

BIODIVERSITY ACTION PLAN

December 2022

This document has been developed/revised as indicated below and described in the revision record on next page. Please destroy all previous revisions.

Revision	Date	Authors	Reviewed	Pages
V0.1	21/10/21	Wardell Armstrong	Šefket Goletić & Vildana Mahmutović	33
V0.2	21/12/22	Prof. dr. Šefket Goletić	Vildana Mahmutović & Danira Zanović	30

Revision	Status	Date	Update/change details
V0.2	Figure 1: Layout of the Vareš project	21/12/22	New layout map of the Vareš project due to relocation of road route from Zagarski potok to the regional road Vareš Majdan - Tisovci
V0.2	Table 1.1. Biodiversity Action Plan - Key measures	21/12/22	Changed key measures in the Biodiversity Action Plan: BIO.01/BIO.03 - Excluded need identification of new wetland habitat area and restoration of a nearby stream/river. BIO.04/BIO.08 - Increased area for restorative forest management by 15% and mountain meadows by 20%. BIO.09 - Excluded is need for a new area for restoration of hydrophilic tall herb vegetation, due to displacement of road route BIO.10 - Added/included 4 more PBF types (FBiH-VU). BIO.11 - Added/included 2 more species of birds (FBiH-VU). BIO.13 - Transshipment station was relocated from Droškovac location south to former Vareš Majdan railway station.
V0.2	6.1. BIO.01 - Ensure a Net Gain for Annex IV Amphibians.	21/12/22	The need to identify an area for a new wetland habitat is excluded, due to relocation of road route outside Zagarski Potok. Measures for avoiding/mitigating impact are described.
V0.2	6.3.BIO.03 - Ensure a Minimum NNL of PBF Watercourses from Plain to Montane Levels	21/12/22	Excluded need for restorative management of nearby stream/river, due to relocation of road route from Zagarski Potok. Avoidance/mitigation measures are described.
V0.2	6.4. BIO.04 - Ensure a Minimum NNL of PBF Acidophilous Spruce Forest	21/12/22	Increased the area of restorative forest management by 15%, included a map of displacement area and added a plan for restorative management (RM) of spruce forest on an area of 115 ha.
V0.2	6.8. BIO.08 - Ensure a Minimum NNL of PBF Upland Hay Meadow	21/12/22	Increased the area of restorative management of mountain meadows by 20%, included a map of the displacement area and added a plan for restorative management (RM) on an area of 6ha.
V0.2	6.9.BIO.09 - Ensure a Minimum NNL of PBF Hydrophilous Tall Herb vegetation	21/12/22	The need to identify an area (about 1.5ha) for restoration of hydrophilic tall herb vegetation is excluded, due to displacement of road route to a greater distance - avoidance and mitigation measures
V0.2	6.10. BIO.10 - Ensure a Minimum NNL of Balkan Endemic, and Nationally Threatened Plants	21/12/22	4 more national species of plants from vulnerable species category (FBiH-VU) were added/included, for which, in addition to other 8 Balkan endemic and nationally threatened plants, measures are planned to ensure minimum NNL and long-term net profit.
V0.2	6.11. BIO.11 - Ensure a Minimum NNL of PBF Hazel Grouse	21/12/22	2 more nationally endangered bird species from vulnerable species category (FBiH-VU) were added/included, for which, as well as for Hazel Grouse, needed measures to ensure minimum NNL are planned.
V0.2	6.13. BIO.13 - Avoiding impacts on IUCN EN Annex IV bat species.	21/12/22	Transshipment station was relocated from location of Droškovac to former Vareš Majdan railway station, thereby avoiding impact on shelters and residences of kso and potential hibernation sites.

ISSUED FOR: Design Construction Operations Other _____

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1 INTRODUCTION

This Biodiversity Action Plan (BAP - Biodiversity Action Plan) is in accordance with recommendations from the Impact Assessment (chapter 5.4), part of the Environmental and Social Impact Assessment (ESIA), for the Vareš Project of company Eastern Mining doo Vareš in Bosnia and Herzegovina (hereinafter referred to as the "Project"). The BAP is a key component of the Environmental and Social Management System (ESMS) of the project, and will be managed and coordinated by the Sustainability Manager.

Within framework of the BAP, the framework for special measures required for appropriate resolution of impact on priority values of biodiversity resulting from the project activities is presented in detail. This document is required to demonstrate project compliance with the European Bank for Reconstruction and Development (EBRD) Performance Requirement (PR6) on Biodiversity (including national and international laws), in terms of Priority Biodiversity Features (PBF) and Areas of Critical Habitat (ACH) or qualified species for any of those areas.

The BAP extends to the Specific Biodiversity-related Avoidance and Mitigation Measures listed in Chapter 5.4 Impact Assessment to be undertaken before, during and after Project implementation, along with responsibilities, timelines and monitoring requirements. The General Mitigation Measures outlined in Table 5.4.10 of the Impact Assessment are not discussed in further detail here.

The BAP is a "live" document and is expected to be developed and improved as necessary throughout the Project detailed design, early works, construction, operations and decommissioning phases. For this reason, the BAP is being revised in order to harmonize project solutions with requirements for avoiding and mitigating impacts on priority biodiversity values. For monitoring, there is an expectation that it will be carried out regularly (annually, and if necessary, more often) for the first five years with a review after five years. At this point, monitoring can be reduced or increased as necessary in order to achieve objectives of the BAP and to avoid and mitigate impacts on biodiversity.

The company Eastern Mining doo Vareš has full responsibility for implementation of measures and the achievement of the goals specified in this BAP.

In order to achieve several actions and goals from this plan, consultation will need to be undertaken with the local forestry commission of the Zenica-Doboj Canton (JP Šumskoprivredno društvo Zavidovići), fishing society, local/national institutions for environmental protection, Ministry of Agriculture, Water Management and Forestry ZDK and Ministry of Spatial Planning, transport and communications and environmental protection ZDK, including institutions responsible for the Konjuh Protected Landscape and other protected areas and areas that are planned to be placed under protection, local non-governmental organizations/groups dealing with protection of the environment, natural and cultural heritage, the Federal Ministry of the Environment and Tourism and other participants.

2 REGULATORY FRAMEWORKS

The EBRD-financed projects are designed to be managed in accordance with good international practices related to sustainable development. PR relevant to biodiversity is EBRD PR6, whose objectives are as follows:

- Protection and preservation of biodiversity using precautionary and prevention approach;
- Implementation of a hierarchy of mitigation measures with the aim of no net loss of biodiversity and, where appropriate, net gain of biodiversity; and
- Implementation of good international practice (GIIP) in sustainable management and use of natural resources

This Plan provides a method to achieve compliance with the objectives of EBRD PR6.

3 PROJECT DESCRIPTION

3.1.1 Project location and setting

The Project is located in the municipality of Vareš, Zenica-Doboj canton, Bosnia and Herzegovina. The Rupice mine site is in close proximity to the border of neighbouring Kakanj Municipality. The Project consists of the polymetallic Rupice deposit, and the Vares Processing Plant facility, as well as a 27.4km haul route connecting two locations. The sites are located 8.7km west-northwest and 3.5km east respectively, from the town of Vareš. The Project is approximately a 50-minute drive from the capital city of BiH, Sarajevo.

Access to the concession consists of a series of paved roads passing through the mining town of Breza from the closest airport at Sarajevo, 50km to the south of the Project. A railway runs through valleys in the area and the ore processing plant can be accessed by a road connected to the railway in Vareš.

The Rupice mine and associated surface infrastructure footprint is situated within a steep wooded valley, on land owned and managed by the Vareš Forestry Commission of the Zenica-Doboj Canton (JP "Šumskoprivredno društvo" Zavidovići). The haul route passes through a combination of forestry land, using existing forest and local roads where possible, as well as some areas of grassland/meadow. The ore processing plant is located on a plateau (engineered platform) high on the edge of a valley at the Tisovci location and is brownfield land used for processing of ores during the previous mining period (1990s)

3.1.2 Project overview

The Project broadly consists of underground polymetallic mining at Rupice location, transporting of ore along a purpose-built haul road 24.5 km long to the ore processing plant at the Tisovci location, processing of ore and transporting the tailings back to the Rupice location for paste backfill. Waste rock will be stockpiled at Rupice, before being used as part of backfill. Tailings not used in backfill will be stored in a dry stack facility, designed to meet the capacity requirements across the life of mine, located immediately south of the ore processing plant. The final lead-silver and zinc concentrates will be transported to a rail loadout facility in Vares Majdan and then onwards for further refinement and sale. The Project layout is shown in Figure 1.

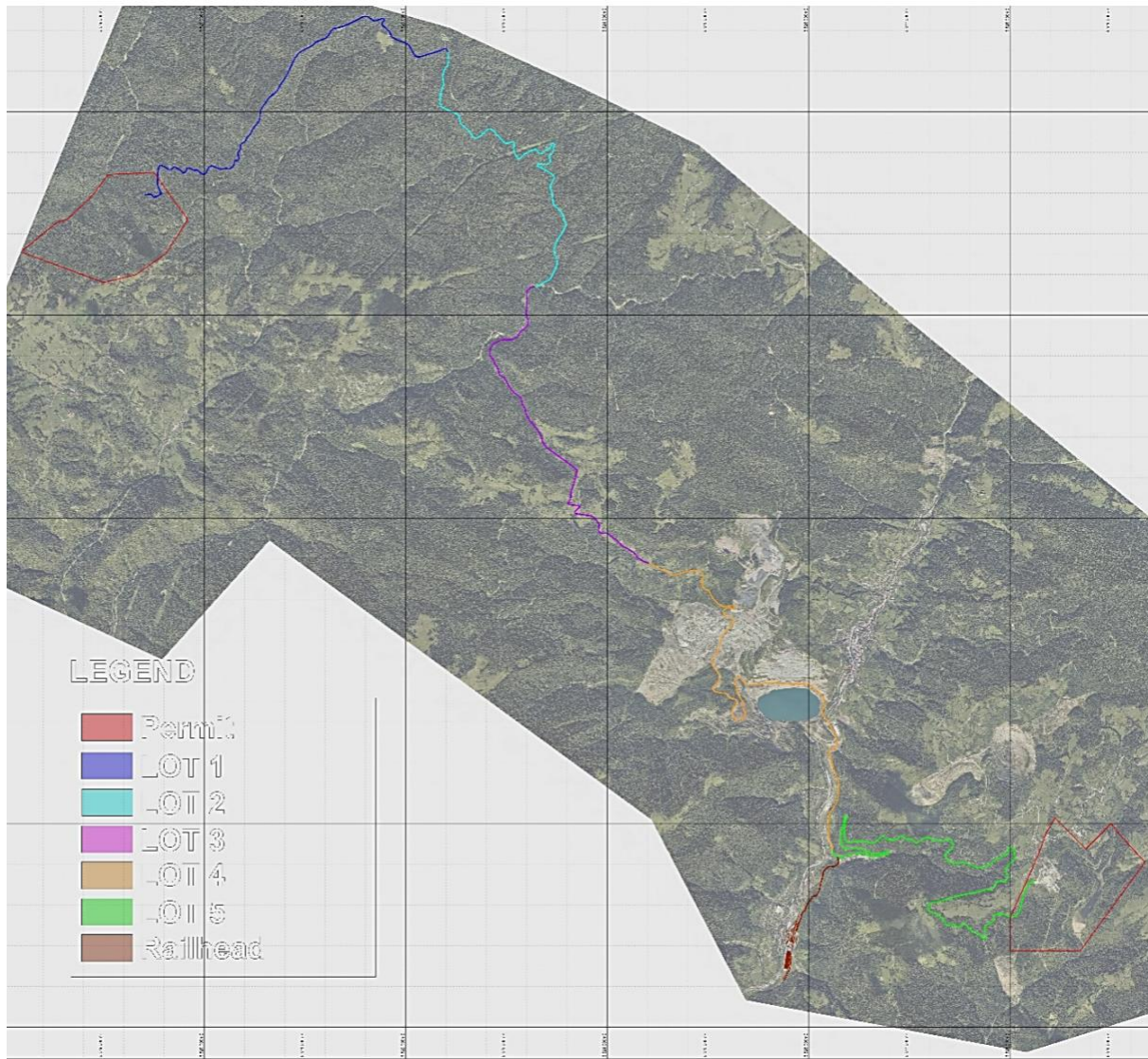


Figure 1: Layout of the Vareš project

4 BASELINE AND IMPACT ASSESSMENT

The baseline and impact assessments considered an Ecologically Appropriate Area of Analysis (EAAA)¹ for each habitat, species or group of species, in particular for "priority biodiversity features" and "areas of critical habitat". "Priority Biodiversity Features" (PBF)² include the following guidelines taken directly from Table 1. of the 2020 Guidance note for PR6³:

¹ The landscape level distribution of the feature requiring study, considering the ecological patterns, processes and functions that are necessary to support that feature.

² Priority biodiversity features are a subset of biodiversity that is particularly irreplaceable or vulnerable, but at a lower priority level than critical habitats.

³ Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (v. January 1, 2020). Sept 10, 2020

Criterion	Priority Biodiversity Feature	Critical Habitat
1. Priority ecosystems		
<i>Threatened ecosystems</i>	(PR6 para. 12-i)	(PR6 para. 14-i)
(a) Habitats listed in Annex 1 of EU Habitats Directive (EU members only) or Resolution 4 of Bern Convention (signatory nations only)	(a) EAAA is habitat type listed in Annex 1 of EU Habitats Directive or Resolution 4 of Bern Convention	(a) EAAA is habitat type listed in Annex 1 of EU Habitats Directive marked as “priority habitat type”
(b) IUCN Red-List EN or CR ecosystems	(b) EAAA** < 5% of the global extent of an <i>ecosystem</i> type with IUCN status of CR or EN	(b) EAAA ≥5% of global extent of an ecosystem type with IUCN status of CR or EN
		(c) EAAA is ecosystem determined to be of high priority for conservation by national systematic conservation planning
2. Priority Species and their Habitats		
<i>Threatened species</i>	(PR6 para. 12-ii)	(PR6 para. 14-ii)
(a) Species and their habitats listed in EU Habitats Directive and Birds Directive (EU members only) or Bern Convention (signatory nations only)	(a) EAAA for species and their habitats listed in Annex II of Habitats Directive, Annex I of Birds Directive, or Resolution 6 of Bern Convention	(a) EAAA for species and their habitats listed in Annex IV of the Habitats Directive (See EU restrictions)
(b) IUCN Red List EN or CR species	(b) EAAA supports < 0.5% of global population OR < 5 reproductive units of a CR or EN species.	(b) EAAA supports ≥ 0.5% of the global population AND ≥ 5 reproductive units of a CR or EN species
(c) IUCN Red List VU species	(c) EAAA supports VU species	(c) EAAA supports globally significant population of VU species necessary to prevent a change of IUCN Red List status to EN or CR, and satisfies threshold (b)
(d) Nationally or regionally (e.g., Europe) listed EN or CR species	(d) EAAA for regularly occurring nationally or regionally listed EN or CR species	(d) EAAA for important concentrations of a nationally or regionally listed EN or CR species
<i>Range-restricted species</i>	(PR6 para. 12-ii)	(PR6 para. 14-iii)
	(a) EAAA for regularly occurring range-restricted species	(a) EAAA regularly holds ≥ 10% of global population AND ≥ 10 reproductive units of the species***
<i>Migratory and congregatory species</i>	(PR6 para. 12-ii)	(PR6 para. 14-iv)
	(a) EAAA identified per Birds Directive or recognized national or international process as important for migratory birds (esp. wetlands)	(a) EAAA sustains, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species’ lifecycle
		(b) EAAA predictably supports ≥10 percent of global population during periods of environmental stress

*Quantitative thresholds derived from IUCN Key Biodiversity Area Standard and aligned with International Finance Corporation’s (IFC) Guidance Note 6 (rev. 2019)

**EAAA = *ecologically appropriate area of analysis*, as defined above

***The IUCN Key Biodiversity Areas standard cites the following definition for reproductive unit: “the minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site. Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species.”

Desk study and extensive site surveys were undertaken to inform this Biodiversity Action Plan (BAP). Desk and field studies have been undertaken by the University of Zenica, Institute "Kemal Kapetanović" in Zenica (Zenica Institute) and overseen by Wardell Armstrong International (WAI).

The desk study involved searches for:

- Legally protected areas for nature conservation within a theoretical zone of impact of the Project, and areas which are internationally recognised as having high biodiversity, including potential Natura 2000 sites, Biosphere Reserves, Key Biodiversity Areas, Global 200 Ecoregions, Endemic Bird Areas (EBAs), Important Bird Areas (IBAs) and areas listed within the national 'Strategy and Road Map for Protection of Biological and Landscape Diversity (2015-2020)';
- Species which are protected in BIH or on the 'red list' in BIH (based upon Habitats Directive (EU Habitats Directive (92/43/EEC) and Birds Directive (Council Directive 79/409/EEC);
- Species or sub-species which are considered by specialists to be threatened, declining or endemic either in BIH or in the region (Balkans);
- Areas of critical habitat according to the definition in EBRD's PR6;
- Species which might suggest or trigger the presence of critical habitat according to PR6. This includes species which are listed by International Union for Conservation of Nature (IUCN) as being endangered or critically endangered at a global and European level as well as species meeting other criteria listed in the Performance Standards; and
- Habitats or ecosystems which might be associated with key evolutionary processes or are associated with ecological functions that are vital to maintaining the variability of biodiversity features (described as critical habitat features), defined in PR6.

The subsequent field surveys were informed by the desk study and the preliminary habitat assessment. Field surveys for various habitats and species identified as potentially being impacted by the project were undertaken between 2019 and 2022.

The ecological baseline results and assessment of impacts are discussed in detail in the ESIA chapters 405 and 504 respectively. The Impact Assessment identified several features requiring specific avoidance, mitigation or offset measures which are the subject of the Biodiversity Action Plan (BAP).

5. SUMMARY OF KEY ACTIONS

This BAP enables the project to meet the requirements of PR6 within an acceptable time frame, as stipulated in PR6, paragraph 6 as discussed above.

In July 2021, Natural England (NE), the government’s advisor for nature in England, launched a new tool to help measure biodiversity net gain on development sites. PR6 does not require the use of a specific calculation tool, and as such in order to inform the net gain/loss calculations, The Biodiversity Metric 3.0 - Calculation Tool⁴ was used as the most up-to-date tool in use in England. This tool is used to assess the baseline biodiversity value and the predicted value of habitats post-development (see Appendix 1).

Existing habitat areas and their condition are taken from the baseline survey information and areas were measured using GIS.

In terms of fitting the local habitats into a table that is designed for British ecosystems, a ‘best fit’ was used in terms of the type and condition of forest areas. A summary is provided below in Figure 2.

Headline Results		Return to results menu
On-site baseline	Habitat units	344.52
	Hedgerow units	0.00
	River units	16.08
On-site post-intervention <small>(including habitat retention, creation & enhancement)</small>	Habitat units	110.41
	Hedgerow units	0.00
	River units	0.00
On-site net % change <small>(including habitat retention, creation & enhancement)</small>	Habitat units	-67.95%
	Hedgerow units	0.00%
	River units	0.00%
Off-site baseline	Habitat units	493.90
	Hedgerow units	0.00
	River units	40.00
Off-site post-intervention <small>(including habitat retention, creation & enhancement)</small>	Habitat units	956.61
	Hedgerow units	0.00
	River units	56.61
Total net unit change <small>(including all on-site & off-site habitat retention, creation & enhancement)</small>	Habitat units	228.60
	Hedgerow units	0.00
	River units	0.53
Total on-site net % change plus off-site surplus <small>(including all on-site & off-site habitat retention, creation & enhancement)</small>	Habitat units	66.35%
	Hedgerow units	0.00%
	River units	3.32%

Figure 2: Summary of Biodiversity Metric

Table 5.1 below summarises the PBF/ACH features requiring specific actions, which are described in further detail thereafter.

⁴ The Biodiversity Metric 3.0 updates and replaces the beta Biodiversity Metric 2.0 (JP029) published in 2019. Biodiversity Metric 3.0 is a biodiversity accounting tool that can be used for the purposes of calculating biodiversity net gain.

TABLE 0.1: BIODIVERSITY ACTION PLAN - KEY MEASURES

ID	Ecological receptor	Summary of Action	Rationale for Action	Timing
BIO.01	<p>Amphibians that breed along the Vrući Potok and the Trstionica River downstream from the mouth of the Vrući Potok and along the Mala Rijeka (Annex IV species):</p> <ul style="list-style-type: none"> - Yellow-bellied toad - Green toad - Greek frog - Agile frog 	<p>Wastewater management and implementation in accordance with the ARRRRT framework (Avoid, Reduce, Restore/Regenerate, Transform) in order to avoid, mitigate and minimize impacts on PBF Amphibians and minimize net losses and ensure net gains for duration of the project, including:</p> <ul style="list-style-type: none"> - Supervision and maintenance of amphibian ponds and ponds in wetlands in the project's impact zone; - Translocation from endangered zone to a suitable place of the same habitat; - Preventing runoff of polluted wastewater into watercourses; - Installation and maintenance of waste water treatment devices for the purpose of their recovery and prevention of impact on hydrological and ecological conditions of watercourses into which they are discharged and which form the habitat of PBF Amphibians; - Monitoring the quality of effluent in order to check impact on environment and effects of the measures taken; - Supervision over undertaking and implementation of waste water and waste management measures; - Monitoring the PBF of amphibians every quarter during construction phase and at least once a year during operational phase for next five years, including breeding activity by engaging a suitably qualified ecologist (SQE). 	<p>Annex IV species are triggers of critical habitat and therefore, in the long term, there can be no demonstrable impact on species population within the EAAA i.e. on local populations in the project's impact zone (without net losses).</p>	<p>Before carrying out project activities, it is mandatory to include in the project all project solutions related to protection of PBF watercourses and amphibians, and during construction phase it is mandatory to take appropriate protection measures in order to minimize net losses.</p> <p>Equally, during operation phase, all measures and activities related to protection of PBF watercourses and habitats of PBF amphibians must be taken and implemented in order to minimize net losses and ensure net profits for period of the project.</p> <p>Monitoring of PBF amphibians in construction phase should be conducted quarterly and during operation phase at least once a year for next five years.</p>
BIO.02	<p>Invertebrates Annex II, IUCN EN White clawed crayfish (PBF) Annex II, IUCN DD Stone Crayfish</p>	<p>Construction of settlement ponds to intercept and prevent runoff from construction site that would contaminate the Mala Rijeka during construction phase. Settlement ponds must be constructed to enable sediment and any pollution to be captured and treated prior to its entry into the Mala Rijeka.</p>	<p>Annex II and IUCN EN species are PBF. In line with PR6, the project must demonstrate no net loss or ideally a net gain of PBF in the long term</p>	<p>Suitable measures will be in place prior to construction of any parts of the VPP at Tisovci location that may cause runoff into the Mala Rijeka.</p>

TABLE 0.1: BIODIVERSITY ACTION PLAN - KEY MEASURES				
ID	Ecological receptor	Summary of Action	Rationale for Action	Timing
		Wastewater management in accordance with the ARRRT framework in order to avoid, mitigate and minimize impact on PBF Invertebrates and minimize net losses, i.e. with no net losses		Implementing wastewater management measures in accordance with the ARRRT framework.
BIO.03	<p>PBF watercourses from the plain to the montane level (Annex I. Habitat):</p> <ul style="list-style-type: none"> - Vrući Potok - Mala Rijeka - Bukovica River - Borovički Potok 	<p>Construction of settlement ponds to intercept and prevent runoff from construction site into watercourses during construction period. Settlement ponds must be constructed to enable sediment and any pollution to be captured and treated before entering watercourses in order to prevent impact on ecological conditions of these watercourses.</p> <p>Wastewater management in accordance with the ARRRT framework in order to avoid, mitigate and minimize impact on PBF watercourses so that the project does not cause changes and disturbances in these watercourses during operation phase.</p>	<p>In line with PR6, the project must not show a net loss or ideally a net gain of PBF in the long term. Since stated PBF watercourses are in area of impact, suitable avoidance/prevention and mitigation/minimization measures are required because the project must not show a net loss.</p>	<p>Before carrying out the works, the project must include measures related to protection of PBF watercourses, which must be undertaken during construction phase. Likewise, during operations phase, all measures related to protection of PBF watercourses must be undertaken and implemented.</p>
BIO.04	<p>Priority Biodiversity Feature (PBF) Spruce Forest (Annex I Habitat)</p>	<p>Signing an agreement with the local Forestry Service to initiate and perform restorative management (RM) of retained degraded forest area located north and east of the Rupice mine site in order to improve biodiversity value, including but not limited to selective logging, forced aging of some trees, creating occasional clearings suitable for natural regeneration, etc. Proposed area is 115 ha of degraded spruce forest so a net benefit can be demonstrated in terms of habitat quality combined with area restoration. Core area and buffer area to be established with core area being 75% of total area to ensure>NNL. Tree nursery for supply of locally indigenous trees, shrubs and flora for regeneration of degraded forest will be established/financed by the project.</p> <p>Monitor success of restoration in accordance with Restorative Management Plan for Degraded Forests in order to compensate for biodiversity loss in habitat of acidophilic spruce forests caused by the Project implementation.</p>	<p>In line with PR6, the project must demonstrate no net loss or ideally a net gain of PBF in the long term.</p> <p>Offsets should be in place before any impact from felling/ground disturbance occurs.</p>	<p>An area of existing spruce forest in poor condition located near Rupice mine site (north and east of Rupice mine site, to ensure connectivity with forest habitat to the north and east) has been identified as suitable for restoration and restorative management in cooperation with the Forestry commission of the Zenica-Doboj Canton (JP ŠPD), in order to be able to achieve requirements for RM specified in BIO.04 of the BAP (below).</p>

TABLE 0.1: BIODIVERSITY ACTION PLAN - KEY MEASURES				
ID	Ecological receptor	Summary of Action	Rationale for Action	Timing
BIO.05	Invasive species - Japanese knotweed	Identify, fence off and treat Japanese Knotweed (JK) before it has a chance to spread as a result of project activities. Japanese knotweed can be treated with herbicide application by trained personnel or some other environmentally appropriate method to eradicate it. Identified plants will require repeated treatment. Monitor treated areas and signs of appearance of new plants in the project areas in order to take measures to prevent spread.	PR6 requires invasive species to be considered and treated where necessary. JK can spread through small living fragments of the plant becoming rooted and causes detrimental impacts to important habitats, especially to wetland areas where it can spread rapidly.	Prior to any potential impact on invasive plants including haul road.
BIO.06	Any potential receptor	Ecological monitoring of the project areas by SQE and nearby buffer/transition areas in order to establish and ensure that no priority biodiversity features requiring special or additional avoidance and/or mitigation have been identified since baseline surveys.	Some potential Priority Biodiversity Features or species triggering Critical Habitat are mobile and may have colonised project areas since baseline surveys were undertaken.	Immediately prior to any vegetation clearing, soil disturbance and performance of project activities within project areas.
BIO.07	Reptiles (Annex IV species) <ul style="list-style-type: none"> - Nose-horned viper - Wall lizard - Sheltopusik - Green lizard - Sand lizard - Smooth snake 	Careful removal of potential refugia as recommended and supervised by SQE prior to ground clearance. Mowing the lawn to a height of 150mm, removal of remaining, and then leave for at least 3 days in suitable weather to allow reptiles to disperse to adjacent habitat. Creation of log and debris piles in retained habitat to provide basking sites for reptiles.	Annex IV species are triggers of critical habitat and therefore there can be no demonstrable impact to the population within the EAAA (i.e. local population) in the long term. No project areas are likely to provide more than occasional or transitory habitat for these species but individuals may be affected during ground clearance.	Vegetation should be trimmed and arisings removed during the reptile active period as far in advance of the works as possible, and kept trimmed (reptile active period is usually April to October in sunny weather, may depend on local climate). Careful removal of potential refugia to be completed immediately prior to and during any vegetation clearance or ground removal.

TABLE 0.1: BIODIVERSITY ACTION PLAN - KEY MEASURES

ID	Ecological receptor	Summary of Action	Rationale for Action	Timing
BIO.08	PBF Mountain Hay Meadow - will be lost permanently due to haul road construction	<p>Identify (a minimum 5ha) of species rich grassland-existing mountain meadow that are currently being lost due to natural vegetation succession or being negatively impacted by agricultural practices, or species-poor grassland areas that can be restored. A private parcel of land in the area of the village of Semizova Ponikva would be better and a clear demonstration of commitment to biodiversity.</p> <p>Location to be agreed in consultation with Zenica Institute and depending on availability of land for proposed restoration and restorative management.</p> <p>There are areas that are retained near haul road in the area of village Semizova Ponikva that have been identified as suitable for restorative management of mountain meadows habitat.</p>	<p>In line with PR6, project must demonstrate no net loss or ideally a net PBF gain. Offsets should be set before impact ground disturbance occurs. Offsets should be set before any ground impact.</p> <p>This habitat is also located closely adjacent to proposed haul road and is sensitive to residual runoff, dust and nitrogen deposition from trucks that cannot be 100% mitigated.</p>	<p>The area was identified so that mountain meadow management measures were established before construction of haul road that passes through this habitat in the area of Semizova Ponikva (Lot-3).</p>
BIO.09	PBF Hydrophilous Tall Herb vegetation (Annex I Habitat)	<p>This habitat is located near planned haul road route north of village Semizova Ponikva and is spread over an area of approx. 1.5 ha, next to a small stream that abys on border of meadow with spruce forest.</p> <p>Given that hydrophilic tall herb vegetation habitat is very sensitive to changes in ecological conditions and that it supports species that classify as a critical habitat (marsh marigold) and priority biodiversity features (angelica, Heart-leaved ox-eye daisy, etc.) and that it is exposed to possible indirect impacts of construction and haul road usage, it is needed to ensure protection measures management for this habitat and monitoring of condition and changes in its structure in accordance with management and control plan in order to maintain existing natural potential of biodiversity without net loss.</p>	<p>In line with PR6, the project should demonstrate that there is no net loss or ideally a net gain of PBF over life of the project.</p> <p>This habitat is located near a proposed haul road and therefore exposed to indirect negative impacts from potential hydrological disturbances due to road construction, residual road runoff, and dust and nitrogen emissions from trucks.</p>	<p>Prior any project activities on haul road construction and over lifetime of the project, it is needed to establish management measures for protection of hydrophilic tall herb vegetation habitat in order to avoid negative impacts so that there is no net loss in this habitat under impact of construction and haul road use.</p>

TABLE 0.1: BIODIVERSITY ACTION PLAN - KEY MEASURES

ID	Ecological receptor	Summary of Action	Rationale for Action	Timing
BIO.10	(Precautionary PBF) Balkan endemics or FBiH, CR, EN or VU plant species: - Marsh marigold (FBiH-CR), - Pančić's blue sow thistle (FBiH-VU), - Red helleborine (FBiH-VU) - Angelica (FBiH-VU), - Ox-eye daisy (FBiH-VU) - Stemless gentian (FBiH-VU), - Liver Leaf (FBiH-VU), - White helleborine (FBiH-VU), - Heart-leaved ox-eye daisy (FBiH-VU), - Bladder sedge (FBiH-VU), - Platanthera bifolia (FBiH-NT), - Dipsacus pilosus (NT), - Dinaric widowflower - a Balkan endemic, - Crepis balcanica - a Balkan endemic	Restorative management of the forest, hay mountain meadows and hydrophilous tall herb vegetation in accordance with a specially developed action plan will ensure key mitigation of negative impacts and improvement of ecological conditions needed for maintenance and increase of local populations of mentioned plant species, because they are treated as PBF due to their unfavorable conservation status in region or endemism in the Balkans. Additional measure: Before removing vegetation and ground clearance, SQE will perform field monitoring during growing season to identify and translocate individuals of listed species from endangered areas to suitable places in retained habitats and habitats identified for restorative management within the EAAA. Populations of these species should be periodically sampled each year during spring-summer season to ensure formation over several seasons.	In line with PR6, the project must demonstrate no net loss or ideally a net gain of PBF over the life of the project. Species are preventively treated as PBF due to their unfavourable conservation status in the region or their endemism in the Balkans.	Identify a SQE who must be present prior and during vegetation/ground clearance and who must carry out the translocation of those plants if they are identified/found in the areas to be cleared, i.e. located in threatened zone in order to avoid and mitigate negative impacts so that the project does not show net loss.
BIO.11	Annex I birds (PBF) Hazel grouse (<i>Bonasia bonasia</i>) and two nationally vulnerable species (FBiH VU).	Avoidance of vegetation clearance in the breeding season if possible. If not, a check of suitable nesting habitat will be undertaken by the project ecologist and any active nests protected until nesting is complete. Proposed Spruce Forest area for Restorative Management (RM) in BIO.04 will benefit this species in long term in order to support local populations.	Annex I bird species which is a PBF. In line with PR6, the project must demonstrate no net loss or ideally a net gain of PBF in the long term. This species as well as some other nationally protected PBF bird species are threatened by habitat loss, poor forest management and climate change.	Nest check immediately prior to vegetation clearance by SQE if undertaken during the breeding season (March to August inclusive)

TABLE 0.1: BIODIVERSITY ACTION PLAN - KEY MEASURES

ID	Ecological receptor	Summary of Action	Rationale for Action	Timing
BIO.12	<p>Annex IV. Large Mammals (ACH Qualifying Species):</p> <ul style="list-style-type: none"> - Brown bear - Gray wolf - Eurasian lynx - European wild cat 	<p>Crossings points and/or culverts will be installed along the route of haul road where it passes through the forested landscape from Rupice to Semizova Ponikva.</p> <p>A speed limit will be implemented on the haul road, and appropriate signage will be installed along road to inform drivers of potential presence of large mammals, especially at night. Beneficial management of retained forest away from the haul road will be designed to benefit these species through increased cover, availability of burrow/shelter sites and foraging resources. Adaptive management can be used if monitoring identifies regular road crossings for large mammals.</p> <p>Proper disposal of food waste, especially in the Rupice project area (further away) will ensure that bears are not attracted to work areas where they may interact with personnel. Site personnel will receive instructions on litter disposal and behavior if they see these species.</p> <p>Remote camera monitoring of potential mammal crossings along haul road by SQE, as well as the Šajnovički Kamen and Grčki Kamen sites, to establish use by large mammals and to inform any ongoing mitigation if their regular road crossing is found.</p>	<p>Annex IV species are triggers of critical habitat and therefore there can be no demonstrable impact to the population within the EAAA (i.e. local population) in the long term.</p> <p>The project areas are not considered critical habitat for these species which evidence shows may utilise the project areas only occasionally.</p> <p>Main possible effect stems from the barrier effect that arises as a result of construction and use of haul road.</p>	<p>Speed limit and signage should be in place prior to first use of haul road by haulage trucks.</p> <p>Briefings and waste regulations should be in place at the start of project activities.</p> <p>Remote camera monitoring will be ongoing along the haul road to identify any areas which may be used as favoured crossing points by large mammals.</p> <p>Before starting to use haul road, crossings and culverts for large mammals should be built and established and their maintenance and control during the project should be ensured.</p>
BIO.13	<p>Annex IV and IUCN EN bats (lesser horseshoe)</p>	<p>The transshipment station was translocated south of previously planned Droškovac location to the location of former Vareš Majdan Railway Station. Additional research has shown that existing facilities at the location of Vareš Majdan Railway Station, which is planned for a transshipment station, are not suitable for shelter and residence of bats. Do not contain PRFs (Potential Refuge Features).</p>	<p>Annex IV and IUCN EN species are triggers of critical habitat and therefore there can be no demonstrable impact to the population within the EAAA (i.e. local population) in the long term.</p>	<p>Immediately before the start of the works, SQE will carry out periodic surveillance in abandoned buildings that could be used by bats for resting and roosting, and if they are observed, they will take necessary measures to avoid and mitigate them.</p>

6. KEY ACTION ITEMS

6.1. BIO.01 – Ensure a Net Gain for Annex IV Amphibians

Background

In order for amphibians from Annex IV. of Habitats Directive ensures protection of habitats for reproduction and shelter so that there are no net losses in Vrući Potok, Trstionica, Bukovica and Mala Rijeka, it is necessary to ensure undertaking and implementation of avoidance, mitigation and minimization measures as well as measures to restore listed PBF watercourses and habitats of PBF amphibians in the phase design, construction phase and operations phase. To maintain natural potential of amphibians from Annex IV it is necessary to undertake and implement measures to prevent and mitigate impact of project activities on wetlands suitable for breeding of the yellow-bellied toad, Greek frog, green toad, agile frog and other species under supervision of a suitably competent ecologist (SQE). Other than Greek frog, which is more reliant on running water but will breed in standing water, these generally early-successional species respond well to the creation of new areas of standing water, temporary and permanent ponds with surrounding terrestrial habitat, which should be performed based on impact and possible consequences of project activities in order to minimize net losses and ensure net profit under the supervision of SQE.

Considering that during development phase of the project, road route was moved from Zagarski potok to existing Vareš Majdan - Tisovci regional road, haul road construction project will not cause loss and harm of this stream on the previously planned length of 1 km and will not affect this habitat of PBF amphibians (no net loss of amphibians from Annex IV.). Due to road route relocation from Zagarski potok to existing regional road, it is not necessary to provide restorative management for a minimum of 3 km length of other stream in order to minimize or prevent net loss of PBF amphibians, which achieves preservation of existing biodiversity potential of amphibians in wetland areas of Zagarski potok, which is a special/significant contribution to preservation of habitat due to modification of haul road project. Measure of restoration and restorative management for amphibian habitat from Annex IV. will be implemented only in the event that avoidance, mitigation and minimization measures fail to ensure that the project does not cause a net loss in order to ensure that there are no net losses based on results of field monitoring and SQE recommendations.

Actions

1. Control and maintenance of amphibian ponds in wetlands in the project impact zone: ponds should be permanently or temporarily filled with water in order to support amphibians are usually formed in an area where they will naturally fill with rainwater, surface water or flood water, so that they do not require human intervention. The preferred areas are those with a naturally poorly drained substrate, on relatively flat ground along Vrući Potok, Trstionica, Bukovica, Mala Rijeka and other small ponds.
2. Vegetation Establishment: Generally, it will not be necessary to establish vegetation in the ponds since there is value in permitting natural vegetation succession, and species like yellow-bellied toad and green toad prefer unvegetated, shallow areas for breeding. The exception would be the

translocation of plants or seeds of threatened plants which will be impacted by the project – such as marsh marigold and Angelica which are associated with wetland habitat (see BIO.08 and BIO.10). In order to achieve the NNL of Hydrophilic Tall Herb Vegetation (BIO.09), hay cut and managing could spread this vegetation around new wetland so that the project does not cause a net loss.

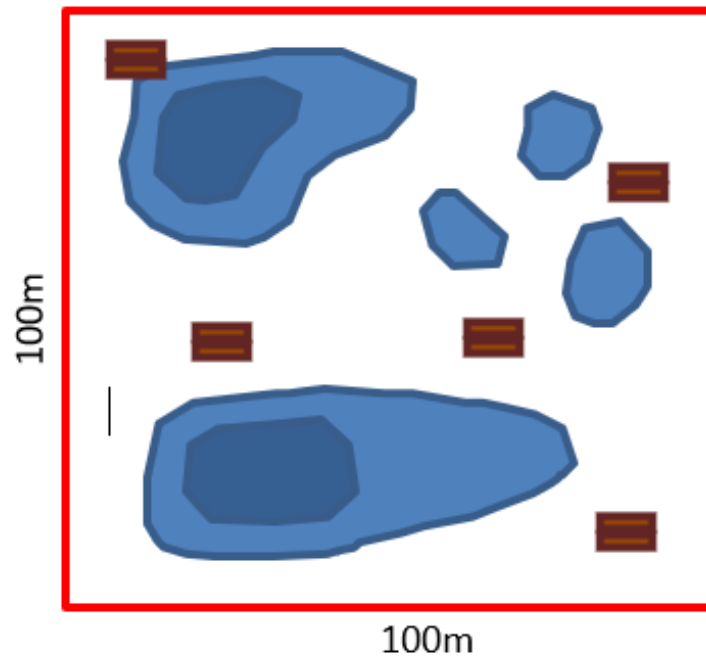


Figure 3: Example of a potential 1ha new wetland area (can be modified to topography).

Note: Light blue – shallow (temporary) water; Dark blue – deeper (permanent) water; Brown – log/stone piles. Area within red line – natural regeneration, planting of marsh marigold, Angelica and scattering of Hydrophilous Tall Herb vegetation arisings.

3. Protected Habitats: Within the wetland area, partially buried log and/or stone piles will be created to provide refuge and hibernation habitat for amphibians, as well as reptiles; helping to achieve a net gain in habitat for Annex IV reptiles (see BIO.07).
4. Translocation: SQE will be present immediately before and during site clearing and works near the Vrući Potok, Bukovica and Mala Rijeka watercourses to check for protected habitats (under stones, logs, deep leaf litter, etc.) and relocate the amphibians present. Captured amphibians will be moved to a suitable location in the same habitat and placed inside piles of logs and/or stones.
5. Monitoring: Local SQE will monitor natural and new ponds and tarns annually in spring/summer months to ensure formation of target species for the first five years, with a detailed review after five years when monitoring frequency may be reduced. If additional intervention is required, this can be addressed through a dynamic action plan process as recommended and supervised by SQE, including water, waste and environmental management measures. For example, after a number of years, one or more ponds and tarns/swamps may require re-excavation or removal of vegetation in order to create ecological conditions for sustaining amphibians. For the Greek frog see BIO.03.

6.2. BIO.02 – Ensure a Minimum NNL of PBF Invertebrates; White Clawed Crayfish (WCC) and Stone Crayfish

Background

It is known that Mala Rijeka is inhabited by PBF species White-legged Crayfish (*Austropotamobius pallipes* - EN) and Stone Crayfish (*Austropotamobius torrentium* - FBiH-VU, as a precaution by PBF). It is possible that noble crayfish are also present in the Bukovica River. In order to ensure NNL of the PBF, it will be necessary to prevent impacts on quality and quantity of water within the Mala Rijeka and Bukovica river, which arise as a result of the project.⁵

Actions

1. Design and construction of small ponds (settling ponds): Appropriately designed sediment ponds will be downstream of proposed tailings storage facility (TSF) to ensure that any runoff resulting from construction work and operational activities is captured and treated appropriately before reaching the Mala Rijeka. Ponds will be designed to the appropriate engineering specification as per the TSF design.
2. Design, implementation and functioning of system for recirculation of process and precipitation wastewater in order to return it to the process and prevent/minimize discharge into Mala Rijeka and thus prevent impact on hydrological and ecological conditions of this watercourse and habitat of PBF invertebrates in order to minimize net losses.
3. Crayfish Survey: Survey of crayfish downstream from the intake of water from the Studenac source, which forms the left tributary of the Bukovica river, water level monitoring and adaptive mitigation, where necessary, if indigenous species of noble crayfish are present.
4. Water quality monitoring: (a) in Mala Rijeka downstream of discharge point during construction and operation of TSF and (b) in the Bukovica River during the works downstream of bridging of this river, to ensure that all contaminants and pollutants can be treated before discharge of treated and purified water into mentioned watercourses in order to avoid and minimize impact on hydrological and ecological conditions of these watercourses and PBF species of invertebrates.
5. WCC Monitoring: SQE will conduct annual monitoring of white-legged crayfish including stone crayfish and other PBF invertebrates during spring-summer season for the first five years, with a review and review of the scope and dynamics of monitoring after that period, when there may be a reduction in monitoring based on the SQE rating. Results of water quality monitoring, monitoring of crawfishes and PBF invertebrates as well as all additional mitigation measures are prescribed within this BAP, based on which the planned measures must be undertaken and implemented, and field monitoring must be carried out and, if necessary, additional/corrective measures must be taken in order to minimize net losses, i.e. ensuring that there are no net losses of PBF invertebrates.

⁵The survey work is ongoing, and results will be submitted in the updated BAP.

6.3. BIO.03 – Ensure a Minimum NNL of PBF Watercourses from Plain to Montane Levels

Background

Watercourses Vrući Potok, Mala Rijeka, Bukovica river and Borovički potok meet criteria of PBF as a habitat from Annex 1 of the Habitats Directive. Given that these PBF watercourses are located in the area of potential impacts of project activities, appropriate measures are needed in order to protect them through mitigation hierarchy use in accordance with the ARRRT framework with ambition of no net losses.

By using hierarchy of mitigation in accordance with the ARRRT framework with ambition of no net losses, a change was made to haul road project on the section that was planned for the Zagarski stream part of watercourse in order to avoid a permanent loss on a length of 1 km. Haul road was relocated from Zagarski stream area to the existing Vareš Majdan - Tisovci regional road, thus avoiding permanent loss of this habitat and impact on this habitat, so that construction of haul road will not cause a net loss of invertebrate biodiversity in Zagarski stream. Therefore, due to relocation of road route from Zagarski potok to existing regional road, it is not necessary to ensure planned restorative management on a minimum 3 km length of another suitable stream in order to minimize or prevent net losses, which achieves preservation of existing potential of invertebrates in Zagarski stream. Zagarski stream can be used to implement measures to improve biodiversity potential of invertebrates in order to achieve objectives of the BAP in accordance with PR6.

The effects on amphibian species supported by said watercourses are addressed in BIO.01. In order to ensure the NNL of PBF habitats, it is necessary to undertake and implement the planned measures using mitigation hierarchy in accordance with the ARRRT framework with ambition of no net losses. During entire project, managing and monitoring activities are planned, as well as taking appropriate measures to achieve goals without net losses.

As part of detailed design, an engineering study must be carried out and the project must include, as far as possible, maintenance of the ecological integrity, existing hydrological regime and natural ecological conditions of PBF watercourses in order to minimize net losses and achieve net profit during period of the project through using and implementation appropriate measures in accordance with BAP and criteria PR6. Likewise, by successfully integrating PBF watercourses mitigation, protection and monitoring measures into the project management system and their responsible implementation in accordance with the ARRRT framework, goals without net losses can be achieved, which is fundamental goal of BAP and requirements of PR6.

Actions

1. Design and construction of small ponds (settlement ponds) to appropriate engineering specification: to ensure that any runoff resulting from construction works and operational activities is captured and treated appropriately before reaching PBF watercourses, to avoid or minimize impacts on the existing natural hydrological and ecological conditions of the PBF watercourses.
2. Design, performance, operation and maintenance of system for recirculation of process and precipitation wastewater at Rupice mine location and Tisovci ore processing plant location with purpose of returning it to the process and preventing or minimizing discharge into watercourses and thus preventing or minimizing impact on hydrological and ecological conditions with ambition of zero net losses.

3. Taking measures to improve ecological conditions of PBF watercourses habitats to sufficiently mitigate net losses with ambition of zero net losses as recommended and under supervision of SQE.
4. Water quality monitoring in: (a) Mala Rijeka upstream and downstream of wastewater discharge point, (b) Vrući Potok, (c) Bukovica river upstream and downstream of bridge construction (d) Borovički stream during construction phase, in order to ensure that all contaminants and polluting substances can be treated before discharge of treated water into the mentioned watercourses in order to avoid and minimize impact on hydrological and ecological conditions of these watercourses and PBF species of invertebrates. Water quality monitoring in operation phase should cover at least: (a) Mala Rijeka and (b) Vrući Potok, in accordance with the Water and Wastewater Management Plan.
5. Monitoring: For the first five years, SQE will conduct annual monitoring of PBF invertebrates and amphibians in spring-summer season in watercourses: Vrući Potok and Mala Rijeka, with a review of scope and dynamics of monitoring after that period, when there may be a reduction in monitoring if deemed acceptable. Monitoring of water quality and monitoring of PBF invertebrates and amphibians as well as all avoidance/mitigation measures is prescribed within this BAP, based on which planned measures should be undertaken and implemented, as well as field monitoring and additional interventions, i.e. corrective measures with ambition of no net losses.

6.4. BIO.04 – Ensure a Minimum NNL of PBF Acidophilous Spruce Forest

Background

The majority of direct and indirect impacts from the project are on this habitat type. Historically the habitats in the region would have been part of a rich mixed forest system; the Dinaric Mountains Mixed Forests Ecoregion. Primary forests have been heavily exploited in recent history for timber, initially for the iron smelting which took place intensively in Vares, and during and following local conflicts. Locally the forests were clear-felled and replanted with a more commercially targeted species mix which is dominated by Norway spruce, but many of the other constituent species are still present in small numbers. The vegetation type is therefore analogous to the UK habitat 'plantation on ancient woodland sites' (PAWS); where there is a largely continuous history of forest cover, but the structure and function has been degraded through poor management. As such, there is great potential for the quality of the forest to be enhanced through restoration management in accordance with a specially designed restorative management plan, implementation of which achieves goals of no net loss.

The project will require direct loss of 78.3 ha of this habitat, approximately 40ha of which will be restored in the long term after decommissioning of the Rupice mine. It is accepted that restored forest will take many decades to reach desired ecological condition in order to meet the PBF definition. There will be a net loss of forest area of 38.3 ha of relatively poor-quality spruce forest associated with haul road construction. In order to realistically demonstrate a minimum NNL, an area of 115 ha of existing degraded spruce forest will be restoratively managed in accordance with the Restorative Management Plan for spruce forest with purpose of compensating loss of biodiversity in habitat of acidophilic spruce forests caused by implementation of the project (Figure 4).

Restoration management will also help to achieve a minimum of NNL in respect of hazel grouse (BIO.11) and large mammals (BIO.12).

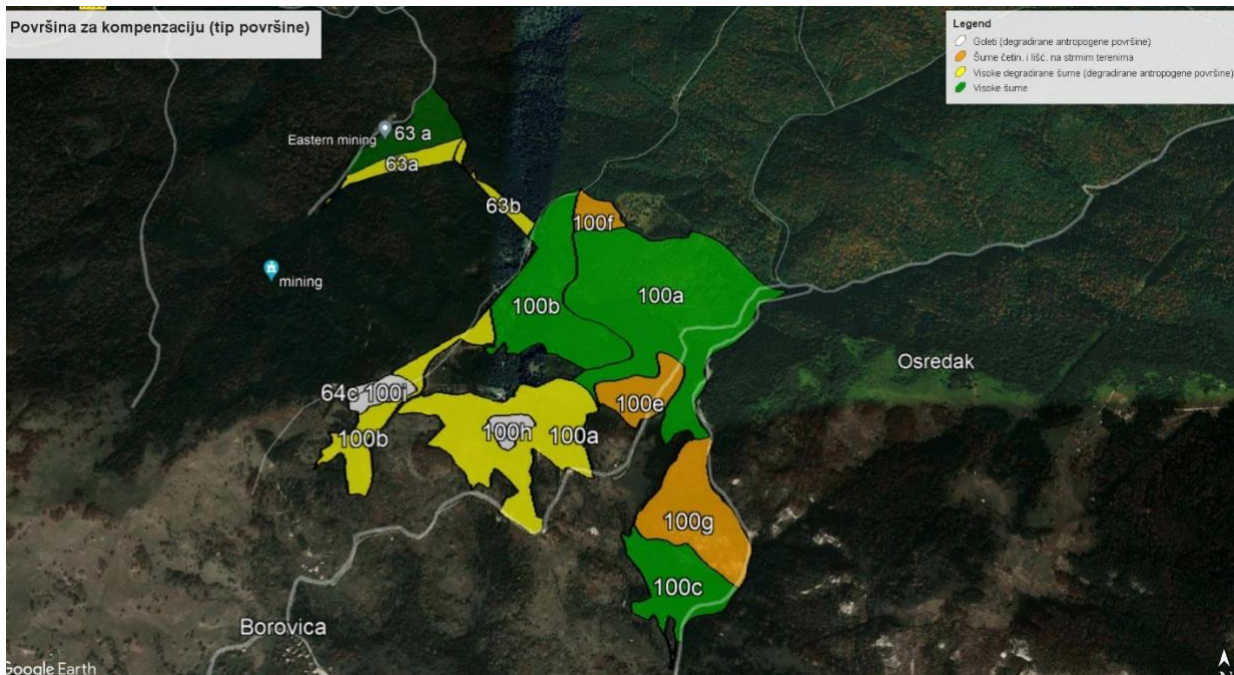


Figure 4: Spruce Forest restoration area in order to compensate for loss of biodiversity caused by the project of Rupice mine opening and construction of Rupice - Tisovci road

Actions

1. Identification of habitat for restorative management: in agreement with SQE and local Forestry Commission, an area of degraded spruce forest was identified for restoration and restorative management of 115 ha (Figure 4), which is included in the Forest Management Foundation of the Zenica-Doboj Canton in order to create conditions for compensation of biodiversity losses caused by Rupice mine opening and construction of the Rupice - Tisovci road, with ambition of no net loss and in the long term with a net gain. Through restorative management, it is planned to convert degraded spruce forest into high conservation value forests (HCVF), which support PBF. The area is close to Rupice mine site and is located to the north and east of this site, thus ensuring that restored habitat is within the EAAA, but that it is not affected by effects of obstacles and that objectives of BIO.11 can be realized within framework of the EAAA project. The local Forestry Commission was encouraged to increase area of forest for restorative management from planned 100ha in the BAP (V0.1) to 115ha in the revised BAP (V0.2), which is included in the Spruce Forest Restorative Management Plan for purpose of compensation for loss of biodiversity in habitat of acidophilic spruce forests caused by implementation of Rupice mine opening project.
 An additional option may be to support development and implementation of projects for protection and restorative management within areas proposed for protection, such as special nature reserve "Gornja Trstionica-Bukovica", park Zvijezda - Tajan - Konjuh in the north and others with purpose of providing and achieving the goals from BAP (without net loss and in the long term with net gain).
2. Support the nursery of shrubs and flora managed by local Forestry Commission so that it can be used for restoration of plants in spruce forest restorative management area in accordance with a specially developed plan in cooperation with the local Forestry Society, the Cantonal Forestry Administration and other forest users.

3. Restorative Management (RM): RM may include, but not be limited to⁶:

- Establishment of a core zone occupying at least 75% of the area for restorative management. Establish a buffer zone around the core area that occupies about 25%.
- Core area:
 - No extraction of timber in perpetuity.
 - Thinning, creation of standing and fallen dead wood – 5% of trees to be felled and left as fallen or leaning dead wood, 5% to be ring-barked and left as standing dead wood (in addition to glades/barrens, see below).
 - Forced veteranisation of 1% of trees – e.g. crown removal, creation of cavities.
 - Creation of small glades 20x20m to promote dense natural regeneration – 5% of area.
 - Planting of occasional locally grown beech (*Fagus sylvatica*), black pine (*Pinus nigra ssp. nigra var. nigra*), sycamore (*Acer pseudoplatanus*), silver fir (*Abies alba*) in glades, and understorey species
- Buffer/Transition Zone Area:
 - Creation of fallen dead wood – 5% of trees to be felled and left as fallen dead wood (in addition to glades/barrens, see below).
 - Creation of small glades 20x20m to promote dense natural regeneration - 5% of the area;
 - Planting of locally grown beech, sycamore, silver fir, understorey species in glades.
 - Limited harvesting of trees (30% permitted to be harvested, the rest left in perpetuity).

Selection of which trees to manage will be made in consultation with the SQE and Forestry Commission in order to preserve any existing ecological interest (e.g., trees with existing woodpecker holes/squirrel dreys/raptor nests). An agreement has been signed between company Eastern Mining doo Vareš and Forestry Commission of Zenica-Doboj Canton (JP Šumskoprivredno društvo) on the implementation of this plan for the restorative management of the spruce forest (Appendix 3).

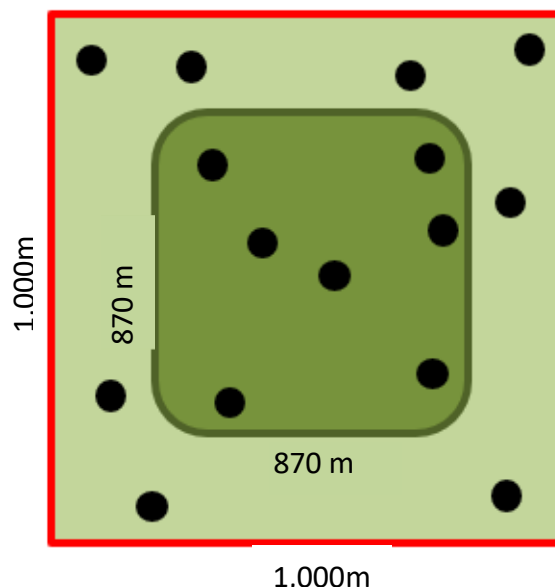


Figure 5: Example of 100ha RM area of forest. It can be adapted in shape depending on site selection

Note: Dark green – core area; Light green – buffer zone; and Black dots - glades.

⁶<https://www.caledonianconservation.co.uk/cms/resources/Publications/cieemip73sep2011cathrineamphlett.pdf>

4. Monitoring: A SQE will undertake monitoring surveys for the effectiveness of the RM, including habitat mapping, monitoring changes in bird assemblages, ground flora, invertebrates and mammals. Amendments to the action plan can be made where necessary if additional ecological features are identified in need of protection or enhancement.
5. Forest Restoration Following Decommissioning: The Rupice project area and the VPP, including the TSF, will be restored following decommissioning. Restoration will utilise a mixture of natural regeneration and replanting of native species, including from the nursery, which will permit a more dynamic emerging forest than planting alone would achieve. Natural regeneration allows areas of dense and open forest to establish with a prior period of grassland and scrub development which are also of value as 'intermediate' habitats and as migratory corridors for species of more open habitats.

In terms of species targeted for planting, the reforestation scheme will aim to diversify the species mix towards the local Dinaric Mixed Mountain Forests ecotype for that elevation, and also include understorey shrub species. For example, prior to exploitation the forest is likely to have been a more open mixture of beech, Norway spruce, silver fir, sycamore, Bosnian maple (*Acer opalus subsp. Obtusatum*), hop-hornbeam (*Ostrya carpinifolia*) with some native birch (*Betula spp*) and alder (*Alnus spp.*). Trees will not be planted at high density, to allow a forest ground flora to develop which can be supplemented by understorey and ground flora species grown in the nursery



Photo 6.1: Examples of closed and open coniferous/mixed forest showing mature trees, standing and fallen dead wood, young regeneration and extensive ground flora.



Figure 6: Example of forest planting and natural regeneration.

Note: Light green – existing forest; Mid green – block planting of trees; Orange – glades sown with locally harvested green hay; and White – areas left to natural regeneration.

6.5. BIO.05 – Ensure Project Activities do not Spread Invasive Species

Background

Japanese knotweed is located adjacent to project working areas, including the existing haul road. Vehicles using the haul road risk spreading Japanese knotweed on wheels of trucks or excavators, or via accidental movement of contaminated material. Japanese knotweed (JK) is a Schedule 9 invasive species in the UK and also listed as invasive in Europe. This species can spread vegetatively from any living part of the plant and once established can permanently damage sensitive ecosystems by shading out less competitive species, especially in damp areas and may affect PBFs.

Actions

1. Identify and Treat JK: SQE will identify all areas of Japanese knotweed within or adjacent to project areas through an update survey. SQE will advise on a suitable buffer zone where space allows and JK will be appropriately fenced off to demarcate an exclusion zone and prevent accidental spread. An appropriate invasive species management plan will be developed and implemented. Where there is a risk JK will be spread by project activities, it will be treated in situ with regular herbicide application during the growing season, by a suitably qualified person. Control of JK is usually through application of a glyphosate-based herbicide three times annually during the growing season; May
2. Monitoring: A SQE will monitor working areas and transport routes for JK (and other invasive species). Any new locations where JD (or other invasive species) is found will be appropriately marked and treated in accordance with the management plan.



Photo 6.2: Japanese knotweed along access road to the VPP Tisovci location.

6.6. BIO.06 – Ecological Walkover

Background

Many species that may trigger the designation of PBF or Critical Habitat are mobile. Whilst a given species may have been absent from project footprint areas or adjacent habitat during the baseline surveys, there is a chance additional habitat features may establish prior to works.

Actions

1. SQE will undertake an update ecological walkover of project areas immediately prior to vegetation clearance or earthworks to ensure no ecological features requiring additional avoidance or mitigation are present, in order to avoid and mitigate impacts to species that characterize PBF or critical habitat. Any required actions will be discussed with company Eastern Mining Vareš and included in BAP.

6.7. BIO.07 – Inspection for and Translocation of Annex IV Reptiles

Background

Annex IV reptiles were recorded during the baseline surveys, all of which are relatively common and widespread nationally and locally. Generally, Project areas, being largely dense spruce forest, are considered sub-optimal for reptiles and local populations will not be impacted significantly as a result. Parts of the haul road pass through hay meadow and forest edge which may provide basking and sheltering habitat for occasional or transient reptiles. The actions undertaken for BIO.01, BIO.08 and BIO.09 will also help to adequately address impacts on reptiles.

Actions

1. Avoid Disturbance: Vegetation clearance and ground-breaking will be avoided during the reptile dormant period (October to April) wherever possible at forest edge or grassland areas. Grassland within the Project footprint will be strimmed to approximately 150mm in height and left for a few days to allow reptiles to disperse to retained habitat before construction commences.
2. Walkover and Translocation: SQE(s) will be present prior to and during vegetation clearance/construction work along the haul road where it passes through grassland and forest edge, to check habitat e.g. log piles and rocks and to capture any reptiles. Reptiles will be encouraged to move to or manually moved to retained habitat or be captured and moved to the new wetland area and placed within log/stone piles if necessary.
3. Monitoring: It should not be necessary to monitor reptiles since no significant impact is expected as a result of project activities, but all species identified during amphibian monitoring at the new wetland area will be recorded.

6.8. BIO.08 – Ensure a Minimum NNL of PBF Upland Hay Meadow

Background

This habitat is located along haul road in the area of Semizova Ponikva village, and about 2.5 ha will be permanently lost due to road construction, with potential for surrounding preserved habitat to be negatively affected through dust and exhaust emissions. In order to adequately mitigate these impacts, it is necessary to compensate for the loss of mountain meadow habitat through restoration and ongoing management of offset areas. These measures will also help in solving the problems and achieving goals of BIO.09 - Ensure a Minimum NNL of PBF Hydrophilous Tall Herb vegetation and BIO.10 - Ensure a Minimum NNL of Balkan Endemic, and Nationally Threatened Plants.

Actions

1. Identify a suitable area for restorative management of mountain meadows: according to SQE recommendations, a suitable area for restorative management of mountain meadows was identified along haul road in the area of village Semizova Ponikva, which are at risk of being lost due to natural succession of vegetation and poor agricultural practices. Contracts were signed with local population for the use of meadows with a total area of 6 ha with purpose of implementing measures for restoration and ongoing management in order to compensate for losses in habitat of mountain meadows due to construction of a haul road. These meadows will be restoratively managed in accordance with developed action plan for restorative management in order to compensate for losses of mountain meadows, so that the project will show a minimum net loss (NNL) and a long-term net gain within the EAAA project.
2. Grassland Management: After identifying and providing the use of a suitable area of upland meadows with local population, SQE developed a offset area management plan for the life of the Project, which includes but is not limited to:
 - Engaging local grazier for conservation services;
 - Installation of fences and shelters for grazing animals;
 - Control of regeneration of bushes and trees and removal of the resulting growths;
 - Cessation of fertilisation, burning and herbicide use (except any invasive species).
 - Localized topsoil removal, if necessary;
 - Grassland mowing and removal of growths (ideally one mowing per year at the end of summer);
 - Low-intensity grazing (ideally livestock, which is generally better for botanical protection); and
 - Offset of e.g., Balkan endemic Dinaric widowflower, *Crepis conyzifolia* and stemless gentian if locally absent from new area of managed grassland.
3. Monitoring: SQE will monitor the condition of the grassland at least once a year, during the summer, over the lifetime of the Project and determine if any additional interventions are needed, which should be added to the action plan.

6.9. BIO.09 – Ensure a Minimum NNL of PBF Hydrophilous Tall Herb vegetation

Background

This habitat is located within area of mountain meadows near haul road route and habitat can be negatively affected by possible changes in local hydrology and runoff of polluted rainwater from roadway, as well as exhaust emissions and dust, which can change the structure and composition of this habitat if no action is taken and do not implement adequate avoidance and mitigation measures. In order to adequately avoid and mitigate these effects, haul road route was moved southwest and west to a greater distance from habitat of the hydrophilic tall herb vegetation in order to avoid permanent loss in this habitat and to mitigate/minimize negative impacts of road construction and use on this habitat so that there is no net loss. By moving the route of haul road away from habitat of hydrophilic tall herb vegetation, a permanent loss in this habitat was avoided and the need to implement compensation measures was excluded, and potential indirect negative impacts of emissions from the road on this habitat and species present will be minimized and avoided by taking

planned measures to solve this problem (controlled drainage and treatment of rainwater, mitigation of local hydrological disturbances, mitigation of dust and exhaust gas emissions, etc.) for the purpose of protecting habitat of mountain hay meadows (BIO.08) and indirect protection of the habitat of hydrophilic tall herb vegetation. These measures will also help in achieving the goals from BIO.10 - Ensure a Minimum NNL of Balkan Endemic, and Nationally Threatened Plants and potential indirect negative impacts of emissions from road on this habitat and species present will be minimized and avoided by taking planned measures to solve this problem (controlled drainage and treatment of rainwater, mitigation of local hydrological disturbances, mitigation of dust and exhaust gas emissions,) and indirectly protecting the habitat of hydrophilic vegetation of tall greens. These measures will also help in achieving the goals from BIO.10 - Ensure a Minimum NNL of Balkan Endemic, and Nationally Threatened Plants.

Given that the habitat of hydrophilic tall herb vegetation is very sensitive to changes in ecological conditions related to changes in high humidity of hydromorphic soil (change in water level), as well as runoff of polluted rainwater from the road and deposition of dust and nitrogen by passage of trucks, and that it supports species that classify as critical habitat, it is necessary to ensure the management of protection measures for this habitat and annual monitoring of condition and changes in its structure over the lifetime of the project in accordance with management and control plan in order to avoid net loss and maintain existing natural potential of biodiversity, with ambition to ensure net profit. Construction and use of a haul road must not show a long-term net loss of species populations in habitat of hydrophilic marginal communities of tall herbs, and therefore it is very important to provide planning and implementation of protection measures for this habitat in order to ensure that there is no net loss.

Actions

1. Vegetation management: The Company Eastern Mining Vareš will ensure undertaking and implementation of measures for management of hydrophilic tall herb vegetation in accordance with a management plan specific to the location conditions of this habitat over lifetime of the project which may include, but not be limited to:

- Hiring a conservation organization or conservation experts;
- Control of bushes and trees regeneration and removal of resulting vegetation at the end of summer;
- Cessation of fertilization, burning and herbicides use (except for any invasive species);
- Localized removal of topsoil, if necessary;
- Low-intensity grazing (ideally with livestock, which is generally better for botanical conservation);
- Other appropriate measures as recommended and under the supervision of the SQE.

2. Monitoring: A SQE will monitor condition of the hydrophilous tall herb vegetation annually in summer, over the lifetime of the Project and ascertain whether any additional interventions are required, to be added to the action plan, in order to avoid negative impacts of the project on this habitat and the present PBF species and ensure that there is no net loss.

The areas for managing implementation of measures BIO.08 - Ensuring a Minimum NNL of PBF Upland Hay Meadow and BIO 09 - Ensure a Minimum NNL of PBF Hydrophilous Tall Herb vegetation are given in figure 7.

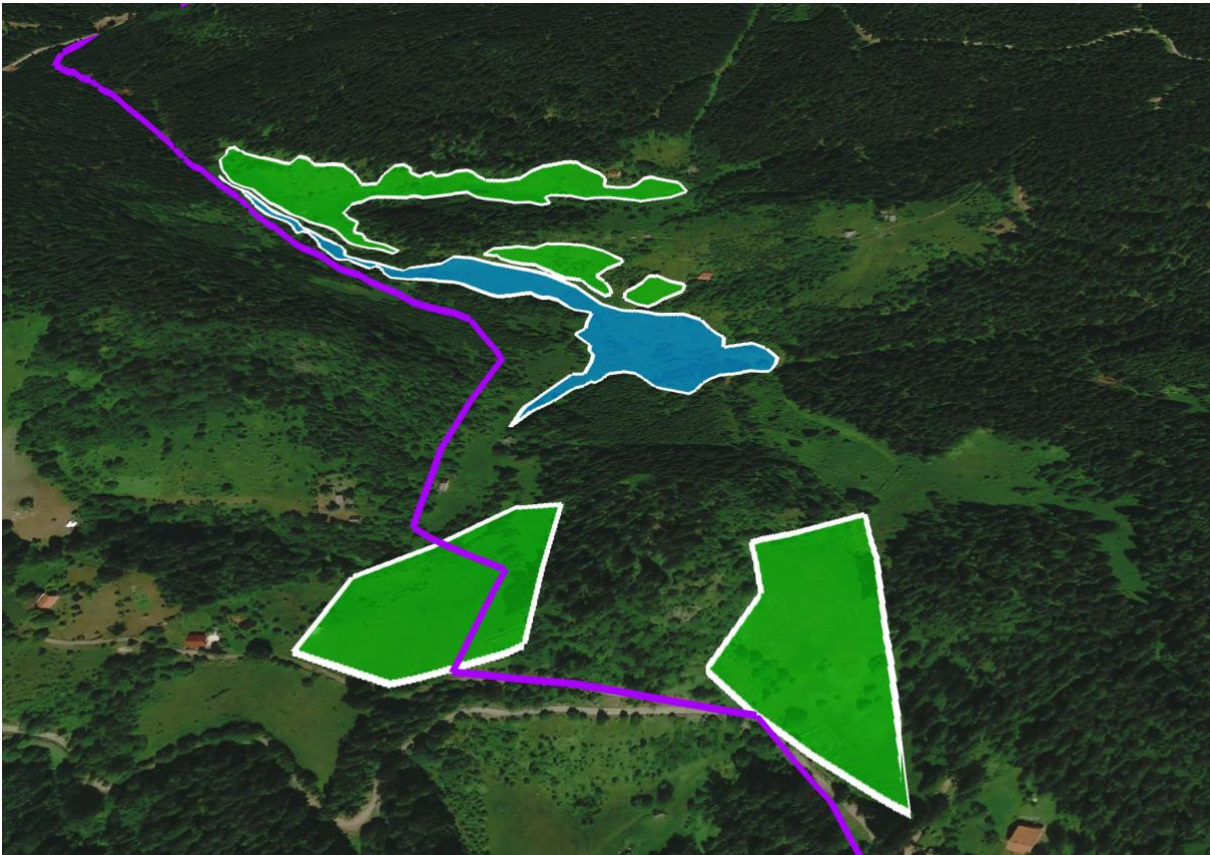


Figure 7. Areas of management of mountain meadows habitat and hydrophilic tall herb vegetation habitat

6.10. BIO.10 - Ensure a Minimum NNL of Balkan Endemic, and Nationally Threatened Plants

Background

During baseline surveys, 12 nationally threatened plant species and 2 Balkan endemic plant species were identified. Although the project is not expected to have a significant impact on local populations of those species, avoidance, mitigation, minimization and management measures will seek to achieve a net benefit to populations in the EAAA. These species are: Pančić blue sow thistle, Red helleborine, Angelica, *Dipsacus pilosus*, gentian, Liver Leaf, White helleborine, heart-leaved ox-eye daisy, Ox-eye daisy, *Platanthera bifolia*, Bladder sedge, marsh marigold, Dinaric widowflower, *Crepis conyzifolia* and *Crepis balcanica*.

The habitats of these species are being preserved and improved by managing retained habitats and/or creating new habitats within the EAAA. As such, even without translocation, local populations of these species are expected to be maintained, including by taking management measures for retained habitats and restorative management areas.

Actions

1. Walkover and Translocation: SQE will conduct a pre-vegetation and construction walkover and relocate all individuals of these species from endangered zone by digging up and replanting to suitable locations in retained habitats appropriate for each species. New populations of nationally

endangered, vulnerable and endemic plant species will be established in offset areas designated to compensate for losses in acidophilic spruce forest habitats and mountain meadows, and restorative management of these areas, i.e. habitats in accordance with developed action plan, will create conditions for an increase in abundance present plant species that classify critical habitat or priority values of biodiversity.

2. Monitoring: SQE will monitor restored and managed habitat and translocated or new habitat every year in the spring-summer season to ensure successful establishment and additional removal, to ensure successful establishment and increase the number of populations of endemic and nationally threatened species, and will if necessary, collect additional seedlings or seeds for purpose of strengthening populations and maintaining local populations of those species and ensuring minimum NNL and in the long term, over lifetime of the Project, ensuring net profit.

6.11. BIO.11 – Ensure a Minimum NNL of PBF Hazel Grouse

Background

Hazel grouse is a species from Annex I, which has been recorded in marginal areas of forest and in spruce forest. This species prefers mixed forests with a rich substrate and a diverse age structure. It does not prefer dense stands of acidophilic spruce forest, without clearings and ground flora, such as is represented in wider area of Rupice and along haul road route from Upica to Semizova Ponikva. During May, it forms nests on the ground where it lies for up to 25 days, which is reason why, before removing the vegetation, it is mandatory to conduct detailed monitoring surveys from March to August in order to determine presence of Hazel grouse, i.e. its nests, in order to avoid negative impacts and preserve local populations. Hazel grouse can benefit from long-term forest restoration works undertaken as part of BIO.04, as well as from the long-term restoration of the project's footprint after the work has ceased.

In addition to the Hazel grouse, two nationally endangered species of birds from category of vulnerable species (Eurasian hobby and horned lark, FBIH-VU) are present in this area, which require taking required measures in order to maintain natural potential of their local populations without net losses, and five birds from categories of low-risk species (scops owl, nightingale, great grey shrike, rook and white-throated dipper, FBIH-NT) which, if possible, should be protected as much as possible in order to minimize negative impacts and preserve local populations.

Actions

1. Walkover and Avoidance of Nests: Vegetation clearance during bird breeding season will be avoided where possible (March to August). If unavoidable, prior to vegetation clearance and construction, if carried out within the nesting period, SQE will conduct a walkover of the area immediately prior to project activities and if any active nests are found, the area should be avoided with an appropriate buffer zone and protected until nesting attempt is complete, as recommended and supervised by SQE. It is expected that these species will benefit from forest restoration works from BIO.04 and therefore monitoring will probably not be necessary.

6.12. BIO.12 – Adequately Mitigate Impacts on Annex IV Mammals

Background

Baseline surveys have determined that none of the project areas provide more than transient habitat for Annex IV terrestrial mammals (which are ACH qualifying species). These species are brown bear, gray wolf, Eurasian lynx and European wild cat. Although very little information is available on distribution of large mammals in BiH, areas known to be key for these species are located a few kilometers north of the project area which is connected to the proposed national park "Zvijezda-Tajan-Konjuh", and potentially two caves: Šajnovići Kamen and Grčki Kamen south of Rupice. A haul road bisects habitat to the north of these caves and as such is main identified impact on large mammals.

The proposed forest restoration area (RM) associated with BIO.04 will improve foraging and denning habitat for listed species in the short and long term by increasing cover and available foraging resources within an area of largely degraded forest.

Actions

1. On the section of haul road between Rupice and Semizova Ponikva a greater number of crossings and culverts for large mammals will be installed to ensure connectivity between denning habitats and the forested area to the north is maintained. It is anticipated that approximately 4 crossings will be required along this section of haul road to ensure sufficient connection between separated parts of habitat, designed in accordance with published guidance⁷. Crossings may be box culverts or ecological bridges, dependent on topography and engineering characteristics of the location. All crossings will be protected and designed in such a way to incorporate with the surrounding landscape and vegetation. Box culverts will be a minimum of 2.5 m high and 3 m wide, whilst ecological bridges will be a minimum of 7m wide, all crossings will have a 100m section of fencing, or natural fencing, on either side to lead wildlife to them. The exact location, number and specification of the culverts will be determined by company Saraj inženjering during the detailed design phase, and will be guided by the in-country biodiversity specialist to ensure the effective placement of crossing locations for unhindered migratory movements between parts of the separated habitat due to construction and use of haul road.
2. Signage: Placement of appropriate signage at the necessary places along the haul road, especially on section from Rupice location to the locality of Semizova Ponikva, which passes through a coniferous forest.
3. Personnel Briefings: SQE to be involved in briefing the haul road drivers and other Project personnel for potential presence of large mammals, their conservation value, and what measures are expected of them during the Project. These measures may include but not be limited to:
 - Enforcement of appropriate speed limits on haul roads;
 - Enforcement of appropriate waste disposal in designated areas;
 - Continuous Professional Development (CPD) briefings on ecological importance of local area and the Annex IV mammals the region supports; and
 - Briefing personnel about the importance of legal hunting.

4. **Monitoring:** Monitoring of presence and migratory routes of large mammals and their tracks should be carried out before and during performance of project works and during operations phase of the project, which should be recorded, including recording of the date and location where mammals were observed and traces of their movement or stay, in order to taking mitigation measures and ensuring minimal net losses. Eastern Mining Vareš will keep records of large mammals or tracks observed by haulage road drivers or other project personnel, including date, location and other important data. This information will be forwarded to SQE in order to map all areas in which it would be desirable to further reduce the vehicle speed limit, possibly limiting it to certain months of the year.
5. **Remote camera monitoring:** SQE will install at least 6 remote cameras along haul road between Rupice and Semizova Ponikva to monitor usage of crossing by large mammals and to inform any ongoing mitigation if a regular road crossing of mammals is found. If available, remote cameras should also be installed in the vicinity of Šajinovički Kamen and Grčki Kamen caves to determine their use by large mammals and determine if they should be treated as critical habitat features.



Figure 8: Examples of road signage

6.13. BIO.13 – Avoiding impacts on IUCN EN Appendix IV bat species

Background

Basic monitoring survey did not detect suitable places for hibernation, roosts and shelters of bats within the project areas where removal of vegetation and construction works are planned. Abandoned buildings along route of haul road in the area of Semizova Ponikva and Vareš Majdan and in the area of former railway station Vareš Majdan do not contain PRFs (potential roost features) and are not suitable for bat maternity or hibernation. Based on field research and collected data, it was estimated that the project areas are not of crucial importance for support of bats and therefore these species do not represent a hindrance to the project activities. All known and identified places of hibernation and residence of bats are located outside the project areas and endangered zones (caves: Ponikva, Grčki kamen and cave in the Kapija location south of Vareš Majdan).

Initial research shows that the facilities in the project area of Tisovci, along road route in the area of Semizova Ponikva, as well as in the area of road route and transfer station Vareš Majdan are not suitable for shelter and residence of bats in accordance with the criteria from the Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edn., 2016.

The transshipment station was relocated south of previously planned Droškovac location to the location of former Vareš Majdan Railway Station. Additional research has shown that existing facilities at the location of Vareš Majdan Railway Station, which is planned for a transshipment railway station, are not suitable for shelter and residence of bats, and no bats and traces of presence of bats were observed in the facilities, under bridges and in other places. Therefore, this location of the transshipment station is more suitable because potential impact on bat roost in the abandoned administration building and abandoned tunnel of former Droškovac mine is avoided.

Actions

1. Monitoring: SQE will monitor presence of bats and traces of their presence immediately before the start of project activities and during construction in abandoned buildings which contain PRFs (potential roost features) along haul road route Semizova Ponikva - Vareš Majdan and at the location of Vareš Majdan transfer/railway station, in order to take avoidance and mitigation measures if traces of their presence are observed. Any additional mitigation should be added to the Biodiversity Action Plan.

