FEASIBILITY STUDY FOR RAILWAY INFRASTRUCTURE NEED ASSESSMENT IN MOLDOVA – ENVIRONMENTAL AND SOCIAL APPRAISAL TASK 4

REF: EME – FR01T16G53-11

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SYSTRA

MOLDOVAN RAILWAY RESTRUCTURING PROJECT

FEASIBILITY STUDY FOR RAILWAY INFRASTRUCTURE NEED ASSESSMENT IN MOLDOVA – ENVIRONMENTAL AND SOCIAL APPRAISAL TASK 4

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4. LEGAL REQUIREMENTS

The Environmental and Social Impact Assessment process is mainly based on and guided by the following documents:

- The Moldovan legislation on the Environmental Impact Assessment (Law No. 86 on Environmental Impact Assessment of May 29, 2014);
- Performance Requirements of EBRD's Environmental and Social Policy (2014);
- EIB's environmental and social requirements given in their Environmental and Social Handbook (2013);
- International conventions applied in Moldova, especially the Convention on Access to Information, Public Participation in Decision-Making Process and Access to Justice in Environment (Aarhus, 1998), ratified in 1999;
- European Union Council Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Council directive 2014/52/EU, entered into force on May 15, 2014;
- The Government Decision No. 301 of April 24, 2014 on the approval of the Environmental Strategy for the years 2014 - 2023 and of the Action Plan for its implementation (Published in the Official Monitor no. 104-109 of May 6, 2014)
- Concept for "The Establishment and Development of National Network of International Transport Corridors" (dated April 05, 2002);
- Strategy for Transport and Logistics for 2013 – 2020;
- The Freight and Logistics Strategy for the period 2013 - 2020 (approved on September 4, 2013).

The Ministry of Environment, as the Competent Authority for the issuing of the Environmental permit, submitted to CFM the letter No. 04-07/2011 dated September 28, 2016 with detailed description of the procedural steps related to the preliminary assessment and with related timeframe which are stipulated by the Law on EIA No. 86/2014 in the Republic of Moldova.

4.1 The screening process

If a project is listed in Appendix 2 of the Law on EIA No. 86/2014, before any application for development consent can be considered, the developer must apply in writing to the Competent Authority to undertake a "Preliminary assessment" to determine whether or not EIA is required. This decision is equivalent to a "Screening Determination" under the EU EIA Directive.

This request should be submitted to the Competent Authority together with information (i.e. a "screening report") that would allow them to make a determination.

Dialogue between the developer and the authority will often be useful in making a screening decision. The Environmental Authority will also find it useful to consult with and take advice from other Official Consultees.

The decision should take no longer than 10 working days. The Competent Authority will post information about the receipt of the application and its decision on its website. It the event that an EIA is not required, the project proposal will be subject to the state environmental expert examination as part of the development consent procedure.

NB. More information on the sceening process stipulated by the Law on EIA No. 86/2014, including the public involvement in screening, are provided in the Inception Report.

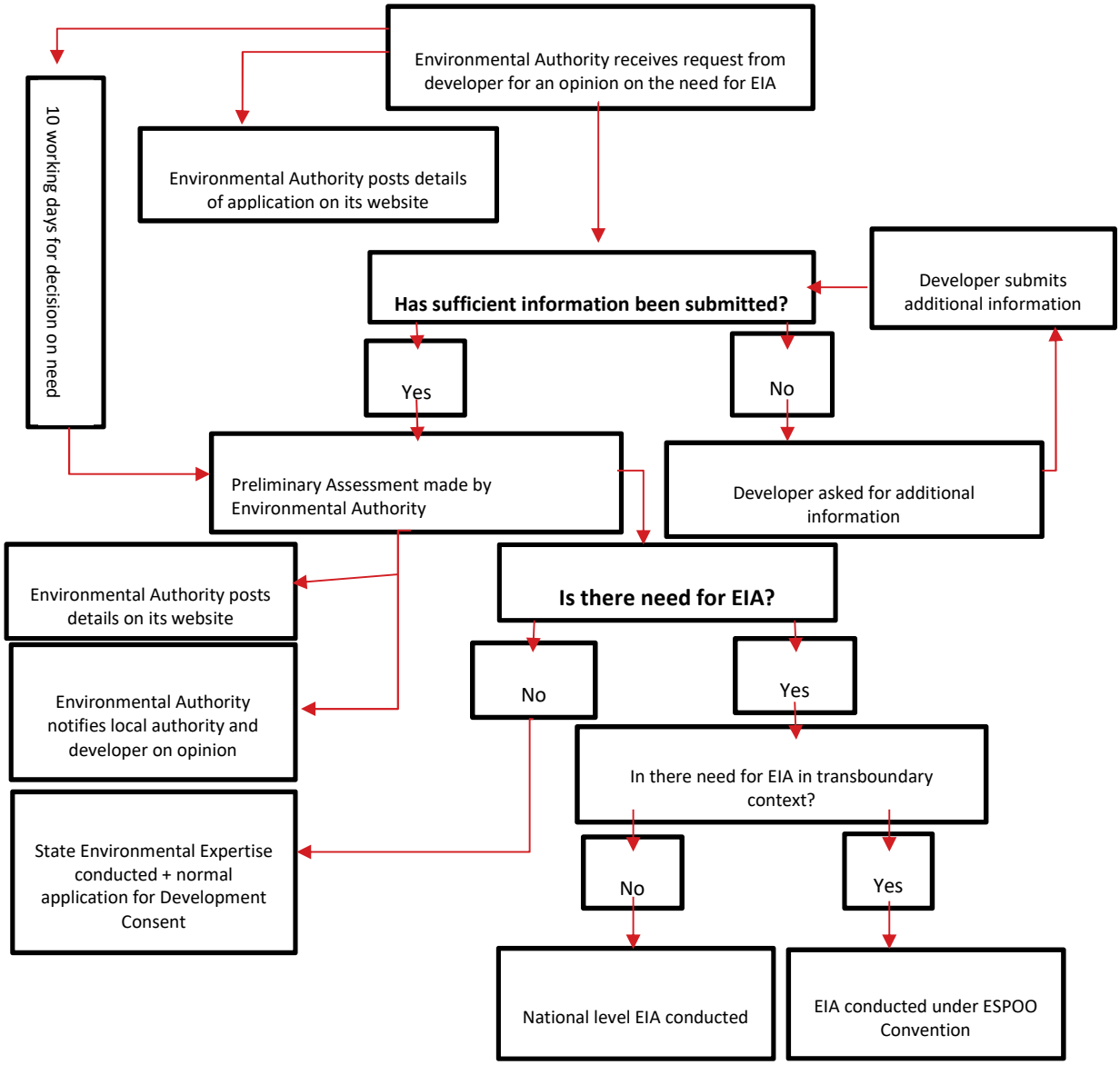


Illustration 7. The EIA screening process

5. BASELINE CONDITIONS

The following information on environmental baseline is mainly drawn from the existing sources, such as official thematic maps, literature and official internet documents. This information was complemented by data obtained during the field visit.

5.1 Geology

The Geology of the Republic of Moldova is dominated by neogene, quaternary and contemporary deposits. Neogene deposits are developed all over the Republic and are represented by sands and loams, limestone and marls. In the south – west the thickness of Neogene deposits reaches 400 m.

The quaternary deposits are also developed almost all over Moldova. In the river valleys their depth reaches 30 m. The thickness of deposits is increasing from north to the south. Loess-type loamy soils, sands, loams, silts and pebbles of the river valleys are prevalent.

Contemporary deposits are represented by deposits of gullies, waterway channels, various embankments, dams, channels, and contemporary landslide deposits. Most underground water bearing strata are formed by neogene deposits.

The project area is located within South of Moldova. The relief of this area is considerably cut with ravines and characterized by high seismic activity. As regards seismicity the Project route runs through two seismic regions: Center – where the earthquakes up to level 7 on the Richter scale may occur. South - in this seismic region earthquakes up to level 8 on the Richter scale may occur.

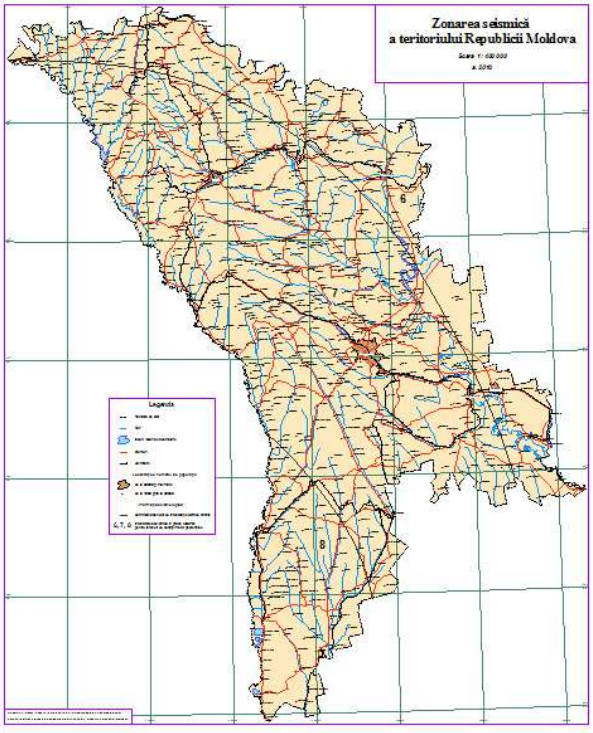


Illustration 8. Seismic map of Moldova

Moldova does not have any major mineral deposits but natural resources include deposits of limestone, sandstone and gypsum.

5.2 Geomorphology

The territory between Prut and Nistru Rivers is a part of a plateau that extends from the Bucovina Mountains and the Moldavian Sub-Carpathians in the West to the Nistru River in the East. On the left bank of Nistru River are the South-Western branches of the Podolia Plateau.

The relief is rather fragmented, with the highest fragmentation density in the Center and the South-Western part of the country (Ialpug Plain). Relatively reduced values of the fragmentary density are in Northern Moldova Plateau and in the Lower Nistru Plain. The relief, along with other geo-ecological, biotic and socio-human elements contributed to the landscape and eco-systems evolution. The evolution of the geo-ecological complex took place at the end of the Upper Pleistocene and in the first half of Holocene. The biotic complex (vegetation and fauna) and soils were formed in the second half of the Holocene.

5.3 General Topography and Landscapes

The topography of the country is generally characterized by hills and plains, with the plateaus being mainly located in the Central part, which is slightly inclined from the South-East. Overall, the country is relatively low-lying, with semi-arid steppe developed in the plains in the southern parts. The hills in the Central part of the country are densely forested, while arable fields replaced the natural grass cover of the plains and steppes in the North and South. Absolute elevations hardly exceed 400 m, the absolute maximum (429 m) is reached in the Central part of the country. The relief altitudes vary from 5 m (Giurgiulesti and the end point of the Study corridor).

The territory of the country is divided into two natural zones and five landscape regions:

5.3.1 Forest Steppe Zone

This natural zone occupies the northern and central parts of the country and is characterized by alternating plains and plateaus. The flora of this zone is rich with characteristic forest, steppe and meadows formations. Soils are mainly composed of normal and leached chernozems, as well as dark chestnut and brown soils in the oak and beech forests and under the meadows. According to the physico-geographical conditions the forest steppe zone can be distinguished into three landscape regions:

- Region of plateaus and forest steppe plateaus in the North of the country;
- The region of plateaus and plains with grasslands of the Baltic Steppe;
- The plateaus of the Codrii forests in the central part of Moldova.

5.3.2 The Steppe Zone

Is located in the South and Southeast of Modova. It comprises elements of the steppe and forest steppe but has a lower biodiversity than the latter. Within this zone normal carbonic and leached chernozems as well as regularly flooded meadow soils prevail. The landscape regions of the Steppe Zone are:

- The steppe plains of the lower Nistru River terrace, situated in the South-East of Moldova;
- Fragmented plains of the Bugeac Steppe in the Southwest and South of the country.

The level of degradation of the natural landscapes of Moldova is high due to intensive agriculture and high population density. Agricultural land occupy 75.14% of the territory of the country, forests – 9.6%, swamps – 0.16%, steppes and wet meadows are preserved as grazing fields – 11.23%. Of the latter only about 5% have preserved their high natural value; about 30% are still capable of self regeneration, the rest is degraded due to overexploitation. Seriously degraded soils occupy more than 13% of the country.

5.3.3 Natural Hazards

The territory of the Republic of Moldova is exposed to some unfavorable natural processes and phenomena, such as erosion, landslides, earthquakes, etc. Torrential rains, draughts, desertification processes, strong winds, tornadoes, hails, spring and autumn frosts are other common natural phenomena in the region.

Natural calamities like droughts, heavy rains (often with hail), massive floods, hurricanes, snowstorms, extremely cold winters and other destructive processes became increasingly frequent in the recent past. During the warm periods of 2004 and 2008 several heavy rains (often with hail) occurred during May, July and August, sometimes accompanied by storms and vortexes. During the warm period 2007 heavy drought was recorded in May – September, causing high social and economic damage.

Moldovan landscapes are naturally susceptible to landslides, a phenomenon that is often triggered by human activities such as construction on dangerous slopes resulting from poor physical planning.

5.4 Soils

Three-quarters of the country are covered with fertile chernozem soils which is the main natural resource in Moldova. The naturally productive soils and favourable climatic conditions support substantial and diverse agricultural production such as wheat, corn, barley, tobacco, sugar beets, soybeans, sunflower, fruits and vineyards. Beef and dairy cattle, as well as pigs, sheep and poultry are raised on a family farm scale. In the South of the country the prevailing soil type is simple chernozem, one of the most fertile types of soils.

Alluvial soils characterize the floodplains, while the lower reaches of the Prut and southern river valleys have saline and marshland soils. The excessive use of chemical fertilizers, pesticides, and herbicides during the Soviet period has generally resulted in significant contamination of the soil and groundwater.

5.4.1 South zone

The soils of the South Plain are characteristic of typical chernozem humus and carbonate weak, vertices chernozems, solonetzs, saline soils. In this area were investigated agroclimatic carbonated typical chernozem and cambic. Data analysis shows that the soils investigated in southern regions are classified for the most part as moderately alkaline. Ph values ranging from 8.2 to 8.8 aqueous extract.

Humus content in soils of southern localities: very low (10%), low (30%) and moderate (60%) and varies from 1.06 to 3.92 %. The values of nitrates in soils in the South ranges from 10.51 mg NO_3/kg up to 117.90 mg NO_3/kg and not exceeding MAC (Maximum Allowable Concentrations), except the value of 133.30 mg NO_3/kg detected in the soil in the agricultural field an area of 80 ha (barley) from exceeding 1.03 MAC in Tomai villageAG.

5.5 Climatic factors

The climate of Moldova is moderately continental and characterized by a lengthy frost-free period, a comparatively mild winter, considerable temperature fluctuations and erratic rainfall, and, in the south, extended droughts. Average temperatures are -3.5°C in January and +21.4°C in July. The warm period of the year lasts about 193 days. Average annual rainfall decreases from 711 mm in the North-West to 600 mm in the South-East.

Extreme lows near −36 °C in the north and excessive highs of about 41 °C in the south have been recorded. The country receives highly variable amounts of precipitation, usually averaging 500 mm annually, with totals a little lower in the south, but these figures conceal variations that may double the quantity in some

years and result in prolonged dry spells in others. Most precipitation occurs as rain in the warmer months. Heavy summer showers coupled with the irregular terrain cause erosion problems and river silting.

Winter snow cover is thin. Winds tend to come from either the Northwest or Southeast.

5.6 Air emissions

While 20-25 years ago the industrial and energy sectors were the main polluters, transport represents the current main source of emissions. According to the Ministry of Environment and the State Hydrometeorological Service, noxious emissions have increased by 10 - 15% p.a. during the last five years. Due to the significant increase of imported second-hand motor cars, road transport, including railway transport that use outdated Diesel locomotives, accounts for about 90% of total emissions.

	Year	The emissions mass, tons	CO	Hydrocarbons	NO_2	SO_2	Aldehydes	Solid substances
Auto transport	2012	140 052,5	107 614,3	13 657,5	12 922,8	3 016,0	1 010,8	1 831,3
	2013	213 067,1	154 889,4	22 824,5	23 544,1	6 368,5	1625,0	3 815,5
Air transport	2012	11 406,5	9 732,4	1 017,5	553,0	44,2	26,5	33,2
	2013	10 681,2	9 113,3	952,8	517,8	41,4	24,9	31,1
Railway transport	2012	2 684,2	1 013,2	371,1	779,0	282,9	64,3	173,6
	2013	2 847,5	1 085,0	392,6	821,3	298,0	67,8	182,9
Fluvial transport	2012	6,3	1,8	0,7	1,6	0,6	1,3	0,4
	2013	13,1	4,6	1,8	4,0	1,5	0,3	0,9

Illustration 9. Air emissions caused by the transport

Pollutant name	No. of stationary posts	No. of observa-tions	Annual concentrations				The number of days exceeding 1 mm MAC	Pollution Index
			average		mm - maximum of momentary, recorded for 20 minutes			
			mg/m³	The amount in the MAC per day	mg/m³	The amount in the MAC per day		
Solid suspensions	2	794	0,04	0,3	0,3	0,6	-	0,29
	3	799	0,04	0,3	0,4	0,8	-	0,29
	4	799	0,04	0,3	0,6	1,2	1	0,27
	5	792	0,04	0,3	0,2	0,4	-	0,24
Sulfur dioxide	2	781	0,001	0,02	0,007	0,01	-	0,01
	3	783	0,001	0,02	0,007	0,01	-	0,02
	4	786	0,001	0,02	0,005	0,01	-	0,01
	5	798	0,001	0,02	0,017	0,03	-	0,03
Carbon monoxide	2	784	1,5	0,5	4,0	0,8	-	0,55
	3	787	1,5	0,5	2,0	0,4	-	0,56
	4	789	1,5	0,5	2,0	0,4	-	0,54
	5	801	1,7	0,6	3,0	0,6	-	0,60
Nitrogen dioxide	2	781	0,02	0,5	0,28	3,3	10	0,44
	3	783	0,02	0,5	0,12	1,4	2	0,42
	4	786	0,02	0,5	0,07	0,8	-	0,40
	5	798	0,04	1,0	0,16	1,9	14	0,93
Formic aldehyde	3	606	0,005	1,7	0,330	9,4	-	1,86
	5	618	0,010	3,3	0,098	2,8	23	4,45

MAC = Maximum Allowable Concentrations

Illustration 10. The characteristic air pollution from stationary observation posts in the municipality Bender for 2014 year

While estimates of traffic borne emissions do exist for Chisinau, no such data are available for the rural areas, including the studied southern railway corridor. However, given the lack of any significant stationary sources of emissions (e.g. industries), the current traffic volumes and the open character of the landscape it can be assumed that air quality is not currently an issue of significant environmental concern in the studied corridor.

As regards the existing railway itself the stands of trees and / or bushes that are found along many sections of railway play a significant role in protecting adjacent arable fields from the accumulation of traffic borne pollutants. Within settlements avenue trees also have important functions in filtering pollutants, thereby contributing to the protection of air quality and thus the health of the local population.

Moreover, these trees and shrubs minimize the effects of wind erosion on the adjacent arable lands, provide food and shelter to a number of animals and, given the linear shape of these avenues, functioned as bio-corridors.

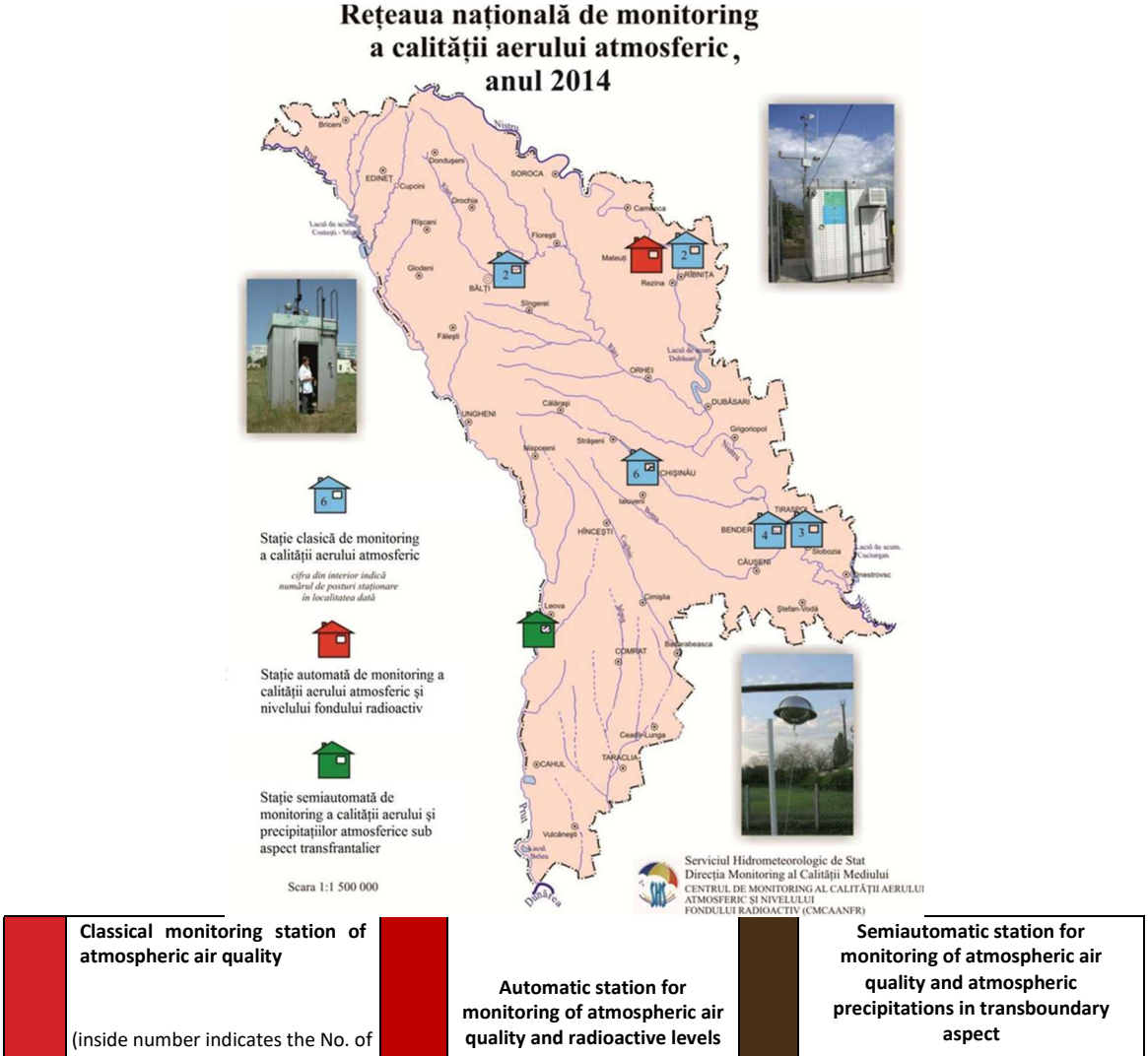


Illustration 11. National network monitoring of atmospheric air quality, year 2014

5.7 Hydrology and Drainage

The country has a well-developed network of rivers and streams, all draining south towards the Black Sea lowlands, and eventually into the Black Sea. Out of the 3 600 rivers and streams only 8 rivers and streams exceed 100 km in length. In fact, many of these are small, shallow streams that dry up during the summer. The Nistru, Moldova's main river, is navigable throughout almost the entire country, and in warmer winters it does not freeze. River Prut is a tributary of the Danube, which it joins at the far southwestern tip of the country (close to the end of the Project railroad). Over 95% of the surface water in Moldova drains into Prut or Nistru Rivers.

Most of the internal rivers are canalized, with regulating dams and flood protection dykes, built in cascade and regulated by weirs. Those reservoirs have been designed to trap sediments, provide water for irrigation, domestic and industrial needs, and support fishery. Local surface water resources (ponds, reservoirs, small rivers) are strongly affected by soil erosion, contaminated runoff from the earth surface, waste water discharges and unauthorized waste disposals/dumps.

The floodplains of several small rivers might be exposed to flooding, due to climate and landscapes characteristics, poor technical status of weirs and inadequate dam safety management, as several cases of severe floods on small rivers have been reported over the last decade. The railway line in Ciadir Lunga was flooded just during the field trip on November 1, 2016.

The main rivers in the southern part of the country are Cogîlnic and Ialpug, both around 100 km long. Other smaller streams that are crossed by the railroad are (from North to South): Isnovat, Botna, Botnisoara, Ialpujeli, Cirsova Mare, Cerac, Salcea Mare and Cahul. Numerous other streams that are crossed are unnamed. Ialpug, Cogâlnic, and other small southern rivers largely drain into the Danubian estuary nearby Ukraine. Most of the smaller water courses are fed by precipitation, the contribution of groundwater is limited. Maximum water levels are mainly in spring, following the snow melt, and in summer, when torrential rains may cause catastrophic flooding. During the rest of the year such small streams generally fall dry.

Moldova only has a few **natural lakes**, most of them in the Prut and Nistru river floodplains. Water reservoirs were created for various purposes, e.g. irrigation, fish-farming, leisure, industrial and domestic needs, and flood protection.

Groundwater resources are limited in Moldova, especially in the southern part of the country, which is classified as water scarcity area. Groundwater is the major source of potable water supply for the majority of the rural population. The general characteristics of the mostly shallow aquifers are high salt contents of over 1.000 mg/l (in the belt between Comrat and Cahul even exceeding 3.000 mg/l) and nitrate contents. In the EU, the permissible limit of nitrate content for potable water supply is 50 mg/l. This value is apparently exceeded almost everywhere in the south of Moldova, except in the area between Cimislia and Comrat, Balabanu and Vulcanesti and in a small area in the southernmost part of the country.

While high salt contents are mainly due to natural factors such as geologic and climatic conditions, high nitrate contents are caused by agriculture through inappropriate use of organic fertilizers.

5.7.1 Surface Water

Detailed and up to date information on the water quality of the rivers and streams that are crossed by the Project railroad are not available. However an overview of the situation of some selected rivers and streams is provided in map. According to this source water quality of streams generally deteriorates on their way to the south.

While River Botna still has a class III water quality = *moderate pollution with organic substances and nutrients* over a relatively large distance, others like Cogilnic, Ialpug and Cahul deteriorate to class IV = *pollution with organic and anorganic substances, including toxic ones* downstream of larger towns/villages like Cimislia, Ceadir-Lunga and Vulcanesti. Rivers Ialpugel and Salcia Mare have a class II water quality at these points.

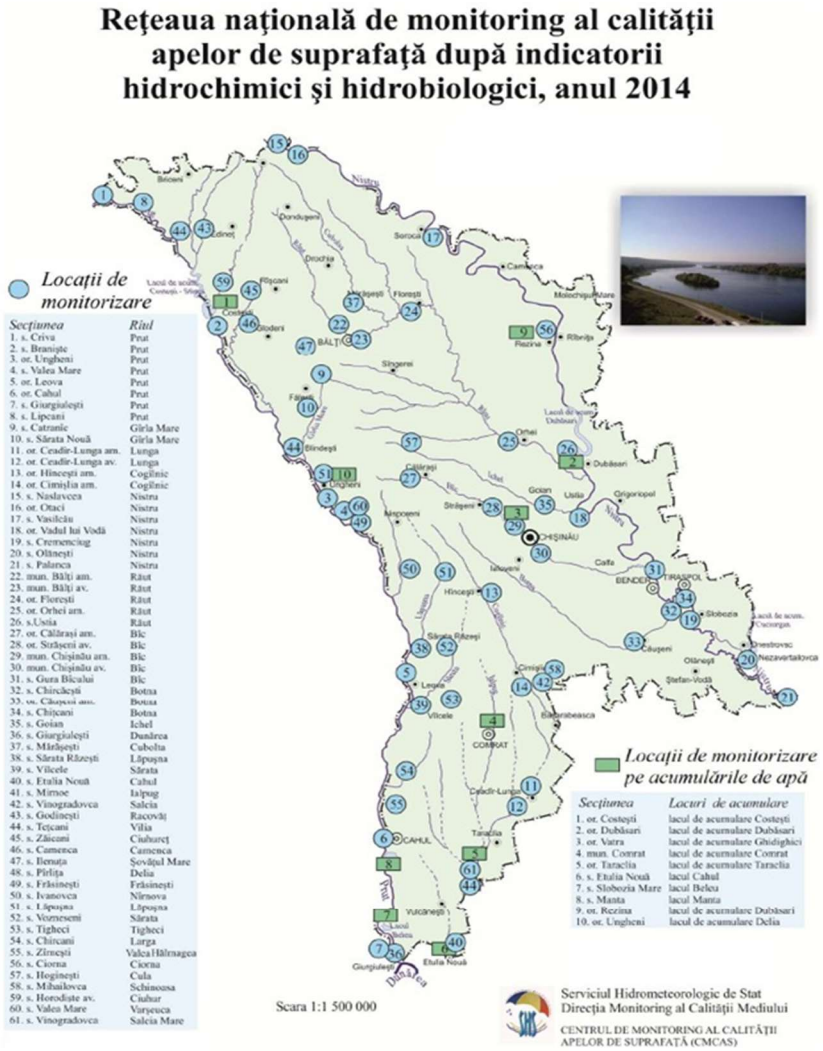


Illustration 12. National network for the monitoring of surface water quality

5.7.2 Biological and ecological resources (fauna, flora, biodiversity, protected species, critical habitats, ecosystems)

The geographic location, climate and landscape of Moldova provide favourable conditions for the occurence of a rich flora and fauna. The Red Book of the Republic of Moldova (2001) includes 126 species of flora and 116 species of rare and/or endangered animal species that are protected by law.

5.8 Flora

As was mentioned earlier in this report, the territory of the Republic of Moldova can be distinguished into two natural vegetation zones, forest steppe and steppe. The *steppe zone* covers the plains and highlands located South and East of the Central *Codrii Plateau* and the *Tigheci Hills*. In addition, steppe vegetation appears in the North of the country (the *Bălti steppe*). Almost all former steppe areas and especially the *Bugeac Region* (through which most of the study corridor runs) are now being used for agriculture. As a result only fragments of natural steppe communities remained, mainly on steep hillsides or areas affected by landslides.

Such steppe fragments are mainly formed by xerophytic *Poaceae*, such as *Festuca valesiaca* and *Stipa* species. *Asteraceae* and *Lamiaceae* are also common. In the very south of the country fragments of sub-desert steppes remain. These communities are sparsely vegetated, resistant to drought and high temperatures and have a short period of growth. They have a less diverse flora than other steppe communities and are dominated by *Andropogon spec., Artemisia spec.* and *Thymus spec.*

Steppe ecosystems include a diverse and unique flora and fauna with a high biodiversity. They play an important role in soil stabilization and are important ecotone habitat elements in the forest and agricultural landscape. The few remaining steppe communities are under constant pressure through the expansion of pastures and overgrazing.

Lush meadows and reed growths occur in parts of the floodplains of the River Prut, while salt-marsh grasslands flourish in the saline valleys of the rivers Cogâlnic, Ialpug, and lower Prut.

The *forest steppe zone* located in the northern part of the country includes forest communities, mostly located in hilly areas alternating with steppe vegetation areas. Moldovan forests basically consist of communities of broad-leaved species (98 %) dominated by oak and acacia. The dominant forest species are english oak and durmast oak (*Quercus petraea*), locally in association with beech (*Fagus sylvestris*). In the South, pubescent oak (*Quercus pubescens*) groves occur on the hillsides. Alluvial forests are spread in the river floodplains and mainly consist of willow (*Salix spec.)* and poplar (*Populus spec.)*.

At the beginning of the 19th century, forests covered about one-third of the country. However, a large increase in population severely reduced the forested areas. At the beginning of 2006 forests covered cca. 363 000 ha (10.7 % of the country's territory). The extensive deforestation in the 19th century has resulted in soil erosion, wind damage, lowering of the water table, flooding, and loss of fauna. The current forestation level is considered insufficient for ensuring an effective ecological balance.

5.9 Fauna

The occurrence and abundance of animal species mainly depends on the type and area of habitats that provide food resources and shelter and on the level of disturbance that these habitats may be exposed to. As most of the former natural steppes have been converted to arable lands many of the typical animal species have disappeared.

The current most common mammals of Moldovan forests are fallow deer, wild boar, fox, badger, squirrel, marten and wild cat. Bird species include orioles, magpies, hoopoes, nightingales, blackbirds, etc.

Typical steppe animals include several species of rodents like hare, hamster and shrew and birds such as skylark, quail and partridge.

The artificial lakes, wetlands and marshes provide ecological niches for many birds, including migratory species. The study corridor is almost entirely located within the Eastern European migration corridor. In

this context, the lakes located along the Project may have important functions as staging or feeding habitats for migratory species.

The same lakes (artificial reservoirs) also support abundant fish resources including carp and perch, bream, ruff and pike from the rivers.

Agricultural ecosystems occupy about 75,6 % of the Republic and are also the prevailing type of land use along the study corridor. Among mammals rodents prevail. Common bird species breeding in these open anthropogenic habitats are skylark, tufted lark, quail, bunting, white wagtail and others.

As regards the protection of biodiversity the 1st National Report of 2001 indicates the following secondary habitats to be of major importance for flora and fauna which should thus be given special attention:

- Lakes;
- Swamps and riparian meadows along the rivers;
- Agricultural areas with perennial crops and mixed cultures;
- Areas with a well-developed mosaic of arable lands and natural vegetation; and
- Animal migration corridors

5.10 Protected areas

5.10.1 Natural State Protected and Significant Areas

The Law on the Natural State Protected Areas Fund (NSPAF), approved in 1998, set the legal basis for creating and maintaining the NSPAF, the principles and mechanism of implementation, as well as the prerogatives of the central and local authorities, economic entities, NGOs and citizens on this matter.

The Law established 12 categories of natural protected areas, eight of which correspond to the IUCN classification: scientific reserve, national park, nature monument, natural reserve, landscape reserve, resource reserve, multifunctional management area, biosphere reserve; and four categories of national interest: botanical garden, dendrological garden, landscape architecture monument, zoological garden.

The requirements of the Law on NSPAF have been detailed in the framework statutes for every category of natural protected area, as well as in specific statutes for every natural protected area. In early 2006, the NSPAF comprised 1225 objects totaling 66,467 ha or 1.96 % of country's territory. In November 2006, the NSPAF Law was modified to include three wetland areas of international importance, one of which, the Lower Prut Lakes (19,152 ha), is located at the southern end of the study corridor. This area is also included in the site list of the Ramsar Convention. Today Moldova's protected areas total 157,227 ha, i.e. 4.65% of the overall territory.

Despite the taken measures to conserve and extend the natural protected areas, their current condition is poor. The NSPAF Law is not currently properly enforced and its requirements are often violated. Following the land reform, many of the protected areas are now managed by economic entities, mayoralties, schools, etc, which neither show interest nor have the capacity for maintaining them in good condition.

The state of *natural reserves* is generally good, protection zones are marked and warning posters are installed. In some forest natural reserves the protection regime is only partially observed, and grazing, fishing and waste dumping episodically occur.

The state of the *landscape reserves*, comprising 41 sectors, is pretty bad and practically they do not correspond to IUCN criteria. Lack of finance does not allow meeting even the most elementary requirements of the Law on the NSPAF and the international conventions. The intensively visited areas are under severe impact and both the landscape and biodiversity are suffering. This concerns the landscape reserves Saharna, Tipova, Trebujeni, Ivancea, Capriana, Suta de Movile, etc.

The management of these areas is deficient: there are no fitted stopovers for visitors; tourist routes are not marked; rules for visitors are not visualized; etc. The authorities' supervision is practically missing; consequently legal requirements are not enforced. A serious impediment in observing the protection regime is the tenure problem since areas within several landscape reserves have been privatized and economically used.

An important particularity of Moldova is the inclusion of 13 etalon sectors of soils in the NSPAF. Most of these areas are in a poor state: no landmarks; sometimes they are used for agriculture purposes; often the local authorities even do not know about their existence.

The *multifunctional management areas* include 32 sites. The protection regime of these areas is only partially observed. The natural zones subject to a special protection regime are not delineated, no landmarks, no warning posters. During the last decades the *landscape architecture monuments* (old parks) and the architecture monuments (mansions, family tombs, and other buildings) suffered the most. During the last years, the condition of many of them worsened. In 2006, works were implemented to rehabilitate and conserve the old parks and architecture monuments in Tzaul and Mîndîc.

The State Ecological Inspectorate, in cooperation with the local authorities and the police, undertook a number of compliance checks and took action in order to enforce the Law on NSPAF. In 2006, the protection regime and status of 357 protected areas was checked. The main offenses revealed were related to the violation of the regime of protected areas through extraction of minerals (limestone, sand, gravel, etc.), grazing and other illegal activities on their territory.

5.10.2 Protected Areas of the Study Area

The very first planning of the local ecological network in Moldova was done on the right bank of the Lower Nistru River. This eco-network occupies the territory from floodplain of the Botna River to the border with Ukraine. The east boundary of the territory creates the Nistru River. The Causeni - Palanca highway forms the west boundary. This is beautiful area where steppe with dominance of Fescue and Feather-grass meets azonal flora of floodplain (wet forests, meadows and swamps) as well as dry oak forests - gyrnets, which are tree stands combined with bright glades full of steppe herbs.

The original mixed character of this area is connected with peculiarities of its climate as well as with the impact of winding river and complexity of relief along the river. There are also relatively high slopes of the upper terrace of the Nistru River.

Outside rural settlements, mainly anti-erosion plantations cover these slopes and some remaining original oak forest with fragments covered by steppe flora. In some places, such slopes are quite close to the river and continue until the border with Ukraine. All this has predetermined high diversity of flora and eco-system diversity. Today, fields cover most of these lands, while floodplain is drained and used in agriculture.

The first task in establishing this local eco-network was to identify core areas. Some of them were evident in the beginning like two reserves with upland forest (Copanca and Leuntea making together 197 hectares), floodplain forests Turkish Garden (224 hectares), Olanesti (108 hectares), wetland Togai Bog (50 hectares). In any case, there was a need to assess them to be sure what comes under protection.

The available data about Copanca upland forest and Turkish Garden are too outdated, especially taking into account that last years were "unstable" for the nature protection. Moreover, when research on these lands took place, the concept of National Eco-Network was just an idea (1999).

5.10.3 Ramsar Sites

Lower Prut Lakes, Cahul region - 19,152 ha. 45º42'N 028º11'E. The River Prut forms the western border of the site as well as the state border with Romania, and the site extends to the river's confluence with the Danube. Consisting of Ramsar Wetland Types O (permanent freshwater lakes), M (permanent river), and 1 (fish ponds), the site is considered to fulfil Criteria 2 on vulnerable species and especially 3 on biodiversity. Lakes Beleu and Manta are unique ecosystems, described as the last natural floodplains in the lower Danube region. The system is important for groundwater recharge, flood control, and sediment trapping, and it supports an imposing list of rare and threatened species of flora and fauna.

A number of heritage sites can be seen in the area, including some of Roman Emperor Trajan's wall (ca. 100 A.D.). Fish harvests have been decreasing markedly in recent years, forests are generally seen to be deteriorating, and quite a few adverse conservation factors have been listed as requiring attention. A management plan is in preparation, particularly in hopes of creating a UNESCO Biosphere Reserve over more or less the same site.

5.10.4 Core Areas of the International Importance – The Moldovan National Ecological Network (in the vicinity of the Southern Railway Corridor)

5.10.4.1 Floodplain Talmaza

Location: Stefan Voda; Bender (Tighina) company for forestry, forestry Talmaza (parcels 58-73) and adjacent land. Surface 200.0 / 1592.0 ha. 46°38'58" N 29°45'9" E

The altitude above sea level: maximum 15 m, minimum altitude - 1 m, average height - 4 -5 m, level difference - 10 to 14 m, inclination limits - 1º - 5º, exhibitions prevalent: ground plan.

PHYSICAL FEATURES:	
General geographical description	The core area is located in the south-east of the country, within the flood-plain of the Nistru River, 35 km south-east of the municipality Bender and 100 km south-east of Chisinau municipality, in the flood plain of River Nistru.
Relief	Nistru river floodplain with an insignificant action of the natural and anthropogenic processes.
Water basins	River Nistru.
General geological description	Composed of sand, clay and limestone of the thickness of miocene sarmatian upper floor.
Landscape feature	Nistru river floodplain with extensive floodplain soils, floodplain wetlands, sometimes with poplar and willow forests and floodplain areas and swamps.

Illustration 13. Physical features of Floodplain Talmaza

Property type and category of use of the land: 1126 ha are owned by the state (the State forestry enterprise Bender), there are other areas of land and water resources; Talmaza villages and habitations belonging Cioburciu, are also and land privatized illegally used as arable land.

5.10.4.2 Ciumai - steppe sector in southern Bugeac

Location: Near the village Vinogradovca, surface 50 / 102.8 ha. 45°47'39" N 28°32'30" E

The altitude above sea level: 45 – 100 m.

PHYSICAL FEATURES:	
General geographical description	The core area is located 135 km south of Chisinau municipality, Tigheci border plateau and plain Cahul.
Relief	On the right side of the river Salcia Mare, right affluent of Great Ialpug river. Little impact of anthropogenic processes and one of the strongest natural habitat.
Water basins	River Salcia Mare.
General geological description	Composed of sandy sediments of the floor neorus undergrowth layer of silt the pontian and indivisible floors and akchagyil cimerian of the pliocene.
Landscape feature	Landscape of the fragmented plains, Budjak region. Cahul chernozioms plain ordinary clays and carbonate loess high thicknesses

Illustration 14. Physical features Ciumai - steppe sector in southern Bugeac

Scheme of the Southern railway corridor Bender-1 - Giurgiulesti

Legend:

	Railroad
	Station with passenger transport
	Train stop
	Bridge over the river
	Border crossing
	District/Rayon

Illustration 15. Scheme of the Southern railway corridor Bender-1 - Giurgiulesti

List of the protected areas in the South-Eastern Moldova and their importance in the National Ecological Network

Ecological Network elements legend:

The first letter means: **N** - core area territory, **B** – buffer zone;
The second letter represents the importance of territory: **I** - international, **N** - national, **Z** - zonal, **L** - local.

DESIGNATION	SURFACE (ha)	LOCATION	NETWORK ELEMENT	LAND OWNER
STEFAN VODA DISTRICT				
MONUMENTS OF NATURE: Geology & Paleontology				
Rîpa de Piatră (canyon)	2	In the north of the village Tudora		Municipality of Tudora
Rîpa lui Albu (canyon)	2	Above the Cioburciu village, near the forestry "Olanesti"		State forestry Bender (Tighina)
Rîpa din Purcari (canyon)	5	The north of the Purcari village on the bank of the Nistru river		Municipality of Purcari
NATURAL RESERVATIONS: Forestry				
Olăneşti	108	South-east of the Olanesti village, forestry Stefan Voda, Olanesti, plot 23	**BL**	State forestry Bender (Tighina)
NATURAL RESERVATIONS: Mixed				
Togai Bog (Wetlands)	50	The east of the Crocmaz village, forestry Olăneşti, plot 27	**NN**	State forestry Bender (Tighina)
RESOURCE RESERVATIONS				
Complex of alluvial soils, carbonated, cherno- ziomic, fine, wetlands and oozy soils of Bessarabian steppe zone	200	Talmaza forestry, Talmaza uddles, plots 9, 10, 13; Woods and fine meadow	**BL**	State forestry Bender (Tighina)
LANDSCAPE ARCHITECTURE MONUMENTS				
Leuntea Park	21,49	In village, Kindergarten	**BL**	Agricultural enterprise "Leuntea"
SLOBOZIA DISTRICT/RAYON				
NATURAL RESERVATIONS: Forestry				

DESIGNATION	SURFACE (ha)	LOCATION	NETWORK ELEMENT	LAND OWNER
Copanca	167	Forestry Copanca, plots 41, 43, 44	**BL**	State forestry Bender (Tighina)
Leuntea	30,1	Forestry Copanca, plot 50, sub-plots 12, 14	**BL**	State forestry Bender (Tighina)
LANDSCAPE RESERVATIONS				
Grădina Turcească (Turkish Garden)	224	Between Leuntea and Copanca villages, forestry Adajia, Copanca, plot 65; Grădina Turcească, plot 66, the old riverbed of the Dniester over a distance of 12 km	**BL**	State forestry Bender (Tighina)
RESOURCE RESERVATIONS				
Fatty usual Cernoziom of Bessarabian steppe zone	2	At the 1 km northeast of the village Sucleia		Ministry of Agriculture and Food Industry
MULTIFUNCTIONAL MANAGEMENT AREAS: Representative sectors of steppe vegetation				
Steppe vegetation sector	71	Forestry Copanca, Andriaşevca Nouă, plot 69	**BL**	State forestry Bender (Tighina)
CAUSENI DISTRICT/RAYON				
MONUMENTS OF NATURE: Geology & Paleontology				
Quarry near the Zaim village	4	On the right slope of the Botna river		Municipality of Zaim
Fîrlădeni outcrop	5	Near the Firladeni village, on the right slope of the valley, near the road to Căuşeni		Municipality of Fîrlădeni
Sălcuţa canyon (ravine)	3	To the southeast of the village Sălcuţa, forestry Căuşeni, Sălcuţa, plot 43, third sub-plot		State forestry Bender (Tighina)
NATURAL RESERVATIONS: Forestry				
Misilindra	1,7	At the south of the village Hagimus, forestry Căuşeni, plot 21, sub-plot 6		State forestry Bender (Tighina)

DESIGNATION	SURFACE (ha)	LOCATION	NETWORK ELEMENT	LAND OWNER
CAINARI DISTRICT/RAYON				
MONUMENTS OF NATURE: Geology & Paleontology				
Taraclia canyon (ravine)	12	In the south-eastern part of the Taraclia village		Municipality of Taraclia
NATURAL RESERVATIONS: Forestry				
Moleşti-Răzeni	250,7	Răzeni forestry, Villa Moleşti-Răzeni, plots 30-32; sub-plots 1, 2, 7; Plot 33, sub-plots 1, 5		State forestry Cimişlia
LANDSCAPE RESERVATIONS				
Cărbuna	607	Between the Cărbuna village and the railway station Zloty, forestry Zloty Villa Mileşti-Răzeni, parcels 1-4, 9		State forestry Cimişlia
RESOURCE RESERVATIONS				
Compact Cernoziom of the Danube steppe area	5	Baurci village, Brigade No.1, field crop rotation, near forestry Zloty		Joint-stock comp. Chircăieşti Noi
CIMISLIA DISTRICT/RAYON				
MONUMENTS OF NATURE: Geology & Paleontology				
Coţofana canyon (ravine)	10	At the east of the Gura Galbenei village, forestry Zloty, Coţofana, plot 33, sub-plots 3, 5; Plot 34, sub-plots 3, 8, 12		State forestry Cimişlia
NATURAL RESERVATIONS: Forestry				
Hîrtopul Moisei	101	Mihailovca forestry, Hirtopul Moisei, plot 15	**BL**	State forestry Cimişlia
LANDSCAPE RESERVATIONS				
Cimişlia canyons (ravines)	256	At the south of Cimislia on the road to Basara- beasca, forestry Ciucur - Mingir, Oziornoe, plot 3 sub-plots 11, 13, 15; Recea, plot 7 sub-	**BL**	State forestry Cimişlia

DESIGNATION	SURFACE (ha)	LOCATION	NETWORK ELEMENT	LAND OWNER
		plots 1, 4, 5, 10; Bacanciu, plot 5, Sub-plots 5, 9, 11, 13-15, 17-19, 22, 23, 25, 27, 29		
COMRAT DISTRICT/RAYON				
MONUMENTS OF NATURE: Geology & Paleontology				
Geological section of the Ialpug river valley	5,6	Comrat, left slope of the valley of the Ialpug river, forestry Comrat Comrat-IV, plot 34, sub-plot 11		State forestry Iargara
MONUMENTS OF NATURE: Hydrological				
Comrat Reservoir	204		**NL**	
Congaz Reservoir (RC)	500		**NL**	
MONUMENTS OF NATURE: BOTANICAL - Representative sectors with forest vegetation				
Borceac	11,3	Congaz forestry, Borceac, plot 32, sub-plot 2; plot 31, sub-plot 5		State forestry Iargara
Cîietu	4	Congaz forestry, Cîietu plot 25, sub-plot 15		State forestry Iargara
NATURAL RESERVATIONS: Forestry				
Liceul Bolgrad	54	Near the village Frumu- şica, forestry Congaz, Liceul Bolgrad, plot 26, sub-plot 2	**BL**	State forestry Iargara
NATURAL RESERVATIONS: Medical Plants				
Bugeac	56	The west of Brigade No. 2	**NZ**	Agricultural enterprise "Bugeac
RESOURCE RESERVATIONS				
The usual Cernoziom of Danube steppe area	4	No. 2 Brigade tractors, field No. 7	**NZ**	Agricultural enterprise "Maiac"
MULTIFUNCTIONAL MANAGEMENT AREAS: Representative sectors of steppe vegetation				
Steppe sector in northern of Bugeac	4	Bugeac village, on the border with Cimislia district	**BL**	Agroindustrial complex "Bugeac"

DESIGNATION	SURFACE (ha)	LOCATION	NETWORK ELEMENT	LAND OWNER
Steppe sector in northern of Bugeac	15	Dezghingea village, 3 km north of the animal husbandry complex	**NL**	Agricultural enterprise "Rodina"
CEADIR-LUNGA DISTRICT				
MONUMENTS OF NATURE: Geology & Paleontology				
Baurci outcrop	1	On the road Congaz-Baurci at 2 km from the bridge over the Ialpug river, forestry Congaz, Congaz, plot 38, sub-plot 12		State forestry Iargara
Ceadîr-Lunga canyons (ravines)	10	At the east of Ceadir-Lunga, near the forestry Ceadîr-Lunga, State forestry Cahul, plot 46, sub-plot 2		State forestry Cahul
TARACLIA DISTRICT/RAYON				
MONUMENTS OF NATURE: Geology & Paleontology				
Budăi canyon	5	The western edge of the Budăi village, on the right coast of the Salcia river	**BL**	Agricultural enterprise "Drujba"
Musaitu canyon	5	In the middle of the Musaitu village	**BL**	Agricultural enterprise "Musaitu"
Outcrop near the Taraclia town	4,1	The south of the Taraclia town, along the left slope of dale, forestry Taraclia, Taraclia-II, plot 20, sub-plot 1		State forestry Cahul
MONUMENTS OF NATURE: Hydrological				
Spring of Copceac village	1,5	Edge of the Copceac village in dale		Agricultural enterprise "Pobeda"
Taraclia Reservoir	550		**NL**	
MULTIFUNCTIONAL MANAGEMENT AREAS: Representative sectors of steppe vegetation				
Steppe sector in Bugeac southern	50	Near the Vinogradovca village	**NI**	Agricultural enterprise "Ciumai"
VULCANESTI DISTRICT				
MONUMENTS OF NATURE: Geology & Paleontology				

DESIGNATION	SURFACE (ha)	LOCATION	NETWORK ELEMENT	LAND OWNER
Outcrops of etulien clays	10	The left slope of the valley of the Cahul river above the village Etulia	**BL**	Agricultural enterprise "K. Marx"
Cişmichioi canyon	3	Cismichioi village, on the left dale tributary of Lake Cahul dale	**NL**	Production Association "Nerudprom"
CAHUL DISTRICT				
MONUMENTS OF NATURE: Geology & Paleontology				
Outcrop near the Văleni village	3	At the 0.5 km south of Valeni, eastern slope of the Prut river valley	**BL**	
SCIENTIFIC RESERVATIONS				
Prutul de Jos (Lower Prut)	1691	Slobozia Mare, Valeni villages and Giurgiulesti village (located on the outskirts Scientific Reservation Lower Prut (Prutul de Jos), which includes the Lake Beleu	**NI**	Central Environmental Authority

Core areas in support of landscape diversity

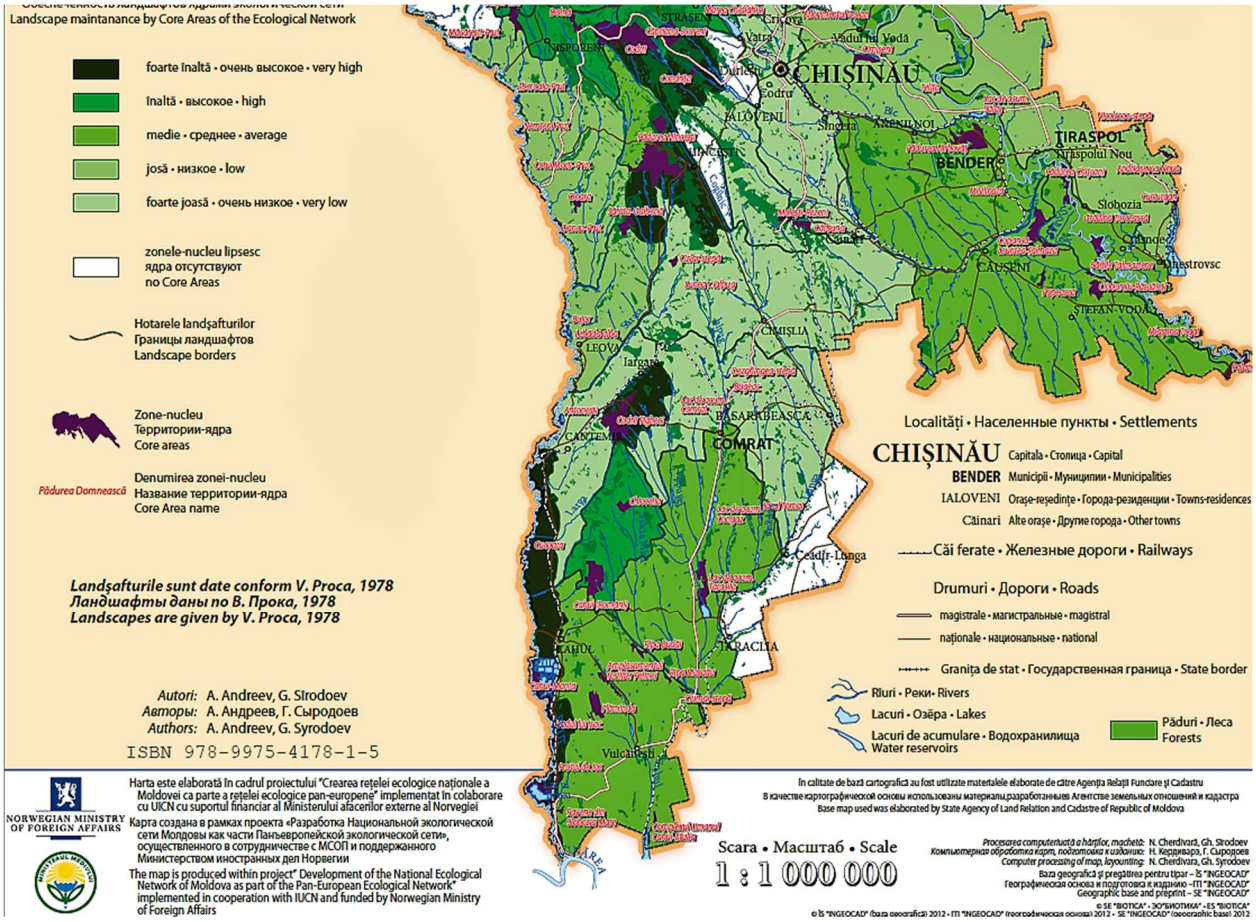


Illustration 16. Core areas in support of landscape diversity

5.10.4.3 The list of the natural areas protected by the states at their distance of the railway corridor

DESIGNATION	SURFACE	HOLDER	TYPE	BASIN	ADMINISTRATIVE RAYON
Fossil fauna site near the village of Calfa	35	Vierul Production Agricultural Cooperative	MNGP	Nistru	Anenii Noi
The quarry near the village of Zaim	4	City Hall of Zaim	MNGP	Nistru	Causeni
Colcot Glen	16	City Hall of Tiraspol	MNGP	Nistru	UTA Nistru Left
Izvorul lui Suvorov	0,5	I.A. Nistru, City Hall of Hagimus	MNH	Nistru	Causeni
Steppe sector in the Nord	15	I.A. Rodina	AMMVS	Marea Neagra	UTA Gagauzia

DESIGNATION	SURFACE	HOLDER	TYPE	BASIN	ADMINISTRATIVE RAYON
Bugeacului (Dezghingea)					
Bugeac	56	I.A. Bugeac	RNPM	Marea Neagra	UTA Gagauzia

Illustration 17. The list of the natural areas protected by the state at a distance of 1 km of the railway Bender – Basarabeasca - Giurgiulesti

DESIGNATION	SURFACE	HOLDER	TYPE	PARCEL_MOL	BASIN
Fossil fauna site near the village of Calfa	35	Vierul Production Agricultural Coop.	MNGP		Nistru
The quarry near the village of Zaim	4	City Hall of Zaim	MNGP		Nistru
The ravines of Ceadir-Lunga	10	GSS Cahul	MNGP	GSS Cahul, OS Ceadir-Lunga, Village of Cahul p46, sp. 2	Marea Neagra
Etulian clays outcrop	10	I.A. K. Marx	MNGP		Marea Neagra
The outcrop near the city of Taraclia	4,1	GSS Cahul	MNGP	GSS Cahul, OS Taraclia, Taraclia-II, p20, sp1	Marea Neagra
Cismichioi Ravine	3	Nerudrop Production Assoc.	MNGP		Marea Neagra
Colcot Glen	16	City Hall of Tiraspol	MNGP		Nistru
Izvorul lui Suvorov	0,5	I.A. Nistru, City Hall of Hagimus	MNH		Nistru
Izvor-havuz	1	I.A. Tighin	MNH		Nistru
Fat black soil micellar-carbonate of the steppe Danube area (Rosu)	4	City Hall of Rosu	RR		Prut

DESIGNATION	SURFACE	HOLDER	TYPE	PARCEL_MOL	BASIN
Common fat black soil of Bessarabian steppe area	2	Ministry of Agriculture and Food Industry	RR		Nistru
Carbuna	607	GSS Cimislia	RP	OS Zloti, Vila Milesti-Rezeni, par. 1-4; 9	Nistru
Steppe sector in the Northern side of Bugeac	4	Bugeac Agro-industrial Complex	AMMVS		Marea Neagra
The steppe sector in the Northern side of Bugeac (Dezghingea)	15	I.A. Rodina	AMMVS		Marea Neagra
Steppe sector in the Southern side of Bugeac	50	I.A.Ciumai	AMMVS		Marea Neagra
Misilindra	1,7	GSS Bender	RNS	Os Causeni, p. 21, sp. 6	Nistru
Hirtopul Moisei	101	GSS Chimislia	RNS	OS Mihailovca, Hirtopul Moisei, p. 15	Marea Neagra
Bugeac	56	IA Bugeac	RNPM		Marea Neagra
Cantemir	132	IA Drujba	RNM		Prut
Dendrological garden of Tiraspol	21	Ministry of Agriculture and Food Industry	GD		Nistru

Illustration 18. The list of the natural areas protected by the state at the distance of 3 km of the railway Bender – Basarabeasca - Giurgiulesti

DESIGNATION	SURFACE	HOLDER	TYPE	PARCEL_MOL	BASIN
Salcuta Ravine	3	GSS Bender	MNGP	GSS Bender, OS Causeni, Salcuta, p43, sp. 3A	Nistru
The ravines of Cadir-Lunga	10	GSS Cahul	MNGP	GSS Cahul, OS Ceadir-Lunga, Village of Cahul p46, sp2	Marea Neagra
Geological section of Ialpug river valley	5,6	GSS Iargara	MNGP	GSS Iargara, OS Comrat, Comrat-IV, p34, sb11	Marea Neagra

DESIGNATION	SURFACE	HOLDER	TYPE	PARCEL_MOL	BASIN
Etulian clays outcrop	10	I.A. K. Marx	MNGP		Marea Neagra
The outcrop near the city of Taraclia	4,1	GSS Cahul	MNGP	GSS Cahul, OS Taraclia, Taraclia-II, p20, sp1	Marea Neagra
Cismichioi Ravine	3	Nerudrop Production Assoc.	MNGP		Marea Neagra
Colcot Glen	16	City Hall of Tiraspol	MNGP		Nistru
Izvor-havuz	1	I.A. Tighina	MNH		Nistru
Compact black soil of the steppe Danube area (Baurci/Chircaiesti)	5	S.A. Chircaiestii No	RR		Marea Neagra
Common fat black soil of the steppe Bes-arabian area	2	Ministry of Agriculture and Food Industry	RR		Nistru
Hirbovat Forest	2218	GSS Bender	RP	OS Hirbovat, Vila Hirbovat, plots 8-36	Nistru
Carbuna	607	GSS Cimislia	RP	OS Zloti, Vila Milesti-Rezeni plots 1-4;9	Nistru
Steppe sector in the North of Bugeac	4	Bugeac Agro-industrial Complex	AMMVS		Marea Neagra
Steppe sector in the North of Bugeac (Dezghingea)	15	I.A. Rodina"	AMMVS		Marea Neagra
Sector with steppe vegetation	71	GSS Bender	AMMVS	OS Copanca, Adriasevca Noua, p. 69	Nistru
Steppe sector in the South of Bugeac	50	I.A. Ciumai	AMMVS		Marea Neagra

DESIGNATION	SURFACE	HOLDER	TYPE	PARCEL_MOL	BASIN
System of protection forest curtains in the village of Tvardita	80,2	I.A. Lenin	AMMPP	No. 1-5(7, 1) 8-22(20, 5) 27 (1,7) 39 (0,98) 43 (1,1) 49-50 (2,6) 52 (1,4) 54-59 (7,2) 65 (1,3) 68-69 (2,3) 73-75 (3,7) 77 (0,8) 81-86 (5,3) 88 (1,6) 96-97 (2,7) 99 (2) 100-108 (19,8)	Marea Neagra
Misilindra	1,7	GSS Bender	RNS	OS Causeni, p. 21, sp. 6	Nistru
Hirtopul Moisei	101	GSS Edinet	RNS	OS Mihailovca Hirtopul Moisei, p.15	Marea Neagra
Leuntea	30,1	GSS Bender	RNS	OS Copanca, Copanca, p.50, sp. 12, 14	Nistru
Copanca	167	GSS Bender	RNS	OS Copanca, Copanca, p. 41, 43, 44	Nistru
Pedunculate oak	0	GSS Bender	MNBa	OS Hirboovat	Nistru
Schinoasa Mare	15	GSS Chisinau	MNBs	OS Anenii Noi. Schinoasa Ma- re, p.5, sp. 3	Nistru
Erjova	123	GSS Ribnita	RNS	OS Erjova, Erjova, p. 31, 32	Nistru
Bugeac	56	IA Bugeac	RNPM		Marea Neagra
Dendrological garden of Tiraspol	21	Ministry of Agriculture and Food Industry	GD		Nistru

Illustration 19. The list of the natural areas protected by the state at the distance of 5 km of the railway Bender – Basarabeasca - Giurgiulesti

AMM – Multifunctional Management Areas; MAP - Monuments of landscape architecture; MN – Natural monuments; RNS – Scientific Natural reservation; RP – Landscape reservation; RR – Resources reserve;

The above listed Protected Areas are indicated according to the Law on State Protected Area No. 1538, 25.02.1998.

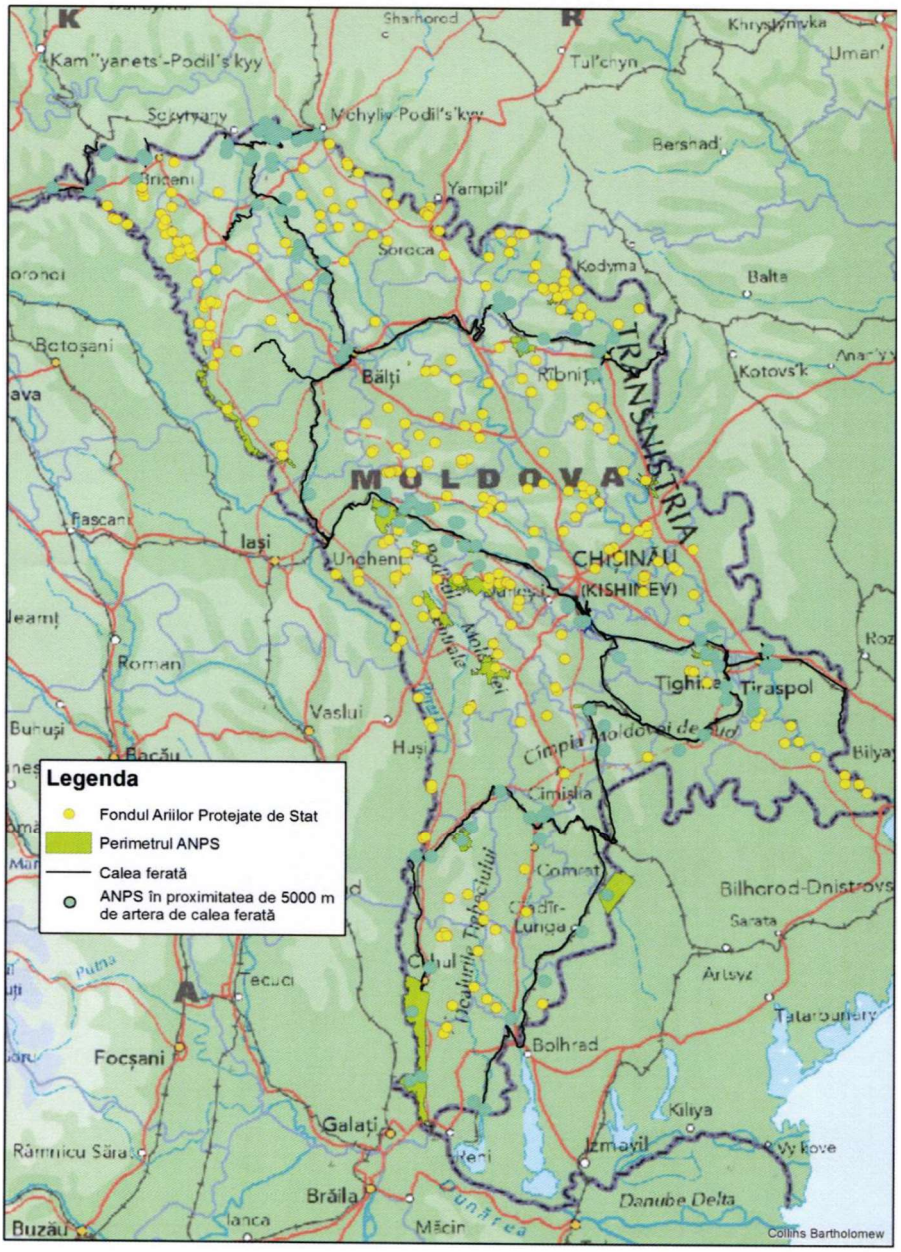
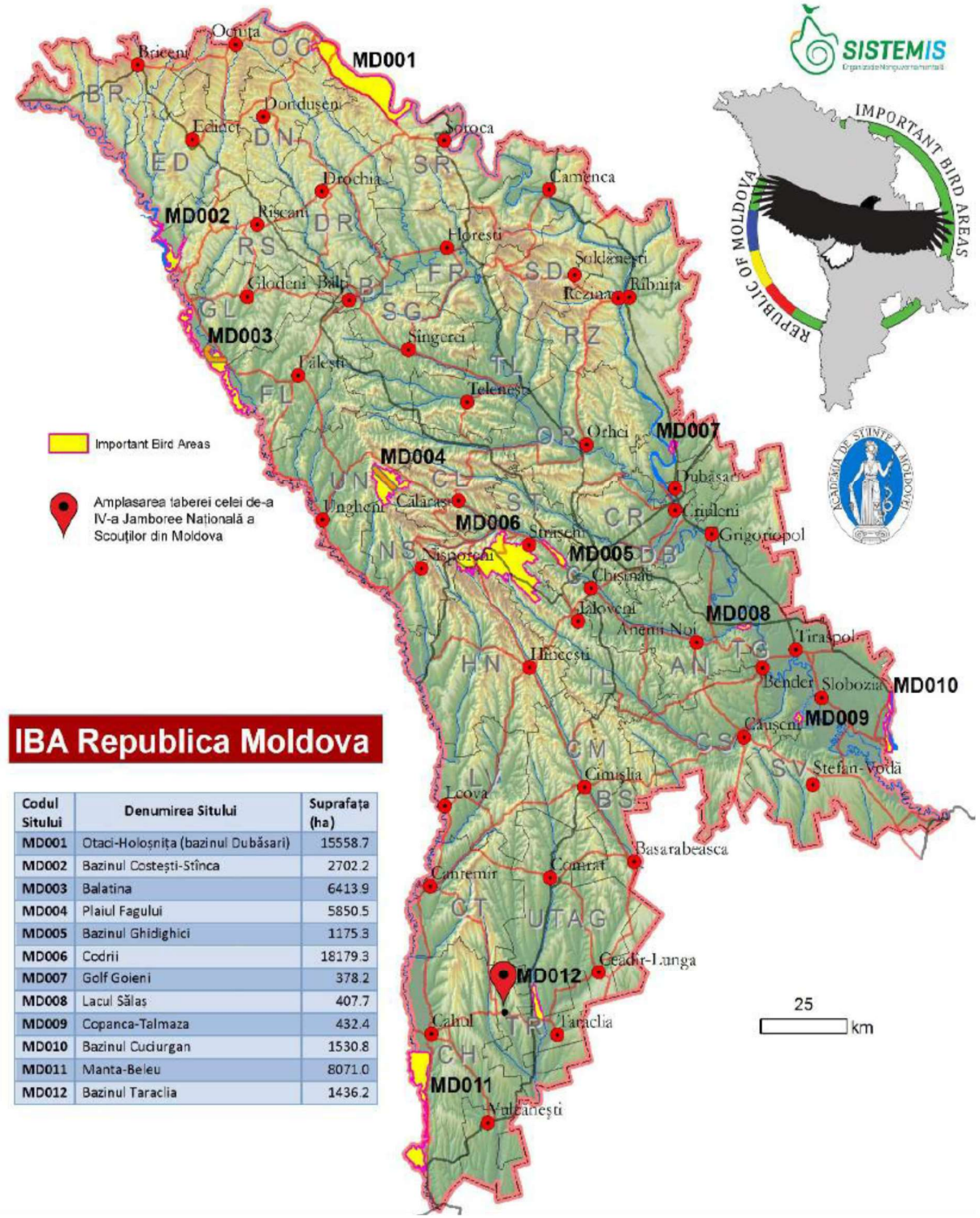


Illustration 20. **Map of protected areas in the proximity of 5km of the Railway (110 protected areas), Source: Ministry of Environment, Institute of Ecology and Geography 2016**

5.10.5 Important Bird Areas in the Republic of Moldova

In 2000, BirdLife International designated 12 Important Bird Areas in the Republic of Moldova using data collected by local ornithologists. The aim of these sites is to protect the areas with large population of bird species. The Important Bird Area (IBA) Network does not have a legal protection according to the national and international laws but, these sites are used to be designated as Natura 2000 Special Protected Areas or Emerald Sites. Also, these sites are promoted by BirdLife International as areas with a high interest for conservation.



Codul Sitului	Denumirea Sitului	Suprafața (ha)
MD001	Otaci-Holoșnița (bazinul Dubăsari)	15558.7
MD002	Bazinul Costești-Stînca	2702.2
MD003	Balatina	6413.9
MD004	Plaiul Fagului	5850.5
MD005	Bazinul Ghidighici	1175.3
MD006	Codrii	18179.3
MD007	Golf Goieni	378.2
MD008	Lacul Sălaș	407.7
MD009	Copanca-Talmaza	432.4
MD010	Bazinul Cuciurgan	1530.8
MD011	Manta-Beleu	8071.0
MD012	Bazinul Taraclia	1436.2

Illustration 21. Map of Important Bird Areas in the Republic of Moldova, Source: Project Code 04151113 - Monitoring Important Bird Areas in Moldova to Improve Conservation Management, 2014

Near the proposed project area is located IBA MD012 Bazinul Congaz – Taraclia. During the further ornithological survey was proposed to designate the new IBA in the area of Purcari - Etulia due to the high level of biodiversity and good habitat conditions.

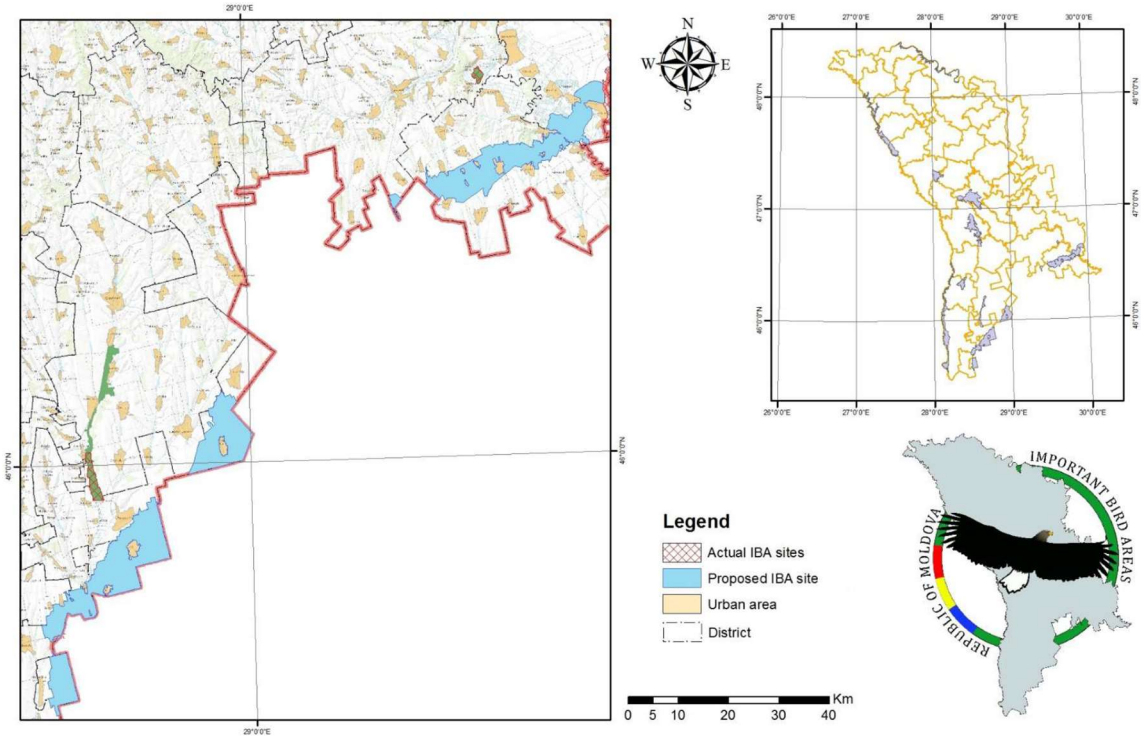


Illustration 22. Map of proposed Important Bird Area between Purcari – Etulia (3 blue areas left down), Source: Project Code 04151113 - Monitoring Important Bird Areas in Moldova to Improve Conservation Management, 2014

5.10.6 Emerald network in the Republic of Moldova

A total of 19 habitats in accordance with the Bern Convention were selected, described and proposed for inclusion in the Emerald Network: A2.5512 – Continental glasswort swards; F4.1 – European wet healths; E1.2 – Continental steppes; E3.4 – Eutropic humid grasslands; E2.25 – Continental meadows; G1.6 – Beech forests; G1A1– Oak-hornbeam forests; G1A4 - Mixed ravine and slope forests; G1.11 – Riparian willow formations; G1.21 – Middle European stream ash-alder woods; G1.221 – Great medio- European fluvial forests; G1.223 – South-east European ashoak- alder forests; G1.36 – Ponto-sarmatic mixed poplar riverine forests; G1.4115 – Eastern Carpathian alder swamp wood; D5.2 – Fen-sedge beds; D4.1 – Rich fen; D2.226 – Peri-Danubian blackwhite-star sedge fens; H1 – Caves; X18 – Wooded steppe.

The following 17 integrated sites with the total area of around 10,67% of the surface of the Republic of Moldova, having the special importance for the protection of species and habitats as from the Bern Convention, have been identified to form the Emerald Network in the country:

- **Forest area:** Carauşeni, Codrii Orheiului, Codrii Străşenilor, Codrii Tigheci, Bahmut Hârjauca, Codru Scientific Reserve, Pădurea Domneasca Scientific Reserve, Plaiul Fagului Scientific Reserve;
- **Wetlands:** Prutul de Mijloc, Prutul de Jos Scientific Reserve, Lacurile Prutului de Jos, Nistrul de Jos, Unguri-Holoşniţa;

- **Petrophytes:** Stâncile Nistrene, Rezina-Ţipova;
- **Steppes:** Bugeac Steppe, Bălţi Steppe.

Near the proposed project area is situated 2 Emerald network sites: Bugeac steppe and Lower Prut.

Bugeac steppe

The area of this steppe site makes 50,000 ha. The localities which this zone involve: Ciucur-Minjir, Bugeac, Dezghingea, Comrat, Congaz, **Taraclia, Ciumai**. Composition and structure of steppes within this zone is very diverse. The Vinogradovca-Ciumai area is considered as a nucleizone of international importance. The steppe communities are of special interest within this area, as they represent the remains of the steppes which were broadly distributed in the past on the South Moldovan Plain. A total of 422 vascular plant species, 46 rare plants have been registered in this protected area, some of them could be found only here. Out of them, 3 are included into the Red Book of Moldova. This is an unique sector with the floristic diversity and a special phytocenosis. The plant and animal species according to the Bern Convention, that are met there, are: *Colchicum fominii, Otis tarda, Emys orbicularis, Bombina bombina.* The habitat type is represented by Continental steppes.

Lower Prut

The Prutul de Jos (Lower Prut) Natural Reservation is located in southern Moldova between the Prut River and Slobozia Mare village, south of Cahul. It covers 1,691 ha, which includes 312 ha of forest and Lake Beleu (10 km2).

The reserve was founded in 1991 to protect the flora and fauna of the lake and the surrounding wetlands. It includes 270 species of plants; 241 species of animals, including 34 species of mammals, 7 reptiles, and 11 amphibians; 168 bird species; and 42 species of fish. The site shelters several vulnerable and endangered plants species listed in the Red Book of the Republic of Moldova, including white water lily, floating fern, water caltrop, marsh fern and wild grape.and is also important for many migratory bird species (little egret, big egret, white stork, swan, pelican, white kingfisher, herons, white-headed duck, storks, marsh bittern, yellow Heron, etc.), which nest and breed near the lake. Water levels in the lake vary depending upon spring and summer floods and upon the water levels of Prut and Danube rivers.

The Nature Reserve is extremely significant as a location for stop-over, feeding, reproduction and overwintering habitats for a large number of aquatic and semi-aquatic birds, as well as a refuge for rare and internationally protected species. In fact, the Reserve offers habits for several bird species included in the Red Book of the Republic of Moldova.

Illustration 23. Map of Emerald network in Moldova, Source: Emerald Network in Moldova, 2012

5.11 Cultural heritage, including architectural and archaeological heritage

The Republic of Moldova has developed a legislative framework - **The Law on Protection of the Intangible Cultural Heritage** (29 March 2012, 20/04/2012 in MO Nr. 76-80 Art. Nr: 255). At present, Moldova is still in

the process of formation of the politics regarding the heritage preservation. In 2002, the Parliament of Republic of Moldova ratified the Convention on Protection of World Cultural and Natural Heritage. In order to target the existing imperfections, through a decision of the Government dated with 26 September 2006, the National Agency on Monuments Inspection and Restoration was created.

At local level the responsible institutions are the Local Public Authorities and the local Culture Directions. At national level, the ones responsible are the Ministry of Culture, the Agency for Inspection and Restoration of Monuments and the National Archaeologic Agency.

In 2012 was approved by the Ministry of Culture and published The National Inventory of Intangible Cultural Heritage of Republic of Moldova. Volume A.

From the experience of the National Archaeological Agency, the lack of funds has performed fewer archaeological excavations. Only occasionally, especially in the case of excavation on the site, can be detected archaeological remains of the Cucuteni culture.

5.11.1 In the project territory the following historical objects are situated

Trajan's Wall (*Valul lui Traian* in Romanian) is a complex of Valla in Eastern Europe (Romania, Moldova and Ukraine). Contrary to the name and popular belief, the ramparts were not built by Romans during Trajan's reign. The remnants in Moldova comprise earthen walls and palisades. There are two major fragments preserved in Moldova, the Upper Trajan's Wall (between the villages Valea Perjei and Ecaterinovca, what means this object is not situated directly in the project territory) and the Lower Trajan's Wall.

The **Lower Trajan's Wall** is thought to be dated by the 3rd century, and stretches about 126 km from the village of Vadul in Cahul region by the Prut River, stretches into the Ukraine and ends at Lake Sasyk by Tartarbunar. The Lower Trajan's Wall is crossed by the existing railway alignment near the village of Vulcanesti.

Bender (Tighina) Fortress is an architectural ensemble of irregular quadrilateral plan, surrounded by wide walls, 2-3 meters thick, made of limestone and brick. The fortress has 10 artillery bastions at the corners, 11 towers, and 6 gates. It is surrounded by a moat of stone. After the last battle of the Russo–Turkish War, in 1806 the city was acquired by the imperial Russian military authorities, becoming "legitimate" master here in 1812, after the occupation of Bessarabia. The fortress is situated more than 1 km from the railway line.

5.12 The policy framework and legislation in Moldova in the field of health and safety at work

In January 2009, the new Occupational Safety and Health Law (Law on Health and Safety at Work No. 186–XVI of 10 July 2008) came into effect in Moldova. The text of the Law is largely referenced to the EU Framework Directive 89/391/EEC[2] on measures to encourage improvements in the safety and health of workers at work. This Law establishes the general principles relating to the prevention of occupational risks, protection of workers in the workplace, the elimination of risk factors and occupational accidents, the information, consultation, balanced participation and training of workers and their representatives together with general guidelines for the enforcement of these principles.

The Law does not entrust any specific public authority with the task of designing, monitoring and evaluating of state policy on health and safety at work, although it does provide that the Ministry for Labour, Social Security and Family is the central public administration body that coordinates safety and health at work.

Regulation of national labour law includes not only legislation but also collective agreements between trade unions and employers and their organisations, the 'social partners'. The main regulation of labour law is contained The Labour Code of the Republic of Moldova, which has been adopted on 28 March 2003 and entered into force in October of that same year. Title IX on "Labour Safety" was drafted in part with reference to the provisions of the ILO Convention on Occupational Safety and Health and the Working Environment (No. 155).

5.13 Free Economic Zones: Tvardita, Taraclia, Vulcanesti and Giugiulesti Port

Free Economic Zones (FEZ) are created for a period of at least 20 years. Four FEZ, out of seven FEZ established between 1996 and 2011, located all over the country's regions, are directly connected with the southern railway corridor.

FEZ Taraclia was established in 1998 for a period of 25 years. Taraclia FEZ is located in the south region of Moldova, in Taraclia District. The Free Zone is located along the railway Chisinau-Basarabeasca-Reni, on the territory of several industrial enterprises, its total area being of 36 ha. In 2013 there were 10 residents registered. Total investments since the establishment of the FEZ amount to USD 15 million.

FEZ Vulkanes was created in 1998 for a period of 25 years. It is the only FEZ located in the Gagauzia region, 6 km from Vulcanesti. FEZ Vulkanes has an area of 122.3 ha divided in two sectors (78 ha and 44.3 ha respectively). In 2013 there were 30 residents registered. Total investments since the establishment of the FEZ amount to USD 15.1 million.

FEZ Tvardita is situated on the south of the Republic of Moldova. It was created in 2001 for a period of 30 years. The FEZ area is 3.57 ha. In 2013, five residents were registered. Total investments since the establishment of the FEZ amount to USD 15.5 million.

[2] Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work, OJ L 183 of 29 June 1989.

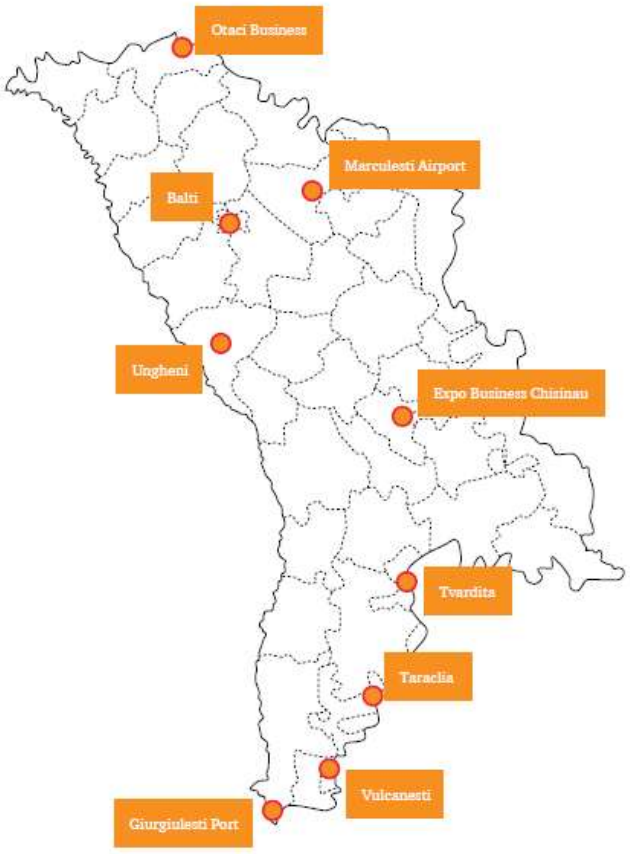


Illustration 24. Free Economic Zones in Moldova

Giurgiulesti International Free Port (GIFP) was established in 2005 for a period of 25 years. It is located 133.8 km up the river Danube, which is included in the Rhine-Main-Danube waterway corridor, in the South of Moldova with its territory bordering directly with Romania and the Ukraine. It has a territory of 120 ha, including a petroleum terminal, a cargo port and an industrial free zone. GIFP is capable of receiving both inland and sea-going vessels.

GIFP is within the private ownership of its general investor and operator ICS Danube Logistics SRL, a company owned by Danube Logistics Holding BV and EBRD. Unlike those of FEZ, the residents of GIFP may carry out any activity ordinarily allowed throughout the Republic of Moldova, including: port and transport services; manufacture of industrial products, including oil products; transportation, processing, packaging and finishing of goods; wholesale trade; paid services, etc. There is no minimum investment requirement to become a GIFP resident. In 2013, there were 41 residents registered.

By the National Bureau of Statistics (2016) 1482.7 thousand tons were transported by the railway in January-June 2016, which is 29.6% less than in the same period of 2015. In the structure of goods loaded into wagons in the railway stations of the country the highest share occupied the following product groups: ferrous metals and ferrous metals - 27.0% (in January-June 2015 year - 8.6%), grain and milling products - 17.5% (in January-June 2015 - 41.1%), construction materials and cement - 10.3% (in January-June 2015 - 8.7%), oil and oil products - 9.5% (in January-June 2015 - 1.5%).

In the railway transport has increased an average downtime of transit cargo cars at service stations from 41.78 hours in January-June 2015 to 46.98 hours in January June 2016 and the average downtime of

freight wagons for loading and unloading operations with 51.53 hours to 61.23 hours. Average time of turnover of freight cars increased from 8.58 days to 9.48 days in the relation to January- June 2015.

5.14 Socio-economic status of the population

5.14.1 Standards of living

According to the Household Budget Survey, disposable income in the 1. quarter of 2016 amounted to 2,026.8 MDL on average per person per month, an increase of 9.3% compared with the corresponding period last year. In real terms (taking into account the consumer price index) the disposable income decreased by 1.5%.

Income from employment is the main source of income, their share in the formation of disposable income was 42.5%, an increase of 2.3 percentage points in comparison with 1. Quarter of 2015. Social benefits are the second most important source of income in the structure of revenues, they amounted to 19.5% or 1.9 percentage points less than in the corresponding period last year.

The income from the self-employment accounted for 14.9% of household incomes, including 8.7% income from individual agricultural activities, and 6.2% of the income from individual non-agricultural activities. A significant source of the income are remittances, which averaged 18.4% of total revenue or 0.2 percentage points less than in 1. quarter of 2015.

Revenues of the urban population were higher by an average of 785.5 MDL, or 1.5 times the income of the rural population. The main source of the income in urban areas is the income from hired labor, the share of which amounted to 55.4% of disposable income and social transfers - 18.3%. For the rural population the most important source of the income are also incomes from the wage labor (28.1%), but their share is 2 times less than in urban areas. Income from the agricultural activity in the formation of disposable income amounted to 17.2%.

The largest part of consumer spending was directed at the needs of food - 42%. One member of the household on average spent on the maintenance of housing 17.5% of total consumer spending (+0.4 percentage points in comparison with the 1. quarter of 2015), and clothes and footwear - 9.7% (-1.3 percentage points). The remaining costs were focused on transport (7.3% compared with 4.9% in the 1. quarter of 2015), health (6.3% compared to 7.7%), communication - 4.3%, construction of housing - 3.6%, education - 0.6%, and others.

5.14.2 Labor market

According to the labor force profiles in the 1. quarter of 2016 the economically active population of the Republic of Moldova amounted to more than 1,198 thousand. The level of activity of the population aged 15 years and older (the ratio of the active population aged 15 years and older to the total population of the same age) amounted to 40.1%, registering higher values in men (43.1%) than women (37.5%) and urban areas (44.9%) compared to the rural areas (36.3%). The highest level of activity (60.4%) were in the age group 45-49 years.

The number of the employed population was about 1,124 thousand. People. The distribution by sex shows that the number of men and women were almost equally (respectively 49.7% and 50.3%). Of the total number of employed population 51.5% - rural population, 48.5% - urban.

The number of unemployed, as defined by the International Labour Office (ILO), amounted to over 74 thousand. The unemployment rate (the ratio of the Office of the unemployed to the active population) was

6.2%. Among men, the figure registered a value of 8.3%, and among women 4.0%, a significant difference occurred between the unemployment rate in urban areas (8.4%) and rural areas (4.0%).

	I. QUARTER 2015	II. QUARTER 2015	III. QUARTER 2015	IV. QUARTER 2015	I. QUARTER 2016
Total					
Activity level [1]	38,6	44,8	45,2	40,9	40,1
Employment level [2]	35,3	43,0	43,7	39,2	37,6
The unemployment rate [3]	8,5	4,1	3,3	4,2	6,2
Men					
Activity Level[1]	41,2	47,9	48,2	43,2	43,1
Employment Level[2]	36,6	45,4	46,4	41,1	39,5
The unemployment rate[3]	11,2	5,2	3,9	4,8	8,3
Womens					
Activity Level[1]	36,1	42,1	42,4	38,9	37,5
Employment Level[2]	34,1	40,8	41,3	37,5	35,9
The unemployment rate[3]	5,7	3,0	2,6	3,6	4,0
Urban population					
Activity Level[1]	43,7	44,3	45,5	46,0	44,9
Employment Level[2]	39,7	41,6	43,2	43,4	41,1
The unemployment rate[3]	9,2	6,2	5,0	5,6	8,4
Rural population					
Activity Level[1]	34,5	45,2	44,9	36,9	36,3
Employment Level[2]	31,8	44,1	44,1	35,8	34,8
The unemployment rate[3]	7,8	2,5	1,8	2,8	4,0

Illustration 25. Tab. 8: Economically active population aggregated by gender and area in %

[1] The ratio of the active population aged 15 years and older to the total population aged 15 years and older
[2] The ratio of the employed population aged 15 years and older to the total population aged 15 years and older
[3] The ratio of the unemployed, according to the ILO definition, the economically active population

THE DISTRIBUTION OF THE ECONOMICALLY ACTIVE POPULATION BY GENDER, AREA AND AGE GROUP IN THE I. QUARTER OF 2016

	The active population, thousand			The level of economic activity (%)	Employment rate (%)	ILO unemployment rate (%)
	Total	Including				
		Employed population	ILO unemployed			
Total	**1198,1**	**1123,7**	**74,4**	**40,1**	**37,6**	**6,2**
15-24	7,7	7,0	17,2	18,8	16,2	13,9
25-34	26,8	26,1	37,0	47,8	43,7	8,6
35-49	34,9	35,4	27,9	57,1	54,3	5,0
50+	30,6	31,4	17,9	33,5	32,3	3,6
Men	**609,3**	**558,6**	**50,7**	**43,1**	**39,5**	**8,3**
15-24	8,5	8,0	13,4	19,6	17,0	13,1
25-34	28,9	27,9	40,3	52,3	46,2	11,6
35-49	32,0	32,6	25,3	54,6	51,0	6,6
50+	30,6	31,5	21,1	41,0	38,6	5,7
Women	**588,7**	**565,0**	**23,7**	**37,5**	**35,9**	**4,0**
15-24	6,8	6,0	25,4	17,9	15,2	15,0
25-34	24,7	24,4	30,0	43,2	41,1	4,9
35-49	38,0	38,2	33,6	59,5	57,4	3,6
50+	30,5	31,4	11,0	28,2	27,8	1,4
Urban popul.	**594,6**	**544,5**	**50,1**	**44,9**	**41,1**	**8,4**
15-24	7,3	6,5	15,9	23,7	19,4	18,3

THE DISTRIBUTION OF THE ECONOMICALLY ACTIVE POPULATION BY GENDER, AREA AND AGE GROUP IN THE I. QUARTER OF 2016						
25-34	31,9	30,8	43,7	57,1	50,5	11,5
35-49	33,7	34,5	25,3	62,9	58,9	6,3
50+	27,0	28,1	15,1	32,9	31,3	4,7
Rural popul.	**603,5**	**579,2**	**24,3**	**36,3**	**34,8**	**4,0**
15-24	8,0	7,5	19,8	15,9	14,3	10,0
25-34	21,8	21,7	23,2	38,7	37,0	4,3
35-49	36,1	36,2	33,4	52,7	50,7	3,7
50+	34,1	34,6	23,6	34,1	33,1	2,8

Illustration 26. The distribution of the economically active population by gender, area and age group in the I. quarter of 2016

Unemployment. According to the National Employment Agency, on July 1, 2016 the number of officially registered unemployed persons amounted to 24.9 thousand. 48% of the total unemployed people are women. About 12% of the registered unemployed receive unemployment benefits, the average size of which was in June 2016 1386.3 MDL. On the one free workplace by enterprises accounted for an average of three unemployed.

6. CHARACTERISATION OF IMPACTS AND OPPORTUNITIES

In principle, the Environmental and Social Impact Assessment (ESIA) of the planned project in the Southern railway corridor between Bender and Giurgiulesti stems from the relationship between the environmental benefits and damages that can be caused by implementation of the envisaged construction/ rehabilitation/ maintenance.

Therefore, this chapter depicts in detail all benefits as well as possible environmental and social impacts associated with this development project, in particular during its construction. Regardless the fact that the developers will exercise the works respecting the work safety as well as environmental protection, there is a possibility of occurrence of some adverse environmental impacts which should be given special attention.

There are very strict demands which are coming by the National and EU legislation for protection of the environment. The trackway renewal activities may cost several impacts to the environment. The activities include removal the old stone material, wooden sleepers and other trackway material, storage the new materials, machinery, temporary disposal of removed materials and implement working technology for the trackway renewal. All these activities should be in compliance with the national and EU environmental and Occupational Safety and Health standards.

To this aim, the environmental and social impact assessment challenges the feasibility/acceptability of the project in the light of the extent of environmental and social impacts as well as Cost and benefit analyses (CBA) associated with its feasibility. In compliance with the required evaluation of the feasibility of the rehabilitation project, the possible effects have been determined in terms of the following decisive characteristics:

- time of occurrence (during construction);
- duration period (the short term, medium term, long term, permanent);
- area of distribution (local, regional, global);
- frequency of occurrence (temporary, sporadic);
- kind of effect (direct, indirect, secondary, cumulative);
- significance (minor, large, unacceptable);
- favourableness (positive, negative).

To identify potential environmental and social impacts is possible to use different methods including field research, modelling the proposed conditions, analysing similar scenarios in the past, and an analysis of the proposed state on the basis of scientific facts in the relevant fields.

For the purpose of predicting the potential harmful environmental and social impacts of the intervention in the Southern railway corridor between Bender and Giurgiulesti we used the analytical methods and method of the analysis of the proposed state based on scientific facts.

6.1 Environmental and social issues associated with the trackway renewal

The making of this E&S Appraisal is based on international regulations, EU directives and national and local legislature of the Republic of Moldova. In completing this Report effects on various segments of the environmentand society were analyzed:

- Waste management;
- Wastewater;
- Emissions to air;

- Noise;
- Fuel management;
- Habitat alteration and fragmentation;
- Visual effect;
- Rails and ballast;
- Community Health and Safety.

6.1.1 Solid waste

The renewal, maintenance and upgrade of rail infrastructure may also result in the generation of non-hazardous and hazardous waste including wooden sleepers, rails, ballast, sub-ballast, soil, waste from removed vegetation, packaging materials, oil filters and saturated spill absorbent material, etc). Improper managing and handling with generated waste may cause significant impacts of soil, water, biodiversity and people.

It is anticipated that some parts of the ballast may be contaminated with petroleum products, minerals, fertilizers and other products transported by rail. Therefore, during preparation of technical design project it will be necessary to carry out analysis of contamination and select appropriate waste management methods depending on the results.

Some materials may be classified as hazardous as defined in Directive 2008/98/EC or Decision 2001/573/EC. Some materials may be inert or relatively non-hazardous in situ, but could become hazardous depending on the used disposal method.

Wastes are considered to be hazardous if they are: explosive, oxidizing, flammable, irritable or toxic, carcinogenic, corrosive, infectious, teratogenic, and mutagenic; when incinerating or in contact with air, water and acids generate toxic substances. Such wastes shall be temporarily stored (until final treatment or disposal) on a separated/proper protected area and labeled with special signs.

The potential fire danger that could spread also over material requires specific measures of protection, because they could easily release very dangerous substances, e.g. impregnated wooden sleeper. Distribution and usage of big amounts of oil, lubricants and other dangerous materials, set up high standards regarding the protection measures. However the implementation of the project will ensure higher technical level of the railway hence it is anticipated that probability of accidents, fire and other emergency situations will be significantly reduced.

Illustration 27. Rotten wooden sleepers near Ceadir-Lunga

The creosote content varies, so the researchers suggest that a critical limit of 150 ppm PAH16 (dry weight) should be set to represent the lower limit of hazardous concentration of PAH16. Sleepers with levels of creosote content above this should be classified as hazardous waste.

The general concentration of creosote is usually found to be significantly above the EU's critical creosote limit. Therefore, all creosote railway sleepers should be considered as the hazardous waste and disposed of accordingly.

If the total creosote content is greater than the limit set by the European Union, of 1,000 ppm dry weight (1g per kg dry weight), the sleepers should be classified as hazardous waste and disposed of according to the regulations. Under Commission Decision (EU) No. 2014/955/EU amending Decision 2000/532/EC, and EU Directive 2000/76/EC, strict precautions are in place for the safe disposal of sleepers as hazardous waste. In Moldova there is currently no regulation on the management of hazardous waste. The disposal of construction and demolition waste directs the Practical Code A 09 04 2014 on construction waste. List of authorized waste management companies in Moldova could by found on the following website: http://mediu.gov.md/index.php/activitate /autorizatii/100-categorii-in romana/ activitate/ autorizatii/ 2333-lista-autorizatiilor-eliberate-in-perioada-2010-2015-intreprinderilor-care-desfasoara-activitati-de-gestionare-a-deseurilor.

The Waste Management Department of the Ministry of Environment in Moldova confirmed that currently does not exist in Moldova company, dealing, *i.e. handling and transportation or recycling,* with hazardous waste. In practice, this means that these services should be provided by company from Romania or Ukraine, having appropriate license. These company can use one of the cement plants - in the City of Rezina (Lafarge) or in the City of Rybnitsa (in Transnistria) - having technical capacity to incinerate hazardous waste.Structures that are too worn or contaminated will be submitted to waste management companies having necessary permits. When sleepers are burnt as ordinary waste, some carcinogenic compounds are released. Therefore it is important to prevent incineration in inadequate installations.

Collection, treatment and transportation of wastes generate at the site will be implemented in accordance with the general plan of waste management, i.e. should be managed according to the national and international legislation.

6.1.2 Wastewater

Incidental pollution/contamination related with the activities on the track could take place during the construction and operation periods. Construction works bring potential time-limited risks of water pollution, notably surface waters due to fuel leaks or lubricant spills from the operating machines during rehabilitation. Further water pollution/contamination is possible due to the building materials soluble in water that are used in construction, particularly if such materials contain toxic substances.

Water pollution is a pressing environmental problem in railway transport. Its main sources are usually emergency cargo spills (especially oil products), cleaning and maintenance of trains and their equipment, pollutants leaching from contaminated ballast and passenger trains effluent. However, it should be noted that the proposed economic activity will significantly improve current technical state of the railway section under consideration, reduce the risk of accidents, worn-out drainage canals will be fixed, contaminated ballast will be cleaned and high quality drainage system maintenance will be implemented. During preparation of technical design project, all necessary technical mitigation measures will be foreseen in order to collect and properly treat generated and surface wastewater.

Pollution of waters during railway renewal may be physical, chemical and biological. Physical pollution is manifested through presence of particulate matters from earth residues, sand, solid particles from tires

friction, remains from accidents, etc. Chemical contamination of surface waters may result from discharge of liquid matters such as grease and oils. Solid particles, through road surface washing, are settled in gutters and drainage canals and this can cause their clogging, while grease and oils float over the surface and reach the recipient.

Biological pollutions result from disintegration of organic matters used as food of various micro organisms. They may be due to food thrown by unconscious participants, leaves scattered around by wind, feathers and other matters present in the immediate surroundings.

Excavated or removed material during the railway renewal can have significant impacts on water quality, i.e. to provoke change in the watercourse configuration, as well as increased turbidity and quantity of nutrients and solid suspended particles.

Sanitary waste water will be generated on the project site, which can have negative impact on the surface and ground water, and soil.

Taking into account assumptions provide above, it can be concluded that the proposed economic activity will not cause significant increase of water pollution; on the contrary - introduction of mitigation measures and modernization of the railway is expected to reduce potential negative impacts on surface and groundwater.

During construction the incidental contamination could take place by:

- damage of building machines and tools used in construction,
- uncontrolled construction material handling (reloading),
- leaks or uncontrolled spills of dangerous liquids (fuels, chemicals),
- intentional or accidental release or dumping the dangerous building material surplus and chemicals into the rivers/streams/dykes,
- flooding the construction site during high water periods.

6.1.3 Emissions to air

Possible adverse effects on air, which are time-limited, during the renewal activities are expected as a result of the operation of machinery and equipment with combustion engines (emission of exhaust and dust). The dispersion area of exhaust and dust as a result of earthwork (up to standard levels of air quality) depends on the concentration of machinery and equipment at the site and the capacity of their engines. The quantity of the dust emitted from the aforementioned sources depends on the conditions of a top-cover base of the access roads and atmospheric conditions: humidity and speed of air, in particular. Cleaning of the vegetation near the trackway may have adverse impact to the ambient air quality.

Dispersion of the total emitted dust (particle size below 80 µm) depends primarily on the meteorological conditions – wind and air humidity. Actions by gravity (depending on air velocity) cause for the dust to turn into sediments at a distance further away. In dry periods, the sediments may be taken into the atmosphere again if the wind blows faster than 4 m/s. The particles ranging in size between 30 - 80 µm then fall on the construction site and have a small reach of dispersion. They are the issue of work safety, whereas the particles of 30 µm are part of the environmental and social impact assessment. With regards to the limited time of work performance, the quantity of dust that will be generated during construction is minimal and will not have any adverse effects on the environment.

The quantity of exhaust fumes released by the relevant building machines is not large so their impact on the environment is omissible.

In terms of fostering the sustainable transport development, development of transport connectivity, and modes of transport, the emission is closely related with environmental protection where a particular attention is given to the development of railways (and inland navigable waterways). This is also in conformity with a strategy of promoting the multimodal transport and generating the effects of redirection of transport from the road transport, being a heavy polluter, to the energy-more efficient railways and/or inland waterway transport.

In regard with the assessment of the fuel consumption and possible air pollution, it can be concluded that railways transport option is eco-friendlier than road transport, whilst the road transport generates approximately 2-10 times higher quantities of the air pollutants. The increased quantities of the pollutants which will be released by locomotives (due to the increased transport, more frequent services and higher speed after completion of the track rehabilitation) will have no significant, neither positive nor negative, impact on climate.

6.1.4 Noise

Rehabilitation works during construction phase are related with the works similar to other works typical in low-building. The construction works to be carried out aiming at completion of the intervention produce the noise typical for construction works in general. Noise is also being generated by camps and parking areas, warehouses, etc. and transportation of construction materials.

The machinery that may be used for transportation and construction can generate noise level 80-120 dB (A). The noise level will not increase due to the rehabilitation works. The speed will be slightly increased after the rehabilitation, causing less passing noise time. The noise emitted from old locomotives remains the same, after the purchase of new locomotives will decrease. Regarding the vibrations - the fact to use long welded rail will prevent the hammering noise at each rails connection and this noise will disappear.

During construction works the impacts will be felt by the local population residing near this linear construction. It is not permitted to carry out works and activities which make noise that disturbs night peace and sleeping from 8 p.m. until 6 a.m. in the zone of settlements.

Due to a distance between the construction site and nearest houses it is anticipated that the impact of the noise made by the building machinery and heavy vehicles will sporadically exceed the relevant norms prescribed by law. During the occurrence of such a situation a mobile/portable noise barriers will be put in place so that the law is complied with. They are temporary and local, but they are related with the impact that noise and air pollution (dust, exhaust fumes) have on humans' health caused by operations of the machinery.

SOURCE OF NOISE	WORK POWER (KW)	LEVEL OF NOISE POWER OF NOISE SOURCE DB(A)
Compressor	22	99
Drill	100	96
Hydraulic dredger	180	101
Loader	180	104
Heavy vehicle/lorry	150	110
Hydraulic hammer	120	108
Diesel generator of electricity	250	87

Illustration 28. Level of noice of selected construction machines

Source: Update of noise database for prediction of noise on construction and open sites in UK (Department of Environment Food and Rural Affairs, 2005)

6.1.5 Fuel Management

Storage tanks and filling equipment are with the potential for soil and water resource contamination due to leaks and spills. Storm water falling on fueling areas and secondary containment systems may contain oil residues from incidental releases.

6.1.6 Habitat Alteration and Fragmentation

The trackway renewal may result in alteration and disruption to terrestrial and aquatic habitats. Right-of-way construction activities along a railway alignment may adversely affect wildlife habitats depending on the characteristics of existing vegetation, topographic features, and waterways. Habitat alteration may include loss of nesting sites and other wildlife habitat through bush clearing; disruption of watercourses; creation of barriers to wildlife movement; and visual and auditory disturbance due to the presence of machinery, construction workers, and associated equipment. In addition, sediment and erosion from construction and storm water runoff may increase turbidity of surface waters.

It is important to state that no animal or plant species will become extinct due to the construction. Some animal species of vertebrates will leave parts of a broader study area due to the noise. However, the animals that have escaped will resettle in their old habitats after the works have been completed.

The Republic of Moldova signed and ratified the following in ternational conventions related to the nature protection:

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) (ratified in 1993) whose principal aims are to ensure conservation and protection of wild plant and animal species and their natural habitats (listed in Appendices I and II of the Convention), to increase cooperation between contracting parties, and to regulate the exploitation of those species (including migratory species) listed in Appendix 3. To this end the Convention imposes legal obligations on contracting parties, protecting over 500 wild plant species and more than 1000 wild animal species.

The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (ratified in 2000). Contracting Parties work together to conserve migratory species and their habitats by providing strict protection for endangered migratory species (listed in Appendix 1 of the Convention), concluding multilateral Agreements for the conservation and management of migratory species which require or would benefit from international cooperation (listed in Appendix 2), and by undertaking co-operative research activities.

The *Convention on Wetlands* (ratified in 1999), is an inter- governmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. It is the world's oldest international conservation treaty, with the aim of sustainable use of wetlands for mankind without disturbing the natural properties of the ecosystem.

There are presently 156 Contracting Parties to the Convention, with 1676 wetland sites, totalling 150 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance. This List, commonly called Ramsar sites, not only recognizes the world's most important wetlands, but are also an effective tool to help countries meet their goals of sustainability.

***Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters* (Aarhus, 1998) - ratified in 1999 -** is the international document which promotes civil role and making decision about environment, through better approach to sources of information and justice. In case of our action this will be also accomplished during process of environmental impact assessment which includes participation of public in process of public insight and public discussion.

In the period of preparatory works as well as during the time of construction and use of the railway, the planned intervention will cause no important elements of transboundary environmental impact which are not in conformity with the national standards or contradictory to the international commitments of the Republic of Moldova.

6.1.7 Rails

The removed rails can be recycled and reused.

6.1.8 Ballast

In order to reduce the need for building materials during the rehabilitation work, all the ballast will be recycled. This is especially important in re-using ballast contaminated with oil products – which will be cleaned by spraying a special detergent, rinsed with high pressure hot water (50-60^0 C) and finally cleaned by oil disintegrating bacteria.

6.1.9 Visual effects

Landscape in the frames of construction zones established along the route of the railway line will be notably modified during the renewal. These zones, together with the sites for storage of construction materials and assemblage segments for the railway line, will be visible and cause changes in the aesthetics of the landscape. Yet, these changes will be of short-term nature, their duration being equal to the duration of the railway construction itself.

The rehabilitation works will not pose significant impact on the morphology of the surrounding terrain, because the technical infrastructure already exists. Construction works in the area under consideration will not cause permanent devastation of trees.

The Republic of Moldova is a signatory of The **European Landscape Convention** (ratified in 2001) adopted in Strasbourg, October 2000. The members who have signed the Convention have agreed, pleading for the

fact that quality and diversity of the European landscapes makes common wealth, that it is important to cooperate aiming at protecting, managing, and planning all landscapes in Europe. The Convention as such deals with the landscapes which can be regarded extraordinary as well as ordinary or degraded ones, and its objective is to promote landscape protection, management, planning, and organisation cooperation in landscape-related issues on the European level.

6.1.10 Community Health and Safety

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under the track way renewal. Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and residents of local communities.

Rehabilitation activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local population.

Assessment of train traffic safety condition on sections of the Southern Corridor
Bender 1 - Basarabeasca - Etulia – Giurgiulesti

Incident Description	Year				
	2012	2013	2014	2015	2016*)
The collapse of a freight train through the fault of the path distance Besarabeasca and locomotive depot (PM) Besarabeasca			1		
Damage of locomotive in the passenger train that required a supplementary locomotive:					
- PM Besarabeasca	1	2	2	5	
- PM Bender		1	2		
Damage of locomotive in the freight train that required a supplementary locomotive:					
- PM Besarabeasca	1	6	11	9	1
- PM Bender	1	4	3	3	
Automatic coupling failure:					
- PM Besarabeasca		1			
- PM Bender					1
Self-uncoupling in the freight train PM Besarabeasca			1	1	1
Train delay for more than 1 h:					
- train depot Besarabeasca (ICP)	1	5	2		
- PM Besarabeasca	1	9	5	3	4
- FC Besarabeasca	1				
- PM Bender	1	6	1	3	7
Derailment during shunting:					
- FC Besarabeasca	1	1		2	2
- DC Giurgiulesti		1			
- ICP Besarabeasca	1			2	
- PM Besarabeasca					1
Track defect that caused:					
- traffic closure at the section or				1	
- train traffic speed reduction up to 15 kph				1	
Signalling problems				1	
Total cases of incidents	**9**	**36**	**28**	**31**	**17**

*) during 11 months of 2016 *Source: CFM*

Due to the rehabilitation work of the infrastructure and railway signaling systems the safety of persons and good will be improved. The project does not include any additional provisions for safe level crossing or footbridges.

The project aims to rebuild according to the original design and following the level crossing classification and safety rules. Level crossings are the basic one with flashing linghts, but without barriers. Also there is no specific gangway for perestrians.

Implementation of the project will not substantially increase the speed of trains as currently sections with speed limitations are few and short (60 km/h instead of 80 km/h) and even with new locomotives, due to the complicated line profile, it will not be noticed a real “increase” of speed of trains running. So trains running by rehabilitated rail infrastructure will not present an additional risk to people.

Classification of accidents and transport incidents used at the CFM is not in line with the Railway Safety Directive 2004/49/EC that has not been implemented in Moldova yet. The data on industrial injuries for 2015 and 2016 can be found as Annex 3 to this Report.

7. ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES AND THEIR IMPLEMENTATION PLAN

7.1 Environmental protection measures during the rehabilitation

Environmental protection is a comprehensive embodiment of all measures designated for preservation and improvement of natural and cultural heritage, rare and endangered plant and animal species, their habitats as well as for unique landscape features. Consideration of these measures is therefore extremely important for ensuring the conditions aimed at mitigation of adverse effects on environment throughout the stage of construction and operation.

During the envisaged activities aimed at improving of the services of CFM, the leading authority/project leader will be required to implement the environmental protection measures defined in this study, and they become an integral part of the provisions of location and construction permits. Additionally, as a part of his activities the project leader will be required to comply with particular regulations of the Republic of Moldova which are associated with regulation of the issues of protection of nature and environment, forests, waters, soils, air, noise, and human health.

It is crucial for the overall system of environmental protection measures to establish the rules for the optimal use of the railway instrastructure rehabilitation project. These environmental protection measures must be in implementation during the preparatory work prior to construction, during the construction, and throughout the life cycle of the project.

The specific actions to achieve the compliance with Moldovan environmental, labour, health and social regulatory standards, EBRD's environmental and social policy and performance requirements and EIB environmental and social policies are included in the Environmental and Social Action Plan (ESAP) attached. This includes actions that reflect good industry practice.

7.1.1 Protection measures for waste material disposal

The objectives of proper waste management are:

- waste prevention or reduction;
- material re-use;
- materials recycling or recovery;
- energy recovery; and/or
- disposal in a safe manner.

Wooden sleepers soaked in creosote have to be treated and disposed of as hazardous waste. Precautionary measures must be developed to prevent their simple incineration/burning. Creosote has been used as a wood preservative for decades and contains toxic chemical compounds including polycyclic aromatic hydrocarbons (PAHs). Some of these are a danger to human health, being carcinogenic. (Creosote is therefore classified as potentially carcinogenic).

Taking into account the current understanding related to the harmful influence of the creosote oil to the environment, for the future, it is recommended the old impregnated sleepers to be stored and destroyed in the following manner:

- to consult the industry on the possibility the sleepers to be burnt in stoves where the combustion is beyond 1000 °C (example: Cement plant);

- to locate deposit sites for safe storage of the sleepers or to conclude Contract with entity registered to be official deposit site for hazardous materials;
- to carry out analyses on the harmfulness of the old wooden sleepers which will be stored. The analyses are to be made by authorized laboratory;
- to deposit the old wooden sleepers on places officially approved by environmental authorities.

7.1.2 Water and watercourse protection measures

General measures for reduction of potential impacts of emissions into surface waters during construction phase include procedures of good construction practice which should be taken care of by the competent civil engineering supervisor:

- Near surface waters, construction/renewal zones will be established on adequate distance, or in absence of space for construction zones establishment, surface waters will be channelized adequately;
- Collection and treatment of the wastewaters from the construction/renewal site prior to their discharge into surface watercourses;
- Disposal of excavated material outside drainage lines and surface waters;
- Removal of excavated and deposited earth material, as soon as possible;
- Provision and use of equipment/vessels for evacuation of potential leakages;
- Solid waste disposal into containers;
- Placement of mobile toilets at distances of more than 100 meters from drainage lines;
- Use of services of authorized company for handling and removal of wastewater from mobile toilets.

7.2 Air pollution protection measures

- In order to avoid and minimize the pollution and ensure environmental safety of workers and the population all construction equipment should be licensed and permitted in accordance with national requirements;
- The following mitigation measures could be used to mitigate impacts of dust on the area isolation of the construction area from the settlements through special fences; adequate sheeting of vehicle loads up until tipping point when moving around the site;
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content. Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements;
- Avoiding open burning of solid waste, vegetation and managing emissions from mobile sources.

7.3 Noise protection measures

- Most of the works will be carried out outside of the residential zones, far away from the sensitive receptors. Planning activities will be performed in consultation with local communities. The activities with the greatest potential to generate noise are planned during periods of the day that will result in least disturbance. The activities which must be performed near the residential zones will be managed between 6.00 a.m. - 20.00 p.m.

- Using noise control devices, such as temporary noise barriers, equipment which generates less noise and avoiding or minimizing materials transportation through the residential areas will be obligatory.

7.4 Fuel management measures

- Storage tanks and components should meet international standards for structural design integrity and operational performance to avoid catastrophic failures during normal operation and during exposure to natural hazards and to prevent fires and explosions;
- Fueling facilities should develop a formal spill prevention and control plan that addresses significant scenarios and magnitude of releases. The plan should be supported by the necessary resources and training. Spill response equipment should be conveniently available to address all types of spills, including small spills.
- During operation all stationary construction machinery operating on diesel and petrol will be equipped with a special container to collect leaking fuel for disposal.

7.5 Habitat alteration and fragmentation measures

- The destruction of critical habitats is not expected while this project consists of a rehabilitation of existing railway infrastructure. When necessary utilize existing road transport corridors for the supply of the construction material.
- Minimize the clearing of riparian vegetation during the work;
- Before cutting shrubs and trees, specifically in Taraclia – Vulcanesti section, but not only there, an ornithology survey should be conducted to check whether rare or endangered bird species are not present. An ornithology expert should be invited in case of their occurence;
- Avoid the use of herbicides that fall under or are listed under: The World Health Organization Recommended Classification of Pesticides by Hazard Classes 1a and 1b;
- Avoid the use of pesticides that fall under the World Health Organization Recommended Classification of Pesticides by Hazard Class II. When necessary follow the stipulations of the Regulation on the management of phyto-sanitary products and fertilizers in the national economy (approved by the Ministry of Agriculture and Food Industry Ordinance No. 231 of 28 November 2003) establishes the mandatory sanitary, environmental and hygienic requirements for all aspects of agricultural chemical management., In all cases handle, store, apply, and dispose of these products properly.

7.6 Visual effect measures

Upon the completion of the construction works, and in accordance with the obligations of the Law on Construction and Law on Environment, micro relief and vegetation in these zones will be subject to restoration.

7.7 Community Health and Safety

Risk management strategies may include:

- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community. Removing hazardous conditions on construction sites that cannot be controlled affectively with site access

restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials.

- The road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising, and the adoption of procedures that will be set in the Traffic management plan.
- Preparation of Traffic management plan (during the construction phase). Continuous maintenance of the used vehicles and machinery (Preparation of the Machinery/Vehicles maintenance plan-benchmark-record of maintenance done).

7.8 Measures for protection in case of accidents

- limit all activities that could cause fire and place signs that forbid unauthorized entry;
- ensure undisturbed access for intervention vehicles in the case of fire by maintaining the fire ways;
- every machine has to be equipped with the fire extinguisher which does not have halones;
- removal of pollutants after extinguishing a fire (extinguishing foam) by collecting the surface layer with tools – shovels and buckets or barrels, and further disposal appropriate for hazardous waste – delivering it further to a legal person registered and authorized for handling and collecting hazardous waste;
- it is required to control technical validity of vehicles and equipment on the construction site;
- it is required to organize and obligate the constructor to abide appropriate protection measures implementation during construction in order to prevent environment pollution (construction materials, oils, packaging and similar);
- it is necessary to have neutralizing substance for minimally 1,000 l of fuel and hand tools for pollutant removal available at the construction site;
- removal of oily pollutants by authorized legal or private persons, by collecting the surface layer with hand tools – shovels and buckets or barrels, no matter whether the pollution is found on the water or on land. Following preliminary collection with hand tools the surface should be covered with an appropriate absorbent (feathers, wood shavings or special synthetic absorbents) and following this treatment collect it and place it in appropriate storage containers (metal barrels with lids);
- substances used during remediation of unexpected water pollution need to have a water usage license;
- special remediation of the environment will be needed only following larger exceptional situations such as larger explosions, fires or earthquakes of greater intensity. In that case the natural state of the environment should be returned through earth and construction works, and damaged sections be repaired.

8. MANAGEMENT AND MONITORING PLAN

The outline of the feasible cost-effective measures to avoid, minimise, mitigate or compensate for environmental and social impacts to acceptable levels the following stages must be considered where appropriate:

- Construction;
- Implementation and maintenance;
- Closure and decommissioning;
- Management and Monitoring plan.

The discussion and tables below look at the detailed requirements of the Environmental and Social Management and Monitoring Plan (ESMMP) during the active phases of implementation.

8.1 Pre-construction Phase

This part of the work includes planning for the construction activities, developing management policies, ensuring that sub-contracts include the need to follow the ESMMP and setting up the reporting and monitoring systems (see also section 1 of the Environmental and Social Action Plan [ESAP]).

The final design of the rehabilitation project needs to address the mitigation measures described in the impact assessment, and tender documents must include these measures. The necessary permits to enable the full development to be completed.

8.1.1 Development of policies, manuals and procedures

Implementation of the ESAP and ESMMP requires a set of manuals and procedures to be developed, each of which requires training of the relevant personnel. Some of these need to be in place prior to commencement of the construction phase (also see section 1 of the Environmental and Social Action Plan).

Operational and management manual for all parts of the rehabilitation/construction works developed into final manual and procedures to include:

- Health and Safety plan for all operations;
- Emergency plan, identifying responsibilities.

Each policy and plan needs to have a feedback and review process that will be a part of the audit process.

8.2 Construction Phase

As stated above, all sub-contracts need to include the requirement to implement the ESMMP and the associated manuals and procedures. The policies and plans mentioned above can be adapted by sub-contractors or replaced by equivalent policies and plans of their own, but every contractor must be able to demonstrate that their personnel have had the relevant training.

8.3 Operational Phase

The operational phase, i.e. the regular functioning of railway transportation is not the subject of this study, therefore it is not further elaborated.

8.4 Environmental and Social Management and Monitoring Plan

ACTIVITY	IMPACT	MITIGATION METHOD	OVERALL RESPONSIBILITY	MONITORING CRITERIA AND FREQUENCY
Monitoring requirements during the Pre-construction phase				
General issue				
Apply for necessary permits for construction / rehabilitation.	Permits required to rehabilitation need to be incorporated in the contracts for delivering the work.	Analysis of legal requirements for permits for all proposed operations; Application for necessary permits.	CFM	All necessary permits issued.
Improve Environment, Health and Safety (EHS) requirements.	Clear technical criteria for construction and improved management and training of personnel.	Develop Operational and Management Manual.	CFM	Manual and procedures written prior to contract tendering process.
Develop a training programme on the new EHS procedures for all personnel.	Improved management and training of personnel	To change attitudes and behaviour, all members of staff involved.	CFM	Check staff training plans; Annual report on number of staff receiving each training.
Stakeholder engagement				
General Stakeholder consultations.	Commence engagement to reduce future problems through lack of knowledge during implementation phase.	Continuation of SEP - Stakeholder Engagement Plan to keep stakeholders informed about proposed changes and the timetable for change.	CFM / Contractor	Number of activities undertaken; Minutes of meetings & attendance figures.
Monitoring requirements during the Construction phase				
Reduction of environmental emissions and nuisance				

ACTIVITY	IMPACT	MITIGATION METHOD	OVERALL RESPONSIBILITY	MONITORING CRITERIA AND FREQUENCY
Increased heavy vehicle traffic to and from the site delivering construction materials.	Air emissions, additional climate change, emissions of CO_2 will occur in the construction area, noise and dust.	Planned routes to and from and within the site to minimise travelling distance and traffic jams on site, phasing of deliveries to minimise fuel consumption; Restricted hours of operation to reduce noise at night; Noise and dust monitoring; Trucks to be covered; Speed limits introduced.	Contractor	Monitor implementation of planned routes and scheduling of deliveries on site and report monthly; Monthly reporting of emissions.
Control of surface water pollution from construction operations.	Primarily risk that loose soils and construction materials will flow to rivers. Additional risk from fuel and oils on site for machinery and vehicles.	Construction Quality Assurance and Site Management Plan. Draft procedures produced through technical assistance prior to tendering	Contractor	Construction site management plan in place prior to tender; Environmental Health and Safety operational manual in place prior to tender, site manager identified with reporting responsibilities defined.
Waste disposal during construction.		Construction waste management plan.	Contractor	Quarterly reporting of waste management plan implementation
Implementation of monitoring plan and reporting plan for the whole environmental, health and safety programmes.	To minimise emissions and risks to workers on site.	Monitoring and reporting is the control system to identify problems as early as possible and enable mitigation and management mechanisms to respond.	CFM / Contractor	Initially written prior to tendering, and then implemented and amended with experience through construction phase.
Visual nuisance of the landscape	Much of the activity in full view of residents along the railway.	Final planting plan	Contractor	

ACTIVITY	IMPACT	MITIGATION METHOD	OVERALL RESPONSIBILITY	MONITORING CRITERIA AND FREQUENCY
Impacts on flora and fauna.	Biodiversity lost.	Enhancement measures possible to increase biodiversity and improve the wildlife corridor along the trackway through planting of local indigenous species on visual and noise protection bunds.		Annual report on bird monitoring; Restoration plan to include enhancement planting.
Health and safety issues				
Heavy vehicles and equipment on site, working on different parts of the construction contract.	Dangers from construction vehicles and operations to site workers.	Health and Safety Plan in place and disseminated.	Contractor	Health and safety plan in place
Unauthorised access to construction site.	Danger to members of the public or unscheduled contractors.	All vehicles to report to site office at entrance and receive instructions.		
Employment issues				
Training	Reduction of potential impacts to environment and risks to the health and safety of workers requires structured training.	Ensure that all employees receive general training on EHS issues related to the construction plans.	CFM / Contractor	Performance Criteria: No. of persons not receiving critical EHS training within one month of appointment.
Accident Policy	Enable improvements to health and safety plan and operational procedures	Establish accident record system and report quarterly on type of accident, actions taken to remedy systemic or one-off problems, and documentation of any changed EHS procedures.	Contractor	

ACTIVITY	IMPACT	MITIGATION METHOD	OVERALL RESPONSIBILITY	MONITORING CRITERIA AND FREQUENCY
Internal Grievance mechanisms	Workers must have a mechanism to complain about conditions of service and management must demonstrate that necessary remedial actions are taken to reduce reoccurrence.	Standard procedures to be produced and clearly advertised to staff; Collation of data on grievance procedures and appeals and the percentage resolved within agreed timeframe.	Director and HR managers at CFM and Contractor	Annual reporting of grievances and resolution; Performance criteria: percentage resolved within agreed timeframe.
Operational Phase	The operational phase, i.e. the regular functioning of railway transport is not the subject of this study, therefore it is not further elaborated.			
Decommission	Not foreseen for the railway rehabilitation project, because railway itself is a permanent structure. Special measures arre foreseen only for all temporary occupied sites. The same monitoring company will perform it, by taking into account all agreements and permits issued for the usage of each site occupied by Contractor, if the case.			

Illustration 29. Format legend of illustration