited.

ANNEX 1

Permitting Process

Overview of the legal projects permitting process in Romania and applicable legislation

Introduction

This chapter presents the Legal permitting process in Romania and the project status in the overall process for the Crucea North Wind Farm project (hereinafter referred to as "*the Project*").

The Project "Crucea North Windfarm" is owned by STEAG GmbH and Monsson Alma through the local project company SPV (SC Crucea Wind Farm SRL).

Crucea North Wind Farm (99 MW (extension up to 108 MW as option)) will be located on fields within the incorporated areas of Vulturu, Pantelimon and Crucea Communes, in Constanta County.

The present report provides an overview of the legal projects permitting process in Romania (e.g. PUZ, DTAC etc.) and indication on the projects (and/or its components) status in the overall permitting process. This deliverable is intended to respond to the ESAP agreed with the lenders for assuring that the EIA will achieve full IFC Performance Standard 1 (PS1) compliance.

The Environmental Impact Assessment (EIA) Report dated June 2010, conducted to Romanian standards and legislation, has been requested by LEPA Constanta during the permitting procedures and was prepared by a local consultant, Eng. Tudor Darie. However, the study does not contain requirements or information specifically provided during permitting procedures by environmental authority in technical EIA Guidelines or any reference to the legal procedure or the reason for conducting the EIA Study.

At present, *the Project* is permitted and part of them is in reviewing process due to some changes in technical solutions.

REGULATIONS AND REQUIREMENTS

Introduction on Romanian permitting Procedures

In Romania, the execution of construction works is allowed only based on a Construction Permit (CP) (*Autorizatia de Construire*).

The Construction Permit is issued based on the **Urban Certificate** (UC) (*Certificatul de Urbanism*) that sets forth the required technical parameters and approvals needed for the specific project, in our case the wind farm.

The Urban Certificate is an informal document that includes a check list of required approvals and permits to be obtained before starting the construction, including PUZ (Zonal Urban Plan) (Plan Urbanistic Zonal), Approval and Environmental Agreement, if applicable. Additionally, the Urban Certificate will include approvals from utility providers and other authorities (e.g. the Civil Aeronautic Authority, the Water Administration, the Ministry of Culture, the Fire Protection Agency etc.) or some necessary specific documentation (e.g. D.T.A.C. – Technical Documentation for the Construction Permit).

PUZ could be required by a private company only in few situations, including if a proposed project will implicate changes in land use, height regime for an industrial park. During PUZ approval procedure, an Environmental Approval for Plans and Programs should be obtained. The procedure will follow the SEA Directive 2001/42/EC (transposed in Romanian legislation by GD (Government Decision) 1076/2004 and, depending on the complexity of the project and its specific location, will implicate elaboration of an environmental report (SEA – Strategic Environmental Assessment report) by a certified company.

Romanian legislation does not clearly specify if the necessity of PUZ (Zonal Urban Plan) should be specified within the Urban Certificate for construction works or within a previous separate Urban Certificate only for PUZ purpose. Therefore, local authorities may act in both abovementioned ways.

The EIA Directive was transposed into Romanian law by the *GD No. 445/2009 on environmental impact assessment for certain public and private projects*. Construction of wind farms is listed in Annex 2 point 3.i, for which screening stage is performed, in order to establish if the projects are likely to have impact on the environment.

The actual EIA Procedure is described in the *Ministry Order No. 135/2010,* while the Guideline for elaboration of the EIA Study is detailed in the *Ministry Order No. 863/2002* and Annex 4 from the *GD No. 445/2009*.

In order to apply for the construction permit, in incipient stage, the project developer should apply and obtain the Urban Certificate and submit documentations to relevant authorities (including Local Environmental Protection Agencies - LEPA) in order to obtain all approvals, agreements and permits necessary for applying for the construction permit. One of the most important approvals is the Environmental Agreement and, in order to obtain this act, for wind farm projects, an EIA Study is usually required.

Depending on the location towards Natura 2000 sites, as part of EIA Procedure, an Appropriate Assessment Study may be required. The necessity of preparation the Appropriate Assessment Study and conducting the relevant legal procedure will be taken by LEPA and TAC (Technical Analyses Committee) members during the screening phase of the EIA procedure.

The permitting process ends with the issuing of the BP. In this final phase the Local Construction Inspectorate make the technical supervision on D.T. (Technical Documentation).

In the meantime, it is necessary to obtain the grid connection permit (in Romanian "Aviz Tehnic de Racordare" or 'ATR"). The ATR is the document based on which the developers is being granted with a reserved capacity in the grid. The users of an electrical network have the obligation to obtain the ATR or to update the ATR, by case, before execution of the installation which will be connected to the power network, respectively the modification of the existent one. According to the *Rule regarding the connection of users to the public power network* approved by *Government Decision 90/2008*, the ATR is valid 6 months from the issuance, for the users that connects to the power networks with the voltage of 110 kV or more and for locations of production with a total installed power higher than 10 MW, if the owner does not pay the connection fee and sign the connection contract or the contract for the electrical works downstream of the point of separation, necessary for connection to the grid.

Urban Certificate

The procedure for application and obtaining the Urban Certificate and Construction Permit are detailed in the *MO (*Ministry Order*) 839/2009 for approving the Methodological Norms for the application of Law No. 50/1991 regarding permitting of construction works.*

The UCs are issued by the City Halls or County Councils according to the urban planning documents, as well as to any other regulations standing as legal building framework in Romania. Anyone is entitled to ask for an UC and the relevant local council is obligated to provide a copy to anyone who asks.

The UC is valid for a period between 6 and 24 months (depending on the scope of UC or the complexity and characteristics of the project). The validity of the UC can be extended for a maximum 12 months. The validity of a UC is according to the nature of the relevant area and project.

The UC usually includes the approvals for the PUZ and, at the same time, the Detailed Design (D.T. – ex PAC), and other permits from many agencies and authorities – (such as: Environmental Agency, Aviation Authority, Ministry of Culture, Fire Protection Agency, Civil Aeronautic Authority, etc.).

Zonal Urban Plan (PUZ)

As mentioned before, within the Urban Planning Certificate ("Planului Urbanistic Zonal" in Romanian), it has been noticed whether it is necessary or not to proceed with the planning procedures for approval of the Urban Plan Documentation (PUZ).

In most of the cases in Romania, for construction of the Wind Farms, the PUZ procedure is required. The PUZ applies to neighbourhoods or larger plots of land in which a real estate project is located.

The PUZ procedure starts with making the Technical Project of the PUZ phase (Documentatie tehnica) exclusively by Architects or Engineers registered with RUR - Romanian Urbanists Register). Then the Technical Project is sent to the Local Environmental Protection Agency - LEPA, who decides whether or not such project should be subject to the SEA procedure. If the project should not be fall under SEA procedure, the PUZ can be adopted by the relevant authority once all other required permits are obtained. If the project should follow the SEA procedure, LEPA initiates and run the SEA procedure.

The PUZ has to be approved by the Local Council, based on the prior consent of the Technical Committee with the Local Council. The initiator of a PUZ might be advised to change partially or totally the technical dates

enclosed in the PUZ. There are no legal guarantees that a PUZ will be approved by the Local Council, or that once approved it will not be further challenged in Court, provided that such PUZ has not been legally made up or even deny the procedure.

When all the permits have been granted, the PUZ will be presented to the Local Council and the PUZ will be approved and stamped.

The process of the PUZ approval involves also the participation of the interested public, who has access to the relevant information and documents.

D.T. Detailed Design (ex. PAC - Project for the Authorization of Construction)

After the PUZ is approved, the D.T. can be drawn up. The projects for the authorization of construction works, with all the technical reports needed, are issued by recognized specialists such as architects and civil engineers. The expertise must be recognized by Romanian law as described below:

- Architects with a diploma recognized by Romanian authorities (member of OAR with signature right), for the architectural design of the objective of investments including all important categories of the subterranean and supra land construction.

- Civil Engineers with a diploma recognized by the Romanian authorities, for civil and construction design of the parts in specific domain of the objective of investments including all important categories of the subterranean and supra land construction.

The Verifications of *the Projects* must be in accordance with Romanian Design Exigencies under the following aspects: Structural Stability; Af Expertise - Geotechnical Safety; Public Safety; Fire Safety; Public Health Safety; Thermal and Water Insulations Conformity, Energy Economy Conformity; Environmental Safety; HVAC, Plumbing, Sanitation, Electricity Design Conformity with the Design Norms and Laws.

Environmental permitting

Under the relevant provisions of the Romanian legislation on environmental protection, all activities capable of having a significant

impact on the environment may only be carried out under special permits, approvals and authorizations.

In general, Romanian legislation on environmental aspects is in the stage of finalizing the transposition of EU requirement. The absences of a sufficient experience and expertise, the insufficiency of technical equipment and trained staff, as well as the inadequate institutional framework represent the main deficiencies in this field.

The procedure of issuing the environmental permits on the grounds of the environmental assessment is led by the central, regional and territorial authorities for environmental protection – the Ministry of Environmental Protection and the Local Environmental Protection Agencies (at county level) – and is achieved with the participation of other public central or local authorities with responsibilities in the environmental protection field.

After examination of the relevant reports and studies, of the conclusions from parties involved in the assessment and of the assessment of public's proposals, the competent public authority for environmental protection decides to issue or not to issue the environmental agreement.

Chronologically, the environmental assessment is divided in three main phases:

- Strategic Environmental Assessment (SEA – at urbanism phase);

- Environmental Impact Assessment (EIA – at construction phase) which may include, by case, Appropriate Assessment procedure and study;

- Environmental Permit (at operational Phase).

The SEA Procedure– urbanism phase

The Strategic Environment Assessment is applicable to the plans, programs and policies ("PPPs") of a strategic importance, that are to be approved by public authorities.

The main steps of SEA procedure are:

- notification sent by the Beneficiary of the PPP to LEPA regarding the PPP;

- screening phase – (decision whether or not the PPP has to be submitted to SEA procedure); SEA is mandatory for any PPP inside or in the neighborhood of Natura 2000 sites;

- scoping phase

- preparation of the Environmental Report (SEA Report);

- the participation of the pubic – the relevant information are made available to the public and also public debates are organized for granting any interested person with the chance of raising comments and remarks. Main steps of the procedure are also making public in local newspapers and on the web pages of the relevant LEPA authority and of the Beneficiary.

- The analysis of the environmental report quality.

- Final decision – normally, if all the previous phases have been properly passed through, the final decision should be positive; the only case when the final decision may be negative is when the PPP seriously affects certain protected areas, including the Natura 2000 sites.

The positive decision is materialized in the issuance of the environmental approval for plans and programs "Aviz de Mediu". Aviz de Mediu does not give the right for the PPP to be actually implemented but for the PPP to be adopted. The validity of the "Aviz de Mediu" is until the PPP is fully implemented.

The EIA Procedure – construction phase

The Environmental Impact Assessments is required for the implementation of any project considered as having a potential impact over the environment.

The EIA procedure is focusing to the effects of a concrete project towards the environment, and takes into account all the details of a project. Any change in the information provided within the EIA procedure, should be submitted to the competent authority for assessment should the "Acord de Mediu" has been already obtained. The competent authority to manage the EIA procedure for wind farms projects is the Local Environmental Protection Agency ("LEPA").

The main steps of EIA procedure are:

a) Initial assessment: application

b) Screening phase

c) Scoping phase – in EIA procedure there are not working groups but the Technical Analysis Committee ("TAC meeting") which is still chaired by the LEPA and is composed by the local authorities having powers in the environmental protection field; the preparation of the Environmental Impact Study ("EIA Study") and presentation of the EIA Study to the TAC;

d) The participation of the pubic – the relevant information are made available to the public and also public debates are organized for granting any interested person with the chance of raising comments and remarks;

e) The analysis of the EIA Study quality;

f) Final decision – the decision may be positive, consisting of the Decision to issue the "Acord de Mediu" or can be negative, meaning a decision for the justified rejection of the request for the "Acord de Mediu". The Validity of the "Acord de Mediu" is until the proposed project is fully implemented.

As mentioned before, depending on the location towards Natura 2000 sites, as part of EIA Procedure, an *Appropriate Assessment (AA) Study* may be required. The necessity of preparation the Appropriate Assessment Study and conducting the relevant legal procedure will be taken by LEPA and TAC (Technical Analyses Committee) members during the screening phase of the EIA procedure.

Natura 2000 represents a network of sites whose main scope is to protect certain species of wild birds and of habitats of wild fauna and flora. Natura 2000 network is regulated by two European directives the Council Directive 92/43/EEC on the conservation of natural habitats of wild fauna and flora and the Council Directive 79/409/CEE on the conservation of wild birds, both transposed and implemented into the Romanian legislation.

According to the EU recommendations, the assessment procedure shall follow the following steps:

- Stage One: Screening — the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant;

- Stage Two: Appropriate assessment — the consideration of the impact on the integrity of the Natura 2000 site of the project or plan, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives.

Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts;

- Stage Three: Assessment of alternative solutions — the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site;

- Stage Four: Assessment where no alternative solutions exist and where adverse impacts remain — an assessment of compensatory measures where, in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed. In case of imperative reasons of overriding public interest, a further appropriate assessment is to be made.

The Natura 2000 assessment or the adequate assessment shall be integrated in EIA procedure.

Environmental permit – operation phase

Both the "Aviz de Mediu- SEA" and "Acord de Mediu- EIA" may stipulate the necessity to implement some monitoring measures.

Furthermore, after finalization of the construction works but before the activity is started, an Environmental Permit for operation is required. In the cases on the relevant project has previously obtained an "Acord de Mediu", the operational permit is given taking also in consideration the verification by the competent environmental authority of the compliance of the activity with the conditions stipulated in the "Acord de Mediu".

According to M.O. no. 1798/2007, the maximum legal timeline for obtaining the Environmental Permit is 90 working days from the submittal

of the complete documentation, respectively after 30 working days from publishing the decision for issuing the Environmental Permit.

The validity of such authorization is of 10 years; before the expiration of its validity, the owner of the plant has to apply for the renewal of the authorization.

Location Approval

Location approval ("Aviz de Amplasament" in Romanian) is requested for the wind farms projects, being stipulated in the Urban Certificate for construction. It represents the answer of grid operator regarding the existence of interaction between the owner future constructions and the grid lines. The validity is extended with the validity of the Urbanism Certificate and the one of the Construction Permit.

Ministry of Culture and Cults Approval

Wind farms are subject to legislation designed to protect important cultural and fossil resource sites. The approval is request through the Urban Certificate and is issued by the Ministry of Culture and Cults to protect sites of archaeological interest or historical monuments located in the area within a radius of 100 meters measured from the outer limit of historical monument (cf. Art.59 of Law No. 422/2001).

Grid Connection Approval

Enel Green Power Romania has presented possible solutions for the grid connection of the wind farms ("Studiu de Solutie"). Based on this study, Enel Dobrogea has issued the connection permit ("Aviz Technic de Racordare - ATR") which has, according to the law, (i.e. the Government Decision no. 90/2008) a validity of minimum 25 years, unless certain cessation cases occur.

Once the Connection Contract is signed any modification of the data included in the ATR are to be subject of an additional act to the contract. This Approval is also requested through the Urban Certificate.

Authorization from the Romanian Energy Regulatory Authority

All the activities related to the energy field are regulated by ANRE.

Any construction related to the energy field new energy unit, has to be previously authorized by the Setting up Authorization ("Autorizaţie de înfiinţare") issued by A.N.R.E. This Approval is also requested through the Urban Certificate.

After the wind farm is finished, in order the Company to be able to run its activity, the exploitation license has to be obtain still from ANRE. With this license A.N.R.E. recognizes officially the right of being an electricity producer.

In order to obtain both the Setting up Authorization and the Exploitation License, the ATR and the Acord de Mediu are required, inter alia.

Other approvals

Other approvals may be requested by the Urban certificate, such as : from Telephone company, Public Health and Safety Approval, Use Destination of the Land Approval (issued by Agricultural and Rural Development Direction), Water management approval, Romanian Civil Aeronautic Authority (RCAA) Approval, Ministry of National Defense, Romanian Intelligence Service, National Administration of Land Improvements approval, Romanian Ministry of Administration and Interior, County Roads and Bridge Administration, The National Company for Highways and National Roads (CNADNR), Railways National Company – CFR, State Inspectorate in Construction, ENEL Distributie Dobrogea, Cadastre and Real Estate Publicity Office, National Gas Transport Company S.N.T.G.N. Transgaz S.A. etc

Construction Permit

The Construction Permit (Autorizatia de Construire) will be required after all the approvals, agreements, plans, studies and official documents requested through the Urban Certificate are obtained.

Environmental Permitting Status for Crucea North Wind Farm

A detailed overview of the permitting status for Crucea North Wind Farm is presented in the Stakeholder Engagement Plan (SEP) prepared for the Project.

No Environmental Report (SEA Reports) was requested by LEPA Constanta as part of PUZ procedures. The following Urban Certificates requesting PUZs have been issued to date for Crucea North Project:

A: Urban Certificates no. 363/ 28.10.2009 and no. 135 / 29.07.2010 for Crucea North Wind Farm (132 MW);

B: Urban Certificate no. 38/10.04.2012 for Crucea North Wind Farm (130 MW);

C: Urban Certificate no. 6/31.01.2012 for the construction of 400/110 KV substation and connection to 400 kV overhead line;

D: Urban Certificate no. 92/24.09.2012 for the Preparation of the Urban Zoning (PUZ) Plan for the extension of Crucea North Wind Farm with a maximum installed power 10 MW located in the unincorporated area of Vulturu Commune.

Crucea Wind Farm SRL has already obtained the PUZ approvals and continued the procedure for obtaining the construction permit for the works included in the Urban Certificates no. 38/10.04.2012 and 6/31.01.2012.

For permitting purposes, the Project has obtained the environmental agreement for construction and is now in the reviewing process (for technical aspects).

For obtaining the construction permit, related to each Urban Certificate issued for construction works, an environmental impact assessment was required, following the EIA Directive procedural steps. The following Urban Certificates for construction works were issued for Crucea North Project:

A: Urban Certificate no. 4/18.01.2010 for construction of Crucea North Wind Farm (132 MW) issued by Crucea City Hall

B: Urban Certificate no. 40/10.04.2012 for Crucea North Wind Farm (130 MW)- modification of foundations diameters, turbines capacity, height regime, technical solution for wind farm connection to the Power Distribution Grid, issued by Constanta County Council

C: Urban Certificate no. 3/18.04.2012 for upgrade of existing roads, Vulturu Commune

D: Urban Certificate no. 11/05.04.2012 for upgrade of existing roads, Pantelimon Commune

E: Urban Certificate no. 24/04.04.2012 for upgrade of existing roads, Crucea Commune

F: Urban Certificate no. 27/08.11.2010 for Crucea North Construction Camp and storage area

G: Urban Certificate no. 62/29.05.2012 Construction of electrical and optic fiber network for Crucea North Wind Farm (Crucea, Vulturu and Pantelimon Commune)

H: Urban Certificate no. 19/14.03.2012 – Construction of 400/110 KV Stupina 2 Substation

I: Urban Certificate no. 51/16.05.2012 – obtained on behalf of Transelectrica in relation to the construction of a 400 kV cell in the 400 kV Stupina Substation.

J: Urban Certificate no. 72/16.08.2012 regarding the power line connecting the 400/110 kV substation and GIS cell.

K: Urban Certificate no. 76/12.09.2012 for the construction of 20 kV connection point to supply the 400/110 kV Stupina 2 substation (titleholder S.C. ENEL Distributie Dobrogea S.A. through S.C. Crucea Wind Farm S.R.L.)

L: Urban Certificate no. 81/19.09.2012 for the modernization of existing exploitation road De 349 and agricultural road for plot A346/20 and connection from national road 2A, Crucea Commune

M: Urban Certificate no. 93/24.09.2012 for the extension of Crucea North Wind Farm with a maximum installed power 10 MW, in the unincorporated area of Vulturu Commune

As was decided by LEPA Constanta, all the procedures for obtaining the environmental agreements were simplified (without EIA Study), excepting the procedure for approving the main project's components (following the UC No. 4/18 January 2010). In this case, as part of the screening stage, the Technical Analysis Committee has taken the decision that a full EIA is necessary and an Appropriate Assessment procedure should be initiated.

In this regards, in 2010, a certified person, Mr. Darie, has produced an EIA Study and an Appropriate Assessment Study was performed by Wildlife Management SRL in September 2010. Based on these studies, the authorities have decided to issue the environmental agreement for construction.

By January 2013, Crucea Wind Farm SRL had obtained the following construction permits for the Project components.

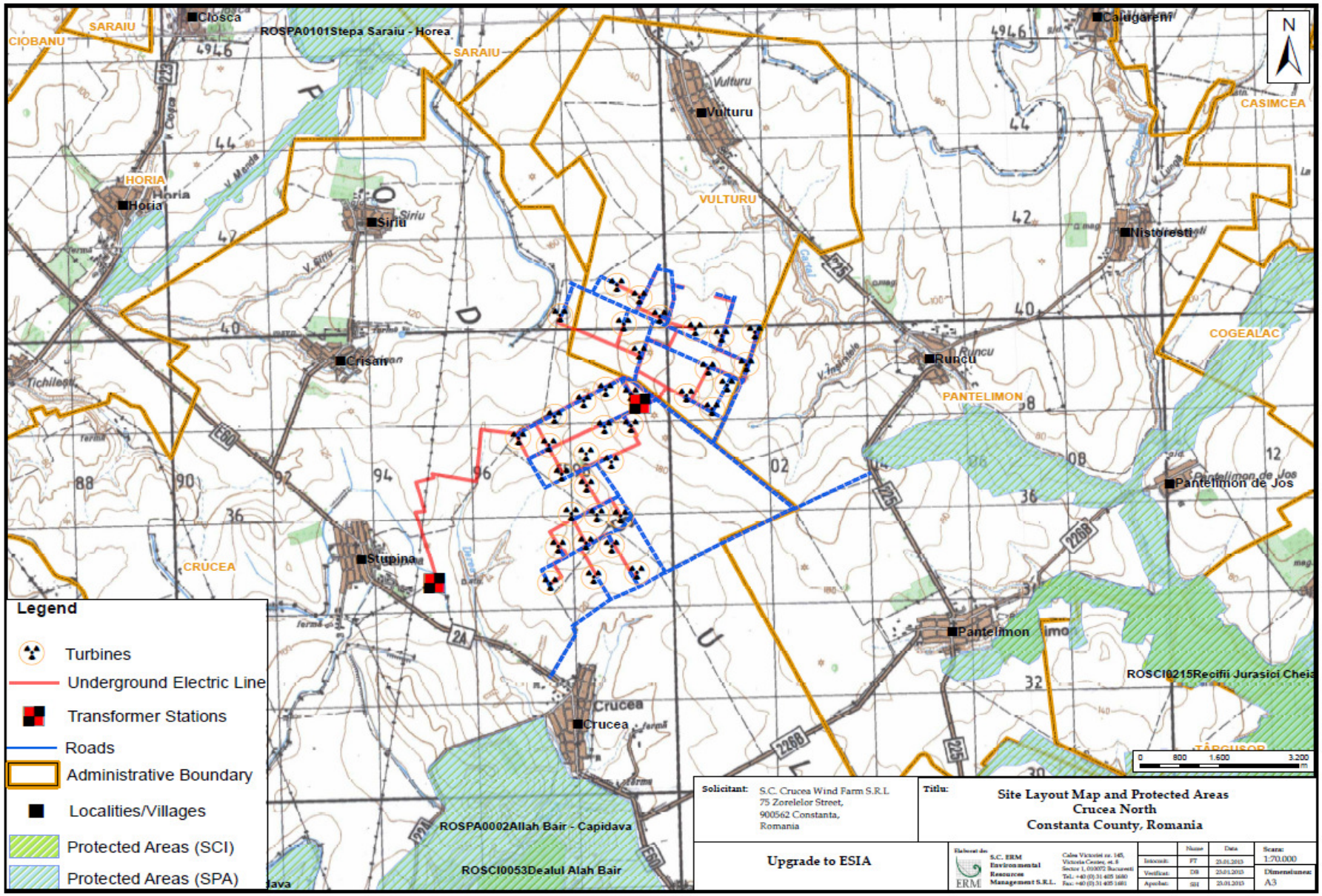
No. and date of issue	Scope of the construction permit	Issued by
no. 5 dated April 26, 2012	Organization of construction compound and warehouse Crucea North (proposed to be located on plots A 302/8/1 and 302/8/2 in the unincorporated area of Crucea commune)	Crucea Mayoralty
no. 16 dated August 31, 2012	Modernization of existing exploitation roads located in the unincorporated areas of Crucea Commune	Crucea Mayoralty
no. 7 dated August 31, 2012	Modernization of existing exploitation roads – exploitation road at the border of Runcu village or (De316/24), De 452/1, Pantelimon Commune, Constanta County	Vulturu Mayoralty
no. 28 dated September 24, 2012	Modernization of existing exploitation roads, Vulturu Commune, Constanta County	Constanta County Council
no. 25 dated December 20, 2012	Construction of 400/110 kV Stupina 2 substation on plots A718/3 + A718/4 1/2 located in the unincorporated areas of Crucea Commune	Crucea Mayoralty
no. 40 dated December 21, 2012	Construction of electrical and optical fiber networks for Crucea North Wind Farm, Crucea, Pantelimon and Vulturu Communes, Constanta County	Constanta County Council
no. 41 dated December 21, 2012	"Crucea North Wind Farm, total capacity 130 MW, amendment of diameter of the	Constanta County Council

No. and date of issue	Scope of the construction permit	Issued by
	foundations, amending of capacity per turbine up to 3.6 MW, amendment of total turbine height up to 180 m and amendment of wind farm connection to the Power Distribution Grid" (amendment of technical specifications laid down in the construction permit no. 8 dated April 28, 2011), installed power of 99 MW in Crucea and Vulturu Communes, Constanta County	

The table above showing information available up to January 2013 will be regularly reviewed and revised as the permitting procedures are completed or as regulatory documents already obtained in 2012 are being revised. However, by April 2013 no updated information regarding the permitting status of the Project was available. As part of the process of revising regulatory documents already obtained (environmental approvals or agreements) in 2013 Constanta EPA did not request the revision of the existing EIA Study or the preparation of a SEA Report.

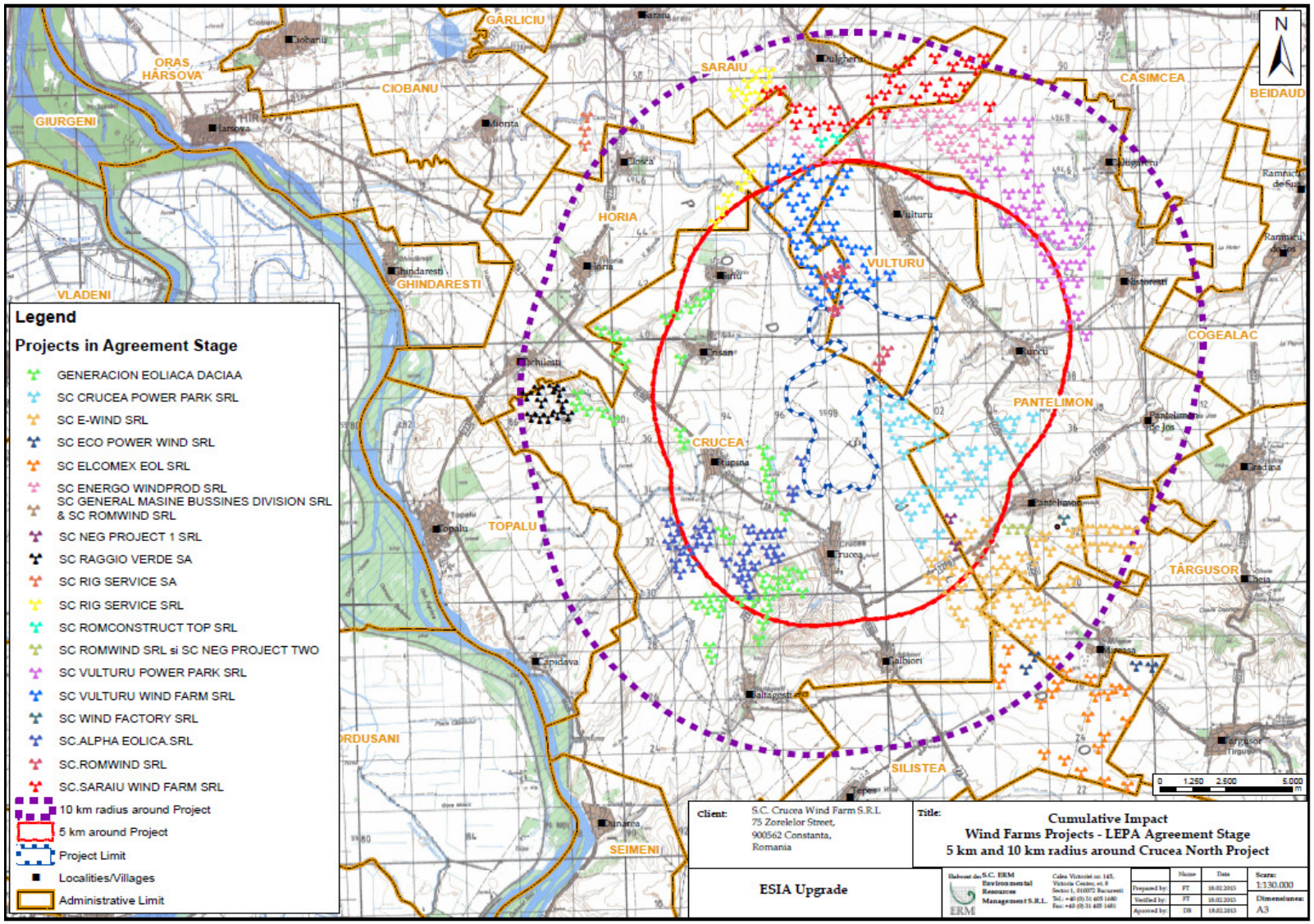
ANNEX 2

Project components map


Legend
Turbines
Underground Electric Line
Transformer Stations
Roads
Administrative Boundary
Localities/Villages
Protected Areas (SCI)
Protected Areas (SPA)
ROSPA0101Stepa Saraiu - Horea
ROSPA0002Allah Bair - Capidava
ROSCI0053Dealul Alah Bair
ROSCI0215Recifii Jurasici Chei
SARAIU
CIOBANU
HORIA
VULTURU
CASIMCEA
COGEALAC
PANTELIMON
CRUCEA
Ciosca
Horia
Siriu
Vulturu
Nistoresti
Calugareni
Crisan
Runcu
Stupina
Crucea
Pantelimon
Pantelimon de Jos
N
0 800 1.600 3.200 m
Solicitant: S.C. Crucea Wind Farm S.R.L. 75 Zorelelor Street, 900562 Constanta, Romania
Titlu: Site Layout Map and Protected Areas Crucea North Constanta County, Romania
Upgrade to ESIA
Elaborat de: S.C. ERM Environmental Resources Management S.R.L.
Scara: 1:70.000
Dimensiunea: A3

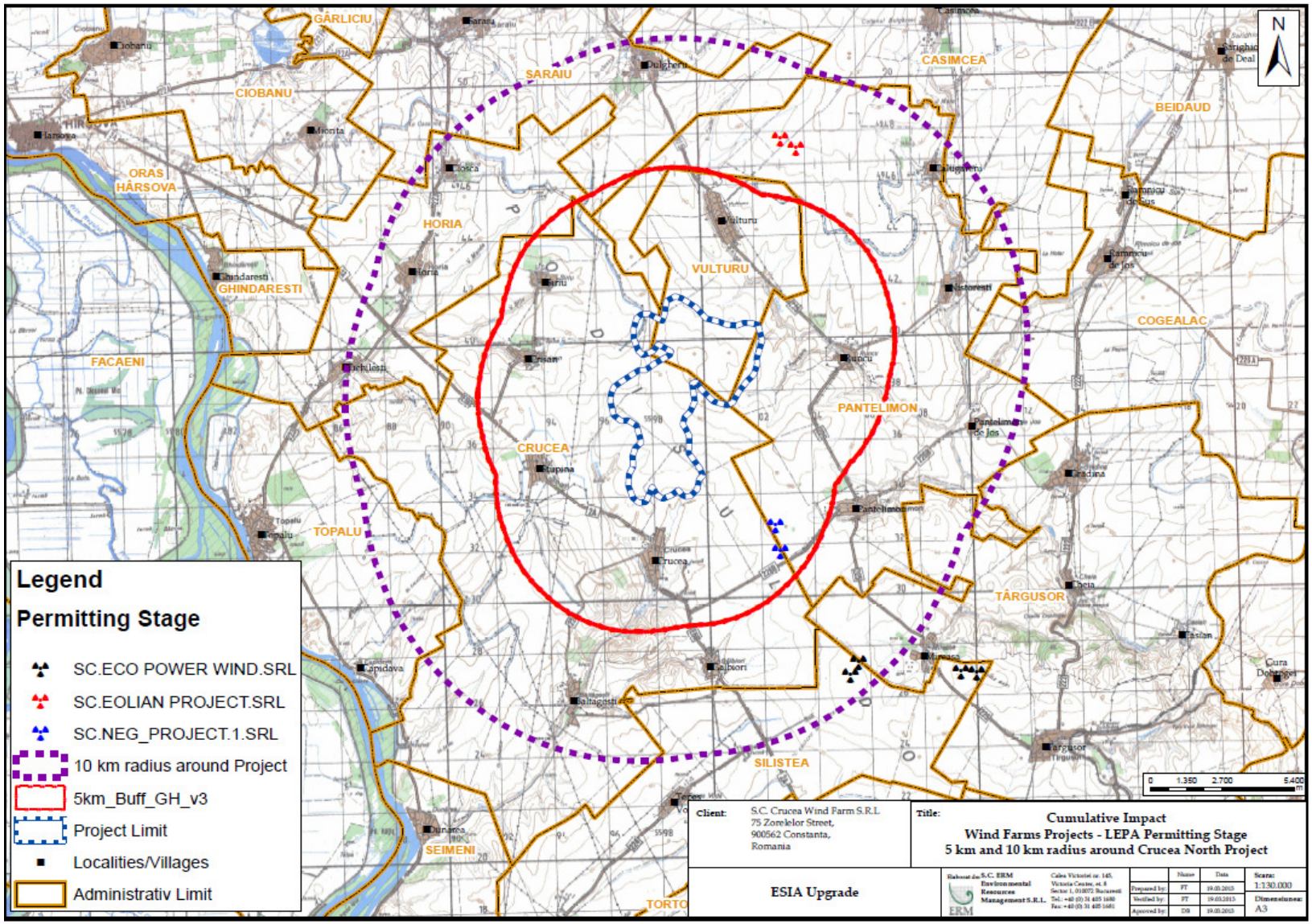
ANNEX 3

Map with projects from the selected area, passing the Environmental Agreement stage for construction


GARLICIU
ORAS HÂRSOVA
CIOBANU
SARAIU
CASIMCEA
BEIDAUD
GIURGENI
HÂRSOVA
HORIA
VULTURU
GHINDARESTI
VLADENI
COGEALAC
PANTELIMON
CRUCEA
TOPALU
TÂRGUSOR
SILISTEA
SEIMENI
N
Legend
Projects in Agreement Stage
GENERACION EOLIACA DACIAA
SC CRUCEA POWER PARK SRL
SC E-WIND SRL
SC ECO POWER WIND SRL
SC ELCOMEX EOL SRL
SC ENERGO WINDPROD SRL
SC GENERAL MASINE BUSSINES DIVISION SRL & SC ROMWIND SRL
SC NEG PROJECT 1 SRL
SC RAGGIO VERDE SA
SC RIG SERVICE SA
SC RIG SERVICE SRL
SC ROMCONSTRUCT TOP SRL
SC ROMWIND SRL si SC NEG PROJECT TWO
SC VULTURU POWER PARK SRL
SC VULTURU WIND FARM SRL
SC WIND FACTORY SRL
SC.ALPHA EOLICA.SRL
SC.ROMWIND SRL
SC.SARAIU WIND FARM SRL
10 km radius around Project
5 km around Project
Project Limit
Localities/Villages
Administrative Limit
0 1.250 2.500 5.000 m
Client:
S.C. Crucea Wind Farm S.R.L.
75 Zorelelor Street,
900562 Constanta,
Romania
Title:
Cumulative Impact
Wind Farms Projects - LEPA Agreement Stage
5 km and 10 km radius around Crucea North Project
ESIA Upgrade
Name
Date
Prepared by:
FT
18.02.2013
Verified by:
FT
18.02.2013
Approved by:
DB
18.02.2013
Scale:
1:130.000
Dimensiunea:
A3

ANNEX 4

Map with projects from the selected area, passing the Environmental Permit stage for operation


GÂRLICIU
CIOBANU
SARAIU
CASIMCEA
BEIDAUD
ORAS HÂRSOVA
HORIA
VULTURU
GHINDARESTI
COGEALAC
FACAENI
PANTELIMON
CRUCEA
TOPALU
TÂRGUSOR
SILISTEA
SEIMENI
TORTO
N
Legend
Permitting Stage
SC.ECO POWER WIND.SRL
SC.EOLIAN PROJECT.SRL
SC.NEG_PROJECT.1.SRL
10 km radius around Project
5km_Buff_GH_v3
Project Limit
Localities/Villages
Administrativ Limit
0 1.350 2.700 5.400 m
Client:
S.C. Crucea Wind Farm S.R.L.
75 Zorelelor Street,
900562 Constanta,
Romania
Title:
Cumulative Impact
Wind Farms Projects - LEPA Permitting Stage
5 km and 10 km radius around Crucea North Project
ESIA Upgrade
S.C. ERM Environmental Resources Management S.R.L.
Name
Date
Prepared by: FT 19.03.2013
Verified by: FT 19.03.2013
Approved by: DB 19.03.2013
Scale: 1:130.000
Dimensions: A3