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## **Infrastructure Projects Facility Technical Assistance Window (IPF TA)**

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**WB4bis-REG-ENE-01:**

**Feasibility Study and ESIA for  
Elbasan (AL) - Bitola (MK)  
400 kV Transmission Line**

**MK Environmental and Social  
Impact Assessment (ESIA):  
MK Non-Technical Summary (NTS) -  
Section from Bitola (MK) to MK/AL Border**

**30.11.2012**



This project is funded by  
the European Union

**COWI • IPF CONSORTIUM**

\*) This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo declaration of independence.

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- Bitola (MK) 400 kV Transmission Line

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Prepared	Konstantin Siderovski, WB4bis-REG-ENE-01 Project Team
Checked	Heikki Lehtimäki
Approved	Ole Johansen

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## LIST OF ABBREVIATIONS

a.s.l.	above sea level
AL/ALB	Albania
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EMF	Electric and Magnetic Fields
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ICNIRP	International Commission on Non-Ionizing Radiation Protection
MEPP	Ministry of Environment and Physical Planning
MEPSO	Transmission System Operator of the Republic of Macedonia
MK/MKD	Macedonia
OHL	Over-head (Transmission) Line(s)
OHS	Occupational Health and Safety
SEP	Stakeholder Engagement Plan
SS	substation
TPP	thermal power plant
TSO	Transmission System Operator

## 1 Synopsis

Project Title:	Feasibility Study and ESIA for Elbasan (AL) - Bitola (MK) 400 kV Transmission Line
Project Number:	WB4bis-REG-ENE-01
Contractor:	COWI-IPF Consortium
Beneficiaries:	OST (AL) and MEPSO (MK)
Lenders:	EBRD, KfW
Location:	Tirana and Skopje
Project start date:	26/01/2012
Project Duration:	12 months
Anticipated completion:	January 2013

## 2 Introduction

Macedonian transmission system operator (MEPSO) proposes to design, construct, and operate a new approx. 100 km long 400 kV overhead transmission line (OHL) from Bitola to Macedonian /Albanian border<sup>1)</sup>, to construct and operate a new 400/110 kV substation near Ohrid, and to modify the existing substation Bitola 2 to accommodate the proposed 400 kV OHL. This document is a Non-Technical Summary (NTS) of the Environmental and Social Impact Assessment (ESIA) of the proposed project.

The main national and regional benefits from the proposed project are summarized below:

1. Significantly better, more powerful transmission network in South – West Macedonia.
2. More reliable power supply and reducing electrical supply constraints for further economic developments in the wider project region.
3. Improved network capacity to facilitate anticipated load and transit growth, new generation connections, in the context of improving transmission capacity in Albania and in Macedonia, and in the Balkans Region.
4. Improvement of the reliability of the regional network, the overall security of supply, and system operational issues such as stability.
5. A decrease of the technical losses in the transmission system.
6. Improving the quality of electricity supply (normalise the voltage levels, stabilize the load flow and the frequency fluctuations, etc).
7. Supporting the potential to develop the regional energy market in South East Europe and creating trading opportunities with Bulgaria and Italy.
8. Mutual support between Macedonia and Albania to complement power generation types (Albania - hydro, Macedonia - thermal).
9. Reducing the cost of providing reserve capacity, and providing mutual emergency support.

Based on detailed feasibility study and multi-disciplinary analysis consisted of technical, environmental and socio-economic appraisal, MEPSO selected a preliminary OHL route as shown in Appendix 1.

MEPSO is seeking financing from the European Bank for Reconstruction and Development (EBRD), and an ESIA to evaluate potential impacts from construction and operation of the proposed OHL was prepared to meet the Macedonian and Bank's requirements.

MEPSO has made this NTS, the ESIA, a Stakeholder Engagement Plan (SEP), and an Environmental and Social Action Plan (ESAP) available to the public for review and comment. The documents are on the internet at MEPSO's web-

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<sup>1)</sup> This transmission line is interconnection between Macedonia and Albania. From Macedonian / Albanian border it continues to Elbasan (Albania).

site - [www.mepso.com.mk](http://www.mepso.com.mk), website of the Ministry of Environment and Physical Planning - [www.moepp.gov.mk](http://www.moepp.gov.mk) and EBRD's website - [www.ebrd.com](http://www.ebrd.com) and are also available at following locations:

- Ministry of Environment and Physical Planning (MEPP), Blvd. Goce Delcev b.b., (MRTV, floor 10-11-12)
- Offices of the concerned municipalities: Novaci, Mogila, Bitola, Resen, Debrca, Ohrid and Struga
- The central premises of MEPSO in Skopje, Orce Nikolov str b.b., 1000 Skopje
- EBRD offices in Skopje (Soravia Centre Skopje, 7th floor, Vasil Adzilarski b.b., 1000 Skopje) and London (One Exchange Square, E14 8RP).



### 3 Description of the Project

The proposed 95 km long OHL is situated in south-western region of Macedonia. It passes various geographical features from its starting point in flat area of the Pelagonija Field via hilly and mountainous northern slopes of the Baba Mountain through Prespa valley to Struga Field at the northern side of the Ohrid Lake and eastern bottom edge of the Jablanica Mountain.

In general, the proposed OHL follows, as much as practicable, the corridor of the existing 110 kV OHL Bitola-Resen-Ohrid-Struga.

Its starting point is the existing MEPSO's substation Bitola 2 in the locality Tebalica at the immediate vicinity of the thermal power plant (TPP) REK Bitola. From SS Biola 2, the OHL continues toward north-west over the Pelagonija Field, avoiding the settlements in its surroundings (Dobromiri, Trn, Mogila). At the locality Karamanski Pat it turns to south-west, crossing the roads Bitola-Prilep and Bitola-Kicevo to the hilly area above the village Krklino. From the locality Koriija (in immediate vicinity to the road Bitola-Ohrid on its north side) the proposed corridor turns toward west up to a point in the area of the village Gjavato, passing north from the road Bitola-Resen in an unpopulated area. At the locality Gradiste on the southern slopes of the Bigla Mountain, the OHL turns to north-west, following the existing 110 kV OHL, avoiding the settlement Sopotsko and bypassing the town Resen in wide ring. Further on to north, it avoids villages Kriveni, Leva Reka as well as Krusje karst area (water supply facilities for Resen).

At the area of the village Svinista, the OHL turns to western direction, avoiding the villages Rasino and Livoista and enters the Struga Field by crossing the road Ohrid-Kicevo. Within the Struga Field, at the locality Veljo Pole, the OHL turns to south-west and avoids the villages Volino and Moroista. On the western edge of the Struga Field, at the locality Belicka Krasta the proposed OHL turns to south toward the crossing point on the Macedonian-Albanian border (locality Kafasan) following bottom east slopes of the Jablanica Mountain. It avoids the villages Zagracani, Radolista, Frangovo and Mali Vlaj.

A map of the project area with the route of the proposed transmission line is given in Appendix 1.

The proposed transmission line includes following main components:

- ✓ **Towers.** The transmission line will be constructed of 250 steel-lattice single circuit self-supporting towers (Figure below), each with four legs and a single concrete foundation per leg, with horizontal configuration of conductors and two earth wires. Depending on their position in the OHL, the types of towers could be suspension towers (total number – 217) used for straight section of the line, or angle towers (total number – 33) used where the line changes direction.

- ✓ **Phase conductors.** Two conductors (wires) per phase are planned at a mutual distance of 400 mm. Characteristics of the conductors will be in compliance with the national standards.
- ✓ **Substations.** The project includes construction of a new 400/110 kV substation in Ohrid area in vicinity to village Livoista and upgrading of existing substation Bitola 2 to allow it to accommodate the proposed transmission line.

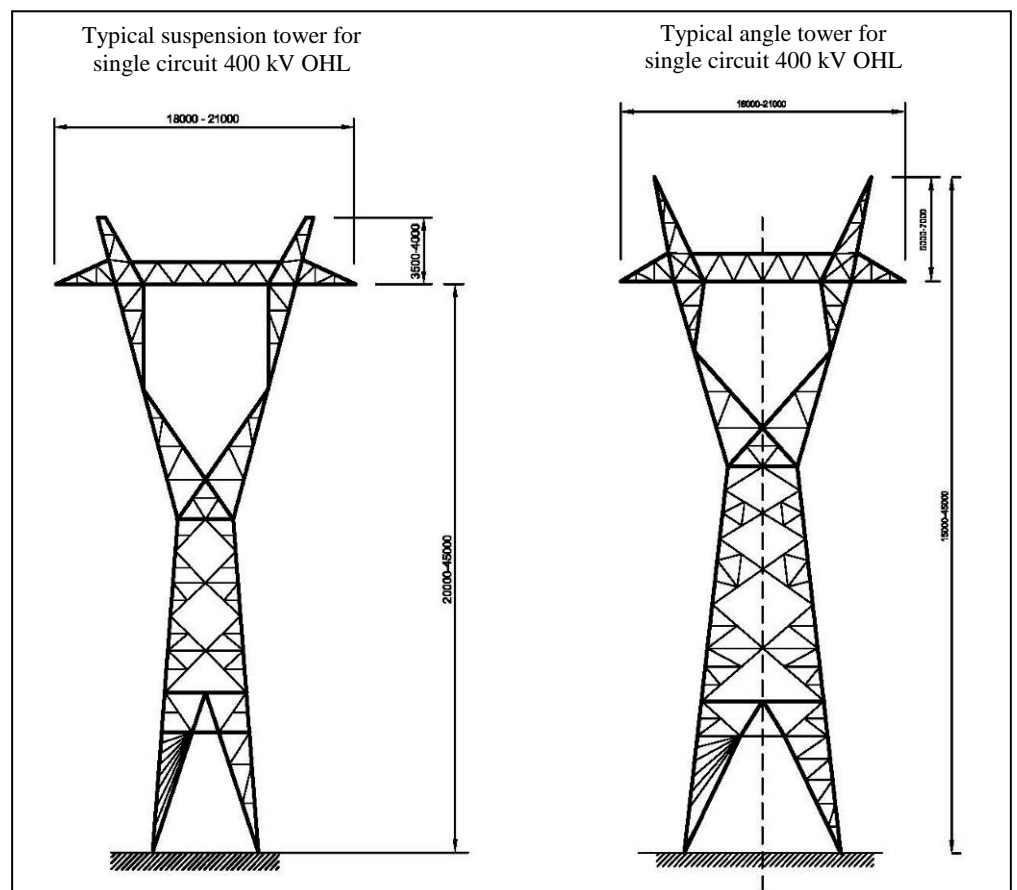


Figure 1-1 - Typical single circuit 400 kV OHL tower types

## **4 Project Status and Level of Details**

The project has been developed to a feasibility level, i.e. to a detail considered sufficient to establish that the proposed line is technically feasible and to allow environmental effects to be assessed. Final design, including precise location of towers and access roads would be undertaken once the main technical design is developed and prior to construction commencing.

This refinement of the current design would be within the limits of deviation defined for the 500 meters wide transmission line corridor.

## 5 Considered Alternatives

### 5.1 New 400/110kV Substation in Ohrid Area

A number of alternative locations for the 400/110 kV substation in the area of the villages Vapila and Livoista (Ohrid area) were considered. These were:

- **Alternative 1**, located at north from village Vapila, on a hilly locality on altitude of 800 m a.s.l. in immediate vicinity of the hill Ceso Glava, a point where the OHL branch to Ohrid from the existing 110 kV OHL Bitola-Resen-Ohrid-Struga is created. Construction on this location would cause transport difficulties due to the steepness of the access road and significant nuisance to local population due to construction traffic and noise. No operational environmental and social effects are likely.
- **Alternative 2**, located on the locality Livage on altitude of 760 m a.s.l. on western bottom area of the hill Ceso Glava. It is easily accessible via network of existing local roads. This location is close to several houses. Construction on this location would cause significant nuisance to local population due to construction traffic and noise as well as loss of agricultural land. Operational social effects are likely due to risk of EMF exposure and operational noise from the substation equipment.
- **Alternative 3**, located at north-west from village Livoista at relative distance of more than 1 km, on the locality Staro Selo on altitude of 800 m. It is well accessible via existing unpaved road Trebenista – Livoista, rarely used by local residents. No significant environmental and social impacts during project construction and operation are expected.

Upon thorough evaluation of the proposed sites, MEPSO has concluded that the alternative 3 is an optimal choice for a location of the planned new substation and, therefore, this alternative has been selected future SS development site.

### 5.2 Overhead Transmission Line

Fundamentally different alternative OHL corridors for interconnection between Macedonia and Albania (further on to Italy) have been evaluated at a strategic and spatial planning level in 2007, which resulted in proposal for a general OHL corridor that should accommodate the OHL route. Two main corridor alternatives of the section between Bitola and Elbasan as a part of the overall OHL corridor have been considered. These are:

1. **OHL Corridor 1**, from the SS Bitola 2 toward the Resen area bypassing city of Bitola and the National Park Pelister. In Resen area the corridor turns to south toward connection point with Albania passing through the National Park Galicica in Macedonia and National Park Prespa in Albania and reaches Zemblak (Albania).
2. **OHL Corridor 2**, from the SS Bitola 2 through Pelagonija Field via Prespa valley to Struga Field at the northern side of the Ohrid Lake and south and eastern parts of the Jablanica Mountain toward connection point with Albania – border station “Kafa san”. This alternative avoids

all existing protected areas in the wider project region and passes in areas with various human developments and land-uses. As such, this option is considered as most favourable alternative of the proposed transmission line and selected for further detailed examination and development.

A map of the above strategic transmission line corridors on Macedonian territory relative to the selected OHL corridor (red line) is given in Appendix 1.2.

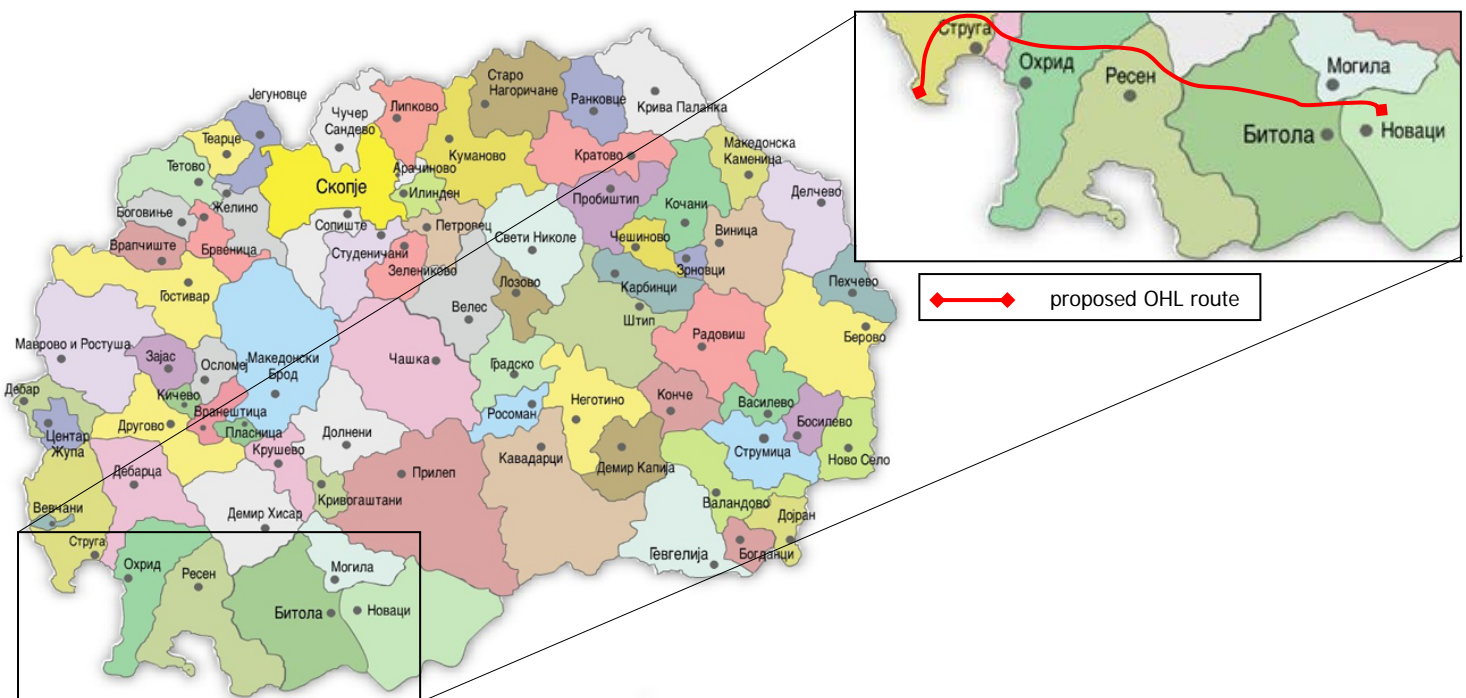
## 6 Key Environmental and Social Issues

Environmental issues	Social and economic issues
Air quality	Settlements
Water quality	Health and safety
Soils	Land acquisition
Biodiversity (flora and fauna, habitats)	Nuisance impacts
Land use	Visual appearance
Waste management	Electromagnetic fields and interference
	Cultural heritage

**Table 4-1 – Main environmental and socio-economic aspects of the project**

### *Settlements*

The proposed transmission line passes through the territory of seven Macedonian municipalities: Novaci, Mogila, Bitola, Resen, Ohrid, Debrca i Struga (Figure below).



**Figure 4-1 - Route of the transmission line and overview of concerned municipalities**

Settlements close to the proposed transmission line as well as their relative distance to the proposed transmission line are given in the table below.

<b>Settlements – by Municipality – close to the proposed OHL line</b>			
<b>Municipality</b>	<b>Settlement</b>	<b>Population 2002<sup>*)</sup></b>	<b>Relative distance from the proposed OHL</b>
Novaci	Novaci	1,054	>1,000m
	Dobromiri	285	500m
Mogila	Mogila	472	>1,000m
Bitola	Trn	30	1,000m
	Krklino	205	> 1,000m
	Kukurecani	1,121	> 1,000m
	Bračin Dol	154	> 1,000m
	Rotino	106	> 2,000m
	Capari	422	> 2,000m
	Kazani	65	> 1,000m
	Gjavato	111	600m
Resen	Sopotsko	184	500m
	Kriveni	25	400m
	Leva Reka	54	600m
Ohrid	Svinista	63	300m
	Rasino	8	200m
	Vapila	97	1,000m
	Livoista	150	1,000m
Debrca	Volino	362	750m
Struga	Moroista	224	750m
	Vranista	1,174	> 1,000m
	Dolna Belica	693	> 1,000m
	Zagracani	753	1,000m
	Radolista	1,961	500m
	Frangovo	1,154	500m
	Mali Vlaj	61	750m

**Table 4-2 – Settlements along the proposed transmission line corridor**

<sup>\*)</sup> Source: Census of Population, Households and Dwellings in Macedonia, 2002

### *Air Quality during Construction*

During the construction of the proposed OHL, there will be site preparation and construction activities, all of which have the potential to generate air emissions, including dust and small particulate matter (PM10-particles less than 10 microns in diameter). The main sources of dust and PM10 include:

- construction vehicle movements and other project related traffic on unpaved roads
- soil excavation, handling, storage, stockpiling
- site preparation and restoration
- construction of towers and access roads
- internal and external construction works on substations.

Depending on wind speed and turbulence during construction, nearly all dust will be deposited on the ground within about 200 meters of the construction site. Therefore, only properties within 200 meters of a construction site would experience nuisance if dust is not controlled. Even then, the nuisance would be temporary, since there will be only a week to 10 days at construction activity at each tower location before the crew moves to the next location. When there is visible dust during dry periods, MEPSO will apply water to dusty areas and use other practices to reduce dust. This will prevent any major impacts from dust and PM10. The impact on air quality from dust and PM10 is expected to be very minor, local, and temporary. There will be no impact on air quality during operation.

### ***Noise and Traffic Impacts during Construction***

Construction works for the proposed OHL is estimated to take three years along the approx.100 km long route, while for the substation in Ohrid area construction will last about two years.

Construction works, heavy machinery and large transport vehicles and increased intensity and volume of the traffic will generate increased noise level and will affect the normal traffic regime in the project area. This kind of likely impacts would be temporary and minor, since there will be only a week to 10 days at construction activity at each tower location. No blasting is expected. Construction will take place in daylight hours, so there should be no noise during the night. In addition, all equipment will be maintained in good condition and fitted with mufflers or silencers whenever possible. Overall, noise impacts on the transmission line should be very temporary and localized, with very little noise audible over 200 meters from construction site. At the Ohrid substation site, construction activities will take much longer – approx. two years. Again, however, noise should not reach beyond 200-300 m from the construction site.

The table below identifies the main construction routes which would be used for the import of machinery and equipment, materials and labour for construction of the proposed transmission line.

<b>OHL section</b>	<b>Principal routes</b>	<b>Access routes</b>
Bitola – Resen	<ul style="list-style-type: none"> <li>• Prilep - Bitola - Resen</li> </ul>	<ul style="list-style-type: none"> <li>• Bitola – Novaci</li> <li>• Novaci – Dobromiri – Aglarci</li> <li>• Bitola – Orizari –Karamani –Trn</li> <li>• Bitola - Mogila</li> <li>• Bitola – Kicevo</li> <li>• Road to Krklino</li> <li>• Road to Ramna / Lera / Strezevo Lake</li> <li>• Kazani - Dolenci</li> </ul>
Resen region	<ul style="list-style-type: none"> <li>• Bitola - Resen - Ohrid</li> </ul>	<ul style="list-style-type: none"> <li>• Sopotsko – Zlatari</li> <li>• Resen – Zlatari</li> <li>• Road to Kriveni</li> <li>• Road to Leva Reka</li> </ul>
Ohrid region	<ul style="list-style-type: none"> <li>• Resen – Ohrid</li> <li>• Kicevo - Ohrid</li> </ul>	<ul style="list-style-type: none"> <li>• Road to Svinista</li> <li>• Vapila – Rasino</li> <li>• Vapila – Sirula</li> <li>• Trebenista – Volino</li> <li>• Trebenista – Livoista</li> </ul>



Struga region	<ul style="list-style-type: none"> <li>• Ohrid – Struga</li> <li>• Struga – Debar</li> <li>• Struga - Cafasan</li> </ul>	<ul style="list-style-type: none"> <li>• Mislesevo – Moroista</li> <li>• Sum – Dolna Belica</li> <li>• Struga – Radolista</li> </ul>
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**Table 4-3 – Key construction transport routes**

The number of truckloads for all construction works is currently estimated to be in the range of 2,000 for the transmission line and between 2,000 and 3,000 truckloads for the substation the entire construction period. The heavy machinery will remain on the construction site during overall construction works. Except in a few places where construction equipment and materials will be stored, increases in traffic at any tower location will be very temporary, involving about 3 – 4 truckloads a day and lasting less than a week. MEPSO will develop a traffic management plan and train all drivers, and also consult with road authorities and local authorities. As a result, effects on local traffic will be minor, and even then impacts will be carefully controlled so there should be limited impacts. Special attention will be paid on the control of the traffic and placement of warning signs at places and road sections where the geometry of the road may potentially cause safety problem.

***Nuisance Impacts during Operation***

Energized electrical lines can produce a “corona” noise (a buzzing sound), especially in wet weather. However, there are no properties and other sensitive receptors along the OHL route at distances where the corona noise would cause nuisance effects and thus, it is not likely that impacts on people from corona noise will occur.

At the new substation, most noise will be from transformers (a constant low humming noise), coolers (more broadband and not constant), and switchgears (circuit breaker clicking or a short period). The distance of the closest residential properties to the new substation in Ohrid area is more than 1 km and acoustic nuisance to residents will not occur. There are no residential properties in vicinity of the existing substation SS Bitola. No new transformers are planned in this substation as it will be upgraded only with switchgear in order to accommodate the new OHL and increased noise levels would not be significant in comparison to the current level.

***Visual Effects and Landscape***

The proposed transmission line does not pass through or in vicinity to important scenic areas or areas of landscape that is highly valued, rare or distinctive. Overall, the landscape along the proposed OHL route is not sensitive and is tolerant to changes and this is reflected in the absence of any designations.

Careful corridor alignment resulted in avoidance of all existing protected areas / scenically important areas in the project region.

The proposed transmission line will be visible from the roads in both the immediate and wider area around the route of the line. Views from roads are transient views, in that the view changes as the traveler passes through the landscape, and are therefore less sensitive than views from fixed locations such as

residential properties. In many areas along the route, there are already transmission lines crossing the landscape, so this new one would not have a major effect in those areas. Even in other areas where there are no other lines, the OHL towers will be noticeable at first, but nearly all people would become adapted to them so they become part of the landscape.

The proposed OHL will be visually exposed and visible where its route passes through open terrains. Such cases are Pelagonija Field and Struga Field. The OHL will be also visible from the road Bitola-Resen between localities Korija-Prevalec (hilly open landscape) and between localities Prevalec and Gjavato (flat agricultural area) as well as in the area of village Livoista, where the new substation is planned. These areas represent landscapes with number of anthropogenic land uses and developments and as such their scenic quality is low and tolerant to change. Therefore, the proposed OHL would be experienced as part of the wider landscape and would cause only indirect visual effects in conjunction with existing features in the landscape. From the locality Gjavato to village Sopotsko, further on to village Zlatari and Kriveni (Resen region), the proposed OHL route would pass distant from the road Bitola-Resen, through hilly and mountainous terrain. Therefore, it would not be visible from the road with certain exceptions in the area around the village Gjavato and from the road section from village Jankovec to village Izbista. From village Leva Reka to village Svinista, further on to Rasino in Ohrid region the OHL will be not be exposed to the road Resen-Ohrid as it would be sheltered by the topography and vegetation. It would be exposed to local residents in the project area at the crossing points with the local roads leading to settlements in this region (Sopotsko, Zlatari, Kriveni, Svinista, Rasino, Vapila, Livoista and Sirula). The section of the proposed OHL which passes through lower parts of the Jablanica Mountain will be exposed to the residential areas along the local road Dolna Belica-Radolista, sheltered in particular sectors by the topography. Due to scenic values, the landscape in this area could be classified to be of moderate sensitivity, but due to existing developments and various infrastructure, it could be considered as tolerant to moderate change. The route avoids highly valued scenic landscape and touristic areas along the western shore of the Ohrid Lake at the area of village Radozda as experienced from the lake.

### *Hydrology and Soils*

The route of the proposed transmission line will intersect number of watercourses which belong to two large catchment areas:

- Aegean catchment area – the OHL section in the Bitola region, i.e. from its starting point (SS Bitola 2) to the mountain pass “Gjavato”. This area is characterized with well developed hydro-graphical network with one main watercourse – Crna River, which is tributary to the country’s longest river – Vardar River. In this section, the proposed OHL crosses number of natural watercourses (Dragor River (tributary to Crna River), Bratindolska River, Rotinska River, Shopnica and Caparska River) as well as man-made drainage and irrigation channels in the Pelagonia Valley.
- Adriatic catchment area – the OHL section in Prespa region and Ohrid-Struga field, i.e. from the mountain pass “Preseka” to the mountain pass

“Kafa San” (crossing point to Albania) represented by one main watercourse – river Crn Drim. This area includes two regional basin catchments – Prespa Lake and Ohrid Lake. The proposed OHL crosses number of watercourses in Prespa area: Kriva River (occasional character of flow), occasional stream from Zlatari village to Resen, Cheshinska River, Kriveshnica and Leva Reka, as well as in Ohrid-Struga region: Mokresh, Starechki Dol, Trebishki Dol, Rasinska River, Sirulska River (occasional character of flow), Sateska River channel (artificially changed flow into the Ohrid Lake), Moluzja channel, Crn Drim River, Shum and Vishenska River.

Watercourses will be crossed by the wires in a span with standard length shorter than 600 meters and with towers located at least 10 meters from the riverbank.

The project will use best practice techniques to avoid damage to soils and erosion into rivers. This is especially important in steep terrain and where there may be limited vegetation cover. Land disturbance will be kept to a minimum, and drainage will be carefully controlled to avoid erosion. As soon as construction is complete, disturbed land will be restored, with seeds or young plants will be planted to re-establish the vegetative cover.

Water protection measures against transformer oil spill will be installed in the new substation. These will include oil / storm water tank, placed below energy transformer on a concrete foundation with capacity to hold 1.1 times the oil as the transformer unit. Regular inspection throughout substation operation period will be performed.

#### ***Vegetation, Flora and Fauna***

There may be various adverse impact on forests from the construction activities, but the primary impacts will be loss of biomass (economic value) and fragmentation effect due to the establishment and maintenance of the corridor as well as due to construction of new access tracks (where necessary). A total of approx. 78 hectares of forest along the OHL route will be affected. Impact from forest fragmentation was estimated as low due to the following facts:

- the forests in the corridor are already fragmented and the actual level of fragmentation is low since clearing of the forest belt of approximately 30 m width represents the distance that can be passed by almost all vertebrate animals and most of invertebrates.
- although tall trees in the corridor will need to be cut so there is enough distance from the tops of the vegetation to the line, grass, herbs, young trees, and shrub vegetation will be re-established once construction activities are complete, and even some trees will grow back, although they will need to be trimmed periodically.

The effects on birds and other fauna during construction will primarily be from disturbance due to human activities and fragmentation of habitats. As far as disturbance is concerned, it will affect birds and mammals the most. In general, the impact along the proposed transmission line will be low and limited in sense of size. To reduce any impacts on protected and important species, ex-

perts will survey the route before construction and if there are protected species of nesting birds, breeding animals, etc., construction will be scheduled so as to avoid their disturbance.

During operation of the proposed transmission line, tall trees and other tall vegetation will be cut or trimmed in the OHL safety corridor. The impacts will be similar but less than the original clearing, and again birds and fauna would return immediately after the activities are completed.

Birds are potentially the animal group most vulnerable transmission line developments. Potential adverse effects would be due to

1. Collision with wires, especially larger birds such as geese, ducks, swans, and birds of prey, and smaller birds that move in large flocks. Pre-construction bio-survey will be executed to allow sound micro-sitting of towers and access tracks and to identify eventual need of bird diverters on selected OHL sections, in particular Pelagonija and Struga Field.
2. Electrocution. Mortality due to power line electrocution is directly related to the spacing between elements, which makes large birds more vulnerable. Electrocution will not be a problem for this line since the distance between the conductors is large enough, more than 500 cm, even for the biggest known birds of prey in Macedonia.

Other key measures to reduce impacts on flora and fauna will be to use existing roads as much as possible so as not to have to cut vegetation except when necessary; prohibiting any fires; and quick restoration of land disturbed during construction. Workers will be warned not to do disturb or destroy plants and animals, with particular attention to avoiding (i) the collection of medicinal plants, mushrooms and fruits, (ii) collecting snails, (iii) disturbance and hunting of game, birds, etc., (iv) collection of eggs from birds and other.

### ***Waste Management***

Wastes that will be generated during construction will include excess rock and soil excavated at tower foundations, packaging wastes from supplies and equipment, wood waste from tree and shrub cutting, small quantities of waste oil and paint, waste from construction camps and work sites and sanitary wastes from workers. Wastes that will be generated during the maintenance of the proposed transmission line include consumables, spare parts and obsolete equipment. All wastes will be managed according to Macedonian law and EU waste management requirements. All wastes except excess rock and soil will be removed from the construction sites by licensed haulers and managed or disposed properly. Recyclable wastes will be recycled wherever possible.

### ***Electric and Magnetic Fields***

Electromagnetic fields (EMF) will be generated around energized electric wires (conductors). For this single-circuit 400 kV OHL, EMF intensities even right under the wires will be below exposure limits determined by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and EU regulations. The OHL safety corridor will be at least 30 meters wide so there should be no exposure over the limit by any person.

### ***Land Acquisition***

Some land will be permanently acquired, mainly land needed for the construction of the new substation in the area of the village Livoista (Ohrid region) (approximately 3.5 Ha)<sup>2)</sup>, the construction of the towers of the proposed transmission line and access roads, where required access does not exist. The corridor was designed to avoid houses, so no one will lose their house or have to move. A Land Acquisition and Compensation Framework will be developed to guide MEPSO in acquiring land and also for compensating people for any losses they may suffer (damaged fences, accidents with livestock, damaged crops, etc.). This Framework will comprise the principles of the Macedonian law and the requirements of EBRD. After compensation, no one will suffer any economic loss as a result of the project.

### ***Work Force Safety***

MEPSO and its contractors will employ about 270 people for 36 months construction. There are serious hazards working with heavy equipment and also from working with electricity. All work will follow an Occupational Health and Safety (OHS) Plan that will help every worker know the hazards of his or her job and how to avoid any dangers. All workers will receive training also.

### ***Community Safety***

Construction may disturb local people for short periods of time during construction—towers and construction will be visible, there will be additional traffic to and from construction sites, and there could be small amounts of dust and noise. However, each tower should take no more than 7-10 days to construct, after which the construction work will move to the next tower. Therefore, construction of the transmission line will not affect any people for more than one or two weeks, and impacts should be minor.

Construction at the Ohrid substation site will last a longer time, about 24 months. During that time, nearby residents will experience increased automobile and truck traffic and will be able to see construction as it takes place. In addition, there could be some noise during daylight hours from equipment and machinery and possibly some dust during dry periods. All these impacts will be controlled as much as possible, so the impacts on any people should be relatively minor.

During the operational phase, no one should suffer any impacts from the occasional maintenance and repairs. There could be one or a few days of traffic and

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<sup>2)</sup> No additional land is needed for the operations pertaining to SS Bitola 2, as they only involve upgrading of the substation.

noise during major repairs, but it will not last long and will not create major disturbance. There will be some additional traffic at the Ohrid substation, but this will not have a negative effect on anyone.

In Pelagonija, MEPSO will ensure that the OHL design does not pose operational safety risk during irrigation activities that include water cannons.

### ***Cultural Heritage***

No archeological sites and areas of cultural heritage were identified within the 500 meters selected corridor that would constitute a limiting factor in the implementation of the project. All contractual personnel will be trained to stop all activities if any artifacts or other valuable historical or pre-historical items are found. If this happens, construction will not begin again until authorized by the competent public institution for protection of cultural heritage.

### ***Radio and TV Interference***

The transmission line should not interfere with television and radio reception due to the fact that it does not pass in immediate vicinity to residential properties.

## **7 Environmental Management**

Many actions have been described in the ESIA to avoid, reduce, or control potential impacts on people and nature, and the most important ones are summarized in this NTS. All of these actions are included in an Environmental and Social Action Plan (ESAP) that will be part of the legal agreement between MEPSO and EBRD. This ESAP is available for public review at the websites and locations shown at the beginning of this NTS.