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SECTION 7

ENVIRONMENTAL IMPACT ASSESSMENT

7.0 ENVIRONMENTAL EFFECTS ASSESSMENT

7.1 Principles and Objectives

This Section provides a summary of the method followed to assess environmental effects as a result of activities conducted during construction and operations/maintenance of the **RTB Bor Copper Smelter Modernization/Reconstruction Project (the Project)**, as well as a summary of the residual or "net" environmental effects that are expected to remain following the implementation of (mitigation) measures that will be implemented to reduce, minimize or eliminate the potential environmental effects. A description of the Project is provided in Section 4.0.

This Section also provides:

- An analysis of the effects that could be caused to the physical, natural, socio-economic and cultural environments as a result of Project activities during construction and operations/maintenance;
- An analysis of the environmental effects that could be caused to the environment as a result of accidents and malfunctions during Project construction and operations/maintenance;
- An analysis of the effects of the environment on the project; and
- An analysis of the cumulative effects that could be caused to the environment as a result of the combination of Project activities together with the effects of other projects and planned activities in the study area and surrounding region over the foreseeable future.

The assessment of environmental effects was conducted to be consistent with the following:

- Economic Development Canada (EDC), Environmental Review Directive (the "directive") under Section 10.1 of the Canadian *Export Development Act*,
- Current guidelines and policies of the Canadian Environmental Assessment Agency (CEAA);
- International Financial Corporation (IFC), World Bank Group Environmental, Health, and Safety Guidelines - Base Metal Smelting and Refining;
- International Financial Corporation (IFC), World Bank Group, Environmental, Health and Safety Guidelines for Mining, December 2007;

- International Financial Corporation (IFC), World Bank Group, Environmental, Health, and Safety (EHS) Guidelines – GENERAL EHS GUIDELINES, April 30, 2007;
- Serbian Law on Environmental Impact Assessment (Off Jour of Republic of Serbia, No. 135/04 and 36/09); and
- Accepted best management practices (BMPs) within the industry.

The specific objectives of the environmental effects assessment were to:

- Provide a description of potential linkages and/or interaction(s) between the Project, existing environmental conditions and valued ecosystem components (VECs);
- Provide sufficient information to understand the nature, extent, and significance of potential effects to VECs within the physical and biological environments resulting from activities conducted during the construction, operation, and maintenance of the Project, as well as effects to the socio-economic, and cultural environments that might arise from those physical and biological effects;
- Describe mitigation measures that can be applied to reduce, minimize or eliminate the significance of potential environmental effects;
- Describe all residual effects to VECs that are expected following consid eration of mitigation, and provide an assessment of the significance of each residual effect;
- Identify and assess the cumulative effects of the Project that may be anticipated to occur in combination with other projects or planned activities in the study area;
- Provide an assessment of the effects that could be caused by accidents and malfunctions during construction and/or operations/maintenance of the Project; and
- Provide an assessment of the effects the environment could have on the Project;

In addition to providing an understanding of the potential Project interactions with the environment in the study area, the environmental effects analysis also provides other benefits:

- Provides an understanding of the Project, the environment that could be affected by the Project, potential effects of the Project, mitigation measures/commitments the Proponent has agreed to implement to reduce the significance of environmental effects;
- Assists with the identification of environmental monitoring and follow-up activities to be undertaken during the construction and operations phases of the Project in order to determine the actual effects of the Project compared to the predicted effects (verification of predictions), and to assess the effectiveness of mitigation measures;
- Assists the Project proponent with decision-making and design;
- Demonstrates how RTB Bor is in the process of modernizing the Bor Smelter Complex and in the process is addressing a number of the environmental problems that have occurred as a result of past operations;
- Provides a basis for evaluation of the sustainability of the Project; and
- Provides a summary of commitments that have been made to protect communities and the broader environment.

Context of the Assessment

Project Definition

The current smelter modernization project and planned investment scope relates solely to those areas within the Bor smelter and concentrator complex from receipt of road and rail delivered concentrates up to the production of the primary blister copper product and sulphuric acid and steam by-products for export from the complex. Investment in or changes to the existing anode plant and refinery facilities are not included in the current project.

The project is planned to be built on the site of the existing TIR plant and Cadastral parcels in the industrial complex. All works will be carried out within the industrial complex with no expansion of existing boundaries and no temporary engagement of areas not belonging to the smelter.

The new smelter project will involve closure of the old roaster / reverberatory furnace technologies and installation of new primary smelting by FSF technology. The existing copper smelter is to be modified to treat up to 400,000 tpa of copper concentrates using the Outotec FSF technology. The new production capacity will be equivalent to about 80,000 tpa of fine copper.

The modernization will also incorporate the installation of a new modern gas collection for the FSF and a single operating PSC, with sulphur dioxide in the process gases fixed to sulphuric acid in a new sulphuric acid plant.

The new sulphuric acid plant will treat the gases from the new FSF and modernized PSC gas handling operations. Liquid effluent from the smelter wet gas cleaning scrubbers will be treated in an effluent treatment plant.

Out of Scope Activities

The following items have not been included in the engineering or construction requirements of SNC-Lavalin's Contract and partly form obligations that are to be undertaken separately by RTB Bor:

- Topographical, land and legal survey;
- Geotechnical (Soil and Subsoil water) exploration and geotechnical recommendations;
- Contaminated soil removal and disposal;
- Embankments and soil stabilization;
- Demolition and site clearance;
- Any importation of soil and disposal, soil stabilization, water table or water logging;
- Earthwork including selective filling with suitable granular refill;
- Underpinning and shoring of existing structures in the vicinity of construction;
- Removal or relocation of any underground obstructions;
- Dewatering and snow overburden in winter;
- Pile foundations (if required);
- General civil works (roads, sanitary and storm water drainage, fire protection hydrants; utilities and services to new construction (refer separate list);
- Utilities and Services up to the battery limits of the project:
    - Power Generation and Supply to MCCs
    - Oxygen Plant

- Potable and Demin water supply
- Auxiliary Steam and Fuel for the start up
- Telephone and Internet to Control Rooms
- Building and Offices Complete with Services unless explicitly mentioned in this report
- Handling and Delivery of all additives for the smelter and acid plant processing system e.g. regents; fluxes and quick lime etc.
- Laboratory services, laboratory instruments and equipment for routine analytical work (e.g. dilution tests, SO2 gas strength, boiler feed water testing)
- Third party independent testing of material, process emissions and treated effluent quality assurance

- Access to any utilities necessary for performance of the Project;
- Lay down area adjacent to the New Smelter and Sulphuric Acid Plant;
- Existing buildings and Workshops with all utilities and maintenance for on site assembly for FRP, Steel plate work, structural steel work and fabrication;
- By-product exportation from the battery Limit of the project:
  - High and Medium Pressure Steam from FSF and SAP
  - Handling and pumping of Strong Product Acid from Storage Tank
  - Disposal of treated effluent liquids and gypsum slurry to polishing pond and engineered tailing pond

Although a number of the above noted activities are not part of SNC- Lavalin's – RTB Bor Copper Smelter Modernization and Reconstruction Contract, a number of these activities are directly or indirectly associated to the functioning and operation of the facility and have therefore been acknowledged and accounted for the in environmental assessment (as appropriate). For example, the following initiatives are currently being investigated by RTB Bor:

- Location of a polishing pond to receive the effluent from the smelter's waste water treatment plant;

- Location of a secure hazardous waste cell to be located along with a new engineered tailings pond that will accommodate hazardous waste associated with various RTB Bor production and waste generating processes. This facility will accommodate hazardous wastes produced during the demolition of portions of the existing smelter. Waste that can not be reprocessed would be temporarily and redirected to this new disposal facility;

- The development of a new fully engineered tailings pond to address an number of environmental problems associated with the contaminant leakage, seepage, and migration from the existing and previous tailings pond;

- Restoration and rehabilitation of section of the old and existing tailings ponds to reduce groundwater infiltration and to reduce dust scavenging that contributes to the off-site contamination of agricultural soils.

7.2 Data Sources Used in the Environmental Effects Analysis

Information collected and used to conduct the environmental effects analysis for this Project were obtained from a variety of sources, and included both published and primary (field) data. The following were the major sources of information used:

- Government publications and various reports such as:

- UNEP Assessment of Environmental Monitoring Capacities in Bor, Mission Report, 2002 (see TSD # 1);

- Local Environmental Action Plan – Municipality of Bor, September 2003

- Environmental Assessment Report of RTB Bor Operations – Final Report 2006. This was a World Bank funded EIA undertaken in support of the "Restructuring and Privatization of RTB Bor (Parent Company), RB Bor (RBB), RB Majdanpek (RBM), and Smelter and Refinery (TIR)".

- Published material obtained from non-government sources;

- Materials available from the Serbian Ministry of Environment and Spatial Planning;

- Information obtained from the Serbian Agency for Environmental Protection;

- Published reports, studies, etc. obtained from the study for RTB Bor;

- Unpublished records and technical records supplied by RTB Bor with respect to production rates, employment, emission rates, effluent discharges, and environmental monitoring activities;

- 1:50, 000 and 1:25,000 national topographic maps;
- 1:10,000 satellite photo of the Bor Complex and surrounding area (including topographic information;
- Site photographs derived from historical reports, site visits, and Google Earth panoramic imagery;
- Site visits conducted by University of Belgrade and SNC-Lavalin between May and July 2010.

A compilation of all data sources is provided in the References Section (Section 11) located at the end of the EIA document.

The information obtained from the various data sources was used to prepare a description of environmental baseline conditions (existing environment) within the study area.

7.3 Factors Considered in the Environmental Effects Analysis

The environmental effects analysis was conducted on the basis of potential effects to VECs. VECs are those aspects or elements of the existing environment that are considered valuable and important to protect against the potential effects of the Project.

The Canadian Environmental Assessment Agency defines VECs as:

"*The environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance. The value of an ecosystem component may be determined on the basis of cultural ideals or scientific concern. Valued ecosystem components that have the potential to interact with project components should be included in the assessment of environmental effects.*"

VECs were used to focus the assessment on important elements of the physical, biological, socio-economic and cultural environments that have the potential to be affected by the Project, or conversely might exert an effect on the Project. The VECs assessed in the environmental effects analysis for this Project were defined by the multi-disciplinary project team undertaking the assessment based on:

- Identified regulatory requirements;
- Consultation with regulatory authorities;
- Information derived from published and unpublished date sources;

- Information and comments received during the engagement of local communities;
- Traditional Knowledge surveys conducted within aboriginal communities in the study area – defining features of cultural importance and significance; and,
- Biophysical field surveys.

VECs examined in the environmental effects analysis of the EIA are listed in Table 7.1 below:

Table 7.3.1 Physical Environment VECs

Physical Environment VECs
• Landscape/topography • Bedrock • Soils • Surface Water Quality • Surface Water Quantity • Groundwater Quality • Groundwater Quantity • Air Quality • Climate Change
Natural Environment VECs
• Natural Vegetation (on- site) • Natural Vegetation (off- site) • Wildlife / Wildlife Habitat • Migratory Birds • Fish and Fish Habitat
Socio-Economic/Socio-Cultural Environment VECs
• Occupational Health / Safety • Human Health / Safety • Land Use (Urban, Rural Agricultural, and Forested Areas) • Employment • Visual Aesthetics • Cultural heritage • Historical / Archaeological • Noise • Waste

7.4 Methodology for the Environmental Effects Analysis

The environmental effects analysis conducted for this Project considered how the Project could affect the environment and how the environment may in turn affect the Project.

The environmental effects assessment was conducted in three steps:

- Establishment of the scope of the assessment;
- Analysis of the environmental effects of the Project prior to consideration of mitigation; and
- Analysis of the residual or “net” environmental effects of the Project following the consideration/application of mitigation.

The methodology applied in each of these steps and results of the analysis are provided in the following sections.

Scope of the Assessment

Table 7-2 presents the results of the scoping of the social and environmental effects assessment for the Project. The table shows the extent to which various Project components could affect broad categories of the environment during the site preparation, construction and operations phases of the Project.

The environmental effects analysis conducted for this Project considered the significance of potential environmental effects that are expected to occur based on the application of Best Available Technologies (BAT) in the design and development of the Project, and Best Management Practices being applied during the construction and operations of the facility.

Environmental effects were categorized as follows:

- Physical environment – land (physiography, geology and soils), water (surface and groundwater resources), and air(climate, air quality, and noise);
- Natural (biological) environment – aquatic and terrestrial habitats;
- Socio-economic environment – present and planned land and resource uses and associated economic activities; and
- Cultural environment – archaeological, cultural and heritage features including any site or feature of historical significance that could be affected by a physical aspect of the project.

Table 7.4.1 Potential Project - Environment Interaction Matrix

PROJECT PHASES / COMPONENTS	ENVIRONMENTAL COMPONENTS																														
	PHYSICAL ENVIRONMENT												NATURAL ENVIRONMENT							SOCIO-ECONOMIC/CULTURAL ENVIRONMENT												
	Land				Water					Air			Natural Ecological Systems							Socio-Economic						Cultural			OTHER		
	Landscape/topography	Bedrock	Soils	Other (Hazardous Substances)	Surface Water Quality	Surface Water Quantity	Groundwater Quality	Groundwater Quantity	Other (Hazardous Substances)	Air Quality	Climate Change	Other (Hazardous Substances)	Natural Vegetation (on- site)	Natural Vegetation (off- site)	Wildlife / Wildlife Habitat	Migratory Birds	Fish and Fish Habitat	Environmental Protection Areas	Other	Occupational Health / Safety	Human Health / Safety	Land Use (urban industrial, resident)	Land Use (rural – agric , forest)	Population /Employment	Other	Cultural heritage	Historical / Archaeological	Other	Noise	Waste	Social Impact
SITE PREPARATION PHASE																														X
• Geotechnical Site Investigations	X			X					X	X		X								X	X			X				X	X	
• Geo-environmental Investigations		X	X	X					X	X		X								X	X			X				X	X	
• Site demolition – buildings, structures, equipment	X	X	X	X					X	X		X								X	X			X				X	X	
• Site excavations	X	X	X	X					X	X		X								X	X			X				X	X	
• Waste characterization and waste disposal	X	X	X	X	X	X	X	X	X	X		X								X	X			X				X	X	
• Site foundations		X	X	X					X	X		X								X	X			X				X	X	
• Site grading	X	X	X	X					X	X		X								X	X			X				X	X	
• Installation of site services (water and waste connections)		X	X	X					X	X		X								X	X			X				X	X	
CONSTRUCTION PHASE																														
Mobilization:																														
• Equipment and Supplies	X	X	X	X					X			X												X						
• Set-up, functional Staging Areas, Laydown Areas	X	X	X	X					X			X												X						
Construction:																														X
• Surveying		X	X	X					X			X								X	X			X						
• Borrow materials (sand & granular materials)		X	X	X					X			X								X	X			X				X		
• Grading and Fill Placement		X	X	X					X			X								X	X			X				X		
• Foundation Works		X	X	X					X			X								X	X			X				X		
• Site Drainage		X	X	X	X	X			X			X								X	X			X						
• Erosion and Sediment Control		X	X	X	X	X			X			X								X	X			X						
• Materials and Equipment Delivery				X					X			X												X						
• Construction Site Maintenance					X	X	X	X																X						
• Construction Site Restoration/Rehabilitation		X	X		X	X	X	X																X						
• Accidents & Malfunctions																														
• Vehicular/equipment collisions				X	X	X	X	X	X	X		X								X										

PROJECT PHASES / COMPONENTS	ENVIRONMENTAL COMPONENTS																														
	PHYSICAL ENVIRONMENT												NATURAL ENVIRONMENT							SOCIO-ECONOMIC/CULTURAL ENVIRONMENT									OTHER		
	Land				Water					Air			Natural Ecological Systems							Socio-Economic						Cultural					
	Landscape/topography	Bedrock	Soils	Other (Hazardous Substances)	Surface Water Quality	Surface Water Quantity	Groundwater Quality	Groundwater Quantity	Other (Hazardous Substances)	Air Quality	Climate Change	Other (Hazardous Substances)	Natural Vegetation (on- site)	Natural Vegetation (off- site)	Wildlife / Wildlife Habitat	Migratory Birds	Fish and Fish Habitat	Environmental Protection Areas	Other	Occupational Health / Safety	Human Health / Safety	Land Use (urban industrial, resident)	Land Use (rural – agric , forest)	Population /Employment	Other	Cultural heritage	Historical / Archaeological	Other	Noise	Waste	Social Impact
• Material/Product Spills				X	X	X	X	X	X	X		X								X									X	X
• Fires /explosions				X					X	X		X								X								X		
Site Commissioning																														
• Acid Plant start-up				X		X			X	X		X		X								X	X					X		
• Smelter start-up				X		X			X	X		X		X								X	X					X		
OPERATIONS PHASE											X																			
• Normal Operations																														X
• Materials Handling and Blending System										X										X	X			X				X		
• Concentrate Drying										X										X	X			X				X		
• Flash Smelting Furnace (FSF)										X	X			X	X	X				X	X	X	X	X				X		
• Peirce-Smith Converter (PSC)										X	X									X	X	X	X	X				X		
• Metallurgical Off-Gas Handling										X	X			X	X	X				X	X	X	X	X				X		
• Acid Plant				X					X	X		X		X	X	X				X	X	X	X	X				X		
• Effluent Treatment				X					X	X		X					X			X	X			X				X		
• Planned Shutdown (maintenance)					X	X				X														X						
• Environmental Shutdown (compliance conditions)					X	X				X				X										X						
• Accidents and Malfunctions																														
• Vehicular/equipment collisions				X					X			X								X				X						
• Material/Product Spills				X	X	X	X	X	X			X								X	X			X						
• Fires /explosions				X					X	X		X								X	X			X						
• Environmental Monitoring					X	X	X	X		X				X						X	X			X						
Decommissioning/Demobilization																														
• Borrow Sources/Quarries		X	X							X										X	X	X								
• Staging and Disposal Areas					X	X	X	X		X										X	X	X								
• Demolition and Restoration Works					X	X	X	X		X			X							X	X	X								

7.4.1 Environmental Effects and Mitigation Measures

The effect of undertaking the Project activities identified in Section 7.4.1 and listed in Table 7.2 was undertaken as a multidisciplinary analysis by specialists from the University of Belgrade and SNC-Lavalin with knowledge and experience in their respective disciplines.

The effects analysis was conducted using the categories of VECs described in Section 7.4.1 and those applied in determining the scope of the assessment and the environmental interactions that are identified on Table 7.2 under the following categories:

- Physical environment;
- Natural environment; and
- Socio-economic/socio-cultural environments.

The physical environment analysis of the proposed Smelter modernization and reconstruction effort focuses on:

- The effects of the site preparation activities required to undertake geotechnical and geo-environmental investigations required for detailed site design;
- Environmental effects related to the demolition of existing structures and equipment, site excavation and grading work, site foundations and service connections;
- Construction activities related to site mobilization, staging , and establishment of laydown areas;
- Environmental effects associated with the construction of the new smelter and acid plant facilities;
- The effects of construction and operation activities on air quality (noise and dust);
- The environmental effects associated plant maintenance and monitoring activities; and
- Effects pertinent to the decommissioning and disposal of materials required to facilitate construction of the project.

The natural environmental assessment focuses on indirect environmental impacts on off-site areas since the proposed site development area is devoid of natural environment features associated with the proposed development site. The natural environmental effects focuses on:

- Indirect or off-site impacts caused to the terrestrial environment by the air emissions from the modernized and reconstructed smelter and acid plant, relative to other operations in the Bor Complex;
- Environmental effects of waste water effluents on the local downstream water resources and aquatic habitats.

The socio-economic environment assessment has addressed occupational health and safety matters related to the construction of the new smelter and acid plant, general human health issues related to the operation of the proposed facility, effects on local land and resource use, and socio-economic benefits associated with the employment base.

The cultural environment analysis focused on the potential direct or indirect effects on the local cultural or heritage resources.

The environmental effects analysis conducted for this Project considered the significance of potential environmental effects that are expected to occur both before and after mitigation measures have been implemented.

Mitigation Measures

Mitigation measures are Project design elements, controls and preventative measures that are implemented to eliminate or reduce the significance of a potential effect to a valued ecosystem component.

Project-specific Best Management Practices will be further developed during detailed design and incorporated into the Construction Environmental Management Plan (CSEMP). A preliminary draft of the CSEMP is provided in Section 8.

General environmental protection guidelines are included in the CSEMP.

7.4.2 Environmental Effects Analysis - Significance Determination

The environmental effects analysis and resulting determination of the significance of environmental effects to VECs, was conducted in three steps:

- Identification of potential interaction between project activities and the environment;

- Assessment of the potential effects of Project activities on the environment, prior to the consideration of mitigation measures; and
- Assessment of the residual changes to the environment caused by Project activities, after the consideration of mitigation measures, to demonstrate the significance of potential changes to the environment, and to demonstrate the expected effectiveness of the mitigation measures considered. Effects were assessed considering Project activities undertaken during both the construction and operations phases of the Project.

The results of these analyses are contained in a series of matrixes. Further explanation of the methodology conducted in each step of the effects assessment is provided in the following paragraphs.

Analysis of Environmental Effects

The assessment of effects to VECs was considered based on the following:

- ***Potential environmental effect –*** *a description of the potential change to the environment that could result from the Project activity being assessed.*
- ***Project Phase –*** *a description of the Project phase during which the Project activity being assessed, is to be conducted (i.e., site preparation-demolition phase, construction phase or operations/maintenance phase).*

The effects analysis criteria were used to demonstrate the extent or severity of the potential change to the environment resulting from the Project activity being assessed based on BAT design principles, and construction and operational procedures based on the application of environmentally appropriate BMPs. The effects analysis criteria provide a basis upon which to consider significance of the effect. A description of the levels used to assess the severity of potential effects in relation to each criteria, is provided in Table 7-3. The effects analysis criteria applied in the effects assessment of the Project (prior o consideration of mitigation), included:

- ***Ecological Context –*** *the extent to which a Project activity is expected to affect the biological or physical environment.*
- ***Geographic Extent –*** *the distance which the effect is expected to extend from the footprint of the Project activity and/or the areal extent of the effect.*
- ***Magnitude*** *– the expected strength of the adversity of the effect.*

- ***Duration –*** *the expected temporal nature of the effect (i.e., how long it will last over time).*
- ***Frequency*** *– how often the effect expected to occur over the life of the Project (i.e. is it a one-time event, or does the event repeat.)*
- ***Permanence –*** *the extent to which the effect is expected to permanently change the environment, or whether the environmental change that occurred can be reversed.*
- ***Likelihood*** *– the effects assessment conducted for the Project included an indication of the certainty of the effect occurring.*

Table 7.4.2 Effect Analysis Criteria Definitions

Criterion	Low	Moderate	High
Magnitude (of the effect)	• Effect is evident only at or nominally above baseline conditions.	• Effect exceeds baseline conditions however is less than regulatory criteria or published guideline values.	• Effect exceeds regulatory criteria or published guideline values.
Geographic Extent (of the effect)	• Effect is limited to the project site/footprint.	• Effect extends into areas beyond the project site/footprint boundary.	• Effect is trans-boundary in nature.
Duration (of the effect)	• Effect is evident only during the construction phase of the project.	• Effect is evident during construction and/or the operational phase of the project.	• Effects will be evident beyond the operational life of the project.
Frequency (of conditions causing the effect)	• Conditions or phenomena causing the effect occur infrequently (i.e. < once per year).	• Conditions or phenomena causing the effect occur at regular intervals although infrequent intervals (i.e. < once per month).	• Conditions or phenomena causing the effect occur at regular and frequent intervals (i.e. > once per month).
Permanence (of effect)	• Effect is readily reversible over a short period of time (i.e. one growing season).	• Effect is not readily reversible during the life of the project.	• Effect is permanent.
Ecological Context (of effect)	• Evidence of environmental effects by human activities. Effect results in minimal disruption of ecological functions and	• Relatively pristine area. Effect results in some disruption of non-critical ecological functions and relationship in the effected area.	• Pristine area / not affected by human activity. Effect results in disruption of critical

Criterion	Low	Moderate	High
	relationships in the effected area.		ecological functions and relationship in the effected area.
Likelihood	• Not likely to occur; chance of effect occurring is unlikely	• Effect could occur, but not equally throughout the Project footprint	• Effect will occur

Significance of Environmental Effects

The level of severity of each effect, for each of the criteria, was categorized into the three levels described in Table 7-3 above.

Considering the combined levels of severity of a Project activity on a VEC as measured using the criteria described above, a "*severity of effect*" rating was applied for each of the effects considered. This rating represents an estimate of the overall expected severity of the effect that a project activity could have on the environment, with the application of appropriate mitigation measures.

For this assessment, severity levels were categorized into three levels: significant, not significant and uncertain and is based on the evaluation of residual effects:

Significant The severity of the residual effect is expected to affect the functioning of the local or regional ecosystem or local community and/or any aspect of an identified VEC.

Not Significant The severity of the residual effect is not expected to affect the functioning of the local or regional ecosystem or local community and/or any aspect of an identified VEC.

Uncertain The severity of the residual effect cannot be determined for a given reason (i.e., insufficient data; insufficient knowledge of the Project activity, etc.).

A summary of the analysis of environmental effects with consideration of mitigation, and a summary the severity ratings, is provided by Category in the sections that follow.

The requirement for monitoring or follow-up was identified as a component of the environmental effects analysis. Details of monitoring plans are provided in Section 10.0.

7.5 Environmental Effects on the Physical Environment

The analysis of environmental effects on the physical environment is summarized in Table 7.5-1 (located at the end of section 7).

7.5.1 Landscape and Topography

The environmental effect on the local landscape and topography rated as low and the overall significance is low. The site is located downslope from adjacent areas of the Town of Bor, approximately 25 m below surrounding urban areas. The area is a completely disturbed industrial landscape. Existing urban and industrial buildings partially block views of the smelter area. Area may be visible from some taller residential buildings or other viewpoints, but these tend to be distance views. The smelter fits in to the existing industrial landscape and does substantively alter the general view that has existed for more than 50 years. In redeveloping the smelter, efforts should be made to have the new facilities generally blend in with the surrounding landscape. From the point of view of visual aesthetics, the improved air emissions systems will reduce the smog like setting that was a common occurrence with the previous smelter operations.

7.5.2 Environmental Effects on Bedrock

The effects of construction activities on surface and subsurface soils and bedrock will be limited to the immediate area of the footprint of the construction works required for the new smelter and acid plant and the associated effluent treatment plant.

The site is located on plateau where underlying bedrock is located at a depth of 2-8 m below existing grade. Bedrock froms the competent foundation for the existing and proposed facilities of the RTB Bor Complex. Geotechnical investigations indicate bedrock predominately consists of andesite. Potential for contaminant leaching into underlying bedrock, based on historical milling operations on site and surrounding area, is low due to dry hydrogeological conditions. Results of preliminary geo-environmental investigations indicate heavy metal contamination in upper 3 meters of surficial soils overlying the bedrock. No environmental effect on local bedrock through construction or operation of the proposed plant.

The proposed facility design will minimize extent of foundation excavations and disturbance to bedrock. Potential contamination of underlying bedrock considered low. Foundations for the proposed facilities will involve a mixture of pile and slab foundations depending upon the structural requirements. No special mitigation measures required.

7.5.3 Environmental Effects on Soils

Extent of contaminated surficial soils will be defined through a final geo-environmental report that is to be issued in mid-August. It is anticipated that a significant portion of these soils may be reprocessed with ore due to the high content of Cu.

Preliminary geo-environmental investigations indicate bedrock underlies approximately 2-8 m of fill (including some slag). Proposed facility design minimizes extent of foundation excavations and disturbance to bedrock. Foundations for the proposed facilities will involve a mixture of pile and slab foundations depending upon the structural requirements. No special mitigation measures required.

7.5.4 Environmental Effects on Surface Water

Local site area drains to the Bor Pit, with no alteration of the existing surface drainage system. The surficial soils are reasonably permeable and most precipitation appears to infiltrate and there is no significant site runoff.

No special mitigation required for construction or operation of the proposed smelter, acid plant and associated waste water treatment plant. Any site drainage improvements designed to address broader surface drainage effects of the Bor Complex are outside of the scope of the EIA and are addressed through other environmental improvement initiatives.

7.5.5 Environmental Effects on Groundwater

There is no significant shallow or perched groundwater system on-site in area of smelter or acid plant. Groundwater conditions do not represent a significant constraint to construction of the smelter, acid plant, or effluent treatment facilities. Construction of the proposed facilities will not affect the broader groundwater system that has been impacted by the larger scale historical operations of the RTB Bor - Bor Complex. For details on groundwater see TSD # 8, Geo-environmental Investigations Report.

7.5.6 Environmental Effects on Built Environment (Physical Plant)

The modernization and reconstruction of the existing smelter site environment requires the demolition of portions of the existing smelter, acid plant and associated infrastructure facilities to accommodate the proposed improvements. During construction some infrastructure will require modification or relocation which will generate construction wastes requiring disposal. The type of demolition waste may require special handling with respect to noise, dust, and health and safety procedures. (See Noise, Dust, and Air Quality Sections).

The Construction Site Environmental Management Plan in Section 8 identifies the estimated amount and type of wastes requiring disposal as a result of the required demolition works. Preliminary geo-environmental studies (detailed in TSD # 8) have also identified the extent of waste contamination associated with surficial soils. The final Geo-environmental Report will identify the extent of on-site contamination and provide recommendations on how it should be handled. RTB Bor and its' Demolition and Construction Contractors are to maintain spill control and clean-up equipment at

designated construction site area. Demolition and Construction Staging Plans must be developed to allow for smelter operations to continue smoothly during the demolition and construction phases. This plan needs to address scheduling issues, and occupational health and safety matters.

7.5.7 Environmental Effects on Air Quality

Smelter and Acid Plant Emissions

Air quality of the local area has been significantly affected through the history of smelting operations of RTB Bor over the last century. Past history, and the associated problems has initiated Local Environmental Action Plans designed to improve environmental conditions. The modernization of the existing smelter and acid plant will contribute significantly in further improving the ambient air quality of the Bor area.

Smelter modernization and reconstruction is based on the incorporation of Best Available Technologies (BAT) that will result in the capture and control of more than 95% of the SO2 emission sources. The Local Action Plan detailed in TSD # 10 has established protocols for controlling and managing the air emissions from the smelter, acid(s), and power/heating plant located at the Bor Complex based on the current efficiency of pollution controls. The existing Local Action Plan serves as the key component of an overall environmental management system for the Complex

RTB Bor's Local Action Plan (TSD # 10) provides a strategy for managing the existing plant operations through the system of local (AQ) monitoring stations that have been established through the cooperative efforts of RTB Bor, the Town of Bor, and the Serbian Agency for Environmental Protection. This system will be used to manage the existing smelter operations, while the modernization process goes on. TSD # 9, the Air Quality Dispersion Model Assessment provides an assessment of the proposed new smelter and sulphuric acid plant compared against the historical and existing emissions levels. This study indicates the new smelter and acid plant will significantly reduce the emission of SO_2 to the atmosphere.

A key conclusion of the dispersion modeling is that:

- The application of BAT Technologies will significantly reduce air emissions for the smelter and acid plant;
- The local setting – considering the topographic conditions, the local climatological and meteorological characteristics, and nearby critical receptors will continue to present significant limitations to the operations of the modernized smelter from time to time;

- The close proximity of the smelter to a number of sensitive receptors (residential properties, public meeting points, schools, etc) requires the development of a highly managed air quality modeling and management control system that is integrated with smelter processes and scheduling;

- During detailed design further air quality modeling needs to be undertaken to integrate information from the air quality monitoring stations that have been established. Further modeling will allow for refinement of the design and emission controls. During site operations the existing air quality monitoring station system (described in TSD # 6) needs to be integrated with the air dispersion modeling (as described in TSD # 9) to develop an more comprehensive air quality management system.

- Prior to commissioning the new smelter, the existing air quality monitoring system should add 1 or more additional monitoring stations to address extended SO2 effects on villages such as Borska Slatina and the surrounding agricultural areas. This is important to document potential trans-boundary effects given the proximity of the Bulgarian border.

Noise and Dust – Nuisance and Worker Health Related Effects

Site demolition work and construction activities will be the principal source of noise and dust. During construction noise and vibration impacts may result from foundation piling operations. The extent of piling requirements dependent upon results of geotechnical investigations that are currently in progress. During site operations noise is primarily associated with exhaust fans, vents, and blowers; and the movement of equipment or materials. Dust control during operations is associated with the movement or conveyance of materials.

Best management practices will be employed to minimize the impacts of construction noise and dust. This includes the use respirators and other dust control measures where site conditions or activities require. The smelter and acid plant includes dust and noise controls as part of the facility design. For example, all noise generating equipment producing noise in excess of 85 dBA at 1 m from the source will be equipped with some from of noise control or shield anddust control wetting and the use of surfactants (calcium/magnesium chloride or suitable substitutes).

As part of the smelter modernization process, access roads in the area of the smelter and acid plant should be hard surfaced to control dust. Side panels on the concentrate storage shed should be repaired to minimize this area as a potential source of dust through the modernization upgrade process. Construction activities resulting in significant noise or vibration (e.g., pile driving) will be limited to the period 7am to 7 pm

due to residential uses located within 500m of the construction area.

7.5.8 Environmental Effects of Hazardous Substances

Potential releases of hazardous substances (e.g. fuels, chemicals, etc) into the physical environment may occur due to demolition activities, construction, operations, or maintenance activities or unplanned spills.

The Acid plant and smelter modernization and reconstruction design provides for spill control from key storage tanks of vessels during operations (e.g., bermed areas to contain 110% of largest tank or vessel). Spill prevention BMPs such as designated re-fuelling pads for construction and maintenance equipment, emergency spill kits, spill response plans will be employed.

7.6 Environmental Effects on the Natural Environment

The analysis of environmental effects on the physical environment is summarized in Table 7.6-1(located at the end of section 7). .

7.6.1 Natural Vegetation (on- site)

There is no vegetation (ground cover, shrubs, or trees, etc.) in the immediate area of the proposed new smelter, acid plant, or effluent treatment facility. There will, therefore, be no direct impact on terrestrial environment.

Although no mitigation required for the smelter, RTB Bor will promote some re-vegetation of other areas within Bor Complex as part of their LEAP. For example, the older waste piles, and older tailings areas are designated to be rehabilitated and re-vegetated. This will help to mitigate or off-set some of the historical impacts that site operations have had on local site vegetation.

7.6.2 Natural Vegetation (off- site)

Impacts to off-site vegetation or habitats has occurred as result of the effects of air emissions from stacks and fugitive emissions affecting the ambient air quality of the air that in turn has affected sensitive vegetation in some areas surrounding Bor.

The historical emission rates resulted in more than 50% of the $S0_2$ being released to the local atmosphere around the Bor Complex. The historical extent of these environmental effects are generally documented in TSD #1 and #2. The modernization and reconstruction of the smelter and the associated reduction in SO_2 emissions will reduce the emission rates of SO_2 to the point where there should be no significant effects on off-site vegetation. Some fugitive emissions from smelter may cause some minor impact to local vegetation within 1,000-1,500m of the facility.

The improvement in overall ambient air quality will have a positive effect on off-site vegetation, and this will contribute to a general increase in biodiversity of the environment with 1-2 km of the area affected by elevated ground level concentrations of $S0_2$ as shown by the dispersion modeling of Scenario 4 in TSD # 8.

The Local Action Plan (See TSD # 11) developed to control the plant operations when emission levels exceed the locally approved limits according the Serbian Ministry of Environment. SO_2 levels are based on designed values (PV) of 500 mg/Nm^3, limiting emission values (GVE) of 1200 mg/Nm^3 for the existing operations, and 500 mg/Nm^3 based on BAT or the modernized and reconstructed smelter. Details of protocols are provided in TSD # 11. Note: The RTB LEAP document calls for the re-vegetation of portions of the old and existing tailings ponds as part of their environmental improvements. These actions assist in improving the natural environment within the Bor Complex and are undertaken independent of the smelter modernization initiative.

7.6. 3 Wildlife / Wildlife Habitat

Bird Populations

Smelter site and acid plant does not have any definable vegetative habitat favouring the local bird habitats on site, but conditions in adjacent town areas are suitable to a variety of bird species. Improvement in air quality may lead to some modification and increase in the biodiversity of local vegetative habitats. This may have a positive effect on local bird habitat and bird populations over time. Other site rehabilitation efforts under taken in accordance with the RTB Bor Local Action Plan (TSD #11) or the Environmental Protection Plan (TSD # 12) may improve the potential on-site bird habitat.

Small Mammals

The site conditions in the immediate area of the smelter and acid plant(s) do not offer any habitat suitable for small mammals. Some mammals typical adaptable to the urban environment setting would be found in the surrounding Town of Bor and natural areas surrounding the Bor Complex. Improvements in general air quality may improve the biodiversity of the natural environment so some degree within 1-2 km of the Bor complex over time. Subsequent re-vegetation of the tailings and waste piles through other LEAP initiatives undertaken independent of this Project may improve the on-site habitat for small mammals in the future.

Large Mammals (wolves, lynx, bear)

The proposed smelter and acid plant will have no effect on larger mammal populations since their habitats are not found in the immediate of the RTB Bor Complex.

7.6.3 Fish and Fish Habitat

Historically the operations of RTB Bor have served to significantly degrade the water quality and fisheries habitat of the Krivelj and Borska River systems. Downstream of their mine site(s) due to untreated mine or contaminated base flow from groundwater contaminant migration. These issues are matters that are being addressed through the RTB Bor and Bor LEAP initiatives. The inclusion of the waste water treatment facility for the smelter and acid plant will constructively assist in minimizing the contamination of both local ground and surface waters that, in turn, affects fish habitat and the associated fisheries resources.

7.7 Socio-economic/Socio-cultural Environment

The analysis of environmental effects on the physical environment is summarized in Table 7.7-1 (located at the end of section 7).

7.7.1 Occupational Health / Safety

There is a general occupational health and safety concern for various activities, that vary according to project phase as indicated below:

- Site demolition and site preparation phase, OHS issues associated with demolition activities and the contaminants associated with the demolition debris and the associated dust levels;
- During construction phase the OHS issues are associated with construction materials, construction wastes, and hazardous materials required to support construction;
- Operational OHS issues relate to safe plant operations.

For the demolition phase, the amount of potential waste has been identified and a plan identified as to where and how the material should be disposed of. Details on a demolition staging plan and occupational health and safety issues need to be specified.

The preliminary geo-environmental study has identified the nature of heavy metal contamination surficial soils. Final study will define locational hotspots and recommend general handling procedures. Some contaminated material is to be reprocessed along with ore and slag streams. Other material is to be disposed of in hazardous waste cell to be developed by RTB Bor.

RTB Bor will provide workers with appropriate safety training appropriate to demolition, construction, and operational/maintenance procedures. Detailed Health and Safety Plan(s) should be prepared appropriate for each of the Site Construction and Site Preparation, Construction, and Operations Phases.

7.7.2 Human Health / Safety

Potential health and safety effects for workers associated with exposure to contaminants during all phases of site development and operations. Community Health risks associated with long-term air quality issues associated with $S0_2$ in ambient air through smelter operations during the modernization and subsequent future operations.

Material Data Safety Sheets should be used to advise workers of hazardous materials. Workers to be supplied with appropriate environmental and HSE training and supplied with appropriate protective equipment for tasks to be undertaken. The modernization of the smelter using BAT and BMPs reduces the $S0_2$ emissions to the environment and reduces risk to community health. Detailed Health and Safety Plan(s) should be prepared appropriate for each of the Site Construction and Site Preparation, Construction, and Operations Phases.

7.7.3 Land and Resource Use

Urban Focused Land Uses

The construction and operation of the modernized smelter and acid plant could have an effect on land uses within the immediate proximity of the Bor Complex in terms of potential redevelopment considerations and long term land use plans. There are some residential units that are located within 400-500m of the emission stacks and are at a higher risk of exposure to SO_2 emissions than other areas of the Bor community. The modernized smelter and acid plant may foster the development of additional suppliers and secondary industries within Bor. Improved economic conditions resulting from the improvements at RTB Bor should promote additional growth and development within the community over the next 20 years.

The Town of Bor can constructively plan for continued development within the Town of Bor given the restored viability of RTB Bor. RTB Bor and the Town of Bor through the implementation of the Local Environmental Action Plan can further reduce the environmental effects associated with the historical operations of RTB Bor

Rural Land Uses

The modernization of the smelter within the Bor Complex will not directly affect the existing areas associated with agricultural, rural residential, forestry, and open space uses. Improvement in air quality resulting from the new smelter will reduce the historical effects on certain land uses (e.g., crop damage, contamination of agricultural soils, forest productivity, etc.). This represents a positive benefit to the community over the long-term.

7.7.4 Local Population - Economy – Employment

At present there are approximately 7,000 unemployed people on the labor market in Bor and surrounding area and more than the half of them are professionals. Within that group there is a contingent of unemployed young people of age up to 30 who may be readily hired to provide the necessary workforce rejuvenation of RTB Bor. This contingent of young unemployed people also includes about 200 young mining, metallurgical, chemical technology, metal and other professional profiles.

Earlier this year it was estimated that there were approximately 4648 workers of the relatively favorable qualification structure (3744 or 80.55% professionals and 904 or 19.45% unqualified workers) employed in the RTB Bor company. The age structure of the current workforce has significant limitations since many workers are over the age of 50 and nearing retirement. There are approximately 900 employees who are going to be eligible for retirement in the next 5 years as identified below:

Year of Retirement Eligibility	Number of Workers
2010	142
2011	151
2012	140
2013	189
2014	203
2015	84

Based on the current make-up of the present workforce it is necessary for RTB Bor to encourage the employment of new, younger and better qualified people in place of the aging workforce. This would serve rejuvenate and raising eligibility of the workforce in RTB Bor in the future. Such a strategy will be provided by the Smelter modernization and reconstruction project.

The modernization of the smelter within the Bor Complex will require specific employment requirements that can be filled by RTB Bor personnel, new job hires, and specialized trades during the Site Demolition and Site Preparation, Construction Phase. RTB Bor will re-train staff to take on the operations/maintenance of the new smelter.

Increased employment in RTB Bor will contribute positively to local population growth within the Bor District over time. Revitalization of RTB Bor will have a significant positive impact on the community population given that RTB Bor has served as the principal source of local employment for 3 or 4 generations.

Population Dynamics

Population in the municipality of Bor offers a significant potential for the future development. The current age structure of the Bor town tends to favour the future development potential of this area.

The population is relatively young, the ratio of young (0-19 years) and older population (over 60) is 1.6:1 (aging index is 0.64). The potential of the population is reflected in the existence of the reserve labor force, considering the current employment (about 68%), especially in the female population (utilization of labor resources is 63%). However, the spatial differentiation of the population and quite marked polarization between urban settlements and villages around Bor is evident.

The project of introduction of new technologies in mining and metallurgy would also provide encouragement for the development of small and medium enterprises in the manufacturing and services company RTB Bor, particularly in nearby rural areas and in areas that employ the female labor force. This way, the present process of depopulation, especially reducing the number of people in surrounding villages, would be stopped and reversed.

Educational Opportunities in Bor

Training programs are being coordinated within the area through the cooperation of RTB Bor, the Town of Bor, and local educational institutions. Special programs are being put in place to foster the training of younger unemployed workers who want to remain in the Bor area, and who can contribute to the long term growth of RTB Bor.

Within Bor there are a number of opportunities to offer additional training or technical education to those who are interested. For example, courses are available to advance the training and qualifications of the existing RTB Bor staff, as well as workers who have left the RTB Bor as surplus. Other unemployed workers may also choose to take courses from the system of educational institutions located in Bor.

<u>Secondary Technical School</u>

The Bor Secondary Technical School, in which mining and metallurgical professionals have been, educated (whose education now can be renewed) and which now provides education for environmental technicians and recycling technicians. Within this school, the Regional Centre for Adult Continuing Education was created and it operates (the Center, as one of 5 so far established in Serbia, in cooperation with the Transitional Center RTB Bor in the period from 2006 to 2008. It has implemented various training programs for over 400 employees in RTB Bor who left the company as surplus, and are now being retrained under the National Employment Service.

Electro-Mechanical High School

The electro-mechanical high school in Bor offers courses leading to several metallurgical and electrical professions, and Technical Faculty Bor that would lead to various engineering professions associated with mining, metallurgical, non-organic and technological, environmental, recycling and industrial management.

Economic Diversification

As the economy improves – the Town of Bor needs to promote the diversification of the local economy by attracting other industries over time.

7.7.5 Tourism and Recreation

The modernization of the smelter and construction of the new acid plant will not adversely affect local tourism or recreational activities. An improved local economy will potentially encourage spin-off growth for local tourism or recreational businesses or facilities.

7.7.6 Cultural heritage and Historical / Archaeological Resources

The proposed smelter modernization will not have any effect of local cultural features or activities such as the Castle of Prince Alexander Karadjordjevic in Brestovacka Spa area.

7.7.7 Historical and Archeological Resources

Historical Equipment

Selected pieces of historic equipment removed from the existing smelter to facilitate the modernization may be retained by RTB Bor for historical value.

Archeological Features

The disturbed state of the Bor Complex designated for the reconstruction and modernization of the existing smelter and acid plant will not effect local archeological resources. In the event that an archaeological feature is encountered during the construction, construction will stop and the significance of the feature will be assessed.

7.7.8 Noise Affecting the Community

Noise will be a localized impact throughout the Site Demolition and Site Preparation, and Construction Phases of the Project. During operations certain vents, motors, and pressure valves will provide localized sources of noise.

Areas where noise levels exceed 82 dBA during Site Demolition and Site Preparation, Construction, and Operational Activities - workers must wear hearing protection. In areas

where equipment noise exceeds 85 dBA at a distance of 1m from the source, some form of noise attenuation should be considered in site design.

The facilities will be designed in accordance with IFC Noise level Guidelines so that the maximum increase in background noise at the nearest receptor location off-site is no more than 3 dB. In addition, noise levels affecting the nearby residential, institutional, or educational receptors would not exceed 55 dB during daytime hours (07:00 – 22:00) and 45 dB during nighttime (22:00 – 7:00).

7.7.9 Water Supply

Water supply obtained from existing RTB water supply system that comes from Bor Lake. The proposed Project will not change the existing supply source or significantly alter the requirements of the on-site water treatment facility.

7.7.10 Wastes

Solid Waste

A detailed estimate of waste by type and quantities has been prepared for the demolition of the existing facilities to facilitate the construction of the new smelter. Steel will be recycled and other materials will be landfilled.

The final geo-environmental report will identify the extent of contaminated soils that may need to be disposed of or reprocessed along with ore or slag materials.

Slag or other process wastes will continue to be processed as per existing practice.

General industrial/commercial waste generated by the smelter/acid plant and other RTB Bor facilities will be sent to the Bor municipal landfill.

7.8 Liquid Wastes

No significant amount of liquid waste generated during demolition construction phases so the environmental effect is negligible.

Waste water from modernized smelter and acid plant directed to polishing pond/tailings pond with no direct discharge to local natural watercourse. Additional treatment may be required to address future consideration of discharge to a local natural watercourse. This issue to be assessed during detailed design. The treatment of other mine water wastes are being addressed under separate RTB - LEAP based initiatives.

7.8.1 Social Impact

The smelter modernization has the potential of having a very significant social impact on the Bor Community and the surrounding District that serves as a positive contribution to

the Region and to Serbia. As an environmental hotspot on the Danube – attention has been focused on this area for some time and the LEAP Programs serve as a primary vehicle for moving forward in a constructive manner to the benefit of the local community.

7.8.2 Public Health

Improvements to the ambient air quality compared to the past and existing situation should contribute to an improvement in the health of individuals with existing respiratory problems. This will generally benefit the Residents of Bor, but it will particularly benefit the young children in the community or older residents.

7.9 Accidents and Malfunctions

Potential accidents and malfunctions may occur during construction and operational stages of the project. These include

- hazardous spills on land and water;
- accidental encroachment;
- fire and explosion;
- collisions; and
- third party damage.

Environmental effects associated with accidents could include potential effects to the air, water, soil, flora, fauna and aquatic life. A Construction Site Environmental Management Plan (CSEMP) and a Health and Safety Plan (HSP) will be developed and will be put in place for construction. Plans will also be developed to prevent and/or minimize accidents/environmental emergencies and provide procedures and protocols to be followed in the case of an accident or malfunction that may result in adverse effects to the environment.

7.9.1 Collisions

The potential exists for serious accidents from vehicle, equipment that could result in equipment damage, site damage or injury or mortalities to workers.

The potential of collisions with equipment will be managed through worksite safety plans and protocols

7.9.2 Hazardous Materials Spills

With the application of the mitigation and follow-up measures, the potential effects on the environment and indirect effects on health and safety will be low. The residual effects from accidents involving hazardous spills are deemed not significant.

7.9.3 Fires and Explosions

Activities during construction such as welding, cutting, portable heaters, equipment malfunctions, incorrect storage of hazardous materials and worker smoking can result in fires. Explosions may occur during the handling of products with a risk of exploding such as petroleum products.

Fires and explosions can seriously harm workers, and the surrounding plant facilities. Fire prevention will be enforced through the application of the appropriate fire codes during construction and operation phase activities. Restrictions will be in place on smoking at the work site and will be enforced on a risk basis.

7.9.4 Damage by Third Party

Damage to any part of the road by a third party can lead to serious accidents. While damage by a third party to the Project is usually of little consequence to the environment, it can lead to serious injury. As a prevention measure, warning signs and fencing will be installed around camps and fuel areas to prevent unauthorized access to these facilities. Access to the existing ASR will remain unaffected.

During operations standard road and safety signage (as per Manitoba Government Standards) will be deployed and maintained to minimize the risk of third party damage due to vehicular usage.

7.10 Cumulative Effects Analysis

7.10.1 General Context

The Cumulative Effects Assessment (CEA) associated with the proposed Project was undertaken in regard to the Cumulative Effects Assessment Practitioners Guide (CEAA, 1999). The Practitioners Guide suggests the following considerations:

- Effects of the proposed project in the context of the surrounding regional planning area;
- Effects relative to the existing transportation network and the future linkages created by the Project;
- Effects on Valued Ecosystem Components (VECs) due to interactions with other projects and not just the effects of the single action under review;
- Other past, existing, or currently identified planning initiatives; and
- The significance of other indirect or extended effects.

The cumulative effects of the proposed new smelter and acid plant is most appropriately explained in regards to other environmental initiatives that are planned by RTB Bor over the 2010-2015 period.

7.10.2 World Bank/Government of Serbia - Bor Regional Development Project

The most significant cumulative effects associated with this Project involves:

- 135 million EUR loan contribution towards the construction of the Proposed Smelter Acid Plant; and
- Funding of the improvements of the Bor Regional Development Project based on a World Bank loan in the amount of Eur 24.3 million (US$33.0 million equivalent) and a proposed credit in the amount of SDR 6.6 million (US$10.0 million equivalent) to the Republic of Serbia.

The pooling of these funds creates allows for a number of complimentary environmental improvements that significantly benefits the local and regional community. This represents the critical seed money needed to advance the most significant environmental improvements. By committing to these projects, RTB Bor will be in a position to undertake subsequent improvements on their own or in concert with the Government of Serbia as RTB Bor's production and economic position improves in the next few years.

7.10.3 RTB Environmental Protection Plan for the Period 2010-2015

TSD #11 - the Environmental Protection Plan (EPP) was developed by RTB Bor for period 2010-2015. In this plan major problems caused by longtime work of mining and metallurgical operations are identified.

The main environmental problems are related to permanent air and water pollution from past operations, and generation of large amounts of wastes that must be addressed on an on-going basis.

This EPP presents a series of mitigation measures designed to address specific issues or problems. These mitigation measures are described in general terms, and where appropriate and estimate of the cost of specific mitigation measures are provided. The plan also indicates the term of application or implementation and the authority or responsible institution responsible for the execution or specific mitigation measures or programs. Supplementary explanations of specific programs or measures are provides for additional clarity.

Where appropriate, the pre-calculated costs of the various have been specified in the table. It is difficult to ascertain at this point the relative effectiveness of the various

expenditures in mitigating various environmental issues or problems, or addressing future planning issues.

Apart from RTB Bor companies (RBB, TIR, Power plant, Sulfuric Acid Plant, etc.) responsibility for mitigation measures execution also have the support of the Municipality of Bor and Government of Serbia.

7.11 Effects of the Environment on the Project

7.11.1 Earthquake

Whole Serbia is in area of moderate seismic activity, with weakest and rarest earthquakes expected in the eastern Serbia. The region of Bor belongs to the zones of seismic intensity I=VIIo MCS scale for return period Tr =100 years and I = VIIIo MCS scale for return period Tr =1,000 years, according to the state seismic maps (Seismic institute SFRJ, 1987).

7.11.2 Climate Change Considerations

The improved efficiency of the new smelter will result in a significant reduction in greenhouse gases as indicated by the four different emissions scenarios indentified in TSD # 9, the Air Dispersion Assessment.

The waste heat derived from the new smelter will also reduce the demand for power production in the power plant, compared to the existing situation.

Climate change may, however, result in greater seasonal variation in the local weather conditions. This may result in warmer summers, longer periods of calm air conditions, and extended periods of smog. It may also result in more severe storms during all periods of the year.

The smelter and acid plant is not located in an area that is subject to flooding that could be influenced by changes in local climatic conditions.

The facilities will be designed taking into account historical climate records.

The air quality monitoring and modeling system needs to be developed in an integrated manner that takes into account the seasonally and daily variations in local climatic and meteorological conditions.

Table 7-5-1
Environmental Effects Analysis -- Physical Environment

		Effects Analysis										
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Landscape and topography	Site Preparation, Construction, and Operations	Site located downslope from adjacent areas of the Town of Bor, approximately 25 m below surrounding urban areas. Area is a completely disturbed industrial landscape. Existing urban and industrial buildings partially block views of the smelter area. Area may be visible from some taller residential buildings or other viewpoints. Smelter fits in to the existing industrial landscape and does substantively alter the general view that has existed for more than 50 years.	L	L	L	L	L	H	L-M	No special mitigation required for construction of the proposed smelter, acid plant and associated waste water treatment plant. Architectural treatments of the new facilities will help to improve the general aesthetics and vew of the facilities from the surrounding area. Buildings, tanks, and associated piping should be painted appropriate colours to match surrounding earth tones of the adjacent landscape.	**L**	**NS**
Bedrock	Site Preparation, Construction, and Operations	Site located on plateau where underlying bedrock located at a depth of 2-4 m below existing grade. Bedrock from competent foundation for the existng and proposed facililtes of the RTB Bor Complex. Geotechnical investagations indicate bedrock predominately consist of andesite. Potential for contaminant leaching into underlying bedrock, based on historical milling operations on site and surrounding area low due to dry hydrgeological conditions. Geoenvironmental investigations required to define extent of local contamination. No effect to local bedrock through construction or operation of the proposed plant.	L	L-M	L-M	L-M	L-M	L	**L**	Geoenvironmental investigation indicates bedrock underlies appriximately 2-8 m of fill (including some slag). Proposed facility design minimizes extent of foundation excavations and disturbance to bedrock. Potential contamination of underlying bedrock considered low. Foundations for the proposed fascilitites will involve a mixture of pile and slab foundations depending upon the structural requirements. No special mitigation measures required.	L	NS

Table 7-5-1
Environmental Effects Analysis -- Physical Environment

		Effects Analysis										
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Surface Water	Site Preparation, Construction, and Operations	Local site area drains to the Bor Pit, with no alteration of the existing surface drainage system.	L	L	L	L	L	H	H	No special mitigation required for construction or operation of the proposed smelter, acid plant and associated waste water treatment plant. Any site drainage improvements designed to address broader surface drainage effects of the Bor Complex are ouside of the scope of the EIA and are addressed through other environmental improvment initiatives.	L	NS
Soils (On-site)	Site Preparation and Construction	Local soils on-site have been disturbed through construction and operation of the existing smelter and acid plant facilties. Existing soils in area of smelter generally limited to 2.5 to 4m of fill material. Local soils contaminated to varying degrees with heavy metals such as Cu, As, Hg, Pb, and Zn. Final geApproximately __ tonnes of material will require removal and ___ tonnes will require disposal as hazardous waste. For details on on-site soil characteristics see TSD # 8, Geoenvironmental Investigations Report.	L	L	L	L	L	L-M	H	Preliminary on-site geoenvironmental study investgations reported in TSD # 8 indicate heavy metal contamination within 1-3 m of ground surface. Final geoenvironmental study to identify extent of potential soil contamination, or extent of additional work required to support demolition and waste disposal requirements. General approach will be to mimimize extent of disturbance to underlying contaminated soils. New facilties will be placed over contaimated soils that are not removed -- encapsulting the soils. Some of the excavted soils will be reprocessed along with the ore and slag, others will be disposed of in a hazardous waste cell established with tailings pond. The location and development of hazardous waste disposal site is outside of scope of the Smelter/Acid Plant EIA and the responsibility of RTB Bor. Potential sites and design considerations are currently under review by RTB Bor in consultation with the Ministry of Environment.	L	S

Table 7-5-1
Environmental Effects Analysis -- Physical Environment

		Effects Analysis										
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Soils (Off-site)	Previous Site Operations and Future Site Operations	Historical sampling has indentified contamination of off-site agricultural soils (with Cu and As) due to air emissions and dust fall. This has been linked to the previous stack emissions lacking appropriate control equipment, or from dust deposited from wind savanged dust from the pit, tailings, and waste piles.	L[(1)]	L[(1)]	L[(1)]	L[(1)]	L[(1)]	L[(1)]	L[(1)]	Efficiency of emission controls for the new smelter and acid plant, and the modernization of the other site facilties effectively eliminates the smelter as any significant source of this type of emission. Other environmental initiatives (beyond the scope of the this EIA) planned by RTB Bor (e.g., revegetation of old tailings or waste piles) will reduce dust savaging from these areas. This will reduce the build-up on heavy metals in off-site agricultural soils.	L[(1)]	NS
Groundwater	Site Preparation, Construction, and Operations	No significant shallow or perched groundwater system on-site in area of smelter or acid plant. Groundwater conditions do not represent a significant constraint to construction of the smelter, acid plant, or effluent treatment facilties. Construction of the proposed facilties will not affect the broader groundwater system that has been impacted by the larger scale historical operations of the RTB Bor - Bor Complex. For details on groundwater see TSD # 8, Geoenvironmental Investigations Report.	L-M	M	L-M	L	L	L	L	Local dewatering may be required for some foundation works during construction. Other improvements to the Mining Operations at the Bor Complex (beyond the scope of the Smelter/Acid Plant EIA) will serve to reduce groundwater impacts and assist in environmental rehabilitation.	L	NS

Table 7-5-1
Environmental Effects Analysis -- Physical Environment

		Effects Analysis										
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Built Environment	Site Preparation, and Construction	The modernization and reconstruction of the existing mill site environment requires the demolition of portions of the existing smelter, acid plant and associated infrastructure facilties to accommodate the proposed improvements. During construction some infrastructure will require modification or relocation which will generate construction wastes requiring disposal. The type of demolition waste may require special handling with respect to noise, dust, and health and safety procedures. (see Noise, Dust, and Air Quality Sections)	L	L	L	L	L	H	H	The Construction Site Environmental Management Plan in Section 8 identifies the estimated amount and type of wastes requiring disposal as a result of the required demolition works. Preliminary geoenvironmental studies (in TSD # 8) has identified extent of waste contamination associated with surficial soils. Final Geoenvironemntal Report will identify the extent of on-site contamination and provide recommendations on how it should be handled. RTB Bor and its Demolition and Construction Contractors are to maintain spill control and clean-up equipment at designated construction site area. Demolition and Construction Staging Plans must be developed to allow for smelter operations to continue smoothly during the demolition and construction phases. This plan needs to address scheduling issues, and occupational health and safety matters.	L	NS

Table 7-5-1
Environmental Effects Analysis -- Physical Environment

		Effects Analysis										
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Air Quality - General Atmospheric Conditions (SO_2 ,$C0_2$, Particulates)	Site Preparation, Construction, and Operations	Air Quality of the local area is affected by the existing smelter, and acid plants and by the modernization and reconstruction of the smelter/acid plant and associated facilities. The transition from the existing operations to the new and improvement facilties will also affect the local air quality with respect to $S0_2$, CO_2, and Particulates. TSD # 9 provides and air quality impact assessment of the proposed new smelter and sulphuric acid plant compared against the historical and existing emissions levels. This study indicates the new smelter and acid plant will significantly reduce the emission of SO_2 to the atmosphere. The existing air quality monitoring system has been developed and expanded (as per the LEAP) to address SO2 effects on the Town of Bor. The existing system does not include stations to monitor extended effects of nearby community of Borska Slatina or the surrounding agricultural area.	L	L	L-M	L	L	H	H	Smelter modernization and reconstruction is based on the incorporation of Best Available Technologies (BAT) that will result in the capture and control of more than 95% of the SO2 emission sources. The Local Action Plan detailed in TSD # 10 has established protocols for controlling and managing the air emssions from the smelter, acid(s), and power/heating plant located at the Bor Complex based on the current efficiency of polltion controls. The existing Local Action Plan serves as the key component of an overall environmental management system for the Complex. During detailed design further air quality modelling needs to be undertaken to integrate information from the air quality monitoring stations that have been established. Further modelling will allow for refinement of the design and emission controls. During site operations the existing air quality monitoring station system (described in TSD # 6) and air dispersion modelling (as described in TSD # 9) needs to be integrated to develop an more comprehensive air quality management system. The existing air quality monitoring sytem should add 1 or more additional montoring stations to address extended SO2 effects on villages such as Borska Slatina and the surrounding agricultural areas. This is important to document potential transboundary effects given the proximity of the Bulgarian border.		

Table 7-5-1
Environmental Effects Analysis -- Physical Environment

		Effects Analysis										
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Air Quality - Noise and Dust	Site Preparation, Construction and Operations	Site demolition work and construction activities will be the principal source of noise and dust. During construction noise and vibration impacts may result from foundatuion piling operations. The extent of piling requiremernts dependent upon results of geotechnical investiagtions that are in progress. During site operations noise is primarily associated with exhaust fans, vents, and blowers; and the movement of equipment or materials. Dust control during operations is associated with the movement or conveyance of materials.	L	L	L	L	L	H	H	Best management practices will be employed to minimize the impacts of construction noise and dust. This includes the use respirators and other dust control measures where site conditions or activities require. The smelter and acid plant includes dust and noise controls as part of the facility design. For example, all noise generating equipment producing noise in excess of 85 dBA at 1 m from the source will be equipped with some from of noise control or shield. Dust control wetting and the use of surfactants (calcium/magnesium chloride or suitable substitutes). Access roads in the area of the smelter and acid plant should be hard surfaced to control dust. Side panels on the concentrate storage shed should be repaired to minimize this area as a potential source of dust through the modernization upgrade process. Construction activities resulting in significant noise or vibration (e.g., pile driving) will be limited to the period 7am to 7 pm due to residential uses located within 500m of the construction area.	L	NS
Hazardous Substances	Site Preparation, Construction and Operations and general maintenance of equipment.	Potential release of hazardous substances (e.g. fuels, chemicals, etc) into the physical environment due to construction, operations, or maintenance activities or unplanned spills.	L	L	L	L		H	H	Acid plant and smelter modernization and reconstruction design provides for spill control from key storage tanks of vessels during operations (e.g., bermed areas to contain 110% of largest tank or vessel). Spill prevention BMPs such as designated re-fuelling pads for construction and maintenance equipment, emergency spill kits, spill response plans.	L	NS

Notes:
(1) effect attributable to the smelter/acid plant considered in this EIA independent from the historical conditions contributing to the current conditions.

Table 7.6.1
Environmental Effects Analysis -- Natural Environment

		Effects Analysis									
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Terrestrial Environment - Natural Vegetation (on-site)	Site Preparation, Construction, and Operational Phases	Site for smelter has no vegetation (ground cover, shrubs, or trees, etc.) in the immediate area of the proposed new smelter, acid plant, or effluent treatment facility. No direct impact on terrestrial environment.	L	L	L	L	L	L	L	No mitigation required, but would be useful to promote some revegetation of areas within Bor Complex. Waste pile, and older talings area areas will be rehabilitiated and revegetated to off-set some of the historical impacts that site operations have had on local site vegetation.	L	NS
Terrestrial Environment - Natural Vegetation (off-site)	1. Transitional Site Operations during construction of the new smelter and acid plant, and the modernization of the new facilities; and 2. Operations of the modernized and reconstructed facilities	Impacts on-site vegetation or habitats related to the impact of air emissions from stacks and fugitive emissions to the general atmosphere. This has affected the ambient air quality as a result of the long-term facility operations. The historical emission rates resulted in more than 50% of the $S0_2$ being released to the local atmosphere around the Bor Complex. The historical extent of these effects are generally documented in TSD #1 and #2. The modernization and reconstruction of the smelter and the associated reduction in SO_2 emissions will not result in significant off-site effects to vegetation. Some fugitive emissions from smelter may cause some minor impact to local vegetation within 500-800m of the facility.	L	L	L	L	L	L	L	The Local Action Plan (See TSD # 10) developed to control the plant operations when emission levels exceed the locally approved limits accoding the the Serbian Ministry of Environment. SO_2 levels are based on designed values (PV) of 500 mg/Nm^3, limiting emission values (GVE) of 1200 mg/Nm^3 for the existing operations, and 500 mg/Nm^3 based on BAT or the modernized and reconstructed smelter. Details of protocols are provided in TSD # 10. Note: The RTB LEAP document calls for the re-vegetation of portions of the old and existing tailings ponds as part of their environmental improvements. These actions assist in improving the natural environment within the Bor Complex.	L	NS

Table 7.6.1
Environmental Effects Analysis -- Natural Environment

Aquatic Resources - Fish Habitat and Fisheries	Site Preparation, Construction, and Operational Phases	Aquatic resources in the areas downstream of the RTB Bor complex have been degraded due to the historical discharges of untreated waters to the local surface and groundwater systems as noted in TSD #1 and #2. There are no aquatic resources within the limits of the RTB Bor complex. Therefore the development of the proposed project will have any direct or indirect effect on fish habitat or resources.	L[(1)]	L[(1)]	L[(1)]	L[(1)]	L[(1)]	L[(1)]	L[(1)]	No mitigation required for construction of the new smelter and acid plant, and the modernization of the existing facilties. Other environmental initiatives undertaken by RTB Bor or the Government of Serbia, or from other funding initiatives will assist in the rehabiltation of local water and aquatic resources. The are beyond the scope of this EIA. (See Local Action Plan, TSD # 10, and the Environmental Protection Plan for details on other initiatives focused on the reduction of mine waters impacts and the rehabilitation of the degraded aquatic environments of the	L	NS
Wildlife Habitat - Birds	Site Preparation, Construction, and Operational Phases	Smelter site and acid plant does not have any definable vegetative habitat favouring the local bird habitats on site, but conditions in adjacent town areas are suitable to a variety of bird species. Improvement in air quality may lead to some modification and increase in the biodiversity of local vegetative habitats. This may have a positive effect on local bird habitat and bird populations over time.	L	L	L	L	L	L	L	No mitigation required pertinent to this EIA.	L	NS
Wildlife Habitat - Small Mammals	Site Preparation, Construction, and Operational Phases	The site conditions in the immediate area of the smelter and acid plant(s) do not offer any habitat suitable for small mammals. Some mammals typical adaptable to the urban environment setting would be found in the surrounding Town of Bor and natural areas surrounding the Bor Complex. improvements in general air quality may improve the biodiversity of the natural environment so some degree within 1-2 km of the Bor complex over time.	L	L	L	L	L	L	L	No mitigation required pertinent to this EIA.	L	NS
Wildlife Habitat - Large Mammals	Site Operations	The proposed smelter and acid plant will have no effect on larger mammal populations since their habitats are not found in the immediate of the RTB Bor Complex.	L	L	L	L	L	L	L	No mitigation required pertinent to this EIA.	L	NS

Table 7.6.1
Environmental Effects Analysis -- Natural Environment

Fish Habitat and Local Fisheries	Site Operations	Historically the operations of RTB Bor have served to significantly degrade the water quality and fisheries habitat of the Krivelj and Borska River systems. Downstream of the their mine site(s) due to untreated mine or contaminated base flow from groundwater contaminant migration. These issues are matters that are being addressed through the RTB Bor and Bor LEAP initiatives. The inclusion of the waste water treatment facility for the smelter and acid plant will constructively assist in minimizing the contamination of both local ground and surface waters that, in turn, affects fish habitat and the associated fisheries resources.	L (1)	L (1)	L (1)	L (1)	L (1)	L (1)	L (1)	RTB Bor long term objective is to recycle or reclaim as much of their waste waters as possible in order to minimize off-site discharge to either the Krivelj and Borska River systems.	L	NS

Notes:
(1) effect attributable to the smelter/acid plant considered in this EIA independent from the historical conditions contributing to the current conditions.

Table 7.7.1 Environmental Effects Analysis - Social Environment

			Effects Analysis									
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Occupational Health / Safety	Site Construction and Site Preparation, Construction, and Operations Phases	▪ Site demolition and site preparation phase, OHS issues associated with demolition activities and the contaminants associated with the demolition debris and the associated dust levels. ▪ During construction phase the OHS issues are associated with construction materials, construction wastes, and hazardous materials required to support construction. ▪ Operational OHS issues relate to safe plant operations.	L	L-M	L	L	L-M	M-H	H	Amount of potential waste have been identified. Geoenvironmental study to define extent of potential contamination in underlying soils and representative samples of dust/debris. Some contaminated material to be reprocessed along with ore and slag streams. Other material to be disposed on in hazardous waste cell to be developed by RTB Bor. Develop logistics plan for demolition activitities, undertake further site testing to identify significance of contaminants. Provide workers with appropriate safety training appropriate to demolition, construction, and operational/maintenance procedures. Detailed Health and Safety Plan(s) should be prepared appropriate for each of the Site Construction and Site Preparation, Construction, and Operations Phases.	L	NS
Human Health / Safety	Site Construction and Site Preparation, Construction, and Operations Phases	▪ Potential health and safety effects for workers associated with exposure to contaminants during all phases of site development and operations. ▪ Community Health risks associated with long-term air quality issues associated with $S0_2$ in ambient air through smelter operations during the modernization and subsequent future operations.	L-M	L-M	L	L	L	L	M-H	Material Data Safety Sheets should be used to advise workers of hazardous materials. Workers to be supplied with appropriate environmental and HSE training and supplied with appropriate protective equipment for tasks to be undertaken. The modernization of the smelter using BAT and BMPs reduces the $S0_2$ emissions to the environment and reduces risk to community health. Detailed Health and Safety Plan(s) should be prepared appropriate for each of the Site Construction and Site Preparation, Construction, and Operations Phases.	L	NS

Table 7.7.1 Environmental Effects Analysis - Social Environment

			Effects Analysis									
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Land Use (urban industrial-commercial, and residential land uses)	Construction and Operations Phase	The construction and operation of the modernized smelter and acid plant could have an effect on land uses within the immediate proximity of the Bor Complex in terms of potential redevelopment considerations and long term land use plans. There are some residential units that are located within 400-500m of the emission stacks and are at a higher risk of exposure to SO2 emissions than other areas of the Bor community. The modernized smelter and acid plant may foster the development of additional suppliers and secondary industries within Bor. Improved economic conditions resulting from the improvements at RTB Bor should promote additional growth and development within the community over the next 20 years.	L-M	L-M	L-M	L-M	L-M	L-M	H	The Town of Bor can constructively plan for continued development within the Town of Bor given the restored viability of RTB Bor. RTB Bor and the Town of Bor through the implementation of the Local Environmental Action Plan can further reduce the environmental effects associated with the historical operations of RTB Bor. Other funding sources supplied through the Government of Serbia, the World Bank will compliment the environmental improvements acheived through the smelter modernization and reconstruction initiative. The environmental action initiatives should be used to promote secondary employment opportunities (e,g., local suppliers for revegetation/plant materials, etc.)		
Land Use (agricultural, rural residential, foresty, and open space uses)	Construction and Operations Phase	The modernization of the smelter within the Bor Complex will not directly affect the existing areas associated with agricultural, rural residential, forestry, and open space uses. Improvement in air quality resulting from the new smelter will reduce the historical effects on certain land uses (e.g., crop damage, contamination of agricultural soils, forest productivity, etc.). This represents a positive benefit to the community.	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	No special mitigation required, as general improvements in local economy will naturally spill positively over into the surrounding district in direct and indirect ways.	L-M[(1)]	S[(1)]

Table 7.7.1 Environmental Effects Analysis - Social Environment

			Effects Analysis								
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Population & Employment	Site Demolition and Site Preparation, Construction, and Operations Phases	The modernization of the smelter within the Bor Complex will require specific employment requirements that can be filled by RTB Bor personnel, new job hires, and specialized trades during the Site Demolition and Site Preparation, Construction Phase. RTB Bor will re-train staff to take on the operations/maintenance of the new smelter. Increased employment in RTB Bor will contribute positively to local population growth within the Bor District over time. Revitalization of RTB Bor will have a significant impact on the community population given that RTB Bor has served as the principal source of local employment for 3 or 4 generations.	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	L-M[(1)]	Training programs are being coordinated within the area through the cooperation of RTB Bor, the Town of Bor, and local educational institutions. Special programs are being put in place to foster the training of younger unemployed workers who want to remain in the Bor area, and who can contribute to the long term growth of RTB Bor.	L-M[(1)]	S[(1)]
Tourism and Recreation	Site Operations	The modernization of the smelter and cosntruction of the new acid plant will not adversely affect local tourism or recreational activities. An improve economy,will potentially encourage spin-off growth for local tourism or recreational facilties.	L	L	L	L	L	L	L	No special mitigation measures are required. Economic improvements in the local community will serve to foster tourism and recreational activities in the local area.	L	NS
Cultural Heritage	Site Operations	The proposed smelter modernization will not have any effect of local cultural features or activities such as the Castle of Prince Alexander Karadjordjevic in Brestovacka Spa area.	L	L	L	L	L	L	L	No mitigation measures are required	L	NS
Historical / Archaeological	Site Demolition and Site Preparation, Construction, and Operations Phases	▪ The disturbed state of the Bor Complex designated for the reconstruction and modernization of the existing smelter and acid plant will not effect local archeological resources. ▪ Selected pieces of historic equipment removed from the existing smelter to facilitate the modernization may be retained by RTB Bor for historical value.	L	L	L	L	L	L	L	In the event that an archaeological feature is encountered during the construction, construction will stop and the signficance of the feature will be assessed.	L	NS

Table 7.7.1 Environmental Effects Analysis - Social Environment

			Effects Analysis									
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Noise	Site Demolition and Site Preparation, Construction, and Operations Phases	Noise will be a localized impact throughout the Site Demolition and Site Preparation, and Construction Phases of the Project. During operations certain vents, motors, and pressure valves will provide localized sources of noise.	L	L-H		L-M	L-M	L-M	H	Areas where noise levels exceed 82 dBA during Site Demolition and Site Preparation, Construction, and Operational Activities - workers must wear hearing protection. In areas where equipment noise exceed 85 dBA at a distance of 1m from the source, some form of noise attentuation should be considered in site design.	L	NS
Water Supply	Construction, and Operations Phases	Water supply obtained from existing RTB water supply system that come from Bor Lake. No change in existing supply source of on-site water treatment facility.	L	L	L	L	L	H	H	No mitigation measures are required	L	NS
Waste (solid)	Site Demolition and Site Preparation, Construction, and Operations Phases	▪ A detailed estimate of waste by type and quantities has been prepared for the demolition of the existing facilities to facilitate the construction of the new smelter. ▪ The geoenvironmental report identies the extent of contaminated soils that may need to be disposed of or reprocessed along with ore or slag materials.	L	L	L	L	L	H	H	Materials of recyclable value such as steel will be temporarily stored for recycling. Materials such as Firebrick from reverb Bath (480 tons) and magnetite (2029 t) are stored on and will be recycled. The remaining material (concrete, Masonry Bricks, Clay blocks, refractory, acidresistant brick and clay) are disposed in the old open pit. Contaminated soils containing hazardous levels of Cu, Pb, Hg, Zn and As derived from site demolition of foundation excavations will be reprocessed along with ore and slag, where possible. If necessary, an segregate hazardous waste cell will be developed within or adjacent to the exisitng tailings pond. Thius faciltiy would be located and approved in consultation with the Serbia Ministry of Environment.	L	NS
Waste (liquid)	Site Demolition and Site Preparation, Construction, and Operations Phases	▪ No significant amount of liquid waste generated during demolition construction phases. ▪ Waste water from modernized smelter and acid plant directed to polishing pond/tailings pond with no direct discharge to local natural watercourse. Additional treatment may be required to address future consideration of discharge to a local natural watercourse. This issue to be assessed during detailed design.	L	L	L	L	L	L	L	RTB Bor developing water management plan to recycle and re-use as much waste water as possible internally within the Bor Complex. A number of other Local Environmental Action Plan Initiatives beyond the scope of the Smelter EIA are focusing on solving the problems of the mine water balance and associated mine water environmental issues.	L	NS

Table 7.7.1 Environmental Effects Analysis - Social Environment

			Effects Analysis								
VEC Feature	**Project Phase**	**Potential Effects**	**Ecological Context**	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Premanance / Reversibilty**	**Likelihood**	**Proposed Mitigation**	**Residual Effects**	**Overall Significance**
Community Relations	Site Demolition and Site Preparation, Construction, and Operations Phases	Community awareness and understanding of project status, and ability to address concerns that may arise in a timely and meaningful manner.	H(2)	L-H(2)	M(2)	H(2)	H(2)	H(2))	H(2)	▪ The modernization of the smelter is a significant initiative of RTB Bor. Progress on this project needs to be communicated on a regular basis to community and interested stakeholders. ▪ RTB Bor maintains communication with its employees and the community through it company newspaper the Kolectiv, through it corporate website, through various liaison activities with the Town of Bor, and the Serbian Ministry of Environment and Spatial Planning, and the Agency for Environmental Protection.	H(2)	S
Social Impact	Site Demolition and Site Preparation, Construction, and Operations Phases	The smelter modernization has the potential of having a very significant social impact on the Bor Community and the surrounding District that serves as a positive contribution to the Region and to Serbia.	M(3)	M(3)	M(3)	M(3)	M(3)	M(3)	M(3)	RTB Bor in conjunction thw Town of Bor to monitor and document the social impacts attributed to the environmental improvements being made for Bor.	M	S(3)

Notes:
(1) The socio-economic effect on the local population is a positive effect.
(2) Has the potential to be both positive and negative in environmental effect
(3) social impact of the modernization is a positive effect