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TA-MON-02 FS

400 kV Overhead Line Lastva Grbaljska - Pljevlja

Environmental and Social Impact Assessment Report

-- Non-Technical Summary --

Feasibility Study Draft Final Report



Report Issue RecordProject Title: **400 kV OVERHEAD LINE LASTVA GRBALJSKA - PLJEVLJA**Project Number: **TA-MON-02**Report Title: **ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
NON – TECHNICAL SUMMARY**Issue Number: **DRAFT-01**

| Revision | 1 | 2 |
|--------------------|--|----------|
| Date | 15 December 2011 | |
| Detail | | |
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Abbreviations

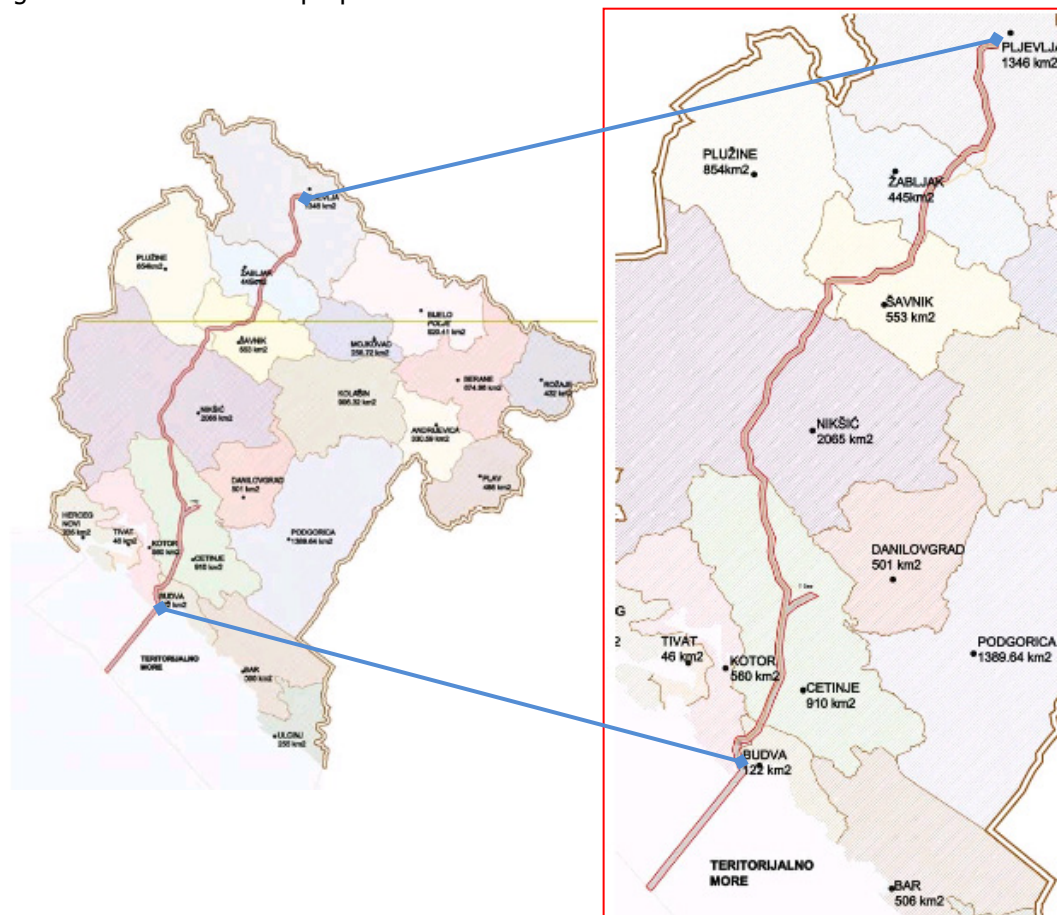
| | |
|--------|--|
| AC | alternating current |
| a.s.l. | above sea level |
| CC | converter station |
| CGES | Montenegrin Transmission System Operator |
| DC | direct current |
| EBRD | European Bank for Reconstruction and Development |
| EIA | Environmental Impact Assessment |
| EMF | Electric and Magnetic Fields |
| ESIA | Environmental and Social Impact Assessment |
| EU HD | European Union Habitat Directive |
| ha | hectare |
| HPP | Hydro Power Plant |
| HVDC | High voltage DC (cable) |
| ICNIRP | International Commission on Non-Ionizing Radiation Protection |
| IPF | Infrastructure Project Facility |
| MN | Montenegro |
| NP | National Park |
| OHL | Over-head (Transmission) Line(s) |
| OHS | Occupational Health and Safety |
| PM10 | particulate matter suspended in air (with an aerodynamic diameter of up to 10 µm) |
| SEE | South Eastern Europe |
| SEP | Stakeholder Engagement Plan |
| SS | substation |
| TPP | Thermal Power Plant |
| T&R | Tourism and Recreation |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| WHS | (UNESCO) World Heritage Site |

Introduction

Montenegrin transmission system operator (CGES) proposes to design, construct, and operate a new 152.5 km long 400 kV overhead transmission line (OHL) from Lastva Grbaljska to Pljevlja via Cevo, to construct and operate a new 400/110 kV substation near Lastva, and to modify the existing substation Pljevlja to accommodate the proposed 400 kV transmission line. This document is a Non-Technical Summary (NTS) of the Environmental and Social Impact Assessment of the project.

The Government of Montenegro, Ministry of Sustainable Development and Tourism, prepared a Detailed Spatial Plan (DSP) and a Strategic Environmental Assessment (SEA) on the one-kilometer wide corridor of the proposed transmission line in July 2011 (see map below).

Figure 1 – Corridor of the proposed transmission line



Based on the DSP and SEA, CGES selected a preliminary route, as shown in Appendix 1 and on Figures 1 and 2. CGES is seeking financing from the European Bank for Reconstruction and Development (EBRD), and an Environmental and Social Impact Assessment (ESIA) to evaluate potential impacts from construction in this corridor was prepared to meet the Bank's requirements. Following the final design of the transmission line and substation, Elaborate on environmental impact assessment will be prepared under Montenegrin law on the substation and the micro-location of towers along the OHL corridor. This is expected to be during 2013. This document will be submitted to the Environmental Protection Agency to be reviewed and approved, as required by Montenegrin law.

CGES 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 CGES's website - www.cges.me and EBRD's website - www.ebrd.com and are also available at following locations:

- Montenegrin Environmental Protection Agency, IV Proleterske 19, 81000 Podgorica.

- Offices of the concerned municipalities: Budva, Kotor, Cetinje, Niksic, Pluzine, Savnik, Zabljak and Pljevlja.
- The central premises of CGES in Podgorica, Bulevar Svetog Petra Cetinjskog 18, 81000 Podgorica.

In March 2012, there will be consultations in Lastva Grbaljska and in other Montenegrin places as set out in the Stakeholder Engagement Plan. CGES is going to refer official invitations to all stakeholders, announcing meetings. Comments may be submitted by mail or in person, by email to: www.contact@cg.es.me. CGES will consider and respond to each comment before making a final decision on the route, and EBRD also will consider the ESIA and comments in its decision making.

1 Project Purpose

The construction of the 400 kV OHL Lastva-Pljevlja will close the 400 kV ring within the Montenegrin network (Lastva – Pljevlja – Ribarevine - Podgorica). This will make the entire network more reliable and stronger. At the same time, this new 400 kV OHL will reduce the impact of neighbouring power systems in case of large disturbances. Together with the new 400 kV OHL, the new substation at Lastva should resolve most of the critical situations that are encountered in the Montenegrin transmission network, particularly in the western part of the coastal area, which currently suffers supply interruptions that impact tourism and economic development.

The proposed transmission line would be an essential reinforcement of the Montenegrin transmission network, necessary for the maximum utilisation of the planned submarine HVDC interconnection between Italy and Montenegro, and would contribute toward more intense electricity trade in the SEE region. Additional benefits from the proposed 400 kV OHL development could be expected. These are summarized below:

- (i) Significantly better, more powerful Montenegrin transmission network.
- (ii) Improved and more reliable power supply, specifically to coastal areas, and the reduction in electrical supply constraints to further economic developments within the coastal region, NP Durmitor and Zabljak.
- (iii) Facilitation of industrial development programs and investments in Montenegro
- (iv) Strengthening of the internal and regional transmission grid as a pre-requisite for facilitation of the regional electricity market.
- (v) Encouraging signal for new – renewable sources of energy: hydro power plants: Moraca River, Komarnica and Berane; small hydro power plants and wind power – various locations
- (vi) Value added to Montenegrin power supply.

2 Project Description

The starting point of the proposed transmission line is a 400/110/35 kV substation at locality Gorovici, situated on the right-hand side of the road Budva – Tivat, in the settlement Lastva Grbaljska. The neighbouring locality Blato will accommodate convertor station that will be the property of CGES's strategic partner TERNA RETE ELETTRICA NAZIONALE S.P.A. From the locality Gorovici, the proposed transmission line continues toward Cetinje and Cevo, passing through the eastern part of NP Lovcen. This section of the proposed project, from Lastva to Cevo includes two parallel transmission lines. One is a double-circuit 400 kV OHL from Lastva to Cevo, composed of two lines – OHL Lastva–Trebinje (BiH) and OHL Lastva–Pljevlja. The other one is a single 400 kV OHL Lastva–Cevo which will be part of the OHL from Lastva towards Podgorica. From Cevo, the proposed transmission line continues to Savnik, passing west of Niksic, close to the lakes Slano and Krupac (HPP Perucica reservoirs) before crossing the canyon of the Komarnica River. The section of the proposed transmission line from Savnik to Pljevlja passes east of Zabljak, through the National Park Durmitor, crossing the canyon of the Tara River using the corridor of the existing line 110 kV Zabljak-Pljevlja. at the bridge on the road R-6 and continues toward Pljevlja. In order to save space the part of the line Zabljak –Pljevlja is supposed to be dismantled and installed at the same towers along with 400 kV line. The ending point of the proposed transmission line is the existing substation in Pljevlja.

Figure 2 – Route of proposed OHL line, including protected areas

The total length of the proposed single circuit 400 kV transmission line from Lastva via Cevo to Pljevlja would be 152.5 km, while of the double circuit 400 kV OHL from Lastva to Cevo would be 36.1 km. Of the total of 188.6 kilometers, 27.5 kilometers will be in existing corridors where transmission lines are already located. The proposed OHL crosses 6.6 km of NP Lovcen and 4 km of NP Durmitor, as well as 19 km of the planned Regional Park Sinjavina (see Figure 2).

The proposed project includes following main components:

- ✓ Towers. The transmission line will be constructed of 583 steel lattice towers (see Figure 3), each with four legs and a single concrete foundation per leg. Depending on their position in the OHL, the types of towers could be suspension towers (total number – 478) used for straight section of the line, or angle towers (total number – 105) used where the line changes direction.
- ✓ Phase conductors and insulators. Two conductors (wires) per phase are planned, spaced at least 500 mm apart.
- ✓ Substations. The project includes construction of a new 400/110 kV substation Lastva Grbaljska at locality near Gorovici and Blato and modification of existing substation Pljevlja so it can accommodate the proposed transmission line.

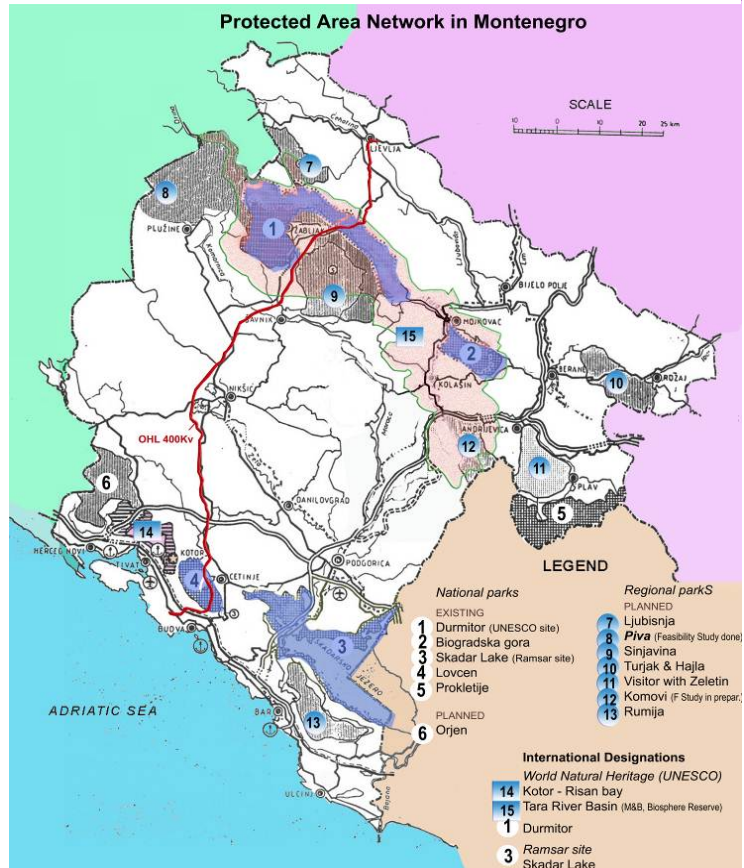
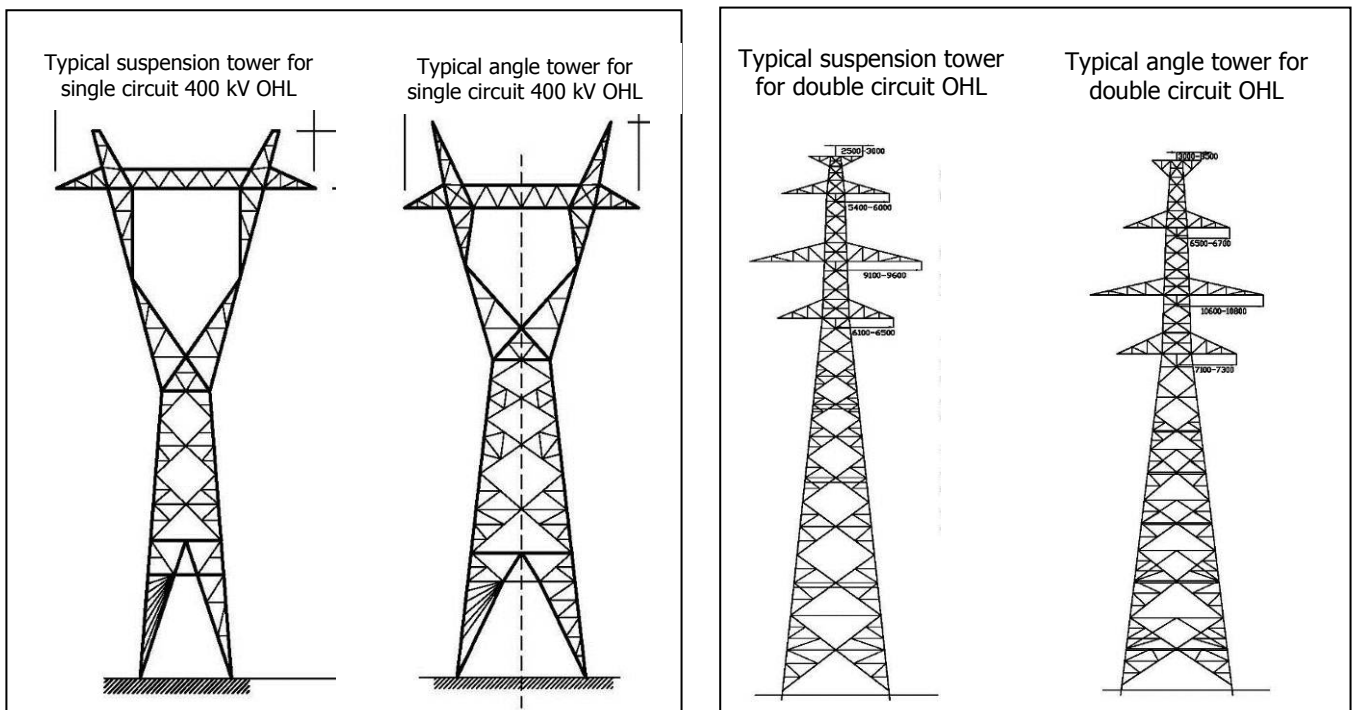


Figure 3 - Tower types for the proposed transmission line



For 27.5 kilometers of existing transmission lines, the conductors (wires) will be removed from the old towers and carried on the same towers as the new 400kV line, and the old towers will be dismantled and removed. These sections are as follows:

- The existing 400 kV OHL Podgorica – Trebinje (BiH) at Cevo, in the part where it will be cut and diverted to the new substation in Lastva. This segment is 6.0 km long.
- The existing 110 kV OHL Zabljak – Pljevlja, in the section from Njegovudja through the NP Durmitor to Kosanica. This segment is 21.5 km long.

3 Level of Detail

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. A Detailed Spatial Plan and associated Strategic Environmental Assessment were completed, and this led to the selection of a corridor one kilometer wide. Now, CGES has selected a preliminary OHL route within the corridor, and this is analyzed in the ESIA and described in this Non-Technical Summary. The final design, including precise location of towers within that corridor and access roads, will be undertaken once the main technical design is developed. An Environmental Impact Assessment will be prepared under Montenegrin law to analyze impacts of the final tower locations before construction permits are issued.

4 Considered Routing Alternatives

Ministry of Sustainable Development and Tourism conducted a detailed process for selecting the optimal one-kilometer-wide OHL corridor in which CGES participated, including comprehensive environmental and technical data collection via desktop study and field survey. This process considered many options, which were tested against environmental and technical criteria, to identify a preferred corridor which was then subject to major public consultation exercise by the Government of Montenegro as part of the Strategic Environmental Assessment. An abbreviated option of a corridor avoiding both national parks was analyzed in the ESIA. This corridor would be over 200km compared to the proposed 152.5km corridor, or about 50km longer. This would raise costs by about 16,000,000 EUR, or about 27 percent more. This alternative was not considered economically feasible. The main purpose of the environmental analysis of feasible alternatives was to identify eventual zones / localities with potential environmental conflicts along the alternative OHL corridors so those areas could be avoided. The selection exercise also incorporated a full set of spatial planning aspects through a process for developing of the Detailed Spatial Plan for the OHL corridor in accordance Montenegrin law, including the DSP-related SEA. The final DSP document was officially announced on 23rd September 2011 (Official Gazette of MN no. 47/2011).

5 Key Environmental and Social Issues

Table 1 - Environmental and socio-economic aspects considered throughout the ESIA

| 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 |
| | Tourism |
| | Cultural heritage |

Settlements

The proposed transmission line passes through the territory of eight Montenegrin municipalities: Budva, Kotor, Cetinje, Niksic, Pluzine, Savnik, Zabljak and Pljevlja. Settlements close to the proposed transmission line as well as their distance to the proposed transmission line are given in the table below.

Table 2 – Settlements nearest the proposed transmission line

| Settlements – by Municipality – close to the proposed OHL | | | | |
|---|-------------------|-------------------------------|--|---|
| Municipality | Settlement | Population 2011 ^{*)} | Relative distance from the OHL to settlement [m] | Distance from the OHL to nearest property in settlement crossed [m] |
| Budva | Gornji Pobori | 30 | 900 | NA |
| | Donji Pobori | | 630 | NA |
| | Lapčici | | >500 | NA |
| Kotor | Lastva Grbaljska | 537 | 1,600 | NA |
| Cetinje | Dubovik | 8 | 350 | NA |
| | Milijevici | 3 | 700 | NA |
| | Vojkovići | 0 | Crossing | 50 |
| | Resna | 11 | 590 | NA |
| | Prediš | 19 | 480 | NA |
| | Lješev Stub | 0 | 530 | NA |
| | Čevo | 63 | >2,000 | NA |
| | Trnjine | 23 | 950 | NA |
| | Ubli | 40 | Crossing | 110 |
| | Bijele Poljane | 16 | 1,000 | NA |
| | Nikšić | Brocanac Niksicki | 76 | Crossing |
| Rudine | | 45 | Crossing | 140 |
| Sjenokosi | | 9 | 2,000 | NA |
| Duga | | 62 | 1,000 | NA |
| Plužine | Gornja Brezna | 48 | >500 | NA |
| Šavnik | Duži | 106 | Crossing | 50 |
| | Komarnica | 56 | 1,100 | NA |
| | Godijelji | 72 | Crossing | 150 |
| Zabljak | Novakovići | 23 | 930 | NA |
| | Njegovudja | 217 | Crossing | 70 |
| | Rasova | 29 | Crossing | 50 |
| Pljevlja | Djurdjevića Tara | 149 | Crossing | 50 |
| | Kosanica | 188 | >500 | NA |
| | Crnobori | 33 | Crossing | 60 |
| | Gornje Selo | 76 | Crossing | 110 |
| | Vrbica | 47 | Crossing | 80 |
| | Zbljevo | 209 | 730 | NA |
| | Komine (Pljevlja) | 576 | Crossing | 50 |

• NA – Not Applicable

^{*)} Source: Census of Population, Households and Dwellings in Montenegro, 2011 – First Results; Statistical Office of Montenegro – MONSTAT, May 2011

It can be concluded that approximately 1,493 people live in settlements (their core areas) within about 500 meters to the central axis of the OHL route. Of these, less than 1,000 people could be expected to be potentially affected by construction impacts, primarily noise and dust and traffic, and none could be expected to be potentially affected by operation of the line and substation; there should be no health effects at any stage of the project. .

Air Quality during Construction

During the construction of the proposed 400 kV transmission line and the dismantling of the selected sections of the existing 110 kV and 400 kV lines, 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
- demolition of existing towers and removal of materials from site
- 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, CGES 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 four years along the 188 km route, while for the substation in Lastva Grbaljska construction will last about three 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. No blasting is expected, although it may be needed in a few places, 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 Lastva Grbaljska substation site, construction activities will take much longer. Again, however, noise should not reach beyond 200-300m 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 400 kV transmission line and removal of materials associated with dismantling of the selected 110 kV and 400 kV lines.

Table 3 – Key construction transport routes

| OHL section | Principal routes | Local access routes |
|---------------|--|---|
| Lastva – Cevo | <ul style="list-style-type: none"> • Budva - Tivat • Budva – Cetinje – Podgorica (R-3) | <ul style="list-style-type: none"> • Lastva – Gorovici – Radanovici • Lastva – Pobori - Lapcici • Cetinje – Cekanje – Kotor (R-1) • Cekanje – Resna – Cevo (R-15) • Cetinje – Lovcen – Krstac (R-13) |
| Cevo - Savnik | <ul style="list-style-type: none"> • Vilusi – Niksic (M-6) • Scepan polje – Niksic – Podgorica (M-18) • Niksic – Savnik (R-5) | <ul style="list-style-type: none"> • Vir – Krstac (R-6) • Cevo – Ubli – Bijele Poljane – Ridjani (R-15) • From cross point with M-18 to Brezna • Petnica – Poscenje – Komarnica • Petnica – Poscenje – Dubrovsko |

| | | |
|-------------------|---|--|
| Savnik - Pljevlja | <ul style="list-style-type: none"> • Savnik – Zabljak – Djurdjevica Tara (R-5) • Djurdjevica Tara – Plevlja (R-6) | <ul style="list-style-type: none"> • From cross point with R-5 to Njegovudja • Kosanica – Vlahovici – Crnobori – Odzak • From cross point with R-4 to Krusevo |
|-------------------|---|--|

The number of truckloads for all construction works is currently estimated to be in the range of 7,000 for the transmission line and between 3,000 and 4,000 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. On the storage areas, there will be about 8 -10 truckloads vehicle trips per day. CGES 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 except at one or two locations, 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 Lastva 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 is more than 500 meters and acoustic nuisance to residents is not expected. The distance of the closest residential properties to the existing substation in Pljevlja is approximately 100 meters. 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. Due to that no acoustic nuisance to residents is expected.

Visual Effects and Landscape

The proposed transmission line will be visible from many of 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.

Most of the proposed transmission line will not be exposed to viewpoints along the coast as its route will be sheltered by the hilly and mountainous coastal landscape. The OHL section north from Budva in the area around village Lapcici would likely be visible from some viewpoints in Budva.

The line will not be widely exposed to distant viewpoints on the coastal mountain landscape – Lovcen Mountain and surrounding hilly terrain -- as it would be sheltered by vegetation and forest. Still, the line could be visible to users of tourist and recreational tracks located in vicinity of the route. To reduce the effect,, the two proposed 400 kV lines in the section through Lovcen NP (a single and double circuit) will follow the corridor of the existing 110 kV OHL Budva – Cetinje; even so, some cumulative visual effect and additional fragmentation of the landscape in this area is expected (see below). The proposed transmission line will not be visible from the road Budva – Cetinje due to hilly and mountainous topography of the area between the road and the line.

The proposed transmission line will be exposed and visible where its route passes through open terrains, such as around Cevo, the karstic landscape in the region around Niksic (i.e. the Niksic field area), and lakes Slano and Krupac. Close to lake Slano, at approximately 1.5 km from its shore, the proposed transmission line will cross two existing OHLs: 110 kV OHL Niksic – Bileca and 220 kV OHL Podgorica – Trebinje (BiH) and will add to the cumulative impact on the lake's landscape seen from viewpoints along the road Niksic – Trebinje.

The proposed transmission line will be visible on the open-type landscape of the mountainous plateaus, in particular at Brezna field and Zabljak plateau with Njegovudja area and crossing section over the Tara River canyon. In the area of Njegovudja, the proposed OHL will meet the existing 110 kV OHL Zabljak – Pljevlja. From this point onward, over the Tara River canyon until Kosanica area, the existing 110 kV line will be dismantled and installed on the new 400 kV OHL; although the towers will be higher and thus more visible over the forest, the use of single towers for both the 400 kV and 110 kV lines will be less than if there were separate lines in this section (see below).

The proposed transmission line will not be visually exposed along the section from north of Kosanica to Plevlja and the road Zabljak – Plavlja, as it will be sheltered by the continental mountainous and forest landscape of eastern slopes of Ljubisnja Mountain.

Protected Areas

Two areas along the proposed transmission line are identified as landscape sensitive areas – NP Durmitor and NP Lovcen. The visual amenity of the National Parks, especially NP Durmitor since it is designated as a World Heritage Site by UNESCO. An analysis of the visual effects on these designated areas is given below.

- *NP Durmitor*

The proposed route passes through the NP Durmitor at one of its narrowest parts – the crossing is only about 4 km long - and will follow the same corridor as the existing 110 kV OHL Zabljak – Pljevlja. Combined towers with a standard height of approximately 40 – 50 meters are planned to accommodate both OHLs (that is, each tower will carry both the existing 110 kV and the proposed 400 kV line). At present, the towers of the existing 110 kV line are 20 - 25 meters high and stand above the trees in this area, which are 12 to 15 meters. The new taller towers will stand even higher over the trees and will be visible from various viewpoints in the area, including five points where the line crosses the the road Zabljak – Pljevlja and the bridge over the Tara River, which is an important landmark and viewpoint for the canyon landscape. Thus, the new line could be considered to cause noticeable change to a highly sensitive and nationally valued landscape. The landscape seen from the bridge toward village Djurdjevica Tara (north and north-east directions) will be most significantly affected due to its openness and the width of the canyon in this particular area, which is approximately two kilometers (see the simulations below). In certain localities, the views of the towers would eventually be constrained by the topography. Such case is the view from the bridge toward north-west where the proposed line will be visually sheltered by the topography. In general, it is important to note there is already a (smaller) transmission line along the entire Park and canyon crossing, so this will be a smaller visual impact than if there were no line already there.

- *NP Lovcen*

In the section over the NP Lovcen, both proposed transmission lines – the single circuit 400 kV and the double circuit 400 kV - will mainly utilize areas close to the existing 110 kV OHL corridor Budva - Cetinje. Therefore, the changes to the landscape would mainly result from the widening of the corridor to accommodate the single and double circuit 400 kV OHL towers, which would require wider sanitary zone (that is, a cleared corridor where vegetation will need to be kept well below the lines to allow sufficient clearance) in comparison to the 40-50m corridor for the existing 110 kV line. The additional corridor for the new transmission lines would be approximately 100 meters wide and would cause some additional fragmentation of the forest habitats and cumulative visual effect on the landscape. In general terms, the landscape in the NP Lovcen could be classified as highly sensitive as it is valued nationally. Still, due to the fact that the proposed transmission line will avoid the central and most valuable region of the NP Lovcen, the visual effect on the landscape could be estimated as

of moderate significance. Having in mind the above and the fact that the views of the towers would be eventually constrained by the mountainous landscape topography and forest, it could be estimated that the appearance and the functional values of the landscape will not be changed significantly.

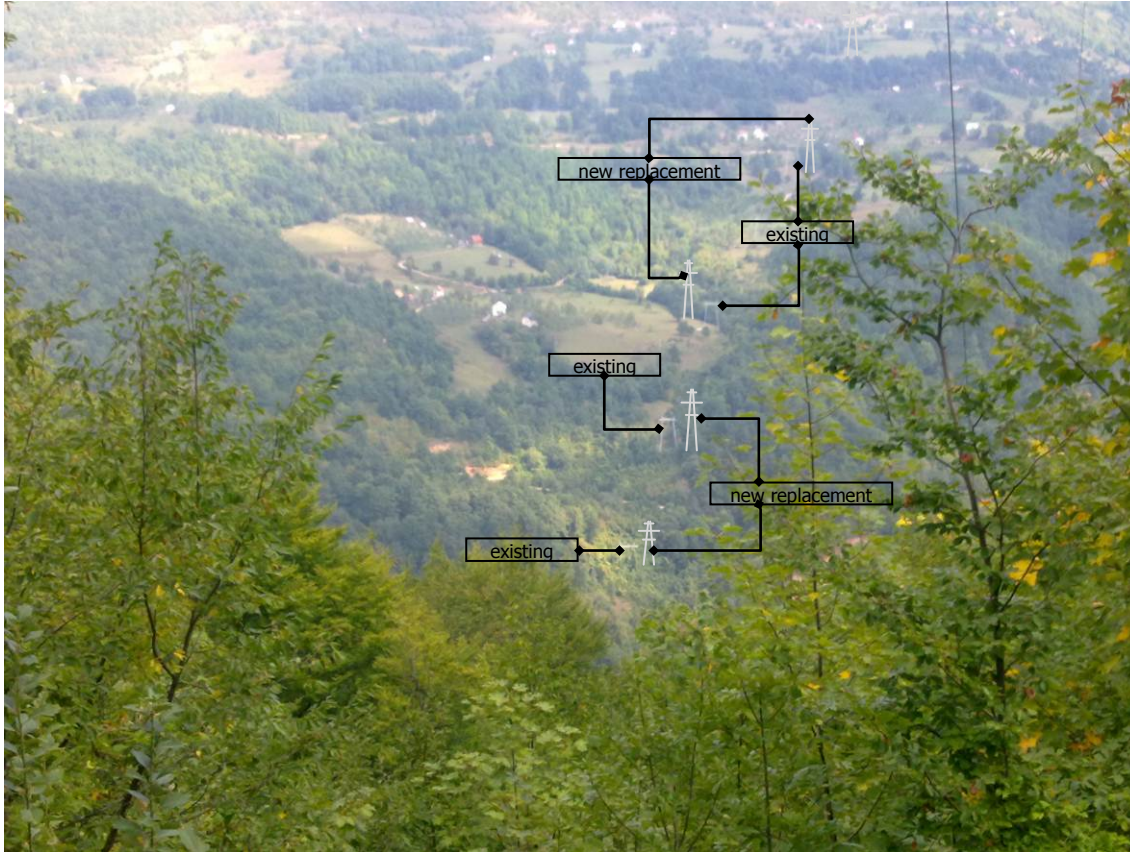
In both protected areas, there will be careful analysis of all tower positions, particularly where towers could give rise to adverse landscape and visual effects, including views from settlements and properties, roads, tourist and recreation areas and public open space. CGES will consult with NP authorities to discuss and agree upon tower heights and positions to ensure the optimum positioning is achieved with regard to landscape and visual effects. In crossing the Tara Canyon in NP Durmitor and Komarnica Canyon, the decisions will need to balance between the numbers of towers and the heights of the towers (taller towers can support a longer span). For example, visual effect would be reduced if greater number of smaller towers with height similar to the existing ones (110 kV OHL Zabljak – Pljevlja) and shorter spans are used at the crossing section near to the bridge over the Tara Canyon and other crossings, but there would be more disturbance on the ground due to more towers. Using the existing tower sites would minimize overall change of the landscape, and this will be considered. Tower positions will be discussed with the NP authorities and reviewed on site prior to construction to confirm the location of the towers, in particular with regard to views from nearby bridge and properties. Finally, the Elaborate on environmental impact assessment and detailed design are going to seek to a balance between the numbers of towers and the heights of towers.

Settlement Lastva Grbaljska

One particular settlement is identified as an area where there will be visual effects on local residents. The substation in Lastva Grbaljska will be a newly introduced structure in the landscape of the location and as such will change the physical appearance of the particular area. In terms to its scenic values, the landscape on the location could be classified as low sensitive, since it is tolerant to change and is not valued as scenically important. However, community members do perceive the project as having a negative impact. The location is not exposed to the regional road from Tivat to Budva due to natural terrain configuration and thus will not cause any negative visual effect for transient viewers. An existing industrial facility, concrete production plant located on the access road to the site, shelters the location when it is observed from the road and additionally decreases its sensitivity. The location will be visible from residential properties on its south-eastern side. The substation itself should not cause significant visual effect to these residents as it is located on opposite side of the location and will be sheltered by a planned convertor station building whose component will be high 24 meters and will be most prominent structure in the new development. (Although this convertor station is not part of the current project, appropriate architectural design of the CS building will ensure it meets sound visual standards. It will be visible from the properties and could cause significant visual effects.) The following general mitigation measures will be used to mitigate the effects of the proposed project on the landscape:

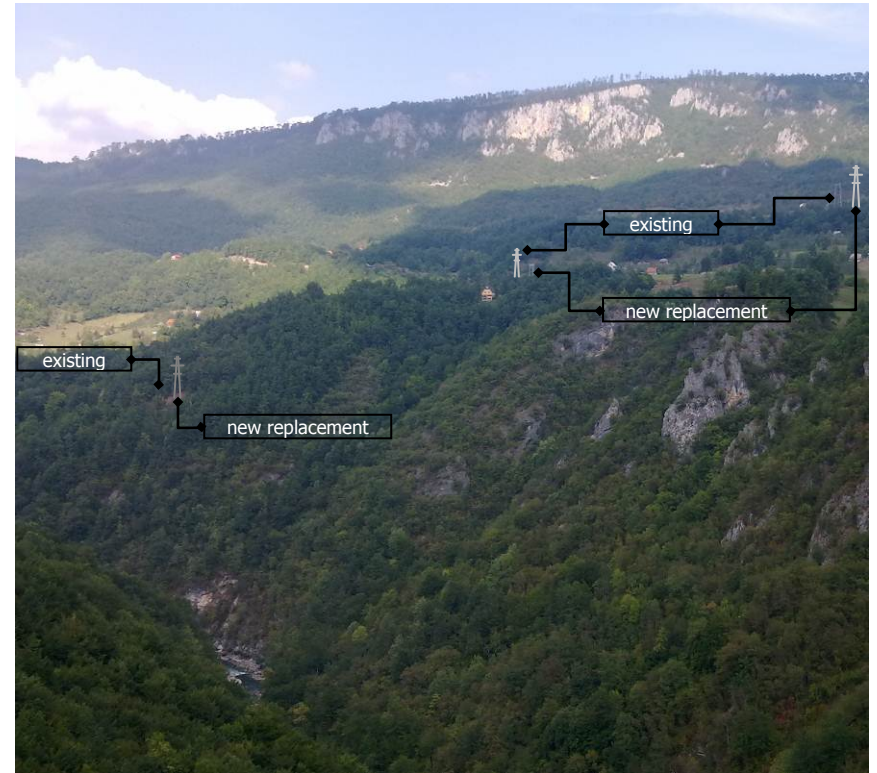
- Landscape plan for the substation and converter station will be prepared based on engineering designs and best practices and discussed with the local community. Implementation of this plan would help these facilities 'fit' as well as possible into the surrounding landscape.
- Planting of indigenous species of native trees and shrubs in areas adjacent to the substation will help integrate it into the wider landscape. This would serve as a visual screen once vegetation is mature.

Figure 4 – View from the road Zabljak – Plevlja toward Tara River canyon (north-east direction)



Note: Tower locations are simulations

Figure 5 – View from the bridge over the Tara River toward north-west direction



Hydrology and Soils

The route of the proposed transmission line will intersect following rivers:

- In the section between Niksic and Savnik:
 - (i) Komarnica River / Canyon on two crossing points:
 - at locality Lucki Do, over Komarnica canyon which is approximately 600 meters wide
 - at locality Razvrsje, over 500 meters wide river valley with shallow river bed
 - (ii) River Grabovica (tributary to Komarnica) and its tributary Gusarev Potok.
 - (iii) River Bukovica (tributary to Komarnica).
- In the section between Savnik and Plevlja:
 - (iv) Tara River / Canyon at Gjurgevica Tara. The proposed transmission line will cross the canyon by approx. seven spans along the existing 110 kV OHL Zabljak – Pljevlja and utilizing the same corridor. Therefore not much additional forest clearing would be needed.

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. Standard protection zone of 60 meters wide will be established. The number of towers of the proposed transmission line through the Tara River canyon will be approximately seven.

The project will use best practice techniques to avoid damage to soils and erosion into rivers. This is especially important in steep terrain at the canyon crossings 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 substations. These will include oil / storm water tank, placed below energy transformers on a concrete foundation with capacity to hold 1.1 times the oil as the largest 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. A total of 210 hectares of forest will be affected. Impact from forest fragmentation was estimated as low due to the following facts:

- the forests in the corridor are already highly fragmented and only small to medium size forest fragments / patches remain,
- 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 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 species, experts will survey the route before construction and if there are protected species of nesting birds or breeding animals, construction will be postponed until the birds and animals are gone. Otherwise, birds and other fauna could be expected to leave the area during construction and return when the disturbance is over (and construction at each tower site will last only 7-10 days). In the National Parks, CGES will consult with Park experts concerning the preconstruction surveys and on scheduling construction activities to minimize effects on protected species.

There will be the loss of *Juncetalia maritimi* habitat (a protected plant listed on the Annex 1 of the EU Habitat Directive) at the location Blato in Lastva Grbaljska. This habitat type occupies an area of approximately 8.29 hectares. Site for the substation itself is positioned away from the habitat area and therefore there will be no direct habitat loss. However, interventions to improve the existing unpaved access road to accommodate construction traffic for substation construction will cause habitat loss of approx. 0.15 ha, or about 2 percent of the total habitat area. This impact is considered to be of minor significance and will be compensated within a future protected site in Montenegro that includes this type of habitat. This process would be carried out in consultation with competent authorities. (More significant habitat loss is expected due to construction of the convertor station in the future. A preliminary estimate shows this would take another 5.13 hectares, which would leave another 3 hectares undisturbed.)

During operation of the proposed transmission line, tall trees and other tall vegetation will be cut or trimmed in the 60-70-meter corridor. In the section from Lastva to Cevo, where two parallel lines are proposed, this belt would be approximately 100 meters wide, including about 6.6 km in NP Lovcen. The impacts will be similar but less than the original clearing, and again birds and fauna would return immediately after the activities were complete.

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, such as starlings, great larks, and many species of buntings. The most likely areas for potential bird loss would be in the river canons, including Tara River canyon at Djurdjevica Tara, Komarnica River canyon at Lucki doli and Komarnica valley at locality Razvrsje, and near Slano lake at Trubjela / Vodnji do. These sections of the proposed OHL would be equipped with bird diverters – in Durmitor, diverters would be used only if Park authorities agreed.
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 Montenegro.

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; minimizing activities in the national parks; 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, steel from dismantled towers, normal trash from construction camps and work sites, sanitary wastes from workers, and concrete from foundations of dismantled towers. All wastes will be managed according to Montenegrin 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. Steel and wood will be recycled wherever possible, as will other recyclable wastes.

Electric and Magnetic Fields

Electromagnetic fields (EMF) will be generated around energized electric wires (conductors). For 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. For the double circuit 400 kV OHL, EMF exposure would be below limits 30 meters from

the lines. The corridor will be at least 60 meters wide so there should be no exposure over the limit by any person.

Land Acquisition

CGES will need to permanently acquire land for project purposes, mainly land needed for the construction of the substation in Lastva Grbaljska (approximately 11.25 Ha), the construction of the towers of the proposed transmission line, and access roads where needed roads do 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 CGES 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 Law of Montenegro and the requirements of EBRD. After compensation, no one will suffer any economic loss as a result of the project.

Work Force Safety

CGES and its contractors will employ about 270 people for 48 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 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 Lastva substation will last a longer time, about 36 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 noise during major repairs, but it will not last long and will not create major disturbance. There will be some additional traffic at the Lastva substation (and the convertor station), but this should not have a negative effect on anyone.

Tourism and Recreation

Tourism activity along the Northern coastal region of Montenegro will benefit from the removal of electrical constraints to further investments in tourism facilities

The routing of the OHL above Budva and through the eastern part of National Park Lovcen was selected to reduce the impact on the protected area and on any tourism and recreational activity in the Park compared to alternative routes. Tourism and recreational impacts within the Durmitor NP will be confined to temporary construction-related nuisance impacts and the visual impact of the transmission line as it crosses the Tara River. The existing 110 kV transmission line is currently visible to tourists from the road near the Tara Canyon and from the bridge across River Tara at Djurdjevica Tara. The new line will be in the same corridor (slightly widened) and on higher towers than the existing 110 kV line, so the visual impact will be somewhat greater than at present. Park authorities will be consulted about placement of towers, scheduling construction, and other aspects of the project inside Durmitor NP.

Cultural Heritage

No archeological sites and areas of cultural heritage were identified within the one-kilometer 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 and substations should not interfere with television and radios.

6 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 that will be part of the legal agreement between CGES and EBRD. This ESAP is available for public review at the websites and locations shown at the beginning of this NTS.