

# **Crucea Wind Farm, Romania**

Non-technical Summary

October 2012



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# 1 INTRODUCTION

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This Non-technical Summary (NTS) provides an overview of the findings of an Environmental and Social Impact Assessment (ESIA) of the construction and operation of a 100MW Wind farm near Crucea commune, Constanta County, Romania by Generacion Eolica Dacia (GED), which is part of the Enhol Group, and Gamesa.

The NTS has been developed to provide a brief overview of the ESIA. It a summary of the potential impacts the Project could have on people and the environment, and of the management and monitoring arrangements that will be implemented to avoid, reduce, or mitigate adverse impacts during construction, operation and decommissioning.

This NTS forms part of the overall ESIA package that is being disclosed for public review and comment. The ESIA package comprises the NTS, the Stakeholder Engagement Plan, the Environmental Impact Assessment and Appropriate Assessment required by Romanian law, a Cumulative Impact Assessment of the impacts of the Crucea wind farm when considered along with other planned developments in the area, and a report on further bird and bat surveys carried out since the Appropriate Assessment was completed.

The ESIA package is being made available for public comment for a period of 60 days before consideration of the Project for funding by the European Bank for Reconstruction and Development (EBRD). Copies of the ESIA package may be viewed at the locations listed below, on the Crucea Commune's website (<http://www.crucea.judetul-constantina.ro/>) and on GED's website ([www.enhol.ro](http://www.enhol.ro)). In addition, many of the documents are also available on the EBRD's web-site ([www.ebrd.com](http://www.ebrd.com)). Most documents are in Romanian and English.

Technological High School, 44 Constantei Road, Crucea Town	Primaria Crucea, 45 Constantei Road, Crucea, Constanta County
Baltagesti Shool, 49 Silistei Street, Baltagesti, Crucea Town	Primaria Horia, 31 Principala Street, Horia, Constanta County
Stupina School, 1 Scolii Street, Stupina, Crucea Town	Crucea Library, 46 Constantei Road, Crucea Town, Constanta County
Crisan School, 1 Amurgului Street, Crisan, Crucea Town	Horia Library, Horia School, Scolii Street, Constanta County
Siriu School, 4 Moldovei Street, Siriu, Crucea Town	EBRD Resident Office, Metropolis Centre, 56-60, Iancu de Hunedoara Bd., 3rd floor, West Wing, Sector 1, Bucharest
Horia School, Scolii Street, Horia,	

Copies of all or part of the package can be obtained by writing to the address below.

Comments will be accepted through to 16 December 2012. Anyone may submit comments on the Project, and all comments will be considered before any part of the Project is constructed. Comments should be sent to:

Florentina Avram  
Generacion Eolica Dacia SRL  
Banu Manta 22, 29 Building, 9th Floor, 80ap, District 1,  
Bucharest, 010011, Romania  
E-mail: favram@enhol.ro  
Telephone: Tel. 0040212220026

## **2 LOCATION, LAYOUT AND LAND USE**

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### **2.1 Site location and layout**

The wind farm will be located outside the built-up area of Crucea village, Constanta County, 40km to the west of the Black Sea coast and 36km north of the Bulgarian border. Crucea commune is located in the North of Dorobantu plateau, in the middle of Dobruja (north-west area of Constanta County).

The wind farm will comprise 50 wind turbines linked by underground cables to a new on-site 20kV/110kV sub-station (the Crucea sub-station) that will, in turn, be linked by a short (approximately 300m long) new underground power line to an off-site hub sub-station (Stupina sub-station). Approximately 3.4km of new access tracks will need to be built to reach the turbine sites and 30km of existing tracks will be upgraded and/or resurfaced. The site location and turbines are shown on Figure 2-1:

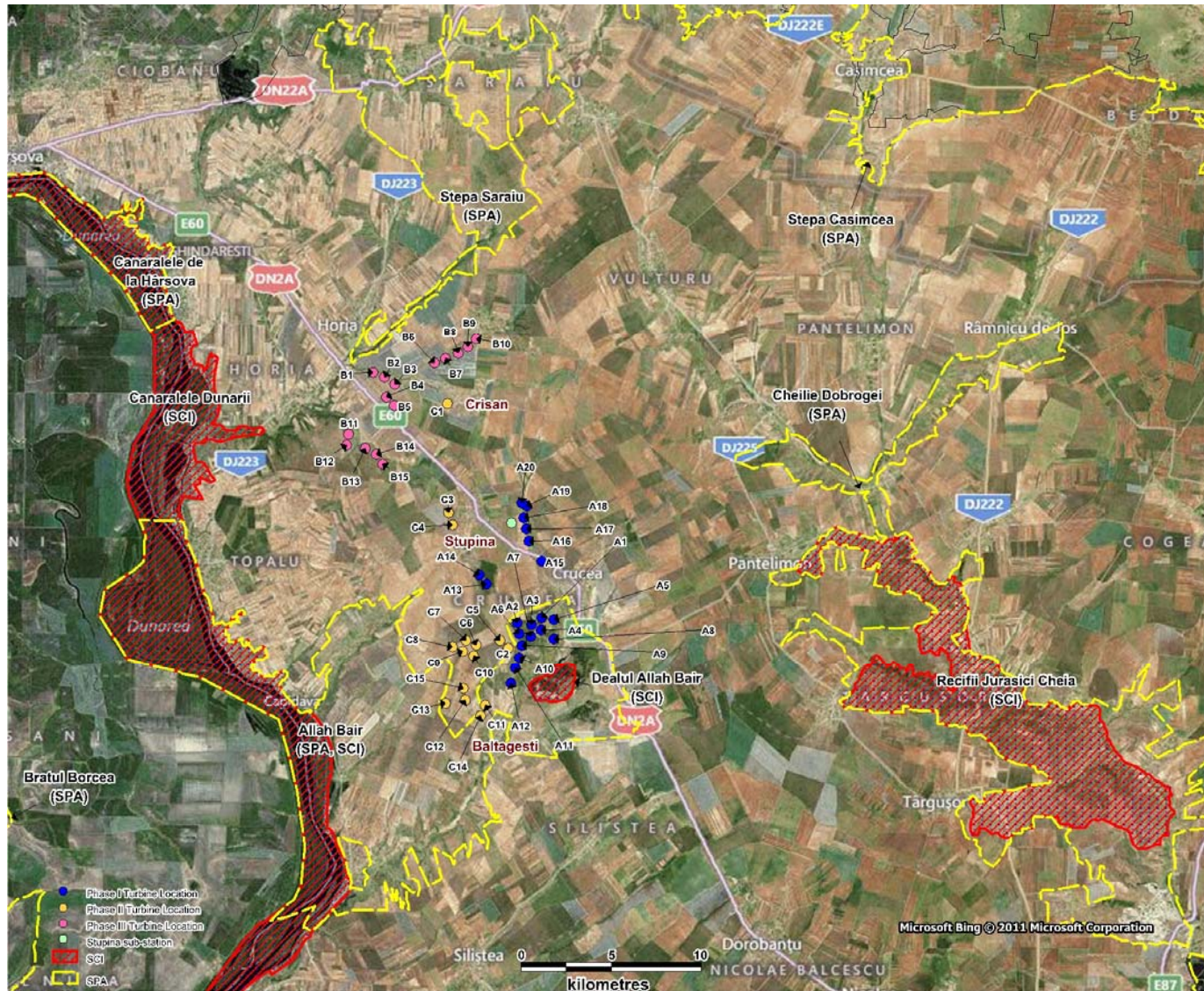


Figure 2-1: Site location

The Project will be developed in up to three phases by both GED and Gamesa. Construction of Phase I (turbines marked A on Figure 2-1, known as “Crucea I”) will commence in early 2013 by Gamesa, and will begin operation in 2014. Phase II (turbines marked C on Figure 2-1, known as “Crucea II”) will be developed by GED at approximately the same time as Crucea I. The Crucea sub-station will be constructed in parallel with Phases I and II. Phase III (turbines marked B on Figure 2-1, “Crucea III”) may be developed by GED in the future, but a final decision has not been made whether to develop this phase.

The wind farm is predominantly situated in an agricultural environment. The Project site itself comprises Allah Bair Hill, the surrounding flat, open, agricultural land and gently sloping hills.

There are no existing dwellings within the Project area. The nearest villages around the site are Crucea, Stupina, Baltagesti, Crisan, Siriu, Horia and Tichilesti villages. The site is close to a county road (DJ 224) and a national road (DN 2A).

The turbines are spaced no less than 270m apart. Approximate distances from the nearest houses in each village to the nearest turbines are given in Table 2-1 below:

**Table 2-1: Approximate distances from nearest houses in villages to the nearest turbines**

Village	Turbine	Phase	Distance from nearest house to the nearest turbine (metres)
Băltăgești	C14	II	500
Crucea	A5	I	800
Stupina	C4	II	700
Crișan	C1	II	500
Siriu	B10	III	500
Horia	B1	III	More than 1500
Țichilești	B11	III	More than 2000

The closest water body is a lake east of turbine A5 near Crucea. This appears to have been created by damming the local stream and is used for fishing.

Figure 2-2 is a photograph of part of the site.



**Figure 2-2: View south from existing track near Turbine A5 looking towards Allah Bair Hill – the site is designated a Site of Community importance (SCI)**

## **2.2 Land to be used**

In total, the Crucea I, II, and III wind turbines are spread out over approximately 1300ha. Most of this land will not be affected and will remain in agricultural use. The permanent land-take, comprising the turbines, the Crucea substation, access roads and permanent crane pads area will be approximately 13ha. In addition, during construction a temporary construction compound, which will be used to construct all of the phases of the Project, will be built within the wind farm site boundary containing temporary stores, offices and fabrication facilities. At the end of the construction period any temporary areas required for construction will be restored to agricultural land according to a restoration plan to be agreed as part of the conditions of the Construction Permit for the Project.

### 3 PROJECT DESCRIPTION

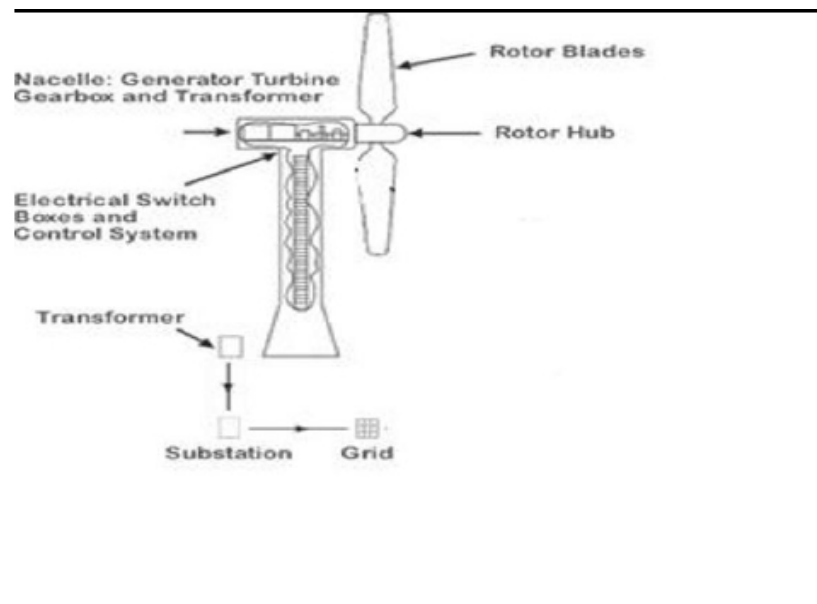
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The wind farm will consist of 50 GAMESA G 90 turbines, each with a capacity of 2MW, with a total maximum power output, for the windfarm as a whole, of up to 100MW. Each turbine includes a tower at the top which has a housing that contains the generator turbine, gearbox and transformer and rotor hub. The total height of the turbine is 145m. The rotor hub is connected to the rotor blades which have a diameter of 90m. Each turbine will be placed on a small permanent concrete foundation with a maximum diameter of 16.8m.

Figure 3-1 is a picture of a typical turbine. Figure 3-2 is a cut-away diagram of a turbine:



**Figure 3-1: Photograph of a typical turbine**



**Figure 3-2: Cut-away** diagram of a wind turbine

The turbines will be accessed from existing roads and tracks as far as possible: approximately 30km of existing tracks will be upgraded and/or resurfaced to access the turbines. In addition, approximately 3.4km of new access roads will need to be built to reach those turbines that cannot be reached from existing tracks. The total length of new access roads (new and resurfaced) used for the Project will therefore be 33.4km.

The turbines will be linked to a new 20/110kV sub-station (Crucea sub-station) by approximately 83km of medium voltage (20kV) underground electrical connection cables. The land over these underground cables cannot be used for agriculture in the future, as ploughing may damage the cables. However, the cable routes will run in the verge beside roads as much as possible, to minimise disturbance to agriculture. Where this is not possible, and the cables cross agricultural land, their route will be indicated by markers.

The sub-station will include three 20/110 kV transformers which will be housed in boxes and will be surrounded by a security fence. The size of the site for the sub-station will be approximately 5.600m<sup>2</sup>.

The Crucea sub-station will be linked by a short (300m long) underground power line to a new off-site hub sub-station (Stupina sub-station) being built by a separate developer (SC Elcomex EOL SA) to connect a number of other wind farms proposed in the same area.

### 3.1 **Construction programme and phasing**

The Project will be executed in 3 stages:

- Crucea I: Phase I will include 20 turbines (40 MW) and will be developed by Gamesa beginning in early 2013;
- Crucea II: Phase II will include 15 turbines (30 MW) and will be developed by GED at approximately the same time as Crucea I;
- Crucea III: Phase III will include 15 turbines (30 MW) and may be developed by GED in the future.

The Crucea sub-station and the link to the Stupina substation will be built before Crucea I and Crucea II go into operation.

The construction of Crucea I and II will take about two 2 years and will comprise the following key phases which may overlap: civil works (road construction, road construction and upgrading, cable burial, construction of wind turbine and sub-station foundations and surfaces), delivery of equipment and materials, electrical works, turbine installation, commissioning and restoration of temporary areas.

Construction permit documents (technical design, detailed method statements and management plans) will be developed before the start of construction. The construction works will be controlled by the State Inspection in Construction - Constanța County Local Inspectorate.

### 3.2 **Traffic**

Construction of the wind farm will be associated with an increase in traffic, both heavy equipment (trucks and construction equipment) and passenger vehicles for worker transportation. At the height of construction, there could be several dozen additional truck and car movements per day, with perhaps 10-15 per hour at peak times. The trucks will include:

- Restricted Access Vehicles (RAV) longer than 19 m or heavier than 42.5 tons, which will be used to transport wind turbine components;
- Semi-trailers used to transport pad mounted, foundation cages, reinforcing steel for foundations, transformer for the 100 MW Project substation, miscellaneous Project substation equipment; and
- Cement trucks.

### 3.3 **Workforce**

On average approximately 30-50 people will be employed during construction, although this may go up to a peak of 200. Of these jobs, 20% will require highly skilled people,

which are therefore unlikely to be filled by local residents, and 80% will be unskilled or semi-skilled positions. Contractors will be encouraged to establish goals for local hiring and to advertise open positions locally.

### **3.4 Permits**

There are a number of permits required for the wind farm and the Crucea sub-station. These include:

- Urbanisation certification (UC) and Regional Town Planning (RTP) permit. The UC for the wind farm has been issued by Crucea commune Mayor's office. The RTP permit is awaited;
- The Environmental Permit, which required submission of an EIA and appropriate assessment (AA) study. The Environment Permit was granted by the Constanta Environment Protection Agency on 10th July 2012;
- Construction permit, which has not been obtained yet. Once obtained, it will be valid for 2 years;
- Operational permit, which will be applied for upon completion of construction; and
- Technical connection agreement (TCA) for the electricity lines, which will be applied for once the Construction Permit has been issued.

### **3.5 Public consultations undertaken to date**

A public meeting for the RTP application for the wind farm was held on the 12th December 2011 at Crucea City Hall, 45 Soseaua Constantei St, Constanța County. The meeting was advertised in *Cuget Liber* newspaper and individual notices were sent to landowners in the vicinity of the planned windfarm. The public consultation period required under Romanian law for the RTP application ended on the 30th December 2011. No objections to the Project were raised.

The public meeting for the Environmental Permit was held on the 6<sup>th</sup> June 2012 at Crucea City Hall after being advertised in *Cuget Liber* and by a notice at Crucea City Hall. No objections were raised.

As described in Section 1, comments on the ESIA package will now be accepted until 16 December 2012.

### **3.6 Land acquisition**

Landowners are being paid for the rights to use land for the Project. The purchase of rights to use the land has been on the basis of "willing buyer, willing seller", with no ability for GED to force landowners to give up their rights. No one will need to move, but there is some limited loss of land to agriculture associated with the construction of the new access roads required to some of the turbines, the Crucea substation and where

the underground electricity cables cross agricultural land. All of the land transactions have now been concluded.

## **4 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES**

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### **4.1 Introduction**

The EIA Reports assess the impacts of all phases of the Crucea Wind Farm during construction, operation and decommissioning.

These impacts are summarised below. Where measures are proposed to mitigate adverse impacts or to provide environmental benefits, key points are noted.

### **4.2 Soils**

The soils at the Project site are quite fertile but are being adversely impacted by soil erosion due to agricultural exploitation and wind, exacerbated by the dry climate. There is no evidence of any existing soil contamination on the Project site.

Any compaction of soil from the movement of heavy vehicles and machinery during construction will be mitigated through implementation of best practice soil handling techniques, including segregation and reinstatement of excavated topsoil and sub-soil. A Pollution Prevention Plan (PPP) will be implemented to reduce the risk of contamination of the soil during construction, including storage of fuel in bunded tanks and areas, storing waste in containers on an impermeable surface and strict refuelling procedures.

Erosion during construction will be minimised through implementation of an Erosion Control and Reinstatement Plan. This will include storing topsoil for later use, limiting the areas disturbed temporarily during construction, installing temporary erosion control measures to limit water run-off (such as berms and silt fences) and reinstating temporary areas promptly following completion of construction.

No significant impacts to soils are therefore anticipated during construction. During operation, maintenance of equipment will be carried out in accordance with a PPP to be developed for the operations phase. The transformers will be placed in bunds to contain any leaks or spills.

### 4.3 **Water resources**

A small fishing lake created by damming a local stream is located due east of turbine A5, near Crucea. There are also watercourses near turbines A16-20, B1-B3 and B6-B10. Groundwater is estimated to be present 19 – 25m below ground level, which is well below the 2.5m depth of the foundations for the turbines and sub-station. Careful erosion control and other best practices (bundling transformers and fuel tanks, etc.) will protect all water resources

Bottled or tankered water will be used to supply any water required during construction. During operation, the wind farm will have no water demand and there will be no discharges from the site except surface water runoff from hard standing areas (including new access roads, crane pads and turbines bases). These are small in size so no significant impacts on run-off rates or drainage patterns are predicted during the operation of the wind farm.

### 4.4 **Biodiversity**

#### 4.4.1 **Birds**

The wind farm site lies within the western extent of the Via Pontica flyway. The Via Pontica flyway is one of the most significant bird migration routes in the world, with large numbers of birds becoming concentrated as they move south during autumn and north during spring. Whilst the main migration routes are concentrated along the Danube River and Black sea Coast, the entire Dobrogea Plain is also used and the wind farm is only approximately 3km from the Danube River. In addition, Turbines A1-A12 (part of Crucea I) are situated within the Allah Bair – Capidava Natura 2000 Special Protection Area (SPA) for birds. This European and Romanian designation reflects the importance of the site for breeding birds and its significance for bird migration. Crucea II and III are not situated within the SPA (with the exception of Turbines C11 and C14 which will be part of Crucea II) but may provide a support function to the SPA. There is also another SPA (Stepa Saraiu - Horea) located approximately 1km north-west of turbines B1-B10, which are part of Crucea III.

Large birds, especially storks, raptors (eagles, vultures, buzzards and other hawks), and wading birds are most at risk from wind turbines since they find it more difficult to avoid the moving blades. Surveys focus on these birds, but also record other birds that are seen or heard.

Bird surveys were first conducted in 2008 and have been carried out since that time, most recently in more intensive surveys during spring, summer and autumn 2012. Monitoring data will be supplemented by further seasonal surveys during winter, spring

and autumn migration seasons, and the breeding season. This information will be used to clarify the importance of the area for birds and the potential risk to birds and bats that may be caused by windfarm operation. Preliminary data suggest that high numbers of large birds migrate across the windfarm site, but this needs to be confirmed by the more robust monitoring program that is currently being implemented, and further assessment is needed to determine if these migratory birds are likely to fly at the relatively low heights that would put them at risk.

Prior to operation of any turbines, monitoring data will be evaluated by an independent ornithologist, who will determine whether additional mitigation measures are needed to avoid or control impacts. Such mitigation measures could include re-siting some turbines or temporary shutdowns in periods of intense migration. Monitoring and further evaluation of impacts and mitigation will continue through at least the first three years of operation, and may continue after that if it is determined to be needed. It is expected that a single monitoring and evaluation programme will serve Crucea I, II and III.

The surveys will also evaluate the potential impacts of breeding Bee Eaters near turbine C1 which have the potential to be impacted during construction of the turbine and access track.

If construction works need to take place during the breeding season, surveys will be undertaken to identify and mark bird nests and no work will be allowed in the vicinity of the nest of protected or sensitive bird species until the young have left the nest permanently. Additionally, in order that construction does not cause adverse impacts to ground-nesting birds, clearance activities will be undertaken outside of the bird breeding season (April –July inclusive).

#### **4.4.2 Bats**

The wind farm site contains habitat suitable for bats including woodland and the fishing lake. Part of the wind farm is also close enough to Reciffii Jurasici Cheia (a designated Natura 2000 Site of Community importance (SCI) for bats) to be used by bats from that site (the SCI is 10km east of the Phase I turbines, more than 15km from the Phase II turbines and more than 20km from the Phase III turbines).

Dedicated bat surveys have not been undertaken in the past. To establish a robust baseline and allow an assessment of impacts on bats to be carried out, bat surveys began in spring 2012 for the entire three-phase Project, and will include a winter hibernation survey, together with bat activity surveys between April and September as well as summer roost surveys. Information will be used by an independent bat expert to assess the importance of the area for bats and to develop any mitigation measures

needed to reduce impacts should the evaluation suggest that such measures are needed.

Bat monitoring will be continued into the operations phase to assess the actual level of impact on bats and to identify the need for further mitigation.

#### **4.4.3 Other flora and fauna**

The wind farm is near to Dealul Allah Bair hill, which is designated a European Site of Community importance (SCI) due to its plants (flora). However, the site is over 600m from the nearest turbine and no significant impacts on the SCI are predicted.

A range of ecological surveys have been carried out to determine the importance of the site for flora (plants) and fauna (animals). These show that the wind farm is predominantly situated in an agricultural environment although access tracks may cross boundary features with little natural habitat. Turbines will not be located in any of the woodland in the area and no trees will need to be removed. Construction work will temporarily disturb some areas and result in the permanent loss of other small areas of agricultural habitat and marginal habitats (on access roads and near watercourses) but these are of low biodiversity value; no rare plants or habitats were identified.

The fauna surveys found the following species listed as important at European level: the European Ground Squirrel (*Spermophilus citellus*); Spur-thighed tortoise (*Testudo graeca*); the Balkan Wall Lizard (*Podarcis taurica*); and Caspian Whip Snake (*Coluber (Dolichophis) caspius*). A range of further surveys will be undertaken before construction to identify any rare flora and fauna within the actual areas to be disturbed and this will be used to plan any mitigation required on a site-by-site basis. This may involve, for example, moving some animals or slightly altering the position of turbines to avoid burrows and scheduling construction outside the breeding/nesting season if needed to protect important species.

All land disturbed by temporary construction will be restored and re-vegetated.

#### **4.5 Landscape and visual impacts**

A landscape and visual assessment of the turbines has been undertaken and is reported below. This assessment has been completed in accordance with best practice guidelines for landscape and visual assessment. Generally, the assessment concludes the impacts on landscape character and views will be low or moderate to low (meaning that impacts are not expected to have significant adverse effects) with the exception of the landscape and visual impact of turbines A1-A12, the landscape impacts of turbines B11 to B15 and the visual impacts of turbines C3 and C4.

The developers will help reduce landscape and visual impacts by:

- Designing new access roads to follow land contours as much as possible;
- Minimizing the removal of vegetation and reinstating temporary areas promptly;
- Limiting signs on the turbines to those necessary for health and safety purposes and putting them on the turbine doors. Advertising and brand names will not be permitted on the turbines;
- Removing the turbines and all other aboveground structures at the end of the operational lifetime of the wind farm.

As required by the Romanian Civil Aeronautic Authority (RCAA) the turbine towers, hubs and blades will be painted white and turbine towers will be provided with lights.

#### **4.5.1 Turbines A1-A12 (Crucea I)**

The turbines will be on a hill that comprises a mixture of agriculture (arable, orchards and vineyard), steppe grassland and tree belts.



**Figure 4 1: View of the area around proposed turbines A1-A12: the turbines will be located both in the foreground and on the hill**

A fishing lake is present 0.65km due east of turbine A5, near Crucea village, which is used for fishing and irrigating the orchards located close to the turbines.

There are no significant buildings in the area or other man-made visual intrusions. The landscape character is therefore judged to be of high importance and sensitivity and the

impacts of the turbines moderate to high as they will form dominant vertical features covering a good part of the hill and altering its profile.

There will be views of the turbines from Crucea village, approximately 800m from the closest turbines (A1 and A5), which will be on a higher level than the houses. Visual impacts are therefore judged to be moderate to high as the turbines will be a distinctive element in the views from these houses.

#### **4.5.2 Turbines C11 and C14 (Crucea II)**

These turbines will be situated on flat arable land within the Allah Bair-Capidava SPA with few natural features. There are few natural features of value and the landscape is degraded by the presence of existing 110kV overhead power lines close to the turbines. The landscape character is therefore judged to be of low importance and sensitivity and landscape impacts low.

The turbines will be located at a distance of approximately 500m from the nearest dwellings and will be highly visible to the residents in the nearest village (Baltagesti). However, these residents also view the existing 110kV overhead power lines so the impact on their views is judged to be moderate to low.

#### **4.5.3 Turbines C2, C5 - C13 and C15 (Crucea II)**

These turbines are situated on a flat agricultural plain with sparse trees close to a number of electricity pylons. The landscape character is judged as of low importance and sensitivity and landscape impacts low.

The turbines will be visible to the residents of Baltagesti village, but the distance from the settlement to the nearest turbine is approximately 1.4km and the residents also view the existing 110kV overhead power lines so the impact on their views is judged to be low.

#### **4.5.4 Turbines A13 and A14 (Crucea I)**

The turbines will be located on grassland/pasture land on a low hill. The landscape character is already degraded by the existence of an overhead line situated very close to the proposed turbine locations. The landscape character is judged as of low importance and sensitivity and landscape impacts low.

These two turbines will only be visible from the county road DJ224. Visual impacts are therefore judged to be low.

#### **4.5.5 Turbine A15 (Crucea I)**

The turbine will be situated within an arable field on a low hill and close to a watercourse running north to south. The landscape character is judged as of moderate to low importance and sensitivity and landscape impacts low.

This turbine will only be visible from the main road (approximately 100m). The residents of Crucea will have distant views (approximately 1.5km). Impacts are judged to be low.

#### **4.5.6 Turbines A16 - A20 (Crucea I) and Crucea sub-station (Crucea II)**

These turbines will be situated in a line on the western side of a valley, containing a watercourse and comprising both arable land and grassland. The landscape character is judged as of moderate importance and sensitivity but the impact low due to the presence of overhead power lines.

The turbines will form visible landmarks from the road (approximately 300m at the nearest point) and from Stupina village (approximately 1.6km away). However, the overhead power lines present between Stupina village and the proposed turbine location reduces the visual impact to low.

#### **4.5.7 Turbine C1 (Crucea II)**

This turbine will be situated on a hill in close proximity (approximately 500m) to the village of Crisan and the village cemetery. The landscape character is therefore judged to be of medium importance and sensitivity but the impact of a single turbine is judged to be low.

The village residents will have a direct view across a valley of the turbines. This turbine will be situated on a hill in close proximity to the village of Crisan. The village residents will have a direct view of the turbine but the visual impact of single turbine is judged to be low.

#### **4.5.8 Turbines B6 - B10 (Crucea III)**

These turbines will be situated on the boundary between arable and grazed grassland. The grassland slopes down to the north into a shallow valley with a watercourse.



**Figure 4 2: View of the area of proposed turbines B6-B10**

The landscape character is judged of moderate importance and sensitivity and impacts low to moderate.

The turbines will be located between 500m - 1km from Crisan village and are likely to be visible to Crisan residents. Visual impacts are judged to be moderate to low.

#### **4.5.9 Turbines B1 - B3 (Crucea III)**

The turbines would be situated on the boundary between arable and grazed grassland. The grassland slopes down to the north into a shallow valley and the landscape character is judged of moderate importance and sensitivity and impacts low to moderate.

The turbines will be visible from the road and there will be restricted views of the proposed turbines from Horia village due to the presence of an intervening ridge. The nearest turbine to the village will be located approximately 1.6km away; therefore visual impacts are predicted to be low.

#### **4.5.10 Turbines B4 and B5 (Crucea III)**

The turbines will be situated on arable land. The landscape character is judged as of low importance and sensitivity and impacts low. The turbines will be visible only from the access road and therefore the impact is judged to be low.

#### **4.5.11 Turbines B11 - B15 (Crucea III)**

These turbines will be situated on the edge of a ridge. The land consists of a mixture of grassland, fruit trees and occasional woodland, and is judged to be of medium to high landscape importance and value, because of the mix of land uses, the presence of trees and the visibility of the ridge. The impact of the turbines on landscape value is judged to be moderate, as this attractive landscape will be semi-permanently affected by the turbines.

The turbines will only be visible from a road 1.2km distant so visual impacts are judged to be low.

#### **4.5.12 Turbines C3 and C4 (Crucea II)**

These turbines will be situated on arable land. The landscape character is judged as of low importance and sensitivity and the landscape impacts are predicted to be low. However, the turbines will be located approximately 700m from the Stupina village and will be very visible to residents so the visual impact is judged to be moderate.

### **4.6 Air quality**

There will be no significant increases in air pollution due to construction and operation of the Project. During construction, air emissions will consist of dust generated from construction/rehabilitation activities (e.g. earth moving, dust from construction vehicles) and combustion related emissions from vehicles and construction equipment. Dust control measures will be employed during construction /rehabilitation and no significant adverse impacts are predicted from dust generation.

Emissions from construction plant and vehicles will be small-scale and temporary and will be minimised by ensuring machinery is properly. No significant impacts are therefore anticipated.

During operation, there will be no significant emissions to air, as emissions will be limited to occasional traffic and maintenance activities.

In addition, every unit of electricity produced by wind power from the Crucea Project will be replacing a unit of electricity generated by other means, including fossil fuels. As such, wind farm development helps to reduce greenhouse gas emissions and emissions of other pollutants caused by conventional fossil fuel power generation (mainly sulphur and nitrogen oxides). Nearly 64,000 tonnes of greenhouse gas emissions every year are predicted to be saved by the operation of Crucea I, if the generation of electricity by the wind farm is compared to generating electricity using the

current mix of mainly fossil fuels used to generate electricity in Romania. Crucea II and III will each save nearly 46,000 tonnes per year.

## 4.7 **Waste**

The wastes generated during construction will mainly be subsoil, rock and other inert construction materials, such as concrete and household trash.

The Project developers will minimise waste generation, and re-use, recycle or recover waste as far as practicable using licensed recycling facilities.

Topsoil will be stored and then re-used to restore areas once construction is complete. Excess subsoil, rock, other inert wastes and non-recyclable solid household waste will be deposited at the municipal household waste depot. Small amounts of hazardous waste (paints, oils, etc.) will be disposed to a licensed waste company.

All waste activities will be conducted in accordance with a Waste Management Plan and no significant impacts are predicted.

Minimal waste will be generated during operation, primarily maintenance materials.

## 4.8 **Noise and vibration**

Noise will be generated during construction and operation. During construction, noise will be generated by plant and machinery (excavators, bulldozers, cranes, generators, etc) and by vehicles (concrete ready-mix trucks, construction and freight vehicles, including heavy transporters).

Contractors will notify nearby residents and authorities when major construction will take place that could result in nuisance noise levels (for example, in the periods of heaviest traffic, construction of nearby turbines).

The impacts of construction plant and machinery will be temporary and confined to small areas of the Project site at any one time. As shown in Section 2.1, the nearest houses are located over 500m from the nearest turbines so no significant negative impacts are predicted. No construction will take place at night but work may be occasionally undertaken at weekends.

Most of the Projects' construction traffic will use the national road (DN 2A), which is a busy existing main road. The additional noise generated during construction is therefore not expected to cause concern to residents along the road.

Noise from the wind turbines during operation at the nearest houses has been assessed in the EIA and the Cumulative Impact Assessment (CIA). The CIA has

predicted that the level of noise will be within permissible levels but will be close to the legal noise limit at Baltagesti. Mitigation measures will be developed if noise levels at or near occupied houses exceed levels defined in Romanian legislation (STAS 10.009/1988 and Order no. 1028/2004) or levels cited in the World Health Organisation (WHO) 'Guidelines for Community Noise' and 'Night Noise Guidelines for Europe'. Mitigation could include shielding as agreed with residents, adjustments to turbine locations, or other measures. It is important to note that weather and other conditions (rain, wind, etc.) affect the direction and distance at which noise can be heard. During operation, the developers will measure noise levels at any nearby houses upon request by the residents, and additional mitigation measures will be put in place if required to ensure that noise is within acceptable limits.

#### **4.9 Traffic and transport**

For all phases of the Project construction traffic will access the site via national road (DN 2A), then by either county road DJ 224 or newly built access roads. At peak times during construction, up to 10-15 vehicles per hour could pass by any single point.

A traffic plan will be developed, including an assessment of traffic impacts and safety risks and including appropriate mitigation, such as signage and escorts, to ensure risks are managed to an acceptable level.

The final route will be discussed and agreed in consultation with Constanta County Council and the National Highway and Roads Company prior to construction.

The Project will generate very little traffic during operation with no significant impacts.

#### **4.10 Land use**

As noted in Section 2.2 above, of the total wind farm (1300ha), approximately 13ha will no longer be used for agriculture. The rest will remain in agricultural use or, in the case of temporary sites, will be reinstated to agricultural use immediately after construction, enabling farmers to continue their agricultural operations.

The companies have completed agreements with all landowners to acquire rights to use the land and compensate for loss of income.

#### **4.11 Employment and other economic benefits**

As noted in Section 3.3, a number of temporary jobs will be created during construction. A small number of permanent posts (probably less than 10) will also be created during operation. The Companies will support recruitment and retention of local people to

these jobs by providing realistic information on job opportunities, advertising all open positions and considering training for permanent positions.

The procurement of local goods and services during construction and operation will have a positive, but limited, benefit to the local economy. In addition, Gamesa and GED will pay annual taxes to the local commune budgets for the lifetime of the Project, which is expected to be at least 30 years.

The construction/rehabilitation works necessary for the access roads to the turbines will provide local farmers with improved access to their agricultural land.

#### **4.12 Social impacts**

Social impacts during construction are expected to be negligible. Local workers will already have accommodation in the neighbouring villages and the remaining workers will be accommodated in bedroom containers on the construction compound.

All workers will be required to adhere to a strict code of conduct that prohibits disturbance of the nearby population. Procedures will be developed and implemented to govern the behaviour of security staff towards members of the public.

Access to, and use of, the fishing lake will not be affected.

#### **4.13 Cultural heritage**

No known historical monuments or archaeological sites are located in the Project area,. No significant impacts are therefore predicted. However, a chance finds procedure will be developed and implemented to ensure that any unexpected finds during construction are identified, protected and fully assessed.

#### **4.14 Electro-magnetic radiation**

Wind turbines can potentially disrupt electromagnetic signals used in a range of telecommunication, navigation and radar services. Contact has been made with all relevant authorities and no concerns have been identified with regard to the wind farm.

#### **4.15 Emergency events**

Wind farms operating in cold climates may suffer from icing in certain weather conditions and a failure in the rotor blade or ice accretion can result in the 'throwing' of a rotor blade or ice from the wind turbines, which may affect public safety. Turbine rotor blades can also shear in high winds.

The companies will take steps to reduce this risk by designing the turbines to shutdown automatically in case of ice accumulation or high wind speeds and by undertaking regular maintenance. In addition, agricultural works will not be carried out on fields during winter time, reducing the risk of impacts in the unlikely event of an incident.

#### **4.16 Cumulative impacts**

For the purpose of cumulative impact assessment (CIA), other projects in a study area 40km from north to south and 29km wide were identified. There are 27 other proposed projects within this area, comprising over 650 turbines. Of these projects, one wind farm is located 2km to the south of the proposed Crucea development and has a 40MW capacity. Another wind farm is located east of the Crucea development and has a 300MW capacity. The road to this second wind farm is currently under construction. Other wind farms will be located in the area between the Crucea wind farm and the Danube to the west.

The CIA concluded that significant impacts on birds, bats, flora and other fauna are not likely, but as noted in Section 4.4.1, more surveys for birds and bats are being undertaken at Crucea to determine if further mitigation measures are needed to ensure that there are no significant effects. As described in Section 4.8, the CIA has predicted that noise levels when the wind farm is in operation will be within permissible levels but will be close to the legal noise limit at Baltagesti. As a result, baseline noise surveys will be undertaken before construction and a full noise assessment undertaken. Mitigation measures will be developed if noise levels at or near occupied houses exceed levels defined in Romanian legislation or levels recommended in WHO guidelines. The CIA also concluded that there could be high cumulative landscape and visual impacts near Baltagesti and Allah Bair hill. Mitigation measures for this are described in Section 4.5. No other potentially significant impacts were identified.

## **5 MANAGEMENT AND MONITORING**

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### **5.1 Environmental and social management**

The key mechanism for environmental and social management during the detailed design and construction stages of the Project will be the permits issued by Romanian authorities and an Environmental and Social Action Plan (ESAP) agreed with each Company (GED and Gamesa) by EBRD. Each ESAP will be part of the legal agreement between the EBRD and each Company and will set out the measures necessary to manage the environmental and social impacts of the Project to comply with applicable Romanian and EU legislation. These mitigation measures, including additional noise monitoring and additional surveys of birds and bats, are described in the sections above. The ESAP for Crucea I is part of the ESIA package available for review and comment through to 16 December 2012, and the ESAP(s) for Crucea II and III will be made available when those phases move closer to development.

### **5.2 Reporting**

The Companies will provide reports to Romanian authorities as required in permits and authorisations. They will report to the EBRD the status of all ESAP requirements each six months during construction and every year during operation. In addition, highlights of important Project activities will be disclosed to local residents and others in accordance with the Stakeholder Engagement Plan.