ENVIRONMENTAL ASSESSMENT REPORT

BRASOV BY-PASS

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1 ENVIRONMENTAL IMPACT ASSESSMENT

1.1 EXECUTIVE SUMMARY

CC MEDIU Ltd. ("CC MEDIU") was retained by Consilier Construct Ltd. ("Consilier") in 02.02.2004 to conduct an Environmental Impact Assessment ("EIA") of a by-pass road site located at Brasov, Romania, (hereafter referred to as the "Site"). The Site is currently occupied by agricultural lands and pastures.

EIA has been completed as part of a contract awarded by the National Company of Highways and National Roads ("NCHNR") to Consilier, which act as Engineer in planning and design of a Brasov by-pass road.

All the initial details of the report were established in a meeting held within NCHNR head office on 28.01.2004, attended by WB representatives, design companies and environmental consultants. Further guidance on WB environmental procedure was provided by Ms Serena Adler, on 02.02.2004.

Based on the results of the EIA, CC MEDIU provides the following conclusions and recommendations:

- Actual location of the by-pass road is not endangering the natural reserves located nearby Hârman and Sânpetru, if no parking area is to be constructed nearby Lempeș forest;
- During construction period there may appear short-term situations of chemical stress on vegetation due to exposure to NOx. The correspondent annual guide is not exceeded;
- Public health could be affected by high concentrations of particles (TSP) in the vicinity of the constructed roads or by the synergic effect of the PM10 and NO2. Exceeding of this health protection limit will occur only for short periods of time;
- Technological processes that produce dust, such as soil filling, shall be reduced during strong wind periods and permanent sprinkling of unpaved surfaces should be carried out;
- In order to monitor the quality of the environmental factors and construction activity, Contractor should retain a specialized company to monitor his environment-related activities on a monthly basis, during the whole construction period, and
- The impact mitigation measures that have been proposed in this report, as well as the contractor’s obligation to comply with the environmental legislation in force on the date of signing the execution contract are enough to address all the impacts likely to occur during construction phase.
1.2 PROJECT DESCRIPTION

1.2.1 Scope and Importance of the Investment Project:

The central position of Brasov municipality within the country locates it at the junction of numerous roads such as:

- The National Road no. 1 (NR1) – Bucharest - Brasov – Sibiu – Oradea that crosses the municipality on the direction south – East to the North - West on the streets: Calea Bucuresti, Boulevards 15 November – Iuliu Maniu Street – Lunga Street – Calea Fagarasului.

- The National Road no. 11 Brasov – Tg. Secuiesc – Bacau that starts from the municipality on the route: Iuliu Maniu Street – Boulevards 15 November – Toamneni Street – Harmanului Street.

- The National Road no. 13 Brasov – Sighisoara – Tg. Mures that follows a route on street 13 Decembrie and Grivitei Street.

- The National Road no. 73 Pitesti – Brasov that starts in Brasov on Calea Cristianului.

In the area there pass also National Road no. 1A that crosses with NR1 by the locality in Dirste and National Road no. 10 that crosses with NR11 by the locality Harman through an interchange.

Besides the National Roads mentioned above, Brasov is also the starting point for several county roads:

- CR 103A – Brasov – Zizin – Intorsura Buzaului that leaves Brasov on Zizinului Street.

- CR 103 – Brasov – Sanpetru – Bod that leaves Brasov on 13 Decembrie Street.

- CR 103C – Brasov – Stupini – Ghimbav that leaves Brasov on Ghorghe Doja Street then on Laniu Street.

At present, the transit to all destinations implies necessarily crossing the central area of the municipality. This traffic loads intensely the existing pavements and leads to phonic and noxes pollution in the area of the municipality.

The present project refers to carrying out the by-pass between CR 103A (Zizinului Street) and the National Road no. 73. The starting point CR 103A was chosen as the connection between NR1 and CR 103A is at present under construction with local funds.

The intersection with CR 103A is to be arranged as a rotary intersection. From this point the route goes to the North of Brasov Switching Yard (overcrossed by the CFR humps), at the intersection with NR 11 being provided a rotary intersection. The route continues on NR 11 up to past Harman interchange where another rotary intersection will be arranged. The by-pass continues its route to the West by the North of Harman commune, over the county road Harman-Bod, passing by the North of the ash pit of Brasov steam power plant and by the South the sugar factory in Bod. The route crosses the CF railway track 300 (Brasov – Sighisoara) and reaches km 9+650 of NR13 (Brasov – Sighisoara – Tg. Mures), where a rotary intersection will be arranged. The route develops on NR 13 towards Brasov and
continues from km 3+350, arranged as a rotary intersection, with the interior by-pass over the railway track 200 to the NR 73, where a grade junction will be arranged.

The road connection to be carried out is considered as the “Ist Stage” because the by-pass variant of the municipium cannot stem from the Motorway Bucharest – Brasov – Tg. Mures which is envisaged to be carried out in 2010. This stage implies the construction of 22 km of road and the rehabilitation of about 4 km of national road.

During the IInd stage the intersection with NR13 will be assured by a dislevelled interchange. The route of the by-pass will continue towards the Bucharest – Brasov – Tg. Mures Motorway where another interchange will be created. The IInd Stage means the construction of about 8 km of national road.

1.2.2 Public Utility and Framing into Urban Planning Development and Land Reclamation

The traffic censuses made during the years show that the traffic on the streets of the municipium is extremely high and 38% of the total traffic is represented by the transit traffic registered at the entrance in the municipium.

Also, at present, any destination of transports in the city makes it compulsory the crossing of the central area of the municipium. This traffic stresses intensely the existing pavements and leads to phonic and noxes pollution in the area of the municipium.

In this situation it is required the urgent carrying out of a by-pass both for the transit traffic and for the carrying out of the access to different destinations in the city on minimum distances run on streets in the municipium.

The road route is included in the County Land Reclamation Plan, section Transports; all General Urban Planning of communes on the road route are to be modified accordingly.

1.2.3 Works Description

1.2.3.1 Road

The road route under assessment was divided in several sections:

- section 1 CR 103A (str. Zizin) – NR11 (L=4,75km)
- section 2 NR 11 (km 6+600– km 10+650) (L=4,25 km)
- section 3 NR11 – NR13 (9+650) (L=11,25km)
- section 4 NR 13 (km 9+650 – km 3+350) (L=6,6 km)
- section 5 NR13 (km 3+350) – CR103C (str. Lanii) (L=2,354 km)
- section 6 CR103C – NR1 (km 173+497) (L=2,618 km)
- section 7 NR1 – NR73 (L = 1,144 km)
- section 8 NR13 – Brasov-Targu Mures Highway (L = 7,85 km)

1.2.3.1.1 Section 1 CR103A (str. Zizin) – NR11

On CR103 A it is provided to be arranged a rotary intersection, the route continuing to be parallel with the existing high tension lines and meeting a garage line at the end of Brasov railway switch yeard.
The crossing of this garage line is made through an overcrossing with here spans $L = 12+16+12$. The overcrossing respects the gauge conditions imposed by Brasov Roads and Bridges Regional Directorate.

The adopted superstructure is on beams with adherent chords and the total superstructure width is of 15.00 meters.

The intersection with the railway Brasov – Harman is made through an overcrossing and the intersection with NR 11 through a rotary intersection.

Besides the overcrossing works specific to the railway will be necessary, such as:

- Protection works for TTR SCB cables relocation (communication, signaling, traffic safety)
- Speed limitation in the area of the working point during the execution.

In order to avoid the introduction of provisional bridges on the railways, the foundations of adjacent infrastructures will be executed on open caissons.

As bridges works, the route crosses Durbav creek where it is provided a bridge with a width of 15.0m and a superstructure made of beams with adherent chords.

The route is designed for a design speed of 80km/h, being respected the provisions of STAS 863/1985. The platform width is provided at 15.00m, the carriageway at 7.00m with turning lanes of 2.50m.

The water discharge along the variant is made through their collection in drainage channels, guiding towards discharge culverts, heading to the environment. (Durbav creek).

On the ramps there were provided shoulders drainage channels, discharge side ditches beginning from a height of the embankment of 3.00 meters.

For the traffic safety guardrails were provided for the case when the platform width increases with 0.65m.

1.2.3.1.2 Section 2 NR11 (km 6+600 – km 10+650)

On this section it will be executed only the reinforcing of the existing road of four lanes. The cracks and joints will be clogged up with asphalt concrete, the geogrid will be installed and over it three layers of asphalt mixture will be cast (8 cm of dense mixture, 4 cm of chipping binder and 4 cm of asphalt concrete).

1.2.3.1.3 Section 3 NR11 (km 10+650) – NR13 (km 9+650)

From NR11 the variant route passes towards the North of Harman and intersects CR112A and CR112 through two overcrossings with three spans, passing from Lempesului Tail and through the North of the ash pits of Brasov steam power plant.

The county road 103 overcrosses the variant with a three spans overcrossing with $L = 12+18+12$ and the same characteristics with the previous overcrossing except for the platform width that is of 7.80 meters.

The route meets further on the railway track 300 Brasov – Sighisoara crossing it with an overcrossing with 3 spans $L = 21+24+21$. On the vertical the electrification gauge for the existing railway tracks (two lanes) is respected. It is to be mentioned the fact that the adjacent
spans create the possibility that the equipment and the agricultural machines undercross the variant.

Besides the overcrossing and the variant works a series of works with railway specific appear as follows:

- Protection works or provisional or final TTR SCB cable relocation works (signaling and traffic safety)
- The Works at the contact line (the eventual support elements of the contact line connected to the overcrossing superstructure, removal and introduction of tension, elimination of piles or new support piles for the contact line (etc)
- Speed limitation in the area of the working point.

The intersection of the by-pass variant with NR13 close this section in this point while during the IInd stage a rotary intersection is to be carried out.

As bridge works the Ghimbasel creek crosses this section.

1.2.3.1.4 Section 4 NR 13 (km 9+650 – km 3+350)

Considering the fact that NR 13 has been recently modernized, no rehabilitation works are necessary on this section.

1.2.3.1.5 Section 5 NR13 – CR 103C (str. Lanii)

After carrying-out the rotary intersection with NR13, the designed route of the by-pass heads towards the CR 103C (Lanii Str.). On this section there are no special problems regarding the works of art. The first obstacle met is the discharge channel of the water treatment plant of APA Directorate Brasov; the bridge arrangement takes into consideration the situation on site and the fact that this channel has dammed banks.

This channel discharges towards Ghimbasel river with a flow of 2.20m³/s, equal to the capacity of the water treatment plant for the mechanic step. The channel is dammed on both banks in order to prevent the damage of adjacent agricultural lands. The distance between dams and the avoidance of affecting them required the design of a bridge with a span of 18 m, the abutments being placed to the exterior of dams.

After the grade junction of Plugarilor Str., the arrangement of merging and diverging lanes, the next obstacle is represented by Timis Channel with a calculation flow Q1%=7.65 m³/s. Timis channel is arranged and it is crossed on a bridge with a span of 18.00m. The bed depth involves carrying out abutments foundations with direct caissons.

Up to the intersection with the CR 103C, intersection arranged with merging and diverging lanes, the by-pass crosses discharge channels under the administration of Brasov RAIF; their crossing is made through bidges with spans of 8.00m, in order to assure the passing of equipment and agricultural adjacent, without affecting the by-pass traffic. Along this sector the road will be entirely arranged in embankment.

1.2.3.1.6 Section 6 CR 103C - NR1 (km 173+497)

On this section it is arranged at grade the access road to the Potato Research Institute, including merging and turning lanes. The route towards NR1 is placed exclusively on agricultural lands.
The simple railway Brasov - Sibiu at km 7+226 crosses the next obstacle by a railway overcrossing, continued with a bridge over NR 1 at km 173+497, including access ramps to the overcrossing and bridge, in the context of the design of the perspective road on the railway right side and of the doubling and electrification of this railway track.

The designed works will develop on the present location of NR 1 for the way towards Sibiu and will extend towards NR 73 occupying lands free of charge for the way from Sibiu, interchange loops being performed on the railway left side, including the direct way Sibiu-Brasov. On the right side of the railway there will develop the perspective road, the interchange loops with the by-pass; over the railway, on the present NR1, including over the location of the future double railway Brasov-Sibiu, there are provided two crossings for each lane of entering and respectively leaving from/the by-pass on/from NR1.

The free heights under the bridge passages were determined by the necessity of carrying out the free height for the railway electrification gauge, gauge that is transmitted to the crossing bridge at values much higher than the ones from normatives; this situation is unfavored by the difference of level of about 0.80 m between the superior interval of the rails and the superior level of the existing NR1. Due to the minimum construction height of the passage superstructure in order to limit the earthworks height, in spite of the very high gauge under the passageway, for the bridge it is maintained that superstructure with a minimum construction height for assuring the flexibility of the entire assembly in order to carry out under the best conditions the continuization of beams on piers, continuization necessary to remove joints from the intermediary bearing devices.

For the overcrossing works specific to the railway are necessary, as follows:
- protection works or provisional or final relocation works for TTR and SCB cables (communication, signaling, traffic safety);
- introduction and suspension of speed limits in the area of the working point during the execution of the dislevelled passage; in order to avoid introducing provisional bridges on the railways, the foundations of infrastructures adjacent to railway tracks will be executed with open caissons.

The width of the carriageway on the one-way roads was provided at 5.00 m to facilitate the overtaking of vehicles accidentally stopped.

In the area of the traffic interchange it is necessary to protect the existing domestic sewerage with NR900*600 mm, on a length of about 6400 m. Along this sector the road will be entirely arranged in embankment.

1.2.3.1.7 Section 7 NR1 - NR73

This sector follows the access road to the newly executed Industrial Park ARO 2000; the left end of this road will represent the axis of the future by-pass. Along this sector the road will be entirely in embankment.

The arrangement of the intersection with NR73 is made at grade, the merging and diverging lanes on the by-pass being constructed on the national road, including left turning lanes to the and from the by-pass.

1.2.3.1.8 Section 8 NR13 – Brasov-Targu Mures Highway
The intersection with NR13 will be made by a disleveled traffic interchange. The by-pass route will continue towards Bucharest – Brasov – Tg. Mures Motorway where another traffic interchange will be constructed. On this route bridges over Borsa river and Cropis creek (Vulcanita) will be executed.

1.2.3.2 Land Acquisition

When this present documentation was prepared the property of the land occupied by the project and affected by the construction works was not clarified.

The land occupied by the project is estimated at about 55 ha for stage I and at about 20 ha for stage II.

The surface temporarily affected by works cannot be quantified at this design stage. In conformity with the national legislation, the winner of the tender for the works execution establishes the location of the potential bias points and their surface. For these surfaces there is a contractual obligation, undertaken by the contractor towards the landowner, to restore these surfaces to their initial use or to agriculture.

1.2.3.3 Site Management Camp

In conformity with the provisions of GD 729 from 22/08/2000 that approves the Application Norms for the award procedures for the public acquisition contracts. The “Site Management Camp” as brief description is part of the Investment Technical Project being specified that it will only refer to this action.

According to the subsidiary legislation, the site management camp represents the task and responsibility of the General Contractor as regards location, solutions, and endowment, a distinct Environmental Impact Assessment being needed in this respect.

Consequently, the Feasibility Study that the present Report is based on cannot include elements to allow the determination of the site management camp impact.

However, for a dimension of the effects that can be produced upon the Environment by the activities specific to it, we present hereto data analysed in the EIA study:

- The volumes of the main materials, semi precast and precast elements to be placed are estimated as follows:
  - Earthworks, digging and fillings about 1380 thousands m$^3$.
  - Quarry and ballast pit aggregates about 190 thousands m$^3$.
  - Bituminous concrete about 60 thousand m$^3$.
  - Cement concrete about 35 thousand m$^3$.

- The equipment used on site during the high period will consist of:
  - 16 Trucks
  - 3 Agitating trucks
  - 4 Excavators
  - 1 Bituminous concrete settlers
  - 2 Cranes
- 3 Angle dozers, land clearing machine, hauling of ramming rollers
- 3 Cars

Based on these elements we can make the following assertions regarding construction management camp and hence assess in a first stage their effect upon the Environment:

- Road site, where the works will take place, does not allow placing there specific constructions such as: asphalt concrete stations, repairing or maintenance workshops, fuel supply centres, or even accommodation spaces for workers.
- The volume of works presented in detail in final report, the volume of the main materials as well as the number of machines is reduced so that there is no need of important site management camp works.
- At a distance of about 10km is to be found the city of Brasov, where arrangements for the construction management site can be placed. Even more, existing production capacities (including cement and bituminous concrete plants, ballast and hard limestone quarries) can be developed or used.

Therefore, we conclude that the site installation activities and constructions will not be developed on the road route, this being a sensitive area from the point of view of the natural environment and that, anyway, they will not produce a significant impact upon this section.

1.2.3.4 Borrow Pits

When this present documentation was prepared no any source of cohesive soil was identified around the city of Brasov. In conformity with the national legislation, the General Contractor establishes the location of the potential bias points and their surface. For these surfaces there is a contractual obligation, undertaken by the contractor towards the landowner, to restore these surfaces to their initial use or to agriculture.

Within this assessment it was considered that a borrow pit should be located at about 20 km from the construction site.

1.2.3.5 Waste Deposition Areas

In conformity with the national legislation, the General Contractor establishes the location of the potential bias points and their surface. However, it can be inferred that all demolition and inert materials might be used in filling in ballast pits located near Barsa river or transported to the municipal landfill.

All litter that might be assimilated as municipal waste shall be transported to the licensed facility of Brasov.

Within this assessment it was considered that all deposition areas should be located within 20 km from the construction site.

1.3 ESTIMATED ENVIRONMENTAL IMPACT

1.3.1 WATER

1.3.1.1 During Execution

The works carried out in the route under review do not involve site management facilities,
thus the main pollution sources are storm water collected from the temporary stocks of construction materials. In this particular case, the water quantity is relatively low, and the impact on the aquatic ecosystem is also low, especially if the stocks of construction materials are properly protected (exterior perimeter drain channels; fuel deposition in controlled spaces).

It can be assumed that the pollutant generated by the traffic to and from the works location and also generated by the construction material handling do not generate a significant increase in the surface water pollution so that this do not change the quality class of the water body.

The quantities of pollutants that can arrive usually during the construction period in the river bed do not affect significantly the aquatic ecosystems or the others down stream water utilities. Surely, the discharge in significant quantity of fuel products, oil products or construction materials should generate damages to the aquatic environment.

As it concerns the potential for phreatic body pollution it can be assumed that this will be not significant taking into account the adoption of good site management practices. The storage of fuel and of all other chemical compounds will be realised in safety location, with no access for public and in specific reservoir according with specific regulation of each of the compounds. The waste water resulted from the washing of construction and transport vehicles will be collected in canals and than settled before will be discharged. If will be necessary the settlement will be pumped by the aid of a tank car and than transported to the closer waste water treatment station.

During the construction period, the water silt charge shall increase due to the foundation excavations. Thus, this type of works must be carried out quickly and smoothly, under the site engineer’s direct supervision, so that they do not pollute the rivers in the area.

There where will be possible some close spaces will be realised, isolated by the main water flow by the aid of small ditches in order to mitigate the turbidity of the river water down stream of the works. The pumped water from the excavation will be discharged in natural receptor by the aid of settlements that have the task to decrease the loading in suspended particles, and to minimise the turbidity of the water and the erosion of the river bed.

1.3.1.2 During Operation

Surface water may be affected especially by rainwater that falls on road surface. No impact on ground water is expected, as wastewater is collected and transported to one-piece concrete water separators.

The operation of this road may have positive effects on the hydrologic system (groundwater or surface water improvement):

- The rigorous collection of rain water, the mitigation of soil erosion, the mitigation of solid particles load;
- The increase in the fluency of the traffic, with benefit effects over the reduction of emission of pollutants, respectively over the loads of rain waters with these type of pollutants;
- Rehabilitation of the small bridges, the construction of some new bridges, that have as consequences the decrease of the flood risk for the small human settlement upstream these section and of the soil erosion due to water accumulated in this areas
- The construction in the section down stream of the bridges of special facilities in orders to the settle the solid sediments so that this will reduce the clogging and the erosion of the rivulet bed.

1.3.2 AIR

1.3.2.1 During Execution

**Population.** Maximum concentrations of main pollutants (TSP, NO\textsubscript{x}) can reach:

\begin{align*}
\text{TSP:} & \quad 1.5 - 2.2 \text{ mg/m}^3 \text{ at road level (above the romanian standard on short term intervals);} \\
\text{PM}_{10}: & \quad 26 - 33 \text{ µg/m}^3 \text{ (below the limit value recommended by the EU legislation)} \\
\text{NO}_2: & \quad 136 - 151 \text{ µg/m}^3 \text{ (under the limit value recommended by UE legislation).}
\end{align*}

Taking into account the national legislation, population could be affected by high concentrations of particles (TSP) in the vicinity of the constructed roads or by the synergic effect of the PM\textsubscript{10} and NO\textsubscript{2}. Exceeding the health protection limit for synergic effects of these two pollutants might show up only for short periods of time.

**Vegetation.** During construction period there may appear short-term situations of chemical stress on vegetation due to exposal to impurification with NO\textsubscript{x}. The annual guide value for ecosystem protection is not exceeded.

**Top Soil.** During the construction period, in the position of the road and on access roads equipment and vehicles shall produce particles charged with heavy metals that shall deposit themselves on the surrounding soil. Therefore there is the possibility for the soil to be contaminated with Cd, Cu, Cr, Ni, Se, Zn, locally, in the above-mentioned areas.

**Constructions.** Acid gases (NO\textsubscript{2}, SO\textsubscript{2}) and the particles discharged in the atmosphere during the works shall temporarily contribute to increasing the aggressivity of the atmosphere.

1.3.2.2 During Operation

**Population.** Should the traffic reach the prognosed intensity; there shall not appear risk situations for population in the adjacent areas of the analysed road.

**Vegetation.** In the carrying out period there shall appear short-term situations of chemical stress on vegetation due to exposal to NO\textsubscript{x} impurification. In the mean time the recommended annual average EU guide value for ecosystem protection is slightly exceeded.

**Top Soil.** In the carrying out period, in the road layout, the vehicles shall send forth particles charged with heavy metals that shall deposit themselves on the soil. Therefore, there is the possibility of soil contamination with Cd, Cu, Cr, Ni, Se, Zn, locally, in the above-mentioned area.
Constructions. Acid gases (NO₂, SO₂) and the particles sent forth in the atmosphere during the carrying out period have a low influence upon the increasing of the atmospheric aggressiveness.

1.3.3  NOISE

1.3.3.1  During Construction
During the construction period the source and close field noise have acoustic characteristics appropriate to nature and to the equipment placing. The far field noise that is not of interest for our present assessment, is influenced by several external factors, out of which the wind velocity and direction, the temperature and wind gradient, the absorption of acoustic waves by the soil (the soil effect), the absorption in the air (depending on the relative pressure, temperature, humidity, on the noise frequency), the soil survey and the type of vegetation.

The equipment mentioned in chapter 2.1 generates between 80dB(A) and 115dB(A) under normal regime of operation. The traffic associated to works was presented in detail in chapter 2.4. During the construction period, significant noise sources will appear, being represented by the operating equipment and by the working motor traffic. It is estimated that noise levels in work places cannot reach equivalent levels (for whole working day) higher than 75dB(A).

The limit imposed by the national legislation - 65 dB(A) – for the noise produced by cement/asphalt concrete plants, by grading / crushing plants can be complied with only if they are placed at more than 250m from residential areas, the same rule being applied to borrow pits. Otherwise the noise level must be monitored periodically at the front side and inside housings, in view of adopting measures for reducing the noise level.

Regarding the work traffic, it is estimated that the equivalent noise levels for a reference period of 24h will be bellow 65 dB(A), limit imposed by STAS 10 144 / 1 – 80 for transit roads that should be used (category I-III).

Regarding the vibrations, although there can be reasons for them to appear in the embankment structure, especially in case of heavy equipment traffic, we cannot speak about vibration levels over the ones accepted by SR 12025:1994.

1.3.3.2  During Operation
Regarding the forecast of the conditions that will exist during operation phase, based on the available data regarding the traffic values, the noise levels from the road vicinity were modelled (Annex E).

In 2030, L_{eq,24h} noise levels at the edge of the road platform would be 76 dB(A) in Section 8; 75 dB(A) in Section 3, and 74 dB(A) in Section 1. It has to be stated that, at different heights the noise map will be different because of the soil effect and of the specific directivity of the sources.

1.3.4  SOIL AND SUBSOIL

1.3.4.1  During Execution
The main impact on soil is the permanent occupation of productive land. Together with it there is also a temporary occupation of lands for access roads, site management and
production camps, borrow pits and inert waste deposition areas etc. In this case, ecological reconstruction of the temporary occupied areas is a must.

The impact produced upon the soil by the activities performed during the construction phase is important. All occupied surfaces will induce structural modifications in the soil profile.

During the performance of the rehabilitation works, the soil environmental factor will be influenced, the impact consisting in:

- The stripping of the vegetal soil and the construction of an artificial profile by the earthworks executed on the road territory.
- The deterioration of the soil profile on a depth of 3-5 m by the operation of borrow pits
- The occurrence of the erosion.
- The loss of the natural characteristics of a fertile soil layer by its inappropriate depositing in soil holes resulted by stripping.
- The removal/ degradation of the fertile soil layer in the areas where new technological roads or by-passes of the present access ways will be constructed.
- The isolation of soil surfaces from natural ecological circuits, by concreting.
- The accidental discharge of substances / compounds directly on the soil that can affect this environmental factor up to depths of maximum 30 cm. The possibility is relatively slight if the conditions of environmental protection are respected and the remedy is easy and possible to be done immediately.
- The uncontrolled depositing of wastes, of construction materials or of technological wastes.
- The potential leakage losses from the sewerage / collection systems of waste waters.
- Qualitative modifications of the soil under the influence of pollutants present in the air (qualitative and quantitative modifications of the local geo-chemical circuits).
- The superficial physical degradation of the soil on very limited areas adjacent to the road in the digging area – it is considered a short period of reversibility after works completion and the recovery of these areas;
- the potential taking out of use of certain land surfaces for site installations, parking areas for the equipment etc;
- the intense circulation of the construction equipment in the working points for the materials transport, asphalt and concrete casting, reconstruction of the pluvial waters discharge system;
- the operation of autovehicles;
- the diversion and temporary traffic restricting;

The pollution during the execution of works has the most important effect upon the soil. The impact of works during the construction is determined by the volume of works and their
organization. This pollution is temporary, depends on the duration of the rehabilitation works and can be reduced by appropriate measures taken by Contractors.

1.3.4.2 During Operation

The present and future operation on the road will be done having as results, during the whole functional period, significant pollutant concentrations, whose direct and indirect (cumulative) effect over the soil represents the main factor in causing damages.

The effects of these pollutants at the soil level are various, the most important of them being:

- The modification of the soil pH due to the acid deposits;
- The accumulation of the heavy metals in the soil followed by the contamination of the biota

From the total emissions of the pollutants resulted from the traffic, it is considered that 40% will be deposited on distances of up to 100 m on the soil from both sides of the road. In the same time, it will be possible to delimit a sensitive area that includes a 30m wide section on both sides of the motorway and its whole length (here, almost the entire pollutant quantities will be deposited).

The Pb mass flows, resulted from the combustion processes of the engines of the motor vehicles that use lead gasoline, will decrease considerably in time because of the reduction of the lead gasoline users. It must not be forgotten that the lead accumulates in the soil, persisting up to hundreds of years.

The solubility and the binding of the heavy metals in soils are influenced, in oxidation conditions, especially by the adsorption and desorption reactions as well as by the compound-forming processes resulting in organic and mineral complex compounds.

In the case of an acid reaction of the soil the heavy metals adsorption represents a buffering mechanism, extremely efficient in the soils, more efficient than the precipitation of the different compounds of the heavy metals, which takes places only in the situation in that the soil concentrations are high.

The rainfalls have an important role in loading the soil with different pollutants. It is mentioned that the rainfalls, besides "washing" the pollutants off the atmosphere and depositing them on the soil, wash the soil, as well, helping to transport the pollutants towards the emissaries. It has to be mentioned also that the rainfalls facilitate the in depth pollution of the soil, a phenomenon that cannot be avoided.

1.3.5 FLORA AND FAUNA

The main potential loss determined by this kind of works is connected to the effect of spatial disorganization of the ecosystems, leading to some barrier effects generated by the specific linear infrastructure.

A potential effect is to be mentioned: opening the horizontal structures of the ecosystems by denudation and/or removing the sustaining forest vegetation, by embankment works etc. These kinds of works lead to the apparition of several regions deprived of the foundation vegetation, that are quite limited, in that new ecological sequences can appear, the first species that grow here are the pioneer elements and the ubiquitous ones. Taking into account the scale of the forecasted phenomena, this kind of changes are expected to occur on quite
limited areas and the phenomenon is expected to be reversible, the natural balance being re-
established in a period of 5-10 years, if the denuded slopes are replanted.

The impact on bird species identified in this area is negligible as the habitat fragmentation is
not so important because of their nesting and foraging areas - very extent on both sides of the
road. For other bird species such as migratory / transitory species this road does not pose any
impact.

The actual route of the Brașov by-pass road is not endangering the natural reserves located
nearby Hârman and Sânpetru, if no parking area is to be constructed nearby Lempeș forest.

The following specific features of the impact on the structures of the ecosystems and natural
balances are to be mentioned:

- The fragmentation produced by works is estimated to have a limited to medium intensity.
  It cannot lead to significant losses of animal populations.
- The unbalances generated by the works will be reversible in 5-10 year. These unbalances
  will take the form of antrophic pressures already generated in the sustaining ecosystems,
  among which the most valuable ones have already succeeded to adapt naturally to the
  construction works made on the existing infrastructure (DJ 112A Harman-Bod).
- Works will lead to the amplification of the stress factors affecting the natural ecosystems,
  as a result both of the direct works and of the collateral effects as the increasing of the
  road traffic.

The impact on the vegetation and fauna of the pollutants existing in the work perimeter, as
well as the guiding values recommended for their protection is described below.

**Particles.** Concentrations of air particles that present such risks for the vegetation might be
encountered during the maximum concentration of the modernization works, only if the
background values generated by the proximity of ash-deposition facilities are high, and only
for strong dry wind intervals.

**Sulphur dioxide.** Concentrations of SO2 in air do not present risks for generating chemical
stress for vegetation.

**Nitrogen oxide.** in air that have such risks for vegetation can be met on short intervals of
time during both the maximum concentrations of construction works and the operation phase,
for small distances (up to 25m).

**Heavy metals.** The pollution of the natural environment with heavy metals will not pose
risks on long term.

1.3.5.1 During Operation

The operation phase is characterised by those types of impact resulting from the road
execution process:

- natural habitat fragmentation.
- corridor narrowing
- modification of bio-geo-chemical circuits.
- contamination of existing animal species
accidental of species not belonging to the area.

- low biological productivity caused by an increasing pollution level in the area.

Road-related risks that affect only the existing fauna must also be added to the above-mentioned types of impact:

- risk of accident-related contamination;
- risk of fires;
- risk of disease spreading;
- risk of accidents.

The impact of air gas pollutants on the vegetation and animal health is below the protection limits for long exposure.

Heavy metal emissions are a risk factor for animals currently and after rehabilitation works completion, as they can build up both in soil and in vegetation.

1.4 IMPACT MITIGATION MEASURES

1.4.1 WATER

1.4.1.1 During Execution

Special attention shall be paid to works carried out in the area nearby rivers (bank consolidation and protection) and to bridge building, in order to avoid the risk of taking in construction materials. Work points shall be kept as closed as possible, in order to reduce silt charge generated when laying down the foundations.

Earth fills shall be managed in such a way that heavy rain does not collect solid construction materials and does not wash and erode their surfaces, other than the actual road territory.

1.4.1.2 During Operation

From technical and economic point of view, the best solution to treat the water collected from the road platform is to use two separation steps and to discharge the water into the emissaries observing the quality conditions imposed by NTPA-001, only in the areas where present and future uses impose that. The first separation step, which is 70%-74% efficient, may be carried out in the drainage ditch along the traffic way, and the second step, with an efficiency of about 70 % will be realised by the aid of settlement will be designed as decanter basin, before of each discharge point into the rivulet will cross the road.

In order to obtain in the first step a 70-74% efficiency separation effect, after the separation/settling of suspended matter, heavy matter resulted from suspended matter, and organic matter, the water flow must be of approximately 0.2 m/s (since the non-silting flow is of over 0.3 m/s).

This can be achieved through a correlated design of sand settlers and ditches within the Detailed Design Study.

In order to avoid surface water pollution, after work completion it is necessary to periodically monitor the traffic, the quality of water discharged into emissaries and that of sediments in the tributary water streams. Improved environmental protection measures shall be taken, pending on the water quality indicators in the future.
1.4.2  AIR

1.4.2.1  During Execution

Permanent moisturizing of unpaved surfaces. Technological processes that produce a lot of dust, such as soil filling, shall be reduced when there is strong wind.

There shall be used equipment with low emission engines, according to the EURO II norms. Equipment and means of transport shall be periodically verified as far as the level of carbon monoxide and emission concentrations in exhaust gases are concerned; they shall be put in use only after remedying any possible damage.

It is recommended that during the works to be used only equipment and means of transport that have Diesel engines that produce very little carbon monoxide and no Pb emissions.

1.4.2.2  During Operation

The use of lead-free fuel and cleaner diesel fuel will become mandatory in Romania soon to comply with the European legislation. This will diminish the risk of poisoning caused by the vehicle exhaust gases. To the same end, reducing speed on steeper slopes will also be compulsory, as the engines usually consume more fuel.

1.4.3  NOISE

1.4.3.1  During Execution

Because all houses are located at more than 300 m distance from the road axis, it is not considered necessary to install any temporary phono-absorbent walls at the moment. A regular monitoring of the noise level should be carried out and, in case of exceeding the legal noise limits, phono-absorbent walls must be set in.

For transit roads, in human settlements there are lower speed limits, and it is not considered necessary to impose supplementary restriction. Works will be carried out only during the day.

1.4.3.2  During Operation

Although there might be houses located within 500 m distance from the road axis, it is not considered necessary to install any phono-absorbent walls at the moment.

A regular monitoring of the traffic and noise level should be carried out and, in case of exceeding the legal noise limits, phono-absorbent walls must be set in.

1.4.4  SOIL AND SUBSOIL

1.4.4.1  During Execution

The emissions of pollutants in the atmosphere, water, soil as well as the noise level generated on site during the construction phase have, to the largest extent, values inferior to concentrations, respectively to the maximum admitted limits.

Nevertheless, besides the general measures indicated above, it is recommended the provision of special constructions and equipment for the impact mitigation.
It is recommended that the platforms of production bases have concrete or crushed stone surfaces in order to prevent or reduce the infiltrations of pollutant substances.

Also for the production bases, it has to be taken into consideration that the maintenance and washing platform for the equipment should carried out with a slope so that it is assured the collection of residual waters (resulted from machine washing), oils, fuels, and then their introduction into a decanter that is periodically cleaned, and that the deposits should be transported to the closest treatment plant.

Supplying with fuel the transportation means should be made only in centralised stations (suppliers). In the case of the equipment that functions at the working points, the supplying is carried out by motor cisterns, in places outside the dust emission areas.

The transportation of the cement slurry by motor concrete mixers will strictly controlled in order to totally prevent the accidental discharging on the route or the washing of the tank and the discharging of the cement slurry in the construction works perimeter or on public roads.

Within the site installation it has to be assured the discharge of meteoric waters that wash a large surface, on which there can be different substances from the eventual losses, in order not to form swamps that in time can infiltrate underground, polluting the soil and phreatic layer. Their discharge can be made at the closest emissary or even on the surrounding soil after passing through a basin – decanter.

The domestic waste waters coming from the site installation must be introduced in a septic tank that will be emptied periodically.

Fr the construction phase there should be provided funds and the Contractor’s obligation to take all environmental protection measures for polluting or potentially polluting objectives (production base, materials deposits, site installations, soil quarries). The Contractor has also the obligation of the ecological reconstruction of occupied or affected lands.

Levelling the vegetal soil from the areas that will be permanently used (e.g. the new bridges area) and grassing with them the soil areas that are not covered with vegetation, after the completing of works.

The monitoring of the construction works will assure the adoption of the measures necessary for the environmental protection.

1.4.4.2 During Operation

An applicable measure is the intensification of the implementation of European norms regarding the use of lead-free gasoline that will have the effect of protecting the air quality as well.

Another possible measure is the replacement of salt with calcium chloride, in the mixtures spread for melting the ice during the periods with meteorological phenomena that are unfavourable for the road traffic.

Periodical check-up of the collection, treatment and discharging system of the meteoric waters;

Periodical check-up of the quality of the soil (pH, heavy metals) from the road area should be performed.
1.4.5 FLORA AND FAUNA

1.4.5.1 During Execution

Modern burning system equipment will be used, in compliance with EURO II regulations.

Necessary measures will be taken to avoid unnecessary vegetable soil scraping. The vegetable soil resulting from scraping will be used to cover road shoulders.

Most of the oak trees located south of the road in Lempes area will be preserved.

1.4.5.2 During operation

Strictly referring to the loading of the area atmosphere with pollutant agents resulted from the motor traffic we can consider that there are few elements that can lead to the mitigation of the impact produced by these. This will be achieved in time, as the restricting legislative measures regarding the vehicle emissions are put in practice.

Although the area, that the road passes through, is, on one hand, a balanced natural ecosystem, and on the other hand, has well-structured forest spaces, for their protection it is not considered necessary to carry out a special study regarding the animal walking routes and to build protection fences, taking into account the low traffic and the numerous new built footbridges, that can be crossed by the small and crawling animals. Fragmentation produced in Lempes area to the track of game is mitigated by the possibility to use the under passage offered by the works of art proposed in the area (over DJ 112A).

1.5 CONCLUSIONS OF THE ENVIRONMENTAL IMPACT ASSESSMENT

The execution phase produces significant short-term impacts with mainly reversible effects. It is estimated that the impact reduction and elimination measures, as recommended in this report, as well as the contractor’s obligations to comply with the environmental laws in force upon the signing of the agreement are sufficient to remedy most of the impacts identified for the execution phase.

Therefore, an appropriate behaviour with respect to environmental protection, construction and waste management is required through the Technical Specifications, in the next project phase.

The proposed investment will have no significant impact on the environment during operation.
2 ENVIRONMENTAL MANAGEMENT PLAN

Introduction

The city of Brașov has a population of 311,059, being one the most important city, from cultural and industrial point of view, of central part of Romania.

Project is located within and outside built-up areas of Brașov municipality, Harman, Sânpetru and Bod communes, Codlea town, beginning from the Eastern part of the municipality on CR 103A (Zizinului Street) up to up to its Western part (National Road no. 73 towards Pitești).

From the setting perspective, it has to be noted the proximity of Lempeș Forrest, a Natural Designated Area, in which the most important habitats are located on slopes with exposure towards south. The development of the proposed project would have no impact on those areas.

This project requires well-known, simple construction works, such as:

- digging in areas where the current route is located and additional earth transport to ensure the superelevation of the current level where it might be flooded by rivers.
- laying a foundation of gravel and crushed stone layers on top of which asphalt is laid using specialised equipment.
- construction of bridges to allow passage of high water during heavy rain.
- construction of support walls and river bank protections where there is a danger of bank sliding.
- construction of long barriers in dangerous areas to prevent cars running on the road from falling into the river.
- placing warning traffic plates and milestones, marking with dye the road axis and the road sections where overtaking is forbidden.

It is intended that all these construction works should be completed in 3 years and modern equipment and trucks will be used to this end.

Relevant Legislation

The Environmental Management Plan was drawn in compliance with legal requirements of the Romanian Laws and Normative:

- Law no 137/1995: “Environmental Protection”,
- Law no 98/1994: “Contravention to the Legal Norms for the Public Health Protection”
- Law no 90/1996: “Labour Protection”
- Law no 645/2002:” Integrated Pollution Prevention”
Regarding the project of By Pass of Brasov city, the designed works are the following objects – that shall be executed:

The main environmental risks are the followings:

1. construction – minor impacts, that’s means risks associated with contamination of the environment factors; traffic accident, dust; exhaust; noise / vibrations;

2. operational – anticipated impacts, as accidents, accidental pollution of soil and river water, etc.

It will provide to maintain arrangements whereby he can quickly call out labour outside normal working hours to carry out any work needed for an emergency associated with the Works. It is provided two levels of responsibility with environmental issues and EMP. During the construction’s works the constructor will specify a person that will be responsible with the safety environmental. This person will be able to solve the problems that can occur regarding the environmental issues and for the eventually hard problem the Constructor established an environmental safety team’s hierarchy.

The second level of responsibility belongs to Client’s employees. After the take-over of work and after the designed training of personnel, the Client will nominee a responsible person for environmental safety.

During the construction it provided that the safeguard of site be training for acting in case of environmental damage (hierarchy of announcements: Constructor, Engineer, Local Utilities etc).

**Pollutant sources during Construction Phase**

The Environmental Management Plan shall take into account the fact that works are to be executed in their main part out side of the city, along the existing routs or along some agricultural and meadow lands. The following are to be considered:

- Employment Opportunities – mainly using local manpower, it will be not necessary to provide special housing for the working teams (measures for environmental protection). According to this situation it is provided training in environmental issues and EMP with all staff of each work point.

- The Working Program will be announced publicly in order to inform the adjacent public areas. Working Program is established in such a way to minimise the possible noise sources (impact to the environment) into an acceptable range. An attention will be paid to the action of keeping the emitted noise and vibration on Site at minimum possible level. Regarding the reducing of noises is provided some actions as: the pneumatic devices will be working only during the announced work schedule, it will be forbidden to maintain in work the pneumatic devices without loading. Regarding the reducing of noises of trucks it will be provided a well maintenance of engine and the loading/charge mode will be made with engine off. The construction equipment will be provided with noise dumps. The silencer devices will be according to Romanian standard 10009/88, 6165/86 and European Norm 86/188/CEE.
Execution of Earthworks will take into consideration Contract requirements, so the dust emissions to be reduced to the minimum values (cover for the earth transporting trucks) and cleaning of access and internal roads and platforms. It is provided the operations of cleaning all spilled dirt, gravel or other foreign material caused by construction operations from all streets and roads at the conclusion of each day’s operation. For these reasons it will be provided a drainage system for collect the waste water from daily road/platform cleaning and/or water aspersing of road in dry period.

Potential odours sources will be reduced by means of containers used for collecting and transporting the materials resulted after cleaning and sanitation. Storage of these materials will be in special designated places (Local Environmental Agency);

For the sanitary facilities for the site personnel mobile toilets shall be installed (10 persons for each cabin, according to work’s period).

The excess earth will be disposed far from site, in designated places. All the deposits of disposal will be designated complying with HG 155/1999 (regarding management of wastes) and with the Government Order no.78/2000 (regarding the wastes). The vegetal soil will be stored carefully and protected from wind and water erosion. The vegetal soil (for the green areas) shall be disposed carefully, before ending the works this soil should be reinstated. The topsoil will be stripped from the areas affected by temporary or permanent works including compounds areas and stored for re-use.

The dismantled installations will be transported and disposed in an area special designated by the Employer and approved by the Environmental Protection Agency, if will be the case.

All the material will be used only in accordance with their quality certificate. All materials will have quality certificate and will be according to approved Quality Assurance Document. The quality of materials and the adequate program of maintenance, will assure a guaranty of environment protection and a well quality of treated water.

Construction Equipment safe from leakages and infestation of soil will be used. According to this reason the reservoirs designed to be used will had the technical agreement for foresee the leakages. It was provided a work’s actions of reservoir’s checking for foresee also the leakages (comparison of storage volume at different times of day).

It is forbidden to use the roads area for the return of supplier or contractor trucks, without traffic signalization.

Public services disturbed by the execution of works shall be reduced to a minimum. Any possible malfunctioning shall be public announced before happening.

The access roads to properties adjacent to the sites will be as possible maintained and, if not, temporary access roads are taken into consideration. All the intention to use the adjacent roads will be operated after the discussions and approval of Local Traffic Authorities; all these roads should be signalled, specifying the period of the deviation or of the operation.
− The safety and health protection of the workers and of the personnel will be assured by specific means as, interdiction for the disposal of wastes, installations or materials in adjacent area.

− It is provided to take all practicable measures to prevent the deposition of silt or other material in, and the pollution of, or damage to, any existing watercourse, canal, lake, reservoir, borehole, aquifer or catchments area, arising from his operations and acts of vandalise. The required storages of oil, fuel etc will be made in special reservoirs, laid on concrete platform in Constructor’s Site warehouse. It will be provided drainage channel for eventually leakages.

− Measures to protect and preserve existing trees to be retained on the site will be taken. The planting, staking and maintenance of trees in the advanced nursery stock category will be carried out. It foresees to avoid cutting of existing trees.

− The project involves construction’s action that result waste materials. According to this reason the constructor in correlation with local Authorities will select the waste materials by future designed using point of view. In accordance with the conclusions of correlations between Constructor, Client and Local Authorities the waste material could be using as: backfilling material for other site (Local Authorities), debris from waste material that will be transporting to dump good storage (by Constructor).

Pollutant sources during Operations Phase

− Measures for accident and seepage control of some chemical liquid pollutants; recovery and mitigation measures will be take by the specialised company will operate and maintain this route.

− The use of chemical substances during winter season, as de-icing agent has to be in accordance with subsequent environmental legislation.

− For each of the possible non expected (dangerous) situation has to be proposed operational and mitigation measures; all the dangerous situations will be signalled by the control equipment.

− All the people in the operation and maintenance services of the company will be regularly trained with new environment legislation.
### A. MITIGATION PLAN

<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigating Measure</th>
<th>Cost</th>
<th>Institutional Responsibility</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Install: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>• Possible community disruption resulting from access by construction vehicles</td>
<td>organise traffic management</td>
<td>N/A</td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>• Noise increase for nearest residents resulting from construction activities</td>
<td>construction programme; construction equipment with low level of noise</td>
<td>N/A</td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>• Possibility of accidents, but site has to be secure against public access. Possibility of road accidents involving haulage vehicles.</td>
<td>traffic management</td>
<td>N/A</td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>• Possibility of local contamination by construction chemicals, oils, etc.</td>
<td>strict management of all construction materials</td>
<td>N/A</td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>• Exhaust emissions (at construction site and on haulage routes) from vehicles and construction equipment.</td>
<td>emission control</td>
<td>N/A</td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>• Possible requirement for floodlighting</td>
<td>proper management of light</td>
<td>N/A</td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td>Construction (cont.)</td>
<td>• Requirement for construction materials and landfill volume for disposal of waste materials.</td>
<td>as much as possible will be used local construction material</td>
<td>N/A</td>
<td>Constructor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Operate: N/A (normal requirements of Technical Specs)</td>
<td></td>
<td>Constructor</td>
<td></td>
</tr>
</tbody>
</table>

23
<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigating Measure</th>
<th>Cost</th>
<th>Institutional Responsibility</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Possibly community disruption resulting from construction vehicles in residential streets</td>
<td>• traffic management&lt;br&gt;(normal requirements of Technical Specs)</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td></td>
<td>• Possibility of accidents, if sites are not secure against public access</td>
<td>• signalization of all working areas&lt;br&gt;(normal requirements of Technical Specs)</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Operation</td>
<td>• Excessive vegetation near the road</td>
<td>• root control by grass cutting&lt;br&gt;(normal maintenance during road operations)</td>
<td>N/A</td>
<td>NCHNR</td>
<td>NCHNR</td>
</tr>
<tr>
<td></td>
<td>• Possible alteration of the soil structure and composition by over usage of salt as de-icing agent</td>
<td>• optimum usage of salt or replacement with calcium chloride&lt;br&gt;(normal maintenance during road operations)</td>
<td>N/A</td>
<td>NCHNR</td>
<td>NCHNR</td>
</tr>
<tr>
<td>Decommissioning</td>
<td>• temporary occupied lands</td>
<td>• affected areas will be cleaned and levelled,&lt;br&gt;all land will be restored with topsoil and vegetation.&lt;br&gt;final payment of the Contractor will require that the site is cleared of all waste material&lt;br&gt;(normal requirements of Technical Specs)</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
</tbody>
</table>
**B. MONITORING PLAN**

In order to monitor the quality of the environmental factors and activity, it is considered necessary the general contractor to contract a specialised company, to monitor his environment-related activities on a monthly basis, during the whole construction period.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not required</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Air</td>
<td>Most affected residential areas</td>
<td>NO$_x$, CO, SO$<em>2$, PM$</em>{10}$, TSP, VOC and acrolleline</td>
<td>Monthly, by a specialised company</td>
<td>Not applicable</td>
<td>Constructor, Constructor</td>
</tr>
<tr>
<td></td>
<td>Water</td>
<td>Most vulnerable areas to pollutant releases</td>
<td>pH, solid suspensions, dry filterable residuum at 150 °C, Ca$^{2+}$, Mg$^{2+}$, SO$_4^{2-}$, COD, BOD, oil products</td>
<td></td>
<td>1000 USD/month</td>
<td>Constructor, Constructor</td>
</tr>
<tr>
<td></td>
<td>Soil</td>
<td>Most vulnerable areas to fuel discharges</td>
<td>Total hydrocarbons from oil products</td>
<td></td>
<td>Not applicable</td>
<td>Constructor, Constructor</td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Most affected residential areas</td>
<td>Noise levels – dB(A)</td>
<td></td>
<td>Periodic, together with traffic census</td>
<td>NAR, NAR, NAR, NAR</td>
</tr>
<tr>
<td></td>
<td>Vegetation</td>
<td>Most affected areas</td>
<td>Dust deposition</td>
<td></td>
<td>NAR, NAR, NAR, NAR</td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Noise</td>
<td>Most affected residential areas</td>
<td>Noise levels – dB(A)</td>
<td></td>
<td>Periodic, together with traffic census</td>
<td>NAR, NAR, NAR, NAR</td>
</tr>
<tr>
<td>Decommission</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Not required; before final site hand-over performed by the same specialized company, for all environmental media</td>
<td></td>
</tr>
</tbody>
</table>
C. INSTITUTIONAL STRENGTHENING

1. Equipment Purchases (Tabular Presentation Preferred)

Not applicable. In order to monitor the quality of the environmental factors and activity, the general contractor should contract a specialised company to monitor his environment-related activities on a monthly basis, during the whole construction period.

2. Training/Study Tours

Not applicable. The Contractor shall present an Health, Safety & Environment Officer, with relevant training and experience in the field. Contractor shall provide to all employees general environmental awareness training, as part of their standard health & safety training.

3. Consultant Services

In order to monitor the quality of the environmental factors and activity, it is considered necessary the general contractor to contract a specialised company, to monitor his environment-related activities on a monthly basis, during the whole construction period.

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The pollution aspects in the investigated area can be generated by traffic, construction equipment, asphalt and concrete plants, fuel storages, quarries, temporary occupation of the agricultural land for site management.

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It is considered that the monitoring campaigns can be performed based on a predefined scheme. This approach will reveal the maximum values and the exceptions, the results will be presented as diagrams compared with the background and limit values, monthly reports will be elaborated.

This methodology will clearly show the lacks and mistakes in the site management or in the equipment maintenance.

The reports will also show the measures that should be taken, such as mitigation measures which can be provide the input for environmental accords and authorisations.

For reducing the costs and necessary time for study elaboration, the following approach is proposed:

- Establishing of the most affected residential areas by the working sites, regarding the air and noise pollution
- Establishing the most vulnerable areas regarding the soil pollution with oil products, such as heavy oil or diesel fuel, and VOC released in the atmosphere:
  - Fuel tanks for heavy oil or diesel fuel;
  - Ramp for charging or discharging of oil products
Establishing the pollutants released in the activity:
- NO$_x$, CO, SO$_2$, TSP, PM$_{10}$, volatile organic compounds (VOC) and acroleine (as air pollutants);
- Total hydrocarbons from oil products (as soil contaminants)
- pH, solid suspensions, dry filterable residuum at 150 ºC, Ca$^{2+}$, Mg$^{2+}$, SO$_4^{2-}$, COD, BOD, oil products (as surface water pollutants).

Establishing the Romanian regulations and EU regulations that impose limit values for the mentioned pollutants, in ambient air, residential areas and soil;

Measurements of air pollutants concentrations, noise levels and soil and surface water contaminations in the vicinity of the working sites;
- Comparison of the measurements results for the specified pollutants with the regulated limits such as:
  - Limit values
  - Alert thresholds for sensible utilities (residential areas or agriculture areas)
  - Intervention thresholds for sensible utilities (residential areas or agriculture areas).

Mathematical modelling studies for air pollutants dispersion in the adjacent area

Planning of the ecological rehabilitation, meant to diminish and eliminate the pollution aspects identified on the site

Elaborating a report which includes also the mitigation measures.

### 3.3 Reporting

A monitoring report should be produced on a monthly basis. The proposed structure is:

- General data
- Methodology
  - Investigations over environmental media (noise, air, soil, water, vegetation)
  - Assessment criteria
- Results of the site investigation.
- Management of construction materials, of deleterious substances and of waste
- Conclusions and recommendations
  - Measures necessary to remediate and mitigate concluded impact

### 4. Special Studies

Not applicable. There is no need for special studies.
D. SCHEDULE

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F. CONSULTATION WITH LOCAL NGOS AND PROJECT-AFFECTED GROUPS

Several public presentation on the project were held in Brasov with all public authorities interested and mass-media, and documentation on the first meeting is attached on Annex F of the EIA report.

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# A. MITIGATION PLAN

<table>
<thead>
<tr>
<th>Phase</th>
<th>Issue</th>
<th>Mitigating Measure</th>
<th>Cost</th>
<th>Institutional Responsibility</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>• Possible community disruption resulting from access by construction vehicles</td>
<td>organise traffic management</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Construction</td>
<td>• Noise increase for nearest residents resulting from construction activities</td>
<td>construction programme; construction equipment with low level of noise</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Construction</td>
<td>• Possibility of accidents, but site has to be secure against public access. Possibility of road accidents involving haulage vehicles.</td>
<td>traffic management</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Construction</td>
<td>• Possibility of local contamination by construction chemicals, oils, etc.</td>
<td>strict management of all construction materials</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Construction</td>
<td>• Exhaust emissions (at construction site and on haulage routes) from vehicles and construction equipment.</td>
<td>emission control</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Construction</td>
<td>• Possible requirement for floodlighting</td>
<td>proper management of light</td>
<td>N/A</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Phase</td>
<td>Issue</td>
<td>Mitigating Measure</td>
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<tr>
<td>------------</td>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
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</tr>
<tr>
<td>Construction (cont.)</td>
<td>• Requirement for construction materials and landfill volume for disposal of waste materials.</td>
<td>• as much as possible will be used local construction material</td>
<td>N/A (normal requirements of Technical Specs)</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td></td>
<td>• Possibly community disruption resulting from construction vehicles in residential streets</td>
<td>• traffic management</td>
<td>N/A (normal requirements of Technical Specs)</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td></td>
<td>• Possibility of accidents, if sites are not secure against public access</td>
<td>• signalization of all working areas</td>
<td>N/A (normal requirements of Technical Specs)</td>
<td>Constructor</td>
<td>Constructor</td>
</tr>
<tr>
<td>Operation</td>
<td>• Excessive vegetation near the road</td>
<td>• root control by grass cutting</td>
<td>N/A (normal maintenance during road operations)</td>
<td>NCHNR</td>
<td>NCHNR</td>
</tr>
<tr>
<td></td>
<td>• Possible alteration of the soil structure and composition by over usage of salt as de-icing agent</td>
<td>• optimum usage of salt or replacement with calcium chloride</td>
<td>N/A (normal maintenance during road operations)</td>
<td>NCHNR</td>
<td>NCHNR</td>
</tr>
<tr>
<td>Phase</td>
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</tr>
<tr>
<td>Decommissioning</td>
<td>• temporary occupied lands</td>
<td>• affected areas will be cleaned and levelled,</td>
<td>Install</td>
<td>Operate</td>
<td>Install</td>
</tr>
</tbody>
</table>
B. MONITORING PLAN

In order to monitor the quality of the environmental factors and activity, it is considered necessary the general contractor to contract a specialised company, to monitor his environment-related activities on a monthly basis, during the whole construction period.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td>Not required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Air</td>
<td>Most affected residential areas</td>
<td>NO$_2$, CO, SO$<em>2$, PM$</em>{10}$, TSP, VOC and acrolleline</td>
<td>Monthly, by a specialised company</td>
<td></td>
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<tr>
<td></td>
<td>Water</td>
<td>Most vulnerable areas to pollutant releases</td>
<td>pH, solid suspensions, dry filterable residuum at 150°C, Ca$^{2+}$, Mg$^{2+}$, SO$_4^{2-}$, COD, BOD, oil products</td>
<td>Not applicable</td>
<td>1000 USD/month</td>
<td>Constructor</td>
</tr>
<tr>
<td></td>
<td>Soil</td>
<td>Most vulnerable areas to fuel discharges</td>
<td>Total hydrocarbons from oil products</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Most affected residential areas</td>
<td>Noise levels – dB(A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vegetation</td>
<td>Most affected areas</td>
<td>Dust deposition</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Operation</td>
<td>Noise</td>
<td>Most affected residential areas</td>
<td>Noise levels – dB(A)</td>
<td>Periodic, together with traffic census</td>
<td>NAR</td>
<td>NAR</td>
</tr>
<tr>
<td>Decommission</td>
<td></td>
<td>Not required; before final site hand-over performed by the same specialized company, for all environmental media</td>
<td></td>
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<td></td>
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