

# Vol. 4 Annexes: Draft Environmental and Social Impact Assessment

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## GEO: Nenskra Hydropower Project

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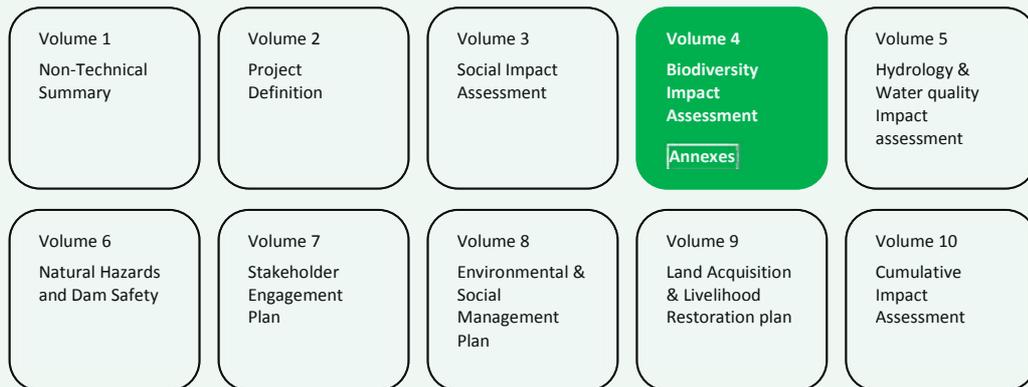


# Nenskra Hydropower Project

## Supplementary Environmental & Social Studies

### Annexes to Volume 4 Biodiversity Impact Assessment

Supplementary E&S  
Studies for the  
Nenskra HPP:



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February 2017



# **Annex 1 - Flora, Vegetation and Habitat Assessment Report**

## **Annex 2 - Ornithological Report**

## **Annex 3 – River Flow Measurements**

## **Annex 4 – River Velocity Measurements**

## **Annex 5 – Appropriate Assessment**

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# Annex 1 - Flora, Vegetation and Habitat Assessment Report

# **Environmental and Social Impact Assessment for the Hydropower Development on the Nenskra River**

## **Additional Survey / Flora and Vegetation (Expanded Corridor)**

### **1. LEGAL FRAMEWORK**

#### **1. LEGAL AND REGULATORY REQUIREMENTS**

This chapter describes the national and international legal framework of the Nenskra HPP Project, including standards and policies applicable to the Project Biodiversity Impact Assessment.

##### **1.1 International Legislation and Policy**

The following international laws/agreements and conventions applicable to this Project related to nature conservation and biodiversity, have been ratified by Georgia:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1975; universal);
- Convention on Biological Diversity (CBD 1992; universal);
- European Union Habitats Directives (1992; regional);
- Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat--Ramsar Convention (1975; universal);
- Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention; 1972; universal);
- United Nations Framework Convention on Climate Change (UNFCCC 1994; universal) and (Kyoto Protocol adopted 1997; universal);
- Convention on the conservation of European Wildlife and Natural Habitats (the Bern Convention 1979);
- European Landscape Convention 2000;
- Convention on the Conservation of Migratory Species of Wild Animals (the Bonn Convention, 1979);
- Agreement on the Conservation of Bats in Europe (EUROBATS) (1995);
- Agreement on the Conservation of African-Eurasian Migratory Water birds (1991).

##### **1.2 European Union (EU) Legislation and Policy**

Georgia is a non-EU country but is a potential EU candidate country. Georgia's relations with the European Union are shaped via the EU Association Agreement.

The Environmental Acquis comprises approximately 300 legal instruments, mostly in the form of Directives. The Acquis covers environmental protection, polluting and other activities, production processes, procedures and procedural rights as well as products. The key EU environmental directives making up the Acquis that are considered to be applicable to the Nenskra HPP Biodiversity Impact Assessment are listed in Table 2 and are shown alongside the directly equivalent transposed Georgian legislation.

**Table 1. EU Legislation Applicable to the Project**

EU Legislation	Georgian Legislation
Council Directive 85/337/EEC (amended by 97/11/EC) on Environmental Impact Assessment (EIA)	Regulation on Environmental Impact Assessment was approved by the Order No. 59 of the Minister of Environment Law on Ecological Examination 2007 Law on Service of Environmental Protection 2007 Law on Environmental Impact Permit 2007 other laws, by-laws, statutory acts and regulations
Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (Natura 2000) – The Habitats Directive	Law on Protection of Environment (1996, amend 2000, 2003, 2007) Law on Wildlife (1997, amend. 2001, 2003, 2004)
Council Directive 78/659/EEC on the quality of fresh waters needing protection or improvement in order to support fish life	Law on System of Protected Areas (1996, amend.2003, 2004, 2005, 2006, 2007)
Council Directive 79/409/EEC on conservation of wild birds	Law on Red List and Red Book of Georgia 2006 Law on Status of Protected Areas, 2007 Biodiversity Protection Strategy and Action Plan, 2014 Red List, 2006 other laws, by-laws, statutory acts and regulations Georgia is a party to Convention on International Trade in Endangered Species (CITES), Ramsar and CBD.
Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy" or, in short, the EU Water Framework Directive	Law on Water 1997 Law on Environment Protection 1996 Law on Public Health 2007 Standard acts of the Ministry of Environment Protection and Natural Resources

### 1.3 National Legislative and Policy Framework

In Georgia, The Ministry of Environment and Natural Resources Protection (MoENRP) is responsible for regulating the natural environment. The MoEENRP participates in the development environmental state policy and implements all policies designed for the protection and conservation of the environment and for the sustainable use and management of Georgia's natural resources. This includes controlling activities that have a potential adverse impact on the environment and natural resources and issuing environmental licenses and permits.

Georgian legislation comprises the Constitution, environmental laws, international agreements, subordinate legislation, normative acts, presidential orders and governmental decrees, ministerial orders, instructions and regulations. Along with the national regulations, Georgia is signatory to a number of international conventions, including those related to environmental protection.

Establishing and updating a National Biodiversity Strategy and Action Plan (2005) is an obligation under the Convention on Biological Diversity, which aims to protect biodiversity, to ensure the sustainable use of biological resources and habitat, and to enable fair access to benefits of biodiversity. 2<sup>nd</sup> National Biodiversity Strategy and Action Plan was adopted by the Government of Georgia in 2014 (decree № 343, 14.05.2014). The Plan puts forward a set of national policies and plans to meet Georgia's responsibilities under the Convention, as well as providing a framework to coordinate priority conservation activities and to share information on biodiversity and key threats on the natural environment. The NBSAP sets strategic goals, national targets, objectives and actions. The strategic goals of the NBSAP are the following:

**Strategic Goal A:** Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society;

**Strategic Goal B:** Reduce the direct pressures on biodiversity and promote sustainable use;

**Strategic Goal C:** Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity;

**Strategic Goal D:** Enhance the benefits to all from biodiversity and ecosystem services;

**Strategic Goal E:** Enhance implementation through participatory planning, knowledge management and capacity building.

The Project has considered these strategic goals and will help achieve these goals. Georgian environmental legislation is based on existing international concepts and criteria. The key pieces of legislation regarding biodiversity are:

- Law of Georgia on Protection of the Environment (Framework Law);
- Law of the General Rules for the Protection of Wild Plants and Animals;
- Law of Georgia on Protected Areas;
- Law of Georgia on Wildlife;
- Law of Georgia on Red List and Red Book;
- Forest Code of Georgia.

The **Law of Georgia on Protection of the Environment** regulates legal relationship between the bodies of the state authority and physical persons/legal entities in the scope of environmental protection and consumption of natural resources on all Georgian territory including its territorial waters, airspace, continental shelf and special economic zones.

The law concerns environmental education, environmental management, economic sanctions, licensing, standards, environmental impact assessment and related issues. The law considers various aspects of ecosystem protection, protected areas, global and regional environmental management, protection of the ozone layer, biodiversity and the Black Sea, as well as discussing international cooperation aspects.

The main goals of the law are promotion of biological diversity, conservation of the country-specific, rare, endemic and endangered species of flora and fauna, marine environmental protection and provision of ecological balance. Law defines "*biological diversity conservation principle*", meaning that an activity should not lead to irreversible degradation of biodiversity.

The **Law of the General Rules for the Protection of Wild Plants and Animals** defines general rules for wildlife and plant protection:

- To maintain self-reproduction of wild plant and animal resources and biodiversity conservation, their extraction from the environment is strictly limited and is a subject to licensing;
- Any activities that could damage wildlife, plants, habitats, reproduction areas and migration routes are prohibited;
- Endangered wild animals and plants are registered in the "Red List" and "Red Data Book" of Georgia; and
- Any kind of activity regarding wild animals and plants, registered in the "Red List" and "Red Data Book" of Georgia are prohibited, including: hunting, trade, catching, cutting, mowing, except in special cases, which decreases the plants and animals number, deteriorates their habitats and living conditions.

The **Law of Georgia on Protected Areas** gives a definition of protected areas (including national parks, reserves, State Preserves and multiple use areas) and sets frameworks of activities, permitted in those areas. Eligible activities are determined according to the area designation, territory legislation, specific provisions and protected area management plans, as well as in accordance with the requirements of international agreements and conventions signed by Georgia. It defines limits of the natural resource use within national parks and other protected areas. Generally, following activities are prohibited in the protected areas:

- To damage or modify natural ecosystems;
- To destroy natural resources due to use or other purposes;
- To seize, damage or disturb natural ecosystems and species;
- To pollute the environment;
- To introduce and multiply alien and exotic species of living organisms;
- To import into the territory explosive or poisonous materials.

The **Law of Georgia on Wildlife** provides protection and restoration of the wildlife and its habitats, conservation of species diversity and genetic resources, sustainability and creating conditions for sustainable development, taking into account interests of future generations; legislative provision of the state regulation, regarding animal protection and animal wildlife use.

The **Law of Georgia on Red List and Red Book (2003)** regulates the Red List of Georgia and Red Book of Georgia, in relation to endangered species protection and their use, with the exception of issues related to aspects of international trade in endangered animals and plants. There are 137 species protected under the Laws in Georgia. Together with species protected by international conventions, the number increases to 200. Most of these are listed in the International Red List (Red Data List of IUCN), Red List of Georgia and in the Conventions' appendices.

The **Forest Code of Georgia (1999)** regulations relate to functions and use of forest, including protection, management of water catchment basin, wood production, etc. It allows for private ownership of forest and commercial woodcutting. According to the law, the Forest Department of Georgia does not undertake commercial woodcutting itself, but controls and manages these operations by granting this function to private enterprises. However, the Forest Department carries responsibility for maintenance woodcutting and forest management. According to the Code, the Ministry of Environment Protection and Natural Resources delegated to the Department a right to issue woodcutting licenses. The Forest Code sets categories of protected forests, including those regulating soil and catchment basins, riparian

and sub-alpine forest zones, floristic species of the Red List, etc. The Forest Code is a framework law and requires execution of detailed regulations.

At present Georgia has no **Fisheries Law**. Recently the Ministry of Agriculture (MoA) started to prepare a new law on fisheries for Georgia. Governmental approval of this law is expected to take place in coming years, after which a number of regulations under the law will still need to be produced.

In addition to these, the **Law of Georgia on Environmental Impact Permit (2007)** gives a complete list of activities subject to ecological examination (Article 4, Chapter II) and defines environmental examination through the EIA process as an obligatory step for obtaining authorization for implementation of the planned development. This includes development of a hydroelectric power station with 2 MW or higher installed capacity. The legislation sets out the legal basis for issuance of environmental permits, including implementation of an ecological examination, public consultations and community involvement in the processes. According to the Law, the environmental permit is the key procedure for implementation of an activity on the territory of Georgia. The permit takes ecological, social and economic interests of the public and the state into consideration in order to protect human health and natural and cultural assets and heritage.

### **1.3.1 Information about the regulatory mechanisms in the field of protection of plants and animals**

#### **Chapter I. Information about the mechanisms established by the legislation of Georgia to regulate the compensation actions when removing the Red-listed plants of Georgia from the environment**

##### **1. Red List of Georgia**

Under the legislation of Georgia (sub-clause (a), clause One, Article One of the Georgian Law “On the “Red List” and “Red Data Book” of Georgia“), the Red List of Georgia is a list of the endangered wild animal and wild plant species spread on the territory of Georgia. Under this statement, the plant species spread in Georgia, which are endangered, are included in the Red List of Georgia. The Red List of Georgia is approved by Decree No. 190 of the Government of Georgia of February 20, 2014 “On approving the Red List of Georgia”. It includes 56 plant species spread in Georgia. The Red List shows the categories of the state and conservation status for each species, which (the notations on the Red List of Georgia) have the same meaning as those indicated in the explanation of the International Union for Conservation of Nature and Natural Resources (IUCN Red List Categories and Criteria, Version 3.1, 2001) and Guidelines of the same Union (IUCN Guidelines for National and Regional Red Lists, 2003), in particular:

CR (Critically Endangered)- Taxons at extremely high risk of extinction

EN (Endangered) – Taxons at high risk of extinction

VU (Vulnerable) - Vulnerable taxon

RE (Regionally extinct) – Extinct on a regional level.

Out of the plant species included in the Red List of Georgia, 36 ones are VU (Vulnerable) – vulnerable taxons, 18 are EN (Endangered) - taxons at high risk of extinction, 2 are CR (Critically Endangered) - taxons at extremely high risk of extinction.

## 2. Georgian Law “On the “Red List” and “Red Data Book” of Georgia“

The questions of protection and use of the endangered species (Red-Listed species) and their restoration are discussed in the Georgian Law “On the “Red List” and “Red Data Book” of Georgia.“

Article 24 of the Law describes the special legal cases of removing such species from the environment, under which:

1. Obtaining (removing from the environment) the endangered wild plant species or parts thereof is admissible only in the following special cases:
  - (a) To restore and propagate them in the natural environment;
  - (b) To propagate them in dendrological or botanical gardens.
  - (c) For economic purposes, to grow them in natural conditions.
  - (d) For scientific purposes;
  - (e) To improve the sanitary condition of a forest during the sanitary felling.
  - (f) During the implementation of the projects of a state or public importance.
  - (g) If there are naturally dug out or broken, hollow, over-dry or withering timber plants included on the Red List of Georgia on the territory of the state economic forest fund.
  - (h) If in the zone of traditional use of a national park, in some areas of a sanctuary or on the territory of a protected landscape, there are dug out or broken, hollow, super-dry or withering timber plants included on the Red List of Georgia.
  - (i) For the safety purposes of the existing enterprises or infrastructure during their exploitation.

2. Obtaining (removing from the environment) the endangered wild plant species or parts thereof for economic purposes, to propagate them under artificial conditions is admissible only if the wild plant is grown artificially.

2<sup>1</sup>. A written consent for obtaining (removing from the environment) the endangered wild plant species or parts thereof is issued by the Ministry of Environment and Natural Resources Protection of Georgia in cases envisaged by sub-clauses (a)-(d) and (i) of clause 1 of this article.

2<sup>2</sup>. In cases envisaged by sub-clause “e” of clause one of this article, a decision about obtaining (removing from the environment) the endangered wild plant species or parts thereof is made by the relevant body envisaged by articles 15 and 16 of the Forest Code of Georgia.

2<sup>3</sup>. In cases envisaged by sub-clause “f” of clause one of this article, a decision about obtaining (removing from the environment) the endangered wild plant species or parts thereof is made by the Government of Georgia.

3. In cases envisaged by sub-clauses “g” and “h” of clause one of this article, a decision about obtaining (removing from the environment) the endangered wild plant species or parts thereof is made by the bodies under articles 15 and 16 of the Forest Code of Georgia within the scope of their competence.

**Note:** The bodies under articles 15 and 16 of the Forest Code of Georgia are as follows:

Under article 15, the protected territories of the state forest fund and their resources are managed by **LEPL Agency of Protected Areas** of the Ministry of Environment and Natural Resources Protection of Georgia, and under article 16:

1. The state forest fund, and protected territories of the local forests and state forest fund, excepting the forest fund on the territories of the Autonomous Republics of Abkhazeti or Ajara are managed by **the National Forestry Agency**.
2. The local forests, within the scope of authority under the legislation of Georgia and by meeting the requirements under this Code, are managed by **self-governing bodies** through the relevant offices.

3. The forest funds on territories of the Autonomous Republics of Abkhazeti or Ajara are managed by **the relevant bodies of the Autonomous Republics of Abkhazeti or Ajara.**

Article 20 of the Law is concerned with the actions to restore the endangered species, in particular, under clause 1 of this article: “The measures to restore the endangered species include the measures to restore and maintain these species and their habitats.” Under clause 3 of the same article: “The measures to restore the endangered wild plants mean protecting them with biological means (preparations), and **artificial propagation and conservation of these species in the natural environment.**”

The said Law does not set the obligation to accomplish any actions to compensate the damage inflicted by the removal of the endangered plants from the environment. By removing the Red-Listed plants from the environment, the state of the Red-Listed plants is harmed and deteriorated: their number decreases. Consequently, it is necessary to plan and implement the relevant restoration actions as compensatory measures. Therefore, the questions of compensation are regulated by other normative acts of Georgia (see below). In some cases (when the question of compensation is not regulated by other normative acts), the decree of the Government of Georgia about the removal of the plants from the environment, or letter of consent of the Protection of Environment and Natural Resources of Georgia sets the obligation to present a package of measures to compensate the damage inflicted by the removal of the Red-Listed plants from the environment. This mainly concerns the removal of the Red-Listed plants from the environment for the following purposes:

- During the implementation of the projects of a state or public importance.
- For the safety of the existing enterprises or infrastructure during their exploitation.

### **3. Normative acts regulating the conservation and restoration actions**

#### **3.1. Forest Code of Georgia and subordinate legislation**

**3.1.1. The Forest Code of Georgia** establishes legal grounds for conducting tending, protection, restoration and use of the Georgian Forest Fund and its resources.

Under sub-clause c) of clause 2 of Article 24 of the Code: “Planning the State Forest Fund Use”, the planning of the state forest fund use covers tending, restoration and propagation of a forest.

Under Clause 1 of Article 95 of the Forest Code: “Restoration of the Georgian Forest Fund and Its Objectives (CHAPTER XXVIII)”, “Restoration of the Georgian Forest Fund is a multi-year cycle of activities, carried out with the purpose of restoration and afforestation of the bare land plots under the Forest Fund or the open stands of the Forest Fund”, while under clause 4, one of the measures of the forest restoration is: “thinning or removing underbrush with the purpose of stimulating natural regeneration of forests, also carrying out tending, protecting, cleaning, planting, and sowing in the managed forests, forest edges, and subalpine open woodlands.”

#### **3.1.2. Rule of forest use (approved by Decree No. 242 of the Government of Georgia dated by August 20, 2010 on Approval of the Rule of Forest Use, following the Forest Code of Georgia)**

The goal of this Rule is to define the rule of forest use on the territory of the state forest fund, including the compensation fee for using the forest fund with a special purpose (Article 1).

By virtue of Decree No. 425 of the Government of Georgia of August 17, 2015, amendments were made to Decree No. 242 of the Government of Georgia of August 20, 2010 on “Approval of the Rule of Forest Use”, sets the payment obligation (under the agreement concluded with the forest management body) and amount of the fee to use the forest fund for special purposes was fixed (when no area is deregistered off the forest fund). The decree also sets the compensation fee and obligation for its payment for cutting the plants on the same territory fixing double fee for cutting down the Red-Listed plant species. These amounts will be used by the governing body to accomplish forest measures, including forest restoration activities. The entities having received the right to remove the Red-Listed plants from the environment, who are obliged to present the package of compensation measures prior to the enactment of the said Decree, have the right to apply to the Ministry and ask for replacing the said obligation with the payment of the amount.

Decree No. 242 of the Government of Georgia of August 20, 2010 on “Approval of the Rule of Forest Use” expresses the above-said as follows:

Article 27<sup>4</sup> fixes the documents to be presented to obtain the right to use the state forest fund for a special purpose. These documents include the information about the existence of the timber plants protected by the Red List in the area selected to use the state forest fund with a special purpose (sub-clause d, clause one of the same article).

Under sub-clauses 5 and 5<sup>1</sup> of the same Article:

“Clause 5. “For using the state forest fund with a special purpose for the purposes of operation of hydro-system, pipelines, roads, power transmission communications or channels, construction, reconstruction (rehabilitation) or dismantling, or necessary design and/or engineering-geological works, study and/or exploration of fossil, operations with oil or gas, accomplishment of state and/or public infrastructural projects, a forest user pays the compensation under the terms of eth agreement concluded with the governing body, as per Table 2 of Annex 7 of the given Rule (*see below*). In addition, for the purposes of the same clause of the same article, in case it is necessary to cut down timber plants, the forest user is also obliged to pay the compensation as per Table 1 of Annex 7 of the given Rule (*see below*). In case of cutting down the Georgian Red-Listed timber plants, the amount of due compensation shall be double. The compensation shall be sued by the governing body for the provision of goals and functions related to the forest measures, including tending, restoration and protection of forest, forest use, forest registration and inventory and fire prevention measures.”

“Clause 5<sup>1</sup>. The compensation set for the use of the state forest fund with a special purpose is paid annually, in the term of use for a special purpose. In case of the necessity for cutting down the timber plants for the purposes of the same clause of the same Article, the forest user pays the compensation fee before the cutting is done according to the volume of the timber resource marked on the cutting area.”

The forest users charged with the compensatory measures for using the forest fund with a special purpose prior to the enactment of the present Decree, have the right to pay the compensation fee set by Clause 5 of Article 27<sup>4</sup> of the given Decree instead of the compensatory measures set above, and must apply to the relevant governing body with the relevant written statement within 3 months of the date of enactment of the given Decree.

The forest users having started to accomplish the compensatory measures for using the forest fund for a special purpose, who decide to pay the compensation fee set by Clause 5 of Article 27<sup>4</sup> of the given Decree, shall pay the compensatory fee in full notwithstanding the costs borne by them for the compensatory measures.

#### Annex 7

**Table 2. Rule to calculate the compensation fee for using the forest fund with a special purpose (including VAT)**

Amount to be paid for 1 m <sup>3</sup> for different groups, Gel						
No.	Volume, m <sup>3</sup>	Group 1 Yew, willow, juniper, elm Zelkova, walnut	Group 2 Oak, chestnut, box elder, elm, mulberry, maple, lime, wild pear, Mt. Atlas mastic tree	Group 3 Beech, hornbeam, acacia, hackberry, European Hop	Group 4 Pine, spruce, fir, cedar, cypress, cryptomeria, thuja	Group 5 Oriental hornbeam, plane tree, other forest timber species
1	Amount for 1 m <sup>3</sup>	80	75	73	70	60

**Table 3. Financial valuation**

№	Volume of the area	Basic annual amount, Gel
1	Up to 500 m <sup>2</sup>	250
2	500 to 1000 m <sup>2</sup>	500
3	1000 to 5000 m <sup>2</sup>	800
4	5000 m <sup>2</sup> to 1,0 ha	1200
5	Over 1 ha	0,12 Gel/ m <sup>2</sup>

According to the transitional provision of the Decree, the action of Article 27<sup>4</sup> does not apply to the state forest fund use with a special purpose in case of implementing the works envisaged by the agreements concluded under Decree No. 1483 of the Government of Georgia of August 26, 2014 “On the electrification of village Mutso of Dusheti Municipality”, Decree No. 1196 of the Government of Georgia of July 3, 2014 “On the measures to accomplish for the electrification of some villages”, Decree No. 1017 of the Government of Georgia of June 9, 2014 “On the measures to accomplish for the electrification of some villages”, Decree No. 812 of the Government of Georgia of May 8, 2014 “On the measures to accomplish for the electrification of some villages”, Decree No. 405 of the Government of Georgia of March 12, 2014 “On the measures to accomplish for the electrification of some villages”, Decree No. 1193 of the Government of Georgia of July 3, 2014 “On the simplified state acquisitions by the Ministry of Energy of Georgia”, Decree No. 2024 of the Government of Georgia of November 7, 2014 “On the simplified state acquisitions by the Ministry of Energy of Georgia”, Decree No. 1883 of the Government of Georgia of October 20, 2014 “On the simplified state acquisitions by the Ministry of Energy of Georgia”, Decree No. 1929 of the Government of Georgia of October 28, 2014 “On making amendments to Decree No. 1196 the of the Government of Georgia of July 3, 2014

“On the measures to accomplish for the electrification of some villages”, Decree No. 1923 of the Government of Georgia of October 27, 2014 “On the simplified state acquisitions by the Ministry of Energy of Georgia”.

The obligation to accomplish the compensatory actions fixed by the Decree does not apply to the questions related to special felling in the protective zones envisaged by Decree No. 366 of the Government of Georgia of December 24, 2013 “On the rule to protect the linear facilities of power networks and establishment of their protective zones” used by the companies, who are the owners of the power network envisaged by Article 27<sup>2</sup> (Clause 1<sup>1</sup>, Article 27<sup>2</sup>), as well to the questions related to special felling in the protective zones envisaged by Decree No. 365 of the Government of Georgia of December 24, 2013 “On the rule to protect main pipelines (oil, oil products, oil co-products and natural gas and their transformation products) and establishment of their protective zones” by the entities owing the main pipelines (oil, oil products, oil co-products and natural gas and their transformation products) and facilities related to the main pipelines and/or the companies holding the permits for transporting natural gas or oil (operators) (Clause 1<sup>2</sup>, Article 27<sup>2</sup>). Under the Decree, these questions related to special felling, except the handing down of the cut timber, are regulated by the governmental decrees Nos. 366 and 365 referred to above.

Below is the full wording of clauses 1<sup>1</sup> and 1<sup>2</sup> of Article 27<sup>2</sup>:

„1<sup>1</sup>. The questions related to special felling in the protective zones envisaged by Decree No. 366 of the Government of Georgia of December 24, 2013 “On the rule to protect the linear facilities of power networks and establishment of their protective zones” used by the companies, who are the owners of the power network over the slopes with the inclination of up to 35 degrees within the limits of the state forest fund, including the protected territories of the state forest fund (except the categories and zones of the protected areas where the use of forest is forbidden by the law), except the handing down of the cut timber, are regulated by Decree No. 366 of the Government of Georgia of December 24, 2013 “On the rule to protect the linear facilities of power networks and establishment of their protective zones”.

„1<sup>2</sup>. The questions related to special felling in the protective zones envisaged by Decree No. 365 of the Government of Georgia of December 24, 2013 “On the rule to protect main pipelines (oil, oil products, oil co-products and natural gas and their transformation products) and establishment of their protective zones” by the entities owing the main pipelines (oil, oil products, oil co-products and natural gas and their transformation products) and facilities related to the main pipelines and/or the companies holding the permits for transporting natural gas or oil (operators) over the slopes with the inclination of up to 35 degrees within the limits of the state forest fund, including the protected territories of the state forest fund (except the categories and zones of the protected areas where the use of forest is forbidden by the law), except the handing down of the cut timber, are regulated by Decree No. 365 of the Government of Georgia of December 24, 2013 “On the rule to protect main pipelines (oil, oil products, oil co-products and natural gas and their transformation products) and establishment of their protective zones”.

In cases envisaged by Article 27<sup>2</sup> of the Decree, a compensation mechanism was set to compensate the damage caused by the removal of the Georgian Red-Listed plants from the environment by virtue of the Resolution of Georgia (Resolution No. 1535 of the Government of Georgia of September 5, 2014 “On some measures to compensate the damage caused by the removal of the Georgian Red-Listed plants from the environment”).

### **3.2. Resolution No. 1535 of the Government of Georgia of September 5, 2014 “On some measures to compensate the damage caused by the removal of the Georgian Red-Listed plants from the environment”**

Under Clause 3 of the Resolution, “within the limits of safe operation of the protective zones of the linear facilities of the power networks and main pipelines, the financing of the measures to compensate and mitigate the damage to the environment caused by the removal of the Georgian Red-Listed plants from the environment shall be done within the limits of the assignments allotted for the Ministry of Environment and Natural Resources Protection of Georgia under the Georgian Law “On the state budget of 2015”. In addition, under the same Resolution, the Ministry of Environment and Natural Resources Protection of Georgia was charged with developing the program to update the plant species on the Red List of Georgia, and the Ministries of Finances were charged with considering the due amounts in the draft state budget of 2015 to finance the said program.

### **4. Compensation the damage caused by the removal of the Georgian Red-Listed plants from the environment when issuing an EIA and relevant expert’s opinion/environmental permit**

In recent years, the number of infrastructural projects needing the environmental impact assessment (EIAs) and relevant permits has increased. For this purpose, the EIA reports are submitted to the Ministry of Environment and Natural Resources Protection of Georgia for consideration and drafting the environmental expert’s opinion. A positive opinion is followed by the issuance of the relevant permit.

Quite often, the implementation of the said projects harms the bio-diversity, including the plant species on the Red List of Georgia. Therefore, in addition to some measures, the legislation provides for the compensation actions.

The legislation of Georgia gives the information about the accomplishment of the environmental impact assessment (EIA) and data to be given in the EIA reports. The following statement is worthwhile: “The environmental impact assessment (EIA) report must allow the body accomplishing the environmental expertise to correctly assess the accepted design solution and in respect of its environmental safety, to examine the project’s correspondence to the legislation and adopted system of limitations, to draft the expert’s opinion about the accuracy of the information gained during the environmental impact assessment and expediency of the design solution gained on its basis” (the Resolution on the environmental impact assessment is approved by Decree N31 15.05.2013 of the Minister of Environment and Natural Resources of Georgia). Under clause 2, article 5 of this Resolution, the environmental impact assessment takes place in several inter-connected stages. The ***offered compensation measures must be identified*** at one of the stages. Under sub-clause “f” of clause 2 of Article 6 of the same Resolution, the environmental impact assessment report, inter alia, must include the following: “ways to mitigate and avoid the negative impact on the environment and human health and identification of the compensation measures if necessary”. The Ministry, based on the environmental expertise of the EIA Report, shall issue an environmental expert’s opinion/environmental permit under the terms, which shall be obligatory. If during the activities, it is inevitable to remove the Georgian Red-Listed plants from the environment and no measures to compensate the damage inflicted to the environment by such a removal are envisaged, the opinion/permit usually envisages the obligation to present such a compensation package as one of the terms.

## **Chapter II. Protection of biological resources**

### **1. Introduction**

For the purpose of protection of biodiversity when using biological resources or in case of other activities, the following mechanisms to avoid/mitigate the damage to biodiversity are in force in Georgia:

- Rules to use biological resources envisaged by various normative acts, as well as terms of licenses or permits.
- Limited use of the biological resources within the limits of extreme quantities of obtaining (quotas) the resources.
- Environmental impact assessment, ecological expertise and environmental permit for the activities established by law.
- State control over the environmental protection covering the monitoring of the environmental legislation and control over its observance, including meeting the terms of permits and licenses and controlling the rules of nature management, identifying those violating the law, and preventing and eliminating the violations.
- A responsibility and compensation system to be used in cases of damaging the biodiversity.

However, it should be noted that above-said mechanisms are not thorough. For example, limiting the volumes of use of the biological resources within the limits of extreme quantities of obtaining (quotas) the resources, except some minor exceptions, is not applied to the non-timber plant resources. There are many rare, endemic or such grass species included on the Red List of Georgia, which are decreasing in numbers. The compensation system for the damage of biodiversity needs perfection. The “Forest Code of Georgia” mostly regulates the questions of plant protection on the territories subordinate to the bodies envisaged by Articles 15 and 16 of the Code only (see Chapter 1 above) and such regulations do not apply to the municipal, state or private territories, except the plants on the Red List of Georgia with the questions of protection regulated by the Georgian Law “On the “Red List” and “Red Data Book” of Georgia“ (see Chapter 1 for the relevant information above). It is true that there is a range of legal acts enacted related to the plants (in August of 2010. the Government of Georgia adopted Decree No. 241 “On the rule to tend and restore forests” stating that the restoration and growing the forest must be done by considering the requirements for protecting the biodiversity). It should be noted that under this Decree, the priority is given to the local species typical to the concrete environmental conditions. There are also other legal acts drafted in this connection, but many issues need further study and perfection.

It should be noted that an updated “Biodiversity Strategy and Action Plan of Georgia 2014-2020” envisaging the above-listed and other gaps was approved in 2014.

In connection to the protection of the plants and animals on the Red List of Georgia, the Georgian Law “On the “Red List” and “Red Data Book” of Georgia“ (Article 10) stipulates the following:

Any action, including hunting, craft, obtaining (removing from the natural environment), felling and mowing, except special cases envisaged by the present Law, Georgian Law "On Wildlife" and other legal acts or subordinate legislation, which may lead to the reduction in numbers of the endangered species or deterioration of their habitats and living environment.

The consideration of the harmful anthropogenic impact on the endangered species is obligatory:

- in drafting the ecological expert's opinion when issuing the environmental permit;
- in case of major, tending or special felling and/or when planning and accomplishing the forest economic measures in line with the Forest Code of Georgia;
- in using the fertilizers, pest and weed-killers and plant protection means and when planning and accomplishing such activity, which may, either directly, or indirectly, cause the extinction of an endangered species, reduction in numbers or deterioration of its habitat or living environment.

## **2. Plant protection**

Major portion of the plant protection measures envisaged by the legislation is described above, in particular: 1) the mechanisms given above apply to the use of plant resources (timber resources) (Chapter 1), what is also true with the mechanisms related to the environmental impact assessment.

The major law regulating the field of plant protection is the Forest Code of Georgia, which regulates the legal relations related to tending, protecting and restoring the forest fund and its resources.

Under the Georgian Law "On the "Red List" and "Red Data Book" of Georgia" (Article 12), "Any action, which may cause the annihilation of an endangered wild plants or reduction of their number and/or habitat is forbidden. Cutting the endangered wild plants on the lands of the forest fund or planning such forest economic measure, which may cause harm to the plant species at the risk of extinction (except the cases envisaged by Article 24 of the same Law envisaging the cases of removing the same species from the environment (see sub-clause 2, Chapter 1 above for the information).

## **3. Animal protection**

The legal act regulating the animal protection and use of its resources is the Georgian Law "On Wildlife". Its major goal is to ensure the protection and restoration of the fauna and its habitat, maintenance of its generic diversity and stability and create the conditions for sustainable development, as well as ensure the legal basis for the state regulation of using the items of fauna. However, it should be noted that a number of articles of this Law related to the use of animal resources (in the field of issuing licenses in hunting industry and fishing) are regulated by the relevant resolutions of the government of Georgia.

Under the Law (Article 17), any activity influencing the locations, breeding areas, habitats, survival stations, immigration and water access ways and water drinking locations of wild animals must be accomplished in line with the requirements protecting them. Another requirement of the Law is that when designing, locating and building the settled areas, enterprises, premises and other objects, or perfecting the existing ones, or introducing new technological processes, or putting the virgin lands, wetlands, coastlines and areas covered with bushes to the economic use, land melioration, forest management, geological-survey works, ore mining, identifying the pastures and driving sites, developing tourist routes and organizing the mass recreation sites for the population, the measures to maintain the habitats and breeding areas, survival stations, immigration and water access ways and water drinking locations of wild animals must be accomplished and the locations with special value for the animals for their normal existence must be kept intact. When designing, locating and constructing the motor roads, pipelines or other transportation mains, power transmission and communication lines, as well as channels, dams and other hydraulic structures, when allocating the pastures and arable and sowing lands, the measures to ensure the maintenance

of the migration and water access routes, breeding areas, survival stations and water drinking locations for wild animals.

The issues of animal protection and avoidance of the animal impact are also given in the legal acts regulating the issues of environmental impact assessment and issuance of the environmental permits. The environmental impact assessment covers the identification and description of direct and indirect impacts within the context of the planned activity and study of the results, including the impact on the vegetation cover and fauna (Article 3 about the environmental impact assessment approved by Decree No. 31 of the Ministry of Environment and Natural Resources Protection of Georgia of 15.05.2013). See clause 4, Chapter 1 for the information in this field about the animals, including compensatory actions.

#### **4. About the animals included in the Red List of Georgia**

At present, there are 139 fauna species included on the Red List of Georgia (including 29 mammal, 35 bird, 11 reptile, 2 amphibian, 14 fish species) with 43 species of the category of “At the risk of extinction” or “At the extreme risk of extinction”. Many animal species spread in Georgia are endangered in a global scale, as well.

The issues of protection of the endangered animal species are set by the Georgian Law “On the Wildlife” (Article 20):

The “Red List” and “Red Data Book” of Georgia are set with the purpose of assessing the state of and conferring the safety status to the endangered animal species, sub-species and other taxonomic units (hereinafter “The Taxon”).

Conferring the state and safety status to the endangered animal species is done by the following categories:

- (a) Extinct taxon (Extinct - EX) - A taxon is considered extinct when its last species is perished.
- (b) Extinct in the Wild (EW) - Known only to survive in captivity.
- (c) Critically endangered (CR) – a taxon is considered critically endangered when it is at extremely high risk of extinction in the wild.
- (d) Presumably endangered (Endangered (EN)) – Not critically endangered, but at a possible risk of extinction in the near future.
- (e) Vulnerable (VU) – Not at the expected risk of extinction, but may be at risk of extinction in the future.
- (f) Lower Risk (LR) – a taxon does not meet the criteria of either expected risk of extinction or vulnerability. This taxon can be divided into three categories:
  - (f)<sup>1</sup>. Conservation Dependent (CD) – a taxon depending on the conservation.
  - (f)<sup>2</sup>. Near threatened (NT) – a taxon, which is not nearly conservation-dependent, but is nearly vulnerable.
  - (f)<sup>3</sup>. Least concerned (LC) – taxon not being close to either conservation-dependent, or vulnerable one.
- (g) Data deficient (DD) – Not enough data to make either direct, or indirect assessment of its risk of extinction.
- (h) Not evaluated (NE) – Has not been evaluated against any criteria.

An action, which may lead to the perish of the endangered animal species, decrease in their numbers or violation of their habitats, breeding areas, survival stations or immigration or access routes to drinking water, is punishable under the legislation of Georgia.

The question of protecting the endangered animal species (included on the Red List of Georgia) are described in the Georgian Law “On the “Red List” and “Red Data Book” of Georgia“ as well and almost reiterates the requirements of the Georgian Law “On Wildlife” in this field, in particular, any action which may lead to the perish of the endangered animal species, decrease in their numbers or violation of their habitats, breeding areas, survival stations or immigration or access routes to drinking water, is forbidden.

Obtaining (removing from the environment) the animals at the risk of extinction is admissible only in special cases – for the purposes of survival, curing or population restoration, or scientific purposes what is done by the written consent of the Ministry of Environment and Natural Resources Protection of Georgia (such a consent may include certain limitations and/or conditions for obtaining (removing from the environment) the animals) (Article 22 of the Law).

## **2. OVERVIEW OF FLORA AND VEGETATION OF NENSKRA-NAKRA CATCHMENT AREA**

The project territory covers botanical-geographical region of Nenskra-Nakra catchment area, which is located on the West part of Svaneti. From the North the region’s boundary is the main watershed; the West boundary matches administrative boundary of Svaneti; the East boundary runs along the Nakra-Dolara watershed – Tsalgmili ridge; the South boundary runs along the right bank of Enguri River.

The Enguri river is the main artery of Zemo Svaneti. It originates in Namkvami (Engur-Ukhvani) glacier and flows near the village Khaishiti on 550 m a.s.l. Enguri valley within this region is a rocky cleft located between rock buttresses of Svaneti and Abkhazia-Svaneti and Samegrelo ridges. Enguri valley runs through this botanical-geographical region, in paleozoic metamorphic suite (the Dizi series), middle-Jurassic porphyrite suite (near Khaishi) and cretaceous limestone (near Larakvakva and above Jvari).

Svaneti-Abkhazia ridge separates from the Caucasus range near the mountain Gvandra. Eastern branches of the Svaneti-Abkhazia gorge are: Dalari and Tskhandiri rivers watershed; Paravani ridge, which is a watershed for the rivers Lagami and Darchi; Likhnili gorge, which is a watershed for the rivers Darchi and Larakvakva. It begins with the Bishkapsara mountain and reaches Bokunsta-Larakvakva and Gandishi. Another orographic unit of the region is Shtaueli ridge, which separates from the Caucasus and represents a watershed for Nenskra and Nakra rivers (Maruashvili, 1970).

Nenskra and Nakra rivers are among the large tributaries of Enguri River. Nenskra River originates from southern slopes of the Caucasus. Upper reaches are presented by karts shale stones, while the lower part is presented by clay-shales and carbonate suite. In this part, it crosses “Deisi” and “Liasi” clay-shales, sand-stones and volcanic rocks.

The Nenskra river is relatively narrow until the Tetnashera confluence. Right tributaries are: Dalari, Tskhandiri, Okrila, Kharali, Tetnashera, Devra, Lagamo, Darchie; left tributaries are – Manchkhapuri, Tita, Margi, Gvashkhara.

Nakra River runs from the glacier and joins Enguri River at 918-1000 m elevation above sea level. Nakra valley is located in crystalline rocks, clay-shales and carbonate and paleolite metamorphosed suite. Until the village Nakra river flows through a narrow valley. It is

bordered by Shtauler, Tsalgimili and main gorges. U-shaped valley is clearly expressed near the source of the river (Ukleba, 1952; Maruashvili, 1970).

Annual amount of precipitation in the region, as well as in the western part of Zemo Svaneti is 1200-1350 mm. Average annual temperature is 10-14°; annual temperature of the coldest month is 0,6°; average temperature of the warmest month is 20,9°.

Amount of precipitation increases above the forest belt. The upper border of the forest belt is at 2000-2300m elevation. Dark coniferous forests dominate in the phytolandscape of the region, as well as of Zemo Svaneti. This part of the region is similar to the Kodori valley forests. Evergreen undergrowth is represented by Cherry Laurel, Rhododendron and Holly. Cherry Laurel is widespread in Larakvakva and Ormeleti valleys. Different mixed deciduous forests dominate in the lower zones. Especially notable are Georgian oak forests along Enguri River, near the confluence of Nenskra River, on the bottom of Nakra River adjacent to Naki village. The peculiarity of the region in the lower part of the forest belt is reflected by well-developed evergreen undergrowth. It has been observed in Larakvakva and Ormeleti valleys.

Exposed limestone of Chekaderi mountain is observed near the confluence of Larakvakva and Enguri rivers, on the right bank of Enguri River, which is a northern branch of Samegrelo ridge. Remains of flora cenotic complex of Colchis limestone are represented there, which is unique for Svaneti. Pine-oak cenoses mixed with *Sesleria* are also represented there, which is characteristic for Western Transcaucasia. Understory is dominated by representatives of Colchian dendroflora: Colchis ivy, Smilax, Broom and Red Dogwood; a lot of Blackberry is found on secondary ecotopes. Smilax is widespread there. Above mentioned Moor grass (*Sesleria anatolica*) is observed on calcific rocky gravel ecotopes. Endemic to Abkhazia and Samegrelo – Colchic *Kemulariella* (*Kemulariella colchica*), which grows on humid rocks; limestone endemic to Abkhazia and Racha-Lechkhumi - *Asperula kemulariae*; limestone endemic to the Western Transcaucasia - *Epimedium colchicum*, which is the component of the oak forest. The same complex of oak is observed on the right bank of Enguri River between Khaishi and Dizi. *Arachne colchica* (*Leptopus colchicus*) grows on gravel ecotopes. This specie is also observed in Chuberi. Sumac and Smoketree should also be noted. A rare, eastern Mediterranean species of Greek Bladderpod (*Alyssoides graeca*) are spread near Dizi village, at approximately 950m a.s.l., on clay shale stones and gravel ecotopes of the right bank of the bottom of valley. Yellow alyssum (*Alyssoides*) is a new specie for Georgian flora. This specie is rare in the Caucasus and it is common in Teberda-Zhelenchuki valleys. *Valeriana alliariifolia* and *Saturea spicigera* are characteristic for botanical-geographic region of Nenskra-Nakra, as well as for other regions and for the bottom of Enguri and its tributaries valleys.

Deciduous forest with beech-hornbeam and chestnut inclusions are found at 1500-1600m elevation in some places of the region. For example, on the slopes of the right bank near Naki village, which is developed within the dark coniferous forest zone. Such forests are especially well developed at 1700-1800 m elevation. This elevation should be considered as optimal for fir-spruce forests (Dolukhanov, Sakhokia, Kharadze, 1946). Above 2000 m elevation, dark coniferous forest zone changes into subalpine zone. Caucasian whortleberry (*Vaccinium arctostaphylos*) is widespread within the dark coniferous forest zone; Beech forests are developed between Tskhvandiri and Dalari. *Senecio pojarkovae*, which is an important specie for agricultural activities is widespread within the areas where dark coniferous forests have been deforested.

Phytocoenologically, vegetation of geobotanical district of Svaneti is rich and diverse. In the western and eastern parts of the depression, due to significant differences in climate conditions (climate in the western part is milder, marine; in the eastern part - more continental, strict), as well as due to uneven impact and other natural or artificial reasons, vegetation structure significantly varies from each other.

The forest zone reaches 1800-1850 m elevations. The difference between the forests of the Western and Eastern parts of Svaneti depression is significant.

Relict forests (formations, associations) are widespread in the western part of Zemo Svaneti. Vegetation cover of the western part of the region reveals certain similarities to the vegetation cover of geobotanical region of Abkhazia- Samegrelo. In the sub zone of the forest, at about 1000-1200m elevation, forest vegetation is dominated by mixed broadleaf forests (mixed broadleaf forests sub zone). The major species of these forests (edificatory) are Beech (*Fagus orientalis*), Chestnut (*Castanea sativa*), Hornbeam (*Carpinus caucasica*). These species are mixed with Lime (*Tilia caucasica*), Norway Maple (*Acer platanoides*), Painted Maple (*Acer laetum*), etc. A significant part of the forests are represented by relict Colchis understory (Rhododendron - *Rhododendron ponticum*, Cherry Laurel -*Laurocerasus officinalis*, Caucasian bilberry - *Vaccinium arctostaphylos*, etc.) Among monodominant and bidominant broadleaf forests most widespread are species such as Sweet chestnut (*Castanea sativa*), Caucasian Hornbeam (*Carpinus caucasica*), Oriental Beech (*Fagus orientalis*), Beech-Hornbeam, Hornbeam-Chestnut. Relatively dry slopes of south, south-east and south-west part are dominated by Georgian oak (*Quercus iberica*) and hornbeam-oak forests. An interesting relict oak forests are found on limestone slopes, where relict species are developed, such as (Barrenwort - *Epimedium colchicum*, *Arachne colchica*, Abraham-Isaac-Jacob -*Trachystemon orientale*, etc.) Alder forest (*Alnus barbata*) is developed in river flood plains (proalluvial terrace). Mixed coniferous-deciduous and coniferous forest groves are developed in subzone, namely, spruce forest (*Picea orientalis*), fir forest (*Abies nordmanniana*), Pine forest (*Pinus sosnowskyi*), spruce-beech, pine-spruce, spruce-fir forests, etc.

The composition of the forest vegetation formation is sharply changing from 1000-1100 m elevation to 1800-1850 m elevation a.s.l. Forest vegetation cover is dominated by Beech forest (*Fagus orientalis*) and dark coniferous (spruce - *Picea orientalis*, Fir -*Abies nordmanniana*) forests. Pine forests (*Pinus kochiana*) are less developed there. It should be noted that the western part of Svaneti is less populated and due to this fact quite a large number of intact and slightly disturbed forest communities are observed there (excellent Beech forest arrays are preserved on northern slopes of Samegrelo and Letchkhumi mountain range). A significant part of the forests (Beech, Fir, Spruce, Beech-Fir) are represented by relict Colchis undergrowth (cherry laurel -*Laurocerasus officinalis*, rhododendron - *Rhododendron ponticum*, Caucasian bilberry - *Vaccinium arctostaphylos*, Yellow Azalea - *Rhododendron luteum*, etc.).

Some other phytolandscape and floristic features of Nenskra-Nakra region should also be noted. Hypnum sedge and sphagnum glacier bogs are developed in subalpine zone, on Svaneti-Abkhazia and Tsalgmili ridges. Especially noteworthy are Bashkapskara ridge bog (source of Ormeleti River, right side of Nenskra), Shavlura bog (sources of Devra) with Sphagnum developments, where a rare Palaearctic species -*Scheuchzeria palustris* – is developed.

Peat-wetlands are quite widespread in mountainous region of Svaneti, especially in Zemo Svaneti; However, they are rarely developed on large areas. Almost all types of boges are found in this region of Georgia, though, meso-oligotrophic boges are still dominant. Most of them are developed at the upper boundary of Spruce-Fir forests, within 1800-2000 m elevation above sea level. A peat accumulation process is intensive in these boges.

From geobotanical point of view, the most interesting peat-boges are those that are developed within the basin of Nenskra River (Chubrula). One of them is described in detail by A. Dolukhanov (1941). These boges are located at about 1750m a.s.l. the name of its surroundings is Chamkharkhi. The plain existing around this bog is covered by broad leaf grass meadow. Spruce-Fir forests are developed on slopes, which are mixed by Beech and Maple trees. *Sphagnetum* *scheuchzeri*-*caricosum*, *Sphagnetum* *scheuchzeriosum* and *Sphagnetum* *caricosum* are developed in most parts of this bog. *Sphagnum* *magellanicum* and *Sph.* *angustifolium* dominate in moss cover of these associations. They are mixed with some other species of sphagnum and *Drepanocladus fluitans*. *Caricetum inflatae* *drepanocladiosum*, *Caricetum irriguae* *drepanocladiosum*, *Scheuchzerietum palustrae purum* and Sedge are developed on the surface of peat lands. Here, development of bog is at oligotrophic stage. Peat-bog surface is wavy.

In the basin of the same valley, at 2200 m above sea level, bog is developed on slightly steep slopes of Ormaleti-Sakeni watershed ridge, which is surrounded by broad leaf herb meadows and Rhododendrons. This bog is characterized by one meter thick layer of peat, which covers the surface and neighboring meadow is gradually swamped by water drained from it. The vegetation of the bog is dominated by *Caricetum kotschyanae* *hypnosum* and *Caricetum kotschyanae* *sphagnosum*. *Caricetum canescenti* *drepanocladiosum* is also represented.

Bog similar to Chamkharkhi is developed on the right side of Nenskra River, on watershed of Lakhami and Devlura. It is located at 1800 m above sea level and it is surrounded by Fir forest. A few Birch, Mountain Maple and Beech trees are found along the bog. The name of the surroundings of this bog is Shamprili. This marshy is in the meso-trophic stage of its development. Its shoreline is convexed, while its inner part is concaved and is close to the groundwater level. A narrow dingle is developed between the land and convexed line of the bog, in which the water drained from peat is accumulated. This dingle is bogging. Bogging moves ashore.

Vegetation of Shamprili peat-bog is dominated by *Cariceta inflatae* and *Cariceta irriguae*. *Scheuchzerieta palustrae* and *Caricetum canescenti* *sphagnosum* are also represented on a relatively small areas. *Sphagnum subsecundum* and *Sph. Teres* are dominant in moss synusia; relatively low abundance of *Drepanocladus fluitans* is observed in *Sphagnum* cover, while rarely it is dominant in moss synusia of some association (*Caricetum inflatae* *drepanocladiosum*, *Scheuchzerietum palustrae* *drepanocladiosum*). Associations of *Scheuchzerieta palustrae* are mostly developed in the middle of marshes.

To the West of the described bog, at about 1900 m elevation, there is a quite large peat-bog, which is known as Dombailara. It is developed at the sources of Lakhamista River, which is the right tributary of Chubrula River. The area is surrounded by fir forest. Birch, Mountain Maple, Alder and two species of willow grow on the shores and in the bogs. Dombailara peat-bog is developed on the terrain generated from old glacier, apparently as a result of waterlogging moraine lakes. Its surface is separated by small streams, which form large plots. Different complexes of sedge – sphagnum are developed on them. For instance, *Sphagnetum*

caricosum lasiocarpae and Sphagnetum caricosum limosae are developed on one isolated plot of the bog. Fragments of Caricetum canescenti calliergonosum are also found. *Sphagnum angustifolium* and *Sph. Magellanicum* dominate in moss synusia of sphagnums. First type of sphagnum dominates on relatively aqueous peat, while the second type – on surfaces that are less saturated with water. Other mosses are also represented, but they have subordinate significance. Sphagneta caricosa dominate on the second part of peat-bog. In vegetation synusia of this association dominate *Carex inflata*, *C. canescens*, *C. irrigua*, *C. limosa*, *C. Dacica*, while in moss synusia - *Sphagnum angustifolium* and *Sph. subsecundum* or rarely *Sphagnum magellanicum* and *Sph. amblyphyllum*. Other types of moss are also found. Sphagnetum molinoso-caricosum is developed on the third isolated plot, which covers the smallest area and in which the moss cover is developed by above mentioned species, while grass synusia is dominated by *Carex irrigua*, *Eriophorum vaginatum*, *Potentilla erecta*, *Nardus glabriculumis*, etc. Caricetum dacicae purum, Caricetum dacicae calliergonosum and Caricetum dacicae sphagnosum, as well as fragments of Sphagnetum caricosum are developed on the fourth plot of the wetland, which is about a fifth of the entire area of the array. This section of Dombailara is mainly covered by complex of eutrophic associations, while the rest part of the wetland – by meso-oligotrophic types of plants.

Dombailara wetland vegetation is developed on a deep peat layer, the organogenic part of which is formed by remains of moss and sedge. Development of wetland is at meso-trophic stage. Sphagnetum caricoso-nardosum is developed on a relatively small area of land, in above mentioned complex of Sedge - Sphagnum. It covers peat bog with most elevated surface. At the final stage of the development of the peat-bogs, most frequently are developed different types of Moor Matgrasses and relatively rarely – Rhododendrons. Fragments of Rhododendrons are represented in some places and occupies an elevated micro relief.

Peat-bogs are far less common in Nakra River basin. Eutrophic wetlands fed by soil are mostly found there. Wetlands in this basin are mainly found watershed ridge of Nenskra and Nakra Rivers (Utviri Mountain pass). The sedge bogs fed by soil are found in the lower part of the watershed ridge, on the right side of Nakra Valley, at about 1600-2000 m a.s.l. this bogs are mainly dominated by Caricetum dacicae purum, Caricetum dacicae hypnosum. There also are some fragments of Caricetum muricatae philonotiosum and Caricetum muricatae sphagnosum. Their moss cover is developed by *Sphagnum squarrosum*, while synusia of herbaceous species is developed by plant species rare to the Caucasus, such as *Primula grandis* and *Cardamine seidlitziana*. Solid peat layers are developed in these bogs, the thickness of which reaches 50-60cm. These bogs are found in the complex of tall Herbaceous and broad-leaf grass meadows.

Different types of wetlands are developed on the left slopes of Nakra River – on Nakra-Maulashi watershed ridge, below the Muhashtobi wetland at 1500 m a.s.l., near Tsaleri village. The name of the surroundings of this wetland is Tsigrani. Potamogetonetum natantis purum is developed in the deepest watery part of this wetland, which is surrounded by Bulrush. Along the shoreline, Blysmetum compressi hypnosum are found together with sedge of previous wetland (Caricetum canescenti hypnosum and Caricetum dacicae ulacomnium). The wetland is fed by mineral springs. That's why there is no Sphagnum on peat surface. There are several eutrophic wetlands in the vicinity, which are fed by mineral springs. Associations of Blysmeta compressi hypnosa and Junceta lampocarpi hypnosa are developed in these wetlands. These types of wetlands are also widespread in Dolara valley, mainly in the vicinity of Mazeri and Guli villages. They are developed on the bottom of the valley or on slightly steep slopes and cover small areas.

Based on phytocoenological content of the vegetation and distribution of major types of vegetation, 11 subzones have been determined within high mountainous region of Svaneti (Kimeridze, 1985). Except the mentioned feature, they more or less differ from each other by composition of flora, as well as by degradation of meadows and soil erosion. The project area is located within the first subzone. Below are some of the features of the first subzone according to the locations and the main indicators of vegetation.

The first subzone is located in the western part of the Caucasus Mountain Range, from Svaneti-Abkhazia ridge to the source of Dolra River. The landscape is dominated by alpine Cranesbills, broad leaf grasses and polydominant forb meadows. Mat-grass is developed on a relatively soft terrain and Rhododendrons - on sloping terrain. Eutrophic and meso-oligotrophic boges are developed in some areas with inclusions of *Scheuchzeria palustris*. One of this type of bog was first described by Dolukhanov (1941), and then by Kimeridze (1964). Sphagnum mosses and the specific wetland mosses are most abundant in this micro-zone.

Floristically rich Colchis subalpine tall herbaceous species are developed within the Nenskra and Nakra valleys. Many new species of plants existing in these basins have been described by Sommer and Levier (1900). A rare Colchis and Caucasian species, such as *Cirsium albuvianum*, *Angelica tatianae*, *Lilium keselringianum*, etc., are observed in these valleys.

Subnival zone is represented on high ridges and peaks above 3200 m elevation. Vegetation cover is represented by open cenoses, fragments of alpine meadows can be also found. Vegetation of the Svaneti Caucasus, from Dolra valley to Tetnuldi, is dominated by rare subnival species to Svaneti - *Delphinium caucasicum*, *Pseudovesicaria digitata* and others (Kimeridze, 1985). Botanical-geographical region of Nenskra-Nakra is characterized by western Caucasus specie - *Jurinea pumila* and Caucasus – Asia specie - *Coluteocarpus vesicaria*.

### **3. DETAILED DESCRIPTION OF FLORA AND VEGETATION OF NENSKRA AND NAKRA VALLEYS (ADDITIONAL SURVEY, 2015)**

The detailed botanical additional survey was carried out within Nenskra HPP project expanded corridor in Nenskra and Nakra Valleys in 2015. As a result of this survey there were identified expected negative and residual impacts on flora and vegetation within the project corridor and adjacent areas during project construction and operation phases along with various conservation value (Red List, endemic, rare) plant species distributed within the project impact area, including the economically valuable plants. Detailed description of the phytocoenosis in the Project impact area is provided below.

#### **Methodology/Flora and Vegetation Survey**

During the Botanical Survey vegetation occurrence/coverage was assessed according to Drude's scale. Symbols of Drude's scale indicate frequency of occurrence/coverage of a species. The symbols are as follows: Soc (socialis) – the dominant species, frequency of occurrence/coverage exceeds 90%; Cop<sup>3</sup> (coptosal) – an abundant species, frequency of occurrence/coverage 70-90%; Cop<sup>2</sup> – a species is represented by numerous individuals, frequency of occurrence/coverage 50-70%; Cop<sup>1</sup> – frequency of occurrence/coverage 50-70%; Sp<sup>3</sup> (sporsal) – frequency of occurrence/coverage about 30%; Sp<sup>2</sup> (sporsal) – frequency

of occurrence/coverage about 20%; Sp<sup>1</sup> (sporsal) – frequency of occurrence/coverage about 10%; Sol (solitarie) – scanty individuals, frequency of occurrence/coverage about to 10%; Un (unicum) – a single individual.

**Data collection**

The approach suggests collection of quantitative data on plant communities. The investigation will be carried out using methods of plot recording. For this purpose three 1m<sup>2</sup> plots will be chosen within each population of high conservation value herbaceous species. In case of shrubs, trees or other life forms different sizes of plots will be used. The sizes of plots are shown in the Table 3 according to R. Tüxen, (1970):

**Table 3. Area (m<sup>2</sup>) of Permanent Plots for Different Habitats**

N	Size (m <sup>2</sup> )	Habitat type
1	1	Meadows
2	4	Wetland
3	25	Scrub
4	100	Forest

Preference is given to the square shape of the recording plots. GPS (Global Positioning System) co-ordinates of each plot will be recorded. For the purpose of delimitation of plot surfaces, frame and tape are used for 1m<sup>2</sup> plots. The time of inventory/assessment will be coincided to two phenological phases in each population at flowering and fruiting stages. For each plot, photos will be taken from fixed points during each visit. The following table is developed for recording the data for each recording plot (Table 4, 5, 6,7):

**Table 4: Data on species inventory in Forest vegetation**

<b>Plant community type</b>	
<b>Conservation value</b>	
Area	
Plot №	
Plot size (m <sup>2</sup> )	
GPS Co-ordinates	
Altitude (m AMSL)	
Aspect	
Inclination	
<b>Structural Features</b>	
Max DBH (cm)	
Average DBH (cm)	
Max height of trees (m)	
Average height (m)	
Number of trees (per plot)	
Coverage of treelayer (%)	
Coverage of shrublayer (%)	
Coverage of herblayer (%)	
Coverage of mosslayer (%)	
Number of higher plant species	
Number of moss species	
<b>Species</b>	<b>Cover-abundance by Drude scale</b>
<b>Treelayer</b>	

<b>Shrublayer</b>	
<b>Herblayer</b>	
<b>Mosslayer</b>	

**Table 5: Data on species inventory in Meadows and Wetland vegetation**

<b>Plant community type</b>	
<b>Conservation value</b>	
Area	
Plot №	
Plot size (m <sup>2</sup> )	
GPS Co-ordinates	
Altitude (m AMSL)	
Aspect	
Inclination	
<b>Structural Features</b>	
Coverage of herblayer (%)	
Coverage of mosslayer (%)	
Number of higher plant species	
Number of moss species	
<b>Species</b>	<b>Cover-abundance by Drude scale</b>
<b>Herblayer</b>	
<b>Mosslayer</b>	

**Table 6: Data on species inventory in Shrubland**

<b>Plant community type</b>	
<b>Conservation value</b>	
Area	
Plot №	
Plot size (m <sup>2</sup> )	
GPS Co-ordinates	
Altitude (m AMSL)	

Aspect	
Inclination	
<b>Structural Features</b>	
Height of shrublayer (m)	
Coverage of shrublayer (%)	
Coverage of herblayer (%)	
Coverage of mosslayer (%)	
Number of higher plant species	
Number of moss species	
<b>Species</b>	<b>Cover-abundance by Drude scale</b>
<b>Shrublayer</b>	
<b>Herblayer</b>	
<b>Mosslayer</b>	

**Table 7: Example Detailed vegetation survey form**

<b>GPS location:</b>	Date:	Sample number:	Height a.s.l.
<p><b>Community Type:</b>  Maximum height of trees (m)..... Average height of trees (m)..... Average age of trees.....years  Coverage of tree layers (%)..... Coverage of shrub layer (%)..... Ground flora cover (%).....</p> <p><b>General description and notes:</b></p>			
<b>No</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation value: low / medium / high</b>
1			Give reason for conservation value:
2			
3			Photograph number/reference:
4			Polygon drawn on map: Yes/No
5			<b>Human activity present (e.g. logging, grazing): Yes / no</b>
6			Domin Scale: This is a system for recording vegetation is a simple scale numbered 1 – 10. It is easy for the reader to understand and has been published:
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			

			<b>Domin value</b>	<b>Cover-abundance</b>
			10	91-100%
			9	76-90%
			8	51-75%
			7	34-50%
			6	26-33%
			5	11-25%
			4	4-10%
			3	<4% frequent
			2	<4% occasional
			1	<4% rare
19				

During the field studies, the following data have to be collected:

1. Data for documentation of the record: target species name, plot No., population no., figure(s), ref. Map, date of field data collection. Majority of plant Latin names given in report will be in accordance with Cherepanov (1995) and II edition of Flora of Georgia; nomenclature of representatives of family Orchidaceae will follow Akhalkatsi et al. (2003).

2. Environmental data:

- Size (m<sup>2</sup>) of entire population of target species;
- Total number of individuals of target species in the plot;
- Location, exact GPS coordinates, altitude and sloping characters (inclination, exposition);
- Vegetation cDifferent regions of (%) and canopy height (cm);
- Habitat type and description of existing disturbances.

The following grades will be used to identify level of modification/disturbance of communities found within the plots:

- Relatively stable or undisturbed communities. Example: old growth, ungrazed forest.
- Late successional or lightly disturbed communities. Example: old growth forest that was selectively logged in recent years.
- Mid-successional or moderately to heavily disturbed communities. Example: young to mature secondgrowth forest.
- Early successional or severely disturbed communities. Example: severely grazed forest of any age.
- Very early successional or very severely disturbed communities. Example: cropland.

### Methodology of the Sensitivity Assessment for the Floral and Vegetation Receptors

The criteria recommended by Morris&Therivel ( 1995) were used when assessing the importance of various plant communities (refer to Table 5):

Table 5: Summery of criteria recommended by Morris&Therivel

Criterion	High	Medium	Low
Species richness	High species richness noted or likely to occur. Endemic or threatened species included in the Georgian Red Data Book and/or IUCN Red List recorded or likely to be present	Medium species diversity. Few rare or threatened species	Low species diversity and almost no threatened species that may be affected
Naturalness and level of modification	Natural or slightly modified habitats	Moderately modified habitats e.g. those which can still support characteristic species assemblages	Heavily modified habitats
Human disturbance	Very little or no human disturbance	Little human disturbance	High human disturbance (grazing, forest felling, etc.)
Rarity and	Rare or endangered	Not so common	Nationally common

<b>Criterion</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>
geographical location of habitat	habitat in the country or region.	habitat in the region	habitat

The habitat classification of Georgia which is provided for Nenskra and Nakra Valleys habitat assessment is based on the Interpretation Manual of European Union Habitats - EUR27. The "Habitats" Directive (Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, O.J. L206) is a Community legislative instrument in the field of nature conservation that establishes a common framework for the conservation of wild animal and plant species and natural habitats of Community importance; it provides for the creation of a network of special areas of conservation, called Natura 2000, to "maintain and restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest". The Directive is developed on the bases of CORINE biotope classification (1989, 1991) determining codes and habitat types of Europe, in particular involving the division of the latter into sub-types. To avoid the difficulties of classification of the habitat types in different countries the Scientific Working Group, set up by the Habitats Committee (established by Directive 92/43/EEC), expressed in May 1992 the need to prepare a manual for the interpretation of Annex I including habitat type classification. The results of the commission work were development of the two following points with the national experts:

- (1) The interpretation work on Annex I should primarily focus on the priority habitat types.
- (2) The CORINE classification (1991 version) provides a basis for a description of the Annex I habitat types; where the experts feel that it is not suitable, an operational scientific description should be produced from the contributions of the national experts.

The aim to develop habitat classification in countries of European continent based on the standards of the EUR27 version of the Interpretation Manual includes descriptions of new habitats, which are characteristics to concrete countries. These new habitat types should be accepted by the Commission and to be added to Annex I.

Georgia is a country hosting highly diverse habitat types. Some of those are identical to the habitats, which are already included in the Annex I of the Interpretation Manual v. EUR27. Others, such as Kolkheti broad-leaved mixed forest, dry open woodland, sub-alpine tall herbaceous vegetation, sub-alpine birch krummholz or Caucasian rhododendron shrubbery, should potentially be included in the Annex I as additional habitat types.

According to Interpretation Manual habitat classification is based on plant community types. Georgian vegetation is well studied by Georgian botanists (Grossheim et al., 1928; Ketskhovali, 1959; Kimeridze, 1965, 1966; Dolukhanov, 1989; Nakhutsrishvili, 1999, Kvachakidze, 2009).

## **The Nakra Valley**

### **Plot 1. Spruce-Hornbeam Forest**

<b>Plant Community Type</b>	<b>Spruce-Hornbeam Forest</b>
<b>Conservation Value</b>	<b>High</b>
Location	Right hand bank of the Nakra River, confluence of the Nakra and Inguri Rivers
Site No	1
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0286237/4770322
Altitude (m AMSL)	1031
Aspect	East
Inclination	35 <sup>0</sup>
<b>Community Structural Features</b>	

Max DBH (cm)	30
Average DBH (cm)	16
Max height of the tree (m)	16
Average height of the tree (m)	10
Number of trees on sample area	10-12
Coverage of treelayer (%)	80-85
Coverage of shrublayer (%)	30-35
Height of shrublayer (cm)	400
Coverage of herblayer (%)	20-25
Height of herblayer (cm)	40
Coverage of mosslayer (%)	5-7 (7-8 species)
Number of higher plant species	21
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Carpinus caucasica	D-30 cm, H-8m, 100 year Sol
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-16-18 cm, H-8-10m, 30-40 year Sol
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-24 cm, H-14-16m, 80 year Sol
Pinus kochiana	D-14-16 cm, H-10m, 15-20 year Sol
Tilia begoniifolia, Fagus orientalis, Castanea sativa-Georgian Red List Species (VU), Taxus baccata-Georgian Red List Species (VU), Quercus iberica-young trees (rare species)	Sol
<b>Shruberry</b>	
Ilex colchica- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor	H-3-4m Sp <sup>3</sup>
Euonymus europaea	Sp <sup>1</sup>
Rubus sp.	Sp <sup>2</sup>
Viburnum orientalis	Sp <sup>1</sup>
<b>Herblayer</b>	
Festuca drimeja	Sp <sup>2</sup>
Primula macrocalyx	Sp <sup>1</sup>
Sanicula europaea	Sp <sup>1</sup>
Oxalis acetosella	Sp <sup>1</sup>
Polystichum braunii	Sol
Polygonatum polyanthemum	Sol
Viola alba	Sol
Asplenium trichomanes	Sol
<b>Mosslayer</b>	
Moss species	Sol

<b>GPS Coordinates:</b> 0286237/4770322	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 1	<b>Height a.s.l.</b> 1031
<b>Community Type: Spruce-Hornbeam Forest</b> Maximum height of trees (m) 16; Average height of trees (m) 10; Average age of trees: 80 year. Coverage of tree layers (%) 85; Coverage of shrub layer (%) 35; Ground flora cover (%) 90.			
<b>General description and notes:</b> <b>Plant community:</b> Beech forest with the understory ( <i>Fageta illicitoso-laurocerasosa</i> ) of holly ( <i>Ilex colchica</i> ) and laurel ( <i>Laurocerasus officinalis</i> ) can be found on limestone mountains in Abkhasia and Samegrelo – on mountain massives of Kvira, Migaria and Askhi.			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: High</b>
1	Carpinus caucasica	4	<b>Giver reason for conservation value:</b> Phytocenosis with Colchic elements (characteristics of phytocenosis)
2	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	3	

3	<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	2	<b>Photograph number/reference: CIMG9860. <i>Viburnum orientalis</i>; CIMG9861. <i>Ilex colchica</i>; CIMG9862. <i>Abies nordmanniana</i>; CIMG9863. <i>Ilex colchica</i>; CIMG9864. <i>Taxus baccata</i>; CIMG9865. Spruce-Hornbeam Forest.</b> <b>Polygon drawn on map: Yes</b> <b>Human activity present (e.g. logging, grazing):</b> Logging <b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>91-100%</td> </tr> <tr> <td>9</td> <td>76-90%</td> </tr> <tr> <td>8</td> <td>51-75%</td> </tr> <tr> <td>7</td> <td>34-50%</td> </tr> <tr> <td>6</td> <td>26-33%</td> </tr> <tr> <td>5</td> <td>11-25%</td> </tr> <tr> <td>4</td> <td>4-10%</td> </tr> <tr> <td>3</td> <td>&lt;4% frequent</td> </tr> <tr> <td>2</td> <td>&lt;4% occasional</td> </tr> <tr> <td>1</td> <td>&lt;4% rare</td> </tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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2	<4% occasional																								
1	<4% rare																								
4	<i>Pinus kochiana</i>	2																							
5	<i>Tilia begoniifolia</i>	1																							
6	<i>Fagus orientalis</i>	1																							
7	<i>Castanea sativa</i> -Georgian Red List Species (VU)	1																							
8	<i>Taxus baccata</i> -Georgian Red List Species (VU)	1																							
9	<i>Quercus iberica</i> - rare plant species	1																							
10	<i>Ilex colchica</i> - tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor	6																							
11	<i>Euonymus europaea</i>	4																							
12	<i>Rubus</i> sp.	5																							
13	<i>Viburnum orientalis</i>	4																							
14	<i>Festuca drimeja</i>	5																							
15	<i>Primula macrocalyx</i>	4																							
16	<i>Sanicula europaea</i>	4																							
17	<i>Oxalis acetosella</i>	4																							
18	<i>Polystichum braunii</i>	2																							
19	<i>Polygonatum polyanthemum</i>	2																							
20	<i>Viola alba</i>	2																							
21	<i>Asplenium trichomanes</i>	2																							

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-02** Beech forest with the understory (*Fageta illicito-laurocerasosa*) of holly (*Ilex colchica*).



Plot 1. CIMG9860. *Viburnum orientalis*



Plot 1. CIMG9861. *Ilex colchica*



**Plot 1. CIMG9862. *Abies nordmanniana***



**Plot 1. CIMG9863. *Ilex colchica***



**Plot 1. CIMG9864. *Taxus baccata***



**Plot 1. CIMG9865. Spruce-Hornbeam Forest**

**Plot 2. Beech forest**

<b>Plant Community Type</b>	<b>Beech forest</b>
<b>Conservation Value</b>	<b>Medium</b>
Location	Right hand bank of the Nakra River, village Nakra
Site No	2
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0286770/4772467
Altitude (m AMSL)	1143
Aspect	East
Inclination	20-25 <sup>0</sup>
<b>Community Structural Features</b>	
Max Average DBH (cm)	50
Average DBH (cm)	32
Max height of the tree (m)	24
Average height of the tree (m)	20
Number of trees on sample area	8-9
Coverage of treelayer (%)	90
Coverage of shrublayer (%)	1-3
Height of shrublayer (cm)	60
Coverage of herblayer (%)	5-7
Height of herblayer (cm)	50
Coverage of mosslayer (%)	3-5
Number of higher plant species	7
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	

Fagus orientalis	D-50 cm, H-22-24m (maximum), 90-110 year D-28-32 cm, H-18-20m (average), 60-65 year Cop <sup>3</sup>
<b>Shruberry</b>	
Rhododendron luteum	H-60cm, Sol
<b>Herblayer</b>	
Dryopteris filix-mas	H-40-50cm Sol
Vicia erocea	Sol
Viola alba	Sol
Sanicula europaea	Sol
Cephalanthera rubra-CITES	Unicum
<b>Mosslayer</b>	
Moss species	Sol

<b>GPS Coordinates:</b> 0286770/4772467	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 2	<b>Height a.s.l.</b> 1143																						
<p><b>Community Type: Beech forest</b> Maximum height of trees (m) 24; Average height of trees (m) 20; Average age of trees: 70 year. Coverage of tree layers (%) 90; Coverage of shrub layer (%) 3; Ground flora cover (%) 20-30.</p> <p><b>General description and notes:</b> <b>Plant community:</b> Beech forest with the azalea (<i>Fageta azaleosa media</i>) understory of the middle zone of the forest is common in mountain massifs of west Georgia with the average annual precipitation of 800-1500 mm. Characteristic landscape is the southern slope with the embossed relief of average inclination. Hornbeam, Georgian oak and Caucasian maple (<i>Acer velutinum</i>) are mixed with the beech. Species of the lower layer are: <i>Festuca drymeja</i>, <i>Rubus</i> spp., <i>Vicia crocea</i>, <i>Trachystemon orientalis</i>.</p>																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>																						
1	Fagus orientalis	9	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis, Red Helleborine ( <i>Cephalanthera rubra</i> )																						
2	Rhododendron luteum	2																							
3	Dryopteris filix-mas	2	<b>Photograph number/reference:</b> CIMG9866. <i>Cephalanthera rubra</i> ; CIMG9867. Beech forest; CIMG9868. Beech forest.																						
4	Vicia erocea	2	<b>Polygon drawn on map:</b> Yes																						
5	Viola alba	2	<b>Human activity present (e.g. logging, grazing):</b> Grazing, logging																						
6	Sanicula europaea	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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1	<4% rare																								
7	Cephalanthera rubra-CITES	1																							
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**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE -05** Beech forest with azalea (*Rhododendron luteum*) understory (*Fageta azaleoza*)



Plot 2. CIMG9866. *Cephalanthera rubra*



Plot 2. CIMG9867. Beech forest



Plot 2. CIMG9868. Beech forest

**Plot 3. Beech forest with chestnut, hornbeam and oak admixture**

Plant Community Type	Beech forest with chestnut, hornbeam and oak admixture
Conservation Value	Medium
Location	Right hand bank of the Nakra River, village Nakra
Site No	3
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0286987/4773147
Altitude (m AMSL)	1197
Aspect	East
Inclination	20-25 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	100
Average DBH (cm)	50
Max height of the tree (m)	26
Average height of the tree (m)	18
Number of trees on sample area	5-6
Coverage of treelayer (%)	50-60
Coverage of shrublayer (%)	–
Height of shrublayer (cm)	–
Coverage of herblayer (%)	15-20
Height of herblayer (cm)	150
Coverage of mosslayer (%)	5-7 (3-4 species)
Number of higher plant species	15
Species	Cover-Abundance by Drude Scale

Treelayer	
Fagus orientalis	D-100 cm, H-24-26m (maximum), 170 year D-50 cm, H-20-22m, 130 year Cop <sup>3</sup>
Castanea sativa-Georgian Red List Species (VU)	D-44 cm, H-18-20m, 90-100 year Sp <sup>1</sup>
Carpinus caucasica	D-100 cm, H-8-10m, 130 year Sp <sup>1</sup>
Quercus iberica - rare plant species	D-40-44 cm, H-18-20m, 100-120 year Sp <sup>1</sup>
Acer campestre	D-30-32 cm, H-14-16m, 70-80 year Sol
Fraxinus excelsior	D-28-30 cm, H-16-18m, 40-45 year Sol
Shruberry	
Shruberry species not found	-
Herblayer	
Senecio pojarkovae - endemic to Caucasus	H-1,5m, Sp <sup>1</sup>
Salvia glutinosa	Sol
Sanicula europaea	Sol
Sambucus ebulus	Sol
Calystegia silvatica	Sol
Circaea lutetiana	Sol
Euphorbia macroceras - endemic to Caucasus	Sol
Helleborus caucasicus - endemic to Caucasus	Sol
Clinopodium umbrosum	Sol
Mosslayer	
Moss species	Sol

<b>GPS Coordinates:</b> 0286987/4773147	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 3	<b>Height a.s.l.</b> 1197		
<p><b>Community Type: Beech forest with chestnut, hornbeam and oak admixture</b>  Maximum height of trees (m) 26; Average height of trees (m) 18; Average age of trees: 80 year.  Coverage of tree layers (%) 60; Coverage of shrub layer (%) ---; Ground flora cover (%) 30-35.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> The existence of the dense understory differentiates the beech forest of Georgia from the one in the rest of Europe. The beech forest with the Colchic understory is the composing part of the eco-region of Colchic mixed broad leaved forest. It is widespread in west Georgia on Northernwestern slopes of Great Caucasus and the Ajara-Imereti Ridge. The climate is moist with about 2500 mm of annual precipitation. In South Colchic forests of this type start from the sea coast. In the Northern part it does so at the 200 meters a.s.l. and reaches about 2250 meters. As a result, the type of vegetation significantly differs. There are several sub-types. Sometimes sub-types are mixed with each other, which makes their classification difficult.</p>					
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>		
1	Fagus orientalis	8	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis		
2	Castanea sativa-Georgian Red List Species (VU)	4			
3	Carpinus caucasica	4	<b>Photograph number/reference: CIMG9869. Castanea sativa; CIMG9870.</b> Beech forest with chestnut, hornbeam and oak admixture.		
4	Quercus iberica - rare plant species	4	<b>Polygon drawn on map:</b> Yes		
5	Acer campestre	2	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing		
6	Fraxinus excelsior	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"><tr><td><b>Domin value</b></td><td><b>Cover-abundance</b></td></tr></table>	<b>Domin value</b>	<b>Cover-abundance</b>
<b>Domin value</b>	<b>Cover-abundance</b>				
7	Senecio pojarkovae - endemic to Caucasus	4			
8	Salvia glutinosa	2			

9	Sanicula europaea	2	10	91-100%
10	Sambucus ebulus	2	9	76-90%
11	Calystegia silvatica	2	8	51-75%
12	Circaea lutetiana	2	7	34-50%
13	Euphorbia macroceras - endemic to Caucasus	2	6	26-33%
14	Helleborus caucasicus - endemic to Caucasus	2	5	11-25%
15	Clinopodium umbrosum	2	4	4-10%
16			3	<4% frequent
17			2	<4% occasional
18			1	<4% rare
19				

**Habitat Type: 91FC-GE\*** Georgian code: Beech forest with Colchic understory (*Fageta fruticosa colchica*)

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)



**Plot 3. CIMG9869.** *Castanea sativa*



**Plot 3. CIMG9870.** Beech forest with chestnut, hornbeam and oak admixture

**Plot 4. Alder-beech forest**

<b>Plant Community Type</b>	<b>Alder-beech forest</b>
<b>Conservation Value</b>	<b>Low</b>
Location	Left hand bank of the Nakra River
Site No	4
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0287393/4774930
Altitude (m AMSL)	1265
Aspect	West
Inclination	20-25 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	90
Average DBH (cm)	40
Max height of the tree (m)	28
Average height of the tree (m)	20
Number of trees on sample area	3-4
Coverage of treelayer (%)	50-60
Coverage of shrublayer (%)	3-5
Height of shrublayer (cm)	700
Coverage of herblayer (%)	30-35

Height of herblayer (cm)	40
Coverage of mosslayer (%)	20-25 (8-9 species)
Number of higher plant species	20
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Fagus orientalis	D-1,5m, H-26-28m (maximum), 190 year D-70-80cm, H-24-26m (average), 140 year Cop <sup>2</sup>
Alnus barbata	D-40-44cm, H-20-22m (maximum), 60 year D-30cm, H-16-18m (average), 50 year Sp <sup>1</sup>
Acer platanoides	D-80-90cm, H-24-26m, 150 year Sol
<b>Shruberry</b>	
Rubus sp.	Sol
Corylus avellana	H-6-7m Sol
<b>Herblayer</b>	
Dryopteris filix-mas	Sp <sup>3</sup>
Athyrium filix-femina	Sp <sup>3</sup>
Asperula odorata	Sp <sup>2</sup>
Cicerbitaa petiolata	Sol
Tamus communis	Sol
Geranium robertianum	Sp <sup>1</sup>
Viola alba	Sp <sup>1</sup>
Sanicula europaea	Sp <sup>1</sup>
Polygonatum polyanthemum	Sol
Symphytum asperum	Sol
Salvia glutinosa	Sol
Brachypodium silvaticum	Sp <sup>1</sup>
Galeopsis sp.	Sol
Euphorbia macroceras - endemic to Caucasus	Sol
Inula magnifica	Unicum
<b>Mosslayer</b>	
Moss species	Sp <sup>3</sup>

<b>GPS Coordinates:</b> 0287393/4774930	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 4	<b>Height a.s.l.</b> 1265
<p><b>Community Type: Alder-beech forest</b>  Maximum height of trees (m) 28; Average height of trees (m) 20; Average age of trees: 100 year.  Coverage of tree layers (%) 60; Coverage of shrub layer (%) 5; Ground flora cover (%) 20-25.</p> <p><b>General description and notes:</b></p>			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>
1	Fagus orientalis	8	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis
2	Alnus barbata	4	
3	Acer platanoides	2	<b>Photograph number/reference:</b> CIMG9873. <i>Inula magnifica</i> ; CIMG9874. Alder-beech forest; CIMG9875. Alder-beech forest; CIMG9876. <i>Tamus communis</i> ; CIMG9877. Alder-beech forest; CIMG9878. <i>Euphorbia macroceras</i> .
4	Rubus sp.	2	<b>Polygon drawn on map:</b> Yes
5	Corylus avellana	2	<b>Human activity present (e.g. logging, grazing):</b> Logging
6	Dryopteris filix-mas	6	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.
7	Athyrium filix-femina	6	

8	<i>Asperula odorata</i>	5	Domin value	Cover-abundance
9	<i>Cicerbitaa petiolata</i>	2		
10	<i>Tamus communis</i>	2	10	91-100%
11	<i>Geranium robertianum</i>	4	9	76-90%
12	<i>Viola alba</i>	4	8	51-75%
13	<i>Sanicula europaea</i>	4	7	34-50%
14	<i>Polygonatum polyanthemum</i>	2	6	26-33%
15	<i>Symphytum asperum</i>	2	5	11-25%
16	<i>Salvia glutinosa</i>	2	4	4-10%
17	<i>Brachypodium silvaticum</i>	4	3	<4% frequent
18	<i>Galeopsis sp.</i>	2	2	<4% occasional
19	<i>Euphorbia macroceras</i> - endemic to Caucasus	2	1	<4% rare
20	<i>Inula magnifica</i>	1		

**Habitats:** 9BCGE\* Code of Georgia: Colchic relic broad-leaved mixed forest

**Habitat sub-type:** 9BC-GE-04 Beech – alder -chestnut-hornbeam forest (*Alnus barbata* - *Carpinus betulus* – *Fagus orientalis* - *Castanea sativa*) can be found in moist, slightly inclined locations of the northern slope.



Plot 4. CIMG9873. *Inula magnifica*



Plot 4. CIMG9874. Alder-beech forest



Plot 4. CIMG9875. Alder-beech forest



Plot 4. CIMG9876. *Tamus communis*



Plot 4. CIMG9877. Alder-beech forest



Plot 4. CIMG9878. *Euphorbia macroceras*

### Plot 5. Spruce-fir-tree forest

Plant Community Type	Spruce-fir-tree forest
Conservation Value	Low
Location	Left hand bank of the Nakra River
Site No	5
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0288335/4776749
Altitude (m AMSL)	1468
Aspect	South-East
Inclination	10 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	32
Average DBH (cm)	28
Max height of the tree (m)	25
Average height of the tree (m)	20
Number of trees on sample area	10-12
Coverage of treelayer (%)	85-90
Coverage of shrublayer (%)	15-20
Height of shrublayer (cm)	500
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	40
Coverage of mosslayer (%)	5-10 (6-7 species)
Number of higher plant species	17
Species	Cover-Abundance by Drude Scale
Treelayer	
<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	D-32cm, H-25m (maximum), 70 year D-18cm, H-20m (average), 60 year Cop <sup>3</sup>
<i>Picea orientalis</i> -sub-endemic for the Caucasus, irradiated to Asia Minor	D-30cm, H-20-22m (maximum), 50-60 year D-16-18cm, H-18m (average), 60-65 year Cop <sup>2</sup>
Shruberry	
<i>Euonymus latifolia</i>	H-30cm Sol
<i>Rubus idaeus</i>	Sol
<i>Rubus</i> sp.	Sp <sup>2</sup>
<i>Corylus avellana</i>	H-4-5m Sol
Herblayer	
<i>Oxalis acetosella</i>	Sp <sup>1</sup>
<i>Geranium robertianum</i>	Sol
<i>Actaea spicata</i>	Sol
<i>Asperula odorata</i>	Sol

Salvia glutinosa	Sol
Dryopteris austriaca	Sol
Dryopteris filix-mas	H-40cm Sol
Tamus communis	Sol
Polygonatum polyanthemum	Sol
Fragaria vesca	Sol
Festuca drimeja	Sol
<b>Mosslayer</b>	
Moss species	Sp <sup>1</sup>

<b>GPS Coordinates:</b> 0288335/4776749	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 5	<b>Height a.s.l.</b> 1468
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**Community Type: Spruce-fir-tree forest**

Maximum height of trees (m) 25; Average height of trees (m) 20; Average age of trees: 60 year.  
Coverage of tree layers (%) 90; Coverage of shrub layer (%) 20; Ground flora cover (%) 30-35.

**General description and notes:**

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

#	Species	Domin	Conservation Value: Low																						
1	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	9	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	8																							
3	Euonymus latifolia	2	<b>Photograph number/reference:</b> CIMG9879. <i>Actaea spicata</i> ; CIMG9881. Spruce-fir-tree forest																						
4	Rubus idaeus	2	<b>Polygon drawn on map:</b> Yes																						
5	Rubus sp.	5	<b>Human activity present (e.g. logging, grazing):</b> Logging																						
6	Corylus avellana	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>91-100%</td> </tr> <tr> <td>9</td> <td>76-90%</td> </tr> <tr> <td>8</td> <td>51-75%</td> </tr> <tr> <td>7</td> <td>34-50%</td> </tr> <tr> <td>6</td> <td>26-33%</td> </tr> <tr> <td>5</td> <td>11-25%</td> </tr> <tr> <td>4</td> <td>4-10%</td> </tr> <tr> <td>3</td> <td>&lt;4% frequent</td> </tr> <tr> <td>2</td> <td>&lt;4% occasional</td> </tr> <tr> <td>1</td> <td>&lt;4% rare</td> </tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
Domin value	Cover-abundance																								
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2	<4% occasional																								
1	<4% rare																								
7	Oxalis acetosella	4																							
8	Geranium robertianum	2																							
9	Actaea spicata	2																							
10	Asperula odorata	2																							
11	Salvia glutinosa	2																							
12	Dryopteris austriaca	2																							
13	Dryopteris filix-mas	2																							
14	Tamus communis	2																							
15	Polygonatum polyanthemum	2																							
16	Fragaria vesca	2																							
17	Festuca drimeja	2																							
18																									
19																									

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



Plot 5. CIMG9879. *Actaea spicata*



Plot 5. CIMG9881. Spruce-fir-tree forest

### Plot 6. Young alder-willow forest on alluvial fan

Plant Community Type	Young alder-willow forest on alluvial fan
Conservation Value	Low
Location	Left hand bank of the Nakra River (upstream camp)
Site No	6
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0288664/4778475
Altitude (m AMSL)	1580
Aspect	West
Inclination	5-10 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	5
Average DBH (cm)	4
Max height of the tree (m)	8
Average height of the tree (m)	7
Number of trees on sample area	40-50
Coverage of treelayer (%)	40-50
Coverage of shrublayer (%)	–
Height of shrublayer (cm)	–
Coverage of herblayer (%)	60-70
Height of herblayer (cm)	200
Coverage of mosslayer (%)	5-10 (4-5 species)
Number of higher plant species	24
Species	Cover-Abundance by Drude Scale
Treelayer	
<i>Alnus barbata</i>	D-4-5cm, H-7-8m, 10 year Cop <sup>1</sup>
<i>Alnus incana</i>	D-4-5cm, H-7-8m, 10 year Cop <sup>1</sup>
<i>Salix caprea</i>	D-4-5cm, H-7-8m, 5-7 year Sp <sup>2</sup>
Shruberry	
Shruberry species not found	–
Herblayer	
<i>Sambucus ebulus</i>	H-2m, Cop <sup>1</sup>
<i>Senecio pojarkovae</i> - endemic to Caucasus	Sp <sup>3</sup>
<i>Salvia glutinosa</i>	Sp <sup>2</sup>
<i>Fragaria vesca</i>	Sp <sup>2</sup>
<i>Milium effusum</i>	H-1m, Sp <sup>1</sup>
<i>Matteuccia struthiopteris</i>	Sp <sup>1</sup>
<i>Rumex</i> sp.	Sp <sup>1</sup>

Aconitum nasutum	Sol
Euphorbia macroceras - endemic to Caucasus	Sol
Sedum stoloniferum	Sol
Senecio propinquus	Sol
Cuscuta europaea	Sol
Anchusa myosotiflora	Sol
Digitalis ciliata - endemic to Caucasus	Sol
Prunella vulgaris	Sol
Clinopodium umbrosum	Sol
Mentha longifolia	Sol
Geranium sanguineum	Sol
Urtica dioica	Sol
Melandrium sp.	Sol
Colchicum specioum-CITES	Unicum
<b>Mosslayer</b>	
Moss species	Sp <sup>1</sup>

<b>GPS Coordinates:</b> 0288664/4778475	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 6	<b>Height a.s.l.</b> 1580
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**Community Type: Young alder-willow forest on alluvial fan**  
Maximum height of trees (m) 8; Average height of trees (m) 7; Average age of trees: 7 year.  
Coverage of tree layers (%) 50; Coverage of shrub layer (%) ---; Ground flora cover (%) 35-40.

**General description and notes:**

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

#	Species	Domin	Conservation Value: Low																						
1	<i>Alnus barbata</i>	7	<b>Give reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Alnus incana</i>	7																							
3	<i>Salix caprea</i>	5	<b>Photograph number/reference:</b> CIMG9882. <i>Colchicum specioum</i> ; CIMG9884. <i>Colchicum specioum</i> ; CIMG9885. Young alder-willow forest on alluvial fan; CIMG9889. <i>Digitalis ciliata</i> .																						
4	<i>Sambucus ebulus</i>	7	<b>Polygon drawn on map:</b> Yes																						
5	<i>Senecio pojarkovae</i> - endemic to Caucasus	6	<b>Human activity present (e.g. logging, grazing):</b> Grazing																						
6	<i>Salvia glutinosa</i>	5	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
Domin value	Cover-abundance																								
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5	11-25%																								
4	4-10%																								
3	<4% frequent																								
2	<4% occasional																								
1	<4% rare																								
7	<i>Fragaria vesca</i>	5																							
8	<i>Milium effusum</i>	4																							
9	<i>Matteuccia struthiopteris</i>	4																							
10	<i>Rumex</i> sp.	4																							
11	<i>Aconitum nasutum</i>	2																							
12	<i>Euphorbia macroceras</i> - endemic to Caucasus	2																							
13	<i>Sedum stoloniferum</i>	2																							
14	<i>Senecio propinquus</i>	2																							
15	<i>Cuscuta europaea</i>	2																							
16	<i>Anchusa myosotiflora</i>	2																							
17	<i>Digitalis ciliata</i> - endemic to Caucasus	2																							
18	<i>Prunella vulgaris</i>	2																							
19	<i>Clinopodium umbrosum</i>	2																							
20	<i>Mentha longifolia</i>	2																							
21	<i>Geranium sanguineum</i>	2																							
22	<i>Urtica dioica</i>	2																							

23	Melandrium sp.	2	
24	Colchicum specioum-CITES	1	

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 6. CIMG9882.** *Colchicum specioum*



**Plot 6. CIMG9884.** *Colchicum specioum*



**Plot 6. CIMG9885.** Young alder-willow forest on alluvial fan



**Plot 6. CIMG9889.** *Digitalis ciliata*

**Plot 7. Mixed forest (fir-tree-beech forest with spruce admixture)**

Plant Community Type	Mixed forest (fir-tree-beech forest with spruce admixture)
Conservation Value	Low
Location	Right hand bank of the Nakra River
Site No	7
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0288421/4777899
Altitude (m AMSL)	1540
Aspect	East
Inclination	15 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	100
Average DBH (cm)	30
Max height of the tree (m)	28
Average height of the tree (m)	20
Number of trees on sample area	5-6
Coverage of treelayer (%)	50-60
Coverage of shrublayer (%)	3-5
Height of shrublayer (cm)	40
Coverage of herblayer (%)	15-20
Height of herblayer (cm)	60
Coverage of mosslayer (%)	5-10 (4-5 species)
Number of higher plant species	19
Species	Cover-Abundance by Drude Scale
Treelayer	
Fagus orientalis	D-80-100cm, H-26-28m (maximum), 160-170 year D-40-60 cm, H-22-24m (average), 100-110 year Cop <sup>1</sup>
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-34-36cm, H-16-28m (maximum), 70-75 year D-20-30 cm, H-14-16m (average), 55-60 year Sp <sup>3</sup>
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-24cm, H-16-18m (maximum), 55-60 year D-16 cm, H-12-14m (average), 30-35 year Sp <sup>2</sup>
Shruberry	
Rubus sp.	H-40cm Sol
Herblayer	
Salvia glutinosa	Sp <sup>1</sup>
Asperula odorata	Sp <sup>1</sup>
Fragaria vesca	Sp <sup>1</sup>
Lapsana grandiflora	Sol
Oxalis acetosella	Sol
Polygonatum polyanthemum	Sol
Euphorbia macroceras - endemic to Caucasus	H-60cm Sol
Urtica dioica	Sol
Calystegia silvatica	Sol
Symphytum asperum	Sol
Sanicula europaea	Sol
Sedum stoloniferum	Sol
Dryopteris filix-mas	Sol
Athyrium filix -femina	Sol
Geranium robertianum	Sol
Mosslayer	
Moss species	Sp <sup>1</sup>

<b>GPS Coordinates:</b> 0288421/4777899	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 7	<b>Height a.s.l.</b> 1540																						
<b>Community Type: Mixed forest (fir-tree-beech forest with spruce admixture)</b> Maximum height of trees (m) 28; Average height of trees (m) 20; Average age of trees: 70 year. Coverage of tree layers (%) 60; Coverage of shrub layer (%) 5; Ground flora cover (%) 25-30.																									
<b>General description and notes:</b> <b>Plant community:</b> Dark coniferous forest with the understory of Pontic rhododendron ( <i>Piceeta rhododendrosa</i> , <i>Piceeto-Abieta rhododendrosa</i> , <i>Abieta rhododendrosa</i> , <i>Fageto-Abieta rhododendrosa</i> ), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: <i>Trachystemon orientalis</i> , <i>Galium rotundifolium</i> . From ferns the following can be found: <i>Blechnum spicant</i> , <i>Polystichum woronowii</i> . These species are rare: <i>Ruscus colchicus</i> , <i>Rubus hirtus</i> , <i>Hedera colchica</i> .																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>																						
1	<i>Fagus orientalis</i>	7	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	6																							
3	<i>Picea orientalis</i> -sub-endemic for the Caucasus, irradiated to Asia Minor	5	<b>Photograph number/reference:</b> CIMG9892. Mixed forest (fir-tree-beech forest with spruce admixture); CIMG9893. Mixed forest (fir-tree-beech forest with spruce admixture)																						
4	<i>Rubus</i> sp.	2	<b>Polygon drawn on map:</b> Yes																						
5	<i>Salvia glutinosa</i>	4	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	<i>Asperula odorata</i>	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	<i>Fragaria vesca</i>	4																							
8	<i>Lapsana grandiflora</i>	2																							
9	<i>Oxalis acetosella</i>	2																							
10	<i>Polygonatum polyanthemum</i>	2																							
11	<i>Euphorbia macroceras</i> - endemic to Caucasus	2																							
12	<i>Urtica dioica</i>	2																							
13	<i>Calystegia silvatica</i>	2																							
14	<i>Symphytum asperum</i>	2																							
15	<i>Sanicula europaea</i>	2																							
16	<i>Sedum stoloniferum</i>	2																							
17	<i>Dryopteris filix-mas</i>	2																							
18	<i>Athyrium filix-femina</i>	2																							
19	<i>Geranium robertianum</i>	2																							

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



**Plot 7. CIMG9892.** Mixed forest (fir-tree-beech forest with spruce admixture)



**Plot 7. CIMG9893.** Mixed forest (fir-tree-beech forest with spruce admixture)

**Plot 8. Mixed forest (fir-tree-beech forest)**

<b>Plant Community Type</b>	<b>Mixed forest (fir-tree-beech forest)</b>
<b>Conservation Value</b>	<b>Low</b>
Location	Right hand bank of the Nakra River
Site No	8
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0288301/4777744
Altitude (m AMSL)	1545
Aspect	East
Inclination	30-35 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	80
Average DBH (cm)	40
Max height of the tree (m)	24
Average height of the tree (m)	18
Number of trees on sample area	6-7
Coverage of treelayer (%)	60-70
Coverage of shrublayer (%)	10
Height of shrublayer (cm)	300
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	30
Coverage of mosslayer (%)	5-7 (2-3 species)
Number of higher plant species	17
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Fagus orientalis	D-80 cm, H-22-24m, 160 year Cop <sup>2</sup>
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-38-40cm, H-16-18m (maximum), 90-100 year D-24-26cm, H-14-15m (average), 80-85 year Cop <sup>1</sup>
<b>Shruberry</b>	
Corylus avellana	H-2-3m Sp <sup>1</sup>
Rubus sp.	H-40cm Sol
<b>Herblayer</b>	
Oxalis acetosella	Sp <sup>1</sup>
Euphorbia macroceras - endemic to Caucasus	Sp <sup>1</sup>
Dryopteris filix-mas	Sol
Festuca drimeja	Sol
Vicia crocea	Sol
Fragaria vesca	Sol

Asperula odorata	Sol
Paris incompleta	Sol
Polygonatum polyanthemum	Sol
Salvia glutinosa	Sol
Geranium robertianum	Sol
Viola alba	Sol
Digitalis ciliata - endemic to Caucasus	Sol
<b>Mosslayer</b>	
Moss species	Sol

<b>GPS Coordinates:</b> 0288301/4777744	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 8	<b>Height a.s.l.</b> 1545
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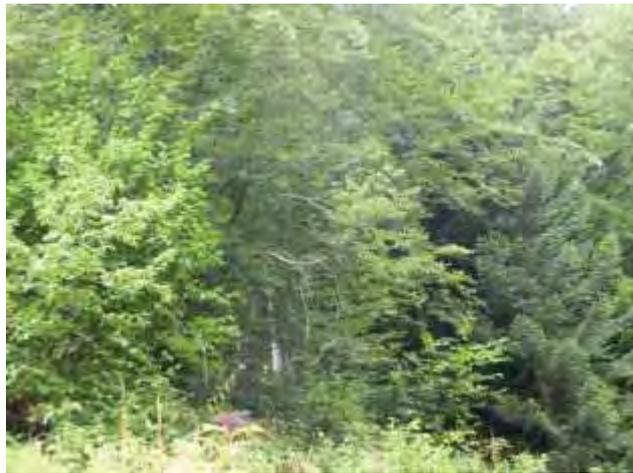
**Community Type: Mixed forest (fir-tree-beech forest)**  
Maximum height of trees (m) 24; Average height of trees (m) 18; Average age of trees: 120 year.  
Coverage of tree layers (%) 70; Coverage of shrub layer (%) 10; Ground flora cover (%) 25-30.

**General description and notes:**  
**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

#	Species	Domin	Conservation Value: Low																						
1	Fagus orientalis	8	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	7																							
3	Corylus avellana	4	<b>Photograph number/reference:</b> CIMG9896. Mixed forest (fir-tree-beech forest); CIMG9897. Mixed forest (fir-tree-beech forest).																						
4	Rubus sp.	2	<b>Polygon drawn on map:</b> Yes																						
5	Oxalis acetosella	4	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	Euphorbia macroceras - endemic to Caucasus	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>91-100%</td> </tr> <tr> <td>9</td> <td>76-90%</td> </tr> <tr> <td>8</td> <td>51-75%</td> </tr> <tr> <td>7</td> <td>34-50%</td> </tr> <tr> <td>6</td> <td>26-33%</td> </tr> <tr> <td>5</td> <td>11-25%</td> </tr> <tr> <td>4</td> <td>4-10%</td> </tr> <tr> <td>3</td> <td>&lt;4% frequent</td> </tr> <tr> <td>2</td> <td>&lt;4% occasional</td> </tr> <tr> <td>1</td> <td>&lt;4% rare</td> </tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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8	Festuca drimeja	2																							
9	Vicia crocea	2																							
10	Fragaria vesca	2																							
11	Asperula odorata	2																							
12	Paris incompleta	2																							
13	Polygonatum polyanthemum	2																							
14	Salvia glutinosa	2																							
15	Geranium robertianum	2																							
16	Viola alba	2																							
17	Digitalis ciliata - endemic to Caucasus	2																							
18																									
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**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



**Plot 8. CIMG9896.** Mixed forest (fir-tree-beech forest)



**Plot 8. CIMG9897.** Mixed forest (fir-tree-beech forest)

**Plot 9. Hazel Shruberry on alluvial fan**

Plant Community Type	Hazel Shruberry on alluvial fan
Conservation Value	Low
Location	Right hand bank of the Nakra River (upstream alpinist camp)
Site No	9
Assessed plot size (m <sup>2</sup> )	50
GPS Coordinates - spherical//UTM	0288291/4777709
Altitude (m AMSL)	1553
Aspect	East
Inclination	5 <sup>0</sup>
Community Structural Features	
Height of shrublayer (cm)	700
Height of herblayer (cm)	80
Coverage of shrublayer (%)	80-90 (2-3 specimen over 50 m <sup>2</sup> )
Coverage of herblayer (%)	20-25
Coverage of mosslayer (%)	-
Number of higher plant species	17
Number of moss species	-
Species	Cover-Abundance by Drude Scale
Shruberry	
<i>Corylus avellana</i>	H-6-7m, Cop <sup>3</sup>
Herblayer	
<i>Asperula odorata</i>	Sp <sup>2</sup>
<i>Sedum oppositifolium</i>	Sp <sup>1</sup>
<i>Fragaria vesca</i>	Sol
<i>Oxalis acetosella</i>	Sol
<i>Geranium robertianum</i>	Sol
<i>Euphorbia macroceras</i> - endemic to Caucasus	Sol
<i>Aconitum nasutum</i>	Sol
<i>Paris incompleta</i>	Sol
<i>Circaea lutetiana</i>	Sol
<i>Lathraea erecta</i>	Sol
<i>Polygonatum polyanthemum</i>	Sol
<i>Tamus communis</i>	Sol
<i>Carex strigosa</i>	Sol
<i>Brunnera macrophylla</i>	Sol
<i>Salvia glutinosa</i>	Sol
Mosslayer	
Moss species not found	-

<b>GPS Coordinates:</b> 0288291/4777709	<b>Date:</b> 11.09.2015	<b>Sample Number:</b>	<b>Height a.s.l.</b> 1553																						
<b>Community Type: Hazel shrubbery on alluvial fan</b> Maximum height of trees (m) ---; Average height of trees (m) ---; Average age of trees: ---year. Coverage of tree layers (%) ---; Coverage of shrub layer (%) 90; Ground flora cover (%) 30-35.																									
<b>General description and notes:</b>																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>																						
1	<i>Corylus avellana</i>	9	<b>Give reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Asperula odorata</i>	5																							
3	<i>Sedum oppositifolium</i>	4	<b>Photograph number/reference: CIMG9898.</b> <i>Oxalis acetosella</i> ; <b>CIMG9899.</b> Hazel shrubbery on alluvial fan; <b>CIMG9901.</b> Hazel shrubbery on alluvial fan.																						
4	<i>Fragaria vesca</i>	4	<b>Polygon drawn on map: Yes</b>																						
5	<i>Oxalis acetosella</i>	2	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	<i>Geranium robertianum</i>	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	<i>Euphorbia macroceras</i> - endemic to Caucasus	2																							
8	<i>Aconitum nasutum</i>	2																							
9	<i>Paris incompleta</i>	2																							
10	<i>Circaea lutetiana</i>	2																							
11	<i>Lathraea erecta</i>	2																							
12	<i>Polygonatum polyanthemum</i>	2																							
13	<i>Tamus communis</i>	2																							
14	<i>Carex strigosa</i>	2																							
15	<i>Brunnera macrophylla</i>	2																							
16	<i>Salvia glutinosa</i>	2																							
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19																									

**Habitats: 62GE04** Code of Georgia: Vegetation of urban and rural areas.



**Plot 9. CIMG9898.** *Oxalis acetosella*



**Plot 9. CIMG9899.** Hazel shrubbery on alluvial fan



**Plot 9. CIMG9901.** Hazel shrubbery on alluvial fan

**Plot 10. Alder trees over the river terrace**

Plant Community Type	Alder trees over the river terrace
<b>Conservation Value</b>	<b>Low</b>
Location	Right hand bank of the Nakra River (at alpinist camp)
Site No	10
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0288450/4777733
Altitude (m AMSL)	1526
Aspect	
Inclination	0°
Community Structural Features	
Max DBH (cm)	22
Average DBH (cm)	16
Max height of the tree (m)	18
Average height of the tree (m)	16
Number of trees on sample area	11-12
Coverage of treelayer (%)	50-60
Coverage of shrublayer (%)	–
Height of shrublayer (cm)	–
Coverage of herblayer (%)	30-35
Height of herblayer (cm)	70
Coverage of mosslayer (%)	20-30 (10-12 species)
Number of higher plant species	16
Species	Cover-Abundance by Drude Scale
Treelayer	
Alnus barbata	D-20-22, H-16-18m (maximum), 35 year D-14-16cm, H-14-16m (average), 16-18 year Cop <sup>1</sup>
Shruberry	
Shruberry species not found	–
Herblayer	
Salvia glutinosa	Sp <sup>3</sup>
Matteuccia struthiopteris	H-60-70cm Sp <sup>2</sup>
Sedum oppositifolium	Sp <sup>2</sup>
Asperula odorata	Sp <sup>1</sup>
Galiopsis bifida	Sp <sup>1</sup>
Fragaria vesca	Sp <sup>1</sup>
Geum urbanum	Sol
Cicerbita petiolata	Sol
Rumex sp.	Sol
Geranium robertianum	Sol

Sambucus ebulus	H-70cm Sol
Euphorbia macroceras - endemic to Caucasus	Sol
Lapsana grandiflora	Sol
Colchicum speciosum-CITES	Unicum
<b>Mosslayer</b>	
Moss species	Sp <sup>3</sup>

<b>GPS Coordinates:</b> 0288450/4777733	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 10	<b>Height a.s.l.</b> 1526
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**Community Type: Alder trees over the river terrace**

Maximum height of trees (m) 18; Average height of trees (m) 16; Average age of trees: 20 year.  
Coverage of tree layers (%) 60; Coverage of shrub layer (%) ---; Ground flora cover (%) 30-35.

**General description and notes:**

**Plant community:** In Svaneti and Lechkumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) adler and species of the willow (*Salix* spp.) grow here. Among the bushes there area lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White adler in these gorges reaches the sub-alpine zone.

#	Species	Domin	Conservation Value: Low																						
1	<i>Alnus barbata</i>	7	<b>Give reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Salvia glutinosa</i>	6																							
3	<i>Matteuccia struthiopteris</i>	5	<b>Photograph number/reference:</b> CIMG9904. Alder forest over the river terrace; <b>Plot 10.</b> CIMG9905. <i>Matteuccia struthiopteris</i> .																						
4	<i>Sedum oppositifolium</i>	5	<b>Polygon drawn on map:</b> Yes																						
5	<i>Asperula odorata</i>	4	<b>Human activity present (e.g. logging, grazing):</b> Grazing, logging																						
6	<i>Galiopsis bifida</i>	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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2	<4% occasional																								
1	<4% rare																								
7	<i>Fragaria vesca</i>	4																							
8	<i>Geum urbanum</i>	2																							
9	<i>Cicerbita petiolata</i>	2																							
10	<i>Rumex</i> sp.	2																							
11	<i>Geranium robertianum</i>	2																							
12	<i>Sambucus ebulus</i>	2																							
13	<i>Euphorbia macroceras</i> - endemic to Caucasus	2																							
14	<i>Lapsana grandiflora</i>	2																							
15	<i>Colchicum speciosum</i> -CITES	1																							
16																									
17																									
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19																									

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 10. CIMG9904.** Alder trees over the river terrace



**Plot 10. CIMG9905.** *Matteuccia struthiopteris*

**Plot 11. Alder trees over the river terrace**

Plant Community Type	Alder trees over the river terrace
Conservation Value	Low
Location	Right hand bank of the Nakra River (downstream alpinist camp)
Site No	11
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0288451/4777734
Altitude (m AMSL)	1524
Aspect	—
Inclination	0°
Community Structural Features	
Max DBH (cm)	36
Average DBH (cm)	24
Max height of the tree (m)	18
Average height of the tree (m)	15
Number of trees on sample area	8-9
Coverage of treelayer (%)	70
Coverage of shrublayer (%)	—
Height of shrublayer (cm)	—
Coverage of herblayer (%)	50-60
Height of herblayer (cm)	40
Coverage of mosslayer (%)	15-20 (7-8 species)
Number of higher plant species	17
Species	Cover-Abundance by Drude Scale
Treelayer	
<i>Alnus barbata</i>	D-36cm, H-16-18m (average), 45 year D-24cm, H-14-15m (average), 36 year Cop <sup>2</sup>
<i>Picea orientalis</i> (young) - sub-endemic for the Caucasus, irradiated to Asia Minor	H-5-6m, 20 year Sol
<i>Abies nordmanniana</i> (young) - sub-endemic for the Caucasus, irradiated to Asia Minor	H-5-15m, 15-50 year Sol
Shruberry	
Shruberry species not found	—
Herblayer	
<i>Matteuccia struthiopteris</i>	Cop <sup>1</sup>
<i>Oxalis acetosella</i>	Sp <sup>2</sup>
<i>Asperula odorata</i>	Sp <sup>1</sup>
<i>Paris incompleta</i>	Sol
<i>Salvia glutinosa</i>	Sol

Galiopsis bifida	Sol
Rumex sp.	Sol
Fragaria vesca	Sol
Sedum oppositifolium	Sol
Prunella vulgaris	Sol
Impatiens noli-tangere	Sol
Lapsana grandiflora	Sol
Euphorbia macroceras - endemic to Caucasus	Sol
Gentiana schistocalyx - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti, Eastern Anatolia)	Sol
<b>Mosslayer</b>	
Moss species	Sp <sup>2</sup>

<b>GPS Coordinates:</b> 0288451/4777734	<b>Date:</b> 11.09.2015	<b>Sample Number:</b> 11	<b>Height a.s.l.</b> 1524																						
<p><b>Community Type: Alder trees over the river terrace</b>  Maximum height of trees (m) 18; Average height of trees (m) 15; Average age of trees: 30 year.  Coverage of tree layers (%) 70; Coverage of shrub layer (%) ---; Ground flora cover (%) 30-35.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (<i>Alnus barbata</i>) and white (<i>A. incana</i>) alder and species of the willow (<i>Salix</i> spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see <i>Matteuccia struthiopteris</i>. White alder in these gorges reaches the sub-alpine zone.</p>																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>																						
1	<i>Alnus barbata</i>	8	<b>Given reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Picea orientalis</i> -sub-endemic for the Caucasus, irradiated to Asia Minor	2																							
3	<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	2	<b>Photograph number/reference:</b> CIMG9908. <i>Gentiana schistocalyx</i> ; CIMG9909. Alder trees over the river terrace; CIMG9910. Alder trees over the river terrace; CIMG9911. <i>Matteuccia struthiopteris</i> .																						
4	<i>Matteuccia struthiopteris</i>	7	<b>Polygon drawn on map:</b> Yes																						
5	<i>Oxalis acetosella</i>	5	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	<i>Asperula odorata</i>	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
Domin value	Cover-abundance																								
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4	4-10%																								
3	<4% frequent																								
2	<4% occasional																								
1	<4% rare																								
7	<i>Paris incompleta</i>	2																							
8	<i>Salvia glutinosa</i>	2																							
9	<i>Galiopsis bifida</i>	2																							
10	<i>Rumex</i> sp.	2																							
11	<i>Fragaria vesca</i>	2																							
12	<i>Sedum oppositifolium</i>	2																							
13	<i>Prunella vulgaris</i>	2																							
14	<i>Impatiens noli-tangere</i>	2																							
15	<i>Lapsana grandiflora</i>	2																							
16	<i>Euphorbia macroceras</i> - endemic to Caucasus	2																							
17	<i>Gentiana schistocalyx</i> - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti, Eastern Anatolia)	2																							
18																									
19																									

**Habitats: 91E0\*** Code of Georgia: Alluvial forests

**Habitat sub-type: 91E0 \*01.** Floodplain forest



**Plot 11. CIMG9908.** *Gentiana schistocalyx*



**Plot 11. CIMG9909.** Alder forest over the river terrace



**Plot 11. CIMG9910.** Alder forest over the river terrace



**Plot 11. CIMG9911.** *Matteuccia struthiopteris*

## The Nenskra Valley

### Plot 12. Mixed forest (fir-tree-beech forest with sycamore maple admixture)

Plant Community Type	Mixed forest (fir-tree-beech forest with sycamore maple admixture)
Conservation Value	High
Location	Right hand bank of the Nenskra River
Site No	12
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0276232/4780098
Altitude (m AMSL)	1382
Aspect	East
Inclination	20-25 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	60
Average DBH (cm)	40
Max height of the tree (m)	26
Average height of the tree (m)	20
Number of trees on sample area	5-6
Coverage of treelayer (%)	60-70
Coverage of shrublayer (%)	30-35

Height of shrublayer (cm)	150
Coverage of herblayer (%)	=
Height of herblayer (cm)	=
Coverage of mosslayer (%)	5-10 (4-5 species)
Number of higher plant species	6
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Fagus orientalis	D-60 cm, H-24-26m (maximum), 140 year D-40cm, H-20-22m (average), 100 year Sp <sup>3</sup>
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-34cm, H-20-22m (maximum), 70 year D-28cm, H-18-20m (average), 60 year Sp <sup>1</sup>
Acer platanoides	D-30 cm, H-16m, 50 year Sol
<b>Shruberry</b>	
Ilex colchica- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor	H-1,5 Sp <sup>3</sup>
Rubus sp.	Sp <sup>2</sup>
Lonicera caucasica	Sol
<b>Herblayer</b>	
Herbaceous species were not recorded	-
<b>Mosslayer</b>	
Moss species	Sp <sup>1</sup>

<b>GPS Coordinates:</b> 0276232/4780098	<b>Date:</b> 12.09.2015	<b>Sample Number:</b> 12	<b>Height a.s.l.</b> 1382				
<b>Community Type: Mixed forest (fir-tree-beech forest with sycamore maple admixture)</b> Maximum height of trees (m) 26; Average height of trees (m) 20; Average age of trees: 80 year. Coverage of tree layers (%) 70; Coverage of shrub layer (%) 35; Ground flora cover (%) 10-15.							
<b>General description and notes:</b> <b>Plant community:</b> Dark coniferous forest with low-herbal cover ( <i>Piceeta nanoherbosa</i> , <i>Piceeto-Abieta nanoherbosa</i> , <i>Abieta nanoherbosa</i> , <i>Fageto-Abieta nanoherbosa</i> ) is predominantly found in moist places, in various regions of Georgia. Herbal cover is mainly of two types. In the first case <i>Oxalis acetosella</i> dominates whereas in the second one – <i>Sanicula europaea</i> . Other species are represented by <i>Galium rotundifolium</i> , <i>Calamintha grandiflora</i> , <i>Cardamine pectinata</i> , <i>Paris incompleta</i> . In the limestone habitat of Bzipi gorge there are <i>Oxalis acetosella</i> and <i>Galium rotundifolium</i> . In Abkhazia, the following arboreal plants are found in the forest of the same type - <i>Acer pseudoplatanus</i> , <i>A. platanoides</i> , <i>Tilia begoniifolia</i> .							
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: High</b>				
1	Fagus orientalis	6	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis (Colchic elements)				
2	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	5					
3	Acer platanoides	4	<b>Photograph number/reference: CIMG9916.</b> <i>Ilex colchica</i> ; <b>CIMG9917.</b> Mixed forest (fir-tree-beech forest with sycamore maple admixture); <b>CIMG9918.</b> Mixed forest (fir-tree-beech forest with sycamore maple admixture).				
4	Ilex colchica- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor	6	<b>Polygon drawn on map:</b> Yes				
5	Rubus sp.	5	<b>Human activity present (e.g. logging, grazing):</b> Logging				
6	Lonicera caucasica	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><b>Domin value</b></td> <td style="width: 50%;"><b>Cover-abundance</b></td> </tr> <tr> <td>10</td> <td>91-100%</td> </tr> </table>	<b>Domin value</b>	<b>Cover-abundance</b>	10	91-100%
<b>Domin value</b>	<b>Cover-abundance</b>						
10	91-100%						
7							
8							
9							
10							

11			9	76-90%
12			8	51-75%
13			7	34-50%
14			6	26-33%
15			5	11-25%
16			4	4-10%
17			3	<4% frequent
18			2	<4% occasional
			1	<4% rare

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto*-*Abieta sine fruticosa*)



**Plot 12. CIMG9916.** *Ilex colchica*



**Plot 12. CIMG9917.** Mixed forest (fir-tree-beech forest with sycamore maple admixture)



**Plot 12. CIMG9918.** Mixed forest (fir-tree-beech forest with sycamore maple admixture)

**Plot 13. Mixed deciduous forest**

<b>Plant Community Type</b>	<b>Mixed deciduous forest</b>
<b>Conservation Value</b>	<b>Low</b>
<b>Location</b>	Right hand bank of the Nenskra River

Site No	13
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0275970/4779925
Altitude (m AMSL)	1372
Aspect	East
Inclination	5 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	69
Average DBH (cm)	40
Max height of the tree (m)	26
Average height of the tree (m)	22
Number of trees on sample area	5-6
Coverage of treelayer (%)	55-60
Coverage of shrublayer (%)	60
Height of shrublayer (cm)	100
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	50
Coverage of mosslayer (%)	2-3 (3-4 species)
Number of higher plant species	25
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Alnus barbata	D-40 cm, H-22-24m (maximum), 60 year D-28-32cm, H-18-20m (average), 50 year Cop <sup>1</sup>
Acer platanoides	D-44cm, H-20-22m, 80 year Sp <sup>3</sup>
Acer pseudoplatanus	D-42cm, H-18-20m, 70 year Sp <sup>1</sup>
Fraxinus excelsior	D-24 cm, H-18-20m, 50-60 year Sol
Carpinus caucasica	D-20 cm, H-16m, 140-50 year Sol
Fagus orientalis	D-36 cm, H-22m, 70 year Sol
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-60 cm, H-26m, 120 year Sol
Betula litwinowii	D-50 cm, H-18m, 90-100 year Unicum
<b>Shruberry</b>	
Rubus sp.	H-1m, Cop <sup>2</sup>
<b>Herblayer</b>	
Fragaria vesca	Sol
Anchusa myosotiflora	Sol
Athyrium filix-femina	Sol
Galeopsis bifida	Sol
Aconitum nasutum	Sol
Dryopteris filix-mas	Sol
Salvia glutinosa	Sol
Urtica dioica	Sol
Sanicula eoropaea	Sol
Asperula odorata	Sol
Symphytum asperum	Sol
Viola sylvestris	Sol
Impatiens noli-tangere	Sol
Elsholtzia ciliata	Sol
Calamintha grandiflora	Sol
Circaea alpina	Unicum
<b>Mosslayer</b>	
Moss species	Sol

<b>GPS Coordinates:</b> 0275970/4779925	<b>Date:</b> 12.09.2015	<b>Sample Number:</b> 13	<b>Height a.s.l.</b> 1372																						
<b>Community Type: Mixed deciduous forest</b> Maximum height of trees (m) 26; Average height of trees (m) 22; Average age of trees: 70 year. Coverage of tree layers (%) 60; Coverage of shrub layer (%) 60; Ground flora cover (%) 40-45.																									
<b>General description and notes:</b> <b>Plant community:</b> dominant tree species are distinguished, that create syntaxons of various composition – chestnut ( <i>Castanea sativa</i> ), beech ( <i>Fagus orientalis</i> ), Imereti oak ( <i>Quercus imeretina</i> ), Colchic oak ( <i>Q. hartwissiana</i> ), Alder ( <i>Alnus barbata</i> ) and hornbeam ( <i>Carpinus betulus</i> ). From hard-wood plants the following are common: Zelkova ( <i>Zelkova carpintfolia</i> ), Georgian oak ( <i>Q. iberica</i> ), elm ( <i>Ulmus glabra</i> , <i>U. elliptica</i> ), maple ( <i>Acer laetum</i> ), Norway maple ( <i>Acer platanoides</i> ), wire-but ( <i>Pterocarya fraxinifolia</i> ), lime ( <i>Tilia begoniifolia</i> ), maple ( <i>Acer campestre</i> ), willow ( <i>Salix micans</i> , <i>S. pantosericea</i> ), Caucasian wild pear ( <i>Pyrus caucasica</i> ), apple ( <i>Malus orientalis</i> ), <i>Diospyros lotus</i> , ash ( <i>Fraxinus excelsior</i> ), pine ( <i>Pinus kochiana</i> ) and Yew ( <i>Taxus baccata</i> ).																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>																						
1	<i>Alnus barbata</i>	7	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Acer platanoides</i>	6																							
3	<i>Acer pseudoplatanus</i>	4	<b>Photograph number/reference:</b> CIMG9923. Mixed deciduous forest; CIMG9925. <i>Impatiens noli-tangere</i> ; CIMG9926. <i>Elsholtzia ciliata</i> ; CIMG9937. Mixed deciduous forest.																						
4	<i>Fraxinus excelsior</i>	2	<b>Polygon drawn on map:</b> Yes																						
5	<i>Carpinus caucasica</i>	2	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	<i>Fagus orientalis</i>	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.																						
7	<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	2																							
8	<i>Betula litwinowii</i>	1	<table border="1"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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5	11-25%																								
4	4-10%																								
3	<4% frequent																								
2	<4% occasional																								
1	<4% rare																								
9	<i>Rubus sp.</i>	8																							
10	<i>Fragaria vesca</i>	2																							
11	<i>Anchusa myosotiflora</i>	2																							
12	<i>Athyrium filix-femina</i>	2																							
13	<i>Galeopsis bifida</i>	2																							
14	<i>Aconitum nasutum</i>	2																							
15	<i>Dryopteris filix-mas</i>	2																							
16	<i>Salvia glutinosa</i>	2																							
17	<i>Urtica dioica</i>	2																							
18	<i>Sanicula eoropaea</i>	2																							
19	<i>Asperula odorata</i>	2																							
20	<i>Symphytum asperum</i>	2																							
21	<i>Viola sylvestris</i>	2																							
22	<i>Impatiens noli-tangere</i>	2																							
23	<i>Elsholtzia ciliata</i>	2																							
24	<i>Calamintha grandiflora</i>	2																							
25	<i>Circaea alpina</i>	1																							

**Habitats:** 9BCGE\* Code of Georgia: Colchic relic broad-leaved mixed forest

**Habitat sub-type:** 9BC-GE-04 Beech – alder -chestnut-hornbeam forest (*Alnus barbata* - *Carpinus betulus* – *Fagus orientalis* - *Castanea sativa*) can be found in moist, slightly included locations of the northern slope.



Plot 13. CIMG9923. Mixed deciduous forest



Plot 13. CIMG9925. *Impatiens noli-tangere*



Plot 13. CIMG9926. *Elsholtzia ciliata*



Plot 13. CIMG9937. Mixed deciduous forest

#### Plot 14. Beech forest with fir-tree admixture

Plant Community Type	Beech forest with fir-tree admixture
Conservation Value	Medium
Location	Right hand bank of the Nakra River (until landslide)
Site No	14
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0275447/4779906
Altitude (m AMSL)	1371
Aspect	South-East
Inclination	15-20 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	60
Average DBH (cm)	40
Max height of the tree (m)	26
Average height of the tree (m)	22
Number of trees on sample area	6-7
Coverage of treelayer (%)	60-70
Coverage of shrublayer (%)	50-55
Height of shrublayer (cm)	150
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	40
Coverage of mosslayer (%)	—
Number of higher plant species	15
Species	Cover-Abundance by Drude Scale
Treelayer	
Fagus orientalis	D-50-60 cm, H-24-26m (maximum), 130 year

	D-36-38cm, H-20-22m (average), 80 year Cop <sup>3</sup>
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-50 cm, H-23-25m (maximum), 90 year D-38-40cm, H-20-22m (average), 70 year Sol
Acer platanoides	D-40 cm, H-20m, 90-100 year Sol
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-24 cm, H-8-9m, 60-70 year Sol
Tilia begoniifolia	D-36 cm, H-16-18m, 80-90 year Unicum
<b>Shruberry</b>	
Rubus sp.	Cop <sup>1</sup>
Laurocerasus officinalis - tertiary relict flora species	H-1,5m Sol
Ilex colchica- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor	H-1,5m Sol
Viburnum opulus	Sol
<b>Herblayer</b>	
Symphytum asperum	Sp <sup>1</sup>
Athyrium filix-femina	Sol
Matteuccia struthiopteris	Sol
Actaea spicata	Sol
Asperula odorata	Sol
Paris incompleta	Sol
<b>Mosslayer</b>	
Moss species	-

<b>GPS Coordinates:</b> 0275447/4779906	<b>Date:</b> 12.09.2015	<b>Sample Number:</b> 14	<b>Height a.s.l.</b> 1371
<p><b>Community Type: Beech forest with fir-tree admixture</b>  Maximum height of trees (m) 26; Average height of trees (m) 22; Average age of trees: 90 year.  Coverage of tree layers (%) 70; Coverage of shrub layer (%) 55; Ground flora cover (%) 35-40.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Dark coniferous forest with the understory of Pontic rhododendron (<i>Piceeta rhododendrosa</i>, <i>Piceeto-Abieta rhododendrosa</i>, <i>Abieta rhododendrosa</i>, <i>Fageto-Abieta rhododendrosa</i>), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: <i>Trachystemon orientalis</i>, <i>Galium rotundifolium</i>. From ferns the following can be found: <i>Blechnum spicant</i>, <i>Polystichum woronowii</i>. These species are rare: <i>Ruscus colchicus</i>, <i>Rubus hirtus</i>, <i>Hedera colchica</i>.</p>			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>
1	Fagus orientalis	9	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis
2	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	2	
3	Acer platanoides	2	<b>Photograph number/reference:</b> CIMG9938. <i>Ilex colchica</i> ; CIMG9939. Beech forest with fir-tree admixture; CIMG9941. <i>Laurocerasus officinalis</i> ; CIMG9944. <i>Viburnum opulus</i> .
4	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	2	<b>Polygon drawn on map:</b> Yes
5	Tilia begoniifolia	1	<b>Human activity present (e.g. logging, grazing):</b> Logging
6	Rubus sp.	7	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.
7	Laurocerasus officinalis - tertiary relict flora species	2	
8	Ilex colchica- tertiary relict flora species, irradiated to Balkans (Strandzha) and	2	
		<b>Domin value</b>	<b>Cover-abundance</b>
		10	91-100%
		9	76-90%

	Assia Minor		8	51-75%
9	Viburnum opulus	2	7	34-50%
10	Symphytum asperum	4	6	26-33%
11	Athyrium filix-femina	2	5	11-25%
12	Matteuccia struthiopteris	2	4	4-10%
13	Actaea spicata	2	3	<4% frequent
14	Asperula odorata	2	2	<4% occasional
15	Paris incompleta	2	1	<4% rare
16				
17				
18				

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



Plot 14. CIMG9938. *Ilex colchica*



Plot 14. CIMG9939. Beech forest with fir-tree admixture



Plot 14. CIMG9941. *Laurocerasus officinalis*



Plot 14. CIMG9944. *Viburnum opulus*

**Plot 15. Alder forest over the river terrace**

Plant Community Type	Alder forest over the river terrace
Conservation Value	Low
Location	Right hand bank of the Nenskra River
Site No	15
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0274336/4779663
Altitude (m AMSL)	1333

Aspect	
Inclination	0°
<b>Community Structural Features</b>	
Max DBH (cm)	24
Average DBH (cm)	16
Max height of the tree (m)	17
Average height of the tree (m)	15
Number of trees on sample area	12-14
Coverage of treelayer (%)	80-90
Coverage of shrublayer (%)	3-5
Height of shrublayer (cm)	300
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	50
Coverage of mosslayer (%)	10-15 (3-4 species)
Number of higher plant species	22
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
<i>Alnus barbata</i>	D-24 cm, H-16-17m, 25-30 year Cop <sup>3</sup>
<i>Alnus incana</i>	D-16 cm, H-14-15m, 20-25 year Cop <sup>3</sup>
<b>Shruberry</b>	
<i>Corylus avellana</i>	H-2-3m Sol
<i>Rubus sp.</i>	Sol
<b>Herblayer</b>	
<i>Fragaria vesca</i>	Sp <sup>1</sup>
<i>Geranium robertianum</i>	Sp <sup>1</sup>
<i>Sedum oppositifolium</i>	Sol
<i>Prunella vulgaris</i>	Sol
<i>Viola sylvestris</i>	Sol
<i>Salvia glutinosa</i>	Sol
<i>Matteuccia struthiopteris</i>	Sol
<i>Athyrium filix-femina</i>	Sol
<i>Dryopteris filix-mas</i>	Sol
<i>Geum urbanum</i>	Sol
<i>Sanicula eoropaea</i>	Sol
<i>Actaea spicata</i>	Sol
<i>Oxalis acetosella</i>	Sol
<i>Rumex sp.</i>	Sol
<i>Lysimachia verticillata</i>	Sol
<i>Stellaria media</i>	Sol
<i>Hydrocotyle ramiflora</i>	Sol
<i>Colchicum speciosum-CITES</i>	Sol
<b>Mosslayer</b>	
Moss species	Sp <sup>2</sup>

<b>GPS Coordinates:</b> 0274336/4779663	<b>Date:</b> 12.09.2015	<b>Sample Number:</b> 15	<b>Height a.s.l.</b> 1333
<p><b>Community Type:</b> Alder forest over the river terrace  Maximum height of trees (m) 17; Average height of trees (m) 15; Average age of trees: 25 year.  Coverage of tree layers (%) 90; Coverage of shrub layer (%) 5; Ground flora cover (%) 25-30.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (<i>Alnus barbata</i>) and white (<i>A. incana</i>) adler and species of the willow (<i>Salix spp.</i>) grow here. Among the bushes there area lot of amounts of nut and azalea. From ferns we can see <i>Matteuccia struthiopteris</i>. White adler in these gorges reaches the sub-alpine zone.</p>			
#	Species	Domin	Conservation Value: Low

1	<i>Alnus barbata</i>	9	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis
2	<i>Alnus incana</i>	9	
3	<i>Corylus avellana</i>	2	<b>Photograph number/reference:</b> CIMG9956. <i>Colchicum speciosum</i> ; CIMG9958. Alder forest over the river terrace; CIMG9959. <i>Hydrocotyle ramiflora</i> .
4	<i>Rubus</i> sp.	2	<b>Polygon drawn on map:</b> Yes
5	<i>Fragaria vesca</i>	4	<b>Human activity present (e.g. logging, grazing):</b> Grazing, logging
6	<i>Geranium robertianum</i>	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.
7	<i>Sedum oppositifolium</i>	2	
8	<i>Prunella vulgaris</i>	2	
9	<i>Viola sylvestris</i>	2	
10	<i>Salvia glutinosa</i>	2	
11	<i>Matteuccia struthiopteris</i>	2	
12	<i>Athyrium filix-femina</i>	2	
13	<i>Dryopteris filix-mas</i>	2	
14	<i>Geum urbanum</i>	2	
15	<i>Sanicula eoropaea</i>	2	
16	<i>Actaea spicata</i>	2	
17	<i>Oxalis acetosella</i>	2	
18	<i>Rumex</i> sp.	2	
19	<i>Lysimachia verticillata</i>	2	
20	<i>Stellaria media</i>	2	
21	<i>Hydrocotyle ramiflora</i>	2	
22	<i>Colchicum speciosum</i> - CITES	2	

Domin value	Cover-abundance
10	91-100%
9	76-90%
8	51-75%
7	34-50%
6	26-33%
5	11-25%
4	4-10%
3	<4% frequent
2	<4% occasional
1	<4% rare

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 15. CIMG9956.** *Colchicum speciosum*



**Plot 15. CIMG9958.** Alder forest over the river terrace



**Plot 15. CIMG9959.** *Hydrocotyle ramiflora*

**Plot 16. Alder forest with birch admixture**

Plant Community Type	Alder forest with birch admixture
Conservation Value	Low
Location	Right hand bank of the Nenskra River
Site No	16
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0274337/4779664
Altitude (m AMSL)	1335
Aspect	South-East
Inclination	3-5 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	28
Average DBH (cm)	16
Max height of the tree (m)	14
Average height of the tree (m)	12
Number of trees on sample area	16-18
Coverage of treelayer (%)	70-80
Coverage of shrublayer (%)	3-5
Height of shrublayer (cm)	60
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	80
Coverage of mosslayer (%)	2-3 (2-3 species)
Number of higher plant species	19
Species	Cover-Abundance by Drude Scale
Treelayer	
<i>Alnus barbata</i>	D-26-28cm, H-14m (average), 30-35 year D-16-18cm, H-10-12m (average), 20 year Cop <sup>2</sup>
<i>Betula litwinowii</i>	D-4-8cm, H-6-8m, 20-25 year Sol
Shruberry	
<i>Rubus</i> sp.	H-60cm Sol
Herblayer	
<i>Fragaria vesca</i>	Sp <sup>1</sup>
<i>Sedum oppositifolium</i>	Sp <sup>1</sup>
<i>Geranium robertianum</i>	Sp <sup>1</sup>
<i>Viola sylvestris</i>	Sol
<i>Salvia glutinosa</i>	Sol
<i>Lapsana grandiflora</i>	H-80cm Sol
<i>Colchicum speciosum</i> -CITES	Sp <sup>1</sup>

Hesperis matronalis	Sol
Rumex sp.	Sol
Cicerbita petiolata	Sol
Clinopodium umbrosum	Sol
Tamus communis	Sol
Senecio pojarkovae - endemic to Caucasus	Sol
Hieracium pilosella	Sol
Geum urbanum	Sol
Paracynoglossum imeretinum -endemic to Caucasus	Unicum
<b>Mosslayer</b>	
Moss species	Sol

<b>GPS Coordinates:</b> 0274337/4779664	<b>Date:</b> 12.09.2015	<b>Sample Number:</b> 16	<b>Height a.s.l.</b> 1335																						
<p><b>Community Type: Alder forest with birch admixture</b>  Maximum height of trees (m) 14; Average height of trees (m) 12; Average age of trees: 25 year.  Coverage of tree layers (%) 80; Coverage of shrub layer (%) 5; Ground flora cover (%) 25-30.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> In Svaneti and Lechkumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (<i>Alnus barbata</i>) and white (<i>A. incana</i>) adler and species of the willow (<i>Salix</i> spp.) grow here. Among the bushes there area lot of amounts of nut and azalea. From ferns we can see <i>Matteuccia struthiopteris</i>. White adler in these gorges reaches the sub-alpine zone.</p>																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>																						
1	<i>Alnus barbata</i>	8	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Betula litwinowii</i>	2																							
3	<i>Rubus</i> sp.	2	<b>Photograph number/reference:</b> CIMG9809. <i>Colchicum speciosum</i> ; CIMG9962. Alder forest with birch admixture; CIMG9963. Alder forest with birch admixture.																						
4	<i>Fragaria vesca</i>	4	<b>Polygon drawn on map:</b> Yes																						
5	<i>Sedum oppositifolium</i>	4	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	<i>Geranium robertianum</i>	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>91-100%</td> </tr> <tr> <td>9</td> <td>76-90%</td> </tr> <tr> <td>8</td> <td>51-75%</td> </tr> <tr> <td>7</td> <td>34-50%</td> </tr> <tr> <td>6</td> <td>26-33%</td> </tr> <tr> <td>5</td> <td>11-25%</td> </tr> <tr> <td>4</td> <td>4-10%</td> </tr> <tr> <td>3</td> <td>&lt;4% frequent</td> </tr> <tr> <td>2</td> <td>&lt;4% occasional</td> </tr> <tr> <td>1</td> <td>&lt;4% rare</td> </tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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2	<4% occasional																								
1	<4% rare																								
7	<i>Viola sylvestris</i>	2																							
8	<i>Salvia glutinosa</i>	2																							
9	<i>Lapsana grandiflora</i>	2																							
10	<i>Colchicum speciosum</i> - CITES	2																							
11	<i>Hesperis matronalis</i>	2																							
12	<i>Rumex</i> sp.	2																							
13	<i>Cicerbita petiolata</i>	2																							
14	<i>Clinopodium umbrosum</i>	2																							
15	<i>Tamus communis</i>	2																							
16	<i>Senecio pojarkovae</i> - endemic to Caucasus	2																							
17	<i>Hieracium pilosella</i>	2																							
18	<i>Geum urbanum</i>	2																							
19	<i>Paracynoglossum imeretinum</i> -endemic to Caucasus	1																							

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 16. CIMG9809.** *Colchicum speciosum*



**Plot 16. CIMG9962.** Alder forest with birch admixture



**Plot 16. CIMG9963.** Alder forest with birch admixture

### Plot 17. Beech forest

<b>Plant Community Type</b>	<b>Beech forest</b>
<b>Conservation Value</b>	<b>Medium</b>
Location	Right hand bank of the Nenskra River
Site No	17
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0273322/4779263
Altitude (m AMSL)	1272
Aspect	South-East
Inclination	5 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	100
Average DBH (cm)	50
Max height of the tree (m)	26
Average height of the tree (m)	18
Number of trees on sample area	3-4
Coverage of treelayer (%)	60-70
Coverage of shrublayer (%)	50-55
Height of shrublayer (cm)	50
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	100
Coverage of mosslayer (%)	5-10 (3-4 species)
Number of higher plant species	14
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>

Treelayer	
Fagus orientalis	D-100cm, H-26m (maximum), 170 year D-50cm, H-18m (average), 100 year Cop <sup>2</sup>
Acer platanoides	D-50 cm, H-18-19m, 100 year Sp <sup>2</sup>
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-20 cm, H-9-10m, 25 year Sol
Shruberry	
Rubus sp.	H-0,5m Cop <sup>1</sup>
Herblayer	
Asperula odorata	Sp <sup>1</sup>
Salvia glutinosa	Sol
Fragaria vesca	Sol
Euphorbia macroceras - endemic to Caucasus	H-1m Sol
Sambucus ebulus	Sol
Dryopteris filix-mas	Sol
Prunella vulgaris	Sol
Sedum oppositifolium	Sol
Geranium robertianum	Sol
Viola sylvestris	Sol
Mosslayer	
Moss species	Sp <sup>1</sup>

<b>GPS Coordinates:</b> 0273322/4779263	<b>Date:</b> 13.09.2015	<b>Sample Number:</b> 17	<b>Height a.s.l.</b> 1272
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**Community Type: Beech forest**

Maximum height of trees (m) 26; Average height of trees (m) 18; Average age of trees: 100 year.  
Coverage of tree layers (%) 70; Coverage of shrub layer (%) 55; Ground flora cover (%) 25-30.

**General description and notes:**

**Plant community:** Beech forest with the azalea (*Fageta azaleosa media*) understory of the middle zone of the forest is common in mountain massifs of west Georgia with the average annual precipitation of 800-1500 mm. Characteristic landscape is the southern slope with the embossed relief of average inclination. Hornbeam, Georgian oak and Caucasian maple (*Acer velutinum*) are mixed with the beech. Species of the lower layer are: *Festuca drymeja*, *Rubus* spp., *Vicia crocea*, *Trachystemon orientalis*.

#	Species	Domin	Conservation Value: Medium																						
1	Fagus orientalis	8	<b>Giver reason for conservation value:</b> Forest phytocenosis																						
2	Acer platanoides	5																							
3	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	2	<b>Photograph number/reference:</b> CIMG9969. Beech forest; CIMG9971. <i>Sambucus ebulus</i> .																						
4	Rubus sp.	7	<b>Polygon drawn on map:</b> Yes																						
5	Asperula odorata	4	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	Salvia glutinosa	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	Fragaria vesca	2																							
8	Euphorbia macroceras - endemic to Caucasus	2																							
9	Sambucus ebulus	2																							
10	Dryopteris filix-mas	2																							
11	Prunella vulgaris	2																							
12	Sedum oppositifolium	2																							
13	Geranium robertianum	2																							
14	Viola sylvestris	2																							
15																									
16																									
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**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE -05** Beech forest with azalea (*Rhododendron luteum*) understory (*Fageta azaleoza*)



**Plot 17. CIMG9969.** Beech forest



**Plot 17. CIMG9971.** *Sambucus ebulus*

**Plot 18. Mixed forest (beech-fir-tree forest with spruce admixture)**

Plant Community Type	Mixed forest (beech-fir-tree forest with spruce admixture)
Conservation Value	Low
Location	Right hand bank of the Nenskra River, downstream the construction camp
Site No	18
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0271913/4778637
Altitude (m AMSL)	1262
Aspect	—
Inclination	0°
Community Structural Features	
Max DBH (cm)	90
Average DBH (cm)	50
Max height of the tree (m)	25
Average height of the tree (m)	15
Number of trees on sample area	25-30
Coverage of treelayer (%)	50
Coverage of shrublayer (%)	—
Height of shrublayer (cm)	—
Coverage of herblayer (%)	30-40
Height of herblayer (cm)	80
Coverage of mosslayer (%)	5-10 (2-3 species)
Number of higher plant species	17
Species	Cover-Abundance by Drude Scale
Treelayer	
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-16cm, H-12m (maximum), 20-30 year D-12cm, H-8m (average), 20 year Cop <sup>2</sup>
Fagus orientalis	D-90cm, H-25m (maximum), 160 year D-50cm, H-20m (average), 100 year Sp <sup>3</sup>
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-20cm, H-14m (maximum), 60-70 year D-12cm, H-10m (average), 35 year Sol

Shruberry	
Shruberry species not found	-
Herblayer	
Hydrocotyle raamiflora	Sp <sup>2</sup>
Sambucus ebulus	H-80cm Sp <sup>1</sup>
Salvia glutinosa	Sp <sup>1</sup>
Asperula odorata	Sp <sup>1</sup>
Fragaria vesca	Sol
Prunella vulgaris	Sol
Paris incompleta	Sol
Geranium robertianum	Sol
Rumex sp.	Sol
Urtica dioica	Sol
Plantago media	Sol
Ranunculus sp.	Sol
Calamintha grandiflora	Sol
Viola sylvestris	Sol
Mosslayer	
Moss species	Sp <sup>1</sup>

<b>GPS Coordinates:</b> 0271913/4778637	<b>Date:</b> 13.09.2015	<b>Sample Number:</b> 18	<b>Height a.s.l.</b> 1262																						
<p><b>Community Type: Mixed forest (beech-fir-tree forest with spruce admixture)</b>  Maximum height of trees (m) 25; Average height of trees (m) 15; Average age of trees: 90 year.  Coverage of tree layers (%) 50; Coverage of shrub layer (%) ---; Ground flora cover (%) 35-40.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Dark coniferous forest with the understory of Pontic rhododendron (<i>Piceeta rhododendrosa</i>, - <i>Abieta rhododendrosa</i>, <i>Abieta rhododendrosa</i>, <i>Fageto-Abieta rhododendrosa</i>), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: <i>Trachystemon orientalis</i>, <i>Galium rotundifolium</i>. From ferns the following can be found: <i>Blechnum spicant</i>, <i>Polystichum woronowii</i>. These species are rare: <i>Ruscus colchicus</i>, <i>Rubus hirtus</i>, <i>Hedera colchica</i>.</p>																									
#	Species	Domin	Conservation Value: Low																						
1	<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	8	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Fagus orientalis</i>	6																							
3	<i>Picea orientalis</i> -sub-endemic for the Caucasus, irradiated to Asia Minor	2	<b>Photograph number/reference:</b> CIMG9972. Mixed forest (beech-fir-tree forest with spruce admixture); CIMG9974. <i>Salvia glutinosa</i> ; CIMG9976. Mixed forest (beech-fir-tree forest with spruce admixture).																						
4	<i>Hydrocotyle raamiflora</i>	5	<b>Polygon drawn on map:</b> Yes																						
5	<i>Sambucus ebulus</i>	4	<b>Human activity present (e.g. logging, grazing):</b> Grazing, logging																						
6	<i>Salvia glutinosa</i>	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	<i>Asperula odorata</i>	4																							
8	<i>Fragaria vesca</i>	2																							
9	<i>Prunella vulgaris</i>	2																							
10	<i>Paris incompleta</i>	2																							
11	<i>Geranium robertianum</i>	2																							
12	<i>Rumex sp.</i>	2																							
13	<i>Urtica dioica</i>	2																							
14	<i>Plantago media</i>	2																							
15	<i>Ranunculus sp.</i>	2																							
16	<i>Calamintha grandiflora</i>	2																							
17	<i>Viola sylvestris</i>	2																							
18																									

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

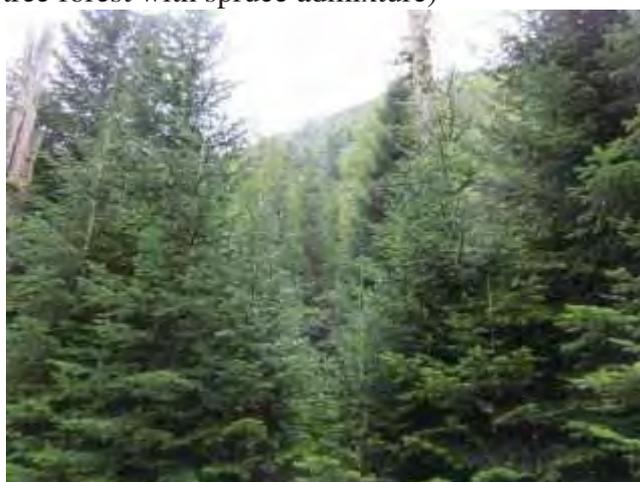
**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto*-*Abieta fruticosa colchica*)



**Plot 18. CIMG9972.** Mixed forest (beech-fir-tree forest with spruce admixture)



**Plot 18. CIMG9974.** *Salvia glutinosa*



**Plot 18. CIMG9976.** Mixed forest (beech-fir-tree forest with spruce admixture)

**Plot 19. Mixed forest (beech-fir-tree forest with spruce and birch admixture)**

Plant Community Type	Mixed forest (beech-fir-tree forest with spruce and birch admixture)
Conservation Value	Medium
Location	Right hand bank of the Nenskra River
Site No	19
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0271245/4777698
Altitude (m AMSL)	1207
Aspect	East
Inclination	25 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	70
Average DBH (cm)	50
Max height of the tree (m)	25
Average height of the tree (m)	20

Number of trees on sample area	6-7
Coverage of treelayer (%)	50-60
Coverage of shrublayer (%)	25
Height of shrublayer (cm)	600
Coverage of herblayer (%)	30-35
Height of herblayer (cm)	60
Coverage of mosslayer (%)	40-60 (10-12 species)
Number of higher plant species	14
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-70cm, H-25m (maximum), 150 year D-50cm, H-20m (average), 90 year Cop <sup>2</sup>
Fagus orientalis	D-60cm, H-25m (maximum), 130 year D-40cm, H-20m (average), 90 year Sp <sup>3</sup>
Betula litwinowii	D-36cm, H-16m (maximum), 90 year D-30cm, H-12m (average), 80 year Sol
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-40cm, H-18m (maximum), 100-120 year D-32cm, H-16m (average), 70-90 year Sp <sup>1</sup>
<b>Shruberry</b>	
Laurocerasus officinalis - tertiary relict flora species	H-4-5m, Sp <sup>3</sup>
Sorbus caucasigena - rare plant species	H-5-6m, Sp <sup>2</sup>
Rubus idaeus	Sp <sup>1</sup>
<b>Herblayer</b>	
Fragaria vesca	Sp <sup>3</sup>
Gentiana schistocalyx - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti, Eastern Anatolia)	Sol
Dryopteris austriaca	Sol
Urtica dioica	Sol
Oxalis acetosella	Sol
Veronica officinalis	Sol
Atropa caucasica - endemic to Caucasus	Unicum
<b>Mosslayer</b>	
Moss species	Cop <sup>1</sup>

<b>GPS Coordinates:</b> 0271245/4777698	<b>Date:</b> 13.09.2015	<b>Sample Number:</b> 19	<b>Height a.s.l.</b> 1207
<p><b>Community Type: Mixed forest (beech-fir-tree forest with spruce and birch admixture)</b>  Maximum height of trees (m) 25; Average height of trees (m) 20; Average age of trees: 90 year.  Coverage of tree layers (%) 60; Coverage of shrub layer (%) 25; Ground flora cover (%) 35-40.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Sub-alpine fir forest with small-reed cover (<i>Abieta subalpina calamagrostidosa</i>). The subalpine forest of this type is preserved only in places that are not easily accessible where grazing almost never takes place, at the altitude of 1950-2100 meters and inclination of 25-40°, on slopes of southern exposition and having convex relief. Beech, spruce, rarely birch (<i>Betula litwinowii</i>) and mountain ash (<i>Sorbus caucasigena</i>) can be found. In the understory there are: <i>Vaccinium arctostaphylos</i>, rarely <i>Rhododendron luteum</i>. From the herbaceous plants there are: <i>Festuca drymeja</i>, <i>F. gigantea</i>, <i>Poa nemoralis</i>, <i>Gadellia lactiflora</i>, <i>Gentiana schistocalyx</i>, <i>Polygonatum verticillatum</i>, <i>Astrantia maxima</i>, <i>Valeriana tiliifolia</i>, <i>Solidago virgaurea</i>, <i>Geranium sylvaticum</i>, <i>Vaccinium myrtillus</i>, <i>Gymnocarpium dryopteris</i>, etc.</p>			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>

1	<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	8	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis																						
2	<i>Fagus orientalis</i>	6																							
3	<i>Betula litwinowii</i>	2	<b>Photograph number/reference:</b> CIMG9979. <i>Laurocerasus officinalis</i> ; CIMG9980. <i>Sorbus caucasigena</i> ; CIMG9983. <i>Laurocerasus officinalis</i> ; CIMG9984. <i>Gentiana schistocalyx</i> ; CIMG9986. <i>Veronica officinalis</i> ; Plot 19. CIMG9987. <i>Atropa caucasica</i> .																						
4	<i>Picea orientalis</i> -sub-endemic for the Caucasus, irradiated to Asia Minor	4	<b>Polygon drawn on map:</b> Yes																						
5	<i>Laurocerasus officinalis</i> - tertiary relict flora species	6	<b>Human activity present (e.g. logging, grazing):</b> Logging																						
6	<i>Sorbus caucasigena</i> - rare plant species	5	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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2	<4% occasional																								
1	<4% rare																								
7	<i>Rubus idaeus</i>	4																							
8	<i>Fragaria vesca</i>	6																							
9	<i>Gentiana schistocalyx</i> - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti, Eastern Anatolia)	2																							
10	<i>Dryopteris austriaca</i>	2																							
11	<i>Urtica dioica</i>	2																							
12	<i>Oxalis acetosella</i>	2																							
13	<i>Veronica officinalis</i>	2																							
14	<i>Atropa caucasica</i> - endemic to Caucasus	1																							
15																									
16																									
17																									
18																									
19																									

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto*-*Abieta sine fruticosa*)



Plot 19. CIMG9979. *Laurocerasus officinalis*



Plot 19. CIMG9980. *Sorbus caucasigena*



Plot 19. CIMG9983. *Laurocerasus officinalis*



Plot 19. CIMG9984. *Gentiana schistocalyx*



Plot 19. CIMG9986. *Veronica officinalis*



Plot 19. CIMG9987. *Atropa caucasica*

**Plot 20. Mixed forest (fir-alder forest with spruce and beech admixture)**

Plant Community Type	Mixed forest (fir-alder forest with spruce and beech admixture)
Conservation Value	Medium
Location	Right hand bank of the Nenskra River, nearby Tengiz Tsindeliani house
Site No	20
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0270909/4775731
Altitude (m AMSL)	1142
Aspect	East
Inclination	35 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	70
Average DBH (cm)	40
Max height of the tree (m)	24
Average height of the tree (m)	20
Number of trees on sample area	10-12
Coverage of treelayer (%)	50
Coverage of shrublayer (%)	40-50
Height of shrublayer (cm)	250
Coverage of herblayer (%)	20-25
Height of herblayer (cm)	100
Coverage of mosslayer (%)	10-15 (3-4 species)
Number of higher plant species	20

Species	Cover-Abundance by Drude Scale
<b>Treelayer</b>	
Alnus barbata	D-40cm, H-19m (maximum), 55 year D-28cm, H-14m (average), 30 year Cop <sup>1</sup>
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-70cm, H-24m (maximum), 150 year D-42cm, H-19m (average), 80 year Sp <sup>2</sup>
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-60cm, H-22m (maximum), 110 year Sp <sup>1</sup>
Fagus orientalis	D-60cm, H-23m (maximum), 130 year D-40cm, H-20m (average), 90 year Sp <sup>1</sup>
Populus tremula	D-16cm, H-10m (maximum), 20 year Sol
<b>Shruberry</b>	
Corylus avellana	Cop <sup>1</sup>
Rhododendron luteum	Sp <sup>3</sup>
Rubus idaeus	Sp <sup>1</sup>
Rubus sp.	Sp <sup>1</sup>
Sorbus caucasigena - rare plant species	Sol
<b>Herblayer</b>	
Dryopteris filix-mas	Sp <sup>2</sup>
Sedum oppositifolium	Sp <sup>1</sup>
Festuca drimeja	Sp <sup>1</sup>
Geranium robertianum	Sol
Impatiens noli-tangere	Sol
Oxalis acetosella	Sol
Calamintha grandiflora	Sol
Salvia glutinosa	Sol
Urtica dioica	Sol
Atropa caucasica - endemic to Caucasus	Unicum
<b>Mosslayer</b>	
Moss species	Sp <sup>2</sup>

<b>GPS Coordinates:</b> 0270909/4775731	<b>Date:</b> 14.09.2015	<b>Sample Number:</b> 20	<b>Height a.s.l.</b> 1142
<p><b>Community Type: Mixed forest (fir-alder forest with spruce and beech admixture)</b>  Maximum height of trees (m) 24; Average height of trees (m) 20; Average age of trees: 80 year.  Coverage of tree layers (%) 50; Coverage of shrub layer (%) 40; Ground flora cover (%) 55-60.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Dark coniferous forest with the understory of Pontic rhododendron (<i>Piceeta rhododendrosa</i>, <i>Piceeto-Abieta rhododendrosa</i>, <i>Abieta rhododendrosa</i>, <i>Fageto-Abieta rhododendrosa</i>), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: <i>Trachystemon orientalis</i>, <i>Galium rotundifolium</i>. From ferns the following can be found: <i>Blechnum spicant</i>, <i>Polystichum woronowii</i>. These species are rare: <i>Ruscus colchicus</i>, <i>Rubus hirtus</i>, <i>Hedera colchica</i>.</p>			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>
1	Alnus barbata	7	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis
2	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	5	
3	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	4	<b>Photograph number/reference:</b> CIMG9995. Mixed forest (fir-alder forest with spruce and beech admixture); CIMG9997. <i>Sorbus caucasigena</i> .
4	Fagus orientalis	4	<b>Polygon drawn on map:</b> Yes
5	Populus tremula	2	<b>Human activity present (e.g. logging, grazing):</b> Logging

6	<i>Corylus avellana</i>	7	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.	
7	<i>Rhododendron luteum</i>	6		
8	<i>Rubus idaeus</i>	4		<b>Domin value</b>
9	<i>Rubus sp.</i>	4		<b>Cover-abundance</b>
10	<i>Sorbus caucasigena</i> - rare plant species	2		10
11	<i>Dryopteris filix-mas</i>	5		9
12	<i>Sedum oppositifolium</i>	4		8
13	<i>Festuca drimeja</i>	4		7
14	<i>Geranium robertianum</i>	2		6
15	<i>Impatiens noli-tangere</i>	2		5
16	<i>Oxalis acetosella</i>	2		4
17	<i>Calamintha grandiflora</i>	2		3
18	<i>Salvia glutinosa</i>	2		2
19	<i>Urtica dioica</i>	2		1
20	<i>Atropa caucasica</i> - endemic to Caucasus	1		

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto*-*Abieta fruticosa colchica*)



**Plot 20. CIMG9995.** Mixed forest (fir-alder forest with spruce and beech admixture)

**Plot 20. CIMG9997.** *Sorbus caucasigena*

**Plot 21. Mixed forest (dark coniferous-deciduous forest)**

<b>Plant Community Type</b>	<b>Mixed forest (dark coniferous-deciduous forest).</b>
<b>Conservation Value</b>	<b>High</b>
Location	Right hand bank of the Nenskra River, nearby Tengiz Tsindeliani house
Site No	21
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0271013/4776175
Altitude (m AMSL)	1186
Aspect	South-West
Inclination	15-20 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	80
Average DBH (cm)	40
Max height of the tree (m)	26
Average height of the tree (m)	18

Number of trees on sample area	4-5
Coverage of treelayer (%)	50
Coverage of shrublayer (%)	50-60
Height of shrublayer (cm)	600
Coverage of herblayer (%)	20-30
Height of herblayer (cm)	40
Coverage of mosslayer (%)	20-25 (6-7 species)
Number of higher plant species	31
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-80cm, H-24m (maximum), 150-160 year D-45cm, H-18m (average), 90 year Sp <sup>2</sup>
Fagus orientalis	D-80cm, H-26m (maximum), 140-150 year D-40cm, H-18m (average), 80-90 year Sp <sup>2</sup>
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-30cm, H-12m (maximum), 60-70 year D-4cm, H-9m (average), 40-50 year Sp <sup>2</sup>
Acer platanoides	D-80cm, H-25m (maximum), 150 year D-30cm, H-18m (average), 80 year Sp <sup>1</sup>
Carpinus caucasica	D-50cm, H-18m (maximum), 90-100 year D-30cm, H-14m (average), 70 year Sp <sup>1</sup>
Alnus barbata	D-22cm, H-14m (maximum), 25-30 year D-18cm, H-10m (average), 15-20 year Sol
<b>Shruberry</b>	
Rubus sp.	Cop <sup>2</sup>
Corylus avellana	Sp <sup>3</sup>
Laurocerasus officinalis - tertiary relict flora species	Sp <sup>1</sup>
Ilex colchica- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor	Sp <sup>1</sup>
Sorbus caucasigena - rare plant species	H-4-6m Sol
Viburnum orientale	Sol
Vaccinium arctostaphylos	Sol
<b>Herblayer</b>	
Fragaria vesca	Sp <sup>1</sup>
Sedum oppositifolium	Sp <sup>1</sup>
Oxalis acetosella	Sp <sup>1</sup>
Luzula sylvatica	Sp <sup>2</sup>
Geranium robertianum	Sol
Athyrium filix-femina	Sol
Asperula odorata	Sol
Salvia glutinosa	Sol
Prunella vulgaris	Sol
Lysimachia verticillata	Sol
Viola sylvatica	Sol
Festuca drimeja	Sol
Clinopodium umbrosum	Sol
Mycelis muralis	Sol
Ranunculus sp.	Sol
Calamintha grandiflora	Sol
Calystegia silvatica	Sol
Atropa caucasica - endemic to Caucasus	Unicum
<b>Mosslayer</b>	
Moss species	Sp <sup>2</sup>

<b>GPS Coordinates:</b> 0271013/4776175	<b>Date:</b> 14.09.2015	<b>Sample Number:</b> 21	<b>Height a.s.l.</b> 1186																						
<b>Community Type: Mixed forest (dark coniferous-deciduous forest).</b> Maximum height of trees (m) 26; Average height of trees (m) 18; Average age of trees: 70 year. Coverage of tree layers (%) 50; Coverage of shrub layer (%) 60; Ground flora cover (%) 60-65.																									
<b>General description and notes:</b> <b>Plant community:</b> Dark coniferous forest with the understory of Pontic rhododendron ( <i>Piceeta rhododendrosa</i> , <i>Piceeto-Abieta rhododendrosa</i> , <i>Abieta rhododendrosa</i> , <i>Fageto-Abieta rhododendrosa</i> ), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: <i>Trachystemon orientalis</i> , <i>Galium rotundifolium</i> . From ferns the following can be found: <i>Blechnum spicant</i> , <i>Polystichum woronowii</i> . These species are rare: <i>Ruscus colchicus</i> , <i>Rubus hirtus</i> , <i>Hedera colchica</i> .																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: High</b>																						
1	<i>Abies nordmanniana</i> -sub-endemic for the Caucasus, irradiated in Asia Minor	5	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis																						
2	<i>Fagus orientalis</i>	5																							
3	<i>Picea orientalis</i> -sub-endemic for the Caucasus, irradiated to Asia Minor	5	<b>Photograph number/reference:</b> CIMG0001. Mixed forest (dark coniferous-deciduous forest); CIMG0004. <i>Ilex colchica</i> ; CIMG0005. <i>Atropa caucasica</i> ; CIMG9999. Mixed forest (dark coniferous-deciduous forest).																						
4	<i>Acer platanoides</i>	4	<b>Polygon drawn on map:</b> Yes																						
5	<i>Carpinus caucasica</i>	4	<b>Human activity present (e.g. logging, grazing):</b> Logging																						
6	<i>Alnus barbata</i>	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	<i>Rubus</i> sp.	8																							
8	<i>Corylus avellana</i>	6																							
9	<i>Laurocerasus officinalis</i> - tertiary relict flora species	4																							
10	<i>Ilex colchica</i> - tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor	4																							
11	<i>Sorbus caucasigena</i> - rare plant species	2																							
12	<i>Viburnum orientale</i>	2																							
13	<i>Vaccinium arctostaphylos</i>	2																							
14	<i>Fragaria vesca</i>	4																							
15	<i>Sedum oppositifolium</i>	4																							
16	<i>Oxalis acetosella</i>	4																							
17	<i>Luzula sylvatica</i>	5																							
18	<i>Geranium robertianum</i>	2																							
19	<i>Athyrium filix-femina</i>	2																							
20	<i>Asperula odorata</i>	2																							
21	<i>Salvia glutinosa</i>	2																							
22	<i>Prunella vulgaris</i>	2																							
23	<i>Lysimachia verticillata</i>	2																							
24	<i>Viola sylvatica</i>	2																							
25	<i>Festuca drimeja</i>	2																							
26	<i>Clinopodium umbrosum</i>	2																							
27	<i>Mycelis muralis</i>	2																							
28	<i>Ranunculus</i> sp.	2																							
29	<i>Calamintha grandiflora</i>	2																							
30	<i>Calystegia silvatica</i>	2																							
31	<i>Atropa caucasica</i> - endemic to Caucasus	1																							

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



**Plot 21. CIMG0001.** Mixed forest (dark coniferous-deciduous forest).



**Plot 21. CIMG0004.** *Ilex colchica*



**Plot 21. CIMG0005.** *Atropa caucasica*



**Plot 21. CIMG9999.** Mixed forest (dark coniferous-deciduous forest).

**Plot 22. Alder forest**

Plant Community Type	Alder forest
Conservation Value	Low
Location	Left hand bank of the Nenskra River
Site No	22
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0270923/4770275
Altitude (m AMSL)	945
Aspect	West
Inclination	5-10 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	60
Average DBH (cm)	40
Max height of the tree (m)	16
Average height of the tree (m)	12
Number of trees on sample area	4-5

Coverage of treelayer (%)	25-30
Coverage of shrublayer (%)	0-3
Height of shrublayer (cm)	600
Coverage of herblayer (%)	30-35
Height of herblayer (cm)	80
Coverage of mosslayer (%)	30-35 (10-12 species)
Number of higher plant species	24
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
<i>Alnus barbata</i>	D-40 cm, H-16m, 50-60 year Sp <sup>1</sup>
<i>Acer campestre</i>	D-60 cm, H-15m, 100 year Unicum
<i>Carpinus caucasica</i>	D-16 cm, H-8m, 10-15 year Unicum
<i>Acer platanoides</i>	D-36 cm, H-14m, 60-70 year Unicum
<i>Tilia begoniifolia</i>	D-60 cm, H-14m, 90-100 year Unicum
<b>Shruberry</b>	
<i>Euonymus europaeus</i>	D-3-4 cm, H-10m Sol
<i>Corylus avellana</i>	Sol
<i>Sorbus caucasigena</i> - rare plant species	H-8m Sol
<i>Mespilus germanica</i>	Unicum
<b>Herblayer</b>	
<i>Viola odorata</i>	Sp <sup>3</sup>
<i>Fragaria vesca</i>	Sp <sup>2</sup>
<i>Brachypodium sylvaticum</i>	Sp <sup>2</sup>
<i>Colchicum speciosum</i> -CITES	Sp <sup>1</sup>
<i>Clinopodium umbrosum</i>	Sol
<i>Geranium robertianum</i>	Sol
<i>Lapsana grandiflora</i>	Sol
<i>Sedum oppositifolium</i>	Sol
<i>Sambucus ebulus</i>	H-80cm Sol
<i>Cynoglossum officinale</i>	Sol
<i>Salvia glutinosa</i>	Sol
<i>Polypodium vulgare</i>	Sol
<i>Glechoma hederacea</i>	Sol
<i>Calystegia silvatica</i>	Sol
<i>Mycelis muralis</i>	Sol
<b>Mosslayer</b>	
Moss species	Sp <sup>3</sup>

<b>GPS Coordinates:</b> 0270923/4770275	<b>Date:</b> 15.09.2015	<b>Sample Number:</b> 22	<b>Height a.s.l.</b> 945
<b>Community Type: Alder forest</b> Maximum height of trees (m) 16; Average height of trees (m) 12; Average age of trees: 70 year. Coverage of tree layers (%) 30; Coverage of shrub layer (%) 3; Ground flora cover (%) 30-35.			
<b>General description and notes:</b> <b>Plant community:</b> In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common ( <i>Alnus barbata</i> ) and white ( <i>A. incana</i> ) alder and species of the willow ( <i>Salix</i> spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see <i>Matteuccia struthiopteris</i> . White alder in these gorges reaches the sub-alpine zone.			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>
1	<i>Alnus barbata</i>	4	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis
2	<i>Acer campestre</i>	1	
3	<i>Carpinus caucasica</i>	1	<b>Photograph number/reference:</b> CIMG0018. Alder forest;

			<b>CIMG0019.</b> <i>Euonymus europaeus</i> ; <b>CIMG0021.</b> <i>Colchicum speciosum</i> ; <b>CIMG0022.</b> <i>Acer platanoides</i> ; <b>CIMG0023.</b> <i>Polypodium vulgare</i> ; <b>CIMG0027.</b> <i>Sorbus caucasigena</i> .																						
4	<i>Acer platanoides</i>	1	<b>Polygon drawn on map: Yes</b>																						
5	<i>Tilia begoniifolia</i>	1	<b>Human activity present (e.g. logging, grazing):</b> Logging																						
6	<i>Euonymus europaeus</i>	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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4	4-10%																								
3	<4% frequent																								
2	<4% occasional																								
1	<4% rare																								
7	<i>Corylus avellana</i>	2																							
8	<i>Sorbus caucasigena</i> - rare plant species	2																							
9	<i>Mespilus germanica</i>	1																							
10	<i>Viola odorata</i>	6																							
11	<i>Fragaria vesca</i>	5																							
12	<i>Brachypodium sylvaticum</i>	5																							
13	<i>Colchicum speciosum</i> -CITES	4																							
14	<i>Clinopodium umbrosum</i>	2																							
15	<i>Geranium robertianum</i>	2																							
16	<i>Lapsana grandiflora</i>	2																							
17	<i>Sedum oppositifolium</i>	2																							
18	<i>Sambucus ebulus</i>	2																							
19	<i>Cynoglossum officinale</i>	2																							
20	<i>Salvia glutinosa</i>	2																							
21	<i>Polypodium vulgare</i>	2																							
22	<i>Glechoma hederacea</i>	2																							
23	<i>Calystegia silvatica</i>	2																							
24	<i>Mycelis muralis</i>	2																							

**Habitats: 91E0\*** Code of Georgia: Alluvial forests

**Habitat sub-type: 91E0 \*01.** Floodplain forest



**Plot 22. CIMG0018.** Alder forest



**Plot 22. CIMG0019.** *Euonymus europaeus*



Plot 22. CIMG0021. *Colchicum speciosum*



Plot 22. CIMG0022. *Acer platanoides*



Plot 22. CIMG0023. *Polypodium vulgare*



Plot 22. CIMG0027. *Sorbus caucasigena*

**Plot 23. Mixed forest (oak forest with spruce and fir admixture)**

Plant Community Type	Mixed forest (oak forest with spruce and fir admixture)
Conservation Value	Medium
Location	Left hand bank of the Ormeleti River, upstream village Lukhi
Site No	23
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0270209/4761857
Altitude (m AMSL)	898
Aspect	South-East
Inclination	40-45 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	80
Average DBH (cm)	40
Max height of the tree (m)	25
Average height of the tree (m)	15
Number of trees on sample area	7-8
Coverage of treelayer (%)	60-70
Coverage of shrublayer (%)	5-10
Height of shrublayer (cm)	300
Coverage of herblayer (%)	20-25
Height of herblayer (cm)	100
Coverage of mosslayer (%)	50-55 (8-10 species)
Number of higher plant species	24
Species	<b>Cover-Abundance by Drude Scale</b>

Treelayer	
Quercus iberica - rare plant species	D-70cm, H-25m (maximum), 150 year D-30cm, H-20m (average), 80 year Cop <sup>2</sup>
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-30cm, H-14m (maximum), 60 year D-24cm, H-10m (average), 50 year Sol
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-20cm, H-12m (maximum), 30 year D-14cm, H-8m (average), 22 year Sol
Tilia begoniifolia	D-80 cm, H-20m, 130 year Unicum
Carpinus caucasica	D-32 cm, H-12m, 70-90 year Unicum
Shruberry	
Rubus sp.	Sp <sup>1</sup>
Rosa canina	Sol
Lonicera caucasica	Sol
Rhus coriaria	Sol
Euonymus europaeus	Sol
Herblayer	
Festuca drimeja	H-1m Sp <sup>2</sup>
Polypodium vulgare	Sp <sup>1</sup>
Poa nemoralis	Sp <sup>1</sup>
Lapsana grandiflora	Sol
Polygonatum glaberrimum	Sol
Campanula alliariifolia	Sol
Clinopodium umbrosum	Sol
Asplenium trichomanes	Sol
Helleborus caucasicus - endemic to Caucasus	Sol
Satureja spicigera	Sol
Paris incompleta	Sol
Sedum oppositifolium	Sol
Calamintha grandiflora	Sol
Asplenium septentrionale	Sol
Laser trilobum	Sol
Mosslayer	
Moss species	Cop <sup>1</sup>

<b>GPS Coordinates:</b> 0270209/4761857	<b>Date:</b> 15.09.2015	<b>Sample Number:</b> 23	<b>Height a.s.l.</b> 898
<p><b>Community Type: Mixed forest (oak forest with spruce and fir admixture)</b>  Maximum height of trees (m) 25; Average height of trees (m) 15; Average age of trees: 70 year.  Coverage of tree layers (%) 70; Coverage of shrub layer (%) 10; Ground flora cover (%) 30-35.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Dark coniferous forest with the understory of Pontic rhododendron (<i>Piceeta rhododendrosa</i>, <i>Piceeto-Abieta rhododendrosa</i>, <i>Abieta rhododendrosa</i>, <i>Fageto-Abieta rhododendrosa</i>), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: <i>Trachystemon orientalis</i>, <i>Galium rotundifolium</i>. From ferns the following can be found: <i>Blechnum spicant</i>, <i>Polystichum woronowii</i>. These species are rare: <i>Ruscus colchicus</i>, <i>Rubus hirtus</i>, <i>Hedera colchica</i>.</p>			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>
1	Quercus iberica - rare plant species	8	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis
2	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	2	
3	Abies nordmanniana-sub-	2	<b>Photograph number/reference: CIMG0035. Rhus coriaria;</b>

	endemic for the Caucasus, irradiated in Asia Minor		<b>CIMG0037. <i>Clinopodium umbrosum</i>; CIMG0038. <i>Satureja spicigera</i>.</b>																							
4	<i>Tilia begoniifolia</i>	1	<b>Polygon drawn on map: Yes</b>																							
5	<i>Carpinus caucasica</i>	1	<b>Human activity present (e.g. logging, grazing):</b> Logging																							
6	<i>Rubus</i> sp.	4	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>		Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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3	<4% frequent																									
2	<4% occasional																									
1	<4% rare																									
7	<i>Rosa canina</i>	2																								
8	<i>Lonicera caucasica</i>	2																								
9	<i>Rhus coriaria</i>	2																								
10	<i>Euonymus europaeus</i>	3																								
11	<i>Festuca drimeja</i>	5																								
12	<i>Polypodium vulgare</i>	4																								
13	<i>Poa nemoralis</i>	4																								
14	<i>Lapsana grandiflora</i>	2																								
15	<i>Polygonatum glaberrimum</i>	2																								
16	<i>Campanula alliariifolia</i>	2																								
17	<i>Clinopodium umbrosum</i>	2																								
18	<i>Asplenium trichomanes</i>	2																								
19	<i>Helleborus caucasicus</i> - endemic to Caucasus	2																								
20	<i>Satureja spicigera</i>	2																								
21	<i>Paris incompleta</i>	2																								
22	<i>Sedum oppositifolium</i>	2																								
23	<i>Calamintha grandiflora</i>	2																								
24	<i>Asplenium septentrionale</i>	2																								
25	<i>Lasium trilobum</i>	1																								

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



Plot 23. CIMG0035. *Rhus coriaria*



Plot 23. CIMG0037. *Clinopodium umbrosum*



Plot 23. CIMG0038. *Satureja spicigera*

**Plot 24. Mixed forest (fir forest with alder and oak admixture)**

Plant Community Type	Mixed forest (fir forest with alder and oak admixture)
Conservation Value	Medium
Location	Left hand bank of the Ormeleti River, upstream village Lukhi
Site No	24
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0270112/4761872
Altitude (m AMSL)	900
Aspect	East
Inclination	35 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	60
Average DBH (cm)	30
Max height of the tree (m)	28
Average height of the tree (m)	14
Number of trees on sample area	6-7
Coverage of treelayer (%)	50-60
Coverage of shrublayer (%)	5
Height of shrublayer (cm)	700
Coverage of herblayer (%)	20-25
Height of herblayer (cm)	50
Coverage of mosslayer (%)	25-30 (4-5 species)
Number of higher plant species	21
Species	Cover-Abundance by Drude Scale
Treelayer	
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-60cm, H-28m (maximum), 140-150 year D-30cm, H-20m (average), 60-65 year Sp <sup>3</sup>
Carpinus caucasica	D-24cm, H-14m (maximum), 65 year Sp <sup>1</sup>
Quercus iberica - rare plant species	D-12cm, H-7m (maximum), 20-25 year Sp <sup>1</sup>
Castanea sativa (young) - Georgian Red List Species (VU)	H-6m Sol
Picea orientalis (young) - sub-endemic for the Caucasus, irradiated to Asia Minor	H-3m Sol
Shruberry	
Rhododendron ponticum - tertiary relict flora species, irradiated to Asia Minor and Balkans (Strandzha)	Sp <sup>1</sup>
Rubus sp.	Sol

Mespilus germanica	H-6-7m, Unicum
<b>Herblayer</b>	
Trifolium ambiguum	Sp <sup>2</sup>
Fragaria vesca	Sp <sup>1</sup>
Epimedium colchicum	Sol
Paris incompleta	Sol
Primula macrocalyx	Sol
Sedum oppositifolium	Sol
Helleborus caucasicus - endemic to Caucasus	Sol
Satureja spicigera	Sol
Clinopodium vulgare	Sol
Leontodon hispidus	Sol
Viola alba	Sol
Salvia glutinosa	Sol
Digitalis ciliata - endemic to Caucasus	Unicum
<b>Mosslayer</b>	
Moss species	Sp <sup>3</sup>

<b>GPS Coordinates:</b> 0270112/4761872	<b>Date:</b> 15.09.2015	<b>Sample Number:</b> 24	<b>Height a.s.l.</b> 900																						
<p><b>Community Type: Mixed forest (fir forest with alder and oak admixture)</b>  Maximum height of trees (m) 28; Average height of trees (m) 14; Average age of trees: 60 year.  Coverage of tree layers (%) 60; Coverage of shrub layer (%) 5; Ground flora cover (%) 25-30.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Beech forest with the understory (<i>Fageta ilicitoso-laurocerasosa</i>) of holly (<i>Ilex colchica</i>) and laurel (<i>Laurocerasus officinalis</i>) can be found on limestone mountains in Abkhasia and Samegrelo – on mountain massives of Kvira, Migaria and Askhi.</p>																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>																						
1	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	6	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis (Colchic elements in understory)																						
2	Carpinus caucasica	4																							
3	Quercus iberica - rare plant species	4	<b>Photograph number/reference: CIMG0042.</b> <i>Clinopodium vulgare</i> ; <b>CIMG0043.</b> <i>Helleborus caucasicus</i> ; <b>CIMG0044.</b> Mixed forest (fir forest with alder and oak admixture); <b>Plot 24.</b> <b>CIMG0045.</b> <i>Satureja spicigera</i> ; <b>CIMG0046.</b> <i>Digitalis ciliata</i> ; <b>CIMG0048.</b> <i>Rhododendron ponticum</i> .																						
4	Castanea sativa-Georgian Red List Species (VU)	2	<b>Polygon drawn on map:</b> Yes																						
5	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	2	<b>Human activity present (e.g. logging, grazing):</b> Logging																						
6	Rhododendron ponticum - tertiary relict flora species, irradiated to Asia Minor and Balkans (Strandzha)	4	<p><b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.</p> <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr> <td>10</td> <td>91-100%</td> </tr> <tr> <td>9</td> <td>76-90%</td> </tr> <tr> <td>8</td> <td>51-75%</td> </tr> <tr> <td>7</td> <td>34-50%</td> </tr> <tr> <td>6</td> <td>26-33%</td> </tr> <tr> <td>5</td> <td>11-25%</td> </tr> <tr> <td>4</td> <td>4-10%</td> </tr> <tr> <td>3</td> <td>&lt;4% frequent</td> </tr> <tr> <td>2</td> <td>&lt;4% occasional</td> </tr> <tr> <td>1</td> <td>&lt;4% rare</td> </tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	Rubus sp.	2																							
8	Mespilus germanica	1																							
9	Trifolium ambiguum	5																							
10	Fragaria vesca	4																							
11	Epimedium colchicum-CITES	2																							
12	Paris incompleta	2																							
13	Primula macrocalyx	2																							
14	Sedum oppositifolium	2																							
15	Helleborus caucasicus - endemic to Caucasus	2																							
16	Satureja spicigera	2																							

17	<i>Clinopodium vulgare</i>	2	
18	<i>Leontodon hispidus</i>	2	
19	<i>Viola alba</i>	2	
20	<i>Salvia glutinosa</i>	2	
21	<i>Digitalis ciliata</i> - endemic to Caucasus	1	

**Habitats:** 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

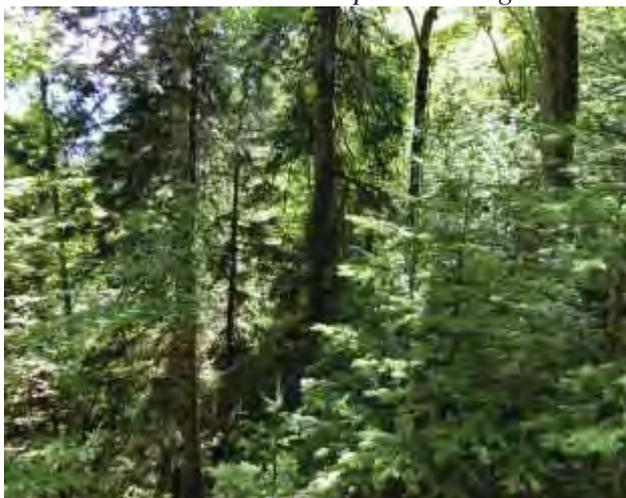
**Habitat sub-type:** 91FC-GE-02 Beech forest with the understory (*Fageta ilicitoso-laurocerasosa*) of holly (*Ilex colchica*).



**Plot 24. CIMG0042.** *Clinopodium vulgare*



**Plot 24. CIMG0043.** *Helleborus caucasicus*



**Plot 24. CIMG0044.** Mixed forest (fir forest with alder and oak admixture)



**Plot 24. CIMG0045.** *Satureja spicigera*



Plot 24. CIMG0046. *Digitalis ciliata*



Plot 24. CIMG0048. *Rhododendron ponticum*

### Plot 25. Oak forest

Plant Community Type	Oak forest
Conservation Value	Low
Location	Left hand bank of the Ormeleti River, upstream village Lukhi
Site No	25
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0269895/4761553
Altitude (m AMSL)	905
Aspect	South
Inclination	25-30 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	36
Average DBH (cm)	20
Max height of the tree (m)	13
Average height of the tree (m)	8
Number of trees on sample area	3-4
Coverage of treelayer (%)	30
Coverage of shrublayer (%)	10
Height of shrublayer (cm)	400
Coverage of herblayer (%)	5-7
Height of herblayer (cm)	50
Coverage of mosslayer (%)	0-2 (1-2 species)
Number of higher plant species	18
Species	Cover-Abundance by Drude Scale
Treelayer	
Quercus iberica - rare plant species	D-36cm, H-13m (maximum), 65-70 year D-32cm, H-8m (average), 55-60 year Sp <sup>2</sup>
Sorbus torminalis	D-20 cm, H-7m, 25 year Sol
Acer laetum	D-30 cm, H-8m, 30 year

	Sp <sup>1</sup>
Carpinus caucasica	D-15 cm, H-6m, 50 year Sol
<b>Shruberry</b>	
Rhus coriaria	H-3m, Sp <sup>1</sup>
Swida australis	H-4m Sol
<b>Herblayer</b>	
Viola alba	Sol
Calystegia silvatica	Sol
Salvia glutinosa	Sol
Clinopodium vulgare	Sol
Digitalis ciliata - endemic to Caucasus	Sol
Festuca drimeja	Sol
Satureja spicigera	Sol
Leontodon hispidus	Sol
Carex sp.	Sol
Aegopodium podagraria	Sol
Mycelis muralis	Sol
Fragaria vesca	Sol
<b>Mosslayer</b>	
Moss species	Sol

<b>GPS Coordinates:</b> 0269895/4761553	<b>Date:</b> 15.09.2015	<b>Sample Number:</b> 25	<b>Height a.s.l.</b> 905
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**Community Type: Oak forest**

Maximum height of trees (m) 13; Average height of trees (m) 8; Average age of trees: 40 year.  
Coverage of tree layers (%) 30; Coverage of shrub layer (%) 10; Ground flora cover (%) 15-20.

**General description and notes:**

**Plant community:** Oak-hornbeam forest (*Quercetum-Carpinion betulii*) is distributed at the altitude of 600-1100 meters a.s.l.. Tree species found: *Quercus iberica*, *Carpinus betulus*, *C. orientalis*, *Sorbus torminalis*, *Acer laetum*, *Picea orientalis*, *Abies nordmanniana*. Bushes - *Cornus mas*, *Corylus avellana*, *Swida australis*, *Chamaecytisus caucasica*, *Lonicera caucasica*, *Mespilus germanica*. Herbaceous plants - *Festuca drymeja*, *Clinopodium vulgare*, *Veronica peduncularis*, *Polygonatum glaberrimum*, *Campanula rapunculoides*, *Dactylis glomerata*. Oak-hornbeam forest with the sedge understory is characteristic to Georgia.

#	Species	Domin	Conservation Value: Low																						
1	<i>Quercus iberica</i> - rare plant species	5	<b>Give reason for conservation value:</b> Degraded, ordinary phytocenosis																						
2	<i>Sorbus torminalis</i>	2																							
3	<i>Acer laetum</i>	4	<b>Photograph number/reference:</b> CIMG0052. Oak forest; CIMG0053. <i>Quercus iberica</i> ; CIMG0055. <i>Rhus coriaria</i> ; CIMG0057. <i>Swida australis</i> .																						
4	<i>Carpinus caucasica</i>	2	<b>Polygon drawn on map:</b> Yes																						
5	<i>Rhus coriaria</i>	4	<b>Human activity present (e.g. logging, grazing):</b> Logging																						
6	<i>Swida australis</i>	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	<i>Viola alba</i>	2																							
8	<i>Calystegia silvatica</i>	2																							
9	<i>Salvia glutinosa</i>	2																							
10	<i>Clinopodium vulgare</i>	2																							
11	<i>Digitalis ciliata</i> - endemic to Caucasus	2																							
12	<i>Festuca drimeja</i>	2																							
13	<i>Satureja spicigera</i>	2																							
14	<i>Leontodon hispidus</i>	2																							
15	<i>Carex sp.</i>	2																							
16	<i>Aegopodium podagraria</i>	2																							
17	<i>Mycelis muralis</i>	2																							
18	<i>Fragaria vesca</i>	2																							

**Habitats: 9160GE** Code of Georgia: - Oak or oak-hornbeam forests (*Quercetum -Carpinion betuli*)

**Habitat sub-type: 9160GE-03** Oak-hornbeam forest (*Quercetum-Carpinion betulii*)



**Plot 25. CIMG0052.** Oak forest



**Plot 25. CIMG0053.** *Quercus iberica*



**Plot 25. CIMG0055.** *Rhus coriaria*



**Plot 25. CIMG0057.** *Swida australis*

**Plot 26. Petrophilous (rock) vegetation group**

Plant Community Type	Petrophilous (rock) vegetation group
Conservation Value	High
Location	Right hand bank of the Nakra River, impoundment area
Site No	26
Assessed plot size (m <sup>2</sup> )	10
GPS Coordinates - spherical//UTM	0270774/4761418
Altitude (m AMSL)	662
Aspect	West
Inclination	90 <sup>0</sup>
Community Structural Features	
Height of shrublayer (cm)	40
Height of herblayer (cm)	30
Coverage of shrublayer (%)	5-10
Coverage of herblayer (%)	3-5
Coverage of mosslayer (%)	30-50
Number of higher plant species	25

Number of moss species	10-15
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Shruberry</b>	
Rubus sp.	H-40cm Sp <sup>1</sup>
Hedera colchica	Sp <sup>1</sup>
<b>Herblayer</b>	
Saxifraga subverticilata	Sol
Satureja spicigera	Sol
Viola alba	Sol
Fragaria vesca	Sol
Tussilago farfara	Sol
Hypericum perforatum	Sol
Allium kunthianum	Sol
Eupatorium cannabinum	Sol
Clinopodium vulgare	Sol
Festuca sp.	Sol
Epilobium nervosum.	H-30cm Sol
Phegopteris polipodioides	Sol
Leontodon hispidus	Sol
Saxifraga cymbalaria	Sol
Asplenium trichomanes	Sol
Sedum oppositifolium	Sol
Alchemilla sp.	Sol
Mycelis muralis	Sol
Centauria bella	Sol
Campanula alliariifolia	Sol
Scabiosa correvoniana- endemic to Caucasus	Sol
Solidago virgaurea	Sol
Colchicum speciosum-CITES	Unicum
<b>Mosslayer</b>	
Moss species	Cop <sup>1</sup>

<b>GPS Coordinates:</b> 0270774/4761418	<b>Date:</b> 15.09.2015	<b>Sample Number:</b> 26	<b>Height a.s.l.</b> 662
<p><b>Community Type: Petrophilous (rock) vegetation group</b>  Maximum height of trees (m) ---; Average height of trees (m) ---; Average age of trees: ---year.  Coverage of tree layers (%) ---; Coverage of shrub layer (%) 10; Ground flora cover (%) 5-10.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Vegetation of limestone rock is compatible with the vegetation of limestone remains and can be found mainly in western Caucasus from Abkhazia including Racha. Significant rock massifs can be found in the gorge of River Tskenistskali on mountain massifs of Askhi and Khvamli. Communities of the vegetation of limestone rock are very well manifested in the gorge of river Jonoula at Askhi. They include the following species: <i>Symphyandra pendula</i> var. <i>transcaucasica</i>, <i>Scabiosa imeretina</i>, <i>Umbilicus oppositifolius</i>, <i>Asplenium ruta-muraria</i>, etc. On mountains of Askhi, Jvari and Migaria there are communities of endemic plants – <i>Geum speciosum</i>, <i>Scutellaria pontica</i>, <i>Carex pontica</i>, <i>Cyclamen colchica</i>. The same community is found on limestones of Abkhazia - <i>Geum speciosum</i>, <i>Carex pontica</i>, <i>Astrantia colchica</i>, <i>Alboviodoxa elegans</i>, <i>Kelumariella colchica</i>, <i>Achillea griseo-virens</i>, <i>Campanula dzaaku</i>, <i>Scutellaria pontica</i>. The following need to be highlighted from non-endemic species that are found on limestone - <i>Cyclamen europaeus</i>, <i>Arctostaphylos uva-ursi</i> subsp. <i>caucasica</i>. In the Alpine zone and below <i>Daphne sericea</i> and <i>Umbilicus oppositifolius</i> are observed. <i>Allium globosum</i> grows on the limestone rock in Racha-Lechkhumi.</p>			
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: High</b>
1	Rubus sp.	4	<b>Giver reason for conservation value:</b> Endemism
2	Hedera colchica	4	
3	Saxifraga subverticilata	2	<b>Photograph number/reference:</b> CIMG0065. Petrophous (rock) vegetation; CIMG0066. <i>Asplenium trichomanes</i> ; CIMG0067. <i>Saxifraga cymbalaria</i> ; CIMG0069. <i>Tussilago farfara</i> ; CIMG0070. <i>Satureja spicigera</i> ; CIMG0072. <i>Hedera colchica</i> ;

			<b>CIMG0081. <i>Centaurea bella</i>; CIMG0084. <i>Scabiosa correvoniana</i>; CIMG0085. <i>Solidago virgaurea</i>; CIMG0088. <i>Campanula alliariifolia</i>; CIMG0090. <i>Colchicum speciosum</i>; CIMG0092. <i>Saxifraga subverticillata</i> - endemic to Caucasus</b>																							
4	<i>Satureja spicigera</i>	2	<b>Polygon drawn on map: Yes</b>																							
5	<i>Viola alba</i>	2	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing - does not occur																							
6	<i>Fragaria vesca</i>	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>		Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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2	<4% occasional																									
1	<4% rare																									
7	<i>Tussilago farfara</i>	2																								
8	<i>Hypericum perforatum</i>	2																								
9	<i>Allium kunthianum</i>	2																								
10	<i>Eupatorium cannabinum</i>	2																								
11	<i>Clinopodium vulgare</i>	8																								
12	<i>Festuca sp.</i>	2																								
13	<i>Epilobium nervosum</i>	2																								
14	<i>Epilobium nervosum</i>	2																								
15	<i>Phegopteris polipodioides</i>	2																								
16	<i>Leontodon hispidus</i>	2																								
17	<i>Saxifraga cymbalaria</i>	2																								
18	<i>Asplenium trichomanes</i>	2																								
19	<i>Sedum oppositifolium</i>	2																								
20	<i>Alchemilla sp.</i>	2																								
21	<i>Mycelis muralis</i>	2																								
22	<i>Centaurea bella</i>	2																								
23	<i>Campanula alliariifolia</i>	2																								
24	<i>Scabiosa correvoniana</i> - endemic to Caucasus	2																								
25	<i>Solidago virgaurea</i>	2																								
26	<i>Colchicum speciosum</i> - CITES	1																								

**Habitat Type: 8210** Calcareous rocky slopes with chasmophytic vegetation

**Habitats: 8210** Calcareous rocky slopes with chasmophytic vegetation



**Plot 26. CIMG0065.** Petrophous (rock) vegetation group



**Plot 26. CIMG0066.** *Asplenium trichomanes*



Plot 26. CIMG0067. *Saxifraga cymbalaria*



Plot 26. CIMG0069. *Tussilago farfara*



Plot 26. CIMG0070. *Satureja spicigera*



Plot 26. CIMG0072. *Hedera colchica*



Plot 26. CIMG0081. *Centaurea bella*



Plot 26. CIMG0084. *Scabiosa correvoniana*



Plot 26. CIMG0085. *Solidago virgaurea*



Plot 26. CIMG0088. *Campanula alliariifolia*



Plot 26. CIMG0090. *Colchicum speciosum*



Plot 26. CIMG0092. *Saxifraga subverticillata* - endemic to Caucasus

## The Nenskra Valley, village Kedani, power house site

### Plot 27. Mixed deciduous forest - degraded hornbeam

Plant Community Type	Mixed deciduous forest - degraded hornbeam
Conservation Value	Medium
Location	The Nenskra Valley, village Kedani, power house site
Site No	27
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0270613/4763372
Altitude (m AMSL)	735
Aspect	West
Inclination	30-35 <sup>0</sup>
<b>Community Structural Features</b>	

Max DBH (cm)	54
Average DBH (cm)	32
Max height of the tree (m)	16
Average height of the tree (m)	10
Number of trees on sample area	3-4
Coverage of treelayer (%)	25-30
Coverage of shrublayer (%)	50-60
Height of shrublayer (cm)	600
Coverage of herblayer (%)	15-20
Height of herblayer (cm)	70
Coverage of mosslayer (%)	10-15 (10-12 species)
Number of higher plant species	20
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Carpinus caucasica	D-maximum-54 cm, H-14-16m, 110 year D-average-32cm, H-8-10m, 70 year Pollard hornbeam grove, that is logging had place Sp <sup>3</sup>
Fraxinus excelsior	D-maximum-20 cm, H-10-12m, 40 year Sol
Acer campestre - young	Sol
Acer laetum - young	Sol
Quercus iberica (young) - rare plant species	Sol
<b>Shruberry</b>	
Corylus avellana	H-5-6m, Cop <sup>1</sup>
Rubus sp.	Sp <sup>1</sup>
<b>Herblayer</b>	
Asperula odorata	Sol
Pachyphragma macrophyllum - representative of monotypic nemoral Colchic-Caucasian family; sub-endemic to Caucasus, irradiated to Assia Minor (Chaneti)	Sol
Primula macrocalyx	Sol
Asarum ibericum - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti)	Sol
Asplenium trichomanes	Sol
Cyclamen vernum	Sol
Polystichum braunii	Sol
Dryopteris filix-mas	Sol
Calystegia silvatica	Sol
Asplenium adianthum nigrum	Sol
Lapsana grandiflora	Sol
Mycelis muralis	Sol
Digitalis ciliata - endemic to Caucasus	H-70cm Unicum
<b>Mosslayer</b>	
Moss species	Sp <sup>2</sup>

<b>GPS Coordinates:</b> 0270613/4763372	<b>Date:</b> 10.09.2015	<b>Sample Number:</b> 27	<b>Height a.s.l.</b> 735
<b>Community Type: Mixed deciduous forest - degraded hornbeam</b> Maximum height of trees (m) 16; Average height of trees (m) 10; Average age of trees: 70 year. Coverage of tree layers (%) 30; Coverage of shrub layer (%) 60; Ground flora cover (%) 15-20.			
<b>General description and notes:</b> <b>Plants:</b> <i>Carpinus betulus</i> , <i>Fagus orientalis</i> , <i>Festuca drymeja</i> , <i>Laurocerasus officinalis</i> , <i>Poa angustifolia</i> , <i>Quercus iberica</i> , <i>Rhododendron luteum</i> , <i>R. ponticum</i> , <i>Trachystemon orientalis</i> , <i>Vaccinium arctostaphylos</i> .			

#	Species	Domin	Conservation Value: Low
1	<i>Carpinus caucasica</i>	6	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis
2	<i>Fraxinus excelsior</i>	2	
3	<i>Acer campestre</i>	2	
4	<i>Acer laetum</i>	2	<b>Photograph number/reference:</b> CIMG9834. Mixed deciduous forest - degraded hornbeam; CIMG9836. <i>Pachyphragma macrophyllum</i> ; CIMG9837. <i>Asperula odorata</i> ; CIMG9838. <i>Asarum ibericum</i> ; CIMG9839. <i>Asplenium trichomanes</i> ; CIMG9840. <i>Pachyphragma macrophyllum</i> ; CIMG9841. Mixed deciduous forest - degraded hornbeam; CIMG9842. <i>Asplenium trichomanes</i> , <i>Asplenium adiantum nigrum</i> .
5	<i>Quercus iberica</i> - rare plant species	2	<b>Polygon drawn on map:</b> Yes
6	<i>Corylus avellana</i>	7	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing
7	<i>Rubus</i> sp.	4	
8	<i>Asperula odorata</i>	2	
9	<i>Pachyphragma macrophyllum</i> - representative of monotypic nemoral Colchic-Caucasian family; sub-endemic to Caucasus, irradiated to Assia Minor (Chaneti)	2	
10	<i>Primula macrocalyx</i>	2	
11	<i>Asarum ibericum</i> - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti)	2	
12	<i>Asplenium trichomanes</i>	2	
13	<i>Cyclamen vernalis</i>	2	
14	<i>Polystichum braunii</i>	2	
15	<i>Dryopteris filix-mas</i>	2	
16	<i>Calystegia silvatica</i>	2	
17	<i>Asplenium adiantum nigrum</i>	2	
18	<i>Lapsana grandiflora</i>	2	
19	<i>Mycelis muralis</i>	2	
20	<i>Digitalis ciliata</i> - endemic to Caucasus	1	

<b>Domin value</b>		<b>Cover-abundance</b>
10		91-100%
9		76-90%
8		51-75%
7		34-50%
6		26-33%
5		11-25%
4		4-10%
3		<4% frequent
2		<4% occasional
1		<4% rare

**Habitats:** 91CBGE Code of Georgia: Hornbeam forest (*Carpinus betulus*)

**Habitat sub-type:** 91CB-GE 02 Hornbeam forest without the understory



**Plot 27. CIMG9834.** Mixed deciduous forest - degraded hornbeam



**Plot 27. CIMG9836.** *Pachyphragma macrophyllum*



**Plot 27. CIMG9837.** *Asperula odorata*



**Plot 27. CIMG9838.** *Asarum ibericum*



**Plot 27. CIMG9839.** *Asplenium trichomanes*



**Plot 27. CIMG9840.** *Pachyphragma macrophyllum*



**Plot 27. CIMG9841.** Mixed deciduous forest - degraded hornbeam



**Plot 27. CIMG9842.** *Asplenium trichomanes*, *Asplenium adianthum nigrum*

**Plot 28. Beech forest with chestnut and spruce admixture**

<b>Plant Community Type</b>	<b>Beech forest with chestnut and spruce admixture</b>
<b>Conservation Value</b>	<b>Medium</b>
Location	Left hand bank of the Nenskra River, village Kedani, power house site
Site No	28
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	N0270720/E4764757
Altitude (m AMSL)	733
Aspect	South-West
Inclination	35 <sup>0</sup>
<b>Community Structural Features</b>	
Max DBH (cm)	80
Average DBH (cm)	30
Max height of the tree (m)	17
Average height of the tree (m)	12
Number of trees on sample area	4-5
Coverage of treelayer (%)	30-35
Coverage of shrublayer (%)	10-15
Height of shrublayer (cm)	700
Coverage of herblayer (%)	5
Height of herblayer (cm)	60
Coverage of mosslayer (%)	10 (8-10 species)
Number of higher plant species	12
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Carpinus caucasica	D-maximum-54 cm, H-14-16m, 110 year D-average-32cm, H-8-10m, 70 year Sp <sup>3</sup>
Castanea sativa-Georgian Red List Species (VU)	D-80 cm, H-16-17m, 120-130 year Sol
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-24-26 cm, H-12m, 60-70 year Sol
Pyrus caucasica	D-20 cm, H-14m, 30 year Sol
Malus orientalis	D-20 cm, H-10m, 30 year Sol
Fraxinus excelsior - young	Sol
<b>Shruberry</b>	

Corylus avellana	H-4-5m, Sp <sup>1</sup>
Mespilus germanica	D-8cm, H-7m, 10 year Sol
Rosa canina	Sol
<b>Herblayer</b>	
Fragaria vesca	Sol
Salvia glutinosa	Sol
Tamus communis	H-60cm Sol
<b>Mosslayer</b>	
Moss species	Sp <sup>1</sup>

<b>GPS Coordinates:</b> 0270720/4764757	<b>Date:</b> 10.09.2015	<b>Sample Number:</b> 28	<b>Height a.s.l.</b> 733																						
<b>Community Type: Beech forest with chestnut and spruce admixture</b> Maximum height of trees (m) 17; Average height of trees (m) 12; Average age of trees: 80 year. Coverage of tree layers (%) 35; Coverage of shrub layer (%) 15; Ground flora cover (%) 15-20.																									
<b>General description and notes:</b>																									
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>																						
1	Carpinus caucasica	6	<b>Give reason for conservation value:</b> Characteristics of phytocenosis																						
2	Castanea sativa-Georgian Red List Species (VU)	2																							
3	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor		<b>Photograph number/reference:</b> CIMG9844. Hornbeam forest with chestnut and spruce admixture; CIMG9846. Hornbeam forest with chestnut and spruce admixture; CIMG9847. <i>Castanea sativa</i> .																						
4	Pyrus caucasica	2	<b>Polygon drawn on map:</b> Yes																						
5	Malus orientalis	2	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing																						
6	Fraxinus excelsior	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10. <table border="1" style="width: 100%;"> <thead> <tr> <th>Domin value</th> <th>Cover-abundance</th> </tr> </thead> <tbody> <tr><td>10</td><td>91-100%</td></tr> <tr><td>9</td><td>76-90%</td></tr> <tr><td>8</td><td>51-75%</td></tr> <tr><td>7</td><td>34-50%</td></tr> <tr><td>6</td><td>26-33%</td></tr> <tr><td>5</td><td>11-25%</td></tr> <tr><td>4</td><td>4-10%</td></tr> <tr><td>3</td><td>&lt;4% frequent</td></tr> <tr><td>2</td><td>&lt;4% occasional</td></tr> <tr><td>1</td><td>&lt;4% rare</td></tr> </tbody> </table>	Domin value	Cover-abundance	10	91-100%	9	76-90%	8	51-75%	7	34-50%	6	26-33%	5	11-25%	4	4-10%	3	<4% frequent	2	<4% occasional	1	<4% rare
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7	Corylus avellana	4																							
8	Mespilus germanica	2																							
9	Rosa canina	2																							
10	Fragaria vesca	2																							
11	Salvia glutinosa	2																							
12	Tamus communis	2																							
13																									
14																									
15																									
16																									
17																									
18																									

**Habitats:** 9260CS-GE\* Code of Georgia: Chestnut forest (*Castanea sativa*)

**Habitat sub-type:** 9260CS-GE-01 Chestnut forest with borage cover, *C. sativa*-*Trachystemon orientalis*; It can be found in west Georgia, beech-chestnut forests or hornbeam- beech-chestnut forests.



**Plot 28. CIMG9844.** Beech forest with chestnut and spruce admixture



**Plot 28. CIMG9846.** Beech forest with chestnut and spruce admixture



**Plot 28. CIMG9847.** *Castanea sativa*

### Plot 29. Spruce-fir-tree forest

Plant Community Type	Spruce-fir-tree forest
Conservation Value	Medium
Location	Left hand bank of the Nakra River, village Kedani, power house site
Site No	29
Assessed plot size (m <sup>2</sup> )	100
GPS Coordinates - spherical//UTM	0272058/4765636
Altitude (m AMSL)	1142
Aspect	South-West
Inclination	35 <sup>0</sup>
Community Structural Features	
Max DBH (cm)	60
Average DBH (cm)	40
Max height of the tree (m)	26
Average height of the tree (m)	20
Number of trees on sample area	8-9
Coverage of treelayer (%)	70
Coverage of shrublayer (%)	25-30
Height of shrublayer (cm)	200
Coverage of herblayer (%)	10-15
Height of herblayer (cm)	150
Coverage of mosslayer (%)	15-20 (8-10 species)

Number of higher plant species	12
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Treelayer</b>	
Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	D-amximum-80 cm, H-24-26m, 140-150 year D-average-40cm, H-20-22m Cop <sup>2</sup>
Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	D-40 cm, H-20-22m (maximum), 90-100 year D-35 cm, H-18-20m Sp <sup>3</sup>
Fagus orientalis	D-25 cm, H-12-14m, 60 year Sol
Acer pseudoplatanus	D-25cm, H-18-20m, 50 year Sol
<b>Shruberry</b>	
Rubus sp.	Sp <sup>3</sup>
Lonicera caucasica	Sol H-2m
<b>Herblayer</b>	
Fragaria vesca	Sp <sup>1</sup>
Cicerbita macrophylla	Sp <sup>1</sup> H-1,5m
Asperula odorata	Sol
Dryopteris filix-mas	Sol
Salvia glutinosa	Sol
Lapsana grandiflora	Sol
<b>Mosslayer</b>	
Moss species	Sp <sup>2</sup>

<b>GPS Coordinates:</b> 0272058/4765636	<b>Date:</b> 10.09.2015	<b>Sample Number:</b> 29	<b>Height a.s.l.</b> 1142	
<p><b>Community Type: Spruce-fir-tree forest</b>  Maximum height of trees (m) 26; Average height of trees (m) 20; Average age of trees: 80 year.  Coverage of tree layers (%) 70; Coverage of shrub layer (%) 30; Ground flora cover (%) 20-25.</p> <p><b>General description and notes:</b>  <b>Plant community:</b> Dark coniferous forest with the understory of Pontic rhododendron (<i>Piceeta rhododendrosa</i>, <i>Piceeto-Abieta rhododendrosa</i>, <i>Abieta rhododendrosa</i>, <i>Fageto-Abieta rhododendrosa</i>), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: <i>Trachystemon orientalis</i>, <i>Galium rotundifolium</i>. From ferns the following can be found: <i>Blechnum spicant</i>, <i>Polystichum woronowii</i>. These species are rare: <i>Ruscus colchicus</i>, <i>Rubus hirtus</i>, <i>Hedera colchica</i>.</p>				
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Medium</b>	
1	Abies nordmanniana-sub-endemic for the Caucasus, irradiated in Asia Minor	8	<b>Giver reason for conservation value:</b> Characteristics of phytocenosis	
2	Picea orientalis-sub-endemic for the Caucasus, irradiated to Asia Minor	6		
3	Fagus orientalis	2	<b>Photograph number/reference: CIMG9848.</b> <i>Abies nordmanniana</i> ; <b>CIMG9849.</b> Spruce-fir-tree forest; <b>CIMG9878.</b> Spruce-fir-tree forest	
4	Acer pseudoplatanus	2	<b>Polygon drawn on map:</b> Yes	
5	Rubus sp.	6	<b>Human activity present (e.g. logging, grazing):</b> Logging, grazing not practiced	
6	Lonicera caucasica	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.	
7	Fragaria vesca	4		
8	Cicerbita macrophylla	4		
9	Asperula odorata	2		
10	Dryopteris filix-mas	2		
11	Salvia glutinosa	2		
		<b>Domin value</b>		<b>Cover-abundance</b>
		10		91-100%
		9		76-90%

12	Lapsana grandiflora	2	8	51-75%
13			7	34-50%
14			6	26-33%
15			5	11-25%
16			4	4-10%
17			3	<4% frequent
18			2	<4% occasional
			1	<4% rare

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto*-*Abieta fruticosa colchica*)



Plot 29. CIMG9848. *Abies nordmanniana*



Plot 29. CIMG9849. Spruce-fir-tree forest



Plot 29. CIMG9850. Spruce-fir-tree forest

**Plot 30. Podzol fernery**

Plant Community Type	Podzol fernery
Conservation Value	Low
Location	Left hand bank of the Nenskra River, village Kedani, power house site
Site No	30
Assessed plot size (m <sup>2</sup> )	10
GPS Coordinates - spherical//UTM	0271487/4766634
Altitude (m AMSL)	875

Aspect	West
Inclination	10-15 <sup>0</sup>
<b>Community Structural Features</b>	
Height of herblayer (cm)	170
Coverage of herblayer (%)	85-90
Coverage of mosslayer (%)	10-15
Number of higher plant species	12
Number of moss species	3-4
<b>Species</b>	<b>Cover-Abundance by Drude Scale</b>
<b>Herblayer</b>	
Pteridium tauricum	Cop <sup>2</sup>
Sambucus ebulus	Cop <sup>1</sup> H-1,5m
Salvia glutinosa	Sp <sup>3</sup>
Viola odorata	Sp <sup>2</sup>
Senecio pojarkovae - endemic to Caucasus	Sol H-1,7m
Fragaria vesca	Sol
Physalis alkekengi	Sol
Geranium robertianum	Sol
Clinopodium umbrosum	Sol
Helleborus caucasicus - endemic to Caucasus	Sol
Phytolaca americana	Sol
Senecio erraticus	Sol
<b>Mosslayer</b>	
Coverage of mosslayer	Sp <sup>2</sup>

<b>GPS Coordinates:</b> 0271487/4766634	<b>Date:</b> 10.09.2015	<b>Sample Number:</b> 30	<b>Height a.s.l.</b> 875	
<b>Community Type: Podzol fernery</b> Logging Maximum height of trees (m) ---; Average height of trees (m) ---; Average age of trees: --- year. Coverage of tree layers (%) ---; Coverage of shrub layer (%) ---; Ground flora cover (%) 45-50.				
<b>General description and notes:</b>				
<b>#</b>	<b>Species</b>	<b>Domin</b>	<b>Conservation Value: Low</b>	
1	Pteridium tauricum	8	<b>Giver reason for conservation value:</b> Degraded, ordinary phytocenosis	
2	Sambucus ebulus	7		
3	Salvia glutinosa	6		
			<b>Photograph number/reference: CIMG0103.</b> Podzol fernery; <b>CIMG9852.</b> <i>Salvia glutinosa</i> ; <b>CIMG9853.</b> <i>Physalis alkekengi</i> ; <b>CIMG9854.</b> Podzol fernery; <b>CIMG9855.</b> <i>Senecio pojarkovae</i> - endemic to Caucasus; <b>CIMG9856.</b> <i>Helleborus caucasicus</i> ; <b>CIMG9857.</b> <i>Senecio erraticus</i> .	
4	Viola odorata	5	<b>Polygon drawn on map: Yes</b>	
5	Senecio pojarkovae - endemic to Caucasus	2	<b>Human activity present (e.g. logging, grazing):</b> Grazing	
6	Fragaria vesca	2	<b>Domin Scale:</b> The system for recording of vegetation using a simple scale numbered 1-10.	
7	Physalis alkekengi	2		
8	Geranium robertianum	2		
9	Clinopodium umbrosum	2		
10	Helleborus caucasicus - endemic to Caucasus	2		
11	Phytolaca americana	2		
12	Senecio erraticus	2		
13				
14				
15				
				<b>Domin value</b>
				<b>Cover-abundance</b>
				10 91-100%
				9 76-90%
				8 51-75%
			7 34-50%	
			6 26-33%	
			5 11-25%	
			4 4-10%	

16			3	<4% frequent
17			2	<4% occasional
18			1	<4% rare
19				

**Habitats: 62GE04** Code of Georgia: Vegetation of urban and rural areas



**Plot 30. CIMG0103.** Podzol fernery



**Plot 30. CIMG9852.** *Salvia glutinosa*



**Plot 30. CIMG9853.** *Physalis alkekengi*



**Plot 30. CIMG9854.** Podzol fernery



**Plot 30. CIMG9855.** *Senecio pojarkovae* - endemic to Caucasus



**Plot 30. CIMG9856.** *Helleborus caucasicus*



**Plot 30. CIMG9857.** *Senecio erraticus*

### **3. Habitat Types of Nenskra and Nakra Valleys identified during additional flora and vegetation surveys (2015)**

#### **Plot 1. Spruce-Hornbeam Forest**

**Habitats:** 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type:** 91FC-GE-02 Beech forest with the understory (*Fageta illicito-laurocerasosa*) of holly (*Ilex colchica*).

**Plant community:** Beech forest with the understory (*Fageta illicito-laurocerasosa*) of holly (*Ilex colchica*) and laurel (*Laurocerasus officinalis*) can be found on limestone mountains in Abkhazia and Samegrelo – on mountain massives of Kvira, Migaria and Askhi.

#### **Plot 2. Beech forest**

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE -05** Beech forest with azalea (*Rhododendron luteum*) understory (*Fageta azaleoza*)

**Plant community:** Beech forest with the azalea (*Fageta azaleosa media*) understory of the middle zone of the forest is common in mountain massifs of west Georgia with the average annual precipitation of 800-1500 mm. Characteristic landscape is the southern slope with the embossed relief of average inclination. Hornbeam, Georgian oak and Caucasian maple (*Acer velutinum*) are mixed with the beech. Species of the lower layer are: *Festuca drymeja*, *Rubus* spp., *Vicia crocea*, *Trachystemon orientalis*.

### **Plot 3. Beech forest with chestnut, hornbeam and oak admixture**

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Plant community:** The existence of the dense understory differentiates the beech forest of Georgia from the one in the rest of Europe. The beech forest with the Colchic understory is the composing part of the eco-region of Colchic mixed broad leaved forest. It is widespread in west Georgia on Northernwestern slopes of Great Caucasus and the Ajara-Imereti Ridge. The climate is moist with about 2500 mm of annual precipitation. In South Colchic forests of this type start from the sea coast. In the Northern part it does so at the 200 meters a.s.l. and reaches about 2250 meters. As a result, the type of vegetation significantly differs. There are several sub-types. Sometimes sub-types are mixed with each other, which makes their classification difficult.

### **Plot 4. Alder-beech forest**

**Habitats: 9BCGE\*** Code of Georgia: Colchic relic broad-leaved mixed forest

**Habitat sub-type: 9BC-GE-04** Beech – alder -chestnut-hornbeam forest (*Alnus barbata* - *Carpinus betulus* – *Fagus orientalis* - *Castanea sativa*) can be found in moist, slightly inclined locations of the northern slope.

### **Plot 5. Spruce-fir-tree forest**

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

### **Plot 6. Young alder-willow forest on alluvial fan**

**Habitats: 91E0\*** Code of Georgia: Alluvial forests

**Habitat sub-type: 91E0 \*01.** Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From

ferns we can see *Matteuccia struthiopteris*. White adler in these gorges reaches the sub-alpine zone.

**Plot 7. Mixed forest (fir-tree-beech forest with spruce admixture)**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

**Plot 8. Mixed forest (fir-tree-beech forest)**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

**Plot 9. Hazel shrubbery on alluvial fan**

**Habitats:** 62GE04 Code of Georgia: Vegetation of urban and rural areas

**Plot 10. Alder trees over the river terrace**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) adler and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White adler in these gorges reaches the sub-alpine zone.

**Plot 11. Alder trees over the river terrace**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) adler and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White adler in these gorges reaches the sub-alpine zone.

**Plot 12. Mixed forest (fir-tree-beech forest with sycamore maple admixture)**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto-Abieta sine fruticosa*)

**Plant community:** Dark coniferous forest with low-herbal cover (*Piceeta nanoherbosa, Piceeto-Abieta nanoherbosa, Abieta nanoherbosa, Fageto-Abieta nanoherbosa*) is predominantly found in moist places, in various regions of Georgia. Herbal cover is mainly of two types. In the first case *Oxalis acetosella* dominates whereas in the second one – *Sanicula europaea*. Other species are represented by *Galium rotundifolium, Calamintha grandiflora, Cardamine pectinata, Paris incompleta*. In the limestone habitat of Bzipi gorge there are *Oxalis acetosella* and *Galium rotundifolium*. In Abkhazia, the following arboreal plants are found in the forest of the same type - *Acer pseudoplatanus, A. platanoides, Tilia begoniifolia*.

**Plot 13. Mixed deciduous forest**

**Habitats:** 9BCGE\* Code of Georgia: Colchic relic broad-leaved mixed forest

**Habitat sub-type:** 9BC-GE-04 Beech – alder -chestnut-hornbeam forest (*Alnus barbata - Carpinus betulus – Fagus orientalis - Castanea sativa*) can be found in moist, slightly inclined locations of the northern slope.

**Plant community:** dominant tree species are distinguished, that create syntaxons of various composition – chestnut (*Castanea sativa*), beech (*Fagus orientalis*), Imereti oak (*Quercus imeretina*), Colchic oak (*Q. hartwissiana*), Alder (*Alnus barbata*) and hornbeam (*Carpinus betulus*). From hard-wood plants the following are common: Zelkova (*Zelkova carpintfolia*), Georgian oak (*Q. iberica*), elm (*Ulmus glabra, U. elliptica*), maple (*Acer laetum*), Norway maple (*Acer platanoides*), wire-but (*Pterocarya fraxinifolia*), lime (*Tilia begoniifolia*), maple (*Acer campestre*), willow (*Salix micans, S. pantosericea*), Caucasian wild pear (*Pyrus caucasica*), apple (*Malus orientalis*), *Diospyros lotus*, ash (*Fraxinus excelsior*), pine (*Pinus kochiana*) and Yew (*Taxus baccata*).

**Plot 14. Beech forest with fir-tree admixture**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa, Piceeto-Abieta rhododendrosa, Abieta rhododendrosa, Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis, Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant, Polystichum woronowii*. These species are rare: *Ruscus colchicus, Rubus hirtus, Hedera colchica*.

**Plot 15. Alder forest over the river terrace**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

**Plot 16. Alder forest with birch admixture****Habitats:**91E0\* Code of Georgia: Alluvial forests**Habitat sub-type:** 91E0 \*01. Floodplain forest**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.**Assessed Plot 17. Beech forest****Habitats:** 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)**Habitat sub-type:** 91FC-GE -05 Beech forest with azalea (*Rhododendron luteum*) understory (*Fageta azaleoza*)**Plant community:** Beech forest with the azalea (*Fageta azaleosa media*) understory of the middle zone of the forest is common in mountain massifs of west Georgia with the average annual precipitation of 800-1500 mm. Characteristic landscape is the southern slope with the embossed relief of average inclination. Hornbeam, Georgian oak and Caucasian maple (*Acer velutinum*) are mixed with the beech. Species of the lower layer are: *Festuca drymeja*, *Rubus* spp., *Vicia crocea*, *Trachystemon orientalis*.**Plot 18. Mixed forest (beech-fir-tree forest with spruce admixture)****Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.**Plot 19. Mixed forest (beech-fir-tree forest with spruce and birch admixture)****Habitats:**91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto-Abieta sine fruticosa*)**Plant community:** Sub-alpine fir forest with small-reed cover (*Abieta subalpina calamagrostidosa*). The subalpine forest of this type is preserved only in places that are not easily accessible where grazing almost never takes place, at the altitude of 1950-2100 meters and inclination of 25-40°, on slopes of southern exposition and having convex relief. Beech, spruce, rarely birch (*Betula litwinowii*) and mountain ash (*Sorbus caucasigena*) can be found. In the understory there are: *Vaccinium arctostaphylos*, rarely *Rhododendron luteum*. From the herbaceous plants there are: *Festuca drymeja*, *F. gigantea*, *Poa nemoralis*, *Gadellia lactiflora*, *Gentiana schistocalyx*, *Polygonatum verticillatum*, *Astrantia maxima*, *Valeriana tiliifolia*, *Solidago virgaurea*, *Geranium sylvaticum*, *Vaccinium myrtillus*, *Gymnocarpium dryopteris*, etc.

**Plot 20. Mixed forest (fir-alder forest with spruce and beech admixture)**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa, Piceeto-Abieta rhododendrosa, Abieta rhododendrosa, Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis, Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant, Polystichum woronowii*. These species are rare: *Ruscus colchicus, Rubus hirtus, Hedera colchica*.

**Plot 21. Mixed forest (dark coniferous-deciduous forest)**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa, Piceeto-Abieta rhododendrosa, Abieta rhododendrosa, Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis, Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant, Polystichum woronowii*. These species are rare: *Ruscus colchicus, Rubus hirtus, Hedera colchica*.

**Plot 22. Alder forest**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

**Plot 23. Mixed forest (oak forest with spruce and fir admixture)**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa, Piceeto-Abieta rhododendrosa, Abieta rhododendrosa, Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis, Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant, Polystichum woronowii*. These species are rare: *Ruscus colchicus, Rubus hirtus, Hedera colchica*.

**Plot 24. Mixed forest (fir forest with alder and oak admixture)**

**Habitats:** 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-02** Beech forest with the understory (*Fageta ilicitoso-laurocerasosa*) of holly (*Ilex colchica*).

**Plant community:** Beech forest with the understory (*Fageta ilicitoso-laurocerasosa*) of holly (*Ilex colchica*) and laurel (*Laurocerasus officinalis*) can be found on limestone mountains in Abkhazia and Samegrelo – on mountain massives of Kvira, Migaria and Askhi.

#### **Plot 25. Oak forest**

**Habitats: 9160GE** Code of Georgia: - Oak or oak-hornbeam forests (*Quercetum -Carpinion betuli*)

**Habitat sub-type: 9160GE-03** Oak-hornbeam forest (*Quercetum-Carpinion betulii*)

**Plant community:** Oak-hornbeam forest (*Quercetum-Carpinion betulii*) is distributed at the altitude of 600-1100 meters a.s.l.. Tree species found: *Quercus iberica*, *Carpinus betulus*, *C. orientalis*, *Sorbus torminalis*, *Acer laetum*, *Picea orientalis*, *Abies nordmaniana*. Bushes - *Cornus mas*, *Corylus avellana*, *Swida australis*, *Chamaecytisus caucasica*, *Lonicera caucasica*, *Mespilus germanica*. Herbaceous plants - *Festuca drymeja*, *Clinopodium vulgare*, *Veronica peduncularis*, *Polygonatum glaberrimum*, *Campanula rapunculoides*, *Dactylis glomerata*. Oak-hornbeam forest with the sedge understory is characteristic to Georgia.

#### **Plot 26. Petrophilous (rock) vegetation group**

**Habitats: 8210** Calcareous rocky slopes with chasmophytic vegetation

**Plant community:** Vegetation of limestone rock is compatible with the vegetation of limestone remains and can be found mainly in western Caucasus from Abkhazia including Racha. Significant rock massifs can be found in the gorge of River Tskhenistskali on mountain massifs of Askhi and Khvamli. Communities of the vegetation of limestone rock are very well manifested in the gorge of river Jonoula at Askhi. They include the following species: *Symphandra pendula* var. *transcaucasica*, *Scabiosa imeretina*, *Umbilicus oppositifolius*, *Asplenium ruta-muraria*, etc. On mountains of Askhi, Jvari and Migaria there are communities of endemic plants – *Geum speciosum*, *Scutellaria pontica*, *Carex pontica*, *Cyclamen colchica*. The same community is found on limestones of Abkhazia - *Geum speciosum*, *Carex pontica*, *Astrantia colchica*, *Alboiodoxa elegans*, *Kelumariella colchica*, *Achillea griseo-virens*, *Campanula dzaaku*, *Scutellaria pontica*. The following need to be highlighted from non-endemic species that are found on limestone - *Cyclamen europaeus*, *Arctostaphylos uva-ursi* subsp. *caucasica*. In the Alpine zone and below *Daphne sericea* and *Umbilicus oppositifolius* are observed. *Allium globosum* grows on the limestone rock in Racha-Lechkumi.

#### **Plot 27. Mixed deciduous forest - degraded hornbeam**

**Habitats: 91CBGE** Code of Georgia: Hornbeam forest (*Carpinus betulus*)

**Habitat sub-type: 91CB-GE 02** Hornbeam forest without the understory

**Plants:** *Carpinus betulus*, *Fagus orientalis*, *Festuca drymeja*, *Laurocerasus officinalis*, *Poa angustifolia*, *Quercus iberica*, *Rhododendron luteum*, *R. ponticum*, *Trachystemon orientalis*, *Vaccinium arctostaphylos*.

#### **Plot 28. Beech forest with chestnut and spruce admixture**

**Habitats: 9260CS-GE\*** Code of Georgia: Chestnut forest (*Castanea sativa*)

**Habitat sub-type: 9260CS-GE-01** Chestnut forest with borage cover, *C. sativa-Trachystemon orientalis*; It can be found in west Georgia, beech-chestnut forests or hornbeam- beech-chestnut forests.

#### **Plot 29. Spruce-fir-tree forest**

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa, Piceeto-Abieta rhododendrosa, Abieta rhododendrosa, Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis, Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant, Polystichum woronowii*. These species are rare: *Ruscus colchicus, Rubus hirtus, Hedera colchica*.

### **Plot 30. Podzol fernery**

**Habitats: 62GE04** Code of Georgia: Vegetation of urban and rural areas

## **4. DETAILED DESCRIPTION OF FLORA AND VEGETATION OF NENSKRA AND NAKRA VALLEYS IN PREVIOUS YEARS (2011-2014)**

Conducted botanical studies cover botanical-geographical region of the rivers Nenskra and Nakra catchment area. Therefore, expected negative and residual impact from the construction and operation of the HPP on the flora and vegetation in the project corridor and adjacent area was determined. Various plant communities and species of different conservation value (rare, endemic species, species from the Red List Georgia), as well as plants with economic value were detected.

During the botanical survey, cover and abundance of vegetation were estimated according to the Drude Scale. Drude scale symbols indicate the cover and abundance of species. These symbols are: Soc (socialis)- dominant species, cover-abundance is more than 90%; Cop3 (coptosal) - aq high number of species, cover-abundance is 70-90%; Cop2 - represented by a variety of species, cover-abundance is 50-70%; Cop1- cover-abundance is 50-70%; Sp3 (sporsal)- cover-abundance is approximately 30%; Sp2 (sporsal)- cover-abundance is approximately 20%; Sp1 (sporsal)- cover-abundance is approximately 10%; Sol (solitarie) – small amount of species, cover-abundance is up to 10%; Un (unicum) – one individ.

**Plot №1.1.** GPS coordinates are N43007'58.9''/E 042012'51.2'', 1320 1320 m a.s.l. Inclination – 250. Habitat with high conservation value. Following plants are developed on this area: Beech (*Fagus orientalis*) forest with Cherry laurel (*Laurocerasus officinalis*) undergrowth, which is mixed by Spruce (*Picea orientalis*), Fir (*Abies nordmanniana*), Elm (*Tilia caucasica*), Maple (*Acer platanoides*), Elder (*Sambucus nigra*), Hazelnuts (*Corylus avellana*), Blackberry (*Rubus* sp.), Elderflower (*Sambucus ebulus*), Fern (*Matteuccia struthiopteris*). *Acer platanoides*-pbh-130cm, height - 30m, *Fagus orientalis*- pbh -170cm, height -20m. *Salvia glutinosa* is massively weeding above mentioned areas. Alder forest (*Alnus incana*) is represented in the lower part. Such type of forests are also found in the upper floodplain, which is mixed with Beech (*Fagus orientalis*). Alder forest with fern and blackberry (*Matteuccia struthiopteris*) are also represented there. Rowan (*Sorbus caucasigena*), Hornbeam (*Carpinus caucasica*), Birch (*Betula litwinowii*), common hazel (*Corylus avellana*). Alder forest is developed at 1364 m a.s.l. *Senecio pojarkovae, S. platyphylloides, Delphinium flexuosum* are found on alluvial fans.

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-02** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa*



**Plot №1.1.** Beech forest with cherry laurel understory



**Plot №1.1.** Beech forest with cherry laurel understory



**Plot №1.1.** Common hazel (*Corylus avellana*)



**Plot №1.1.** Ostrich fern (*Matteuccia struthiopteris*)

**Plot №1.2.** GPS coordinates are N43008'14.1''/E 042013'57.3'', 1370 m a.s.l. Inclination 200-250. Habitat with average conservation value. The following species of mixed deciduous forest are represented on this area: Georgian Oak (*Quercus iberca*), Hornbeam (*Carpinus caucasica*), Lime (*Tilia caucasica*), Rowan (*Sorbus caucasigena*). Spruce-Fir forest is observed in the upper part (*Picea orientalis*, *Abies nordmanniana*). *Senecio pojarkovae*, *Delphinium flexosum* are developed on alluvial fans. *Atropa caucasica*, *Hydrocotyle ramiflora*, *Salvia glutinosa*, *Sinene compacta* are found at the edge of the forests. From here, water will flow up on slopes at 80m and this area will be flooded.

**Habitats:** 9160GE Code of Georgia: - Oak or oak-hornbeam forests (*Quercitum -Carpinion betuli*)

**Habitat sub-type:** 9160GE-03 Oak-hornbeam forest (*Quercetum-Carpinion betulii*)



Plot №1.2. Mixed deciduous forest



Plot №1.2. marsh penny (*Hydrocotyle ramiflora*)



Plot №1.2. Glutinous sage (*Salvia glutinosa*)



Plot №1.2. Rowan (*Sorbus caucasigena*)



Plot №1.2. *Senecio pojarkovae*



Plot №1.2. *Silene compacta*



**Plot №1.2.** Mixed deciduous forest



**Plot №1.2.** Caucasus Belladonna (*Atropa caucasica*)



**Plot №1.2.** Mixed deciduous forest

**Plot №1.3.** GPS coordinates are N43008'19.3''/E 042014'19.6'', 1380 m a.s.l. Inclination 150-200. Exposition – East. High conservation value habitat: Beech forest (*Fagus orientalis*) with Black Sea holly (*Ilex colchica*) understory. Beech forest is degraded (deforestation). Large Beech trees are also found –pbh – 1.5m, height - 30m. Mixed with Fir (*Abies nordmanniana*), Spruce (*Picea orientalis*), Lime (*Tilia caucasica*), Maple (*Acer platanoides*). Elder (*Sambucus ebulus*) is found at the edges of the forest. Fragment of subalpine tall herbaceous is represented within this area - *Senecio pojarkovae*, *Gadalia lactiflora*, after which Alder forest is developed (*Alnus incana*) with Cherry laurel (*Laurocerasus officinalis*) undergrowth; Beech forest with Black Sea holly understory is represented there.

**Habitats:** 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type:** 91FC-GE-02 Beech forest with the understory (*Fageta illicitoso-laurocerasosa*) of holly (*Ilex colchica*).



**Plot №1.3.** Beech forest with Black Sea holly understory



**Plot №1.3.** Elder (*Sambucus ebulus*)



**Plot №1.3.** Beech Forest



**Plot №1.3.** Riverside terrace - Alder



**Plot №1.3.** Fragment of subalpine tall herbaceous vegetation -*Senecio pojarkovae*



**Plot №1.3.** Black Sea holly (*Ilex colchica*)



**Plot №1.3.** Beech forest (*Fagus orientalis*) with Black Sea holly (*Ilex colchica*) understory.



**Plot №1.3.** Beech forest (*Fagus orientalis*) with Black Sea holly (*Ilex colchica*) understory.



**Plot №1.3.** Milky bellflower (*Gadelia lactiflora*)

**Plot №1.4.** GPS coordinates are N43008'26.1''/E 042014'51.5'', 1405 m a.s.l. Inclination 250-300. High conservation value habitat. Beech Forest (*Fagus orientalis*) with Colchis relic undergrowth (tall, Caucasian cranberries -*Vaccinium arctostaphylos*). Beech (*Fagus orientalis*)-pbh-150cm, height-25m (maximum), pbh-60cm, height -15m (minimum); Gentian (*Gentiana schistocalyx*) is represented from herbaceous plants.

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-04** Beech forest with the typical understory (*Fageta magnovacciniosa*) of Caucasian blueberry (*Vaccinium arctostaphylos*).



**Plot №1.4.** Beech Forest (*Fagus orientalis*) with Colchis relic undergrowth



**Plot №1.4.** Gentian (*Gentiana schistocalyx*)



**Plot №1.4.** Tall, Caucasian cranberries - *Vaccinium arctostaphylos*



**Plot №1.4.** Beech Forest (*Fagus orientalis*) with tall, Caucasian cranberries undergrowth

**Plot №1.5.** GPS coordinates are N43008'36.7"/E 042015'00.7", 1377 m a.s.l. Inclination 350. High conservation value habitat. Beech forest (*Fagus orientalis*) is developed within this area with Spruce (*Picea orientalis*). King Solomon's-seal (*Polygonatum polyanthemum*) is developed from herbaceous plants.

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*).

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*).



**Plot №1.5.** Beech forest (*Fagus orientalis*) with dead layer



**Plot №1.5.** Beech forest (*Fagus orientalis*) with dead layer mixed with Spruce (*Picea orientalis*)



**Plot №1.5.** Beech forest with dead layer



**Plot №1.5.** King Solomon's-seal (*Polygonatum polyanthum*)



**Plot №1.5.** Beech forest with dead layer mixed with Spruce

**Plot №1.6.** GPS coordinates are N43008'40.9''/E 042015'11.4'', 1400 m a.s.l. Inclination - 250. High conservation value habitat. Fir forest (*Abies nordmanniana*) is developed within this area, which is mixed with Spruce (*Picea orientalis*) and Beech (*Fagus orientalis*), Blackberry (*Rubus* sp.) and Elder (*Sambucus ebulus*) are found in the undergrowth.

**Habitats: 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)**

**Habitat sub-type: 91SF-GE 03 Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)**



**Plot №1.6.** Fir forest mixed with Spruce and Beech



**Plot №1.6.** Fir forest mixed with Spruce and Beech

**Plot №1.7.** GPS coordinates are N43008'49.6''/E 042015'25.8'', 1430 m a.s.l. Inclination 100-150. Medium conservation value habitat. Alder forest (*Alnus incana*) is developed within this area, which is mixed with Spruce (*Picea orientalis*) in some places.

**Habitats:91E0\*** Code of Georgia: Alluvial forests

**Habitat sub-type: 91E0 \*01.** Floodplain forest



**Plot №1.7.** Alder forest (*Alnus incana*)



**Plot №1.7.** Alder forest (*Alnus incana*) mixed with Spruce (*Picea orientalis*) in some places.



**Plot №1.7.** Mixed deciduous forest

On the other side, on the left bank of the river, mixed deciduous forest is represented with the following species: Hornbeam (*Carpinus caucasica*), Beech (*Fagus orientalis*), Lime (*Tilia caucasica*), Georgian Oak (*Quercus iberca*), Maple (*Acer platanoides*); Spruce (*Picea orientalis*)-Fir (*Abies nordmanniana*) forest is developed on a slope with 250 inclination, *Inula -Telekia speciosa* is also found there. High conservation value habitat.

**Plot №1.8.** GPS coordinates are N43000'37.7''/E 042012'08.8'', 1176 m a.s.l. above Chuberi, which is an approximate location of tunnel outlet. This will be an area for TBM platform or construction site. Area is 300mX200m (1 ha and 200 m). Exposition – South-West, inclination 20o-25o. High conservation value habitat. Caucasian Wild Pear (*Pyrus caucasica*) grow in the forest. Spruce (*Picea orientalis*) - Fir (*Abies nordmanniana*) forest is developed there. The forest where Caucasian Wild Pear is found is a low conservation value habitat. While Spruce-Fir forest is a high conservation value habitat. Fir -pbh-3m, height-20m; Spruce-pbh-2m, height-16m. Young Fir trees are also found. Pasture-forb meadow is represented there. Jupiter's sage (*Salvia glutinosa*), Elder (*Sambucus ebulus*), *Phytolacca americana*, *Digitalis ciliata* are found at the edges of the forest.

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-02** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa*



**Plot №1.8.** Caucasian wild pear (*Pyrus caucasica*)



**Plot №1.8.** Spruce-Fir forest



**Plot №1.8.** Spruce-Fir forest



**Plot №1.8.** Foxgloves- *Digitalis ciliata*



**Plot №1.8.** Spruce-Fir forest

**Plot №1.9.** GPS coordinates are N43000'24.7''/E 042012'25.8'', 1215 m a.s.l. High conservation value habitat. This is an area for tunnel outlet. A narrow road will be arranged between plot №8 and this section and Fir (*Abies nordmanniana*)-Beech (*Fagus orientalis*) forest with dead layer will be deforested. Beech-pbh-120cm, height-25m; Fir-pbh-30cm, height-7m. Maple (*Acer platanoides*) and Black Sea holly (*Ilex colchica*) are represented in undergrowth. Exposition – West, inclination - 350. Young trees of Elder (*Sambucus ebulus*), Jupiter's sage (*Salvia glutinosa*), Hairy foxglove (*Digitalis ciliata*), Common hazel (*Corylus avellana*) and Spruce (*Picea orientalis*) are found in open areas.

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto-Abieta sine fruticosa*)



**Plot №1.9.** Fir-Beech forest with dead layer



**Plot №1.9.** Fir-Beech forest with dead layer



**Plot №1.9.** Fir-Beech forest with dead layer



**Plot №1.9.** Foxgloves- *Digitalis ciliata*

**Plot №1.10.** GPS coordinates are N43000'33.7''/E 042012'14.8'', 1196 m a.s.l. Exposition – South, inclination - 350. High conservation value habitat. This area is a forested slope. This is an area for waste rock disposal. Forest will be destroyed throughout the entire slope, in which Spruce (*Picea orientalis*)–Beech (*Fagus orientalis*) forest with dead layer is developed. Beech-80cm-pbh, height-25m; Spruce-1m-pbh, Height-12m; mixed with Hornbeam (*Carpinus caucasica*)-pbh-25cm, height-12m, Chestnut (*Castanea sativa*)-pbh-25cm, height-15m (rarely in this section); in the lower part, Georgian Oak (*Quercus iberica*) is also mixed. Hairy foxglove (*Digitalis ciliata*) is also found there.

**Habitats:** 9BCGE\* Code of Georgia: Colchic relic broad-leaved mixed forest

**Habitat sub-type:** 9BC-GE-04 Beech – alder -chestnut-hornbeam forest (*Alnus barbata* - *Carpinus betulus* – *Fagus orientalis* - *Castanea sativa*) can be found in moist, slightly inclined locations of the northern slope.



**Plot №1.10.** Spruce-Beech forest with dead layer



**Plot №1.10.** Spruce-Beech forest with dead layer



**Plot №1.10.** Hairy foxglove (*Digitalis ciliata*)



**Plot №1.10.** Beech (*Fagus orientalis*)



**Plot №1.10.** Spruce-Beech forest with dead layer

**Plot №1.11.** GPS coordinates are N43000'47.6''/E 042011'31.9'', 711 m a.s.l. Inclination - 50. Low conservation value habitat. Within this section, on riverside terrace Alder forest (*Alnus barbata*) and Caucasian wild pear (*Pyrus caucasica*) are represented. This is an area for construction site.

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



Plot №1.11. Riverside terrace with Alder forest (*Alnus barbata*) and Caucasian wild pear (*Pyrus caucasica*)

**Plot №1.12.** GPS coordinates are N42059'41.2''/E 042011'14.1'', 774 m a.s.l. Inclination - 50-150. Low conservation value habitat. Area of pastures, agricultural plots, etc. Area for powerhouse, offices and etc.

**Habitats:** 62GE04 Code of Georgia: Vegetation of urban and rural areas



Plot №1.12. Agro-landscape, agricultural plots, pastures, etc.

**Plot №1.13.** GPS coordinates are N43007'22.8''/E 042023'59.1'', 1400 m a s.l. High conservation value habitat. Nakra valley – area where the riv. Nakra water will be discharged into the riv. Nenskra. On the right bank of the river, on riverside terrace Alder forest (*Alnus incana*) is represented (inclination of the slope - 50-100), on the upper terrace – Beech (*Fagus orientalis*) -Fir (*Abies nordmanniana*) forest (inclination of the slope - 250). The right bank of the river will not be affected.

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto*-*Abieta fruticosa colchica*)



**Plot №1.13.** Nakra River – Alder forest (*Alnus incana*)



**Plot №1.13.** Beech-Fir forest



**Plot №1.13.** Beech-Fir forest

**Plot 2.1. Sparse Beech forest mixed with Maple, Fir and Spruce**

Type of plant community	Sparse Beech forest mixed with Maple, Fir and Spruce
Conservation value	Medium
Location	Nenskra River valley, Mashrichala, construction site
Sample plot №	2.1
Area of sample plot (m2)	100
GPS coordinates	N43012'66.6"/E42019'75.0"
Height a.s.l. (m)	1264
Aspect	—
Inclination	00
<b>Structural Features of plant communities</b>	
Max. DBH (cm)	92
Average DBH (cm)	70
Max. height of the tree (m)	27
Average height of the tree (m)	25
Number of trees within a sample plot	25
Coverage of tree layers (%)	15-20

Coverage of shrub layers (%)	–
Heights of shrubs (cm)	–
Grass cover layer (%)	90
Height of grass cover (cm)	150
Moss layer (%)	–
Number of the highest plant species	14
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Fagus orientalis	Sp2
Acer platanoides	Sp1
Abies nordmanniana	Sol
Picea orientalis	Sol
<b>Shruberry</b>	
Shrub species have not been recorded	–
<b>Herblayer</b>	
Urtica dioica	Sp3
Rumex crispus	Sp3
Mentha longifolia	Sp2
Sambucus ebulus	Sp1
Polygonum aviculare	Sp1
Cynoglossum officinale	Sp1
Sisimbrium officinale	Sol
Trifolium anbiguum	Sol
Malva sylvestris	Sol
Poa pratensis	Sol
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats: 9140GE\* Code of Georgia: Subalpine beech forest with *Acer* spp.**



**Plot 2.1.** Sparse Beech forest mixed with Maple, Fir and Spruce



**Plot 2.1.** Sparse Beech forest mixed with Maple, Fir and Spruce

**Plot 2.2. Alder forest with Yellow Azalea undergrowth mixed with Spruce**

Type of plant community	Alder forest with Yellow Azalea undergrowth mixed with Spruce
Conservation value	Medium
Location	Confluence of Nenskra and Khokrili Rivers, area of stone quarry
Sample plot №	2.2
Area of sample plot (m2)	100
GPS coordinates	N43011'12.2''/E42018'28.1''
Height a.s.l. (m)	1199
Aspect	East

Inclination	20-250
<b>Structural Features of plant communities</b>	
Max. DBH (cm)	15
Average DBH (cm)	12
Max. height of the tree (m)	10
Average height of the tree (m)	7
Number of trees within a sample plot	30-40
Coverage of tree layers (%)	50-60
Coverage of shrub layers (%)	60-70
Heights of shrubs (cm)	400
Grass cover layer (%)	50-60
Height of grass cover (cm)	100
Moss layer (%)	–
Number of the highest plant species	9
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Alnus barbata	Cop2
Picea orientalis	Sp1
<b>Shruberry</b>	
Rhododendron ponticum - Oldest relic of the Tertiary period	Cop1
<b>Herblayer</b>	
Dryopteris filix-mas	Cop2
Oxalis acetosella	Sp2
Fragaria vesca	Sp2
Salvia glutinosa	Sp1
Cardamine pectinata	Sol
Epilobium hirsutum	Sol
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto*-*Abieta fruticosa colchica*)



**Plot 2.2.** Alder forest with Yellow Azalea undergrowth mixed with Spruce



**Plot 2.2.** Common rhododendron (*Rhododendron ponticum*)



**Plot 2.2.** Alder forest with Yellow Azalea undergrowth mixed with Spruce

**Plot 2.3. Alder Forest**

<b>Type of plant communities</b>	<b>Alder Forest</b>
<b>Conservation value</b>	<b>Low</b>
Location	Confluence of Nenskra and Khokrili Rivers, area of stone quarry
Sample plot №	2.3
Area of sample plot (m2)	100
GPS coordinates	N43011'12.2''/E42018'28.1''
Height a.s.l. (m)	1190
Aspect	South
Inclination	10-150
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	8
Average DBH (cm)	4
Max. height of the tree (m)	8
Average height of the tree (m)	5
Number of trees within a sample plot	30-40
Coverage of tree layers (%)	50-60
Coverage of shrub layers (%)	–
Heights of shrubs (cm)	–
Grass cover layer (%)	30
Height of grass cover (cm)	100
Moss layer (%)	–
Number of the highest plant species	7
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Alnus barbata	Cop2
<b>Shruberry</b>	
Shrub species have not been recorded	–
<b>Herblayer</b>	
Oxalis acetosella	Sp3
Fragaria vesca	Sp2
Salvia glutinosa	Sp1
Dryopteris filix-mas	Sp1
Cardamine pectinata	Sol
Epilobium hirsutum	Sol
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats:91E0\*** Code of Georgia: Alluvial forests

**Habitat sub-type: 91E0 \*01.** Floodplain forest



**Plot 2.3.** Jupiter's sage (*Salvia glutinosa*)



**Plot 2.3.** Alder forest

**Plot 2.4. Alder forest mixed with young trees of Spruce and Fir**

Type of plant communities	Alder forest mixed with young trees of Spruce and Fir
Conservation value	Medium
Location	Confluence of Nenskra and Khokrili Rivers, area of stone quarry
Sample plot №	2.4
Area of sample plot (m2)	100
GPS coordinates	N43011'12.2''/E42018'28.1''
Height a.s.l. (m)	1190
Aspect	East
Inclination	3-50
<b>Structural Features of plant communities</b>	
Max. DBH (cm)	25
Average DBH (cm)	22
Max. height of the tree (m)	12
Average height of the tree (m)	8
Number of trees within a sample plot	40-50
Coverage of tree layers (%)	30-40
Coverage of shrub layers (%)	–
Heights of shrubs (cm)	–
Grass cover layer (%)	20
Height of grass cover (cm)	60
Moss layer (%)	–
Number of the highest plant species	8
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Alnus barbata	Cop1
Picea orientalis	Sol
Abies nordmanniana	Sol
<b>Shruberry</b>	
Shrub species have not been recorded	–
<b>Herblayer</b>	
Sedum album	Sp2
Dryopteris filix-mas	Sp2
Fragaria vesca	Sp1
Trachistemon orientale	Sp1
Salvia glutinosa	Sp1
Geranium robertianum	Sol

Calamintha grandiflora	Unicum
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



**Plot 2.4.** Alder forest mixed with young trees of Spruce and Fir



**Plot 2.4.** Alder forest mixed with young trees of Spruce and Fir

**Plot 2.5. Alder forest on the riverside terrace**

<b>Type of plant communities</b>	<b>Alder forest on the riverside terrace</b>
<b>Conservation value</b>	<b>Low</b>
Location	Nenskra River valley, upper point of waterlogging
Sample plot №	2.5
Area of sample plot (m2)	100
GPS coordinates	N43014'05.7"/E42024'86.6"
Height a.s.l. (m)	1373
Aspect	–
Inclination	00
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	15
Average DBH (cm)	12
Max. height of the tree (m)	8
Average height of the tree (m)	6
Number of trees within a sample plot	30
Coverage of tree layers (%)	40-50
Coverage of shrub layers (%)	50-60
Heights of shrubs (cm)	250
Grass cover layer (%)	70-80
Height of grass cover (cm)	30
Moss layer (%)	50
Number of the highest plant species	8
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Alnus barbata	Cop3
<b>Shruberry</b>	
Rubus sp.	Sp3
Juniperus depressa	Sp1
Corylus avellana	Sp1
Myricaria alopecuroides	Sol

Grass cover	
Fragaria vesca	Cop2
Sedum album	Cop1
Salvia glutinosa	Sp2
<b>Mosslayer</b>	
Moss layer	Cop1

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 2.5.** Alder forest on the riverside terrace



**Plot 2.5.** Alder forest on the riverside terrace

**Plot 2.6. Alder forest (young) on the riverside terrace**

Type of plant communities	Alder forest (young) on the riverside terrace
Conservation value	Low
Location	Nenskra River valley, upper point of waterlogging
Sample plot №	2.6
Area of sample plot (m2)	100
GPS coordinates	N43013'94.7''/E42024'77.8''
Height a.s.l. (m)	1308
Aspect	—
Inclination	00
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	7
Average DBH (cm)	5
Max. height of the tree (m)	7
Average height of the tree (m)	4
Number of trees within a sample plot	60
Coverage of tree layers (%)	50
Coverage of shrub layers (%)	5-10
Heights of shrubs (cm)	100
Grass cover layer (%)	20-30
Height of grass cover (cm)	80
Moss layer (%)	5-10
Number of the highest plant species	11
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Alnus incana	Cop2
Alnus barbata	Cop1
<b>Shruberry</b>	
Rubus sp.	Sp <sup>1</sup>
<b>Herblayer</b>	
Sedum oppositifolium	Cop2

Fragaria vesca	Sp1
Dryopteris filix-mas	Sp1
Alchemilla sp.	Sol
Lapsana communis	Sol
Salvia glutinosa	Sol
Poa nemoralis	Sol
Hieracium pilosella	Sp2
<b>Moss layer</b>	
Moss layer	Sp <sup>1</sup>

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 2.6.** Alder forest (young) on the riverside terrace

**Plot 2.7. Alder forest with blackberry undergrowth**

Type of plant communities	Alder forest with blackberry undergrowth
Conservation value	Low
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.7
Area of sample plot (m2)	100
GPS coordinates	N43013'94.7''/E42024'77.8''
Height a.s.l. (m)	1306
Aspect	South-East
Inclination	5-100
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	60
Average DBH (cm)	45
Max. height of the tree (m)	25
Average height of the tree (m)	20
Number of trees within a sample plot	30
Coverage of tree layers (%)	80
Coverage of shrub layers (%)	70-80
Heights of shrubs (cm)	150
Grass cover layer (%)	30-35
Height of grass cover (cm)	80
Moss layer (%)	—
Number of the highest plant species	5
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Alnus barbata	Cop3
<b>Shruberry</b>	
Rubus sp.	Cop2

Herblayer	
Dryopteris filix-mas	Sp2
Asperula odorata	Sp3
Symphytum asperum	Sol
Moss cover	
Moss species have not been recorded	–

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 2.7.** Alder forest with blackberry undergrowth



**Plot 2.7.** Alder forest with blackberry undergrowth

**Plot 2.8. Young Fir forest mixed with Birch, Blackberry undergrowth**

Type of plant communities	Young Fir forest mixed with Birch, Blackberry undergrowth
Conservation value	Medium
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.8
Area of sample plot (m2)	100
GPS coordinates	N43013'85.6''/E42024'29.0''
Height a.s.l. (m)	1379
Aspect	South-East
Inclination	5-100
Structural Features of Plant Communities	
Max. DBH (cm)	54
Average DBH (cm)	17
Max. height of the tree (m)	20
Average height of the tree (m)	14
Number of trees within a sample plot	30-40
Coverage of tree layers (%)	40-50
Coverage of shrub layers (%)	70-80
Heights of shrubs (cm)	300
Grass cover layer (%)	–
Height of grass cover (cm)	–
Moss layer (%)	–
Number of the highest plant species	4
Species	Cover-abundance according to Drude scale
Treelayer	
Abies nordmanniana	Cop1
Betula litwinowii	Sol
Shruberry	
Rubus sp.	Cop2
Corylus avellana	Sp1

Herblayer	
Herbaceous species have not been recorded	–
Mosslayer	
Moss species have not been recorded	–

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-01** Dark coniferous forest without the understory (*Piceeto-Abieta sine fruticosa*)



**Plot 2.8.** Young Fir forest mixed with Birch, Blackberry undergrowth



**Plot 2.8.** Young Fir forest mixed with Birch, Blackberry undergrowth

**Plot 2.9.** Dead layered beech forest mixed with Fir and Spruce

Type of plant communities	Dead layered beech forest mixed with Fir and Spruce
Conservation value	Medium
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.9
Area of sample plot (m2)	100
GPS coordinates	N43014'34.9"/E42023'91.8"
Height a.s.l. (m)	1370
Aspect	East
Inclination	5-100
Structural Features of plant communities	
Max. DBH (cm)	45
Average DBH (cm)	15
Max. height of the tree (m)	25
Average height of the tree (m)	18
Number of trees within a sample plot	50
Coverage of tree layers (%)	80
Coverage of shrub layers (%)	60-70
Heights of shrubs (cm)	150
Grass cover layer (%)	–
Height of grass cover (cm)	–
Moss layer (%)	–
Number of the highest plant species	4
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Fagus orientalis	Cop2
Abies nordmanniana	Cop1
Picea orientalis	Sp3
<b>Shruberry</b>	

Rubus sp.	Cop <sup>2</sup>
<b>Herblayer</b>	
Herbaceous species have not been recorded	–
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto*-*Abieta fruticosa colchica*)



Plot 2.9. Dead layered beech forest mixed with Fir and Spruce

**Plot 2.10. Beech Forest mixed with Black Fern**

Type of plant communities	Beech Forest mixed with Black Fern
Conservation value	Medium
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.10
Area of sample plot (m <sup>2</sup> )	100
GPS coordinates	N43014'34.9"/E42023'91.8"
Height a.s.l. (m)	1370
Aspect	West
Inclination	10-150
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	45
Average DBH (cm)	35
Max. height of the tree (m)	25
Average height of the tree (m)	20
Number of trees within a sample plot	50
Coverage of tree layers (%)	60
Coverage of shrub layers (%)	30
Heights of shrubs (cm)	150
Grass cover layer (%)	50-60
Height of grass cover (cm)	200
Moss layer (%)	–
Number of the highest plant species	4
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
<i>Fagus orientalis</i>	Cop <sup>2</sup>
<b>Shruberry</b>	
Rubus sp.	Sp <sup>3</sup>
<b>Herblayer</b>	

Matteuccia struthiopteris	Cop <sup>3</sup>
Sambucus ebulus	Sp <sup>1</sup>
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats: 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)**

**Habitat sub-type: 91SF-GE 05 Beech forest with fern (*Dryopteris filix-mas*, *D. pseudomas*, etc.) cover (*Fageta filicosa*).**



**Plot 2.10.** Beech Forest mixed with Black Fern



**Plot 2.10.** Black Fern (*Matteuccia struthiopteris*)

**Plot 2.11. Beech forest mixed with Holly**

Type of plant communities	Beech forest mixed with Holly
Conservation value	High
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.11
Area of sample plot (m <sup>2</sup> )	100
GPS coordinates	N43008'19.3''/E 042014'19.6'', 1380
Height a.s.l. (m)	1380
Aspect	West
Inclination	10-150
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	60
Average DBH (cm)	45
Max. height of the tree (m)	25
Average height of the tree (m)	18
Number of trees within a sample plot	30
Coverage of tree layers (%)	50
Coverage of shrub layers (%)	60-70
Heights of shrubs (cm)	100
Grass cover layer (%)	–
Height of grass cover (cm)	–
Moss layer (%)	–
Number of the highest plant species	5
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Fagus orientalis	Cop2
Picea orientalis	Sp2
Abies nordmanniana	Sol
<b>Shruberry</b>	

Ilex colchica – besides the Caucasus, it is found in Stranja (Balkans) and Chaneti (Asia Minor)	Cop2
Rubus sp.	Sp2
<b>Herblayer</b>	
Herbaceous species have not been recorded	–
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

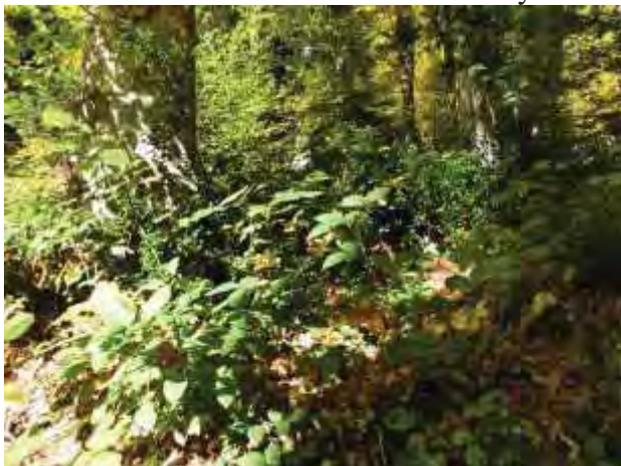
**Habitat sub-type: 91FC-GE-02** Beech forest with the understory (*Fageta ilicitoso-laurocerasosa*) of holly (*Ilex colchica*).



**Plot 2.11.** Beech forest mixed with Holly



**Plot 2.11.** Black Sea holly (*Ilex colchica*)



**Plot 2.11.** Beech forest mixed with Holly

**Plot 2.12. Beech forest with Cherry laurel undergrowth**

Type of plant communities	Beech forest with Cherry laurel undergrowth
Conservation value	High
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.12
Area of sample plot (m <sup>2</sup> )	100
GPS coordinates	N43008'19.3''/E 042014'19.6'', 1380
Height a.s.l. (m)	1370
Aspect	East
Inclination	15-200
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	26

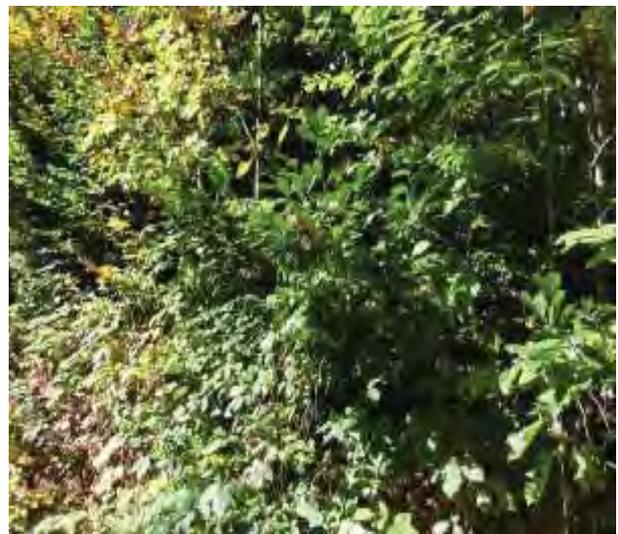
Average DBH (cm)	20
Max. height of the tree (m)	18
Average height of the tree (m)	14
Number of trees within a sample plot	30
Coverage of tree layers (%)	80
Coverage of shrub layers (%)	70-80
Heights of shrubs (cm)	400
Grass cover layer (%)	–
Height of grass cover (cm)	–
Moss layer (%)	–
Number of the highest plant species	7
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Fagus orientalis	Cop2
Picea orientalis	Sp3
Tilia caucasica	Sp1
<b>Shruberry</b>	
Laurocerasus officinalis - the oldest tertiary relict of Eastern Mediterranean area	Cop2
Rubus sp.	Sp2
Corylus avellana	Sp1
Viburnum opulus	Sol
<b>Herblayer</b>	
Herbaceous species have not been recorded	–
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-02** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa*



**Plot 2.12.** Guelder-rose - *Viburnum opulus*



**Plot 2.12.** Beech forest with Cherry laurel undergrowth



**Plot 2.12.** Cherry laurel (*Laurocerasus officinalis*)

**Plot 2.13. Aspect of Calendula on Alluvial fan**

Type of plant communities	Aspect of Calendula on Alluvial fan
Conservation value	Medium
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.13
Area of sample plot (m2)	10
GPS coordinates	N43013'69.7''/E42023'09.6''
Height a.s.l. (m)	1348
Aspect	East
Inclination	50
Structural Features of Plant Communities	
Height of grass cover (cm)	200
Grass cover layer (%)	90
Moss layer (%)	70-80
Number of the highest plant species	9
Number of moss species	2
Species	Cover-abundance according to Drude scale
Herblayer	
Senecio pojarkovae - Endemic to the Caucasus	Cop <sup>1</sup>
Poa pratensis	Cop <sup>2</sup>
Trifolium ambiguum	Cop <sup>1</sup>
Fragaria vesca	Sp <sup>3</sup>
Sedum sp.	Sp <sup>2</sup>
Viola odorata	Sol
Lapsana communis	Sol
Potentilla sp.	Sol
Hesperis matronalis	Unicum
Mosslayer	
Moss layer	Cop <sup>3</sup>

**Habitats: 91E0\* Code of Georgia: Alluvial forests**

**Habitat sub-type: 91E0\*02 River silt vegetation**



Plot 2.13. Aspect of *Senecio pojarkovae*



Plot 2.13. Aspect of *Senecio pojarkovae*



Plot 2.13. Aspect of *Senecio pojarkovae*



Plot 2.13. Dame's rocket - *Hesperis matronalis*

#### Plot 2.14. Hazelnut on riverside terrace

Type of plant communities	Hazelnut on riverside terrace
Conservation value	Low
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.14
Area of sample plot (m <sup>2</sup> )	50
GPS coordinates	N43013'66.6''/E42022'91.4''
Height a.s.l. (m)	1345
Aspect	South-East
Inclination	50
Structural Features of Plant Communities	
Height of shrubs (cm)	600
Height of grass cover (cm)	40
Shrubs layer (%)	60-70
Grass cover layer (%)	20
Moss cover layer (%)	–
Number of the highest plant species	7
Number of moss species	–
Species	Cover-abundance according to Drude scale
Shruberry	
<i>Corylus avellana</i>	Cop <sup>2</sup>
<i>Rubus</i> sp.	Sol
Herblayer	
<i>Viola odorata</i>	Sp <sup>2</sup>

Asperula odorata	Sp <sup>1</sup>
Geranium robertianum	Sp <sup>1</sup>
Sedum oppositifolium	Sp <sup>2</sup>
Dryopteris filix mas	Sol
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats: 62GE04** Code of Georgia: Vegetation of urban and rural areas



Plot 2.14. Hazelnut on riverside terrace



Plot 2.14. Hazelnut on riverside terrace

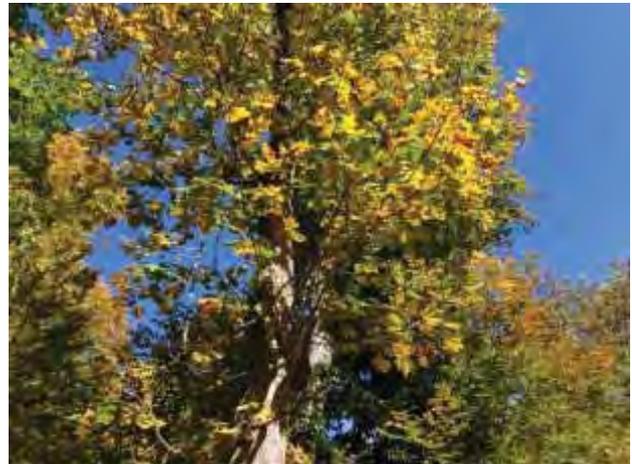
**Plot 2.15. Beech forest mixed with Norway maple**

Type of plant communities	Beech forest mixed with Norway maple
Conservation value	Medium
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.15
Area of sample plot (m2)	100
GPS coordinates	N43013'69.3''/E42022'73.5''
Height a.s.l. (m)	1340
Aspect	–
Inclination	00
<b>Structural Features of plant communities</b>	
Max. DBH (cm)	60
Average DBH (cm)	40
Max. height of the tree (m)	25
Average height of the tree (m)	20
Number of trees within a sample plot	30
Coverage of tree layers (%)	40-50
Coverage of shrub layers (%)	30-40
Heights of shrubs (cm)	100
Grass cover layer (%)	50-60
Height of grass cover (cm)	150
Moss layer (%)	–
Number of the highest plant species	11
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Oriental Beech - <i>Fagus orientalis</i>	Cop <sup>1</sup>
Norway maple - <i>Acer platanoides</i>	Sp <sup>1</sup>
<b>Shrubs</b>	
Rubus sp.	Cop <sup>1</sup>
<b>Herblayer</b>	
Pteridium tauricum	Cop <sup>1</sup>
Sambucus ebulus	Sp <sup>3</sup>
Oxalis acetosella	Sp <sup>2</sup>

Sedum oppositifolium	Sp <sup>2</sup>
Calamintha grandiflora	Sol
Asperula odorata	Sp <sup>1</sup>
Salvia glutinosa	Sp <sup>1</sup>
Dryopteris filix mas	Sol
<b>Mosslayer</b>	
Moss species have not been recorded	–



**Plot 2.15.** Beech forest mixed with Norway maple



**Plot 2.15.** Norway maple - *Acer platanoides*



**Plot 2.15.** Norway maple - *Acer platanoides*

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto*-*Abieta sine fruticosa*)

**Plot 2.16. Alder forest with Blackberry undergrowth**

Type of plant communities	Alder forest with Blackberry undergrowth
Conservation value	Medium
Location	Nenskra River valley, right bank, area of waterlogging
Sample plot №	2.16
Area of sample plot (m2)	100
GPS coordinates	N43013'33.0"/E42022'04.2"
Height a.s.l. (m)	1348
Aspect	–
Inclination	00
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	100

Average DBH (cm)	60
Max. height of the tree (m)	25
Average height of the tree (m)	20
Number of trees within a sample plot	25
Coverage of tree layers (%)	80
Coverage of shrub layers (%)	60-70
Heights of shrubs (cm)	50
Grass cover layer (%)	5-10
Height of grass cover (cm)	60
Moss layer (%)	–
Number of the highest plant species	9
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
Alnus barbata	Cop <sup>2</sup>
<b>Shruberry</b>	
Rubus sp.	Cop <sup>2</sup>
<b>Herblayer</b>	
Dryopteris filix mas	Sp <sup>2</sup>
Oxalis acetosella	Sp <sup>1</sup>
Fragaria vesca	Sp <sup>1</sup>
Laser trifolium	Sp <sup>1</sup>
Viola odorata	Sol
Sedum oppositifolium	Sp <sup>1</sup>
Asperula odorata	Sp <sup>1</sup>
<b>Mosslayer</b>	
Moss species have not been recorded	–

**Habitats: 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)**

**Habitat sub-type: 91SF-GE 03 Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)**



**Plot 2.16.** Alder forest with Blackberry undergrowth



**Plot 2.16.** Alder forest with Blackberry undergrowth



**Plot 2.16.** Male fern - *Dryopteris filix mas*

**Plot №2.16<sup>a</sup>.** GPS coordinates are N43013'36.0''/E 42021'00.4'', 1331 m a.s.l. In the valley, slightly downwards there is an area for dam arrangement, which is narrowed in this section. On the right bank of the river Alder forest is developed on riverside terrace, while Hazelnut and Goat willow are developed on the slope. On the left bank of the river - mixed deciduous forest with Fir and Spruce. Medium conservation value habitat.

**Habitats: 91E0\* Code of Georgia: Alluvial forests**

**Habitat sub-type: 91E0 \*01.** Floodplain forest



**Plot №2.16<sup>a</sup>.** Alder forest – on riverside terrace;  
on the left bank of the river - mixed deciduous  
forest with Fir and Spruce

**Plot №2.17.** GPS coordinates are N43001'06.5''/E 42020'26.3'', 1211 m a.s.l. Exposition – South-West, inclination - 10-150. Young Spruce-Fir trees. Medium conservation value habitat. Surrounding area is represented by grass forb meadow - pasture with weeded elder. There is a plantation of wild apple in the forest. Holly grows in Fir saplings, *Cyclamen vernum* (CITES) at the foot of Fir, as well as Wild Pear tree.

**Habitats: 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)**

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



**Plot №2.17.** Young Spruce-Fir forest



**Plot №2.17.** Plantation of wild apple in the forest



**Plot №2.17.** Holly in Fir saplings

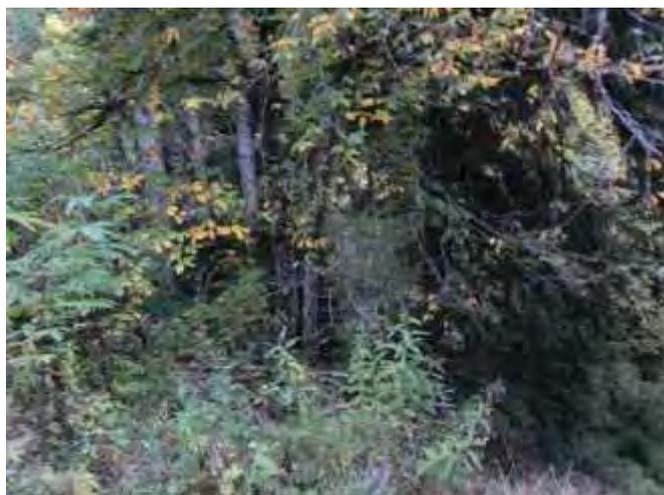


**Plot №2.17.** Cyclamen vernalis

**Plot №2.18.** GPS coordinates are N43001'06.5''/E 42020'26.3'', 1210 m a.s.l. there is a slope, where waste rock excavated from the tunnel will be disposed. Exposition –South, inclination 350. Dead layered Spruce-Beech, in some places mixed with Blackberry. *Fagus orientalis*-D-35cm, H-20m; *Picea orientalis*-D-30cm, H-20m. Tree layer -80%. High conservation value habitat.

**Habitats:** 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)

**Habitat sub-type:** 91SF-GE 03 Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)



**Plot №2.18.** Dead layered Spruce-Beech

**Plot 2.19. Fir forest**

Type of plant communities	Fir forest
Conservation value	Medium
Location	Nakra River water intake
Sample plot №	2.19
Area of sample plot (m <sup>2</sup> )	100
GPS coordinates	N43012'28.8''/E42039'89.7''
Height a.s.l. (m)	1599
Aspect	East
Inclination	10-150
<b>Structural Features of plant communities</b>	
Max. DBH (cm)	48
Average DBH (cm)	30
Max. height of the tree (m)	20
Average height of the tree (m)	18
Number of trees within a sample plot	35
Coverage of tree layers (%)	80
Coverage of shrub layers (%)	–
Heights of shrubs (cm)	–
Grass cover layer (%)	3
Height of grass cover (cm)	100
Moss layer (%)	80
Number of the highest plant species	10
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
<i>Abies nordmanniana</i>	Cop <sup>3</sup>
<i>Fagus orientalis</i>	Sol
<b>Shruberry</b>	
Shrub species have not been recorded	–
<b>Herblayer</b>	
<i>Dryopteris filix mas</i>	Sp <sup>1</sup>
<i>Viola odorata</i>	Sp <sup>1</sup>
<i>Sanicula europaea</i>	Sol
<i>Asperula odorata</i>	Sol
<i>Oxalis acetosella</i>	Sp <sup>1</sup>

<i>Mycelis muralis</i>	Sol
<i>Geranium robertianum</i>	Sol
<i>Symphytum asperum</i>	Sol
<b>Mosslayer</b>	
Moss layer	Cop <sup>3</sup>

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)



**Plot 2.19.** Fir forest

**Plot 2.20. Fir-Beech forest**

Type of plant communities	Fir-Beech forest
Conservation value	Medium
Location	Nakra River water intake
Sample plot №	2.20
Area of sample plot (m <sup>2</sup> )	100
GPS coordinates	N43012'28.8''/E42039'89.7''
Height a.s.l. (m)	1540
Aspect	South
Inclination	10-150
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	105
Average DBH (cm)	50
Max. height of the tree (m)	25
Average height of the tree (m)	20
Number of trees within a sample plot	35
Coverage of tree layers (%)	50-60
Coverage of shrub layers (%)	–
Heights of shrubs (cm)	–
Grass cover layer (%)	3-5
Height of grass cover (cm)	100
Moss layer (%)	10
Number of the highest plant species	11
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
<i>Fagus orientalis</i>	Cop2
<i>Abies nordmanniana</i>	Sp2
<b>Shruberry</b>	
Shrub species have not been recorded	–

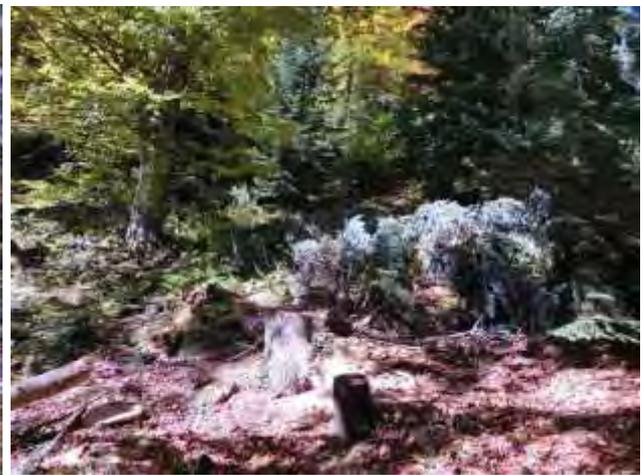
Herblayer	
Poa pratensis	Sp <sup>2</sup>
Fragaria vesca	Sp <sup>1</sup>
Asperula odorata	Sp <sup>1</sup>
Dryopteris filix mas	Sp <sup>1</sup>
Oxalis acetosella	Sp <sup>1</sup>
Sanicula europaea	Sol
Sedum oppositifolium	Sol
Salvia glutinosa	Sol
Euphorbia macroceras	Unicum
Mosslayer	
Moss layer (%)	Sp <sup>1</sup>

**Habitats: 91SF-GE** Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)

**Habitat sub-type: 91SF-GE 01** Beech forest with the mountain fescue (*Festuca drymeja*) cover  
(*Fageta festucosa*)



Plot 2.20. Fir-Beech forest



Plot 2.20. Fir-Beech forest



Plot 2.20. Sweet Woodruff - *Asperula odorata*



Plot 2.20. Fir-Beech forest



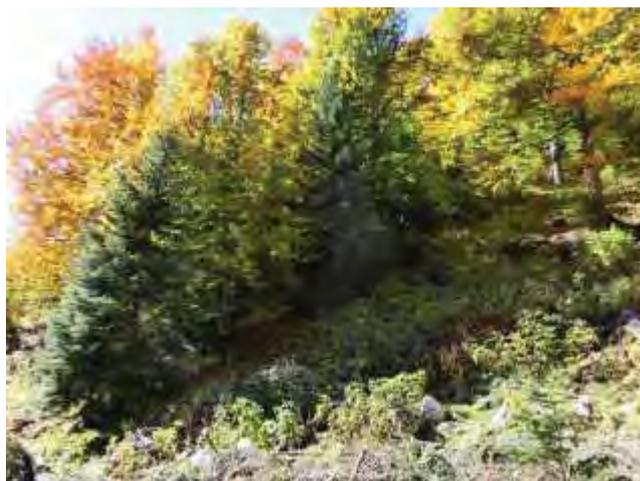
**Plot 2.20.** Cut Fir tree

**Plot 2.21. Beech-Fir forest**

Type of plant communities	Beech-Fir forest
Conservation value	Medium
Location	Nakra River water intake
Sample plot №	2.21
Area of sample plot (m <sup>2</sup> )	100
GPS coordinates	N43012'28.8"/E42039'89.7"
Height a.s.l. (m)	1540
Aspect	East
Inclination	40-450
Structural Features of plant communities	
Max. DBH (cm)	105
Average DBH (cm)	50
Max. height of the tree (m)	25
Average height of the tree (m)	20
Number of trees within a sample plot	35
Coverage of tree layers (%)	50-60
Coverage of shrub layers (%)	10
Heights of shrubs (cm)	80
Grass cover layer (%)	3-5
Height of grass cover (cm)	80
Moss layer (%)	5-10
Number of the highest plant species	10
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
<i>Abies nordmanniana</i>	Cop <sup>2</sup>
<i>Fagus orientalis</i>	Sp <sup>2</sup>
<b>Shruberry</b>	
<i>Rubus</i> sp.	Sp <sup>1</sup>
<b>Herblayer</b>	
<i>Asperula odorata</i>	Sp <sup>1</sup>
<i>Poa pratensis</i>	Sp <sup>1</sup>
<i>Oxalis acetosella</i>	Sol
<i>Symphytum asperum</i>	Sol
<i>Salvia glutinosa</i>	Sol
<i>Dryopteris filix mas</i>	Sol
<i>Calamintha grandiflora</i>	Sol
<b>Mosslayer</b>	
Moss layer (%)	Sp <sup>1</sup>

**Habitats: 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)**

**Habitat sub-type: 91SF-GE 03** Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)



**Plot 2.21.** Beech-Fir forest



**Plot 2.21.** Beech-Fir forest

**Plot 2.22. Alder forest**

<b>Type of plant communities</b>	<b>Alder forest</b>
<b>Conservation value</b>	<b>Medium</b>
Location	Nakra River water intake
Sample plot №	2.22
Area of sample plot (m2)	100
GPS coordinates	N43012'28.8''/E42039'89.7''
Height a.s.l. (m)	1530
Aspect	South-East
Inclination	3-50
<b>Structural Features of Plant Communities</b>	
Max. DBH (cm)	44
Average DBH (cm)	30
Max. height of the tree (m)	12
Average height of the tree (m)	6
Number of trees within a sample plot	50-60
Coverage of tree layers (%)	30-40
Coverage of shrub layers (%)	5
Heights of shrubs (cm)	80
Grass cover layer (%)	5
Height of grass cover (cm)	80
Moss layer (%)	5-10
Number of the highest plant species	10
<b>Species</b>	<b>Cover-abundance according to Drude scale</b>
<b>Treelayer</b>	
<i>Alnus barbata</i>	Cop <sup>1</sup>
<b>Shruberry</b>	
<i>Rubus</i> sp.	Sol
<b>Herblayer</b>	
<i>Rumex crispus</i>	Sp <sup>2</sup>
<i>Ranunculus caucasicus</i> – Endemic to the Caucasus	Sp <sup>2</sup>
<i>Prunella vulgaris</i>	Sp <sup>1</sup>

Sedum oppositifolium	Sp <sup>1</sup>
Carex sp.	Sp <sup>1</sup>
Dryopteris filix mas	Sol
Salvia glutinosa	Sol
Epilobium hirsutum	Sol
Moss cover	
Moss layer (%)	Sp <sup>1</sup>

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest



**Plot 2.22.** Alder forest



**Plot 2.22.** on the left side, Alder forest on riverside terrace

## 5. Habitat Types of Nenskra and Nakra Valleys identified during previous flora and vegetation surveys (2011-2014)

### Plot №1.1.

**Habitats:** 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type:** 91FC-GE-02 Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa*

**Plant community:** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa* similar to Pontic rhododendron is common in the conditions of high level of moisture, where the amount of average annual precipitation amounts to 2000 mm. The amplitude of vertical spreading varies between 700 and 2000 meters. Different from Pontic rhododendron, laurel grows well on limestone and well-illuminated slopes of the south. Besides Kolkheti, it is common in the form of small populations far from the areal. For example, in east Georgia it is widespread in the Alazani basin and river Ilto gorge. Existence of such a widely disseminated areal of distribution is related to ornithochoria, since birds feed on its fruit and disseminate seeds on large distances. Different from Pontic rhododendron, in the laurel understory the grassy cover - *Sanicula europaea*, *Asperula odorata*, *Viola alba*, *V. reichenbachiana*, *Dentaria bulbifera*, *Calamintha grandiflora*, *Salvia glutinosa*, *Geranium gracile*, etc. ferns - *Dryopteris filix-mas*, *D. carthusiana*, *D. assimilis*, *Polystichum braunii*. are better developed.

### Plot №1.2.

**Habitats:** 9160GE Code of Georgia: - Oak or oak-hornbeam forests (*Quercitum -Carpinion betuli*)

**Habitat sub-type: 9160GE-03** Oak-hornbeam forest (*Quercetum-Carpinion betulii*)

**Plant community:** Oak-hornbeam forest (*Quercetum-Carpinion betulii*) is distributed at the altitude of 600-1100 meters a.s.l.. Tree species found: *Quercus iberica*, *Carpinus betulus*, *C. orientalis*, *Sorbus torminalis*, *Acer laetum*, *Picea orientalis*, *Abies nordmanniana*. Bushes - *Cornus mas*, *Corylus avellana*, *Swida australis*, *Chamaecytisus caucasica*, *Lonicera caucasica*, *Mespilus germanica*. Herbaceous plants - *Festuca drymeja*, *Clinopodium vulgare*, *Veronica peduncularis*, *Polygonatum glaberrimum*, *Campanula rapunculoides*, *Dactylis glomerata*. Oak-hornbeam forest with the sedge understory is characteristic to Georgia.

#### Plot №1.3

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-02** Beech forest with the understory (*Fageta illicito-laurocerasosa*) of holly (*Ilex colchica*).

**Plant community:** Beech forest with the understory (*Fageta illicito-laurocerasosa*) of holly (*Ilex colchica*) and laurel (*Laurocerasus officinalis*) can be found on limestone mountains in Abkhazia and Samegrelo – on mountain massives of Kvira, Migaria and Askhi.

#### Plot №1.4.

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-04** Beech forest with the typical understory (*Fageta magnovacciniosa*) of Caucasian blueberry (*Vaccinium arctostaphylos*).

**Plant community:** Beech forest with the typical understory (*Fageta magnovacciniosa*) of Caucasian blueberry (*Vaccinium arctostaphylos*). It is most widely distributed in Kolkheti. In east Georgia it is common in the Lagodekhi region. Two types of communities are differentiated: 1) Beech forest with the typical understory of Caucasian blackberry (*Fageta magnovacciniosa* Typical. It is common in west Georgia, distributed in the middle and upper zones of the forest at the altitude of 900-2150 meters. Besides *Vaccinium arctostaphylos*, the understory is created by ivy - *Hedera colchica* (west Georgia), or *H. pastuchowii* (east Georgia), Blackberry - *Rubus* spp., mountain blueberry – *Vaccinium myrtillus*, fern - *Gymnocarpium dryopteris*, grass cover – *Festuca drymeja*, *Paris incompleta*, *Oxalis acetosella*, these species are rare species - *Trachystemon orientalis*, *Neottia nidus-avis*, *Monotropa uniflora*.

#### Plot №1.5.

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientale-Abieta nordmanniana*).

**Habitat sub-type: 91PA-GE-02** Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*).

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

#### Plot №1.6.

**Habitats: 91SF-GE** Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)

**Habitat sub-type: 91SF-GE 03** Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)

**Plant community:** Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*) is widely distributed in the middle zone of the forest, on the moderately moist slopes of the southern exposition of the Great Caucasus, at the altitude of 1100-1600 meters. It is quite rare in small Caucasus. *Rubus hirtus* is characterized by great polymorphism. Other species of blackberry include *R. serpens*, *R. platyphyllus*, *R. caucasicus*, *R. ponticus*, *R. candicans*, *R. cartalinicus*, *R. georgicus*, *R. tomentosus*, *R. piceetorum*, *R. dolichocarpus*, etc. The grass cover is quite arid and is observed in small quantities *Cephalanthera longifolia*, *C. rubra*, *C. damasonium*, *Epipactis helleborine*, *E. microphylla*, *Neottia nidus-avis*, *Dentaria bulbifera*, *Arum albispathum*.

**Plot №1.7.**

**Habitats: 91E0\*** Code of Georgia: Alluvial forests

**Habitat sub-type: 91E0 \*01.** Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

**Plot №1.8.**

**Habitats: 91FC-GE\*** Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)

**Habitat sub-type: 91FC-GE-02** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa*

**Plant community:** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa* similar to Pontic rhododendron is common in the conditions of high level of moisture, where the amount of average annual precipitation amounts to 2000 mm. The amplitude of vertical spreading varies between 700 and 2000 meters. Different from Pontic rhododendron, laurel grows well on limestone and well-illuminated slopes of the south. Besides Kolkheti, it is common in the form of small populations far from the areal. For example, in east Georgia it is widespread in the Alazani basin and river Ilto gorge. Existence of such a widely disseminated areal of distribution is related to ornithochoria, since birds feed on its fruit and disseminate seeds on large distances. Different from Pontic rhododendron, in the laurel understory the grassy cover - *Sanicula europaea*, *Asperula odorata*, *Viola alba*, *V. reichenbachiana*, *Dentaria bulbifera*, *Calamintha grandiflora*, *Salvia glutinosa*, *Geranium gracile*, etc. ferns - *Dryopteris filix-mas*, *D. carthusiana*, *D. assimilis*, *Polystichum braunii*. are better developed.

**Plot №1.9.**

**Habitats: 91PA-GE** Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*)

**Habitat sub-type: 91PA-GE-01** Dark coniferous forest without the understory (*Piceeto-Abieta sine fruticosa*)

**Plant community:** The dark coniferous forest with borage cover (*Abieta trachystemosa*, *Fageto-Abieta trachystemosa*) is found in Northern Kolkheti at the altitude of 900-1900 meters both on limestone and non-limestone rock layers. Mixed species are: *Acer pseudoplatanus*, *A. platanoides*. Species of the understory are *Vaccinium arctostaphylos*, *Viburnum orientale*, *Ilex colchica*, *Rhododendron ponticum*. The herbal cover is represented by *Oxalis acetosella*, *Polygonatum orientale*, *Sanicula europaea*, *Paris*

*incompleta*, *Euphorbia macroceras*, *Actaea spicata*, *Circaea lutetiana*. At high altitude the following can be found: *Cicerbita petiolata*, *Prenanthes purpurea*, *Chaerophyllum aureum*, *Ligusticum alatum*, *Senecio platyphylloides*. In Abkhazia, in the surroundings of lake Ritsa, mountain Atsetuka, mountain fescue and borage dominate simultaneously.

#### **Plot №1.10**

**Habitats:** 9BCGE\* Code of Georgia: Colchic relic broad-leaved mixed forest

**Habitat sub-type:** 9BC-GE-04 Beech – alder -chestnut-hornbeam forest (*Alnus barbata* - *Carpinus betulus* – *Fagus orientalis* - *Castanea sativa*) can be found in moist, slightly inclined locations of the northern slope.

**Plant community:** dominant tree species are distinguished, that create syntaxons of various composition – chestnut (*Castanea sativa*), beech (*Fagus orientalis*), Imereti oak (*Quercus imeretina*), Colchic oak (*Q. hartwissiana*), Alder (*Alnus barbata*) and hornbeam (*Carpinus betulus*). From hard-wood plants the following are common: Zelkova (*Zelkova carpintfolia*), Georgian oak (*Q. iberica*), elm (*Ulmus glabra*, *U. elliptica*), maple (*Acer laetum*), Norway maple (*Acer platanoides*), wire-but (*Pterocarya fraxinifolia*), lime (*Tilia begoniifolia*), maple (*Acer campestre*), willow (*Salix micans*, *S. pantosericea*), Caucasian wild pear (*Pyrus caucasica*), apple (*Malus orientalis*), *Diospyros lotus*, ash (*Fraxinus excelsior*), pine (*Pinus kochiana*) and Yew (*Taxus baccata*).

#### **Plot №1.11.**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

#### **Plot №1.12.**

**Habitats:** 62GE04 Code of Georgia: Vegetation of urban and rural areas

#### **Plot №1.13.**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

#### **Plot 2.1. Sparse Beech forest mixed with Maple, Fir and Spruce**

**Habitats:** 9140GE\* Code of Georgia: Subalpine beech forest with *Acer* spp.

**Plant community:** the following species - *Acer trautveterii*, *Quercus macranthera*, *Betula litwinowii*, *Sorbus caucasigena*, etc. The Colchic understory is represented by sprawling bushes – *Vaccinium arctostaphylos*, *Ilex colchica*, *Laurocerasus officinalis*, *Ruscus colchica* and rarely by *Rhododendron ponticum*. In eastern Georgia in the circumstances

of a drier climate the beech forest in the sub-alpine zone is associated with the cover of the mountain fescue (*Fageta festucosa*). In the grass cover the following species dominate: *Festuca drymeja*, *Calamagrostis arundinacea*, *Milium schmidtianum*, *Calamintha grandiflora*, *Geranium sylvaticum*, etc. The upper border of the sub-alpine krummholz beech forest is 2300 meters from the sea level. However, in the humid mountain places of south Kolkheti this community is found at the altitude of 2350-2570 meters a.s.l.. *Rumex* spp. is not typical to this habitat compared to the middle European sub-alpine beech forest.

### **Plot 2.2. Alder forest with Yellow Azalea undergrowth mixed with Spruce**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

### **Plot 2.3. Alder Forest**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

### **Plot 2.4. Alder forest mixed with young trees of Spruce and Fir**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

### **Plot 2.5. Alder forest on the riverside terrace**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From

ferns we can see *Matteuccia struthiopteris*. White adler in these gorges reaches the sub-alpine zone.

#### **Plot 2.6. Alder forest (young) on the riverside terrace**

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) adler and species of the willow (*Salix* spp.) grow here. Among the bushes there area lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White adler in these gorges reaches the sub-alpine zone.

#### **Plot 2.7. Alder forest with blackberry undergrowth**

**Habitats:**91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) adler and species of the willow (*Salix* spp.) grow here. Among the bushes there area lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White adler in these gorges reaches the sub-alpine zone.

#### **Plot 2.8. Young Fir forest mixed with Birch, Blackberry undergrowth**

**Habitats:**91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto*-*Abieta sine fruticosa*)

**Plant community:** Sub-alpine fir forest with small-reed cover (*Abieta subalpina calamagrostidosa*). The subalpine forest of this type is preserved only in places that are not easily accessible where grazing almost never takes place, at the altitude of 1950-2100 meters and inclination of 25-40°, on slopes of southern exposition and having convex relief. Beech, spruce, rarely birch (*Betula litwinowii*) and mountain ash (*Sorbus caucasigena*) can be found. In the understory there are: *Vaccinium arctostaphylos*, rarely *Rhododendron luteum*. From the herbaceous plants there are: *Festuca drymeja*, *F. gigantea*, *Poa nemoralis*, *Gadellia lactiflora*, *Gentiana schistocalyx*, *Polygonatum verticillatum*, *Astrantia maxima*, *Valeriana tiliifolia*, *Solidago virgaurea*, *Geranium sylvaticum*, *Vaccinium myrtillus*, *Gymnocarpium dryopteris*, etc.

#### **Plot 2.9. Dead layered beech forest mixed with Fir and Spruce**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientale*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto*-*Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto*-*Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto*-*Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

**Plot 2.10. Beech Forest mixed with Black Fern**

**Habitats: 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)**

**Habitat sub-type: 91SF-GE 05** Beech forest with fern (*Dryopteris filix-mas*, *D. pseudomas*, etc.) cover (*Fageta filicosa*).

**Plant community:** The beech forest with the black fern (*Matteuccia struthiopteris*) covers (*Fageta struthiopteridosa*). The black fern is the biggest size fern distributed in Georgia, which is the strong edifier and expels other ferns and herbal plants from the habitat. Single species of the following may co-exist with it: *Symphytum grandiflorum*, *Paris incompleta*, *Rubus* spp., *Dryopteris filix-mas*, *Athyrium filix-femina*, *Impatiens nolitangere*, *Polygonatum orientale*, *Pachyphragma macrophyllum*, *Asperula odorata*, *Hedera colchica*, *Euphorbia macroceras*, *Tamus communis*, *Urtica dioica*, *Dentaria bulbifera*, etc.

**Plot 2.11. Beech forest mixed with Holly**

**Habitats: 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)**

**Habitat sub-type: 91FC-GE-02** Beech forest with the understory (*Fageta illicito-laurocerasosa*) of holly (*Ilex colchica*).

**Plant community:** Beech forest with the understory (*Fageta illicito-laurocerasosa*) of holly (*Ilex colchica*) and laurel (*Laurocerasus officinalis*) can be found on limestone mountains in Abkhasia and Samegrelo – on mountain massives of Kvira, Migaria and Askhi.

**Plot 2.12. Beech forest with Cherry laurel undergrowth**

**Habitats: 91FC-GE\* Code of Georgia: Beech forests with Colchic understory (*Fageta fruticosa colchica*)**

**Habitat sub-type: 91FC-GE-02** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa*

**Plant community:** Beech forest with the laurel (*Laurocerasus officinalis*) understory *Fageta laurocerasosa* similar to Pontic rhododendron is common in the conditions of high level of moisture, where the amount of average annual precipitation amounts to 2000 mm. The amplitude of vertical spreading varies between 700 and 2000 meters. Different from Pontic rhododendron, laurel grows well on limestone and well-illuminated slopes of the south. Besides Kolkheti, it is common in the form of small populations far from the areal. For example, in east Georgia it is widespread in the Alazani basin and river Ilto gorge. Existence of such a widely disseminated areal of distribution is related to ornithochoria, since birds feed on its fruit and disseminate seeds on large distances. Different from Pontic rhododendron, in the laurel understory the grassy cover - *Sanicula europaea*, *Asperula odorata*, *Viola alba*, *V. reichenbachiana*, *Dentaria bulbifera*, *Calamintha grandiflora*, *Salvia glutinosa*, *Geranium gracile*, etc. ferns - *Dryopteris filix-mas*, *D. carthusiana*, *D. assimilis*, *Polystichum braunii*. are better developed.

**Plot 2.13. Aspect of Calendula on Alluvial fan**

**Habitats: 91E0\* Code of Georgia: Alluvial forests**

**Habitat sub-type: 91E0\*02 River silt vegetation**

**Plant community:** Rioni silt banks are covered with bushes which consist of species of buckthorn and willow. In Upper Imereti there are hawthorn and oriental hornbeam. Buckthorn and Jerusalem thorn are rare. Willow, tamarisk, blackberry and many herbal plants - *Galium articulatum*, *Senecio grandidentatus* grow in Kartli, on islands covered with silt, which is rarely covered by water. *Clematis vitalba*, asparagus (*Asparagus verticillatus*) and madder (*Rubia tinctorum*) are to be mentioned from bindweed plants.

**Plot 2.14. Hazelnut on riverside terrace**

**Habitats:** 62GE04 Code of Georgia: Vegetation of urban and rural areas

**Plot 2.15. Beech forest mixed with Norway maple**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-01 Dark coniferous forest without the understory (*Piceeto-Abieta sine fruticosa*)

**Plant community:** Dark coniferous forest with low-herbal cover (*Piceeta nanoherbosa*, *Piceeto-Abieta nanoherbosa*, *Abieta nanoherbosa*, *Fageto-Abieta nanoherbosa*) is predominantly found in moist places, in various regions of Georgia. Herbal cover is mainly of two types. In the first case *Oxalis acetosella* dominates whereas in the second one – *Sanicula europaea*. Other species are represented by *Galium rotundifolium*, *Calamintha grandiflora*, *Cardamine pectinata*, *Paris incompleta*. In the limestone habitat of Bzipi gorge there are *Oxalis acetosella* and *Galium rotundifolium*. In Abkhazia, the following arboreal plants are found in the forest of the same type - *Acer pseudoplatanus*, *A. platanoides*, *Tilia begoniifolia*.

**Plot 2.16. Alder forest with Blackberry undergrowth**

**Habitats:** 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)

**Habitat sub-type:** 91SF-GE 03 Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)

**Plant community:** Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*) is widely distributed in the middle zone of the forest, on the moderately moist slopes of the southern exposition of the Great Caucasus, at the altitude of 1100-1600 meters. It is quite rare in small Caucasus. *Rubus hirtus* is characterized by great polymorphism. Other species of blackberry include *R. serpens*, *R. platyphyllus*, *R. caucasicus*, *R. ponticus*, *R. candicans*, *R. cartalinicus*, *R. georgicus*, *R. tomentosus*, *R. piceetorum*, *R. dolichocarpus*, etc. The grass cover is quite arid and is observed in small quantities *Cephalanthera longifolia*, *C. rubra*, *C. damasonium*, *Epipactis helleborine*, *E. microphylla*, *Neottia nidus-avis*, *Dentaria bulbifera*, *Arum albispalum*.

**Plot №2.16<sup>a</sup>.**

**Habitats:** 91E0\* Code of Georgia: Alluvial forests

**Habitat sub-type:** 91E0 \*01. Floodplain forest

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

**Plot №2.17.**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis*-*Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow:

*Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

**Plot №2.18.**

**Habitats:** 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)

**Habitat sub-type:** 91SF-GE 03 Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)

**Plant community:** Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*) is widely distributed in the middle zone of the forest, on the moderately moist slopes of the southern exposition of the Great Caucasus, at the altitude of 1100-1600 meters. It is quite rare in small Caucasus. *Rubus hirtus* is characterized by great polymorphism. Other species of blackberry include *R. serpens*, *R. platyphyllus*, *R. caucasicus*, *R. ponticus*, *R. candicans*, *R. cartalinicus*, *R. georgicus*, *R. tomentosus*, *R. piceetorum*, *R. dolichocarpus*, etc. The grass cover is quite arid and is observed in small quantities *Cephalanthera longifolia*, *C. rubra*, *C. damasonium*, *Epipactis helleborine*, *E. microphylla*, *Neottia nidus-avis*, *Dentaria bulbifera*, *Arum albispathum*.

**Plot 2.19. Fir forest**

**Habitats:** 91PA-GE Code of Georgia: Dark-coniferous forest (*Piceeta orientalis-Abieta nordmanniana*)

**Habitat sub-type:** 91PA-GE-02 Dark coniferous forest with Colchic understory (*Piceeto-Abieta fruticosa colchica*)

**Plant community:** Dark coniferous forest with the understory of Pontic rhododendron (*Piceeta rhododendrosa*, *Piceeto-Abieta rhododendrosa*, *Abieta rhododendrosa*, *Fageto-Abieta rhododendrosa*), mainly found in the beech-fir forest, rarely in the eastern Georgia. The grassy cover is rare and represented only by vegetation resistant to the shadow: *Trachystemon orientalis*, *Galium rotundifolium*. From ferns the following can be found: *Blechnum spicant*, *Polystichum woronowii*. These species are rare: *Ruscus colchicus*, *Rubus hirtus*, *Hedera colchica*.

**Plot 2.20. Fir-Beech forest**

**Habitats:** 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)

**Habitat sub-type:** 91SF-GE 01 Beech forest with the mountain fescue (*Festuca drymeja*) cover (*Fageta festucosa*)

**Plant community:** Beech forest with the mountain fescue (*Festuca drymeja*) cover (*Fageta festucosa*) is the most widely distributed community in the beech forests in east Georgia, at the altitude of 1000-1750 meters. In east Georgia this association is more rare and is expelled by the forests of spruce and fir or the beech forest having the Colchic understory where *Vaccinium arctostaphylos*, *Rhododendron luteum* and *Ilex colchica* dominate. The following are common from arboreal plants: *Carpinus betulus*, *Acer laetum*, *A. platanoides*, *Tilia begoniifolia*, *Castanea sativa*, *Fraxinus excelsior*, *Quercus iberica*, *Prunus avium*, etc. The grass cover in the beech forest of the sub-alpine zone is associated with the mountain fescue cover (*Fageta festucosa*). *Festuca drymeja*, *Calamagrostis arundinacea*, *Milium schmidtianum*, *Calamintha grandiflora*, *Geranium sylvaticum*, etc. dominate here.

**Plot 2.21. Beech-Fir forest**

**Habitats:** 91SF-GE Code of Georgia: Beech forests without understory (*Fageta sine fruticosa*)

**Habitat sub-type: 91SF-GE 03** Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*)

**Plant community:** Beech forest with blackberry (*Rubus hirtus*) cover (*Fageta rubosa*) is widely distributed in the middle zone of the forest, on the moderately moist slopes of the southern exposition of the Great Caucasus, at the altitude of 1100-1600 meters. It is quite rare in small Caucasus. *Rubus hirtus* is characterized by great polymorphism. Other species of blackberry include *R. serpens*, *R. platyphyllus*, *R. caucasicus*, *R. ponticus*, *R. candicans*, *R. cartalinicus*, *R. georgicus*, *R. tomentosus*, *R. piceetorum*, *R. dolichocarpus*, etc. The grass cover is quite arid and is observed in small quantities *Cephalanthera longifolia*, *C. rubra*, *C. damasonium*, *Epipactis helleborine*, *E. microphylla*, *Neottia nidus-avis*, *Dentaria bulbifera*, *Arum albispathum*.

#### **Plot 2.22. Alder forest**

**Habitats:91E0\* Code of Georgia: Alluvial forests**

**Habitat sub-type: 91E0 \*01. Floodplain forest**

**Plant community:** In Svaneti and Lechkhumi the vegetation of riverside rock on the banks of river Enguri and its tributary also gets covered with water during the summer flood. Common (*Alnus barbata*) and white (*A. incana*) alder and species of the willow (*Salix* spp.) grow here. Among the bushes there are a lot of amounts of nut and azalea. From ferns we can see *Matteuccia struthiopteris*. White alder in these gorges reaches the sub-alpine zone.

## **6. ASENSITIVE AREAS OF NRNSKRA AND NAKRA VALLEYS**

Detail botanical survey of the project corridor and adjacent territories revealed sensitive areas. Therefore, based on field surveys following medium and high sensitive areas were identified:

### **High Sensitive Areas:**

**Plot №1.1.** GPS coordinates are N43007'58.9''/E 042012'51.2'', 1320 m a.s.l. Inclination 250. Following plants are developed on this area: Beech (*Fagus orientalis*) forest with Cherry laurel (*Laurocerasus officinalis*) undergrowth, which is mixed by Spruce (*Picea orientalis*), Fir (*Abies nordmanniana*), Elm (*Tilia caucasica*), Maple (*Acer platanoides*), Elder (*Sambucus nigra*), Hazelnuts (*Corylus avellana*), Blackberry (*Rubus* sp.), Elderflower (*Sambucus ebulus*), Fern (*Matteuccia struthiopteris*). *Acer platanoides*-pbh-130cm, height - 30m, *Fagus orientalis*- pbh - 170cm, height -20m. *Salvia glutinosa* is massively weeding above mentioned areas. Alder forest (*Alnus incana*) is represented in the lower part. Such type of forests are also found in the upper floodplain, which is mixed with Beech (*Fagus orientalis*). Alder forest with fern and blackberry (*Matteuccia struthiopteris*) are also represented there. Rowan (*Sorbus caucasigena*), Hornbeam (*Carpinus caucasica*), Birch (*Betula litwinowii*), common hazel (*Corylus avellana*). Alder forest is developed at 1364 m a.s.l. *Senecio pojarkovae*, *S. platyphylloides*, *Delpinium flexuosum* are found on alluvial fans.

**Plot №1.3.** GPS coordinates are N43008'19.3''/E 042014'19.6'', 1380 m a.s.l. Inclination 150-200. Exposition – East. High conservation value habitat: Beech forest (*Fagus orientalis*) with Black Sea holly (*Ilex colchica*) understory. Beech forest is degraded (deforestation). Large Beech trees are also found –pbh – 1.5m, height - 30m. Mixed with Fir (*Abies nordmanniana*), Spruce (*Picea orientalis*), Lime (*Tilia caucasica*), Maple (*Acer platanoides*). Elder (*Sambucus ebulus*) is found at the edges of the forest. Fragment of subalpine tall herbaceous is represented within this area - *Senecio pojarkovae*, *Gadelia lactiflora*, after which Alder forest is developed (*Alnus incana*) with Cherry laurel (*Laurocerasus officinalis*) undergrowth; Beech forest with Black Sea holly understory is represented there.

**Plot №1.4.** GPS coordinates are N43008'26.1''/E 042014'51.5'', 1405 m a.s.l. Inclination 250-300. High conservation value habitat. Beech Forest (*Fagus orientalis*) with Colchis relic undergrowth (tall, Caucasian cranberries -*Vaccinium arctostaphylos*). Beech (*Fagus orientalis*)-pbh-150cm, height-25m (maximum), pbh-60cm, height -15m (minimum); Gentian (*Gentiana schistocalyx*) is represented from herbaceous plants.

**Plot №1.5.** GPS coordinates are N43008'36.7''/E 042015'00.7'', 1377 m a.s.l. Inclination 350. High conservation value habitat. Beech forest (*Fagus orientalis*) is developed within this area with Spruce (*Picea orientalis*). King Solomon's-seal (*Polygonatum polyanthemum*) is developed from herbaceous plants.

**Plot №1.6.** GPS coordinates are N43008'40.9''/E 042015'11.4'', 1400 m a.s.l. Inclination - 250. Fir forest (*Abies nordmanniana*) is developed within this area, which is mixed with Spruce (*Picea orientalis*) and Beech (*Fagus orientalis*), Blackberry (*Rubus* sp.) and Elder (*Sambucus ebulus*) are found in the undergrowth. On the other side, on the left bank of the river, mixed deciduous forest is represented with the following species: Hornbeam (*Carpinus caucasica*), Beech (*Fagus orientalis*), Lime (*Tilia caucasica*), Georgian Oak (*Quercus iberca*), Maple (*Acer platanoides*); Spruce (*Picea orientalis*)- Fir (*Abies nordmanniana*) forest is developed on a slope with 250 inclination, *Inula* -*Telekia speciosa* is also found there.

**Plot №1.8.** GPS coordinates are N43000'37.7''/E 042012'08.8'', 1176 m a.s.l. above Chuberi, which is an approximate location of tunnel outlet. This will be an area for TBM platform or construction site. Area is 300mX200m (1 ha and 200 m). Exposition – South-West, inclination 20o-25o. High conservation value habitat. Caucasian Wild Pear (*Pyrus caucasica*) grow in the forest. Spruce (*Picea orientalis*) - Fir (*Abies nordmanniana*) forest is developed there. The forest where Caucasian Wild Pear is found is a low conservation value habitat. While Spruce-Fir forest is a high conservation value habitat. Fir -pbh-3m, height-20m; Spruce-pbh-2m, height-16m. Young Fir trees are also found. Pasture-forb meadow is represented there. Jupiter's sage (*Salvia glutinosa*), Elder (*Sambucus ebulus*), *Phytolacca americana*, *Digitalis ciliata* are found at the edges of the forest.

**Plot №1.9.** GPS coordinates are N43000'24.7''/E 042012'25.8'', 1215 m a.s.l. High conservation value habitat. This is an area for tunnel outlet. A narrow road will be arranged between plot №8 and this section and Fir (*Abies nordmanniana*)-Beech (*Fagus orientalis*) forest with dead layer will be deforested. Beech-pbh-120cm, height-25m; Fir-pbh-30cm, height-7m. Maple (*Acer platanoides*) and Black Sea holly (*Ilex colchica*) are represented in undergrowth. Exposition – West, inclination - 350. Young trees of Elder (*Sambucus ebulus*), Jupiter's sage (*Salvia glutinosa*), Hairy foxglove (*Digitalis ciliata*), Common hazel (*Corylus avellana*) and Spruce (*Picea orientalis*) are found in open areas.

**Plot №1.10.** GPS coordinates are N43000'33.7''/E 042012'14.8'', 1196 m a.s.l. Exposition – South, inclination - 350. High conservation value habitat. This area is a forested slope. This is an area for waste rock disposal. Forest will be destroyed throughout the entire slope, in which Spruce (*Picea orientalis*)-Beech (*Fagus orientalis*) forest with dead layer is developed. Beech-80cm-pbh, height-25m; Spruce-1m-pbh, Height-12m; mixed with Hornbeam (*Carpinus caucasica*)-pbh-25cm, height-12m, Chestnut (*Castanea sativa*)-pbh-25cm, height-15m (rarely in this section); in the lower part, Georgian Oak (*Quercus iberica*) is also mixed. Hairy foxglove (*Digitalis ciliata*) is also found there.

**Plot №1.13.** GPS coordinates are N43007'22.8''/E 042023'59.1'', 1400 m a s.l. High conservation value habitat. Nakra valley – area where the riv. Nakra water will be discharged into the riv. Nenskra. On the right bank of the river, on riverside terrace Alder forest (*Alnus incana*)

is represented (inclination of the slope - 50-100), on the upper terrace – Beech (*Fagus orientalis*) -Fir (*Abies nordmanniana*) forest (inclination of the slope - 250). The right bank of the river will not be affected.

**Plot №2.11.** Beech forest mixed with Holly. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43008'19.3''/E 042014'19.6''. Height – 1380 m a.s.l. Aspect – West. Inclination 10-150. Following tree species are represented there: Beech (*Fagus orientalis*), Spruce (*Picea orientalis*), Caucasian fir (*Abies nordmanniana*). Following shrub species are represented: Black Sea holly (*Ilex colchica*), which is found not only in Caucasus, but in Stranja (Balkans) and Chaneti (Asia Minor), *Rubus* sp.: Grass species have not been recorded.

**Plot №2.12.** Beech forest with Cherry laurel undergrowth. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43008'19.3''/E 042014'19.6'', 1380. Height – 1370 m a.s.l. Aspect – East. Inclination - 15-200. Following tree species are represented there: Beech (*Fagus orientalis*), Spruce (*Picea orientalis*), Caucasian Lime (*Tilia caucasica*); Following shrub species are represented: Cherry laurel (*Laurocerasus officinalis*) - Tertiary relicts of the oldest area of the eastern Mediterranean Sea, *Rubus* sp., *Corylus avellana*, *Viburnum opulus*; Grass species have not been recorded.

**Plot №2.18.** GPS coordinates are N43001'06.5''/E 42020'26.3'', 1210 m a.s.l. There is a slope, where waste rock excavated from the tunnel will be disposed. Exposition –South, inclination 350. Dead layered Spruce-Beech, in some places mixed with Blackberry. *Fagus orientalis*-D-35cm, H-20m; *Picea orientalis*-D-30cm, H-20m. Tree layer -80%. High conservation value habitat.

**Plot 1. Spruce-Hornbeam Forest.** Right hand bank of the Nakra River, confluence of the Nakra and Inguri Rivers. GPS Coordinates 0286237/4770322. Altitude (m AMSL) 1031. Aspect East. Inclination 35<sup>0</sup>. **Treelayer:** *Carpinus caucasica*, *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor, *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Pinus kochiana*, *Tilia begoniifolia*, *Fagus orientalis*, *Castanea sativa*-Georgian Red List Species (VU), *Taxus baccata*-Georgian Red List Species (VU), *Quercus iberica*-young trees (rare species). **Shruberry:** *Ilex colchica*- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor, *Euonymus europaea*, *Rubus* sp., *Viburnum orientalis*. **Herblayer:** *Festuca drimeja*, *Primula macrocalyx*, *Sanicula europaea*, *Oxalis acetosella*, *Polystichum braunii*, *Polygonatum polyanthemum*, *Viola alba*, *Asplenium trichomanes*. **Mosslayer is developed.**

**Plot 12. Mixed forest (fir-tree-beech forest with sycamore maple admixture).** Right hand bank of the Nenskra River. GPS Coordinates 0276232/4780098. Altitude (m AMSL) 1382. Aspect East. Inclination 20-25<sup>0</sup>. Treelayer: *Fagus orientalis*, *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Acer platanoides*, Shruberry: *Ilex colchica*- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor, *Rubus* sp., *Lonicera caucasica*. Mosslayer is developed.

**Plot 21. Mixed forest (dark coniferous-deciduous forest).** Right hand bank of the Nenskra River, nearby Tengiz Tsindeliani house. GPS Coordinates 0271013/4776175. Altitude (m AMSL) 1186. Aspect South-West. Inclination 15-20<sup>0</sup>. Treelayer: *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Fagus orientalis*, *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor, *Acer platanoides*, *Carpinus caucasica*, *Alnus barbata*. Shruberry: *Rubus* sp., *Corylus avellana*, *Laurocerasus officinalis* - tertiary relict flora species, *Ilex colchica*- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor, *Sorbus caucasigena* - rare plant species, *Viburnum orientale*, *Vaccinium arctostaphylos*. Herblayer: *Fragaria vesca*, *Sedum oppositifolium*, *Oxalis acetosella*, *Luzula sylvatica*, *Geranium robertianum*, *Athyrium filix-femina*, *Asperula odorata*, *Salvia glutinosa*, *Prunella vulgaris*,

*Lysimachia verticillata*, *Viola sylvatica*, *Festuca drimeja*, *Clinopodium umbrosum*, *Mycelis muralis*, *Ranunculus* sp., *Calamintha grandiflora*, *Calystegia silvatica*, *Atropa caucasica* - endemic to Caucasus. Mosslayer is developed.

**Plot 26. Petrophilous (rock) vegetation group.** Right hand bank of the Nakra River, impoundment area. GPS Coordinates 0270774/4761418. Altitude (m AMSL) 662. Aspect West. Inclination 90<sup>0</sup>. Shrubbery: *Rubus* sp., *Hedera colchica*. Herblayer: *Saxifraga subverticillata*, *Satureja spicigera*, *Viola alba*, *Fragaria vesca*, *Tussilago farfara*, *Hypericum perforatum*, *Allium kunthianum*, *Eupatorium cannabinum*, *Clinopodium vulgare*, *Festuca* sp., *Epilobium nervosum*, *Phegopteris polipodioides*, *Leontodon hispidus*, *Saxifraga cymbalaria*, *Asplenium trichomanes*, *Sedum oppositifolium*, *Alchemilla* sp., *Mycelis muralis*, *Centaurea bella*, *Campanula alliariifolia*, *Scabiosa correvoniana*- endemic to Caucasus, *Solidago virgaurea*, *Colchicum speciosum*-CITES. Mosslayer is developed.

#### **Medium sensitive areas:**

**Plot №1.2.** GPS coordinates are N43008'14.1''/E 042013'57.3'', 1370 m a.s.l. Inclination 200-250. Habitat with average conservation value. The following species of mixed deciduous forest are represented on this area: Georgian Oak (*Quercus iberca*), Hornbeam (*Carpinus caucasica*), Lime (*Tilia caucasica*), Rowan (*Sorbus caucasigena*). Spruce-Fir forest is observed in the upper part (*Picea orientalis*, *Abies nordmanniana*). *Senecio pojarkovae*, *Delphinium flexuosum* are developed on alluvial fans. *Atropa caucasica*, *Hydrocotyle ramiflora*, *Salvia glutinosa*, *Sinene compacta* are found at the edge of the forests. From here, water will flow up on slopes at 80m and this area will be flooded.

**Plot №1.7.** GPS coordinates are N43008'49.6''/E 042015'25.8'', 1430 m a.s.l. Inclination 100-150. Alder forest (*Alnus incana*) is developed within this area, which is mixed with Spruce (*Picea orientalis*) in some places.

**Plot №2.1.** Sparse Beech forest mixed with Maple, Fir and Spruce. Nenskra River valley, Mashrichala, construction camp area. GPS coordinates are N43012'66.6''/E42019'75.0''. height - 1264 m a.s.l. Inclination - 00. Following tree species are represented there: Beech (*Fagus orientalis*), Maple (*Acer platanoides*), Caucasian Fir (*Abies nordmanniana*) - Sub endemic to the Caucasus, Asia Minor, Spruce (*Picea orientalis*) - Sub endemic to the Caucasus, Asia Minor; Shrub species have not been recorded. Following grass species are found there: *Urtica dioica*, *Rumex crispus*, *Mentha longifolia*, *Sambucus ebulus*, *Polygonum aviculare*, *Cynoglossum officinale*, *Sisimbrium officinale*, *Trifolium anbiguum*, *Malva sylvestris*, *Poa pratensis*;

**Plot №2.2.** Alder forest with Yellow Azalea undergrowth mixed with Spruce. Confluence of Nenskra and Khokrili rivers, stone quarry area. GPS coordinates are N43011'12.2''/E42018'28.1''. Height - 1199 m a.s.l. Aspect - West. Inclination - 20-250. Following tree species are represented there: Common Alder (*Alnus barbata*), Spruce (*Picea orientalis*). Following shrub species are represented there: Common rhododendron (*Rhododendron ponticum*) - oldest relic of the Tertiary period. Following grass species are found there: *Dryopteris filix-mas*, *Oxalis acetosella*, *Fragaria vesca*, *Salvia glutinosa*, *Cardamine pectinata*, *Epilobium hirsutum*;

**Plot №2.4.** Alder forest mixed with young Spruce and Fir trees. Confluence of Nenskra and Khokrili rivers, stone quarry area. GPS coordinates are N43011'12.2''/E42018'28.1''. Height - 1199 m a.s.l. Aspect - East. Inclination - 3-50. Following tree species are represented there: Common Alder (*Alnus barbata*), Spruce (*Picea orientalis*), Caucasian Fir (*Abies nordmanniana*), Asia Minor. Shrub species have not been recorded. Following grass species are found there:

*Sedum album*, *Dryopteris filix-mas*, *Fragaria vesca*, *Trachistemon orientale*, *Salvia glutinosa*, *Geranium robertianum*, *Calamintha grandiflora*;

**Plot №2.8.** Young Fir forest mixed with Birch and with blackberry undergrowth. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43013'85.6''/E42024'29.0''. Height – 1379 m a.s.l. Aspect – South-East. Inclination- 5-100. Following tree species are represented there: Caucasian Fir (*Abies nordmanniana*), Birch (*Betula litwinowii*). Following shrub species are represented: *Rubus* sp., *Corylus avellana*. Grass species have not been recorded there.

**Plot №2.9.** Dead layered Beech forest mixed with Fir and Spruce trees. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43014'34.9''/E42023'91.8''. Height – 1370 m a.s.l. Aspect – East. Inclination - 5-100. Following tree species are represented there: Beech (*Fagus orientalis*), Caucasian Fir (*Abies nordmanniana*), Spruce (*Picea orientalis*). Following shrub species are represented: *Rubus* sp. Grass species have not been recorded there.

**Plot №2.10.** Beech forest mixed with Black Fern. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43014'34.9''/E42023'91.8''. Height – 1370 m a.s.l. Aspect - West. Inclination - 10-150. Following tree species are represented there: Beech (*Fagus orientalis*). Following shrub species are represented: *Rubus* sp., Following grass species are found there: *Matteuccia struthiopteris*, *Sambucus ebulus*.

**Plot №2.13.** Aspect of *Calendula* on Alluvial fan. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43013'69.7''/E42023'09.6''. Height – 1348 m a.s.l. Aspect – East. Inclination - 50. Following grass species are found there: *Senecio pojarkovae* – Endemic to the Caucasus, *Poa pratensis*, *Trifolium ambiguum*, *Fragaria vesca*, *Sedum* sp., *Viola odorata*, *Lapsana communis*, *Potentilla* sp., *Hesperis matronalis*. Moss species are also represented.

**Plot №2.15.** Beech forest mixed with Norway maple. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43013'69.3''/E42022'73.5''. Height – 1340 m a.s.l. Inclination - 00. Following tree species are represented there: *Fagus orientalis*, *Acer platanoides*. Following shrub species are represented: *Rubus* sp. Following grass species are found there: *Pteridium tauricum*, *Sambucus ebulus*, *Oxalis acetosella*, *Sedum oppositifolium*, *Calamintha grandiflora*, *Asperula odorata*, *Salvia glutinosa*, *Dryopteris filix mas*;

**Plot №2.16.** Alder forest with blackberry undergrowth. Right bank of Nenskra River, area of waterlogging. GPS coordinates are N43013'33.0''/E42022'04.2''. Height – 1348 m a.s.l. Inclination -00. Following tree species are represented there: *Alnus barbata*. Following shrub species are represented: *Rubus* sp., Following grass species are found there: *Dryopteris filix mas*, *Oxalis acetosella*, *Fragaria vesca*, *Laser trifolium*, *Viola odorata*, *Sedum oppositifolium*, *Asperula odorata*.

**Plot №2.16a.** GPS coordinates are N43013'36.0''/E 42021'00.4'', 1331 m a.s.l. In the valley, slightly downwards there is an area for dam arrangement, which is narrowed in this section. On the right bank of the river Alder forest is developed on riverside terrace, while Hazelnut and Goat willow are developed on the slope. On the left bank of the river - mixed deciduous forest with Fir and Spruce. Medium conservation value habitat.

**Plot №2.17.** GPS coordinates are N43001'06.5''/E 42020'26.3'', 1211 m a.s.l. Exposition – South-West, inclination - 10-150. Young Spruce-Fir trees. Medium conservation value habitat. Surrounding area is represented by grass forb meadow - pasture with weeded elder. There is a plantation of wild apple in the forest. Holly grows in Fir saplings, *Cyclamen vernalis* (CITES) at the foot of Fir, as well as Wild Pear tree.

**Plot №2.19.** Fir forest. Nenskra River water intake. GPS coordinates are: N43012'28.8''/E42039'89.7''. Height – 1599 m a.s.l. Aspect – East. Inclination - 10-150. Following tree species are represented there: Caucasian Fir (*Abies nordmanniana*), Beech (*Fagus orientalis*). Shrub species have not been found. Following grass species are observed there: *Dryopteris filix mas*, *Viola odorata*, *Sanicula europaea*, *Asperula odorata*, *Oxalis acetosella*, *Mycelis muralis*, *Geranium robertianum*, *Symphytum asperum*. Moss species are also represented.

**Plot №2.20.** Fir- Beech forest. Nenskra River water intake. GPS coordinates are N43012'28.8''/E42039'89.7''. Height - 1540. Aspect – South. Inclination - 10-150. Following tree species are represented there: *Fagus orientalis*, *Abies nordmanniana* - Sub endemic to the Caucasus, Asia Minor. Shrub species have not been found. Following grass species are observed there: *Poa pratensis*, *Fragaria vesca*, *Asperula odorata*, *Dryopteris filix mas*, *Oxalis acetosella*, *Sanicula europea*, *Sedum oppositifolium*, *Salvia glutinosa*, *Euphorbia macroceras*. Moss species are also represented.

**Plot №2.21.** Beech-Fir forest. Nenskra River water intake. GPS coordinates are N43012'28.8''/E42039'89.7''. Height – 1540 m a.s.l. Aspect – East. Inclination - 40-450. Following tree species are represented there: *Abies nordmanniana*, *Fagus orientalis*. Following shrub species are represented: *Rubus* sp., Following grass species are observed there: *Asperula odorata*, *Poa pratensis*, *Oxalis acetosella*, *Symphytum asperum*, *Salvia glutinosa* *Dryopteris filix mas* *Calamintha grandiflora*. Moss species are also represented.

**Plot №2.22.** Alder forest. Nenskra River water intake. GPS coordinates are N43012'28.8''/E42039'89.7''. Height – 1530 m a.s.l. Aspect – South-East. Inclination - 3-50. Following tree species are represented there: *Alnus barbata*. Following shrub species are represented: *Rubus* sp. Following grass species are observed there: *Rumex crispus*, *Prunella vulgaris*, *Sedum oppositifolium*, *Carex* sp., *Dryopteris filix mas*, *Salvia glutinosa*, *Epilobium hirsutum*. Moss species are also represented.

**Plot 2. Beech forest.** Right hand bank of the Nakra River, village Nakra. GPS Coordinates 0286770/4772467. Altitude (m AMSL) 1143. Aspect East. Inclination 20-25<sup>0</sup>. Treelayer: *Fagus orientalis*. Shruberry: *Rhododendron luteum*. Herblayer: *Dryopteris filix-mas*, *Vicia erocea*, *Viola alba*, *Sanicula europaea*, *Cephalanthera rubra*-CITES. Mosslayer is developed.

**Plot 3. Beech forest with chestnut, hornbeam and oak admixture.** Right hand bank of the Nakra River, village Nakra. GPS Coordinates 0286987/4773147. Altitude (m AMSL) 1197. Aspect East. Inclination 20-25<sup>0</sup>. Treelayer: *Fagus orientalis*, *Castanea sativa*-Georgian Red List Species (VU), *Carpinus caucasica*, *Quercus iberica* - rare plant species, *Acer campestre*, *Fraxinus excelsior*. Shrubbery species not found. Herblayer: *Senecio pojarkovae* - endemic to Caucasus, *Salvia glutinosa*, *Sanicula europaea*, *Sambucus ebulus*, *Calystegia silvatica*, *Circaea lutetiana*, *Euphorbia macroceras* - endemic to Caucasus, *Helleborus caucasicus* - endemic to Caucasus, *Clinopodium umbrosum*. Mosslayer is developed.

**Plot 14. Beech forest with fir-tree admixture.** Right hand bank of the Nakra River (until landslide). GPS Coordinates 0275447/4779906. Altitude (m AMSL) 1371. Aspect South-East. Inclination 15-20<sup>0</sup>. Treelayer: *Fagus orientalis*, *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Acer platanoides*, *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor, *Tilia begoniifolia*. Shruberry: *Rubus* sp., *Laurocerasus officinalis* - tertiary relict flora species, *Ilex colchica*- tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor, *Viburnum opulus*. Herblayer: *Symphytum asperum*,

*Athyrium filix-femina*, *Matteuccia struthiopteris*, *Actaea spicata*, *Asperula odorata*, *Paris incompleta*.

**Plot 17. Beech forest.** Right hand bank of the Nenskra River. GPS Coordinates 0273322/4779263. Altitude (m AMSL) 1272. Aspect South-East. Inclination 5<sup>0</sup>. Treelayer: *Fagus orientalis*, *Acer platanoides*, *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor. Shruberry: *Rubus* sp. Herblayer: *Asperula odorata*, *Salvia glutinosa*, *Fragaria vesca*, *Euphorbia macroceras* - endemic to Caucasus, *Sambucus ebulus*, *Dryopteris filix-mas*, *Prunella vulgaris*, *Sedum oppositifolium*, *Geranium robertianum*, *Viola sylvestris*. Mosslayer is developed.

**Plot 19. Mixed forest (beech-fir-tree forest with spruce and birch admixture).** Right hand bank of the Nenskra River. GPS Coordinates 0271245/4777698. Altitude (m AMSL) 1207. Aspect East. Inclination 25<sup>0</sup>. Treelayer: *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Fagus orientalis*, *Betula litwinowii*, *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor. Shruberry: *Laurocerasus officinalis* - tertiary relict flora species, *Sorbus caucasigena* - rare plant species, *Rubus idaeus*. Herblayer: *Fragaria vesca*, *Gentiana schistocalyx* - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti, Eastern Anatolia), *Dryopteris austriaca*, *Urtica dioica*, *Oxalis acetosella*, *Veronica officinalis*, *Atropa caucasica* - endemic to Caucasus. Mosslayer is developed.

**Plot 20. Mixed forest (fir-alder forest with spruce and beech admixture).** Right hand bank of the Nenskra River, nearby Tengiz Tsindeliani house. GPS Coordinates 0270909/4775731. Altitude (m AMSL) 1142. Aspect East. Inclination 35<sup>0</sup>. Treelayer: *Alnus barbata*, *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor, *Fagus orientalis*, *Populus tremula*. Shruberry: *Corylus avellana*, *Rhododendron luteum*, *Rubus idaeus*, *Rubus* sp., *Sorbus caucasigena* - rare plant species. Herblayer: *Dryopteris filix-mas*, *Sedum oppositifolium*, *Festuca drimeja*, *Geranium robertianum*, *Impatiens noli-tangere*, *Oxalis acetosella*, *Calamintha grandiflora*, *Salvia glutinosa*, *Urtica dioica*, *Atropa caucasica* - endemic to Caucasus. Mosslayer is developed.

**Plot 23. Mixed forest (oak forest with spruce and fir admixture).** Left hand bank of the Ormeleti River, upstream village Lukhi. GPS Coordinates 0270209/4761857. Altitude (m AMSL) 898. Aspect South-East. Inclination 40-45<sup>0</sup>. Treelayer: *Quercus iberica* - rare plant species, *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor, *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Tilia begoniifolia*, *Carpinus caucasica*. Shruberry: *Rubus* sp., *Rosa canina*, *Lonicera caucasica*, *Rhus coriaria*, *Euonymus europaeus*. Herblayer: *Festuca drimeja*, *Polypodium vulgare*, *Poa nemoralis*, *Lapsana grandiflora*, *Polygonatum glaberrimum*, *Campanula alliariifolia*, *Clinopodium umbrosum*, *Asplenium trichomanes*, *Helleborus caucasicus* - endemic to Caucasus, *Satureja spicigera*, *Paris incompleta*, *Sedum oppositifolium*, *Calamintha grandiflora*, *Asplenium septentrionale*, *Laser trilobum*. Mosslayer is developed.

**Plot 24. Mixed forest (fir forest with alder and oak admixture).** Left hand bank of the Ormeleti River, upstream village Lukhi. GPS Coordinates 0270112/4761872. Altitude (m AMSL) 900. Aspect East. Inclination 35<sup>0</sup>. Treelayer: *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Carpinus caucasica*, *Quercus iberica* - rare plant species, *Castanea sativa* (young) - Georgian Red List Species (VU), *Picea orientalis* (young) - sub-endemic for the Caucasus, irradiated to Asia Minor. Shruberry: *Rhododendron ponticum* - tertiary relict flora species, irradiated to Asia Minor and Balkans (Strandzha), *Rubus* sp., *Mespilus germanica*. Herblayer: *Trifolium ambiguum*, *Fragaria vesca*, *Epimedium colchicum*, *Paris incompleta*, *Primula macrocalyx*, *Sedum oppositifolium*, *Helleborus caucasicus* - endemic to

Caucasus, *Satureja spicigera*, *Clinopodium vulgare*, *Leontodon hispidus*, *Viola alba*, *Salvia glutinosa*, *Digitalis ciliata* - endemic to Caucasus. Mosslayer is developed.

**Plot 27. Mixed deciduous forest - degraded hornbeam.** The Nenskra Valley, village Kedani, power house site. GPS Coordinates 0270613/4763372. Altitude (m AMSL) 735. Aspect West. Inclination 30-35<sup>0</sup>. Treelayer: *Carpinus caucasica*, *Fraxinus excelsior*, *Acer campestre* – young, *Acer laetum* – young, *Quercus iberica* (young) - rare plant species. Shruberry: *Corylus avellana*, *Rubus* sp. Herblayer: *Asperula odorata*, *Pachyphragma macrophyllum* - representative of monotypic nemoral Colchic-Caucasian family; sub-endemic to Caucasus, irradiated to Assia Minor (Chaneti), *Primula macrocalyx*, *Asarum ibericum* - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti), *Asplenium trichomanes*, *Cyclamen vernalis*, *Polystichum braunii*, *Dryopteris filix-mas*, *Calystegia silvatica*, *Asplenium adianthum nigrum*, *Lapsana grandiflora*, *Mycelis muralis*, *Digitalis ciliata* - endemic to Caucasus. Mosslayer is developed.

**Plot 28. Beech forest with chestnut and spruce admixture.** Left hand bank of the Nenskra River, village Kedani, power house site. GPS Coordinates N0270720/E4764757. Altitude (m AMSL) 733. Aspect South-West. Inclination 35<sup>0</sup>. Treelayer: *Carpinus caucasica*, *Castanea sativa*-Georgian Red List Species (VU), *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor, *Pyrus caucasica*, *Malus orientalis*, *Fraxinus excelsior* – young. Shruberry: *Corylus avellana*, *Mespilus germanica*, *Rosa canina*. Herblayer: *Fragaria vesca*, *Salvia glutinosa*, *Tamus communis*. Mosslayer is developed.

**Plot 29. Spruce-fir-tree forest.** Left hand bank of the Nakra River, village Kedani, power house site. GPS Coordinates 0272058/4765636. Altitude (m AMSL) 1142. Aspect South-West. Inclination 35<sup>0</sup>. Treelayer: *Abies nordmanniana*-sub-endemic for the Caucasus, irradiated in Asia Minor, *Picea orientalis*-sub-endemic for the Caucasus, irradiated to Asia Minor, *Fagus orientalis*, *Acer pseudoplatanus*. Shruberry: *Rubus* sp., *Lonicera caucasica*. Herblayer: *Fragaria vesca*, *Cicerbita macrophylla*, *Asperula odorata*, *Dryopteris filix-mas*, *Salvia glutinosa*, *Lapsana grandiflora*. Mosslayer is developed.

## 7. Rare, Endemic and Georgian Red List Species

2 Georgian Red List species, 7 Caucasian endemic species, 5 Caucasian sub-endemic species, 2 tertiary relict flora species, 2 rare species and 2 CITES species are found within the study area. These include:

1. *Castanea sativa* - Georgian Red List Species (VU)
2. *Taxus baccata* - Georgian Red List Species (VU)
3. *Atropa caucasica* - endemic to Caucasus
4. *Scabiosa correvoniana* - endemic to Caucasus
5. *Paracynoglossum imeretinum* - endemic to Caucasus
6. *Senecio pojarkovae* - endemic to Caucasus
7. *Euphorbia macroceras* - endemic to Caucasus
8. *Helleborus caucasicus* - endemic to Caucasus
9. *Digitalis ciliata* - endemic to Caucasus

10. *Picea orientalis* - sub-endemic for the Caucasus, irradiated to Asia Minor
11. *Abies nordmanniana* - sub-endemic for the Caucasus, irradiated in Asia Minor
12. *Pachyphragma macrophyllum* - representative of monotypic nemoral Colchic-Caucasian family; sub-endemic to Caucasus, irradiated to Assia Minor (Chaneti)
13. *Asarum ibericum* - sub-endemic for the Caucasus, irradiated to Asia Minor (Chaneti)
14. *Pachyphragma macrophyllum* - representative of monotypic nemoral Colchic-Caucasian family; sub-endemic to Caucasus, irradiated to Assia Minor (Chaneti)
15. *Ilex colchica* - tertiary relict flora species, irradiated to Balkans (Strandzha) and Assia Minor
16. *Laurocerasus officinalis* - tertiary relict flora species
17. *Quercus iberica* - rare plant species
18. *Sorbus caucasigena* - rare plant species
19. *Cephalanthera rubra* - CITES
20. *Colchicum specioum* - CITES
21. *Cyclamen vernum* – CITES

## Annex 2 - Ornithological Report

## REPORT

### ON THE RESULTS OF THE ANALYSIS OF ORNITHOLOGICAL SITUATION IN THE VALLEYS OF NENSKRA AND NAKRA RIVERS

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#### PART 1.

#### MATERIAL AND METHODS

Data for this report were collected by ornithologist Dr. Alexander Abuladze from the Institute of Zoology, Ilia State University. The field works within the limits Project areas were undertaken during five working days between September 15<sup>th</sup> and 20<sup>th</sup>, 2015. Areas and sites, sensitive and important from the ornithological diversity and conservation points of view, were preliminary selected for more detailed investigations. All these areas and sites were visited during field works. Data were collected in each areas during one working day, separate sites were visited during short (from 10-15 minutes to 3-4 hours in each site) field excursions. The main methods used during field works were bird counts along the counting routs (transects) crossed study area and direct visual observations from high located watching points. Surveys were conducted on foot throughout the daylight hours, between 08:30 – 09:40 and 18:30-20:00. Additionally, a series of visual observations were made during several road-car surveys. A series of excursions into the bird natural habitats were undertaken on foot, 29 hours 45 minutes in total. During field works all important, for birds and other vertebrata animals, areas and separate sites, selected for study, were surveyed the course of study. Specific attention has been paid to the collecting of data in the most sensitive areas and on rare and threatened bird species, which are included in the List of the Globally Threatened Birds in Europe and included in the Red list of Georgia.

Birds were counted in clear weather conditions, optimal for bird observations - sunny, windless, cloudless, with air temperature +15 ... +23C. Identification of birds was through 10 x 50 binocular "Nikon Aculon". Photo camera "Nikon P530" and photo camera "Fujifilm FinePix XP70" were used during field works.

The species accounts in report will be presented in the systematic order according to the Clement's 6<sup>th</sup> edition (The Clements Checklist of Birds of the World. 6<sup>th</sup> Edition. 2012. Clements, James F., Diamond, J. (Preface); White, A. (Foreword); Fitzpatrick, J.W. (Introduction) // Cornell University Press. 855 pages, 8 1/2 x 11, 2 tables. ISBN: 0-8014-4501-9). All names of birds in presented report follow the Scientific and Common terminology of the "The Birds of the Western Palearctic" (1994).

## PART 2.

### THE GENERAL DESCRIPTION OF THE AVIFAUNA OF NENSKRA RIVER VALLEY AND NAKRA RIVER VALLEY

This part of report presents a brief description of the Avifauna recorded within the limits of study areas – in the middle parts of Nenskra River valley and Nakra River valley.

The analyses of Avifauna are presented on the basis of the materials collected by the author in previous years, mostly in 1977, 1980's and later - in 2003 and 2007. It is related with the literature data which is practically not existed. Special ornithological researches were not carried out in the basins of Nenskar River and Nakra River as well as at adjacent sections of Inguri River Inguri River gorge and slopes of the Great Caucasus. Only lists of bird species recorded in the some parts of Svaneti Region with very short information on the status of presence and habitat selection are presented in several ornithological articles, published in 1970's – 1980's:

1. Kutubidze, M.E. 1974. მთავარი კავკასიონის ფრინველების ეკოლოგიურ-ფაუნისტური მიმოხილვა დასავლეთ საქართველოს ფარგლებში [Faunistic-Ecological review of the Ornithofauna of Main Caucasian Ridge within the limits of Western Georgia] // მასალები საქართველოს ფაუნის შესწავლისათვის [Materials on the study of fauna of Georgia]. Issue No 4. Tbilisi, publishing house of the Academy of Sciences of Georgia: 284-332 (in Georgian, summary in Russian)
2. Kuznetsov, A. 1983. Список птиц Верхней Сванетии [The list of birds of Upper Svanetia] // Распространение и систематика птиц. Сборник трудов Зоологического музея МГУ [Distribution and Systematic of Birds. Archives of the Zoological Museum of Moscow State University], 21, Moscow University Press. 1983: 186-190 (in Russian, summary in English).
3. Kuznetsov, A.A., Vanin, D.I. 1982. Материалы к орнитофауне Верхней Сванетии [Materials on Avifauna of Upper Svaneti] // Орнитология [Ornitologiya], 17: 169-170 (in Russian)
4. Loskot, V.M. 1991. Распространение и образ жизни кавказской большой чечевицы *Carpodacus rubicilla rubicilla* (Guld.) [Distribution and life history of the Caucasian Great Rose Finch, *Carpodacus r. rubicilla* (Guld.)] // Труды Зоологического института АН СССР Ecological studies of bird population. Proceedings of the Zoological Institute of the AS of USSR, volume 231, Leningrad: 43-115 (in Russian).
5. Zhordania, R.G., Gogilashvili, G.S. 1976. Птицы Сванетии (Грузинская ССР) [Birds of Svaneti (Georgian SSR)] // Acta Ornithologica, volume XV, № 6. Warszawa, Poland: 323-338 (in Russian, summary in Polish and English).
6. Zhordania, R.G., Gogilashvili, G.S. 1976. Эколого-зоогеографический обзор птиц Сванетии [The Ecology- Zoogeographical review of the birds of Svaneti] // Proceedings of the Tbilisi State University, volume 167: 141-145 (in Russian).

## 2.1.

### Species composition

On the basis of the author's own field observations carried out in previous years and analysis of all available information from several literature sources, unpublished reports and personal communications of Georgian zoologists, working in previous years within the limits of study area and other sources, a total of 129 bird species have been recorded within the limits of study area. These 129 bird species (50 – Non-Passerines and 79 - Passerines) are associated in 38 families that belong to 14 orders and form around 25% of Avifauna of South Caucasus and around 30% of Avifauna of Georgia.

The following is a Systematic List of the birds recorded within the limits of study area:

#### Order I. *CICONIIFORMES* – 1 species

##### Family I – 1. Herons and Bitterns (*Ardeidae*) - 1 species

Grey Heron - *Ardea cinerea*

##### Family I – 2. Storks (*Ciconiidae*) - 2 species

Black Stork - *Ciconia nigra*

White Stork - *Ciconia ciconia*

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#### Order II. *ANSERIFORMES* - 1 species

##### Family II - 1. Swans, Geese, Ducks (*Anatidae*) - 1 species

Mallard - *Anas platyrhynchos*

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#### Order III. *FALCONIFORMES* – 21 species

##### Family III – 1. Buzzards, etc (*Accipitridae*) - 18 species

European Honey Buzzard - *Pernis apivorus*

Black Kite - *Milvus migrans*

Bearded Vulture (= Lammergeyer) – *Gypaetus barbatus*

Griffon Vulture – *Gyps fulvus*

Cinereous Vulture - *Aegypius monachus*

Egyptian Vulture - *Neophron percnopterus*

Short-toed Eagle - *Circaetus gallicus*

Eurasian Marsh Harrier - *Circus aeruginosus*

Pallid Harrier - *Circus macrourus*

Montagu's Harrier - *Circus pygargus*

Goshawk - *Accipiter gentilis*

Sparrowhawk - *Accipiter nisus*

Common Buzzard - *Buteo buteo*

Rough-legged Buzzard - *Buteo lagopus*

Lesser Spotted Eagle - *Aquila pomarina*

Great Spotted Eagle - *Aquila clanga*

Golden Eagle - *Aquila chrysaetos*  
Booted Eagle - *Hieraeetus pennatus*

Family III – 2. Falcons (*Falconidae*) - 3 species

Common Kestrel - *Falco tinnunculus*  
Hobby - *Falco subbuteo*  
Peregrine - *Falco peregrines*

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**Order IV. GALLIFORMES** - 1 species

Family IV - 1. Pheasants, Quails (*Phasianidae*) - 1 species

Common Quail - *Coturnix coturnix*

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**Order V. GRUIFORMES** – 2 species

Family V- 1. Rails, Crakes, etc. (*Rallidae*) - 1 species

Corncrake - *Crex crex*

Family V - 2. Cranes (*Gruidae*) - 1 species

Common Crane - *Grus grus*

\* \* \* \* \*

**Order VI. CHRADRIIFORMES** – 5 species

Family VI – 1 Plovers (*Charadriidae*) – 1 species

Little Ringed Plover - *Charadrius dubius*

Family VI – 2. Stints (*Scolopacidae*) - 4 species

Green Sandpiper - *Tringa ochropus*  
Eurasian Woodcock - *Scolopax rusticola*  
Common Sandpiper - *Actitis hypoleucos*  
Common Snipe - *Gallinago gallinago*

\* \* \* \* \*

**Order VII. COLUMBIFORMES** - 3 species

Family VII – 1. Pigeons and Doves (*Columbidae*) - 3 species

Stock Dove - *Columba oenas*  
Common Wood Pigeon - *Columba palumbus*  
European Turtle Dove - *Streptopelia turtur*

\* \* \* \* \*

**Order VIII. CUCULIFORMES** – 1 species

Family VIII – 1. Cuckoos (*Cuculidae*) - 1 species

Cuckoo - *Cuculus canorus*

\* \* \* \* \*

**Order IX. STRIGIFORMES** - 3 species  
Family IX – 1. Owls (*Strigidae*) - 3 species  
Eurasian Scops Owl - *Otus scops*  
Tawny Owl – *Strix aluco*  
Boreal Owl - *Aegolius funereus*

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**Order X. CAPRIMULGIFORMES** -1 species  
Family X – 1. Nightjars (*Caprimulgidae*) - 1 species  
European Nightjar - *Caprimulgus europaeus*

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**Order XI. APODIFORMES** – 2 species  
Family XI - 1. Swifts (*Apodidae*) – 2 species  
Common Swift – *Apus apus*  
Alpine Swift - *Apus melba*

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**Order XII. CORACIIFORMES** – 3 species  
Family XII - 1. Bee-eaters (*Meropidae*) – 1 species  
European Bee-eater - *Merops apiaster*

Family XII - 2. Rollers (*Coraciidae*) – 1 species  
European Roller - *Coracias garrulous*

Family XII - 3. Hoopoes (*Upupidae*) – 1 species  
Hoopoe - *Upupa epops*

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**Order XIII. PICIFORMES** - 4 species  
Family XIII - 1. Woodpeckers (*Picidae*) - 4 species  
Wryneck - *Jynx torquilla*  
Black Woodpecker - *Dryocopus martius*  
Great Spotted Woodpecker - *Dendrocopos major*  
Lesser Spotted Woodpecker - *Dendrocopos minor*

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**Order XIV. PASSERINES (*PASSERIFORMES*)** – 79 species  
Family XIV - 1. Larks (*Alaudidae*) - 3 species  
Shore Lark - *Eremophila alpestris*  
Woodlark - *Lullula arborea*  
Eurasian Skylark - *Alauda arvensis*

Family XIV - 2. Swallows and Martins (*Hirundinidae*) - 3 species

Eurasian Crag Martin - *Ptyonoprogne rupestris*  
Barn Swallow - *Hirundo rustica*  
House Martin - *Delichon urbica*

Family XIV - 3. Wagtails and Pipits (*Motacillidae*) - 7 species

Tawny Pipit - *Anthus campestris*  
Tree Pipit - *Anthus trivialis*  
Meadow Pipit - *Anthus pratensis*  
Water Pipit - *Anthus spinoleta*  
Yellow Wagtail - *Motacilla flava*  
Grey Wagtail - *Motacilla cinerea*  
Pied Wagtail - *Motacilla alba*

Family XIV - 4. Dippers (*Cinclidae*) - 1 species

White-throated Dipper - *Cinclus cinclus*

Family XIV - 5. Shrikes (*Laniidae*) - 2 species

Red-backed Shrike - *Lanius collurio*  
Lesser Grey Shrike - *Lanius minor*

Family XIV - 6. Accentors (*Prunellidae*) - 2 species

Dunnock - *Prunella modularis*  
Alpine Accentor - *Prunella collaris*

Family XIV - 7. Wrens (*Troglodytidae*) - 1 species

Winter Wren - *Troglodytes troglodytes*

Family XIV - 8. Thrushes (*Turdidae*) - 16 species

European Robin - *Erithacus rubecula*  
Thrush Nightingale - *Luscinia luscinia*  
Rufous Nightingale - *Luscinia megarhynchos*  
Bluethroat - *Luscinia svecica*  
Caspian Whinchat - *Saxicola rubetra*  
Siberian Stonechat - *Saxicola torquata*  
Isabelline Wheatear - *Oenanthe isabellina*  
Nothorn Wheatear - *Oenanthe oenanthe*  
Black Redstart - *Phoenicurus ochruros*  
Common Redstart - *Phoenicurus phoenicurus*  
Guldenstadt's Redstart - *Phoenicurus erythrogaster*  
Common Blackbird - *Turdus merula*  
Song Thrush - *Turdus philomelos*  
Mistle Thrush - *Turdus viscivorus*  
Ring Ouzel - *Turdus torquatus*  
Common Rock Thrush - *Monticola saxatilis*

Family XIV -9. Warblers (*Sylviidae*) - 12 species

Common Whitethroat - *Sylvia communis*  
Lesser Whitethroat - *Sylvia curruca*  
Garden Warbler - *Sylvia borin*  
Barred Warbler - *Sylvia nisoria*  
Blackcap - *Sylvia atricapilla*  
Willow Warbler - *Phylloscopus trochilus*  
Chiffchaff - *Phylloscopus collybita*  
Caucasian Warbler - *Phylloscopus lorenzii*  
Wood Warbler - *Phylloscopus sibilatrix*  
Green Warbler - *Phylloscopus nitidus (trochiloides)*  
Greenish Warbler - *Phylloscopus trochiloides*  
Goldcrest - *Regulus regulus*

Family XIV- 10. Flycatchers (*Muscicapidae*) - 2 species

Spotted Flycatcher - *Muscicapa striata*  
Red-breasted Flycatcher - *Ficedula parva*

Family XIV - 11. Long-tailed Tits (*Aegithalidae*) - 1 species

Long-tailed Tit - *Aegithalos caudatus*

Family XIV - 12. Tits (*Paridae*) - 3 species

Coal Tit - *Parus ater*  
Blue Tit - *Parus caeruleus*  
Great Tit - *Parus major*

Family XIV - 13. Nuthatches (*Sittidae*) - 2 species

Kruper's Nuthatch - *Sitta krueperi*  
Wood Nuthatch - *Sitta europea*

Family XIV - 14. Wallcreepers (*Tichodromadidae*) - 1 species

Wallcreeper - *Tichodroma muraria*

Family XIV - 15. Treecreepers (*Certhiidae*) - 1 species

Eurasian Treecreeper - *Certhia familiaris*

Family XIV - 16. Orioles (*Oriolidae*) - 1 species

Eurasian Golden Oriole - *Oriolus oriolus*

Family XIV - 17 Crows (*Corvidae*) - 5 species

Eurasian Jay - *Garrulus glandarius*  
Common Raven - *Corvus corax*  
Carrion Crow/Hooded Crow - *Corvus corone corone/Corvus corone cornix*  
Yellow-billed Chough - *Pyrrhocorax graculus*  
Red-billed Chough - *Pyrrhocorax pyrrhocorax*

Family XIV - 18 Finches (*Fringillidae*) - 12 species

Common Chaffinch - *Fringilla coelebs*  
Brambling - *Fringilla montifringilla*  
European Goldfinch - *Carduelis carduelis*  
Eurasian Siskin - *Carduelis spinus*  
European Greenfinch - *Carduelis chloris*  
Red-fronted Serin - *Serinus pusillus*  
Common Rosefinch - *Carpodacus erythrinus*  
Common Linnet – *Acantia cannabina*  
Common Crossbill - *Loxia curvirostra*,  
Great Rose Finch – *Carpodacus rubicilla*  
Eurasian Bullfinch - *Pyrrhula pyrrhula*  
Hawfinch – *Coccothraustes coccothraustes*

Family XIV - 19 Buntings (*Emberizidae*) – 4 species

Corn Bunting - *Miliaria calandra*  
Rock Bunting - *Emberiza cia*  
Yellowhammer - *Emberiza citrinella*  
Black-headed Bunting - *Emberiza melanocephala*

## 2.2.

### **The Status of presence of birds by seasons of year and their abundance**

Based on the author's own unpublished materials collected during field works carried out in previous years in study area, the presence of at least 121 bird species was confirmed to limits of project area and in adjacent areas. About 110 bird species are more-or-less regular elements of Avifauna and 10 – 12 species are occasional visitors.

The breeding of at least 70 species was confirmed by factual materials in the course of study and 3 further species can be assumed to nest at study area (or “probably breeding species”). At least 30 species are year-round residents, or residents with local seasonal altitudinal movements.

About 75 bird species were recorded during seasonal passages in spring and autumn, from which at least 33 species were recorded only during seasonal passages – in spring and in autumn..

The fauna of wintering birds are presented at least of 48 species, about 30 species are regular winterers and other 15-20 species should be considered as an irregular winter visitors.

The full list of bird species recorded within the limits of study area with more detailed information on the status of presence by seasons of year and abundance are presented below in Table 2-1.

The following (one or more) categories were selected for classification of the status of bird species, which are occurred within the limits of study area:

- a) YRR - year-round resident or breeding species, present throughout of all seasons of the year;
- b) YRV - year-round visitor or non-breeding species, present throughout of all seasons of the year;
- c) SB - summer breeder or breeding species, present in breeding season and absent during non-breeding period;
- d) WV - winter visitor or non-breeding species, present in late autumn, winter and early spring;
- e) PM - passage migrant (passage visitor) - bird on regular seasonal passage, present primarily in autumn and spring;
- f) OV - occasional visitor (or vagrant species) - recorded only several times; unexpected because normal distribution range is very distant from study area;

The following abundance categories of the birds in the suitable habitats in the study area were used in the text:

- (++++++) numerous species - recorded on all of field excursions;
- (+++++) common species - recorded on not less than of 50 % field excursions;
- (+++++) uncommon species - recorded on 5-50 % of field excursions;
- (+++)
- (++) very rare species - recorded on less than 1 % of field excursions;
- (+)
- (+) occasional species or vagrant - recorded occasionally (species was recorded only 1-10 times during study period).

**Table 2-2. The list of bird taxa recorded within the limits of study area**

No	Bird species English name <i>Scientific name</i>	Status of presence	Nesting season	Seasonal passages	Winter season
1	Grey Heron <i>Ardea cinerea</i>	OV	-	+	-
2	Black Stork <i>Ciconia nigra</i>	OV	-	+	-
3	White Stork <i>Ciconia ciconia</i>	OV	-	+	-
4	Mallard <i>Anas platyrhynchos</i>	OV	-	+	-
5	European Honey-buzzard <i>Pernis apivorus</i>	PM	-	++++++	-
6	Black Kite <i>Milvus migrans</i>	PM, WV	-	++++++	+
7	Bearded Vulture <i>Gypaetus barbatus</i>	YR-V	++	+++	+++

8	Eurasian Griffon Vulture <i>Gyps fulvus</i>	YR-V	++	+++	+
9	Cinereous Vulture <i>Aegypius monachus</i>	OV	-	+	-
10	Egyptian Vulture <i>Neophron percnopterus</i>	PM	-	+++	-
11	Short-toed Snake-eagle <i>Circaetus gallicus</i>	PM	-	+++++	-
12	Eurasian Marsh Harrier <i>Circus aeruginosus</i>	OV	-	+	-
13	Pallid Harrier <i>Circus macrourus</i>	OV	-	+	-
14	Montagu's Harrier <i>Circus pygargus</i>	PM	-	++	-
15	Northern Goshawk <i>Accipiter gentilis</i>	SB, PM	-	++	-
16	Eurasian Sparrowhawk <i>Accipiter nisus</i>	SB, PM	-	+++++	-
17	Common Buzzard <i>Buteo buteo</i>	SB, PM	++	+++++	-
18	Rough-legged Hawk <i>Buteo lagopus</i>	PM, WV	-	+	+
19	Greater Spotted Eagle <i>Aquila clanga</i>	PM	-	++	-
20	Lesser Spotted Eagle <i>Aquila pomarina</i>	PM	-	++++	-
21	Golden Eagle <i>Aquila chrysaetos</i>	YR-R	++	++	++
22	Booted Eagle <i>Hieraetus pennatus</i>	PM	-	+++	-
23	Common Kestrel <i>Falco tinnunculus</i>	PM	-	+++	-
24	Eurasian Hobby <i>Falco subbuteo</i>	SB, PM	++	++	-
25	Peregrine Falcon <i>Falco peregrines</i>	PM, WV	-	++	+
26	Common Quail <i>Coturnix coturnix</i>	PM	-	+++	-
27	Corncrake <i>Crex crex</i>	OV	-	+	-
28	Common Crane <i>Grus grus</i>	OV	-	+	-
29	Little Ringed Plover <i>Charadrius dubius</i>	SB, PM	++	++++	-
30	Green Sandpiper	PM	-	+++	-

	<i>Tringa ochropus</i>				
31	Common Sandpiper <i>Actitis hypoleucos</i>	SB, PM	++	+++	-
32	Eurasian Woodcock <i>Scolopax rusticola</i>	PM	-	+++	-
33	Common Snipe <i>Gallinago gallinago</i>	PM	-	+++	-
34	Stock Pigeon <i>Columba oenas</i>	PM	-	++++	++
35	Common Wood Pigeon <i>Columba palumbus</i>	PM	-	+++	++
36	European Turtle Dove <i>Streptopelia turtur</i>	PM	-	+++	-
37	Common Cuckoo <i>Cuculus canorus</i>	SB, PM	+++	++++	-
38	Common Scops Owl <i>Otus scops</i>	SB, PM	++	++++	-
39	Tawny Owl <i>Strix aluco</i>	YR-R	++	++	++
40	Boreal Owl <i>Aegolius funereus</i>	YR-R	++	++	++
41	Eurasian Nightjar <i>Caprimulgus europaeus</i>	SB, PM	+++	++++	-
42	Common Swift <i>Apus apus</i>	PM	-	+++++++	-
43	Alpine Swift <i>Apus melba</i>	PM	-	+++	-
44	European Bee-eater <i>Merops apiaster</i>	PM	-	+++++++	-
45	European Roller <i>Coracias garrulous</i>	PM	-	++++	-
46	Eurasian Hoopoe <i>Upupa epops</i>	SB, PM	+++	+++++	-
47	Eurasian Wryneck <i>Jynx torquilla</i>	PM	-	++	-
48	Black Woodpecker <i>Dryocopus martius</i>	YR-R	++	++	++
49	Great Spotted Woodpecker <i>Dendrocopos major</i>	YR-R	+++	+++	+++
50	Lesser Spotted Woodpecker <i>Dendrocopos minor</i>	OV	-	+	+
51	Shore Lark <i>Eremophila alpestris</i>	OV	-	+	+
52	Wood Lark <i>Lullula arborea</i>	SB, PM	+++++++	+++++++	-

53	Eurasian Skylark <i>Alauda arvensis</i>	SB, PM	++++++	++++++	++++++
54	Barn Swallow <i>Hirundo rustica</i>	SB, PM	++++++	++++++	-
55	Crag Martin <i>Ptyonoprogne rupestris</i>	SB?, PM	+	++++	-
56	Northern House-martin <i>Delichon urbica</i>	SB, PM	++++++	++++++	-
57	Tree Pipit <i>Anthus trivialis</i>	SB, PM	+++++	++++++	-
58	Meadow Pipit <i>Anthus pratensis</i>	SB, PM	++++	+++++	-
59	Water Pipit <i>Anthus spinoletta</i>	SB, PM	-	++++	-
60	Tawny Pipit <i>Anthus campestris</i>	PM	-	+++	-
61	White Wagtail <i>Motacilla alba</i>	YR-R(?), SB, PM	++++++	++++++	+
62	Grey Wagtail <i>Motacilla cinerea</i>	YR-R(?), SB, PM	+++++	++++	-
63	Yellow Wagtail <i>Motacilla flava</i>	PM	-	+++	-
64	White-throated Dipper <i>Cinclus cinclus</i>	YR-R	+++++	+++++	+++++
65	Red-backed Shrike <i>Lanius collurio</i>	SB, PM	+++++	+++++	-
66	Lesser Grey Shrike <i>Lanius minor</i>	PM	-	+++	-
67	Winter Wren <i>Troglodytes troglodytes</i>	YR-R	+++++	+++++	+++++
68	Hedge Accentor (Dunnock) <i>Prunella modularis</i>	YR-R	+++	+++++	+++++
69	Alpine Accentor <i>Prunella collaris</i>	YR-R			
70	Siberian Stonechat <i>Saxicola torquata</i>	PM	-	++++	-
71	Caspian Whinchat <i>Saxicola rubetra</i>	SB, PM	++++	+++++	-
72	Northern Wheatear <i>Oenanthe oenanthe</i>	PM	-	+++++	-
73	Isabelline Wheatear <i>Oenanthe isabellina</i>	PM	-	++++	-
74	Black Redstart <i>Phoenicurus ochruros</i>	YR-R(?), SB, PM	+++	++++	+
75	Common Redstart	SB, PM	++++++	++++++	-

	<i>Phoenicurus phoenicurus</i>				
76	Guldenstadt's Redstart <i>Phoenicurus erythrogaster</i>	OV	-	+	++
77	European Robin <i>Erithacus rubecula</i>	YR-R	+++++	+++++	+++
78	Bluethroat <i>Luscinia svecica</i>	PM	-	+++	-
79	Thrush Nightingale <i>Luscinia luscinia</i>	PM	-	+++++	-
80	Common Nightingale <i>Luscinia megarhynchos</i>	SB, PM	+++++	+++++	-
81	Eurasian Blackbird <i>Turdus merula</i>	YR-R	+++++	+++++	+++++
82	Song Thrush <i>Turdus philomelos</i>	SB, PM	++++	++++	-
83	Mistle Thrush <i>Turdus viscivorus</i>	SB, PM	++++	++++	-
84	Ring Ouzel <i>Turdus torquatus</i>	YR-R	++	+++	+++
85	Common Rock Thrush <i>Monticola saxatilis</i>	PM	-	++	-
86	Common Whitethroat <i>Sylvia communis</i>	SB, PM	+++++	+++++	-
87	Lesser Whitethroat <i>Sylvia curruca</i>	SB, PM	+++	+++++	-
88	Garden Warbler <i>Sylvia borin</i>	SB, PM	+++	+++++	-
89	Barred Warbler <i>Sylvia nisoria</i>	SB, PM	+++++	+++++	-
90	Blackcap <i>Sylvia atricapilla</i>	SB, PM	+++++	+++++	-
91	Willow Warbler <i>Phylloscopus trochilus</i>	PM	-	+++++	-
92	Common Chiffchaff <i>Phylloscopus collybita</i>	SB, PM	++++	+++++	-
93	Caucasian Chiffchaff <i>Phylloscopus lorenzii</i>	SB, PM	+++++	++++	-
94	Wood Warbler <i>Phylloscopus sibilatrix</i>	SB, PM	++++	++++	-
95	Green Warbler <i>Phylloscopus nitidus</i>	SB, PM	++++	++++	-
96	Greenish Warbler <i>Phylloscopus trochiloides</i>	PM	-	++++	-
97	Goldcrest <i>Regulus regulus</i>	YR-R	+++	+++	+++

98	Spotted Flycatcher <i>Muscicapa striata</i>	SB, PM	++++++	++++++	-
99	Red-breasted Flycatcher <i>Ficedula parva</i>	SB, PM	+++++	+++++	-
100	Long-tailed Tit <i>Aegithalos caudatus</i>	YR-R	+++	+++	+++
101	Coal Tit <i>Parus ater</i>	YR-R	++++	++++	++++
102	Great Tit <i>Parus major</i>	YR-R	+++++	+++++	+++++
103	Blue Tit <i>Parus caeruleus</i>	YR-R	++	++	+++
104	Kruper's Nuthatch <i>Sitta krueperi</i>	YR-R	++	-	++
105	Wood Nuthatch <i>Sitta europaea</i>	YR-R	+++	+++	+++
106	Wallcreeper <i>Tichodroma muraria</i>	OV	-	+	++
107	Eurasian Tree-creeper <i>Certhia familiaris</i>	YR-R	+++	+++	+++
108	Eurasian Golden-oriole <i>Oriolus oriolus</i>	PM		++++	-
109	Eurasian Jay <i>Garrulus glandarius</i>	YR-R	+++++	+++++	+++++
110	Common Raven <i>Corvus corax</i>	YR-R	+++++	+++++	+++++
111	Hooded Crow <i>Corvus corone cornix</i>	OV	-	++++++	++++++
112	Yellow-billed Chough <i>Pyrrhonorax graculus</i>	WV	-	-	++
113	Red-billed Chough <i>Pyrrhonorax pyrrhonorax</i>	WV	-	-	++
114	Chaffinch <i>Fringilla coelebs</i>	SB, PM	++++++	++++++	-
115	Brambling <i>Fringilla montifringilla</i>	PM, WV	-	+++	+++
116	European Goldfinch <i>Carduelis carduelis</i>	SB, PM	+++	+++++	-
117	Eurasian Siskin <i>Carduelis spinus</i>	SB, PM, WV	++++	++++	++
118	European Greenfinch <i>Carduelis chloris</i>	SB, PM	++++	++++++	-
119	Red-fronted Serin <i>Serinus pusillus</i>	YR-R	+++	++++	+++
120	Common Rose Finch	PM, WV	-	++	+++

	<i>Carpodacus erythrinus</i>				
121	Eurasian Linnet <i>Acantis cannabina</i>	YR-R	++	++++	+
122	Common Crossbill <i>Loxia curvirostra,</i>	YR-R	++++ irregular	++++	+++
123	Great Rose Finch <i>Carpodactus rubicilla</i>	WV	-	-	++ irregular
124	Eurasian Bullfinch <i>Pyrrhula pyrrhula</i>	YR-R	++	++	++
125	Hawfinch <i>Coccothraustes coccothraustes</i>	SB (?),OV	+	++	-
126	Corn Bunting <i>Miliaria calandra</i>	PM, WV(?)	-	++++	+
127	Rock Bunting <i>Emberiza cia</i>	YR-R	+++	+++	+++
128	Yellowhammer <i>Emberiza citrinella</i>	SB, PM	+++	+++++	-
129	Black-headed Bunting <i>Emberiza melanocephala</i>	PM	-	++++	-

### 2.3.

#### Distribution of birds by areas

From the ornithological diversity point of view, the territory of Nenskra River basin is more important (rich), than territory of Nakra River basin. So, 127 bird species were recorded in Nenskra River valley and 95 in Nakra River valley. This is caused by relief, diversity of types habitats useful for birds, food resources, meteorological conditions, etc. For Nakra River valley is typical step slopes covered by dense woodlands; Nenskra valley is open, “wide” and covered with mosaic habitats. Distribution of bird species within the limits of Project areas by the separate parts of study area, i.e. basins of the Nenskra and Nakra rivers, presents in table 2-2 below.

**Table 2-3.**

No	Bird species English and <i>Latin</i> names	Nenskra River valley	Nakra River valley
1	Grey Heron, <i>Ardea cinerea</i>	+	-
2	Black Stork, <i>Ciconia nigra</i>	+	-
3	White Stork, <i>Ciconia ciconia</i>	+	-
4	Mallard, <i>Anas platyrhynchos</i>	+	-
5	European Honey-buzzard, <i>Pernis apivorus</i>	+	+
6	Black Kite, <i>Milvus migrans</i>	+	+

7	Bearded Vulture, <i>Gypaetus barbatus</i>	+	+
8	Eurasian Griffon Vulture, <i>Gyps fulvus</i>	+	+
9	Cinereous Vulture, <i>Aegypius monachus</i>	+	-
10	Egyptian Vulture, <i>Neophron percnopterus</i>	+	+
11	Short-toed Snake-eagle, <i>Circaetus gallicus</i>	+	+
12	Eurasian Marsh Harrier, <i>Circus aeruginosus</i>	+	-
13	Pallid Harrier, <i>Circus macrourus</i>	+	-
14	Montagu's Harrier, <i>Circus pygargus</i>	+	+
15	Northern Goshawk, <i>Accipiter gentilis</i>	+	+
16	Eurasian Sparrowhawk, <i>Accipiter nisus</i>	+	+
17	Common Buzzard, <i>Buteo buteo</i>	+	+
18	Rough-legged Hawk, <i>Buteo lagopus</i>	+	+
19	Greater Spotted Eagle, <i>Aquila clanga</i>	+	-
20	Lesser Spotted Eagle, <i>Aquila pomarina</i>	+	+
21	Golden Eagle, <i>Aquila chrysaetos</i>	+	+
22	Booted Eagle, <i>Hieraaetus pennatus</i>	+	+
23	Common Kestrel, <i>Falco tinnunculus</i>	+	+
24	Eurasian Hobby, <i>Falco subbuteo</i>	+	+
25	Peregrine Falcon, <i>Falco peregrines</i>	+	+
26	Common Quail, <i>Coturnix coturnix</i>	+	+
27	Corncrake, <i>Crex crex</i>	+	-
28	Common Crane, <i>Grus grus</i>	+	-
29	Little Ringed Plover, <i>Charadrius dubius</i>	+	+
30	Green Sandpiper, <i>Tringa ochropus</i>	+	-
31	Common Sandpiper, <i>Actitis hypoleucos</i>	+	+
32	Eurasian Woodcock, <i>Scolopax rusticola</i>	+	+
33	Common Snipe, <i>Gallinago gallinago</i>	+	-
34	Stock Pigeon, <i>Columba oenas</i>	+	+
35	Common Wood Pigeon, <i>Columba palumbus</i>	+	+
36	European Turtle Dove, <i>Streptopelia turtur</i>	+	-
37	Common Cuckoo, <i>Cuculus canorus</i>	+	+
38	Common Scops Owl, <i>Otus scops</i>	+	+
39	Tawny Owl, <i>Strix aluco</i>	+	+
40	Boreal Owl, <i>Aegolius funereus</i>	+	+
41	Eurasian Nightjar, <i>Caprimulgus europaeus</i>	+	+
42	Common Swift, <i>Apus apus</i>	+	+
43	Alpine Swift, <i>Apus melba</i>	+	+
44	European Bee-eater, <i>Merops apiaster</i>	+	+
45	European Roller, <i>Coracias garrulous</i>	+	-
46	Eurasian Hoopoe, <i>Upupa epops</i>	+	+
47	Eurasian Wryneck, <i>Jynx torquilla</i>	+	+
48	Black Woodpecker, <i>Dryocopus martius</i>	+	+
49	Great Spotted Woodpecker, <i>D. major</i>	+	+
50	Lesser Spotted Woodpecker, <i>D. minor</i>	+	+

51	Shore Lark, <i>Eremophila alpestris</i>	+	-
52	Wood Lark, <i>Lullula arborea</i>	+	+
53	Eurasian Skylark, <i>Alauda arvensis</i>	+	+
54	Barn Swallow, <i>Hirundo rustica</i>	+	+
55	Crag Martin, <i>Ptyonoprogne rupestris</i>	+	+
56	Northern House-martin, <i>Delichon urbica</i>	+	+
57	Tree Pipit, <i>Anthus trivialis</i>	+	+
58	Meadow Pipit, <i>Anthus pratensis</i>	+	-
59	Water Pipit, <i>Anthus spinoletta</i>	+	+
60	Tawny Pipit, <i>Anthus campestris</i>	+	-
61	White Wagtail, <i>Motacilla alba</i>	+	+
62	Grey Wagtail, <i>Motacilla cinerea</i>	+	+
63	Yellow Wagtail, <i>Motacilla flava</i>	+	-
64	White-throated Dipper, <i>Cinclus cinclus</i>	+	+
65	Red-backed Shrike, <i>Lanius collurio</i>	+	+
66	Lesser Grey Shrike, <i>Lanius minor</i>	+	-
67	Winter Wren, <i>Troglodytes troglodytes</i>	+	+
68	Dunnock, <i>Prunella modularis</i>	+	+
69	Alpine Accentor, <i>Prunella collaris</i>	+	-
70	Siberian Stonechat, <i>Saxicola torquata</i>	+	+
71	Caspian Whinchat, <i>Saxicola rubetra</i>	+	+
72	Northern Wheatear, <i>Oenanthe oenanthe</i>	+	+
73	Isabelline Wheatear, <i>Oenanthe isabellina</i>	+	-
74	Black Redstart, <i>Phoenicurus ochruros</i>	+	+
75	Common Redstart, <i>Phoenicurus phoenicurus</i>	+	+
76	Guldenstadt's Redstart, <i>Ph. erythrogaster</i>	+	-
77	European Robin, <i>Erithacus rubecula</i>	+	+
78	Bluethroat, <i>Luscinia svecica</i>	+	-
79	Thrush Nightingale, <i>Luscinia luscinia</i>	+	-
80	Com.Nightingale, <i>Luscinia megarhynchos</i>	+	-
81	Eurasian Blackbird, <i>Turdus merula</i>	+	+
82	Song Thrush, <i>Turdus philomelos</i>	+	-
83	Mistle Thrush, <i>Turdus viscivorus</i>	+	+
84	Ring Ouzel, <i>Turdus torquatus</i>	+	+
85	Common Rock Thrush, <i>Monticola saxatilis</i>	-	+
86	Common Whitethroat, <i>Sylvia communis</i>	+	+
87	Lesser Whitethroat, <i>Sylvia curruca</i>	+	+
88	Garden Warbler, <i>Sylvia borin</i>	+	-
89	Barred Warbler, <i>Sylvia nisoria</i>	+	+
90	Blackcap, <i>Sylvia atricapilla</i>	+	+
91	Willow Warbler, <i>Phylloscopus trochilus</i>	+	-
92	Common Chiffchaff, <i>Phylloscopus collybita</i>	+	+
93	Caucasian Chiffchaff, <i>Phylloscopus lorenzii</i>	+	+
94	Wood Warbler, <i>Phylloscopus sibilatrix</i>	+	-

95	Green Warbler, <i>Phylloscopus nitidus</i>	+	+
96	Greenish Warbler, <i>Phylloscopus trochiloides</i>	+	+
97	Goldcrest, <i>Regulus regulus</i>	+	+
98	Spotted Flycatcher, <i>Muscicapa striata</i>	+	+
99	Red-breasted Flycatcher, <i>Ficedula parva</i>	+	+
100	Long-tailed Tit, <i>Aegithalos caudatus</i>	+	+
101	Coal Tit, <i>Parus ater</i>	+	+
102	Great Tit, <i>Parus major</i>	+	+
103	Blue Tit, <i>Parus caeruleus</i>	+	+
104	Kruper's Nuthatch, <i>Sitta krueperi</i>	+	+
105	Wood Nuthatch, <i>Sitta europaea</i>	+	+
106	Wallcreeper, <i>Tichodroma muraria</i>	-	+
107	Eurasian Tree-creeper, <i>Certhia familiaris</i>	+	+
108	Eurasian Golden-oriole, <i>Oriolus oriolus</i>	+	-
109	Eurasian Jay, <i>Garrulus glandarius</i>	+	+
110	Common Raven, <i>Corvus corax</i>	+	+
111	Hooded Crow, <i>Corvus corone cornix</i>	+	-
112	Yellow-billed Chough, <i>Pyrrhocorax graculus</i>	+	+
113	Red-billed Chough, <i>Pyrrhocorax pyrrhocorax</i>	+	+
114	Chaffinch, <i>Fringilla coelebs</i>	+	+
115	Brambling, <i>Fringilla montifringilla</i>	+	-
116	European Goldfinch, <i>Carduelis carduelis</i>	+	+
117	Eurasian Siskin, <i>Carduelis spinus</i>	+	+
118	European Greenfinch, <i>Carduelis chloris</i>	+	+
119	Red-fronted Serin, <i>Serinus pusillus</i>	+	+
120	Common Rose Finch, <i>Carpodacus erythrinus</i>	+	-
121	Eurasian Linnet, <i>Acantia cannabina</i>	+	+
122	Common Crossbill, <i>Loxia curvirostra</i> ,	+	+
123	Great Rose Finch, <i>Carpodactus rubicilla</i>	+	-
124	Eurasian Bullfinch, <i>Pyrrhula pyrrhula</i>	+	+
125	Hawfinch, <i>Coccothraustes coccothraustes</i>	+	-
126	Corn Bunting, <i>Miliaria calandra</i>	+	-
127	Rock Bunting, <i>Emberiza cia</i>	+	+
128	Yellowhammer, <i>Emberiza citrinella</i>	+	+
129	Black-headed Bunting, <i>Emberiza melanocephala</i>	+	-
<b>Total number of recorded bird species</b>		<b>127</b>	<b>95</b>

## 2.4.

### Of national concern are the following Red-Listed bird species:

The Project area is of low importance for bird species included in the national Red List (2006). So, only 10, out of 35 bird species included in the Red List of Georgia (2006), or about 28% of bird species in the National Red List, are recorded within the limits of study area. For more detailed data on the red-listed bird species see table 2-3 below.

Categories of Status are according to the “IUCN Red List Categories and Criteria, Version 3.1, 2001” and “IUCN Guidelines for National and Regional Red Lists, 2003): *CR* - *Critically Endangered*; *EN* - *Endangered*; *VU* – *Vulnerable*;

The following abbreviations are used: *IR-R*- year-round resident; *IR-V*- year-round visitor; *PM* – *passage migrant*; *OV* – *occasional visitor*; *WV* – *winter visitor*.

**Table 2-4. Birds, included in the Red Data List of Georgia (2006), which were recorded within the limits of study area, i.e. in the valleys of of Nenskra and Nakra rivers.**

N	Bird species	National Status	Status of presence	Additional information
1	Bearded Vulture, <i>Gypaetus barbatus</i>	VU D1	YR-V	Regular non breeding visitor in small numbers
2	Eurasian Griffon, <i>Gyps fulvus</i>	VU D1	YR-V	Regular non-breeding visitor
3	Cinereous Vulture, <i>Aegypius monachus</i>	EN D1	OV	Very rare occasional visitor, recorded by solitary individuals
4	Egyptian Vulture, <i>Neophron percnopterus</i>	VU D1	PM	Regular, but rare passage visitor
5	Greater Spotted Eagle, <i>Aquila clanga</i>	VU IUCN	PM	Irregular passage visitor in small numbers; more common in autumn
6	Golden Eagle, <i>Aquila chrysaetos</i>	VU D1	YR-R	Rare year-round resident to area, nests in adjacent areas
7	Common Crane, <i>Grus grus</i>	EN D1	OV	Occasional, irregular, in small numbers visitor
8	Boreal Owl, <i>Aegolius funereus</i>	VU D1	YR-R	More-or less common breeding year-round resident
9	Guldenstadt's Redstart, <i>Phoenicurus erythrogaster</i>	VU B2b	YR-V	Occasional visitor, commonly recorded in late autumn and winter, nests in higher located altitudinal belts in adjacent areas
10	Great Rose Finch, <i>Carpodactus rubicilla</i>	EN D1	WV	Irregular, in small numbers visitor; nests in higher located altitudinal belts in adjacent areas

## 2.5.

### **Ornithological importance of the study areas**

Based on the data collected by author during field works in previous years as well as on the all available data (ornithological publications, unpublished reports, personal communications of Georgian specialists and visitors, etc.), the ornithological importance of the territory located within the limits of project area and adjacent areas may be considered in general as a low. The points of view for such statements are the following:

- The Avifauna of the study areas should be classified as a poor because it is presented mainly by widely distributed, quite common and numerous at the Great Caucasus and in this region of Georgia, i.e. in Svaneti, bird species. Especially, the breeding Avifauna of study areas is presented by widespread and common species. The dominate systematical group of breeding, migrating and wintering birds are small-sized passerines;
- It is well known, that territory of Georgia is important to Western Palaearctic birds as an one of the basic migration route. The western part of Georgia, or the Black Sea basin, especially has an importance for a numerous bird species – birds of prey, herons, egrets, waders, storks, cranes, waterfowl, egrets, gulls, terns, Common Quail, rollers, bee-eaters, swifts, passerines, etc. as a stopover site on passage and as wintering grounds. But study areas are located outside of the most important migratory fly-ways, “bottle-necks”, halting or resting sites and wintering grounds;
- The importance and value of the study area increases during seasonal migrations, because here, namely along the Inguri River valley lies the migration route of numerous bird species. But it is secondary fly-way. The main fly-ways lie West - along the coast of the Black Sea and to the East – along the valley of Rioni River. Especially the role of Nenskra and Nakra river valleys for migrating birds is very low, the majority of transit migrants crossing the region in autumn from north to south and in spring from south to north along the Inguri River valley. In addition, it should be noted, the majority of transit migrants crossing the project area usually without stopping. If they do stop it occurs occasionally and in very small numbers. Nevertheless, the ornithological importance of some parts of study areas during seasonal migrations may be classified as a medium, but only during peaks of autumn transit passage (in the first half of September) and only in the lower part of Nenskra River flood-land;
- Georgia is an important area for various wintering waterbirds, birds of prey, passerines, some other birds. Significance of Georgian wintering grounds is greatly increased when unfavorable weather conditions take place in northward regions (Azov Sea basin, south of Russia, Front-Caucasian area, Northern Caucasus, lower Don River valley, etc.). But study areas are located outside of the main wintering grounds and the importance of this area as a wintering ground is classified as a low;
- There are no protected areas within the limits of Project area;
- And finally, study areas are situated outside of both the rich on endemism sites.
- More-or-less important for birds areas may be considered the upper section of Nenskra River valley;
- Among all negative for birds factors, the human disturbance, should be considered at present as a basic threat to birds.

### PART 3.

#### RESULTS OF THE ORNITHOLOGICAL SURVEY CARRIED OUT BETWEEN SEPTEMBER 16<sup>TH</sup> AND SEPTEMBER 20<sup>TH</sup> IN VALLEYS OF NENSKRA AND NAKRA RIVERS

In total, during five days of field works on September 16<sup>th</sup> – 20<sup>th</sup>, 2015, at least 54 bird species were recorded within the limits of Project areas and in adjacent sections of Nenskra and Nakra river valleys, among which 15 species were non-passerines and other 39 bird species were passerines. At least 38 bird species were observed in Nenskra River valley, in Lekalmakhe and Tita villages and at adjacent slopes. At least 24 bird species were recorded in Nakra River valley.

Count method: survey on foot along the counting routes with stops for visual observations from numerous points, optimal for visual observations, located in various habitats along the counting routes (pictures 3-1 and 3-2);



Pictures 3-1 and 3-2.

The following is list of bird species which presence in study area was confirmed by direct visual observations:

#### I. Non-Passerines

1. Honey Buzzard (*Pernis apivorus*)
2. Black Kite (*Milvus migrans*)
3. Griffon Vulture (*Gyps fulvus*)
4. Goshawk (*Accipiter gentilis*)
5. Sparrowhawk (*Accipiter nisus*)
6. Common Buzzard (*Buteo buteo*)
7. Lesser Spotted Eagle (*Aquila pomarina*)
8. Golden Eagle (*Aquila chrysaetos*)
9. Booted Eagle (*Hieraaetus pennatus*)
10. Common Kestrel (*Falco tinnunculus*)
11. Little Ringed Plover (*Charadrius dubius*)
12. Common Sandpiper (*Actitis hypoleucos*)
13. Common Wood Pigeon (*Columba palumbus*)
14. European Bee-eater (*Merops apiaster*)
15. Great Spotted Woodpecker (*Dendrocopos major*)

## II. Passerine bird species

16. Tawny Pipit (*Anthus campestris*)
17. Tree Pipit (*Anthus trivialis*)
18. Water Pipit (*Anthus spinoleta*)
19. Grey Wagtail (*Motacilla cinerea*)
20. Pied Wagtail (*Motacilla alba*)
21. Woodlark (*Lullula arborea*)
22. Eurasian Skylark (*Alauda arvensis*)
23. Barn Swallow (*Hirundo rustica*)
24. Northern House-martin (*Delichon urbica*)
25. White-throated Dipper (*Cinclus cinclus*)
26. Red-backed Shrike (*Lanius collurio*)
27. Winter Wren (*Troglodytes troglodytes*)
28. Dunnock (*Prunella modularis*)
29. European Robin (*Erithacus rubecula*)
30. Caspian Whinchat (*Saxicola rubetra*)
31. Siberian Stonechat (*Saxicola torquata*)
32. Northern Wheatear (*Oenanthe oenanthe*)
33. Common Redstart (*Phoenicurus phoenicurus*)
34. Eurasian Blackbird (*Turdus merula*)
35. Song Thrush (*Turdus philomelos*)
36. Common Whitethroat (*Sylvia communis*)
37. Blackcap (*Sylvia atricapilla*)
38. Caucasian Chiffchaff (*Phylloscopus lorenzii*)
39. Goldcrest (*Regulus regulus*)
40. Spotted Flycatcher (*Muscicapa striata*)
41. Long-tailed Tit (*Aegithalos caudatus*)
42. Coal Tit (*Parus ater*)
43. Great Tit (*Parus major*)
44. Wood Nuthatch (*Sitta europea*)
45. Eurasian Treecreeper (*Certhia familiaris*)
46. Eurasian Jay (*Garrulus glandarius*)
47. Common Raven (*Corvus corax*)
48. Chaffinch (*Fringilla coelebs*)
49. European Greenfinch (*Carduelis chloris*)
50. European Goldfinch (*Carduelis carduelis*)
51. Eurasian Siskin (*Carduelis spinus*)
52. Red-fronted Serin (*Serinus pusillus*)
53. Rock Bunting (*Emberiza cia*)

More detailed data on the bird species recorded during survey are presented below.

### 3.1. Results of ornithological surveys carried out in the Nenskra River basin

The following 38 bird species were observed within the limits of site:

1. Honey Buzzard (*Pernis apivorus*) – at least 20 individuals in one flock and several solitary individuals were observed flying at heights 200 – 300 m along right side of valley to southwestern and southern directions;
2. Black Kite (*Milvus migrans*) – at least 35 individuals in three small flocks (15+, 10+ and 5) and 4 solitary individuals, totally about 40, were counted during surveys; most of recorded black kites were watched flying to southwestern directions at height from 150 to 300 m above the relief. About  $\frac{3}{4}$  were watched in morning hours - between 08:30 and 10:00;
3. Griffon Vulture (*Gyps fulvus*) – small flock, consisting four soaring individuals, was observed in morning on September 19<sup>th</sup> from a long distance in upper part of valley;
4. Goshawk (*Accipiter gentilis*) - solitary female was watched flying across river valley to western direction;
5. Sparrowhawk (*Accipiter nisus*) – two solitary individuals, one female and one male, were recorded during field works in Nenskra River basin. Adult female, hunting on small unidentified passerine birds, was watched from a close distance directly in Tita village (picture 3-3);



Picture 3-3. Sparrowhawk (*Accipiter nisus*), female

6. Steppe Buzzard (*Buteo buteo*) – about 20 individuals in two small flocks and six solitary individuals were counted in area. Buzzards were observed mostly flying across site at height 200 - 250 m to sothern direction;

7. Booted Eagle (*Hieraaetus pennatus*) – solitary Booted Eagle of white morph, flying across river from left side of valley to western direction, was observed in early morning on September 16<sup>th</sup>;
8. Common Kestrel (*Falco tinnunculus*) – two solitary individuals, probably the same bird, were watched with a 5 – 7 min interval, flying in evening on September 18<sup>th</sup> across large glade lower Tita village;
9. Little Ringed Plover (*Charadrius dubius*) – single was observed feeding directly at river bank in Lekalmakhe village;
10. Common Sandpiper (*Actitis hypoleucos*) – solitary individuals three times were observed at Nenskra River banks – two times near Lekalmakhe village and one time about 800 m above Tita village;
11. European Bee-eater (*Merops apiaster*) small flock, consisting about 15 individuals, was observed at left side of Nenskra River valley near Lekhalmakhe village. Birds were watched flying across valley to southwestern direction;
12. Great Spotted Woodpecker (*Dendrocopos major*) – two solitary individuals were visually watched during observations in area, besides that presence of this species was confirmed by typical for this bird species calls in 3 points;
13. Eurasian Skylark (*Alauda arvensis*) - more-or-less common bird species in dry open habitats. At least 30 individuals were recorded during survey. Most of records were at large glades, along road, at forest edges (pictures 3-4 and 3-5);



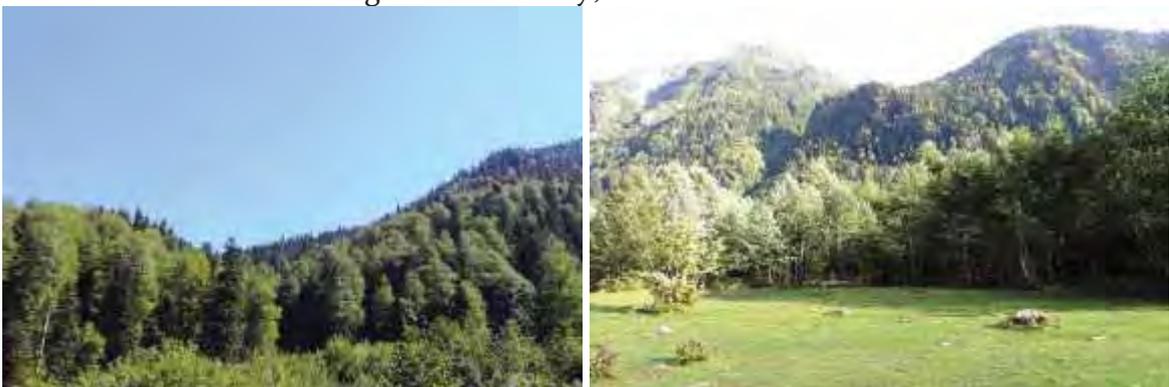
Pictures 3–4 and 3-5. The most typical habitats of Eurasian Skylark (*Alauda arvensis*) in Nenskra River valley

14. Woodlark (*Lullula arborea*) - widespread and quite common bird species in the woodlands of all types (pictures 3-6, 3-7, 3-8 and 3-9). Not counted. This bird species should be classified as a dominant to project area as well as to adjacent areas;



Pictures 3-6, 3-7, 3-8 and 3-9. Habitats of Woodlark (*Lullula arborea*)

15. Barn Swallow (*Hirundo rustica*) – several small flocks, consisting 10 – 15 individuals, totally ca. 80, migrating to southern and south western directions at height 50 – 100 m above relief were recorded during survey in area;
16. Northern House-martin (*Delichon urbica*) – at least 9 individuals, 5 and 4, were observed in small mixed migrating flocks of Barn Swallow;
17. Tree Pipit (*Anthus trivialis*) - widespread and quite common species in woodlands of various types (pictures 3-10 and 3-11). The highest density was recorded in mixed forests at right side of valley;



Pictures 3-10 and 3-11. Typical habitats of Tree Pipit (*Anthus trivialis*)

18. White-throated Dipper (*Cinclus cinclus*) – widespread and common bird along the whole length of river banks within the limits of Project area as well as in adjacent areas. About 20 solitary individuals were counted during survey in various points of

area (pictures 3-12, 3-13, 3-14 and 3-15);



Pictures 3-12, 3-13, 3-14 and 3-15. The most preferred habitats of White-throated Dipper (*Cinclus cinclus*) along banks of Nenskra River;

19. Citrine Wagtail (*Motacilla cinerea*) – widespread and more-or-less common species in Nenskra River basin. Practically all records were at banks of river. At least 15 individuals were recorded during ornithological survey in project area and about 25 were in adjacent areas (pictures 3-16, 3-17, 3-18 and 3-19);

20. White Wagtail (*Motacilla alba*) - widespread and quite common bird species along the whole length of river banks. At least 40 individuals were observed during survey in study area. Most of records were at banks of Nenskra River and along streams and roads (pictures 3-16, 3-17, 3-18 and 3-19);





Pictures 3-16, 3-17, 3-18 and 3-19. Typical habitats of Citrine Wagtail (*Motacilla citreola*) and White Wagtail (*Motacilla alba*)

21. Winter Wren (*Troglodytes troglodytes*) - three solitary were recorded in forests of various types, mostly at plots with dense brushwood (pictures 3-20, 3-21 and 3-22);



Picture 3-20. Winter Wren (*Troglodytes troglodytes*)



Pictures 3-21 and 3-22. Habitats of Winter Wren (*Troglodytes troglodytes*)

22. Dunnock (*Prunella modularis*) – at least eight dunnocks were presented during survey in Nenskra River basin. All recorded solitary individuals were observed along forest edges at plots with high dense bushes (pictures 3-23 and 3-24);



Pictures 3-23 and 3-24. Habitats of Dunnock (*Prunella modularis*)

23. Common Redstart (*Phoenicurus phoenicurus*) - widespread and common bird species in various woodlands, along road and in village, at least 15 solitary were recorded during survey;

24. European Robin (*Erithacus rubecula*) – widespread and common but in general not numerous bird species to study area. At least 14 individuals were recorded in woodlands of various types at plots with dense underbrush, mostly at river banks, along streams, wet habitats (pictures 3-25, 3-26 and 3-27);



Picture 3-25. European Robin (*Erithacus rubecula*)



Pictures 3-26 and 3-27. The most typical habitats of European Robin (*Erithacus rubecula*)

25. Caspian Whinchat (*Saxicola rubetra*) – five individuals were seen during survey in Nenskra River basin, all three records were at large glades with scattered low trees and bushes (pictures 3-28, 3-29 and 3-30);



Picture 3-28. Caspian Whinchat (*Saxicola rubetra*), female



Pictures 3-29 and 3-30. Typical habitats of Caspian Whinchat (*Saxicola rubetra*)

26. Northern Wheatear (*Oenanthe oenanthe*) – widespread and common, but not

numerous species. 12 individuals were recorded during survey, mostly in stony habitats along the river banks and in villages. Additionally, about 15 individuals were observed outside of Project area in stony habitats, under rocks, along roads, stone fences, near ruins (pictures 3-31 and 3-32);



Pictures 3-31 and 3-32. Habitats of Northern Wheatear (*Oenanthe oenanthe*)

27. Eurasian Blackbird (*Turdus merula*) - widespread and common, but in general not numerous bird species in forests of all types, at glades with low trees, dense bushes and in gardens. About 20 individuals were recorded during survey in Nenskra River basin (pictures 3-33, 3-34, 3-35, 3-36 and 3-37);

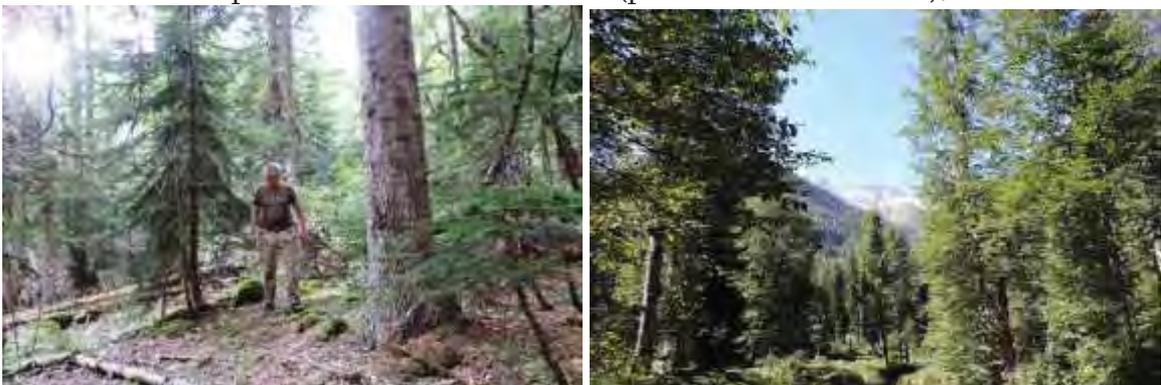


Pictures 3-33, 3-34, 3-35 and 3-36. The most typical habitats of Eurasian Blackbird (*Turdus merula*) in Nenskra River valley



Picture 3-37. Eurasian Blackbird (*Turdus merula*)

- 28. Song Thrush (*Turdus philomelos*) – two solitary individuals were observed in gardens in Tita and Lekalmakhe villages;
- 29. Caucasian Chiffchaff (*Phylloscopus lorenzii*) – widespread and common, presence of about 30 individuals was confirmed during survey in area;
- 30. Great Tit (*Parus major*) - widespread and common bird species in the whole of study area. Three small flocks, 3 – 5 individuals in each, and about 20 solitary individuals were recorded during survey in Nenskra River valley. Most of records were at plots of mature mixed forest (pictures 3-38 and 3-39);



Pictures 3-38 and 3-39. Habitats of Great Tit (*Parus major*)

- 31. Coal Tit (*Parus ater*) - widespread and common bird species in various woodlands. About 40 individuals were recorded during survey, mostly in mixed forest;

32. Eurasian Treecreeper (*Certhia familiaris*) – single was watched in woodlands near Tita village, that was only one record of this bird during survey in area;
33. Eurasian Jay (*Garrulus glandarius krynicki*) – six solitary individuals were counted in various parts of study area;
34. Common Raven (*Corvus corax*) - widespread but rare in general bird species within the corridor of interest and at adjacent areas. Two pairs and five solitary individuals were counted during survey, mostly in upper parts of study area;
35. Chaffinch (*Fringilla coelebs*) - widespread and quite common bird species in lower part of study area. Several tens individuals were observed during survey, most of records were in deciduous forests and in gardens; not counted



Picture 3-40. Chaffinch (*Fringilla coelebs*), male

36. European Greenfinch (*Carduelis chloris*) – small flock and several individuals were watched in Lekalmakhe village;
37. European Goldfinch (*Carduelis carduelis*) – solitary was watched in small mixed flock together with several Chaffinchs feeding in garden in Tita village;
38. Eurasian Siskin (*Carduelis spinus*) – tree solitary were recorded during survey, all were observed in coniferous forest;
39. Red-fronted Serin (*Serinus pusillus*) – flock, consisting about 25 individuals, was seen in morning on September 16<sup>th</sup> near Tita village.

### **3.2. Results of ornithological surveys carried out in the Nakra River basin**

The following 24 bird species were recorded during observations conducted on September 17<sup>th</sup> 2015 in Nakra River valley:

#### **I. Non-Passerines**

1. Lesser Spotted Eagle (*Aquila pomarina*) - three flocks (10 – 12 individuals in each), totally about 35 individuals, were observed during survey in study area. All eagles were transit migrants and were watched at right side of valley, flying across area along the watershed ridge to southwestern directions at heights 200 – 300 meters above relief;
2. Golden Eagle (*Aquila chrysaetos*) - single was recorded flying to southern direction along the right slope of valley at height about 100 m. Probably the same individual was observed from a long distance 10-15 minutes later soaring along watershed part of ridge;
3. Common Wood Pigeon (*Columba palumbus*) - small flock, consisting four individuals, was observed flying across Nakra River valley to southeastern direction;

#### **II. Passerine bird species**

4. Tawny Pipit (*Anthus campestris*) - at least six individuals were counted during survey; birds were observed mostly at large glades at right bank of river;
5. Water Pipit (*Anthus spinoleta*) – five solitary individuals were seen during survey in open stony habitats of project area;
6. White Wagtail (*Motacilla alba*) – eight solitary individuals were watched in study area and about ten were in adjacent areas. Most of records were at banks of river, along the small streams and roads;
7. White-throated Dipper (*Cinclus cinclus*) – six individuals (four solitary and pair) were recorded during survey. All were watched directly at banks of Nakra River (pictures 3-41 and 3-42);



Pictures 3-41 and 3-42. Typical habitats of White-throated Dipper (*Cinclus cinclus*) in Nakra River flood-land

8. Red-backed Shrike (*Lanius collurio*) – three solitary individuals were recorded at right side of Nakra River valley, all were seen in open and semi-open areas, at glades with scattered trees and bushes (pictures 3-43, 3-44 and 3-45);



Picture 3-43. Red-backed Shrike (*Lanius collurio*)



Pictures 3-44 and 3-45. Habitats of Red-backed Shrike (*Lanius collurio*) in Nakra River valley

9. European Robin (*Erithacus rubecula*) – widespread and quite common bird species, at least ten solitary individuals were watched during survey within the limits of study area, most of records were in at plots with dense woodlands (pictures 3-46, 3-47, 3-48 and 3-49);



Pictures 3-46 and 3-47. European Robin (*Erithacus rubecula*)



Pictures 3-48 and 3-49. The most typical habitats of European Robin (*Erithacus rubecula*) in Nakra River flood-land

10. Caspian Whinchat (*Saxicola rubetra*) – common bird, six were counted within the limits of study area and several were in adjacent areas. All were watched at stony glades, in dry riverbed, along road (pictures 3-50, 3-51, 3-52, 3-53, 3-54 and 3-55);





Pictures 3-50, 3-51, 3-52 and 3-53. Habitats of Caspian Whinchat (*Saxicola rubetra*) and Siberian Stonechat (*Saxicola torquata*) in Nakra River flood-land



Pictures 3-54 and 3-55. Caspian Whinchat (*Saxicola rubetra*)

11. Siberian Stonechat (*Saxicola torquata*) – single was recorded within the limits of project area and two were observed in adjacent area – near Nakra village (pictures 3-50 and 3-56);



Picture 3-56. Siberian Stonechat (*Saxicola torquata*)

12. Eurasian Blackbird (*Turdus merula*) – four solitary individuals were observed in study area. Most of recorded blackbirds were watched at large glades with scattered trees and bushes;
13. Common Whitethroat (*Sylvia communis*) – widespread but not numerous bird species in study area. Three individuals were recorded during survey in Nakra River valley;
14. Blackcap (*Sylvia atricapilla*) – single was observed at left bank of river;
15. Goldcrest (*Regulus regulus*) – single was observed in mature mixed forest with dense undergrowth at left side of valley;
16. Spotted Flycatcher (*Muscicapa striata*) – two solitary individuals were recorded during survey in area;
17. Long-tailed Tit (*Aegithalos caudatus*) – five solitary individuals were observed during survey in Nakra River valley, most of recorded birds were seen in small mixed flocks together with Coal Tit (*Parus ater*), Great Tit (*Parus major*), some other small passerines recorded in various woodlands (pictures 3-57, 3-58, 3-59 and 3-60);



Pictures 3-57, 3-58, 3-59 and 3-60. Typical habitats of Long-tailed Tit (*Aegithalos caudatus*), Coal Tit (*Parus ater*), Great Tit (*Parus major*) and Wood Nuthatch (*Sitta europea*)

18. Coal Tit (*Parus ater*) - widespread and common bird species to study area; dominant or sub-dominant species. At least 35 individuals were counted during survey on September 17<sup>th</sup> with a density from 10-12 individuals per 1 km of route (pictures 3-57, 3-58, 3-59 and 3-60);
19. Great Tit (*Parus major*) – widespread and common bird species in woodlands of various types with a density from 15 to 20 individuals per 1 km of route, the highest density was recorded at plots with mature mixed forest. Dominant species to forested part of study area pictures 3-57, 3-58, 3-59 and 3-60);
20. Wood Nuthatch (*Sitta europea*) – two solitary were watched within the limits of study area at plots with mature woodlands (pictures 3-57, 3-59 and 3-61);



Picture 3-61. Wood Nuthatch (*Sitta europea*)

21. Common Raven (*Corvus corax*) – widespread and common species, five individuals (three solitary and pair) were counted during survey within the limits of study area and three were recorded in adjacent areas (picture 3-62);



Picture 3-62. Common Raven (*Corvus corax*)

22. Eurasian Jay (*Garrulus glandarius*) – more-or-less common species, three solitary individuals were presented during survey in study area;
23. Chaffinch (*Fringilla coelebs*) – widespread and common, but not numerous bird to Nakra River valley. About 20 were counted during survey. Chaffinch was more common in mature forest with large glades, clearings, meadows and along roads (pictures 3-63, 3-64, 3-65 and 3-66);





Pictures 3-63, 3-64, 3-65 and 3-66. Habitats of Chaffinch (*Fringilla coelebs*) in project area

24. Rock Bunting (*Emberiza cia*) – single and pair were watched during survey in Nakra River valley, all rock buntings were recorded at right side of valley at plots with stony outcrops (pictures 3-67 and 3-68).



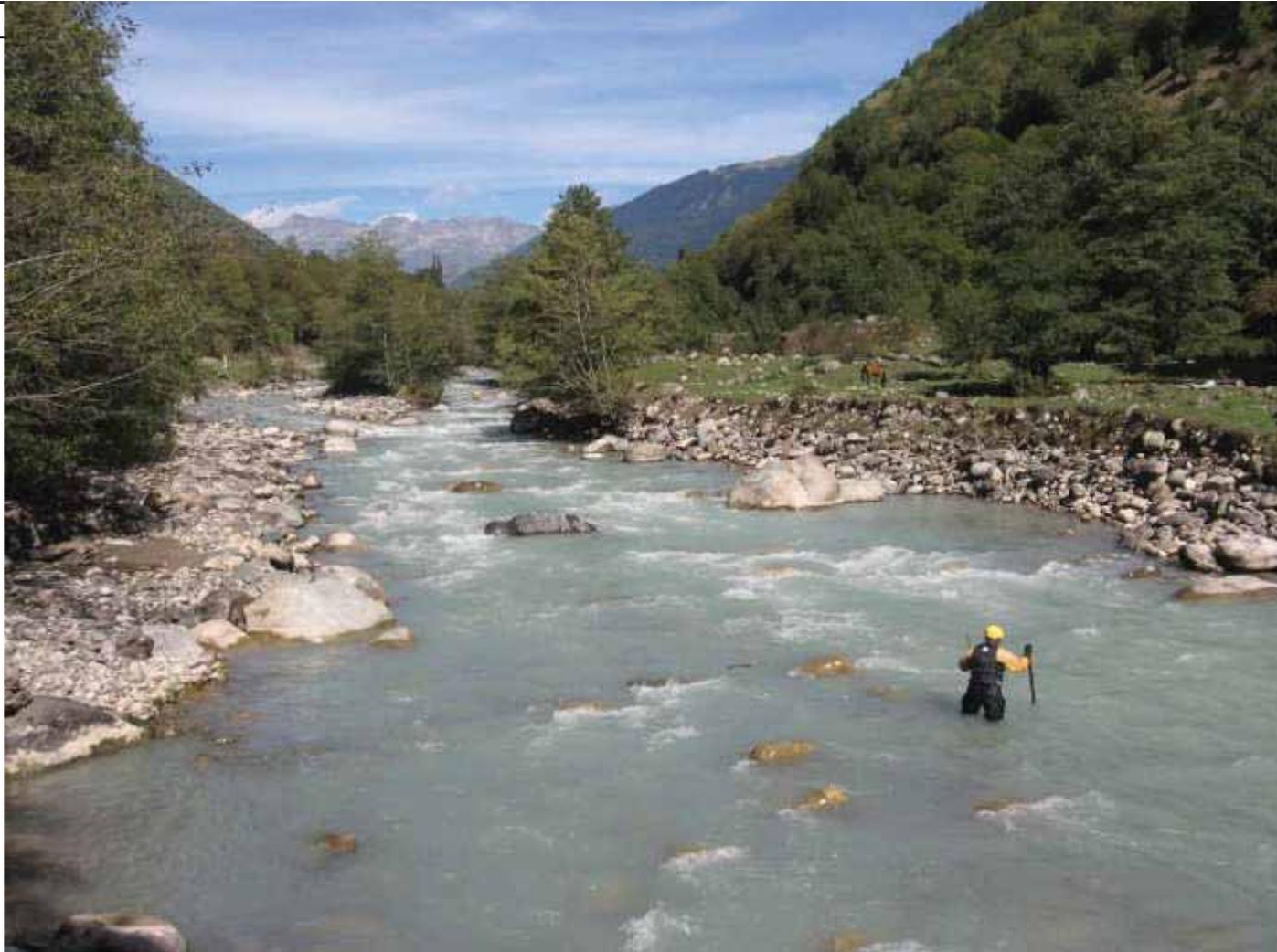
Pictures 3-67 and 3-68. Habitats of Rock Bunting (*Emberiza cia*) in Nakra River valley

## Annex 3 – River Flow Measurements

## Biodiversity Flow Measurements: Summary Table

ID	Date	Time	River	Location	Lat.	Long.	Q (m <sup>3</sup> /s)	Notes / Issues
<b>FL01</b>	06/10/2015	10:30	Nenskra	Nenskra below powerhouse	42.9854°	42.184°	<b>11.3</b>	Dry sunny weather, Large boulders in channel made flow measurement difficult. There were no ideal locations along this stretch for flow measurement due to channel morphology.
<b>FL02</b>	07/10/2015	11:00	Nenskra	Nenskra at proposed dam site.	43.1311°	42.2172°	<b>5.3</b>	Dry and cold, overcast. Started raining heavily at c. 11:30 after flow measurement taken.
<b>FL03</b>	07/10/2015	16:45	Tskhvandin River - Tributary of Nenskra	Track bridge at proposed Camp Site (WP33)	43.1238°	42.1919°	<b>0.7</b>	Raining very heavily for past five hours. Measurement taken upstream of bridge on the Tskhvandin River at Boarder check point. Flow in tributary is significantly higher than when we passed the river in the morning on way to Dam site area.
<b>FL04</b>	07/10/2015	17:30	Okrili River - Tributary of Nenskra	Track bridge between Tita and proposed Camp Site (WP34)	43.1109°	42.1827°	<b>3.2</b>	Flow measurement taken at river ford on Okrili River immediately downstream of bridge. Raining very heavily for past six hours. Flow in tributary is significantly higher than when we passed the river in the morning on way to Dam site area.
<b>FL05</b>	08/10/2015	10:15	Nenskra	Nenskra at Tita Foot Bridge.	43.06323°	42.18565°	<b>14.1</b>	Rained heavily for approx. 12hr. Previous day. Has not rained since c. 22:00 on the 07/10/15. Flow higher due to rainfall in preceding 24hr.
<b>FL06</b>	09/10/2015	11:50	Nakra	Approx 150m downstream of bridge at weir site.	43.1212°	42.3993°	<b>1.8</b>	Dry and sunny at time of flow reading. Rained for approx six hours previous night so flow in river is higher.

FL01



FLO2



FL03



FLO4



FL05



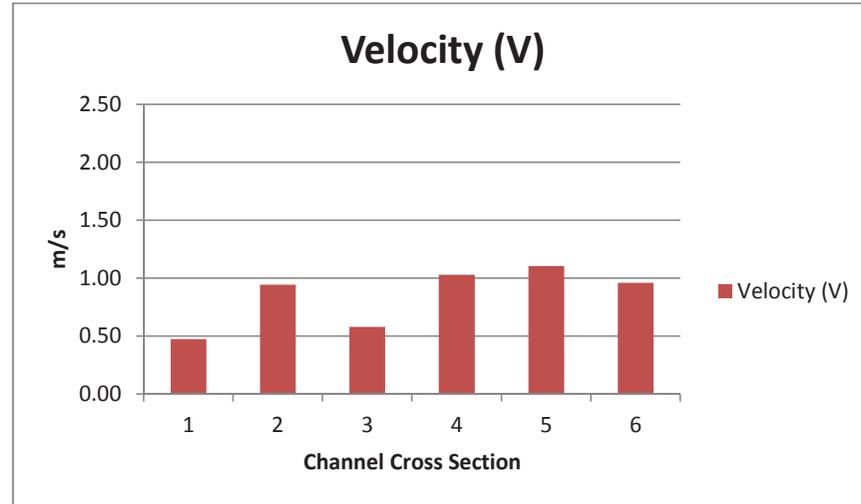
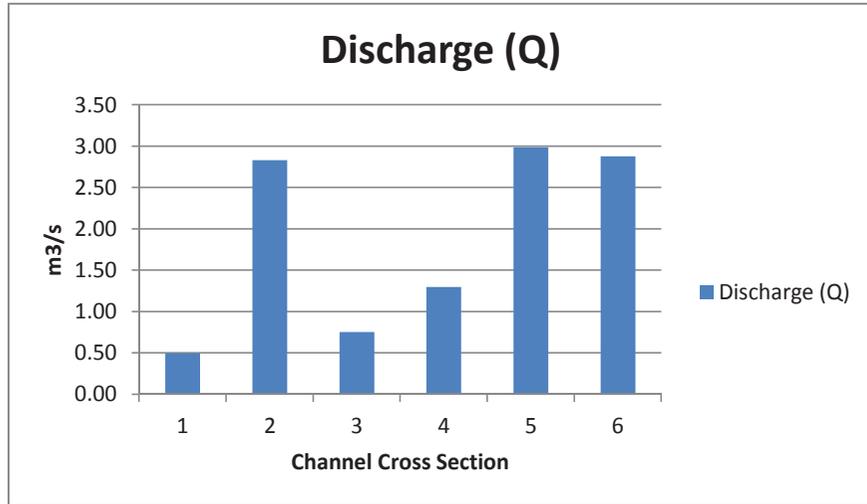
FL06



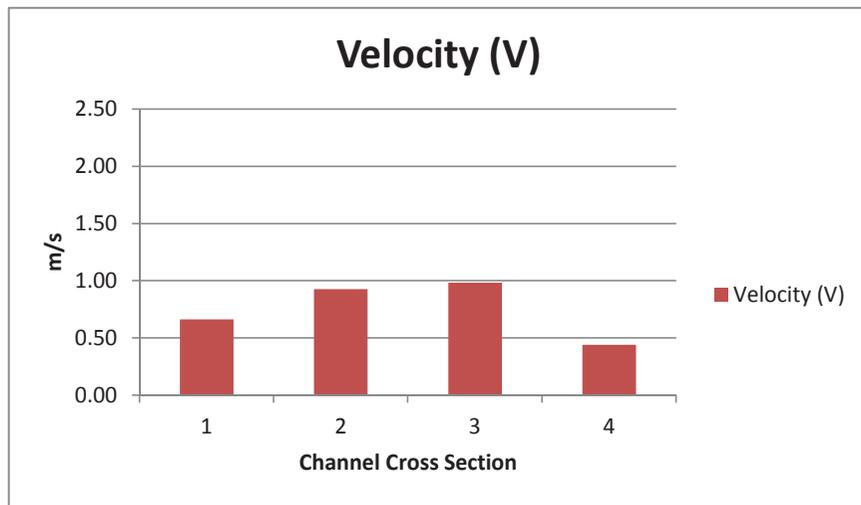
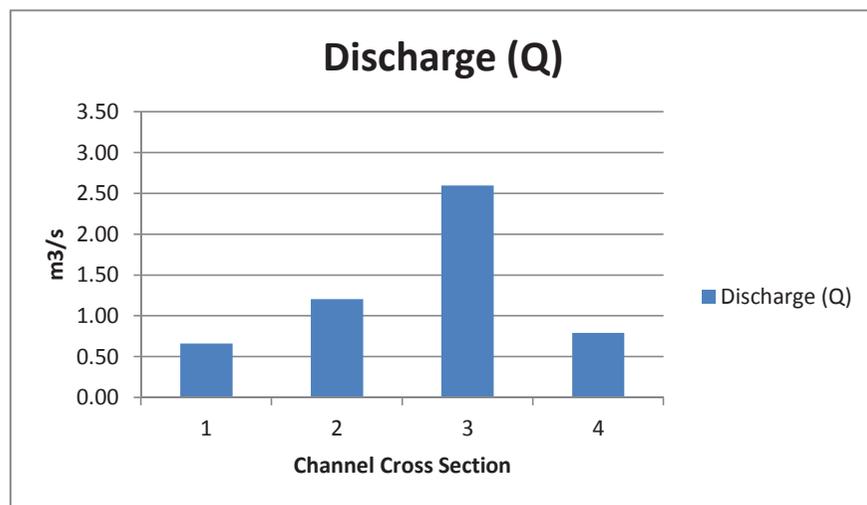
## Annex 4 – River Velocity Measurements

## Biodiversity Flow and Velocity: Charts

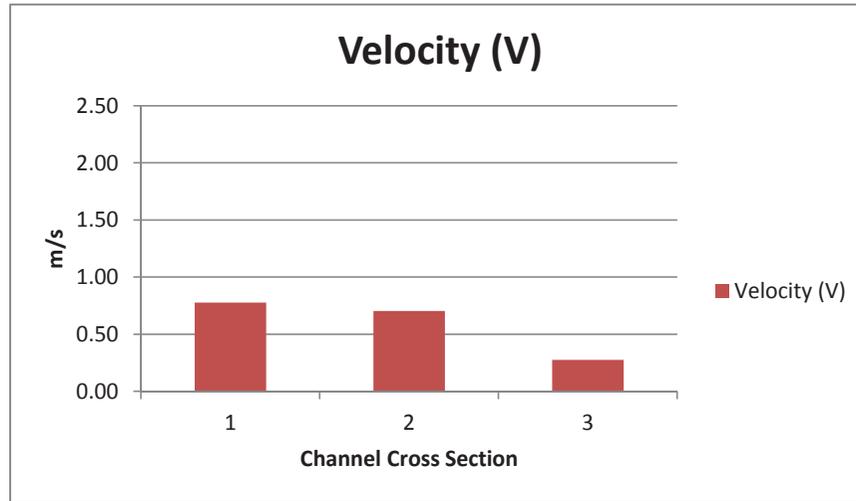
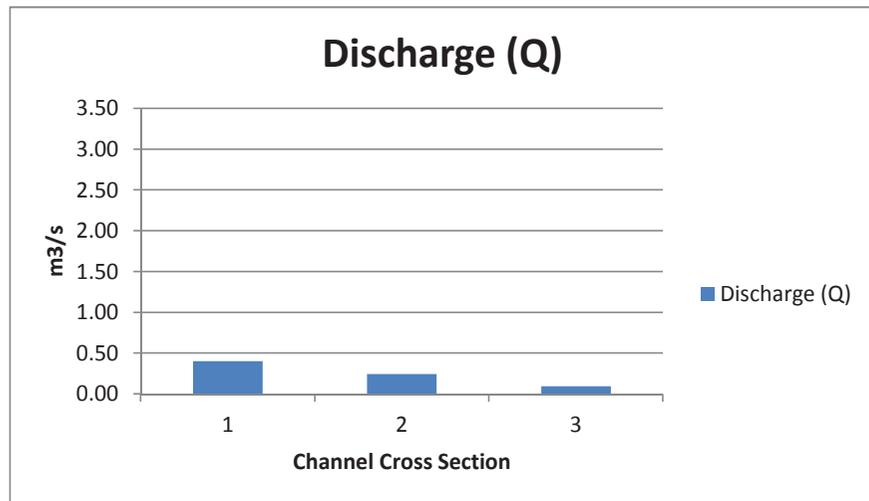
FL01



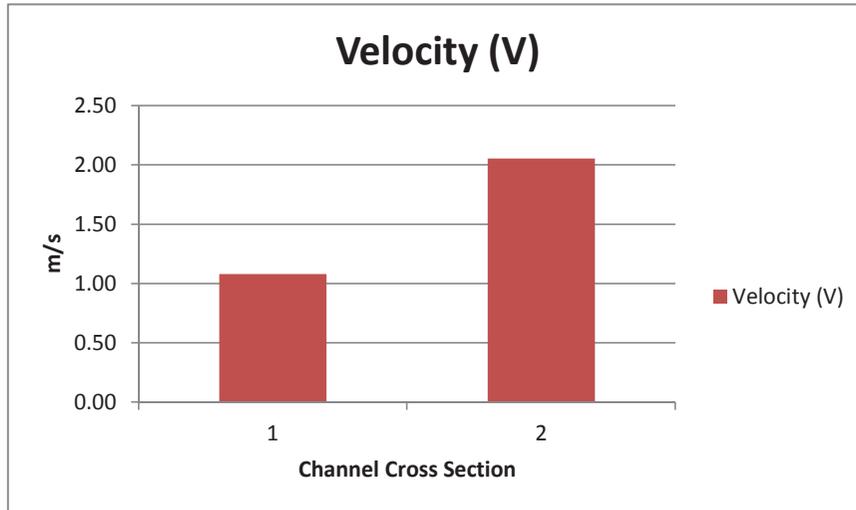
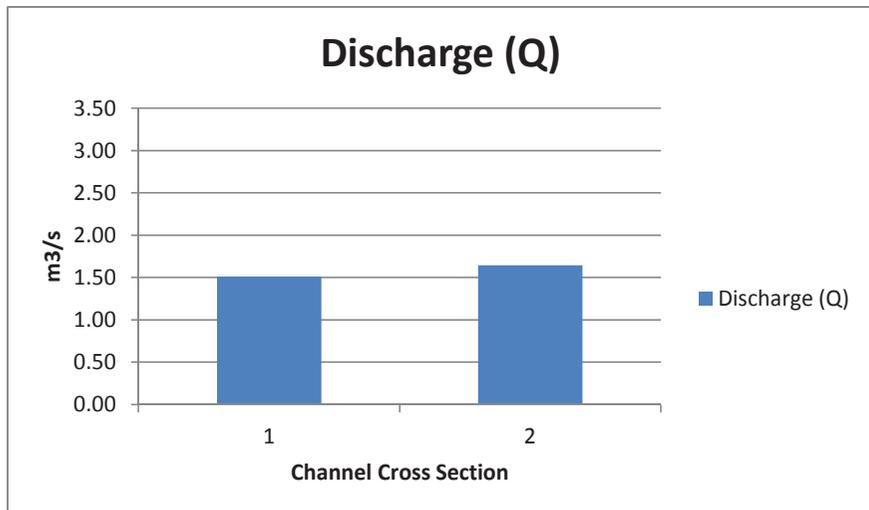
FL02



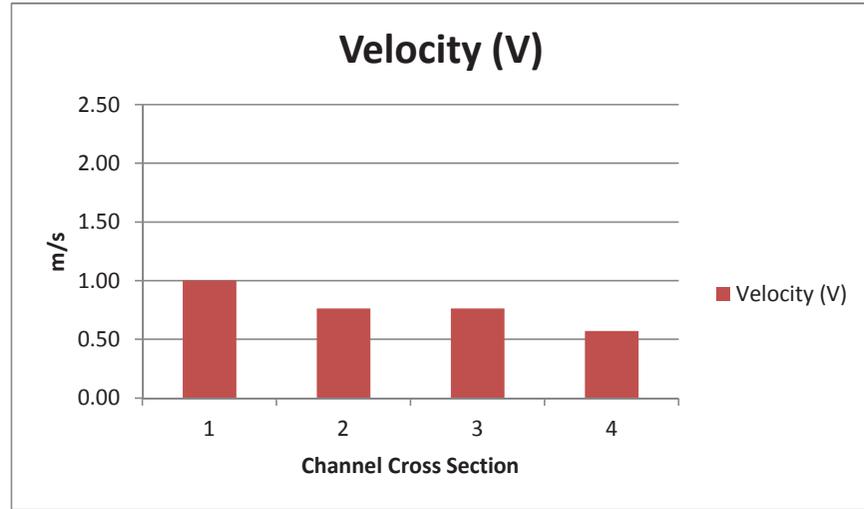
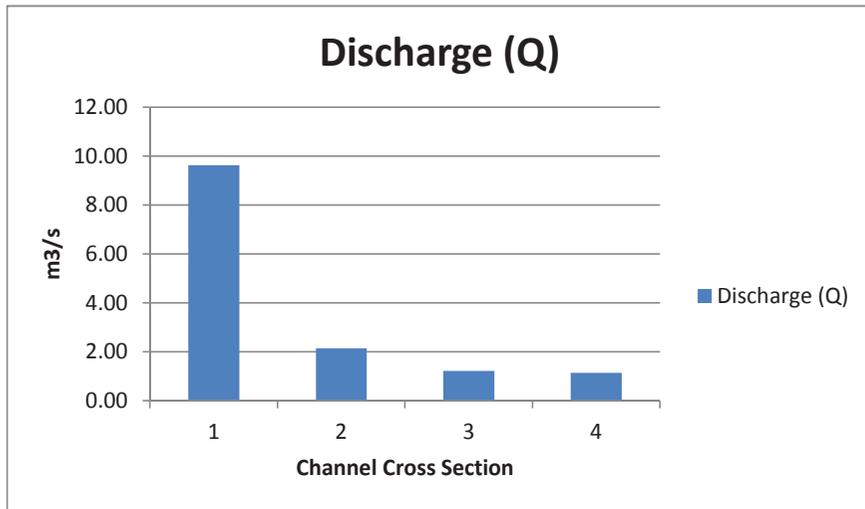
**FL03**



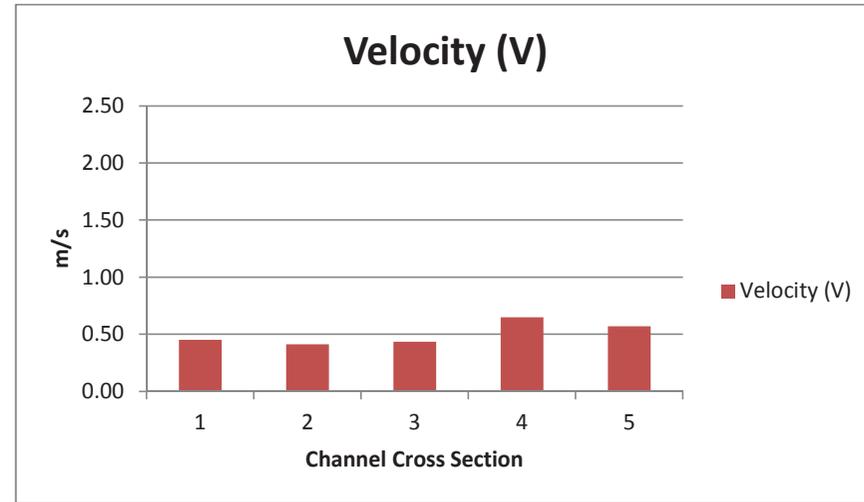
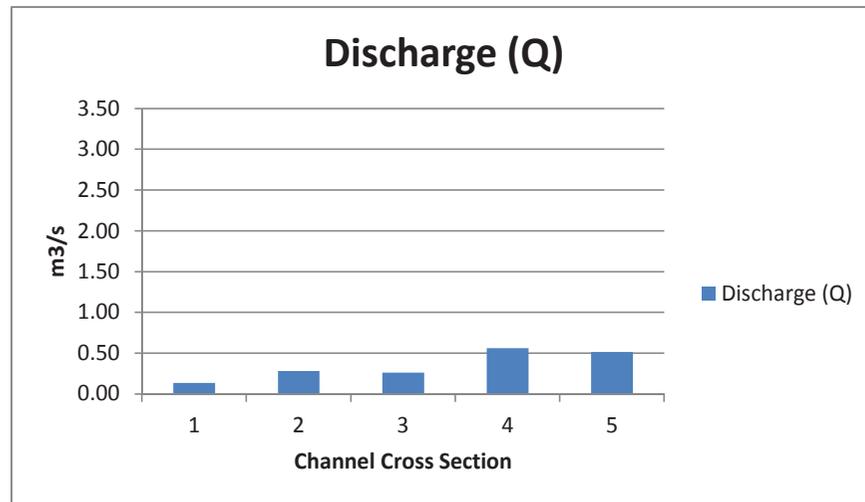
**FL04**



**FL05**



**FL06**





## Annex 5 – Appropriate Assessment

# Habitats Directive Article 6 Assessment

Retrospective Appropriate Assessment Screening Report

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## ANNEX 1 EMERALD STANDARD DATA FORM

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## **1.0 INTRODUCTION**

### **1.1 Background**

In August 2015, the Nenskra Hydropower Project submitted the final Environmental & Social Impact Assessment Report (ESIA) to the Government of Georgia (GoG) as part of the national environmental permitting process. The 2015 ESIA report was prepared by Gamma, a Georgian based consultancy, the ESIA was informed by information gathered during field investigations undertaken in 2011 and 2014, and a series of public consultations meetings held in May 2015. The Environmental Permit was awarded by the Environmental Authorities in October 2015.

Since then, several International Financial Institutions (the Lenders) have been approached to invest into the Project. In compliance with their environmental and social policies, the Lenders have recommended that a number of additional environmental and social studies be undertaken in supplement of the existing ESIA report. As a result of these recommendations, a Supplementary Environmental and Social Studies report was prepared by SLR Consulting and issued in 2017. The supplementary report comprises nine chapters and details with a range of environmental topics. The findings of the Biodiversity Impact Assessment which was performed in August - November 2015 and May - June 2016 by SLR Consulting Ltd (SLR) on the proposed Nenskra Hydroelectric Power Plant (HPP), has been reported in Volume 4.

In January 2016 a meeting was held in Tbilisi with the Lenders. At the meeting all of the Volumes within the Supplementary Environmental and Social Studies report were subject to a review. One of the outcomes of the review was the fact that as a number of the Lenders were based in Europe, that European Legislation should be applied to the Impact Assessment process. The Project site was, at that time, located within an area of interest considered for potential candidate Emerald site (equivalent to a proposed Natura 2000 site, often referred to as an Area of Special Conservation Interest ASCI); therefore Under Article 6(3) of the Habitats Directive, an Appropriate Assessment was considered likely to be required, where a plan or project is likely to have a significant effect upon a European site (in this case candidate Emerald site), either individually or in combination with other projects.

This report therefore seeks to provide information pertaining to the Article 6(3) and Article 6(4) assessment process (henceforth known as the Article 6 assessment process). Due to the location of the project (as of November 2016) outside of, but within 1km of the candidate Emerald site, only the first Stage - Scoping has been completed herein. This is because the Project is not anticipated to have a likely significant effect on the candidate Emerald site. The second stage in the Article 6 assessment process involves an Appropriate Assessment, which has therefore not been undertaken as part of this report.

### **1.2 Article 6 Assessment Process**

Although the country of Georgia is not currently part of the European Union (EU) a number of the Lenders who have been approached to fund this project are European based and therefore require that an Article 6 assessment is undertaken for this project retrospectively, as the project was granted an Environmental Permit by the GoG in October 2015.

Under Article 6(3) of the Habitats Directive (92/43/EEC), an Appropriate Assessment is required where a plan or project is likely to have a significant effect upon a European site, either individually or in combination with other projects.

*Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives Article 6(3)*

This Article has been interpreted as meaning that any project is to be subject to an Appropriate Assessment if it cannot be proven, beyond reasonable scientific doubt, that there is no significant effect on that site (a precautionary approach), either alone or in combination with other plans or projects.

Further to this, Article 6(4) states that where an Appropriate Assessment has been carried out and results in a negative assessment (in other words, any proposed avoidance or mitigation measures anticipated are unable to reduce the potential impact so it is no longer significant) or if uncertainty remains over the significant effect, consent will only be granted if there are no alternative solutions, and there are imperative reasons of over-riding public interest (IROPI) for the development and compensatory measures have been secured.

*If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted. Article 6(4)*

There are four stages to the Article 6 assessment process and these are as follows..

**Table 1-1**  
**The Four stage process to the Article 6 assessment**

Stage	Title	Description
1	Screening	The process to identify the likely impacts of a project on a European site, either alone or in combination with other plans and projects, and consider whether the impacts are likely to be significant in the absence of mitigation.
2	Appropriate Assessment	The consideration of the impacts on the integrity of the European site, wither alone or in combination with other plans and projects, with regard to the site's structure and function and its conservation objectives. Where there are adverse impacts, an assessment of mitigation options is carried out to determine adverse effect on the integrity of the site. If these mitigation options cannot avoid adverse effects then development consent can only be given if stages 3 and 4 are followed.
3	Assessment of Alternative Solutions	Examining alternative ways of achieving the objectives of the project to establish whether there are solutions that would avoid or have a lesser effect on European sites.
4	IROPI	This is the assessment where no alternative solution exists and where adverse impacts remain. The process to assess whether the development is necessary for IROPI and, if so, the potential compensatory measures needed to maintain the overall coherence of the site or integrity of the European site network.

## **1.3 Emerald Network**

### ***1.3.1 The link between the Emerald Network and Natura 2000***

As stated in Section 1.2, the Article 6 assessment pertains to European Designated Sites (Natura 2000 sites). For this assessment to be applied in Georgia, it has to be applied to an Emerald site or Area of Special Conservation Interest (ASCI); this is possible because the two systems are inextricably linked.

The Bern Convention (1979) and the Habitats Directive (1992) have a complete coincidence of objectives. Both are international legal instruments aimed at the conservation of wild flora, fauna and natural habitats. Their main differences come from the territory they apply to:

- European Union member States for the Directive; and
- Whole of Europe and part of Africa for the Convention

Also, the Directive is more explicit on the obligations concerning conservation of natural habitats. The Directive is a piece of legislation designed to implement the Bern Convention in the European Union and is fundamentally coherent with the Convention. Resolution No. 3 (1996) encourages "Contracting Parties and observer states to designate ASCIs and to notify them to the Secretariat. Georgia is one of 25 European States which are Contracting Parties to the Convention.

The Habitats Directive was designed to convert into precise law, the ideas and recommendations on habitat conservation contained in the Bern Convention, improving its reach and reinforcing its application in the member States of the European Union. The member States of the European Union satisfy the habitat requirements of the Bern Convention through the designation of sites called Special Areas of Conservation (SAC) within the Natura 2000 Network. The SACs are considered therefore to equate directly to the Areas of Special Conservation Interest (ASCI) of the Emerald Network, as foreseen in Resolution No. 5 of the Bern Convention.

### ***1.3.2 Legal support and designating features***

The Bern Convention does not deal exclusively with the protection of species. Articles 1, 2, 3, 4, 6 and 9 of the Convention deal with the protection of natural habitats, in particular:

- Habitats of the wild flora and fauna species (especially those in Appendices I and II);
- Endangered natural habitats;
- Areas of importance for migratory species.

Recommendation No. 16 defines Areas of Special Conservation Interest as those designated by states where that area fits one or several of the following conditions:

- a. it contributes substantially to the survival of threatened species, endemic species, or any species listed in Appendices I and II of the convention;
- b. it supports significant numbers of species in an area of high species diversity or supports important populations of one or more species;
- c. it contains an important and/or representative sample of endangered habitat types;
- d. it contains an outstanding example of a particular habitat type or a mosaic of different habitat types;
- e. it represents an important area for one or more migratory species;
- f. it otherwise contributes substantially to the achievement of the objectives of the convention.

It must be stressed that for Contracting Parties which are member States of the European Union the procedures established in the Birds Directive and Habitats Directive will be those to apply so that criteria for choice of those areas will be those of the Directive (which are largely the same criteria anyway).

#### **1.4 Candidate Svaneti Emerald Site**

##### **1.4.1 Emerald site current boundary**

The candidate Svaneti Emerald site shown on Map 1 was ratified by the Bern Convention Standing Committee in November 2016 and covers an area of 373.10km<sup>2</sup>. This newly ratified site boundary, has been formed from a previous site: GE0000012 (prior to November 2016) which covered a vast area 2338.48km<sup>2</sup>.

According to the European Environment Information and Observation Network (EIONET) Central Data Repository, the Georgian Emerald Network was under consideration by November 2010. Following this, a list of candidate sites was drawn up and registered with the Bern Convention by 2012. The Noah's Arc Centre for the Recovery of Endangered Species (NACRES) web site (<http://adlab.ge/da2/>) states that Phase 1 of the initiative to select the potential Emerald sites has now been completed and registered with the Bern Convention.

The candidate Svaneti Emerald site "Standard Data Form" (Annex 1) indicates that the Registration number for the original site is GE0000012. In the absence of any specific data pertaining to the November 2016 boundary change, also referred to as GE0000012, this Standard Data Form is still considered current.

The next phase (Phase II) in the registration/designation process, involves the evaluation of the efficiency of the candidate Svaneti Emerald site. This is done on a species by species and habitat by habitat basis. This is currently being done at (sub-) regional and biogeographical level, in cooperation with the European Environment Agency. Submission of the final database for final adoption by the Bern Convention Standing Committee has not yet been completed, but began in the spring of 2013. Once Phase II is complete then Phase III will entail the official designation of the adopted Area of Special Conservation Interest (ASCIs) at the international level.

##### **1.4.2 Emerald Site boundary change**

At a meeting with a representative from the Ministry of Environment and Natural Resources Protection of Georgia (14th January 2016), it was understood that the government wished to revise the boundaries of several of the areas of interest considered for potential candidate Emerald Sites in Georgia.

The government representative also stated that the Nenskra valley (which includes the Project area) had been evaluated against the criteria of the Bern Convention on the Conservation of European Wildlife and Natural habitats, in conjunction with more recent survey data collected from the Svaneti area. Following this, the government's advisors determined that the habitats located within the Project area did not meet the Convention's criteria for the inclusion into the Emerald Network.

A further meeting was held with the Ministry of Environment and Natural Resources Protection of Georgia in April 2016. It was confirmed at this meeting that the boundaries of the Svaneti area originally considered as area of interest for candidate Svaneti Emerald site were in the process of being amended. The reasons for amending the boundary had also been substantiated by NACRES: that the initial boundary which was submitted was an 'area of interest' boundary, rather than a more refined

candidate Emerald site area, created on an evidence based assessment. The GoG's aim (now achieved) was that by December of 2016 this change would be ratified and enacted.

NACRES confirmed in April 2016 that the 2015 Narrative Report had been submitted to the secretariat of the Bern convention and the Council of Europe and that the updated candidate Emerald Site maps and data base had been uploaded to CDR on the EIONET server which is part of the European Environment Agency (EEA).

### **1.4.3 Assessment assumption**

For the purposes of this assessment, the candidate Emerald site will be treated as an actual existing site. In addition to this, the assessment will be based on the currently registered candidate Svaneti Emerald site boundary, which as of November 2016 does not include any part of the footprint of the Nenskra Hydropower Project site. The closest infrastructure will be the Nakra weir and intake, which is located at its closest 760 metres from the candidate Emerald Site boundary. The main Project site (Nenskra reservoir dam area) is located 16km from the boundary of the candidate Emerald Site. A range of glaciated mountains lie between the Nenskra valley and the candidate Emerald site boundary, creating a natural boundary between the two valleys.

### **1.4.4 Habitat types**

All of the information provided here has been taken from the Emerald – Standard data form (Annex 1) for the candidate Svaneti Emerald Site; explanations and code descriptions have been taken from the Natura 2000 Reference Portal<sup>1</sup>. It should be noted that the EUNIS classification system was developed to represent European habitat types, so descriptions may differ from those habitat types e.g. Beech woodland, found in Georgia; though the general category remains the same.

Habitat types present in the candidate Emerald site:

#### **D4.2 Basic mountain flushes and stream-sides, with a rich arctic-montane flora**

General description

Rare Alpine, peri-Alpine, northern British and peri-arctic pioneer communities colonizing gravelly, sandy, stony, sometimes somewhat argilous or peaty, calcareous sedimentary substrates soaked by cold water, in moraines and on the edge of springs, rivulets, glacial torrents of the alpine or subalpine levels, or on alluvial sands of pure, cold, slow-flowing rivers and calm backwaters. They host many species with a boreoarctic or glacial relict distribution, many of which are redlisted several countries.

Plant communities as listed on EU Habitats Directive as Annex 1:

- 7240: Alpine pioneer formations of the *Caricion bicoloris-atrofuscae*

#### **G1.6 Fagus woodland**

General description

Forests dominated by beech *Fagus sylvatica* in western and central Europe, and *Fagus orientalis* and other *Fagus* species in south-eastern Europe and the Pontic region. Many

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<sup>1</sup> Natural 2000 reference portal: [http://bd.eionet.europa.eu/activities/Natura\\_2000/reference\\_portal](http://bd.eionet.europa.eu/activities/Natura_2000/reference_portal)

montane and oro-Mediterranean formations are mixed beech-fir or beech-fir-spruce forests, which are listed under G4.6 in EUNIS but included here.

Plant communities as listed on EU Habitats Directive as Annex 1:

- G1.61 = 9110 *Luzulo-Fagetum* beech forests
- G1.62 = 9120 Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer
- (*Quercion robori-petraeae* or *Ilici-Fagenion*)
- G1.63 = 9130 *Asperulo-Fagetum* beech forests
- G1.65 = 9140 Medio-European subalpine beech woods with *Acer* and *Rumex arifolius*
- G1.66 = 9150 Medio-European limestone beech forests of the *Cephalanthero-Fagion*
- G1.681, G1.685 and G1.686 = 9210 Apennine beech forests with *Taxus* and *Ilex*
- G1.186 and G1.687 = 9220 Apennine beech forests with *Abies alba* and beech forests with *Abies nebrodensis*

#### 1.4.5 Species listed in Resolution 6 (1998)

Resolution No. 6 (1998<sup>2</sup>) of the Standing Committee lists the species requiring specific habitat conservation measures. This is linked to the Conservation of European Wildlife and Natural habitats. Table 1.2 below sets out the species listed in Resolution 6, which occur within the candidate Svaneti Emerald site and form part of the proposed citation for the site.

**Table 1-2**  
**Species listed on Resolution 6**

Group	Latin Name	English Name	Recorded in project area?
Bird	<i>Aegithalos caudatus</i>	Long tailed tit	Yes
Bird	<i>Aegolius funereus</i>	Tengmalm's owl	No
Bird	<i>Aquila chrysaetos</i>	Golden eagle	Yes
Bird	<i>Bubo bubo</i>	Eagle owl	No
Bird	<i>Buteo buteo</i>	Buzzard	Yes
Bird	<i>Carduelis carduelis</i>	Goldfinch	No
Bird	<i>Certhia familiaris</i>	Tree creeper	No
Bird	<i>Columba palumbus</i>	Wood pigeon	Yes
Bird	<i>Corvus corax</i>	Raven	Yes
Bird	<i>Corvus corone</i>	Carrion crow	No
Bird	<i>Cuculus canorus</i>	Cuckoo	No
Bird	<i>Dryocopus martius</i>	Black woodpecker	No
Bird	<i>Ficedula semitorquata</i>	Semi-collared flycatcher	No
Bird	<i>Gypaetus barbatus</i>	Lammergeier	No
Bird	<i>Gyps fulvus</i>	Griffon vulture	Yes
Bird	<i>Hieraaetus pennatus</i>	Booted eagle	Yes

<sup>2</sup> COE (1998) Resolution 6 information [Online] Available at: <https://wcd.coe.int/ViewDoc.jsp?p=&id=1475233&Site=&direct=true> [Accessed 12 April 2016]

Group	Latin Name	English Name	Recorded in project area?
Bird	<i>Lanius collurio</i>	Red backed shrike	Yes
Bird	<i>Milvus migrans</i>	Black kite	Yes
Bird	<i>Pyrrhocorax pyrrhocorax</i>	Cough	No
Bird	<i>Sitta krueperi</i>	Kruper's nuthatch	No
Invertebrate	<i>Agriades glandon aquilo</i>	Alpine invertebrate	No
Invertebrate	<i>Callimorpha quadripunctaria</i>	Jersey tiger moth	No
Invertebrate	<i>Erebia medusa polaris</i>	Arctic woodland ringlet	No
Invertebrate	<i>Hesperia comma catena</i>	Alpine butterfly	No
Invertebrate	<i>Leucorrhinia pectoralis</i>	Invertebrate	No
Invertebrate	<i>Lindenia tetraphylla</i>	Invertebrate/gomophid	No
Invertebrate	<i>Lycaena dispar</i>	Large copper	No
Mammal	<i>Canis lupus</i>	Wolf	Yes
Mammal	<i>Lutra lutra</i>	Otter	No*
Mammal	<i>Lynx lynx</i>	Lynx	Yes
Mammal	<i>Miniopterus schreibersi</i>	Schreiber's bat	No
Mammal	<i>Myotis blythii</i>	Lesser mouse eared bat	No
Mammal	<i>Rhinolophus ferrumequinum</i>	Greater horseshoe bat	Yes
Mammal	<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat	No
Mammal	<i>Ursus arctos</i>	Brown bear	Yes
Plant	<i>Dicranum viride</i>	Dicranum moss	No
Plant	<i>Vaccinium arctostaphylos</i> <sup>3</sup>	Caucasian whortleberry	Yes
Reptile	<i>Vipera kaznakovi</i>	Caucasian viper	No

\*Recorded by Gamma in 2014, but not recorded in 2015 or 2016 by SLR.

<sup>3</sup> Pursuant to Article 22 of the Berne Convention, Georgia reserves the right not to apply provisions of Article 5 of the Convention in respect to *Vaccinium arctostaphylos* contained in Appendix I to the Convention occurring on the territory of Georgia. Therefore this common and wide spread species can be considered for the purposes of this assessment as not being a key receptor. For more information please refer to: [http://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/104/declarations?p\\_auth=qTKC0gid](http://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/104/declarations?p_auth=qTKC0gid)

## **2.0 STAG ONE: SCREENING**

### **2.1 Overview**

The information presented within this report has primarily been taken from the following documents:

- Gamma (2015) Nenskra JSC Project on the Construction and Operation of Nenskra HPP, Environmental and Social Impact Assessment Report. Gamma Consulting Led Director V. Gvakharia,
- SLR (2016) Nenskra Hydropower Project, Supplementary Environmental and Social Studies, Volume 4 – Biodiversity Impact Assessment. JSC Nenskra Hydro.
- Ministry of Energy (2011) Khudoni – Environmental and Social Impact Assessment – Final Report. ARS Progetti SPA and BRL

Where other sources of information have been used, these have been referenced using foot notes.

The Nenskra Hydropower Project is not connected (directly or otherwise) with or necessary to the management of the candidate Svaneti Emerald site. Therefore the Article 6 screening process is required and is set out below.

### **2.2 Nenskra HPP Project Engineering and infrastructure description**

The Project will use the available discharges from the Nenskra River and the adjacent Nakra River, developing a maximum available head of 725 m down to the powerhouse located approx. 17 km downstream of the dam.

The main Project components comprise a 130 m high, 850 m long asphalt face rock fill dam on the upper Nenskra River creating a live storage of about 176 million m<sup>3</sup> and a reservoir area at full supply level of 2.67 km<sup>2</sup>. The Nakra River will be diverted into the Nenskra reservoir through a 12.25 km long transfer tunnel. The power waterway comprises a headrace tunnel of 15.1 km, a pressure shaft and underground penstock of 1,790 m long. The above-ground powerhouse is located on the left side of the Nenskra River and will house three vertical pelton turbines of 93MW capacity each, for a total installed capacity of 280 MW. A 220 kV transmission line that connects the powerhouse switchyard to a new Khudoni Substation will have to be built.

The main construction period is planned to start in September 2017 and will last 4 years. Some early works began in October 2015 and will continue to September 2017: rehabilitation of access roads, construction of workers camps and technical installations. Power generation is planned to start end of 2019 if the conditions are favourable.

The Project is being developed by JSC Nenskra Hydro (JSCNH), whose main shareholders are K-water, a Korean government agency and Partnership Fund, an investment fund owned by the Government of Georgia. K-water and Partnership Fund are referred to as the Owners in this document.

#### **2.2.1 Site characteristics (biodiversity).**

The floral baseline surveys identified 12 broad scale habitats within the survey area (which covered both the Nenskra and Nakra Valleys (Map 2). The most dominant habitat present was found to be mixed broadleaved and conifer woodland which made up 31% of the survey area. The second most common habitat was alpine zone or bare rock. The broadleaved

woodland which comprised 13% of the area surveyed. Conifer dominant woodland was found to cover only 5% of the area surveyed. The sub-alpine zone covered 25% of the area surveyed. Of the habitats identified, two of habitats of potentially high conservation value were identified (based on the CORINE<sup>4</sup> and a sensitivity assessment<sup>5</sup>) within the reservoir impoundment area. These are: beech forests with Colchic understory (*Fageta fruticosa colchica*) and dark coniferous forest without the understory (*Piceeto-Abieta sine fruticosa*). Habitats of medium conservation (Oak or oak-hornbeam forests (*Quercitum -Carpinion betuli*) and low likely conservation value were also recorded.

The mammal surveys undertaken in 2015 and 2016, identified that brown bear (*Ursus arctos*) is present within the Nenskra valley, with four individual bears being identified through prints, with the likelihood that up to ten bears are present in the Nenskra/Nakra watershed. A single print considered potentially to be from the Eurasian lynx (*Lynx lynx*) was also recorded within the reservoir area. Wolf (*Canis lupus*) was also recorded in the survey area, with a single adult female filmed scavenging from a carcass, and number of footprints recorded, were also attributed to wolf. Bat surveys were also undertaken, they found that less bats use the reservoir area than the area surrounding Tita Village (down-stream), however seven species of bat were identified within the reservoir area using bat call analysis. It is considered likely that bats are roosting within the reservoir area as suitable habitat is present in the form of mature trees with lose bark and rot holes.

During the 2015 mammal surveys no signs of otter (*Lutra lutra*) were noted, however the habitats present within the survey area were considered to be suitable for this species. The Nakra river, was considered less suitable due to the apparent lack of fish populations. The Caucasian squirrel (*Sciurus anomalus*) was noted during the 2016 surveys, and found to be relatively wide spread within the Nenskra valley.

During the bird survey a number of records were made for wide spread and commonly occurring bird species. The surveys were undertaken during September, which is a month when bird migrations (from north to south) are occurring. The survey found that while small flocks of species such as griffon vulture (*Gyps fulvus*) did fly over the survey area, they did not stop and flew over high above. The surveys found that the Nenskra and Nakra valleys are only occasionally used as migratory flyways, the main flyways being situated to the west of the survey area (closer to the Black Sea) and to the east of the survey area. It was also concluded that the project area does not lie within a protected site, nor does it form part of the rich bird endemism sites which are present within Georgia.

The fish surveys comprised a habitat assessment and the examination of fish caught by local anglers, as electro-fishing is not legal in Georgia. The fish which were observed were considered most likely to be the brown trout *Salmo trutta morfa farrio*. It was assessed that no other fish species are present in the Nenskra or Nakra rivers.

### 2.3 Projects considered in-combination

The following projects have been considered for in-combination effects and are within the Nenskra or Nakra river valleys:

- Darachi - Ormeleti
- Lakhami

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<sup>4</sup> CORINE – Co-ordination of information on the environment. More information on the habitats can be found here: Moss D (2008) EUNIS habitat classification – a guide for users. European Topic Centre on Biological Diversity

<sup>5</sup> Morris P., Therivel R. Editors (1995) Methods of Environmental Impact Assessment. UBC Press.

- Okrila
- Tskhvandiri
- Nakra

Map 3 shows the location of these projects, all of which are still at the conceptual or feasibility stage and have not yet been granted permits for construction. All of the projects are run of river hydropower schemes, so will require minimal land take, diversion tunnels, but no dams. They are considered to only cumulatively to affect the hydrological regimes in the area as well as the project infrastructure which may increase human access to the areas (hunting and illegal logging).

The largest project which has been considered cumulatively is the Khudoni Hydropower scheme. Its location is shown on Map 3. This extent of the reservoir for this scheme is located just downstream from the Nenskra Hydropower Project power house (approximately 1km). The boundary shown on Map 3 shows the extent of the area being considered regarding cumulative impacts. This area has been chosen as the assessment area, based on the natural boundaries such as the Enguir river and high mountain ridges. Essentially the cumulative impacts are considered to affect the Nakra and Nenskra watersheds and only a short section of the wide, fast flowing sediment laden Enguir river. It should be noted however that all of the projects outlined above, are located outside of the candidate Emerald Site boundary.

## 2.4 Identification of impacts

The proposed projects in combination will have the following impacts:

- Permanent and temporary loss of vegetative habitats;
- Disturbance during construction;
- Changes in hydrological regime;
- Increased access to anthropological disturbance (e.g. hunting).

It is therefore necessary to assess if the proposed projects, in-combination, would have a likely significant effect on any of the qualifying features of the candidate Emerald Site, noting that none of the proposed projects lie within the candidate Emerald Site boundary.

### 2.4.1 Assessment of likely significant effects

The species and habitats listed in Table 2-1 are listed as the qualifying features of the candidate Svaneti Emerald site and are species and habitats which also occur within the Nenskra HPP area and the Khudoni HPP area. Therefore these are considered to be the key features which will be assessed in terms of impacts upon the characteristics of the candidate Svaneti Emerald site.

**Table 2-1  
Resolution 4 Habitats and Resolution 6 Species which are present in the project area**

Group	Latin Name	English Name
Bird	<i>Aegithalos caudatus</i>	Long tailed tit*
Bird	<i>Aquila chrysaetos</i>	Golden eagle*
Bird	<i>Buteo buteo</i>	Buzzard
Bird	<i>Columba palumbus</i>	Wood pigeon*

Group	Latin Name	English Name
Bird	<i>Corvus corax</i>	Raven*
Bird	<i>Gyps fulvus</i>	Griffon vulture*
Bird	<i>Hieraaetus pennatus</i>	Booted eagle*
Bird	<i>Lanius collurio</i>	Red backed shrike*
Bird	<i>Milvus migrans</i>	Black kite
Mammal	<i>Lutra lutra</i>	Otter*
Mammal	<i>Lynx lynx</i>	Lynx
Mammal	<i>Rhinolophus ferrumequinum</i>	Greater horseshoe bat
Mammal	<i>Ursus arctos</i>	Brown bear*
Mammal	<i>Canis lupus</i>	Wolf

\*Denotes species also recorded within the Khudoni HPP area.

In order for a feature to be considered further within this assessment, a pathway for impact has to be identified. The assessment of likely significant effects has been set out below. Please note that these impacts are assessed in the absence of mitigation.

**Table 2-2**  
**Assessment of likely significant effects**

Habitat/Species	Evaluation	Potential for likely significant effect?
<i>Beech Forest</i>	No habitat loss within the candidate Emerald site will occur as a result of the Nenskra Hydropower Project, or the in-combination projects. Therefore there is no potential pathway for likely significant effects.	No
<i>Ursus Arctos</i> <i>Brown bear</i>	Based on the IUCN evaluation, this geographically widely occurring species is of least concern. However in Georgia where this species is now protected, it is evaluated as Endangered on the Georgian Red List; but still, one of the main reasons for brown bear death in Georgia is illegal hunting (Lortkipanidze 2010 <sup>6</sup> ). Brown bear can occupy large ranges, moving around their range in order to take advantage of food availability. The population of brown bear which makes up the qualifying feature of the candidate Emerald site may range into the Nakra Valley (the valley which forms the western boundary of the candidate Emerald site). The disturbance and habitat losses due to the Project within the Nakra valley will be limited, as here, only a diversion weir and underground tunnel will be built. The habitat loss will comprise generally grazed farmland and is estimated to be less than 0.4km <sup>2</sup> in area. During the baseline surveys for the Project, bears were found to be present within the Nenskra valley. Brown bear signs were found on most survey occasions, and conversations with the local hunters indicate that these bears are more or less resident in the valley. As a result of this it is assessed that due to the territorial nature of brown bear, it would be unlikely that brown bear from the candidate Emerald site population would regularly visit the Nenskra Valley or that this valley forms part of the candidate Emerald Site brown bear population range. Therefore, due to the distances involved it is assessed that there will be no likely significant effect on the conservation status of the candidate Emerald Site brown bear	No

<sup>6</sup> Lortkipanidze (2010) Brown bear distribution and status in the South Caucasus. *Ursus* 21, 97-103.

Habitat/Species	Evaluation	Potential for likely significant effect?
	population due to the Project or in-combination effects.	
<i>Lynx lynx</i> Lynx	<p>As with the brown bear, the IUCN evaluation of this widespread Eurasian species is of least concern. The main prey item of the lynx, are ungulate species such as tur, chamois and roe deer. These are species which are present in the upper reaches of the Enguri, Nenskra and Nakra valleys, where man made disturbance is minimal. Chamois and tur especially are found within the sub alpine zone rather than in the lower valley areas (where the project areas are located) as evidenced during the 2016 brown bear surveys.</p> <p>Lynx territories range in size depending upon terrain and food availability. It is difficult to determine the potential size of a lynx's territory as they can range from 100 – 1000km<sup>2</sup> (IUCN 2015<sup>7</sup>). It is therefore possible, that lynx, which form the candidate Emerald Site population, may include part of the Nakra and Nenskra valleys in to their territory.</p> <p>Due to the large ranges that this species inhabits, and the upland areas in which they hunt, it is considered that the loss of habitats and disturbance generated by the Project and in-combination projects would not significantly affect the conservation status of this species.</p>	No
<i>Lutra lutra</i> European otter	<p>No otter signs were detected within the Nenskra or Nakra watersheds during the 2015 surveys, however otter spraints were noted by Gamma during the 2014 surveys. Otter footprints were also noted during the surveys undertaken on the Khudoni HPP area.</p> <p>No otter signs were noted within the Nakra Valley and fish (in this case brown trout) the main food item for otter were assessed to be at very low populations (Pers Comm local anglers 2015 and 2016). As a result of this it is considered unlikely that otter populations would be present on the Nakra river.</p> <p>Due to the distances involved, it is also considered that otter populations from the candidate Emerald Site would not use the Nenskra River. The confluence of the Nenskra and Enguri river lies at least 25 km downstream of the candidate Emerald site. It is therefore concluded that if an otter population is present on the Nenskra river, then then it is unlikely to form part of the candidate Emerald Site qualifying population. Therefore there is considered to be no pathway present for any significant likely effects to occur with regards the conservation status of otter within the candidate Emerald Site.</p>	No
<i>Canis lupus</i> Wolf	<p>During the 2016 surveys a foal was killed close to Tita; on close examination it appeared to have been killed by a wolf. The foal carcass was left in situ and two camera traps set up to monitor activity throughout the following night. A lone female wolf was recorded feeding on the carcass. Footprints of a single adult grey wolf were also noted in on the tracks above Tita village. These incidental records prove presence in the Nenskra Valley, but the fact that signs were only noted in 2016 and during none of the other survey periods, strongly suggests that while wolf are present they are present at a very low density and are likely have large territories - 100 – 500 km<sup>2</sup>. It is therefore considered that due to the large ranges which wolf occupy, the Nenskra HPP is not anticipated to significantly affect the conservation status of this species through habitat loss or disturbance. The Project, alone or in combination, is therefore considered to have a non-significant effect on the conservation status of wolf within the candidate Emerald Site.</p>	No

<sup>7</sup> IUCN (2015). The IUCN Red List of Threatened Species 2015, Information on Lynx Lynx. [Online] Available from: <http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T12519A50655266.en> [Accessed 27 October 2015]

Habitat/Species	Evaluation	Potential for likely significant effect?
<p><i>Rhinolophus ferrumequinum</i> Greater horseshoe bat</p>	<p>The IUCN website describes the species as follows: it forages in pastures, deciduous temperate woodland, Mediterranean and sub-Mediterranean shrub land and woodland. Important foraging habitat and landscape features include woodland, particularly early in the year, and permanent summer-grazed pasture, particularly late in the summer. It feeds on beetles, moths and other insects at low level in pastures and in trees up to 2 to 3 km from the roost each night (by aerial hawking or perch feeding). Summer roosts are located in warm natural and artificial underground sites, and attics in the northern part of the range. The species will use caves all year, but particularly in northern Europe it uses buildings for summer maternity colonies.</p> <p>This species of bat was not recorded within the Nenskra HPP reservoir area (potentially due to altitude and lack of suitable prey items), but was recorded at Tita within the Nenskra Valley. It is not known if bat surveys were undertaken for the Khudoni HPP, but a habitat appraisal would strongly suggest that this bat species could be present in both areas, though for Nenskra HPP, only the power house and penstock area.</p> <p>This species is generally limited to areas where suitable foraging areas are located, such as pastures with woodland edges. These are habitats which are likely to be minimally affected cumulatively by the run of river hydro schemes. The Nenskra HPP reservoir area was not found to provide suitable habitat for this species, which is where the main habitat loss for the project will occur. The power house and penstock area is thickly wooded, with no pastures and as a result few woodland edges. As a result of this, the Nenskra HPP is not anticipated to significantly affect the conservation status of this species through habitat loss.</p>	<p>No</p>
<p><i>Gyps fulvus</i> Eurasian griffon vulture</p>	<p>This species is described as a regular, non-breeding visitor to the assessment area, but in small numbers. It is therefore considered that the project and other in-combination projects would not have a likely significant effect on this species.</p>	<p>No</p>
<p><i>Aquila chrysaetos</i> Golden eagle</p>	<p>This species is generally widespread across the Western Palearctic area. It is likely to nest within the assessment area, but outside of the Khudoni and Nenskra HPP reservoir areas. Due to the widespread nature of this species, the permanent loss of habitats due to the in-combination projects is not considered to have a likely significant effect on this species.</p>	<p>No</p>
<p><i>Milvus migrans</i> Black Kite</p>	<p>This species is considered as a passage migrant; therefore it is not resident within the assessment area. Cumulatively the proposed projects within the assessment area are not considered to have a likely significant effect on the conservation status of this species.</p>	<p>No</p>
<p><i>Aegithalos caudatus</i> Long tailed tit</p>	<p>This species is widely occurring at low population densities. Within the candidate Emerald site it is considered likely to be a year round resident. As a result of this it would not be subject to in-combination effects from projects outside of the candidate Emerald site as there is no pathway for effects present e.g. pollution, habitat loss etc.</p>	
<p><i>Hieraaetus pennatus</i> Booted Eagle</p>	<p>This species is considered as a passage migrant; therefore it is not resident within the assessment area. Cumulatively the proposed projects within the assessment area are not considered to have a significant effect on the conservation status of this species.</p>	<p>No</p>
<p><i>Lanius collurio</i> Red-Backed Shrike</p>	<p>This species is common and is found both as a summer breeder and as a passage migrant. Due to the widespread and common occurrence of this species in Georgia, the cumulative habitat loss, due to the Khudoni and Nenskra HPP schemes is not anticipated to significantly affect conservation status of this species.</p>	<p>No</p>
<p><i>Buteo buteo</i> Buzzard</p>	<p>This species is relatively common and is found both as a summer breeder (in low numbers) and as a passage migrant (common). Due to the widespread occurrence of this species in Georgia, the cumulative habitat loss, due to the Khudoni and Nenskra HPP schemes is not anticipated to significantly affect conservation status of this species.</p>	<p>No</p>

Habitat/Species	Evaluation	Potential for likely significant effect?
<i>Columba palumbus</i> <i>Wood pigeon</i>	This species was recorded in both the Nenskra and Khudoni HPP areas. It is anticipated only to be a non-breeding resident and a passage migrant within the upper elevations of the Nenskra HPP reservoir area. In the Khudoni HPP area and wider Enguri valley, it is a relatively widespread species which a year round resident. Due to the widespread occurrence of this species in Georgia, the cumulative habitat loss, due to the Khudoni and Nenskra HPP schemes is not anticipated to significantly affect conservation status of this species within the candidate Emerald Site.	No
<i>Corvus corax</i> <i>Raven</i>	This species is common and is found both as a summer breeder and as a passage migrant. Due to the widespread and common occurrence of this species in Georgia, the cumulative habitat loss, due to the Khudoni and Nenskra HPP schemes is not anticipated to significantly affect conservation status of this species within the candidate d Emerald Site.	No

## 2.5 Outcome of screening assessment

For the purposes of this assessment, the candidate Emerald site was treated as an existing site. The candidate Svaneti Emerald site boundary does not include any part of the footprint of the Nenskra Hydropower Project site. The closest infrastructure will be the Nakra weir and intake, which is located at its closest 760 metres from the candidate Emerald Site boundary. The main Project site (Nenskra reservoir dam area) is located 16km from the boundary of the candidate Emerald Site. A range of glaciated mountains lie between the Nenskra valley and the proposed candidate Emerald site boundary, creating a natural geographic boundary.

The assessment of likely significant effects on the qualifying features of the candidate Emerald site found that there is no potential for significant effects to occur on any of the qualifying features. This is principally due to the distances involved (as discussed above) as the Project area, and in-combination projects all lie outside of the candidate Svaneti Emerald Site. The only potential pathways for effects are either hydrological, or where species populations are mobile and will move outside of the candidate Emerald Site.

Likely effects through hydrological linkage are very limited as the Project area lies downstream of the candidate Emerald site. Wolf, brown bear and lynx are the only terrestrial fauna which may range outside of the candidate Emerald Site; however it is because of their large ranges, that the Project and in-combination projects are unlikely to have a significant effect on the conservation status of these species, through land take or disturbance. Finally a number of bird species were considered. Again, for the resident species, it is unlikely that significant effects would occur due to lack of pathways for impacts due to distance and geography. For the more mobile bird species, it is their large ranges and mobility which would render most potential effects (such as habitat loss) non-significant.

In summary, the assessment of significant likely effects found that the Project and in-combination projects would not impact upon the conservation status of the qualifying species of the candidate Emerald Site. Therefore an Appropriate Assessment, Stage 2, is not required.

### **3.0 CLOSURE**

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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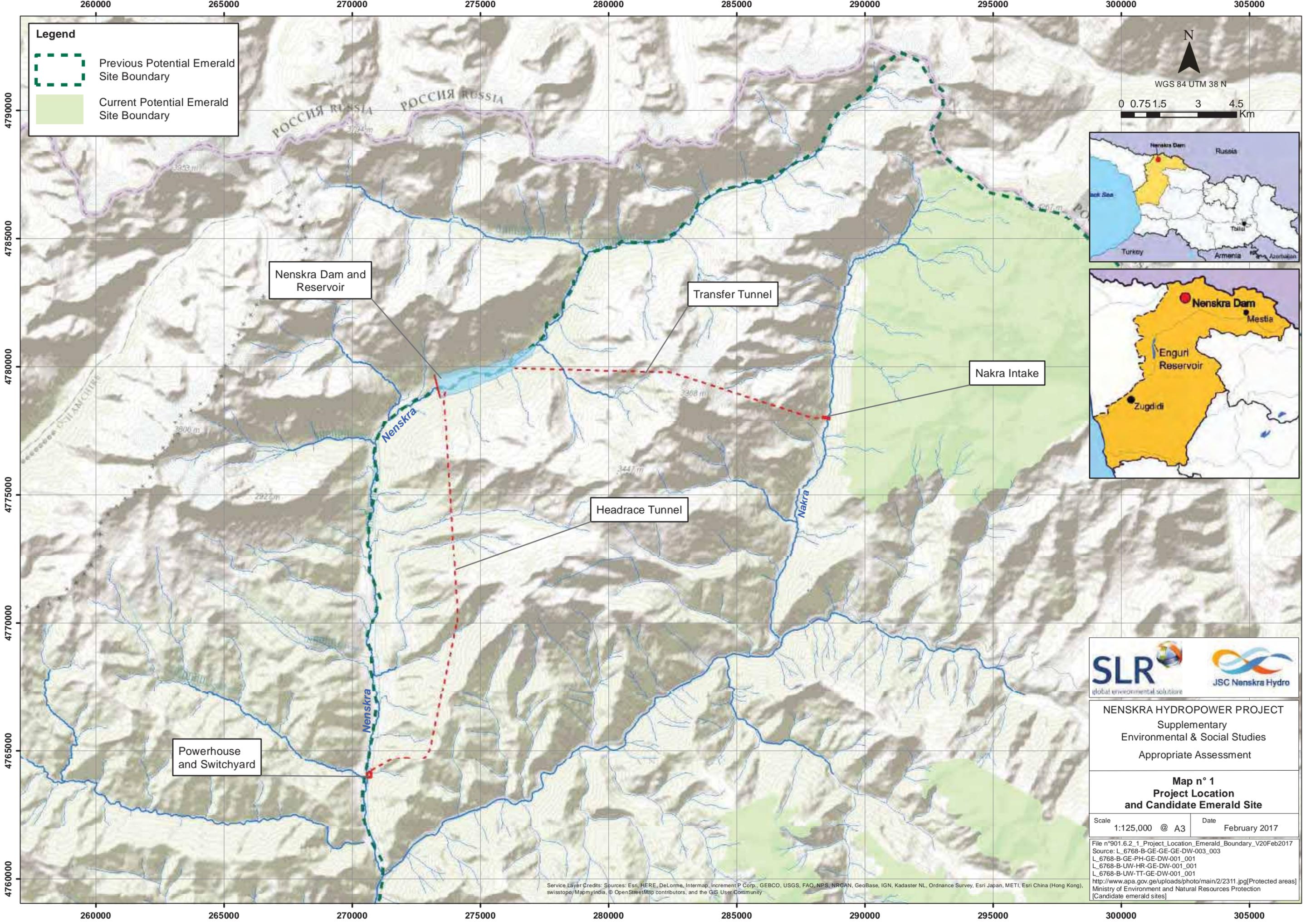
SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

#### **4.0 MAPS**

**Map 1 – Project location and candidate Emerald site boundary**

**Map 2 - Broad scale map of Nenskra and Nakra watershed**

**Map 3 - Cumulative assessment, schemes and assessment boundary**



**Legend**

- Previous Potential Emerald Site Boundary
- Current Potential Emerald Site Boundary

N

WGS 84 UTM 38 N

0 0.75 1.5 3 4.5 Km



Nenskra Dam and Reservoir

Transfer Tunnel

Nakra Intake

Headrace Tunnel

Powerhouse and Switchyard

**SLR** global environmental solutions

**JSC Nenskra Hydro**

**NENSKRA HYDROPOWER PROJECT**  
 Supplementary  
 Environmental & Social Studies  
 Appropriate Assessment

**Map n° 1**  
**Project Location**  
**and Candidate Emerald Site**

Scale 1:125,000 @ A3 Date February 2017

File n°901.6.2\_1\_Project\_Location\_Emerald\_Boundary\_V20Feb2017  
 Source: L\_6768-B-GE-GE-DW-003\_003  
 L\_6768-B-GE-PH-GE-DW-001\_001  
 L\_6768-B-UW-HR-GE-DW-001\_001  
 L\_6768-B-UW-TT-GE-DW-001\_001  
<http://www.apa.gov.ge/uploads/photo/main/2/2311.jpg>[Protected areas]  
 Ministry of Environment and Natural Resources Protection  
 [Candidate emerald sites]

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

260000 265000 270000 275000 280000 285000 290000 295000 300000 305000

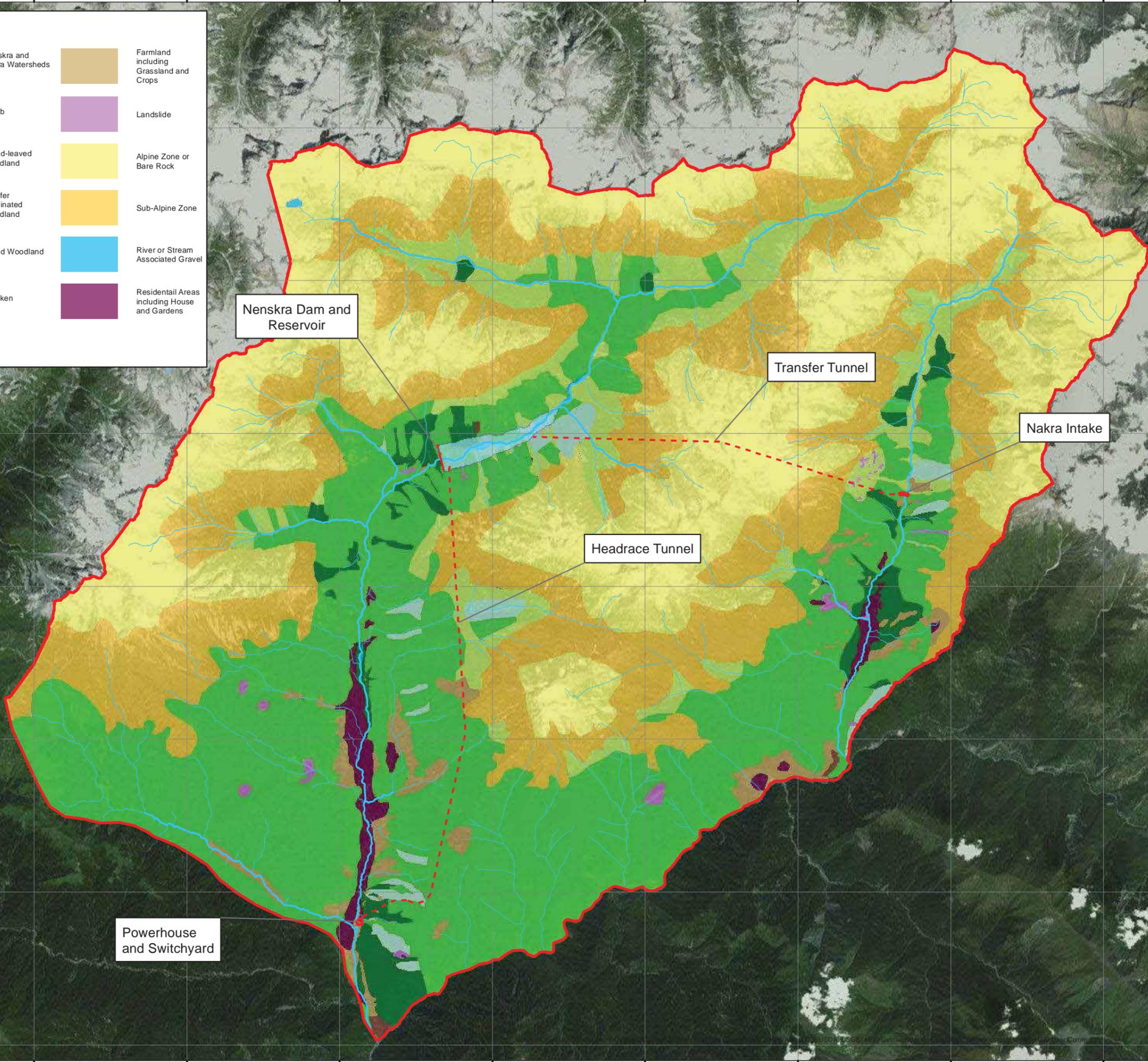
**Legend**

	Nenskra and Nakra Watersheds		Farmland including Grassland and Crops
	Scrub		Landslide
	Broad-leaved Woodland		Alpine Zone or Bare Rock
	Conifer Dominated Woodland		Sub-Alpine Zone
	Mixed Woodland		River or Stream Associated Gravel
	Bracken		Residential Areas including House and Gardens

WGS 84 48° 38' N



4790000  
4785000  
4780000  
4775000  
4770000  
4765000  
4760000



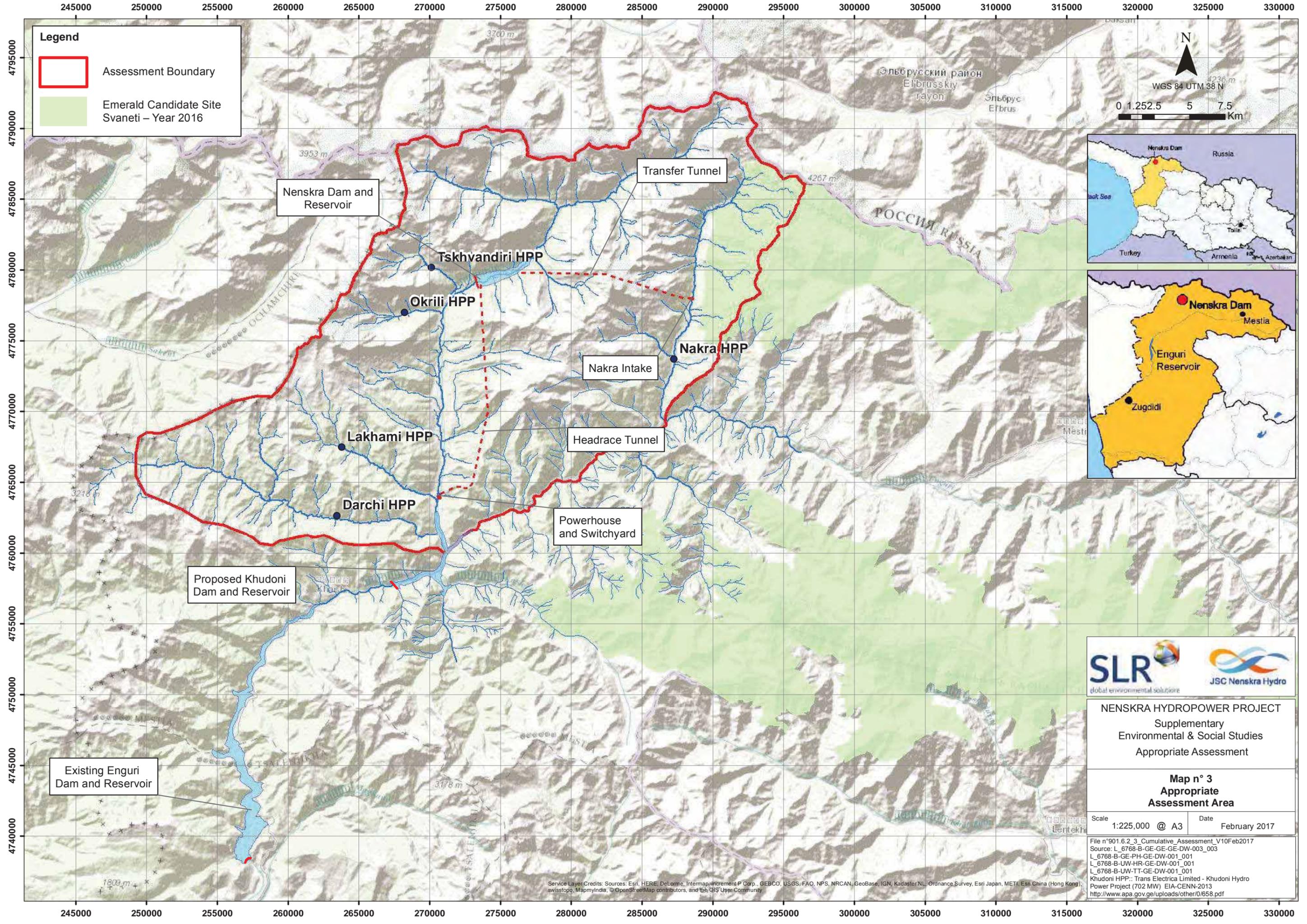
**NENSKRA HYDROPOWER PROJECT**  
 Supplementary  
 Environmental & Social Studies  
 Appropriate Assessment

**Map n° 2**  
**Nenskra and Nakra Watershed**

Scale 1:125,000 @ A3	Date February 2017
-------------------------	-----------------------

File n°901.6.2.2\_Watersheds\_V10Feb2017  
 Source:  
 L\_6768-B-GE-GE-DW-003\_003  
 L\_6768-B-GE-PH-GE-DW-001\_001  
 L\_6768-B-UW-HR-GE-DW-001\_001  
 L\_6768-B-UW-TT-GE-DW-001\_001

260000 265000 270000 275000 280000 285000 290000 295000 300000 305000



**Legend**

- Assessment Boundary
- Emerald Candidate Site  
Svaneti – Year 2016

N

WGS 84 UTM 38 N

0 1.252.5 5 7.5 Km



**SLR** global environmental solutions

**JSC Nenskra Hydro**

**NENSKRA HYDROPOWER PROJECT**  
 Supplementary  
 Environmental & Social Studies  
 Appropriate Assessment

**Map n° 3**  
**Appropriate**  
**Assessment Area**

Scale 1:225,000 @ A3 Date February 2017

File n°901.6.2.3\_Cumulative\_Assessment\_V10Feb2017  
 Source: L\_6768-B-GE-GE-DW-003\_003  
 L\_6768-B-GE-PH-GE-DW-001\_001  
 L\_6768-B-UW-HR-GE-DW-001\_001  
 L\_6768-B-UW-TT-GE-DW-001\_001  
 Khudoni HPP: Trans Electrica Limited - Khudoni Hydro  
 Power Project (702 MW) EIA-CENN-2013  
<http://www.apa.gov.ge/uploads/other/0/658.pdf>

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

**ANNEX 1 EMERALD STANDARD DATA FORM.**



# EMERALD - STANDARD DATA FORM

For proposed Emerald Sites (Areas of Special Conservation Interest, ASCI),  
Candidate Emerald Sites and,  
For Areas of Special Conservation Interest (ASCI = Emerald Sites)

SITE                   GE0000012  
SITENAME           Svaneti

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- [2. SITE LOCATION](#)
- [3. ECOLOGICAL INFORMATION](#)
- [4. SITE DESCRIPTION](#)
- [5. SITE PROTECTION STATUS](#)
- [6. SITE MANAGEMENT](#)
- [7. MAP OF THE SITE](#)

## 1. SITE IDENTIFICATION

<b>1.1 Type</b> C	<b>1.2 Site code</b> GE0000012	<a href="#">Back to top</a>
----------------------	-----------------------------------	-----------------------------

### 1.3 Site name

Svaneti
---------

<b>1.4 First Compilation date</b> 2010-11	<b>1.5 Update date</b> 2014-01
--	-----------------------------------

### 1.6 Respondent:

<b>Name/Organisation:</b>	
<b>Address:</b>	Ministry of environment (www.moe.gov.ge), NACRES (www.nacres.org)
<b>Email:</b>	

### 1.7 Site indication and designation / classification dates

<b>Date site proposed as ASCI:</b>	2004-11
<b>Date site accepted as candidate ASCI:</b>	No data
<b>Date site accepted as ASCI:</b>	No data
<b>Date site designated as ASCI:</b>	No data
<b>National legal reference of ASCI designation:</b>	No data

## 2. SITE LOCATION

[Back to top](#)

### 2.1 Site-centre location [decimal degrees]:

**Longitude**

42.6256

**Latitude**

43.0222

### 2.2 Area [ha]:

233147.75

### 2.3 Marine area [%]

### 2.4 Sitelength [km]:

### 2.5 Administrative region code and name

**NUTS level 2 code**

**Region Name**

GE	GEORGIA
----	---------

### 2.6 Biogeographical Region(s)

Alpine ( %)

## 3. ECOLOGICAL INFORMATION

[Back to top](#)

### 3.1 Habitat types present on the site and assessment for them

Resolution 4 Habitat types						Site assessment			
Code	PF	NP	Cover [ha]	Cave [number]	Data quality	A B C D	A B C		
						Representativity	Relative Surface	Conservation	Global
D4.2					M	C	C	C	C
G1.6					M	B	A	C	C

- **PF:** for the habitat types that can have a non-priority as well as a priority form (6210, 7130, 9430) enter "X" in the column PF to indicate the priority form.
- **NP:** in case that a habitat type no longer exists in the site enter: x (optional)
- **Cover:** decimal values can be entered
- **Caves:** for habitat types 8310, 8330 (caves) enter the number of caves if estimated surface is not available.
- **Data quality:** G = 'Good' (e.g. based on surveys); M = 'Moderate' (e.g. based on partial data with some extrapolation); P = 'Poor' (e.g. rough estimation)

### 3.2. Species listed in Resolution 6 and site evaluation for them

Species	Population in the site	Site assessment

G	Code	Scientific Name	S	NP	T	Size		Unit	Cat.	D.qual.	A B C D			A B C		
						Min	Max				Pop.	Con.	Iso.	Glo.		
B	A324	<a href="#">Aegithalos caudatus</a>			p				P		B	C	B	B		
B	A223	<a href="#">Aegolius funereus</a>			p				P		C	C	C	C		
I	1930	<a href="#">Agiades glandon aquilo</a>			c				P		D					
B	A091	<a href="#">Aquila chrysaetos</a>			p				P		A	C	C	B		
B	A215	<a href="#">Bubo bubo</a>			p				P		B	C	B	B		
B	A087	<a href="#">Buteo buteo</a>			p				P		B	C	C	B		
I	1078	<a href="#">Callimorpha quadripunctaria</a>			c				P		D					
M	1352	<a href="#">Canis lupus</a>			p				P		B	C	C	B		
M	1352	<a href="#">Canis lupus</a>			w				P		B	C	C	B		
M	1352	<a href="#">Canis lupus</a>			c				P		B	C	C	B		
M	1352	<a href="#">Canis lupus</a>			r				P		B	C	C	B		
B	A364	<a href="#">Carduelis carduelis</a>			p				P		B	C	C	B		
B	A334	<a href="#">Certhia familiaris</a>			p				P		B	C	C	B		
B	A208	<a href="#">Columba palumbus</a>			p				P		B	C	C	B		
B	A350	<a href="#">Corvus corax</a>			p				P		A	C	C	B		
B	A349	<a href="#">Corvus corone</a>			p				P		A	C	C	B		
B	A212	<a href="#">Cuculus canorus</a>									B	C	C	B		
P	1381	<a href="#">Dicranum viride</a>			p				P		B	C	A	B		
B	A236	<a href="#">Dryocopus martius</a>			p				P		C	C	C	C		
I	1932	<a href="#">Erebia medusa polaris</a>			p				P		C	C	B	C		
I	1932	<a href="#">Erebia medusa polaris</a>			r				P		C	C	B	C		
B	A442	<a href="#">Ficedula semitorquata</a>									D					
B	A076	<a href="#">Gypaetus barbatus</a>			p				P		B	C	B	B		
B	A078	<a href="#">Gyps fulvus</a>			p				P		A	C	C	B		
I	1933	<a href="#">Hesperia comma catena</a>			p				P		B	C	B	C		
I	1933	<a href="#">Hesperia comma catena</a>			r				P		B	C	B	C		
B	A092	<a href="#">Hieraetus pennatus</a>			r				P		D					
B	A338	<a href="#">Lanius collurio</a>			c				P		D					



Species					Population in the site			Motivation									
Group	CODE	Scientific Name	S	NP	Size		Unit	Cat.	Species Annex			Other categories					
					Min	Max			C	R	V	P	I	II	III	A	B
B		<a href="#">Buteo buteo</a>											X				
M		<a href="#">Capra sp.</a>												X			
M		<a href="#">Capreolus capreolus</a>											X				
B		<a href="#">Carduelis chloris</a>											X				
M		<a href="#">Chiroptera sp.</a>													X		
B		<a href="#">Coturnix coturnix</a>											X				

- **Group:** A = Amphibians, B = Birds, F = Fish, Fu = Fungi, I = Invertebrates, L = Lichens, M = Mammals, P = Plants, R = Reptiles
- **CODE:** for Appendix I, II and III species the code provided in the Emerald reference portal should be used, in addition to the scientific name
- **S:** in case that the data on species are sensitive and therefore have to be blocked for any public access enter: yes
- **NP:** in case that a species is no longer present in the site enter: x (optional)
- **Unit:** i = individuals, p = pairs or other units according to the standard list of population units and codes in accordance with Article 12 and 17 reporting, (see [reference portal](#))
- **Cat.:** Abundance categories: C = common, R = rare, V = very rare, P = present
- **Motivation categories: I, II, III:** Appendix Species (Bern Convention), **A:** National Red List data; **B:** Endemics; **C:** International Conventions; **D:** other reasons

## 4. SITE DESCRIPTION

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### 4.1 General site character

Habitat class	% Cover
N22	10.0
N23	10.0
N19	20.0
N11	40.0
N17	20.0
<b>Total Habitat Cover</b>	<b>100</b>

### 4.2 Quality and importance

A,B,C

### 4.3 Threats, pressures and activities with impacts on the site

The most important impacts and activities with high effect on the site

Negative Impacts			
Rank	Threats and pressures [code]	Pollution (optional) [code]	inside/outside [i o b]

Positive Impacts			
Rank	Activities, management [code]	Pollution (optional) [code]	inside/outside [i o b]

H	B		i
H	A04		i
H	F03.01		i

Rank: H = high, M = medium, L = low

Pollution: N = Nitrogen input, P = Phosphor/Phosphate input, A = Acid input/acidification,

T = toxic inorganic chemicals, O = toxic organic chemicals, X = Mixed pollutions

i = inside, o = outside, b = both

#### 4.4 Ownership (optional)

#### 4.5 Documentation

### 5. SITE PROTECTION STATUS (optional)

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#### 5.1 Designation types at national and regional level:

Code	Cover [%]	Code	Cover [%]	Code	Cover [%]
GE00	0.0				

#### 5.2 Relation of the described site with other sites:

#### 5.3 Site designation (optional)

### 6. SITE MANAGEMENT

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#### 6.1 Body(ies) responsible for the site management:

Organisation:	Local and central government, Forestry department
Address:	
Email:	

#### 6.2 Management Plan(s):

An actual management plan does exist:

<input checked="" type="checkbox"/>	Yes
<input type="checkbox"/>	No, but in preparation
<input type="checkbox"/>	No

#### 6.3 Conservation measures (optional)

Local and central government, Forestry department
---

### 7. MAP OF THE SITES

[Back to top](#)

INSPIRE ID:

--

Map delivered as PDF in electronic format (optional)

<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------

Yes  No

Reference(s) to the original map used for the digitalisation of the electronic boundaries (optional).

--

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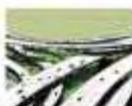
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Industry



Infrastructure



Mining & Minerals



Oil & Gas



Planning & Development



Renewable & Low Carbon



Waste Management



## Annex 6 - Reforestation Strategy

# Nenskra HPP

## Reforestation Strategy

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## **1.0 INTRODUCTION**

### **1.1 Background**

This is a reforestation strategy which forms an Annex to the Nenskra Hydropower Project, Supplementary Environmental and Social Studies, Volume 4 Biodiversity Impact Assessment. This plan has been written by Nicola Faulks (CEcol) with input and expertise from local Georgian expert: Dr Mariam Kimeridze. In essence, this strategy has been written to enable a more detailed plan to be written in the future, once all necessary information has been gathered.

The Supplementary Environmental and Social studies (SESS), Volume 4, Biodiversity Impact Assessment also contains the results of the investigations conducted from August 2015 to June 2016, by SLR Consulting, in the project-affected area on the terrestrial biodiversity and the river fish habitats. The aim of this Biodiversity Impact Assessment was to address the areas where lack of information was identified during a gap analysis conducted on behalf of the Lenders, of the 2015 ESIA<sup>1</sup>.

The Nenskra Hydropower Project (henceforth referred to as “the Project”) will seek to avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services will be implemented. Given the complexity in predicting Project’s impacts on biodiversity and ecosystem services over the long term, the Project will adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the Project’s lifecycle.

The mitigation hierarchy has been applied to the proposed mitigation strategy contained within the SESS Volume 4. In essence this can be described as a three step process:

1. Avoid or prevent negative impacts on the environment in general and biodiversity in particular;
2. Minimise and rehabilitate on-site effects of development if impacts cannot be avoided; and
3. Offset/compensation measures that are undertaken as a last resort (on or off-site) for the residual adverse impacts.

As stated in EBRD Performance Requirement 6 (EBRD 2014) one of the main aims of biodiversity conservation and sustainable management of living natural resources is to adopt the mitigation hierarchy approach with the aim of achieving no net loss of biodiversity and where appropriate a net gain of biodiversity. In order to achieve this: no net loss, this Reforestation strategy has been written. The information contained herein has drawn heavily on the baseline data collected in 2015, 2014 and 2011; which has been compiled in to a detailed report entitled: Flora, Vegetation and Habitat Assessment Report which is contained in Annex 1 of the SESS Volume 4.

### **1.2 Project description**

The proposed Nenskra Hydropower Project is a greenfield high head hydropower project with an installed capacity of 280MW, located in the upper reaches of the Nenskra and Nakra

---

<sup>1</sup> Gamma 2015 Nenskra JSC Project on the Construction and Operation of Nenskra HPP – Environmental and Social Impact Assessment Report.

valleys in the North Western part of Georgia in the Samegrelo-Zemo Svaneti Region (see Map 1).

The Project uses the available discharges from the Nenskra River and the adjacent Nakra River, developing a maximum available head of 725 m down to the powerhouse located approx. 17 km downstream of the dam.

The main Project components comprise a 130 m high, 850 m long asphalt face rock fill dam on the upper Nenskra River creating a live storage of about 176 million m<sup>3</sup> and a reservoir area at full supply level of 2.67 km<sup>2</sup>. The Nakra River will be diverted into the Nenskra reservoir through a 12.25 km long transfer tunnel. The power waterway comprises a headrace tunnel of 15.1 km, a pressure shaft and underground penstock of 1,790 m long. The above-ground powerhouse is located on the left side of the Nenskra River and will house three vertical pelton turbines of 93MW capacity each, for a total installed capacity of 280 MW. A 220 kV transmission line that connects the powerhouse switchyard to a new Khudoni Substation will have to be built.

The main construction period is planned to start in September 2017 and will last 4 years. Some early works began in October 2015 and will continue to September 2017: rehabilitation of access roads, construction of workers camps and technical installations. Power generation is planned to start end of 2019 if the conditions are favourable.

The Project is being developed by JSC Nenskra Hydro (JSCNH), whose main shareholders are K-water, a Korean government agency and Partnership Fund, an investment fund owned by the Government of Georgia. K-water and Partnership Fund are referred to as the Owners in this document.

### **1.3 Survey time line**

Flora, vegetation and habitat surveys were first undertaken on the Project area in 2011 by Gamma. They revisited the site and undertook further surveys in 2014. These surveys were used to inform the 2015 ESIA report, prepared by Gamma Consulting Limited (Gamma) – a Georgian environmental consulting company.

Since the production of the 2015 ESIA, several International Financial Institutions (the Lenders) have been approached to invest into the Project. In compliance with their environmental and social policies, the Lenders have recommended that a number of additional environmental and social studies be undertaken to supplement the 2015 ESIA report. As a result of this, further botanical surveys were undertaken in September 2015.

The SESS document prepared by SLR Consulting was issued in 2016. It details the findings of the Biodiversity Impact Assessment which has been performed from August 2015 to June 2016 by SLR Consulting Ltd (SLR) on the proposed Nenskra HPP. The results of all of the botanical surveys undertaken by both Gamma and SLR contained within a report entitled: Flora, Vegetation and Habitat Assessment Report which is located in Annex 1 of the 2016 SESS Volume 4.

### **1.4 General characteristics of the Nenskra and Nakra district area**

#### **1.4.1 Geo morphology**

The project territory covers botanical-geographical region of Nenskra-Nakra catchment area, which is located on the West part of Svaneti. From the North the region's boundary is the main watershed; the West boundary matches administrative boundary of Svaneti; the East

boundary runs along the Nakra-Dolara watershed – Tsalgmili ridge; the South boundary runs along the right bank of Enguri River, see Map 1.

The Enguri river is the main artery of Zemo Svaneti. It originates in Namkvami (Engur-Ukhvani) glacier and flows near the village Khaishi on 550 m a.s.l. Enguri valley within this region is a rocky cleft located between rock buttresses of Svaneti and Abkhazia-Svaneti and Samegrelo ridges. Enguri valley runs through this botanical-geographical region, in paleozoic metamorphic suite (the Dizi series), middle-Jurassic porphyrite suite (near Khaishi) and cretaceous limestone (near Larakvakva and above Jvari).

Nenskra and Nakra rivers are among the large tributaries of Enguri River. Nenskra River originates from southern slopes of the Caucasus. Upper reaches are presented by karts shale stones, while the lower part is presented by clay-shales and carbonate suite. In this part, it crosses “Deisi” and “Liasi” clay-shales, sand-stones and volcanic rocks.

The Nenskra river is relatively narrow until the Tetnashera confluence. Right tributaries are: Dalari, Tskhandiri, Okrila, Kharali, Tetnashera, Devra, Lagamo, Darchie; left tributaries are – Manchkhapuri, Tita, Margi, Gvashkhara.

Nakra River runs from the glacier and joins Enguri River at 918-1000 m elevation above sea level. Nakra valley is located in crystalline rocks, clay-shales and carbonate and paleolit metamorphosed suite. It is bordered by Shtauler, Tsalgmili and main gorges. U-shaped valley is clearly expressed near the source of the river (Ukleba, 1952; Maruashvili, 1970).

Annual amount of precipitation in the region, as well as in the western part of Zemo Svaneti is 1200-1350 mm. Average annual temperature is 10-14°; annual temperature of the coldest month is 0.6°; average temperature of the warmest month is 20.9°.

## 1.5 Flora and Vegetation

Within the Project area, the two most dominant habitat types are mixed broadleaf and conifer woodland, and broadleaf woodland. These broad habitat types cover a range of species compositions which are described in more detail in the SESS. In summary the broadleaf woodland close to the power house comprises mixed species deciduous forests containing species such as beech *Fagus orientalis*, hornbeam *Caprinus caucasica*, ash *Fraxinus excelsior*, hazel *Corylus avellana*, sweet chestnut *Castanea sativa* and cherry laurel *Laurocerasus officinalis*. The broadleaf woodland within the reservoir area comprises species such as beech, chestnut, Persian maple *Acer velutinum*, Norway maple *Acer platanoides*, alder *Alnus barbata*, oak, birch *Betula litwinowii* and lime *Tilia begoniifolia*. Where the broadleaf woodland is mixed with conifer species the following species are found: Caucasian fir *Abies nordmanniana* and Caucasian spruce *Picea orientalis*. The project area has been subject to logging, which has tended to target the conifer and spruce species.

As well as woodland, there are small areas of grazing land within the Project area. These are short cropped grassy areas grazed by cattle and horses. As well as the open grassy areas the stock also grazes the woodland understory. Non vegetated habitats within the Project area comprise the river Nenskra, river Nakra and associated tributaries and river gravels.

In the wider catchment and Svaneti region, the upper border of the forest belt is at 2000-2300m elevation. Dark coniferous forests dominate in the phytolandscape of the Zemo Svaneti region. Evergreen undergrowth is represented by Cherry Laurel *Laurocerasus officinalis*, Rhododendron *Rhododendron ponticum* and Holly *Ilex colchica*. Cherry Laurel is widespread in Larakvakva and Ormeleti valleys. Different mixed deciduous forests dominate in the lower zones. Especially notable are Georgian oak forests along Enguri River, near the

confluence of Nenskra River, on the bottom of Nakra River adjacent to Naki village. The peculiarity of the region in the lower part of the forest belt is reflected by well-developed evergreen undergrowth.

Deciduous forest with beech-hornbeam and chestnut inclusions are found at 1500-1600m elevation in some places of the region. For example, on the slopes of the right bank near Naki village; which has developed within the dark coniferous forest zone. Above 2000 m elevation, dark coniferous forest zone changes into subalpine zone. Caucasian whortleberry (*Vaccinium arctostaphylos*) is widespread within the dark coniferous forest zone; Beech forests are developed between Tskhvandiri and Dalari. *Senecio pojarkovae*, which is an important specie for agricultural activities is widespread within the areas where dark coniferous forests have been deforested.

Relict forest formations/associations are widespread in the western part of Zemo Svaneti. In the sub zone of the forest, at about 1000-1200m elevation, forest vegetation is dominated by mixed broadleaf forests (mixed broadleaf forests sub zone). The major species of these forests (edificatory) are Beech *Fagus orientalis*, Chestnut *Castanea sativa*, Hornbeam *Carpinus caucasica*. These species are mixed with Lime *Tilia caucasica*, Norway Maple *Acer platanoides*, Painted Maple *Acer laetum*, etc. A significant part of the forests are represented by relict Colchis understory (Rhododendron - *Rhododendron ponticum*, Cherry Laurel - *Laurocerasus officinalis*, Caucasian bilberry - *Vaccinium arctostaphylos*, etc.)

Among monodominant and bi-dominant broadleaf forests most widespread are species such as Sweet chestnut *Castanea sativa*, Caucasian Hornbeam *Carpinus caucasica*, Oriental Beech (*Fagus orientalis*), Beech-Hornbeam, Hornbeam-Chestnut. Relatively dry slopes of south, south-east and south-west part are dominated by Georgian oak *Quercus iberica* and hornbeam-oak forests. An interesting relict oak forests are found on limestone slopes, where relict species are developed, such as (Barrenwort - *Epimedium colchicum*, *Arachne colchica*, Abraham-Isaac-Jacob - *Trachystemon orientale*, etc.) Alder forest *Alnus barbata* is developed in river flood plains (proalluvial terrace). Mixed coniferous-deciduous and coniferous forest groves are developed in subzone, namely, spruce forest *Picea orientalis*, fir forest *Abies nordmanniana*, Pine forest *Pinus sosnowskyi*, spruce-beech, pine-spruce, spruce-fir forests, etc.

The composition of the forest vegetation formation sharply changes from 1000-1100 m elevation to 1800-1850 m elevation a.s.l. Forest vegetation cover is dominated by beech forest *Fagus orientalis* and dark coniferous (spruce - *Picea orientalis*, Fir - *Abies nordmanniana*) forests. Pine forests *Pinus kochiana* are less developed there. A significant part of the forests (Beech, Fir, Spruce, Beech-Fir) are represented by relict Colchis undergrowth (cherry laurel *Laurocerasus officinalis*, rhododendron *Rhododendron ponticum*, Caucasian bilberry *Vaccinium arctostaphylos*, Yellow Azalea - *Rhododendron luteum*, etc.).

Hypnum, sedge and sphagnum glacier bogs are developed in subalpine zone, on Svaneti-Abkhazia and Tsalgmili ridges. Peat-wetlands are quite widespread in mountainous region of Svaneti, especially in Zemo Svaneti; However, they are rarely developed on large areas. There are a number of sub alpine bogs within the Nenskra Valley area, though none lie within the Project area. Peat-bogs are far less common in Nakra River basin. Eutrophic wetlands fed by soil are mostly found there.

Wetlands in this basin are mainly found watershed ridge of Nenskra and Nakra Rivers (Utviri Mountain pass). The sedge bogs fed by water are found in the lower part of the watershed ridge, on the right side of Nakra Valley, at about 1600-2000 m a.s.l. these bogs are mainly dominated by *Caricetum dacicae purum*, *Caricetum dacicae hypnosum*.

Subnival zone is represented on high ridges and peaks above 3200 m elevation. Vegetation cover is represented by open cenoses, fragments of alpine meadows can be also found. Vegetation of the Svaneti Caucasus, from Dolra valley to Tetnuldi, is dominated by rare subnival species to Svaneti - *Delphinium caucasicum*, *Pseudovesicaria digitata* and others (Kimeridze, 1985). Botanical-geographical region of Nenskra-Nakra is characterized by western Caucasus specie - *Jurinea pumila* and Caucasus – Asia specie - *Coluteocarpus vesicaria*.

### **1.5.1 Fauna**

The following Georgia Red List species are known to occur in the Nakra/Nenskra watershed area which encompasses an area greater than the proposed Project area, as a result some of the species listed below will occur well outside of the potential zone of influence of the Project:

Mammals: chamois *Rupicapra rupicapra*, eastern Caucasian tur *Capra cylindricornis*, western Caucasian tur *Capra caucasica*, bear *Ursus arctos*, lynx *Lynx lynx* and lesser horseshoe bat *Rhinopopus hipposideros*.

Birds: bearded vulture (*Gypaetus barbatus*), golden eagle (*Aquila crysaetus*), Caucasian black grouse *Tetrao mlokosiewiczi*, white winged redstart *Phoenicurus erythrogaster*, great rose finch *Carpodacus rubicilla*, syn. *Erythrina rubicilla*, cinereous or black vulture *Aegypius monachus*, griffon vulture *Gyps fulvus*.

## **2.0 COMPLIANCE WITH GEORGIAN LAW AND NATIONAL/INTERNATIONAL STANDARDS**

### **2.1 Applicable Laws and codes of Georgia**

#### **2.1.1 Forest Code of Georgia**

The main law providing regulations for forestry activities, including reforestation is the Forest Code of Georgia adopted in 1999. Under the Forest Code, areas within the Nakra and Nenskra valleys which are registered as Forest Fund land are subject to the Forest code of Georgia. The act of reforestation is described under the Forest Code of Georgia and includes the description of specific actions such as thinning or removing underbrush with the purpose of stimulating natural regeneration of forests etc. The Forest code of Georgia does not apply to areas which are not registered as Forest Fund Land.

#### **2.1.2 Law on Management of the Forest Fund**

The Law on Management of the Forest Fund adopted in 2010 provides grounds for competence, authorities and liabilities of the National Forestry Agency. Under Article 5, Paragraph 1(a) tending the forest and reforestation are objects of the National Forestry Agency.

#### **2.1.3 Code of Local Self Government**

Under Article 24, Paragraph 1 of the Code of Local Self Government adopted in 2014, local municipalities are authorized to establish rules on management of resources of the forests that are in ownership of that municipalities.

### **2.2 Lender's requirements**

There are a number of different Lenders who are interested in funding this Project. Each Lender has their own guidance or requirements regarding Biodiversity and mitigation. In order to comply with the Lenders requirements, the following guidance has been used: EBRD 2014a<sup>2</sup>, IFC 2012a<sup>3</sup>, IFC 2012b<sup>4</sup>, ADB 2012<sup>5</sup> and EBRD 2014b<sup>6</sup>.

### **2.3 Examples of international reforestation initiatives**

There are many examples of international reforestation initiatives, pertaining to temperate forests from across the world, though not all are for hydropower schemes. Because of the time it takes to undertake reforestation, and therefore judge success, the examples set out below relate to schemes which have been running for up to a generation. However, despite their early implementation, many of the techniques, methodologies and lessons learned are just as relevant today.

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<sup>2</sup> EBRD (2014a). Environmental and Social Policy. European Bank for Reconstruction and Development.

<sup>3</sup> IFC (2012a). Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, World Bank Group.

<sup>4</sup> IFC (2012b). Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. International Finance Corporation, World Bank Group.

<sup>5</sup> ADB (2012) Environment Safeguards, A good practice sourcebook, draft working document. Asian Development Bank.

<sup>6</sup> EBRD (2014b) EBRD Guidance note, Environmental and Social Guidance Note for Hydropower Projects.

### **2.3.1 Reforestation in Korea**

On a large scale one of the most successful national reforestation efforts has been the one undertaken in South Korea beginning more than a generation ago. At the end of Korean war hostilities in 1953 the country was almost completely deforested because of logging and heavy use of firewood during the 35 yearlong Japanese occupation earlier in the century. Since then the organised replanting and management of trees has enabled large portions of the country to be successfully reforested, with in some cases restoration of ecosystems which were present prior to the deforestation occurring.

### **2.3.2 Reforestation in Armenia**

In the 1980s a series of events such as earth quakes, military conflict and energy shortages meant that many of the Armenian population turned to wood as a fuel source. As a result large areas of Armenia started to become deforested. However a project called the Armenia Tree Project was set up to try and reverse this deforestation and has to date been quite successful. The project is inclusive and has involved villages from the areas targeted for reforestation. The villages are encouraged to use local seeds to grow tree seedlings in their back gardens. These are then sold on to the Armenia tree Project who plant them in areas targeted for reforestation.

Since its founding in 1994, the Armenia Tree Project has planted and restored more than 3,500,000 trees at over 800 sites around the country and created hundreds of jobs in tree-regeneration programs. The need is dire: Dependence on wood for cooking and heating has reduced the amount of forest cover from a healthy 25 percent at the beginning of the 1900s to less than 8 percent today, causing flooding, erosion, and landslides that have destroyed homes and arable land

## **2.4 Summary of existing Georgian reforestation initiatives**

The latest reforestation initiative is related to restoration of forest areas in National Park of Borjomi- Kharagauli, destroyed as a result of forest fires during an armed conflict in Georgia in 2008. After fires, the forests fully or partially were destroyed on 950 hectares. Reforestation activities started in 2013 on 20 hectares of destroyed forest land in 2013 with the initiative of Government of Georgia, Government of Finland and UNDP<sup>1</sup>. In addition to that, also ÖBf/BFW carried out reforestation of approximately 20 hectares on the territory of the National Park of Borjomi-Kharagauli. On additional 20 hectares of the National Park, measures for reforestation have been undertaken by the National Forestry Agency.

With the assistance and participation of international organizations some other reforestation measures have been carried out in Georgia:

- In 2008 restoration of the forest after sanitary clear cutting on 7.5 hectares took place in the Samtskhe-Javakheti Region with participation of the Bank of Georgia and the Forest Agency.
- In 2010 measures for natural reforestation were carried out on up to 239 hectares on Samtskhe-Javakheti and Kakheti regions with participation of WWF, GIZ and the Forest Agency. In Samtskhe-Javakehti reforestation took place on open areas of the forest.
- In 2010 the National Forestry Agency cultivated Caucasian pine tree and crab apple through planting on 1.7 hectares of Samtskhe-Javakheti Region;

- In 2011 the National Forestry Agency cultivated forest species through planting on 0.5 hectares of Mtskheta-Mtianeti region.

All reforestation activities listed above took place on the lands of the Forest Fund. All of the projects dealt with reforestation of areas which had lost trees relatively recently. This is true of this Project too. The trees in the Nenskra/Nakra valley have been removed due to (illegal) logging which had been occurring at a greater pace during the latter part of the 20<sup>th</sup> and 21<sup>st</sup> centuries. The difference being that for this Project, the land is not considered to be Forest Fund land.

## **2.5 Key points for successful reforestation**

From looking at the key successes (and failures) of reforestation projects large and small, the following key points can be drawn out:

- Start with a good understanding of the biodiversity baseline, e.g vegetation types present, species composition etc as it is against this baseline that the strategy for reforestation will be developed.
- Understand the topography and hydrology of the reforestation sites, as ground conditions may be key to targeting specific tree species to increase establishment success rates.
- The restoration programme will require a stock of germplasm (seeds, cuttings and seedlings) in order to grow for reforestation. Where possible these should be collected locally.
- A facility will be required to store seeds and propagate plants in a nursery, eventually to be replanted in the area, or as with the Armenian example above, involvement of local residents could result in locally grown seedlings.
- The reforestation programme should be progressive, and areas should be reforested and managed as they become available.
- Ongoing monitoring will also be required in order to monitor success, or the need for remediation.

### **3.0 CONSULTATION WITH STAKEHOLDERS**

In order to implement a viable Reforestation Management Plan, the following needs to be identified:

- I. Identification of the local players/land users, land users interests and/or land use conflicts; and
- II. Local survey and mapping of land ownership, land use categories/ vegetation and biomes and impact of various land utilization on sites using available records.

Local players and land users were identified as:

- Agency of Protected Areas under the Ministry of Environment and Natural Recourses (for update information on the proposed protected area).
- National Forestry Agency also under the Ministry of Environment and Natural Recourses Protection
- Municipality of Mestia
- Farmers, Shepherds - local, owners of cattle, horses and pigs.

Targeted consultation with local residents will need to be undertaken in order to understand fully how the forest resource is used. It is anticipated that reforestation of recently logged areas is less likely to impinge on daily use by shepherds and farmers with cattle (no sheep or goats were noted being grazed within the Project area). The aim is not to manage or afforest areas which have been used long term for grazing or other types of farming, but to target more recently cleared areas of forest.

## 4.0 OVERVIEW OF THE CORINE AND REPLANTING AREA CALCULATIONS

### 4.1 Introduction

During the 2015 vegetation surveys, the survey methodology was developed so that broad scale habitat mapping could be undertaken across the project area.

1. To produce a broad scale habitat map based on the broad habitat categories used by the Bern Convention on their Emerald site Data Sheets.

### 4.2 Baseline summary

The flora, vegetation and habitats baseline surveys identified 12 broad scale habitats within the survey area (which covered an area larger than the Project area. The dominant forest habitat present was found to be mixed broadleaved and conifer woodland. The survey area ultimately covered a total of 684km<sup>2</sup>. As the area was so large, the surveys were initially undertaken using satellite imagery, then subsequently ground trothed on foot and by helicopter. The second most common habitat was broadleaved woodland. Conifer dominant woodland was found to cover only a very limited amount of the area surveyed, generally steep and inaccessible ridges and valley sides (Map 2).

### 4.3 Calculation of habitat loss

This reforestation strategy is specifically targeted at compensating for the loss of habitats due to the Project infrastructure and reservoir. Habitats which are temporarily lost, will be subject to a separate revegetation and management plan, as their loss can be mitigated for; post construction, as the land will still be available for revegetating.

The main area of habitat loss will be the reservoir area, due to impoundment, dam location and new roads, however habitat loss will occur elsewhere in the Project area due to the power house, penstock, Nakra weir etc. The calculations for permanent and temporary habitat loss are shown below in Table 4-1. These calculations have been derived from the GIS mapping of habitat types (Maps 2 and 3), so that habitat areas can be calculated.

**Table 4-1**  
**Whole Project area - habitats to be lost or temporarily lost during construction**

Description	Permanent loss ha	Temporary loss ha	Total ha
River or Stream & Associated River Gravels	55.01	1.5	56.51
Farmland including Grassland & Crops	24.43	132.36	156.79
Residential Areas including Houses & Gardens, roads and amenity areas	7.72	26.66	34.38
Broadleaved Woodland	96.8	98.16	194.96
Conifer Dominated Woodland	12.8	20.6	33.4
Mixed Broadleaf & Conifer Woodland	159.04	164.1	323.14
Landslide Areas	5.34	0.92	6.26
Scrub	45.86	10.1	55.96
<b>Total habitats to be lost or temporarily lost</b>	<b>407</b>	<b>454.4</b>	<b>861.4</b>

Table 4-1 shows that the total anticipated loss of forested area with in the Project area, to be lost is 268.64ha (broadleaved woodland + conifer dominated woodland + mixed broadleaf

and conifer woodland). The scrub described here, and covering 45.86ha, is a category which covers the pioneer plants found on the landslide areas, species such as birch, hazel and willow. If these areas stabilise, they may over time (fifty years or more) become a mature type of woodland with secondary succession species such as beech. For this reason, scrub should also be included in the overall habitat loss calculations, even though it is currently an immature habitat and does not constitute 'forest habitat'.

- **Permanent forestry and scrub loss within the reservoir area is calculated to be 314.50ha.**

#### **4.4 Methodology for detailed vegetation surveys**

The calculations set out above have been undertaken using the broad scale habitat mapping undertaken in 2015. In order for the habitat-hectare method described below to be more accurate, more detailed habitat surveys will be undertaken in 2016/17. The detailed vegetation surveys have to be undertaken in such a way that they are able to collect data sufficient to apply the habitat-hectare method.

During the 2015 botanical survey the form contained in Appendix 1 was used, as it contains the level of detail required for undertaking the habitat hectare assessment. The future detailed vegetation surveys should also be based on this so that all the information gathered over the years can be collectively used to assign habitat-hectare scores to each EVC that is identified. In order to aid the assessment, the survey data collated to date should provide sufficient information at this early stage to at least identify which EVCs are present within this area.

#### **4.5 Compensation ratio methodology**

##### **4.5.1 Introduction to the habitat –hectare system**

This is an outline reforestation strategy, as detailed surveys of the reservoir have not yet taken place. What this section aims to do is set out the compensation ratio methodology that will ultimately be used in order to determine the area of reforestation required to attain no net loss for this Project.

The habitat-hectare method has been developed in Australia<sup>7</sup>, but has been adapted for use in Georgia. The habitat-hectare scoring method is a common approach to determine the value of native vegetation in non-monetary units. The environmental proxy used (i.e. the "currency" in which the value of vegetation is expressed) is the "habitat-hectare".

$$\text{Habitat area [ha]} \times \text{habitat score} = \text{habitat-hectares}$$

The habitat-hectare approach requires comparing site-based habitat and landscape components against a pre-determined 'benchmark' relevant to the vegetation type being assessed. The benchmark for site based conditions for each ecological vegetation class (EVC) has to describe the average characteristics of mature and apparently long undisturbed biodiversity and vegetation. Typically benchmark values are established based on the state of existing natural vegetation that has not been through any major ecosystem changes or based on historical information.

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<sup>7</sup> Vegetation Quality Assessment Manual – Guidelines for applying the habitat-hectares scoring method; Department of Sustainability and Environment; Government of Victoria; 2004

In order to collect the relevant data, detailed survey forms are required. These need to be prepared prior to the surveys being undertaken and used in the field. Table 4-2 below shows the data which is considered necessary to undertake the habitat-hectare method in Georgia.

**Table 4-2**  
**Georgian components and weights used in the habitat-hectare calculations**

	<b>Component</b>	<b>Maximum value %</b>
Site condition	Average diameter of tree at breast height (DBH)	15
	Average height	15
	Canopy cover	10
	Number of trees per Ha	10
	Growing stock	10
	Basal Area	15
	Vegetation/coppice	10
Landscape context	Neighbourhood	10
	Distance to core area	5
	<b>Total:</b>	<b>100</b>

In essence, any vegetation data required to assess the various site conditions can usually be collected visually during in situ inspections of the areas under assessment. Any information required to assess the landscape context can be derived from aerial picture interpretation or geographical information systems.

#### **4.5.2 Benchmarks and EVCs**

As the habitat-hectare system is based on an Australian model, EVCs for Georgia have had to be developed. This was completed in 2007 and the relevant EVCs can be found in a report entitled: Independent Advice on Forest Eco-compensation programme for the Ministry of Environment and natural Resources of Georgia<sup>8</sup> (Susan 2007).

#### **4.5.3 Calculation of habitat-area**

The damage to forests in habitat hectares caused by construction of the Nenskra HPP will be calculated in a five-step approach:

1. Based upon the dominant species indicated in the detailed inventory cards (collated to date, plus additional surveys which will be undertaken), each of the forest areas affected by the construction will be mapped in GIS and allocated to the most relevant EVC.
2. To calculate scores for the components describing the site conditions the relevant components (average DBH of dominant species, average height of dominant species, tree canopy cover, number of trees per hectare, growing stock, basal area and coppice/regeneration/understorey) were compared with the benchmarks and scores will be attributed accordingly.

<sup>8</sup> Susan C., and Herbst P. (2007) Independent Advice on Forest Eco-compensation programme for the Ministry of Environment and natural Resources of Georgia. Issue 1.0 Volume 1, OBf Consulting.

3. The scores for the components describing the site conditions (neighbourhood and distance to core area) will be derived using a Geographical Information System data, including the watershed scale mapping which was undertaken in 2015/16.
4. Using the known habitat areas to be affected, taken from the GIS mapping, and multiplying them by their habitat score, the value for all the forest/habitat patches affected by the project can be calculated and quoted in habitat hectares.
5. To determine the overall value of damages to forests/habitats within each EVC, the habitat hectare values for each patch will be classified and added-up according to their affiliation to the relevant EVC.

So for each EVC the area in Ha x the habitat score will result in a habitat hectares total which will ultimately be less than the initial EVC area.

#### **4.5.4 Time as a multiplier**

Essentially time works as a second multiplier. If the proponent of an economic development activity commits to look after an area to be reforested/afforested until the habitat quality of the reforested/afforested area reaches the same level as the habitat quality of the area that has been deforested, then the application of a ratio of 1:1 (i.e. one area unit to be reforested/afforested and looked after until it reaches the same habitat quality as one area unit deforested) is appropriate.

As explained in Susan (2007) in Georgia, it has made more scientific sense to determine the time based compensation ratio for each EVC using yield tables for the dominant species as a proxy for the development of habitat quality. Essentially, as the habitat quality of an EVC increases over time, the compensation ratio to be applied (i.e. how many hectares have to be afforested/reforested per ha lost) depends on the time period the proponent of the economic development activity (in this case the Nenskra HPP) is willing to commit to be responsible for managing the re-forestation scheme. The longer Nenskra HPP can commit to be liable for the Reforestation Management Plan, the lower the compensation ratio will be. The shorter the liability period, the higher the compensation ratio must be to ensure that the host government does not incur any net-loss in habitat value.

## **5.0 DEVELOPMENT OF REFORESTATION PLAN**

### **5.1 Identification of suitable reforestation areas**

During the site surveys undertaken in 2015 and 2016 a broad scale habitat mapping exercise of the Nenskra and Nakra watersheds was undertaken; from this mapping (Map 2) it can be seen that there are 12 broad habitat types present within the survey area. Based on this mapping, further surveys were undertaken in 2016 which noted where replanting and management towards natural regeneration would be beneficial. Illegal logging has taken place across the lower half of both the Nenskra and Nakra watersheds, and it is these areas where replanting and management are considered to be most appropriate. Partly as these are recently damaged areas, and so should respond relatively easily to regeneration, but also because due to the location of these habitats, they are closely representative of those which will be lost in the reservoir area due to the Project.

Map 4 shows indicative areas which will be targeted for re-forestation and management for natural regeneration<sup>9</sup>. During the 2016 surveys, all of these areas showed recent signs of logging where predominantly pine and conifer species had been removed. Signs of grazing by cows was also noted in these areas, but it is considered more likely that here the cows were being herded up from the bottom of the valley, to the alpine meadows and were simply browsing on track side vegetation on the way up. However, the management regime would have to take into account the use of forests by herdsmen with stock.

The indicative management areas, shown on Map 4 cover an area which is approximately four times greater than the total calculated permanent habitat loss (Table 4-1) across the Project Area. This has been done to ensure that as an absolute minimum there will be a 1:1 hectare ratio for replanting and management; but in reality the ratio will be greater than this, especially once the habitat-area methodology has been applied.

### **5.2 Description of potential reforestation and management areas**

The areas which are to be targeted for reforestation are those which have been subject to logging, both recent and historical. The logging appears to have accelerated in recent years, with some areas showing that quite intensive deforestation, but only in discrete areas where target species of commercial value are present. All of the areas referred to below are shown on Map 4. Please note that these areas are indicative only. Subject to consultation with local residents, the reforestation areas may differ from those shown on Map 4; but would be located within the Nenskra/Nakra watersheds.

#### **5.2.1 Area 1: Nenskra-Nakra pass**

The pass which is present between the Nenskra and Nakra valleys is wooded up to about 2400m, however the mixed conifer and broadleaf forests rise to about 2000m. The pass is formed by two relatively accessible small valleys which rise up from the Nenskra river. As these hillsides are less steep than those surrounding they are more accessible to vehicles. Logging has been occurring here and has over time significantly thinned out the forest in places. Although the logging appears to be targeting the pine and conifer species, Photograph 1 below shows that the less commercially viable conifer are left behind. In the foreground, as was often recorded in the area, small amounts of natural regeneration are occurring.

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<sup>9</sup> Please note, these areas are indicative only and their management will be dependent upon further negotiation and consultation with local land users. The actual areas managed may lie outside of these areas, but in all cases will be located within the Nenskra/Nakra watersheds.

Photograph 2 further illustrates this area, showing that in some areas the tree cover consists of a mix of tree species. Disease however was evident in a number of trees, especially where trees had been felled, determined to be of no commercial value due to rot (beetle or fungus), then just left on the side of the track.

Further surveys of Area 1 will be required in order to map out which areas are suitable for management with regards to natural regeneration, and which areas would require reforestation using species of local provenance previously grown in a nursery. The type of species planted will depend on the habitat types present in each area, which would be determined during the further surveys. Contiguous with the further surveys, discussions will need to be held with the local stakeholders (herders, forest resource users etc.) in order to establish an understanding for the need for forest management.



**Photograph 1 Area 1 where deforestation has occurred**



**Photograph 2 Mixed species are present, so too are diseased trees**

### ***5.2.2 Area 2 West of Sgurishi***

Again, like Area 1 this is a relatively more accessible area within the Nenskra valley as the valley sides are relatively less steep. A track leads up from the Nenskra valley to grazing areas at 2000m, where alpine meadows and small wooden huts are evident.

Most of the forest on the slopes here appears to have been subject to logging in the past and recently. At one point a tree was found which had inscribed into it the snow depths that the lumber-jacks have recorded over the years. The earliest date noted was 1983. The

photographs below illustrate the effect that logging has had on the area, with new tracks and large cleared areas appearing on the forested slopes.



**Photograph 3 Tracks built to access the pine and conifer species**



**Photograph 4 Large area of cleared ground located in the centre of the forest**

As stated for Area 1, further surveys of Area 2 will be required in order to map out which areas are suitable for management with regards to natural regeneration, and which areas would require reforestation using species of local provenance previously grown in a nursery. The type of species planted will depend on the habitat types present in each area, which would be determined during the further surveys. Contiguous with the further surveys, discussions will need to be held with the local stakeholders (herders, forest resource users etc.) in order to establish an understanding for the need for forest management.

### **5.2.3 Area 3 Okrila valley and downstream of the dam location**

A third optional area for reforestation or management of natural regeneration has also been included here. This is the area downstream of the dam location, including the bottom sections of the site tributaries into the Nenskra river, e.g. the Okrila (Photograph 5). The majority of these areas have been subject to some form of logging and so would benefit from reforestation either through targeted replanting or natural regeneration.



**Photograph 5 Area close to the Okrila – Nenskra confluence**

### **5.3 Management options and issues**

When assessing reforestation and management options the following will need to be taken into account:

**Land use** – land use type e.g. pasture, no present use, arable land, hayfield etc will all have an impact on the social perception or desire for reforestation or management. If an area is targeted for reforestation and required fencing to prevent stock from grazing, then there may be a socio-economic impact which must be fully understood and avoided if practicable.

**Protection aspects** - Forests can have various protection functions by protecting people, objects and sites against different natural hazards. Forests may protect settlements and roads, and therewith directly people, and other infrastructure such as length of gas pipelines or water pipelines and power supply lines, or agricultural areas against avalanches and landslides, debris flows and areal open erosion. Reforestation or management of areas which are prone to landslides may be very beneficial to the local population. Management through reduction of stock grazing may also benefit areas prone to erosion by allowing self-regeneration and stabilisation of soils.

**Altitude** – As the altitude changes the growing conditions for trees are also affected. It influences air and soil temperature, precipitation, type of precipitation, amount of snow, irradiation, wind speed and pattern, soil development, relief and the CO<sub>2</sub> partial pressure. Overall, growing conditions get harsher with elevation and the importance of the micro-relief increases; therefore areas targeted for reforestation and management at higher altitudes will

take longer to regenerate/grow. This time element could be critical when considered in conjunction with the habitat-area calculations.

**Inclination** – generally steeper slopes are covered with thinner soils. The steeper the slope, generally the slower the regeneration of vegetation will be. This also needs to be considered when planning which areas will be replanted and/or managed.

**Water class** – permanently waterlogged soils are generally considered un-suitable for reforestation. On the other end of the scale areas with very thin soils, high boulder content and scree are also considered unsuitable for reforestation. Within the range of habitable water classes different species will be considered for different water regime classes.

**Replanting vs natural regeneration** - Natural regeneration should occur readily in areas where recent deforestation has occurred and a naturally occurring seed bank or mature seeding species occur, which can form the seed source for the regeneration. As Photograph 1 shows, natural regeneration is occurring in some areas, and it may be that management of these areas to prevent stock grazing will be the only management prescription that is required.

In areas where there is no seed bank remaining, or logging has reduced species richness of target species e.g. *Abies normandia*; replanting may be the only option. Do not have to be grown in a local nursery, but the seed from which they are grown, or the cuttings which are propagated should be sourced locally.

## 6.0 FUTURE TASKINGS

### 6.1 Costing inputs

The cost planning will have to take into account the type of reforestation and management which will be required as well as the total area of land to be covered by this reforestation management plan. The costs will be determined by three main outputs from the final forestry plan:

- The area of forest to be replanted
- The area of forest which will undergo natural regeneration but which may require fencing
- The length of time over which the reforestation management plan will be implemented; which in turn will affect the outcome of the habitat-hectare calculations.

Table 6-1 Indicative unit costings table below sets out some unit costings with are relevant to this reforestation management plan. These costings have been sourced using both UK costs for such activities and also comparing these rates to those quoted in FS Consult (2015<sup>10</sup>).

**Table 6-1 Indicative unit costings table**

<b>Activity</b>	<b>Unit</b>	<b>Cost per unit</b>
Additional surveys of management areas	Person/day \$	350
Seed harvesting and plant production	Per plant \$	3.50
Site preparation	\$/Ha	700
Fence Materials	\$/m	12
Fence maintenance	\$/m	1.2
Tree planting	\$/Ha	800
Weeding (if required)	\$/Ha	420
Forest manager	\$/year	18,000

### 6.2 Roles and responsibilities

Prior to the detailed Reforestation Management Plan being produced, responsibilities will have to be assigned. These will include assigning the following positions:

- Project manager
- Funding source
- Funds manager
- Local representative for consultations

The appointment of these positions will form the basis of a framework for assigning responsibilities and ultimately putting together a timetable for actions, so that the Reforestation Management Plan can be implemented in a times and measureable fashion, with milestones against which to measure success.

<sup>10</sup> FS Consult (2015) Interim report: Georgia: Pilot programme to deliver a carbon neutral and sustainable hydropower project. FS Consult, prepared by Envi Consulting LLC.

### **6.3 Monitoring**

A monitoring strategy will need to be devised so that the overall success of the reforestation can be assessed. The monitoring will be aimed, not only at determining success, but also the need for remediation where replanting or management has not worked. The monitoring plan should be simple, measurable, attainable, realistic and timed. It should also use a methodology which is replicable, so that results from the monitoring plan can be compared year on year.

- Keep the monitoring parameters simple, and replicable. Create and use a standard data form so that consistent relevant information can be gathered over the years, even if the surveyors change.
- The data gathered should allow for success and failure rates to be calculated. The data should also allow for analysis of soil type so this can be linked to failures or successes of particular species.
- The monitoring strategy does not have to examine every single planted tree, but should include for representative samples of each area. This way monitoring is undertaken but does not become onerous.
- The monitoring strategy should be a working document, subject to annual review, so that lessons learned can be applied.
- Monitoring frequency will need to be determined, though it is suggested that each area subject to replanting or management should be monitored annually for the first five years post intervention, then once every 3 – 5 years after that.

The time period over which monitoring will be undertaken will in part be determined by the length of time that JSC NH agree to manage the reforested areas as this time period will also form part of the habitat hectare calculations. The results of the monitoring strategy should also be provided in a written report, at the end of each year that monitoring takes place.

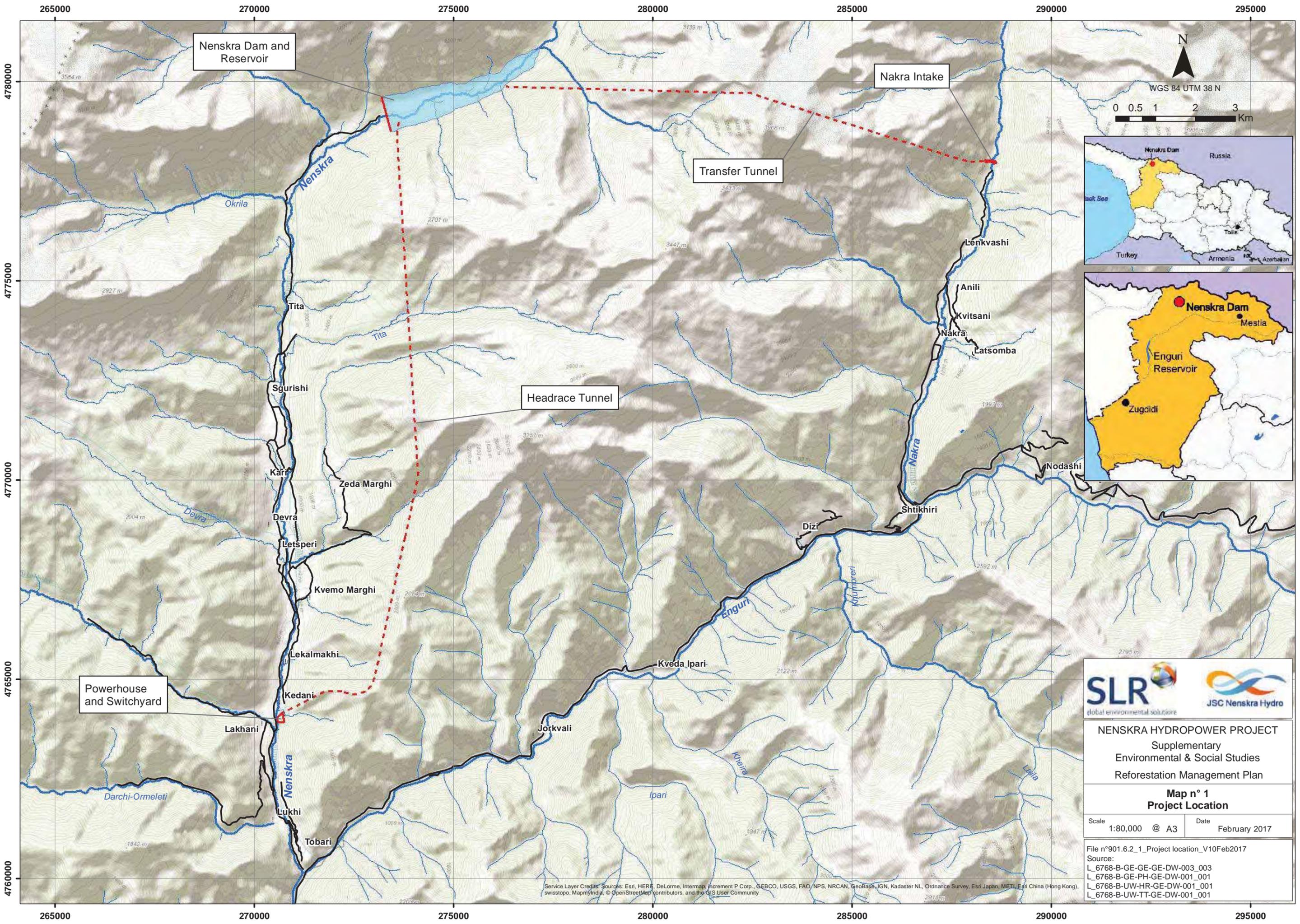
## **7.0 CLOSURE**

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of K-Water; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

## **APPENDIX A - MAPS**



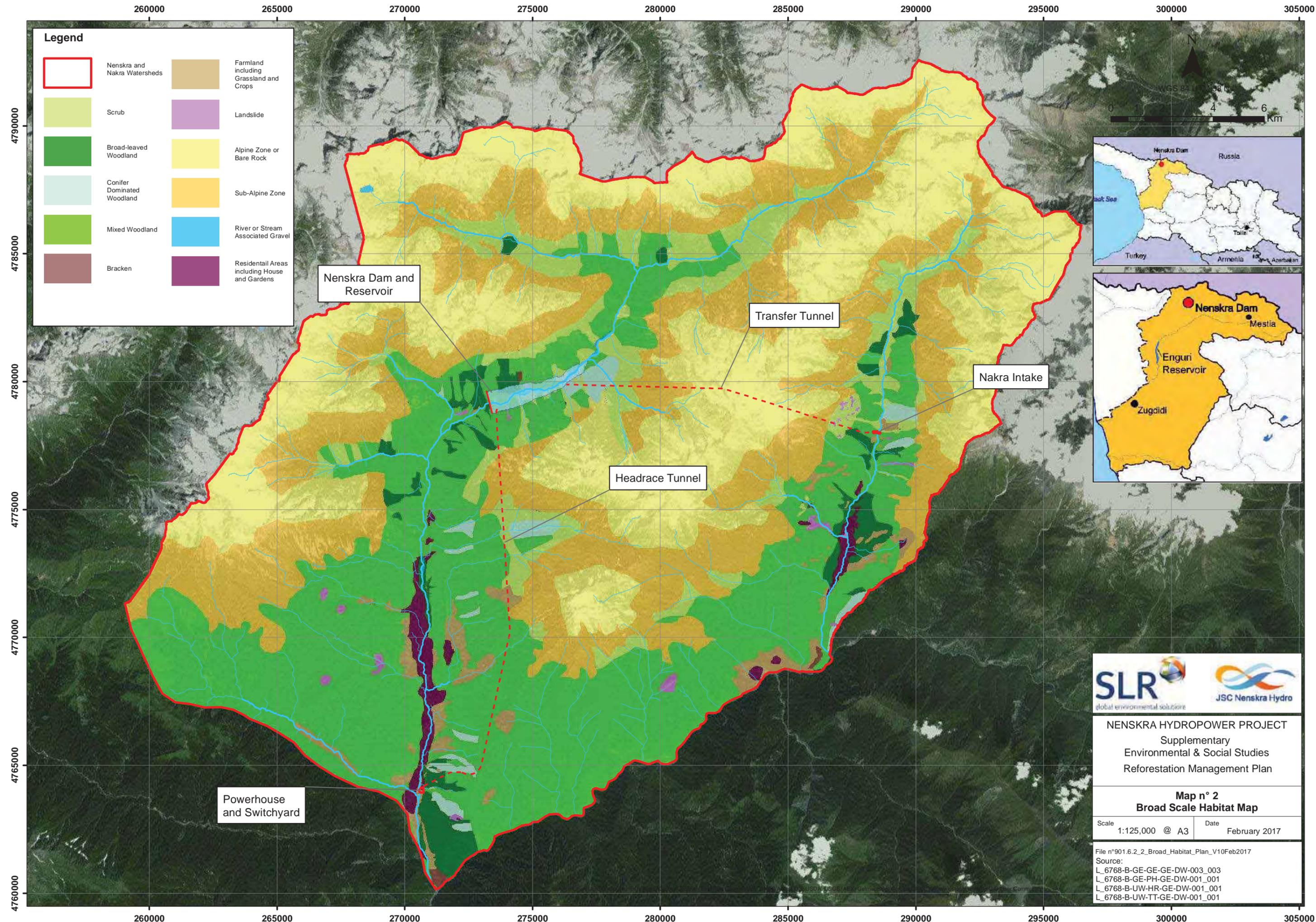
**NENSKRA HYDROPOWER PROJECT**  
 Supplementary  
 Environmental & Social Studies  
 Reforestation Management Plan

**Map n° 1**  
**Project Location**

Scale: 1:80,000 @ A3      Date: February 2017

File n°901.6.2\_1\_Project location\_V10Feb2017  
 Source:  
 L\_6768-B-GE-GE-GE-DW-003\_003  
 L\_6768-B-GE-PH-GE-DW-001\_001  
 L\_6768-B-UW-HR-GE-DW-001\_001  
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**Legend**

	Nenskra and Nakra Watersheds		Farmland including Grassland and Crops
	Scrub		Landslide
	Broad-leaved Woodland		Alpine Zone or Bare Rock
	Conifer Dominated Woodland		Sub-Alpine Zone
	Mixed Woodland		River or Stream Associated Gravel
	Bracken		Residential Areas including House and Gardens



**NENSKRA HYDROPOWER PROJECT**  
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 Reforestation Management Plan

**Map n° 2**  
**Broad Scale Habitat Map**

Scale: 1:125,000 @ A3      Date: February 2017

File n°901.6.2.2\_Broad\_Habitat\_Plan\_V10Feb2017  
 Source:  
 L\_6768-B-GE-GE-DW-003\_003  
 L\_6768-B-GE-PH-GE-DW-001\_001  
 L\_6768-B-UW-HR-GE-DW-001\_001  
 L\_6768-B-UW-TT-GE-DW-001\_001

273000

276000

**Legend**

-  Road
-  Watercourse
- Habitat Type**
-  Broadleaved Woodland
-  Conifer Dominated Woodland
-  Mixed Broadleaf & Conifer Woodland
-  Scrub
-  Bracken (Pteridium) Covered Slopes
-  Farmland including Grassland & Crops
-  Landslide Areas
-  Sub-Alpine Zone
-  River or Stream & Associated River Gravels

4780000

4777000

273000

276000

Nenskra Reservoir and Dam



Transfer Tunnel

Headrace Tunnel



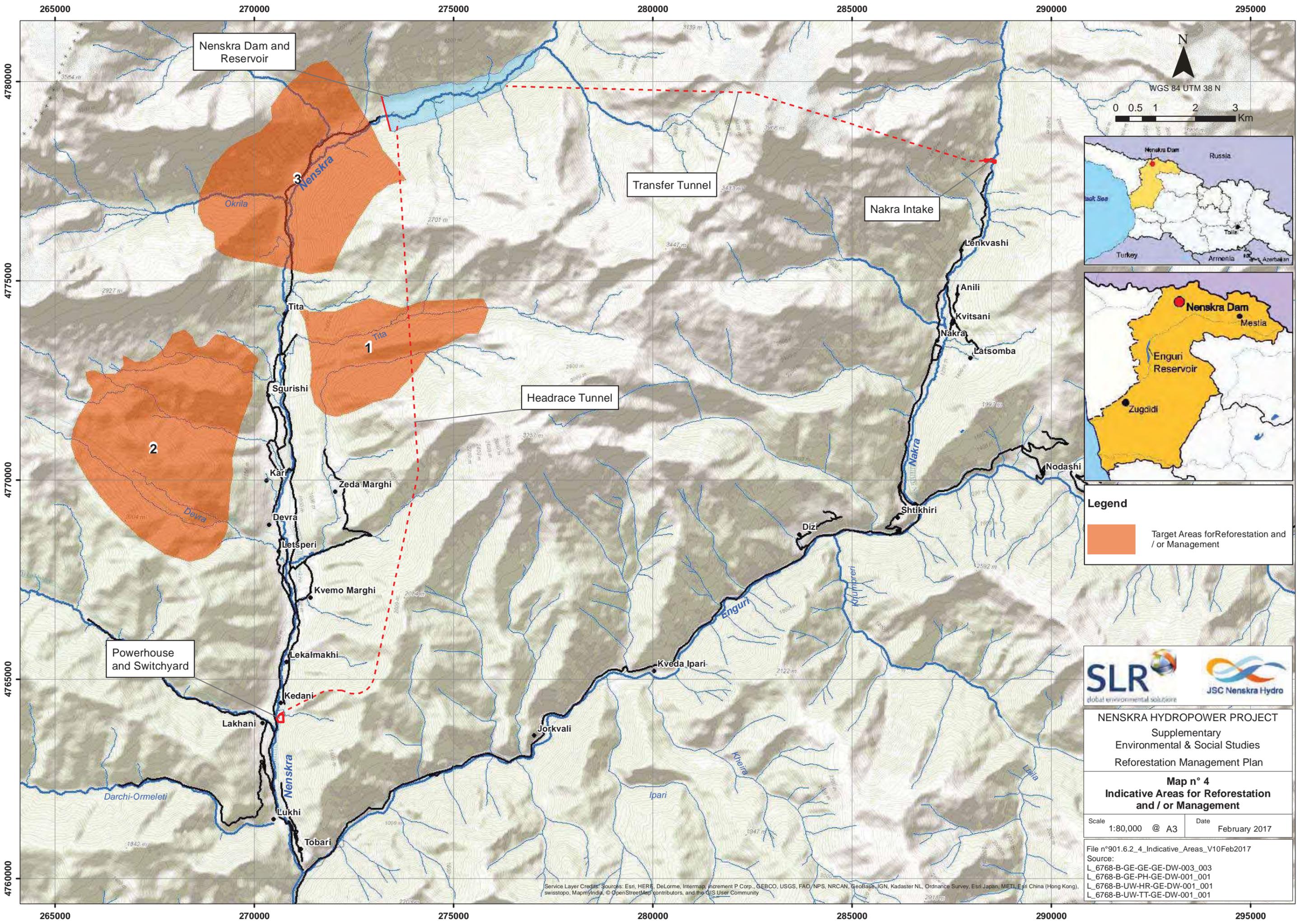
**NENSKRA HYDROPOWER PROJECT**  
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**Map n° 3**  
**Reservoir**  
**Broad Habitat Map**

Scale	1:20,000 @ A3	Date	February 2017
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File n°901.6.2.3\_Reservoir\_Broad\_Habitats\_V10Feb2017  
 Source:  
 L\_6768-B-GE-GE-DW-003\_003  
 L\_6768-B-GE-PH-GE-DW-001\_001  
 L\_6768-B-UW-HR-GE-DW-001\_001  
 L\_6768-B-UW-TT-GE-DW-001\_001

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**Legend**

Target Areas for Reforestation and / or Management



**NENSKRA HYDROPOWER PROJECT**  
 Supplementary  
 Environmental & Social Studies  
 Reforestation Management Plan

**Map n° 4**  
**Indicative Areas for Reforestation and / or Management**

Scale: 1:80,000 @ A3      Date: February 2017

File n°901.6.2.4\_Indicative\_Areas\_V10Feb2017  
 Source:  
 L\_6768-B-GE-GE-DW-003\_003  
 L\_6768-B-GE-PH-GE-DW-001\_001  
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**APPENDIX B - SAMPLE DATA FORM**

Example Data Form for data on species inventory – forestry vegetation.

<b>Plant community type</b>	
<b>Conservation value</b>	
Area	
Plot №	
Plot size (m <sup>2</sup> )	
GPS Co-ordinates	
Altitude (m AMSL)	
Aspect	
Inclination	
<b>Structural Features</b>	
Max DBH (cm)	
Average DBH (cm)	
Max height of trees (m)	
Average height (m)	
Number of trees (per plot)	
Coverage of treelayer (%)	
Coverage of shrublayer (%)	
Coverage of herblayer (%)	
Coverage of mosslayer (%)	
Number of higher plant species	
Number of moss species	
<b>Species</b>	<b>Cover-abundance by Drude* or domin+ scale</b>
<b>Treelayer</b>	
<b>Shrublayer</b>	
<b>Herblayer</b>	
<b>Mosslayer</b>	

\*Symbols of Drude’s scale indicate frequency of occurrence/coverage of a species. The symbols are as follows: Soc (socialis) – the dominant species, frequency of occurrence/coverage exceeds 90%; Cop3 (coptosal) – an abundant species, frequency of occurrence/coverage 70-90%; Cop2 – a species is represented by numerous individuals, frequency of occurrence/coverage 50-70%; Cop1 – frequency of occurrence/coverage 50-

70%; Sp3 (sporsal) – frequency of occurrence/coverage about 30%; Sp2 (sporsal) – frequency of occurrence/coverage about 20%; Sp1 (sporsal) – frequency of occurrence/coverage about 10%; Sol (solitarie) – scanty individuals, frequency of occurrence/coverage about to 10%; Un (unicum) – a single individual.

+ Domin Scale: This is a system for recording vegetation is a simple scale numbered 1 – 10. It is easy for the reader to understand and has been published:

<b>Domin value</b>	<b>Cover-abundance</b>
10	91-100%
9	76-90%
8	51-75%
7	34-50%
6	26-33%
5	11-25%
4	4-10%
3	<4% frequent
2	<4% occasional
1	<4% rare

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