Vol. 1: Draft Environmental and Social Impact Assessment

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GEO: Nenskra Hydropower Project

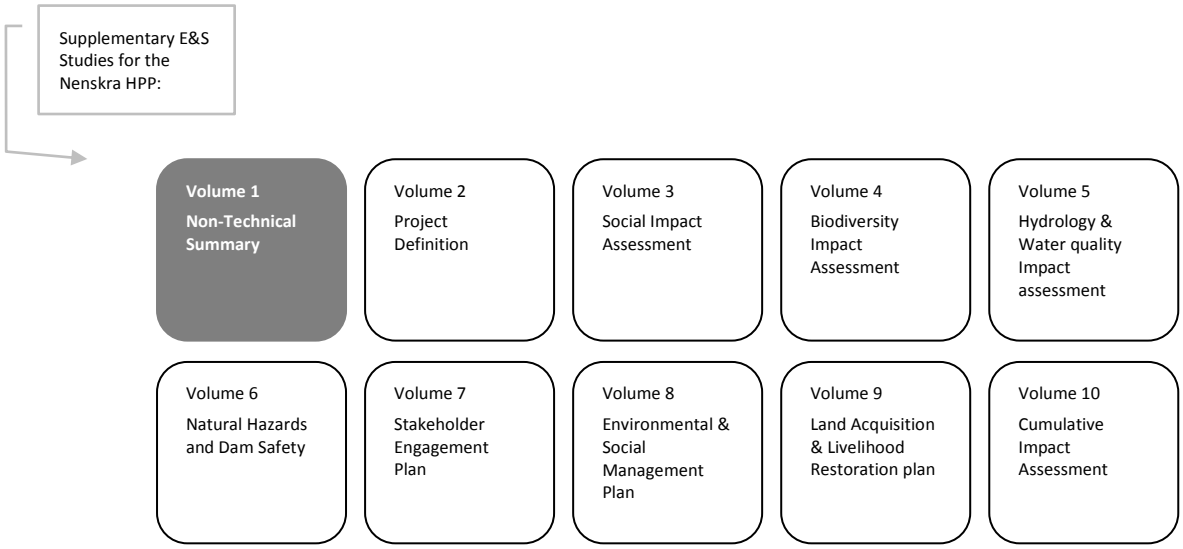
Prepared by SLR Consulting France SAS

JSC Nenskra Hydro

Nenskra Hydropower Project

Supplementary Environmental & Social Studies

Volume 1 Non-Technical Summary



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Acronyms

ADB	Asian Development Bank
APA	Agency of Protected Area
CO_2-eq	Carbon dioxide equivalent
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EPC	Engineering-Procurement-Construction
E&S	Environmental & Social
ESIA	Environmental & Social Impact Assessment
ESMP	Environmental & Social Management Plan
ESMS	Environmental & Social Management System
EU	European Union
GSE	Georgian State Electrosystem
GHG	Greenhouse Gas
GIS	Gas Insulated Substation
GoG	Government of Georgia
HPP	Hydropower project
IFC	International Finance Cooperation
KDB	Korean Development Bank
LALRP	Land Acquisition and Livelihood Restoration Plan
Mm^3	Million cubic meters
NGO	Non-Governmental Organization
NTS	Non-Technical Summary
PMF	Probable Maximum Flood
TBM	Tunnel Boring Machine

1 Introduction

The proposed Nenskra Hydropower Project is a 280 Megawatt (MW) hydropower project (HPP) located in the upper reaches of the Nenskra and Nakra valleys in the North Western part of Georgia in the Samegrelo-Zemo Svaneti Region (see Map 5-1 and Map 5-2). The Project uses the available discharges from the Nenskra River and the adjacent Nakra River, developing a maximum available head of 725 metres down to the powerhouse located approximatively 17 kilometres downstream of the dam.

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.

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 has been prepared by Gamma Consulting Limited (a Georgian consultant), based on field investigations undertaken in 2011 and 2014 and following the 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[1] (the Lenders) have been approached to finance the Project. To ensure compliance with their Environmental and Social (E&S) policies, the Lenders have recommended that a number of Supplementary E&S Studies be undertaken to supplement the existing 2015 ESIA report.

The present document is the Non-Technical Summary prepared in 2017. It summarises the findings of the 2015 ESIA and the 2017 Supplementary E&S Studies (conducted during the period from September 2015 to December 2016):

- **Volume 1: Non-Technical Summary (This document)**
- Volume 2: Project Definition
- Volume 3: Social Impact Assessment
- Volume 4: Biodiversity Impact Assessment
- Volume 5: Hydrology and Water Quality Impact Assessment
- Volume 6: Natural Hazards and Dam Safety
- Volume 7: Stakeholder Engagement Plan
- Volume 8: Environmental & Social Management Plan
- Volume 9: Land Acquisition & Livelihood Restoration Plan
- Volume 10: Cumulative Impact Assessment

All documents are available on line at the following address: <http://www.nenskrahydro.ge>.

[1] In December 2016, the Lenders included the Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), SACE (Italian Export Credit Agency) and the Korean Development Bank (KDB).

In addition to the consultation activities that have already occurred, community members and other stakeholders can provide comments on the Project using the following contact detail:

Description	Contact detail
Company:	JSC Nenskra Hydro
Address:	6 Marjanishvili street, floor 4, Tbilisi, Georgia
E-mail:	info@nenskrahydro.ge
Website:	www.nenskra.com Link to the website grievance mechanism: http://www.nenskrahydro.ge/en/texts/page/10
Telephone:	0 322 430 421 from Georgia + 995 322 430 421 from overseas

2 Description of the Project

The information presented in this Section is described in detail in "Volume 2 - Project Definition" of the 2017 Supplementary E&S Studies.

2.1 Need for the project

Strategic project. The existing Georgian power system is characterized by low demand and high generation in summer, and high demand and low generation in winter. From less than 1% in summer, thermal power's share in total generation increases to 28% during winter when less water is available for hydropower schemes. Georgia imports power from neighbouring countries to meet this higher winter demand. The development of hydropower schemes with a regulation capacity is one of the governmental strategies to reduce this dependency on imported power during the winter period. Together with the proposed Khudoni HPP, the proposed Namakhvani HPPs cascade, and the proposed Oni HPPs Cascade, the Nenskra HPP is one of the four hydropower projects with large regulating capacities; hence it is of national importance.

Annual production. The Nenskra HPP will dispatch 100% of its produced electricity to the Georgian grid under a 36 year Power Purchase Agreement (PPA) with ESCO (Electricity System Commercial Operator). The rationale of the Project is to guarantee energy during the winter season to meet higher domestic demand and promote exports by ESCO during the summer season. The Nenskra HPP will therefore be producing electricity throughout the year. The predicted average annual production is 1,196 GWh.

Preparation stages. The Nenskra HPP has been designed in two phases. Between 2009 and 2012, the Pre-Feasibility Study, the Feasibility Study and the Initial Design were prepared by the engineering company Stucky. In 2015, the Engineering-Procurement-Construction (EPC) Contractor Salini Impregilo was contracted by JSC Nenskra Hydro to carry out the detail design of the Project's components, procure the required works, equipment and services and execute the works until the start of the power production. The findings of the 2017 Supplementary E&S Studies were incorporated into the Project activities during this latter stage.

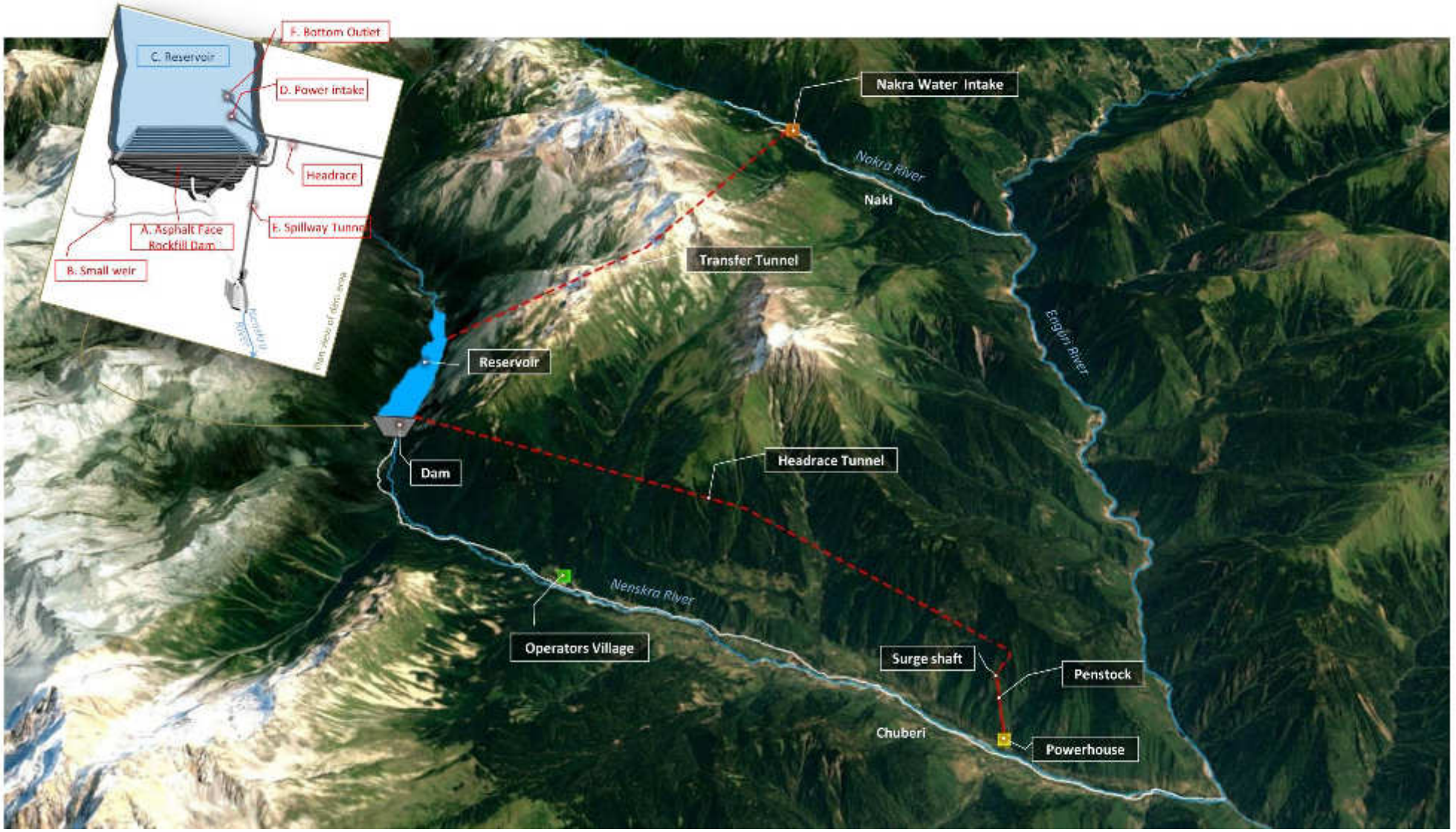
2.2 Project components

The Project components presented in this summary and further considered for the 2017 Supplementary E&S Studies are based on the design approved by JSC Nenskra Hydro in December 2016. The Project's key infrastructure locations are illustrated from [A] to [F] in the schematic on the next page.

A. Nenskra rockfill dam and Nakra water intake

Nenskra dam. The main project components comprise an asphalt face rock fill dam [A] on the upper Nenskra River. The Nenskra Dam will have a crest length of 870 metres and a height of 130 metres above the ground level, which will not exceed elevation 1,436 metres[2]. The total volume of the dam will be of 12.5 million cubic metres. On the right bank of the Nenskra River, immediately downstream of the dam site, a weir [B] will be built to divert the discharge of a small seasonal tributary into the Nenskra reservoir.

[2] All elevations are indicated as above the sea level in this document.


C. Reservoir
F. Bottom Outlet
D. Power intake
Headrace
A. Asphalt Face Rockfill Dam
E. Spillway Tunnel
B. Small weir
Nakra Water Intake
Nakra River
Naki
Transfer Tunnel
Enguri River
Reservoir
Dam
Headrace Tunnel
Nenskra River
Operators Village
Surge shaft
Penstock
Chuberi
Powerhouse

Nenskra Reservoir. The dam will create a live storage reservoir of about 176 million cubic meters and a reservoir area [C] at full supply level of 267 hectares. The Full Supply Level will be at elevation 1,430 metres and the Minimum Operating Level will be at elevation 1,340 metres.

Main water stream. The water stored in the Nenskra Reservoir will flow downstream of the dam through three structures, all located on the left bank of the Nenskra River: the power intake [D], the spillway [E] and the bottom outlet [F]. In normal operation, most of the water stream will flow through the power intake to supply the powerhouse through a 4.5 metre diameter and 15 kilometre long concrete lined headrace tunnel. During high flow periods, the excess water will be discharged downstream of the dam through the 850 metre tunnel spillway. The ungated spillway (52 metre weir length) has been designed to discharge the Probable Maximum Flood. During the construction period, and then for specific operational requirements, part of the water could flow through a 1,163 metre long bottom outlet. The bottom outlet would release water 500 metre downstream of the dam foot, at the same location as the spillway tunnel outlet. At full supply level the discharge capacity of the fully opened bottom outlet will be limited to 200 m^3/s. The bottom outlet tunnel will also be used to release the mandatory ecological flow (0.85 m^3/s) downstream of the dam.

Nakra diversion. The Nenskra reservoir will not only be supplied by the Nenskra River but also by the Nakra River which flows in a valley parallel to the Nenskra valley. The objective of the Nakra diversion is to increase the annual power production of the Nenskra HPP. The Nakra water intake will be built across the Nakra River for that purpose. It will be made of a gated concrete weir at elevation 1,557 metre which will divert most of the Nakra river flow into the Nenskra reservoir through a 12 kilometre long gated transfer tunnel (45.5 m^3/s design capacity). The Nakra weir will be 46 m-wide and 9 metre-high. There will be a fish pass on the left bank. The Mandatory Ecological Flow (1.2 m^3/s) will be maintained, mostly through the fish pass. The Nakra Water intake will not generate a water storage reservoir; only a small water head pond of less than one hectare will be created by the weir.

B. Powerhouse and transmission line

Powerhouse. The Nenskra HPP will have a surface-type powerhouse located on the left bank of the Nenskra River about 17 kilometres from the power intake. The powerhouse will accommodate three vertical Pelton turbine units. Next to the powerhouse, there will also be the transformers and a Gas Insulated Substation (GIS) yard (i.e. enclosed in a building). The total installed capacity will be 47 m^3/s and 280 MW. Each turbine unit will have an installed capacity of 16 m^3/s and 93 MW. The turbine axis is located at an elevation of 705 metres. The powerhouse will be operated in accordance with the dispatch centre of GSE. The energy production will see large differences between summer and winter. The typical daily operation pattern will be: low production during the night and high generation during the day; attempting to cover as much as possible the evening peak with a highest power output.

Penstock. The water will be transported from the headrace tunnel down to the powerhouse through a 1,790 metre long steel lined penstock of 3 metre diameter. The penstock will be buried. Its construction in open trench, and then the operation of associated installations (surge shaft and valve chamber) will require the creation and maintenance of a serpentine road from the Nenskra valley up to the surge shaft.

Transmission Line. A 220 kV transmission line that connects the powerhouse GIS yard to a new Khudoni Substation will be built. Georgian State Electrosystem (GSE) will design, permit, construct, install, commission, own, operate and maintain this Transmission Line and connection facilities in accordance with Transmission line. The grid connection point or boundary for the delivery of power will be the connection to the first tower at Nenskra HPP 220 kV GIS yard. The location of the new Khudoni substation as well as the alignment of the

proposed 220 kV Overhead Transmission Line are yet to be defined by GSE, at the time of writing. GSE confirmed that the ESIA of the proposed transmission line will be undertaken by GSE, taking due consideration of the national legislation requirements and International E&S standards. GSE will consult the Project to harmonise approaches to environment and social risk management and mitigation.

C. Access roads and electrical service line

Access roads. The Project will upgrade existing roads from the main Zugdidi-Mestia national highway to the Nenskra dam site and up to the Nakra water intake. The roadway will be of 6.5 metre width but the drainage system will require additional space; the right-of-way required for the road could therefore vary from 8 to 10 meters, with narrower sections through residential areas. Two new bridges will be constructed over the Nenskra River: in Lakhani 2 kilometre upstream of the powerhouse, and 3 kilometre downstream of the dam. Existing bridges will also be reinforced to support the weight of the special trucks used to carry the large construction (e.g. Tunnel Boring Machine) or operation (e.g. transformers, segments of penstock) equipment mobilized by the Project. This includes the Khaishi Bridge over the Enguri River on the main road to Mestia, as well as the eight existing bridges in the Nenskra valley at Luki, Chuberi and Tita. Bridges to be upgraded or constructed over the Nakra River will be known in 2017.

Service line. During the operation phase, the Nakra Intake will be supplied in electricity by a diesel generator. The Nenskra facilities will be power-supplied with an approx. 18 kilometre long Suppl35 kV electrical line between the powerhouse and the dam site and a 7 kilometre long 11 kV electrical line between the powerhouse and the valve chamber. The service line routes will follow the access road to the dam and the service road to the gate chamber while avoiding houses and other private assets. Poles will typically be of 10 to 13 metres height.

D. Operators village

During the operation phase, JSCNH will accommodate the operation management team into permanent houses, named the “Operators Village”. The Operators village will also be used during the construction period to accommodate the JSCNH Supervision Team. It will be located in the Nenskra valley, along the access road to the dam, 7 kilometres downstream of the dam site and 9 kilometres upstream of the powerhouse, close to Tita Village.

E. Workers camps and temporary installations required for construction purposes

The construction activities will be concentrated on 3 worksites: (i) the dam site and reservoir area, (ii) the powerhouse and penstock area, and (iii) the Nakra water intake area. The worksites are temporary facilities; they will be rehabilitated after construction. The tunnelling activities will be organized from the dam site (Nakra Transfer Tunnel) and from the powerhouse area (Nenskra headrace tunnel) using two Tunnel Boring Machines. These Tunnel Boring Machines will be disassembled and transported away at the end of the construction period.

In each of the three works sites (see Map 5-3) the EPC Contractor will execute the construction works as per the required design and will also operate:

- A construction camp where the workforce will be accommodated;
- Technical installations, including parking areas, workshops, laydown areas. Technical installations are located close to the camps for security and logistics reasons. The Project’s crushing and screening plant will be sited at the dam site only, and
- Disposal areas where the spoils from tunnelling and excavation activities will be disposed of permanently. The quarry areas will be located within the Nenskra reservoir area.

2.3 Analysis of alternatives

Analysis of alternatives was conducted at the prefeasibility and feasibility stages. The alternatives were analysed with respect to the capacity to meet the following 2 criteria: (i) generation of 2.9 GWh per day in December, January and February, and (ii) average annual production of 1,196 GWh over the year.

Alternative technologies based on solar or wind energy, as well as a run-of-river hydropower alternative would not meet the winter production criteria. A Combined Cycle Thermal Power Plant (e.g. gas turbine) could be an alternative to the Nenskra HPP; however it would not reduce the dependency on gas or other fossil fuel imports. It would also render less achievable the reduction of greenhouse gas emissions committed to by Georgia through its Intended Nationally Determined Contribution submitted to the UNFCCC in 2015. The scenario of the Nenskra HPP without the Nakra diversion has also been examined; the annual energy production would be on average 30% less than with the Nakra transfer and the firm annual production would be lower. An alternative scenario with two separated hydropower schemes (one HPP on the Nenskra River and another HPP on the Nakra River) with the same combined power production targets as the proposed Project would not reduce the adverse impacts predicted on the Nakra valley.

Alternative Nenskra dam locations in the Nenskra valley and alternative Nakra diversion weir locations in the Nakra valley were also examined. These alternatives would have caused more adverse impacts on the biodiversity of the upper Nenskra valley without gain on the predicted adverse impacts on communities. Likewise, alternative dam heights were studied. The U-shape of the valley and the low gradient of the riverbed slope upstream of the proposed Nenskra dam location allow a large water storage volume with a small reservoir footprint; A lower dam would have reduced the volume of water stored and reduced the annual power production, without influencing the reservoir footprint, hence the E&S issues. Two potential powerhouse locations have been examined at the pre-feasibility stage as an alternative to the solution selected by the Project. They were located upstream of - and closed to - the proposed powerhouse and would have caused the involuntary resettlement of as many households as the finally selected solution.

E&S contributions to design. The 2017 Supplementary E&S Studies (conducted in 2015-2016) have influenced the Project design in order to reduce the predicted adverse effects on communities, water quality and biodiversity. The changes are documented in “Vol2. Project Definition”. The layout of the powerhouse temporary and permanent installations was modified to avoid permanent physical displacement. The Nakra water intake design was changed to improve sediment management, flood control and ecological continuity. At dam site, the by-pass capacities of the bottom outlet (ecological flow) and the diversion weir (small stream flowing immediately downstream of the dam) have been increased to provide greater adaptive management of downstream water quality.

2.4 Implementation schedule

The main construction period is planned to start in September 2017 and will last 4 years until 2021. Some early works will be executed from October 2015 to September 2017: rehabilitation of access roads, construction of workers camps and technical installations. Power generation is planned to start end of 2020 if the conditions are favourable.

JSCNH will operate the Nenskra HPP for 36 years; after these 36 years, the scheme will be transferred to the Government of Georgia who will continue its operation.

3 Environmental & social assessment

3.1 Benefits sharing

The biggest contribution the Project will make to Georgia is the positive impact of its power production. Locally, in addition of employment during construction and - to a lesser extent - during operation, upgrading of local roads and payment of taxes, a voluntary Community Investment Programme will also offer an important additional avenue for enhancing positive impacts and socioeconomic benefits.

The Community Investment Programme will be developed and implemented with the participation of local authorities as a benefit sharing mechanism. Potential areas for community investment were identified in 2016 through participatory assessment of community needs. They relate to community health (upgrade of clinic, medical equipment, and ambulances), education (rehabilitation of schools, kindergarten and vocational training), upgrade village internal roads, agricultural development and water supply. JSCNH intends to support community investment initiatives during the construction period and the operation phase. The objective is to distribute the first investments in 2017, i.e. during the Early Works period. For that purpose, a preliminary priority action plan is being agreed with the Gamgebeli of Mestia Municipality, the Representative of the Mestia Gamgebeli in Chuberi community and the member of Mestia Sakrebulo elected from the Nakra community at the time of writing. The intent is to select a small number of short-term projects which can be implemented in 2017 to demonstrate goodwill from JSCNH and tangible benefits to communities. Parameters established by JSCNH to decide how much to invest, where to invest and under what conditions will be discussed with the community leaders for further vetting and validation.

3.2 Downstream hydrology effects and water quality

The information presented in this Section is described in detail in "Volume 5 - Hydrology and Water Quality Impact Assessment" of the 2017 Supplementary E&S Studies.

The Nenskra reservoir will be operated according to the following principles: (i) guarantee the safety of the dam and the safety of communities downstream of the dam and downstream of the powerhouse, (ii) maintain a minimum ecological flow of 0.85 m^3/s downstream of the dam, at all times including during construction, (iii) manage the reservoir water level so that it is at full supply level in November in order to guarantee energy production from December to February, (iv) manage the water volume stored in the reservoir the rest of the year in order to produce as much energy as possible. The Nakra water intake will be operated according to the following basic principles: (i) maintain the ecological continuity and the sediment transport management functions of the Nakra River, and (ii) maximize the transfer of Nakra water into the Nenskra reservoir.

The operation regime will impact the hydrology and sediment transport of the Nenskra and Nakra rivers. It has also the potential to affect the Nenskra river water quality during the first years of impoundment. The paragraphs below describe these effects and the proposed solutions.

A. River hydrology and water quality baseline

Hydrology. The Nenskra River and the Nakra River are right bank tributaries of the Enguri River. Low flows are observed in winter from December to March and high flows in spring and

summer from May to August when the glaciers melt. At the proposed dam site, the Nenskra watershed area is 222 square kilometres and the annual average flow is 16.8 m^3/s. At the proposed Nakra intake, the Nakra watershed area is 87 square kilometres and the annual average flow is 9.3 m^3/s.

Water quality. There are no industrial activities and only limited artisanal and agricultural activities upstream of the future Nenskra reservoir or upstream the Nakra diversion weir. The waters are typical of pristine streams in granite and gneiss rock type areas. The concentrations of organic carbon and nitrogen are very low and phosphorous below detection limits. Nutrient input from river water into the future reservoir is consequently expected to be low.

Solid transport. The expected input of solid material into the Nenskra reservoir has been estimated to be 60,000 cubic metres per year. Even in a worst case scenario, if the total quantity of solid material fully accumulated in the reservoir each year, several hundreds of years would be required to fill the reservoir with sediment. The sediment accumulation could reach the level of the bottom outlet, after approximately 20 years of operation. There could therefore - after a number of years – be a need to vent the sediment that has accumulated in the reservoir in order to avoid blocking the bottom outlet gate.

B. Predicted impacts on hydrology

Map 5-4 in Section 5 depicts the hydrological impacts described in the paragraphs below.

Downstream from dam. The Nenskra River between the dam and the powerhouse will be affected by a reduced flow as a result of the Project. Downstream from the dam, the Nenskra flow will comprise the sum of the ecological flow discharged from the reservoir and the natural runoff from the catchment area. The contribution from the natural run off increases with the distance from the dam: immediately downstream of the dam, the Nenskra flow will be made of the ecological flow only and will represent 5% of the existing situation. At the confluence with the Okrili River located 4 km downstream from the dam, the Nenskra flow will represent 15% of the existing situation. Upstream from the powerhouse, the Nenskra flow will represent 40% of the existing situation without the dam.

Spillage. It is expected that for a normal year - in terms of precipitation and runoff - the Nenskra reservoir water level can be managed without spillage of water via the spillway. During very wet years (in average one year out of every five), spillage of reservoir water via the spillway is expected to occur, principally in August, in the range of 10 to 20 m^3/s, possibly for a duration of 2 to 4 hours each day, and possibly every day for about a month causing an increase in flow rate downstream.

Downstream of powerhouse. Because of the Nakra transfer and the water storage in the Nenskra reservoir, the average river flow immediately downstream from the powerhouse will be increased compared to the existing situation. Average monthly increases range from 5% in June - which is the month with the highest flow rate - to 300% in winter, when there is naturally a low flow rate. The downstream flow will be also significantly influenced by the hourly variations in the discharge of the powerhouse turbines causing instantaneous Nenskra flows that are higher than those of the natural conditions. In February - when the river flow is at its lowest - the peak energy turbining would cause the river flow downstream of the powerhouse to vary from 3 to 50 m^3/s.

Downstream of Nakra intake. The diversion of the Nakra river water via the transfer tunnel to the Nenskra reservoir will cause a reduction in the flow of the Nakra River downstream from the weir. The flow downstream from the weir will comprise the sum of the ecological flow and the natural runoff from the catchment area. Immediately downstream from the Nakra weir the reduction in average monthly flows range from 50% in February to 95% in June, and at the Enguri confluence the reduction varies from 30% to 60%.

Effects on Enguri. The reduced flow in the Nakra River will cause a slight reduction in the flow of the Enguri River between the Nakra confluence and the Nenskra confluence. The reduction in average monthly flows range from 6% in February to 11% in July due to the diversion of the Nakra River into the Nenskra reservoir. The average annual flow of the Enguri River downstream from the confluence with the Nenskra River will not be affected by the Nenskra Project. However, the average monthly flow rates will be modified by the storage in the Nenskra reservoir and release during the winter months. In February – when the river is naturally at its lowest, the Enguri flow will be increased by 73%. In July, when the river is naturally at its highest, the flow will be reduced by 9%. The average annual flow into the Enguri reservoir will not be affected by the Nenskra Project. This is not expected to cause a significant change to the functioning of the Enguri reservoir, and power generation potential in winter is expected to increase, which will be beneficial. During the first Nenskra reservoir filling, a loss of inflow to the Enguri reservoir will be observed, representing 3.6 % of the Enguri annual inflow for the year of the Nenskra filling. There will be no loss for subsequent years.

Climate change. The climate change scenario for the year 2100 predicts a decrease in precipitation in winter, spring and autumn respectively. Precipitation will increase by 16% in summer in Mestia and will decrease by 14% in winter. At the time of writing hydrological studies have been undertaken by the Project and the studies on climate change are ongoing. The value of extreme floods adopted for the design will be the value established taking into account the climate change studies. If necessary the detailed design of hydraulic structure will be revised in 2017.

C. Predicted impacts on solid transport

The solid transport in the Nakra River and in the Nenskra River will be affected by the changes in hydrology and changes in solid material transport capacity.

Downstream of Nakra intake. In the Nakra valley, the Lekverari torrent and its confluence with the Nakra - immediately upstream of the Nakra village - is a zone which is vulnerable with respect to hydrological and geomorphological changes. The reduced flow in the Nakra River resulting from the diversion of the water to the Nenskra reservoir could reduce the capacity of the river to regularly flush away accumulated sediments from mudflow events that could occur. A similar, but less serious situation also exists at the confluence of the Laknashura and Nakra, further upstream.

Mitigation strategy. The Nakra diversion weir and transfer tunnel are designed and will be operated to ensure that the sediment transport function of the Nakra River is maintained. The weir is equipped with two large gates to allow sediment that is trapped in the head pond to be flushed downstream. Periodically the gate on the Nakra transfer tunnel inlet will be closed and simultaneously the weir gates opened to allow the Nakra River's natural flow rate to be re-established so that sediment that has accumulated in the riverbed can be flushed away. The most effective method for controlling accumulated sediment by re-establishing periodically the natural flow of the Nakra River will be determined by a specific study. The scope of the study will include improving the current understanding of the baseline sediment situation, establishing recommendations for (i) sediment flushing flow rates, frequency and duration, (ii) sediment accumulation monitoring and (iii) evaluation of the need for and concept of river maintenance works – including the realignment of the Nakra near the confluence with the Lekverari. The need for mechanical removal of sediment will be avoided as far is technically practicable and mechanical removal will be only performed when no other alternative is available. Any such sediment removal works will be performed in alignment with standard practice in other EU countries and will not result in adverse sediment transport.

Downstream from the Nenskra dam, the solid transport capacity of the Nenskra River will also be reduced. However, this will be balanced by the fact that the dam will trap much of the

sediment transported from the upper Nenskra catchment area and because the tributaries downstream of the dam do not transport significant amounts of solid material. Consequently no significant geomorphological impacts are expected along most of the Nenskra. Although the increase in flow of the Nenskra downstream from the powerhouse is not expected to cause erosion of the riverbed, there is a possibility that bank erosion may occur in the first two kilometres. Consequently monitoring will be implemented and if bank erosion is observed then the banks will be reinforced using suitable means.

D. Predicted water quality

Nenskra Reservoir. The Nenskra reservoir water quality is expected to be modified during the first 2 to 3 years of operation after reservoir filling due to the presence of flooded biomass and soils. However because of low reservoir temperature and high rate of recharge, development of excessive primary production causing algal blooms, pH changes, creation of anoxic conditions and further water quality degrading are not expected.

Nenskra River. The water quality of the ecological flow released from the reservoir will influence the water quality in the Nenskra River between the dam and the powerhouse. Although the ecological flow is rapidly diluted by the inflow from tributaries, there could be a discernible increase in the concentrations of nutrient between the dam and Okrili confluence in the first 2 to 3 years after reservoir filling. The amount of nutrients discharged from the reservoir will decrease over time and after 3 years the quality of river water is expected to be similar to natural conditions. During the first 3 years after reservoir filling the stretch from the dam to Tita could be affected by low Dissolved Oxygen. Further downstream the Dissolved Oxygen will have increased due to re-oxygenation and dilution. Downstream from the powerhouse, the water quality of the Nenskra River will be reduced in the first 3 years of operation after reservoir filling because the turbined waters will be discharging water from the reservoir.

Mitigation strategy. The Nenskra HPP will clear the vegetation present in the future reservoir area prior to impoundment, thus minimising the quantities of flooded biomass which is the source of the modification of the water quality. The water quality of the mandatory ecological flow will be monitored. In the event of degraded water quality, the Project would re-establish the flow of the small stream (which is diverted to the reservoir) back to its pre-project state with a discharge into the Nenskra immediately downstream of the dam. The Project would also reduce the release of the ecological flow through the bottom outlet. The effectiveness of this measure will be limited by the seasonality (April to October) and average discharge of this stream which is smaller than the mandatory ecological flow.

Nakra River. No impacts on water quality in the Nakra are expected. The reduced flow is not expected to have an effect on water quality or temperature. The presence of the diversion weir and the upstream pond is not expected to cause a discernible change in water quality or temperature.

E. Greenhouse gas emissions and micro-climate change

GHG. Construction Greenhouse Gas emissions (GHG) represent 2.3 million tonnes of carbon dioxide equivalent (CO_2-eq) over 4 years. Reservoir GHG emissions represent 51 thousand tonnes – produced in the first 7 years after reservoir filling. The reservoir emissions have been compared to benchmark indicators reported by the World Commission on Dams and the value of 643 g CO_2-eq/ m^2/ year is comparable with that of dam-reservoirs in Canada and Finland. The combined construction and reservoir emissions (averaged over 34 years) represent an average of 32 grams CO_2 per kWh which compares favourably for other hydropower projects of comparable capacity reported in 2011 by the Intergovernmental Panel on Climate Change.

Microclimate. In terms of micro-climate change, it is possible that there may be localized micro-climate change in the vicinity of the dam-reservoir - but not extending down the valley further than Tita - with slightly lower temperatures in summer and slightly higher humidity in the summer. No detectable changes are expected in the winter months. It is more likely that the micro-climate changes are negligible compared to regional climate changes as a result of global warming. Microclimate parameters will be monitored to detect any localised changes.

3.3 Land acquisition and economic displacement

The information presented in this Section is described in detail in "Volume 3 - Social Impact Assessment" of the 2017 Supplementary E&S Studies.

A. Socioeconomic environment in the Project area

Population. Most settlements and people which may be potentially directly affected by the Project are located in the Nenskra and Nakra River valleys. The Nenskra valley contains Chuberi village, and two hamlets which are part of the Khaishi village. By the end of 2015, it was estimated that this valley has 1,148 permanent inhabitants (268 households) living in 13 hamlets along the river. The Nakra valley encompasses Naki village and one hamlet from Lakhalmula village. The total count is 300 permanent inhabitants (85 households) living in 5 hamlets. About 30 to 40 families now reside outside the valleys, returning only for the summer months.

Ethnicity. The people identify themselves as Svans, and are recognised as such by the rest of Georgia. Svans have their own unwritten language that is one of the four languages that make up the Kartvelian family of languages - Svan and Georgian have the same roots; and the people in the study area speak Svan and speak, read and write Georgian (and many also Russian). The Svans are an integral part of the Georgian ethnos, are completely integrated into modern Georgian society. For the Lenders, the term "Indigenous Peoples" is used in a technical sense to refer to a social and cultural group, distinct from dominant groups within national societies. Although Svans do show to a certain degree some of the characteristics of the "Indigenous Peoples", overall the affected Svan communities are not considered to meet the Lenders' definition of "Indigenous Peoples", and therefore the Lenders "Indigenous Peoples" policies are not triggered.

Land tenure. In the project area legal and formalized land tenure was introduced in 2008 and coexists and sometimes overlaps with the customary land tenure, which is well recognised by the local communities. However, there have been reports of difficulties for people wishing to register traditionally owned land. This is a factor that has had to be taken account in the land acquisition and livelihood restoration planning. In the Nenskra and Nakra valleys, almost all the land is officially State Land, and categorized by the State as Agricultural Land, and outside the settlements most of the land is also categorized as Forest Fund Land. Within the settlements, individual land plots are all well demarcated, and almost always fenced. Outside the settlements, in the forested areas, customary ownership is also, most of the time, well defined. Specific areas are owned by groups of families sharing the same ancestry and customary right of use of these areas are inherited. Legalizable land will be registered in the name of landowners before acquiring. Customary ownership will be recognised by the Project even if there is no legally recognizable claim to the land.

Pastures. Ownership and right of use of pasture areas is defined by customary rights like elsewhere in mountainous areas in Georgia. An estimate of the available pasture areas in the two valleys has been established from interpretation of aerial imagery. The total area of the summer pastures of Chuberi village has been estimated to be about 695 hectares. This does not include the Lukhi and Tobari pastures as these are not affected by the Project and are not

part of Chuberi village. The total area of the summer pastures of Naki village has been estimated to be about 550 hectares and this does not include Shtikhiri pasture land as not affected by the Project and not part of Naki village.

Livelihoods. Traditionally, farming was the main activity in both valleys. However, the people's traditional way of life has evolved and most households also have additional income from logging for commercial sale and diverse other activities. Almost all families have several sources of income. Only 25 families (7% of 353 households) work only in agriculture. The vast majority of families engage in several remunerative activities. Logging was recognized as a key income source in the economy of the Nenskra and Nakra valleys by most informants. With regard to employment, 27% of households have at least one member permanently employed in the public service, and 11% have at least one member receiving a salary from a private company. Agriculture and livestock farming are largely for home consumption. Based on households' interviews, the average head of cattle owned per household is four. People are largely self-reliant, doing much of their own construction and mechanical repair work. Also, there is a large amount of neighbourly assistance in farming and other activities (e.g. house construction). However, the population is still very dependent on the larger society for services and supplies.

Vulnerability and Women's Role. Households are considered as vulnerable if they possess at least one of the following characteristics: (i) Registered as poor in the local social services; (ii) Women-headed households; (iii) Elder-headed households (≥70 years old) without any other bread-winner in the household; (iv) Households headed by disabled people.

In the Nenskra and Nakra valleys, a total of 150 households (42%) are considered as vulnerable in Nakra and Nenskra valleys, including 82 woman-headed households (23%). Twenty-three households are elderly-headed households without other bread winner in the family, and 8 households are headed by a disabled person. More than a fifth of all households in the project area (78 of 353 or 22%) report receiving Poverty allowance and being officially registered as being under the national poverty line. This is above the national average, which was 11% in 2014 (National Statistics Office of Georgia, 2015), but below typical values for remote mountainous areas where poverty can be as high as 50%.

Amongst these vulnerable households, 28 households will be affected by the land acquisition process. This includes 9 woman-headed households. Fourteen vulnerable households (6 women-headed) are affected by the upgrading of the Nenskra road and will lose strips of non-productive land along the road, fences and 2 structure and some trees. The impact on their incomes and livelihoods is considered as not significant. Fifteen households (including 3 woman-headed households) will be affected by loss of summer pasture areas:

- Eleven vulnerable households (2 woman-headed) will temporarily lose access to a pasture area at the Nakra water intake site during the construction period. The impact on their incomes and livelihoods is considered as not significant.
- Four vulnerable households (1 woman-headed) will lose access to pasture areas at the Nenskra dam & reservoir site. The impact on their incomes and livelihoods is considered significant for the 3 vulnerable households (1 woman-headed) affected by temporary loss of pasture at the Dam construction camp during construction; and severe for one household affected by permanent loss of pasture in the Nenskra reservoir.

The women's role in the community is important, though subordinate to the men's. Women can inherit property. A significant number of women work as educators or nurses' aides, while housewives produce cheese, preserved foodstuffs and some craft items to contribute to the family budget. Reportedly, domestic violence is not a salient issue, although it was impossible to determine the extent to which such issues were being downplayed during the two women's

focus group discussions. According to the focus group conducted with women, gender violence is not an issue in the study area.

Community infrastructure Community infrastructure is mostly basic. School buildings are in a poor state of repair, though people appreciate the quality of the teachers and the importance of education. The health clinics provide first-aid assistance only. Police are based in Khaishi, which is 10 kilometres from Chuberi and some 35 kilometres from Naki. However, law and order is maintained largely through the community. There are few shops in Chuberi, though none in Naki. Public transport is scant in Chuberi and non-existent in Naki. Itinerant marketers travel to Chuberi several times a week to sell basic commodities from the back of their minivans. Demand in Naki is too weak to support even this level of commercial activity. There are no repair services in either valley. Several corn water mills are used in each valley. Each community has a town hall building, though the physical infrastructure is dilapidated. There are two churches in Chuberi, and 10 church buildings in Naki, but only three of which are in a state of repair to allow church services to be held. Each community has a football field for recreational activity. There is no collective water supply system. Individual households are supplied with water from springs and seeps by flexible aboveground pipes in which the water is conveyed by gravity. Each household installs its's own individual pipe. River water is not used as drinking water.

Security and Human Rights. The primary security risk is political; is related to the proximity (located 7 kilometres from the dam) of the administrative boundary line between Georgia and the breakaway region of Abkhazia, which is considered by the government of Georgia as Russian-occupied territory. However, this security risk is a national concern and is managed by the government of Georgia. In the event of any risk situation the Project will follow the government's instructions.

The Project also prevents economical, civil and social risks by identifying potential for violence, understanding the root causes of conflict, and considering the local way of resolving conflict (authority and judiciary' capacity, as well as their capability to respond to situations of violence in a lawful manner). The local communities reported one crime in the past five years in the Nenskra valley. They usually prefer to settle disputes internally using the traditional dispute resolutions – which is a Georgian practice and not specific to Svaneti - by referring the matter to the elders or to religious leaders. If internal resolution is not successful, the dispute is then brought to the local authorities. The project will liaise regularly with representatives of these local institutions to assess and monitor social risks.

In terms of human rights Georgia has strengthened ties with the European Union through the signature and ratification of the European Union Association Agreement. The signing of the agreement represents a commitment by Georgia to progress on human rights. The Project will support government in this way by promoting respect for human rights.

The Project will liaise regularly with state forces to ensure good communication and coordination with private security providers. With regards to private security providers, JSCNH will include compliance with the Voluntary Principles on Security and Human Rights as a contractual requirement, and will only engage licenced private security services providers with a known and approved background. The Project will take appropriate measures to avoid the use of individuals who are credibly implicated in human rights abuses. Private security forces will be regularly trained and monitored to ensure their obligation to provide security in manner consistent with the Principles outlined.

B. Land requirements and resettlement

Impacts caused by the Project's land take are analysed and their mitigation measures are presented in details in report Vol. 9 – Land Acquisition and Livelihood Restoration Plan (LALRP).

The total land requirement is 861 hectares; comprising 407 hectares for permanent facilities and 454 hectares for temporary facilities. All the temporary and permanent land required will be subject to the Land Acquisition Process developed by the Project with the Government. On completion of the construction works, land affected by temporary land use only will be rehabilitated. In total 80 households are affected (as described below), including 28 vulnerable households. There will be no permanent physical displacement.

There will be no impact on land used for residential purposes in the two valleys. In Chuberi village (Nenskra valley) the Project land take represents 5% of arable land (cultivated and non-cultivated) out of which 0.75% will be affected permanently, and 2% of pasture land, of which 0.8% will be affected permanently. In Naki village (Nakra valley), the land take represents a loss of 1% of the land used for pasture only, of which 0.16% will be affected permanently, and there is no loss of arable land.

Reservoir area. The principal land requirement is at the dam-reservoir site, which requires 560 hectares of forest / pasture land including 205 hectares for the temporary construction camp and spoil disposal areas. The dam will occupy 83 hectares, and the reservoir 270 hectares. The land take affects a total of 20 households who will lose pasture land (11 temporarily during construction, and 9 permanently). Four of these households are vulnerable, including 1 woman-headed household.

Powerhouse area. The second most important land requirement is at for the powerhouse, which requires 171 ha of land. However, most of the land (160 hectares) is required for the temporary construction camp and spoil disposal areas. The permanent land take is 11 hectares required for the powerhouse. Four households will be affected by the permanent and temporary facilities and will lose trees, arable land and fences. These households are not vulnerable and there is no female headed household. Two of these households are living within 500 meters of the powerhouse. During the construction period, they will be disturbed by noise, light, traffic, dust and vibrations from drilling, possibly blasting and general construction activities. The EPC contractor will define and implement technical measure to guarantee appropriate health and safety conditions for households exposed to these nuisances during construction.

The Nenskra road widening requires the acquisition of 1.2 hectares of arable land and affects 32 households, including 14 vulnerable households of which 6 are women-headed households. The households are affected by loss of private land, loss of assets (such as wooden fences, and wooden sheds), and loss of perennial trees.

The Nakra weir and transfer tunnel intake requires a land take of 36.7 hectares, of which one hectare will be used for the permanent infrastructures. The land use is pasture and hay fields. 27 households are affected of which 11 are vulnerable, including 2 women-headed households.

The operators' village requires the acquisition of 2.5 hectares of woodland and affects one household who is not vulnerable.

The remaining land acquisition is for the 35 kV power supply line, the 110 kV power supply line, the Nakra road widening. The land acquisition is expected to be in the order of 90 hectares, but the alignment of the transmission line and supply lines will be defined later and the Nakra road widening works have not been defined, and so the number of affected

households and type of land affected will be defined at a later stage and an updated LALRP covering these areas will be prepared prior to any land take.

C. Land acquisition process and livelihood restoration

The land take process has the potential to adversely impact the livelihoods of households affected by loss of land if no mitigation and compensation measures are implemented: loss of pasture or access to pasture, impaired access to timber and non-timber resources, and loss of assets.

Alignment. A Land Acquisition and Livelihood Restoration Plan (LALRP) has been developed to prevent and mitigate the negative impacts of land acquisition and resettlement and to set out the entitlements of the different categories of affected individuals. It has also been prepared to align (i) the land acquisition process ruled by the Implementation Agreement established between GoG and JSCNH with (ii) the Lenders' E&S Policies.

Eligibility. The Project will compensate all affected people regardless of their legal status, including (i) People holding a legal land title; (ii) People without a legal land title, but who could register their land, either because they own documents showing their legal rights to land, or because they are recognizable owners by the Georgian law. People in this category will be assisted by JSCNH to register their land to facilitate timely payment of compensation and turnover of land to the project. Taxes or transaction charges for this will be borne by the project; (iii) People without any formal legal rights or recognized or recognizable claims.

Entitlements. The Project will endeavour to enter into an amicable (willing buyer – willing seller) agreement with the affected persons in compliance with the Lenders' E&S policies thus avoiding involuntary expropriation. No temporary impairment of access to pasture lands are expected as the Project will maintain access to pasture land that are outside the work sites but for which access is impaired by the physical presence of the temporary facilities. The LALRP has established eligibility criteria and entitlements based on: (i) loss of land; (ii) loss of assets on that land; (iii) loss of livelihood, and (iv) loss of access to natural resources.

The significance of the impact on the affected households has been assessed in regards to the share of losses of productive assets, and the consequences on the households' income. Households significantly affected are those who will lose 10% or more of their productive assets[3]. Those severely affected will lose more than 20% for their productive assets. The significance of the impacts caused by the Project Land take is summarized in the Table 1 below.

Table 1 – Distribution of Impact by significance and Project component

Area/ facility	Number of households affected	Low impact / not significant	Medium / significant	High / Severe
Nenskra dam and reservoir	20	---	11	9
Powerhouse site	4	---	---	4
Operators village	1	1	---	---
Nenskra road	32[a]	29[a]	---	---
Nakra weir and transfer tunnel intake channel	27	27	---	---
Total	80[a]	56	11	13

[a] 4 of the households affected by economic displacement are affected by the Nenskra road widening and one other project's component.

[3] As per ADB's Safeguard Requirement 2 on Involuntary Resettlement, which defines the threshold for being significantly affected as the loss of 10% or more of productive (income generating) assets.

Entitlements are as follows:

- Households who are significantly impacted receive compensation at full replacement cost for their assets and benefit from the following livelihood restoration activities: (i) preferential hiring and skills training; (ii) assistance for management of received financial compensation, (iii) support to improve existing economic activities (agricultural production, beekeeping, nuts production, fish farming), (iv) support for initiatives to develop alternative sources of income, (v) for the people affected by the loss of Kvemo-Memuli pasture area: improvement of existing tracks to non-affected pasture areas, and (vi) assistance for legalisation and land ownership.
- Households who are severely impacted receive compensation at full replacement cost for their assets and benefit from the livelihood restoration activities for significantly affected households listed below, plus the following measures: (i) Provision of assistance to increase yield of existing fodder production and develop sustainable livestock production, (ii) assistance to develop to grow and sell hazelnuts, (iii) assistance to develop beekeeping and sale of honey, (vi) assistance to develop market gardening.
- Households affected by loss of pasture area, either temporary or permanent, will benefit from a temporary supply of fodder (or cash to buy fodder) during the transition period, which is the period when (i) livelihood restoration activities are being developed but are not operational and (ii) when pasture areas are unavailable as being used during construction – this includes the time to rehabilitate temporarily affected pasture land. The transition period is planned to be 7 years duration.
- People who are affected by economic displacement but not significantly affected receive compensation at full replacement cost for assets lost.
- Vulnerable households who are affected will receive a specific allowance, equivalent to three months of minimum subsistence income.

The affected people will be able to question the assessment made during the preparation of the LALRP and the mitigation measures proposed by the Project. This will be done when the results of the impact assessment will be discussed with the affected households and the compensation packages and livelihood restoration activities will be negotiated at a household level.

Nenskra dam as a physical obstacle to the upper valley. The baseline situation of the Nenskra valley upstream of the future reservoir is characterised by very limited anthropogenic activities. There is some hunting and during the soviet period there were some logging activities – though this is no longer the case. Once constructed, the Nenskra dam will be a physical barrier blocking the access to this area and the border with the Russian Federation. Consequently the Project will establish a cattle track from the dam, along the Nenskra reservoir leading to the area upstream of the reservoir.

D. Interaction with water uses, fishing, beekeeping and other downstream activities

Use of river water. No discernible negative impacts on the use of water by communities are expected. River water is not used as potable water but only used occasionally to water private gardens and intermittently (in summer period) periods may be used for domestic purposes. Springs and seeps are the source of potable water used for drinking and domestic uses. There is no irrigation for agricultural purposes using the Nenskra and Nakra rivers water. However, the Project will monitor the quality and availability of water and in the case of adverse negative impacts caused by the Project will provide alternative source of water.

Fishing. Impacts on recreational fishing could occur on the reaches of the rivers with reduced flow – because of a potential reduction in the fish population. However, the Project will

implement a river habitat management plan aimed at improving/maintaining fish spawning grounds to minimise the impact on the fish population.

Beekeeping activities could be disturbed during the construction period by the Project traffic. However, it is not anticipated that bees will suffer from any long-term impact such as loss of foraging areas. To minimise potential impacts the project will help beekeepers temporarily move beehives away from traffic affected areas.

There are no on-going mining or forestry concession in the Project area, and the GoG has no plans to issue new concession. Consequently the Project will not have an impact on commercial natural resources exploitation. There is only limited tourism in the Nenskra valley (some limited kayaking and hiking) and no activities in the Nakra valley. Tourism is not a source of income for people. The presence of the Project and improvement of the access roads could attract and facilitate visits by tourists to the valleys. However, kayaking or rafting activities could be negatively impacted.

3.4 Community health and safety

The information presented in this Section is described in detail in "Volume 3 - Social Impact Assessment" and Volume 6 "Natural Hazards and Dam Safety" of the 2017 Supplementary E&S Studies.

A. Key impacts and risk during the construction

Road use by Project vehicles will create additional dust and exhaust gas emissions; noise & vibration; traffic congestion and an increase in the risk of traffic accidents. The principal affected roads are the Nenskra dam and Nakra weir access roads which will be used by the construction traffic. However, the Zugdidi-Khaishi road will also be affected - but to a lesser extent - by the transport of supplies and material. These risks will be mitigated by the implementation of a Traffic Management Plan.

Community health. The recruitment of workers for the construction from other region of Georgia may result in an increased risk of transmissible diseases, including sexually transmitted diseases. Maximizing use of the local workforce combined with the accommodation of non-local workers in controlled worker camps, will reduce this risk. Health screening and health monitoring of the workforce will carried out, and community health awareness campaigns organized. No health impacts related to water supply are anticipated during construction, as the supply of household potable and domestic water is from springs and streams which are not expected to be affected by the Project. However, monitoring of the quality and availability of spring water will be carried out. Access to worksites will be controlled and restricted to prevent exposure of communities to the health and safety hazards which these areas could present. The worksites will be secured through use of security personnel to prevent unauthorised public access.

Natural hazards. Safety of workers with respect **to** avalanches, debris flow and extreme floods hazards are being assessed and addressed primarily through design, monitoring and emergency response planning as appropriate.

B. Key risks related to operation

Regular daily variations in the flow of the Nenskra River downstream from the powerhouse represent a public safety risk. People or livestock present in the riverbed at that time of a rapid increase in river flow would be in danger of drowning. Awareness campaigns will be carried out, warning signs will be installed to inform people of the risk, and access to the most unsafe areas (e.g. turbine or spillway outlet) will be fenced.

Dam spillage. Occasional irregular increased discharge downstream from the dam caused by spillage of reservoir water could occur. People or livestock present in the riverbed at that time of a rapid increase in river flow would be in danger of drowning. Awareness campaigns will be carried out and warning signs installed to inform people of the risk. The Nakra transfer tunnel will be equipped with a gate that will be closed during flood events when the Nenskra reservoir is a fully supply level so that flood flow rates in the Nenskra are not higher than natural flows (i.e. baseline flow rates without the dam).

Bottom outlet opening. On rare occasions there may be a need to open the reservoir bottom outlet gate. This will be done most often during planned operations of short duration (e.g. gate testing or sediment venting): as these actions are planned, the risks they can cause will be anticipated and therefore managed to avoid any accident. The bottom outlet might also be used to preventively lower the reservoir water level (for example in case of avalanche risk): this will be done by opening the bottom outlet partially, at a rate that does not generate a risk for the community. High flow in the Nenskra downstream from the dam (with possibly a risk of flooding) could occur in case of emergency situation (for example during extreme rainfall event). Flood studies will be undertaken to establish the extent of any flooding that could occur and integrated into the Emergency Preparedness Plan.

Natural hazards (seismicity, extreme flood events, avalanches, debris flow, slope stability) are being assessed and are being addressed primarily through safe design, reservoir operating procedures and emergency response planning as appropriate.

The project **Emergency Preparedness Plan** will be finalized in order to ensure effective response to emergency situations. The plan will include (but not limited to): (i) procedures for alerting and mobilising emergency management authorities and emergency response teams; (ii) training plan – including training of local authorities and emergency services; (iii) programme of emergency situation exercises, including the participation of local authorities, emergency services and local communities. The preparation of the plan includes undertaking flood studies for different type of events including dam failure and the opening of the reservoir bottom outlet gate.

Downstream Nakra. Mudflow events on lateral tributaries of the Nakra River can block the river resulting in temporary flooding upstream of the blockage - and downstream flooding when the blockage is breached. The Project could potentially increase this risk because of the reduced capacity of the river to flush away sediment. To address this risk, the Project has included gates on the Nakra weir and a gate on the transfer tunnel inlet. Operation of the gates allows the natural flow of the Nakra to be re-established when required and to ensure the sediment transport function of the river. Studies will be undertaken to establish what further actions can be taken to best minimise the risk of flooding caused by mudflow events and accumulation of sediment so that the population ends up being less exposed to flooding risk with the Project than without the Project.

Water use. During construction and operation, no impact on community water supply is anticipated. Springs and seeps used as a source of potable and domestic water are not expected to be affected by the Project. However, the water quality and availability will be monitored and alternative supply of water provided in the case of Project induced impacts.

3.5 Labour and working conditions

The Project will require a peak workforce of about 1,100 workers for construction. To ensure maximum local benefits are achieved through the construction phase, and to minimise the influx of workers from outside the region, the Project will aim to recruit 100% of the unskilled workers from the Nenskra and Nakra valleys. If insufficient numbers of workers are available

locally, the recruitment will be extended to the nearest villages in the Mestia Municipality and the Svaneti region as secondary catchment areas. This process will be managed through a Local Recruitment and Procurement Plan. If insufficient numbers of workers are available locally, the recruitment will be extended to the nearest villages in the Mestia Municipality and the Svaneti region as secondary catchment areas.

Processes and procedures with respect to labour management will be in alignment with national, Lenders and International Labor Organization requirements. Job opportunities will be communicated locally, and direct recruitment offices will be opened in Chuberi and Naki. Monitoring of the supply chain will allow to enhance local indirect business opportunity where and when possible.

All workers coming from others part of Georgia will be accommodated in working camps.

During operation, the hydropower facilities will employ between 50 to 100 staff on site. Most jobs would be skilled positions. Unskilled labour positions would be limited to guard keeping and operators' village maintenance. During the main construction period, JSCNH will provide training for local unskilled employees in order to raise skill levels of employees to maximize the number of local workers employed during operation.

3.6 Biodiversity and fisheries

The information presented in this Section is described in detail in "Volume 4 - Biodiversity Impact Assessment" of the 2017 Supplementary E&S Studies.

A. Habitats assessment

Vegetation. The flora, vegetation and habitats baseline surveys identified 12 broad scale habitats within the survey area (see Map 5-6). The dominant habitat present was found to be mixed broadleaved and conifer woodland which made up 60% of the survey area. The survey area covered a total of 142 km^2. The second most common habitat was broadleaved woodland which comprised 13% of the area surveyed. Conifer dominant woodland was found to cover only 5% of the area surveyed.

Sensitivity. The more detailed floral surveys identified 20 species of plant which are endemic to the Caucasus Mountains, two which are listed on the Georgian Red List (as vulnerable) and three species covered by the CITES convention (Convention on International Trade in Endangered Species of Wild Flora and Fauna). One individual plant which was found, but requires further verification is *Paracynoglossum imeretinum,* which is an endemic species to Georgia, only recorded from 17 locations within Georgia. Of the habitats identified, two of habitats of potentially high sensitivity value were identified 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 sensitivity value oak or oak-hornbeam forests (*Quercitum -Carpinion betuli*) were recorded. Habitats of a low likely sensitivity value were also recorded.

Mammals. The mammal surveys undertaken in 2015 identified that brown bear *Ursus arctos* are present within the Nenskra valley. The 2016 surveys covered the whole of the Nenskra and Nakra watersheds and found signs of brown bear in both valleys. Signs of brown bear: prints, dung and camera trap photos, were found in a number of the Nenskra tributaries, both upstream and downstream of the proposed reservoir area. The number of brown bear signs suggest that there are between 6 and 10 bears present in the Nenskra valley. A single print considered potentially to be from the Eurasian lynx (*Lynx lynx)* was also recorded within the reservoir area in 2015, but no signs of lynx were recorded during the 2016 surveys. Bat surveys were also undertaken, they found that less bats use the reservoir area than the area

surrounding Tita Village, however seven species of bat were identified within the reservoir area using bat call analysis. It is considered likely that comparatively less bats are roosting within the reservoir area than Tita, but suitable roosting habitat is present in the form of mature trees with lose bark and rot holes. During the 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. Caucasian squirrel *Sciurus anomalus* were noted during the 2016 surveys and were found to be relatively wide spread within the Nenskra valley. A single female wolf *Canis lupus* was recorded on remote camera, feeding on a carcass close to Tita village.

Birds. 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 at height. 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 for birds, nor does it form part of the rich bird endemism sites which are present within Georgia.

River fish. The aquatic biodiversity survey had to rely on a habitat assessment and the examination of fish caught by local anglers as electro-fishing was not licenced in Georgia at the time of survey. Only one fish species has been observed in the two rivers. It is brown trout *Salmo trutta*. The river habitat assessment found that there are a number of habitats present on both the Nenskra and Nakra rivers. High flow areas are considered only to be suitable for adult fish, whereas the lower flow areas with gravels are likely to be suitable as spawning and nursery sites. No spawning areas were noted on the Nakra River up to 2 km upstream of the proposed Nakra water intake; however some areas were considered suitable as nursery areas. On the Nenskra potential spawning habitat was noted upstream of the proposed reservoir area. Downstream of this there are a variety of habitats, including nursery habitats. Local observations found that trout are caught by anglers on the Nenskra River.

B. Conservation initiatives

Proposed Svaneti Protected Area. The Nenskra HPP (dam, reservoir, powerhouse, Nakra water intake, access roads) is not included in an existing protected area. The creation of a new Svaneti protected area is being investigated by the Ministry of Environment and Natural Resources Protection. It has been confirmed that the boundaries of the proposed Svaneti protected area would be located east of the Nakra valley and would not include any of the Nenskra HPP installations or accesses. A management plan has not yet been finalised or made available.

Candidate Emerald Site. There are also plans to create an Emerald site in the Svaneti region. In February 2016 the national authorities made an application to the Bern Convention to change the original Svaneti area boundaries. As of November 2016, NACRES (Center for Biodiversity Conservation & Research) confirmed that the Nenskra Project area lies wholly outside of the candidate Emerald site boundary. Although the Project area resides outside of the boundary of the candidate Emerald site, some species for which the candidate Emerald site has been designated, may range into the Project area, therefore an Appropriate Assessment screening exercise has been undertaken, in line with European Habitats Directive guidance. The Appropriate Assessment Screening Report is presented in Vol 4. “Biodiversity Impact Assessment”.

C. Critical habitat assessment

A Critical Habitat Assessment has been performed, in line with relevant guidance (IFC, ADB, EIB and EBRD) to identify areas of high biodiversity value and which would be sensitive to the proposed development. The five criteria provided by the IFC have been assessed based on the primary data collected during the field biodiversity surveys. Also referenced within the assessments is the requirement of the EBRD to identify Priority Biodiversity Features and of the EIB to identify Natural Habitats. During the assessment of the five criteria, no Critical Habitats were assessed to be present within the Project-affected area (dam and reservoir, powerhouse and penstock, Nakra water intake), as the habitats present were considered to be modified through logging and stock grazing. While emblematic species such as brown bear, lynx and wolf are present in the Project area, none of the habitats present were considered to be Critical for the conservation status of these species as it was considered that habitats outside the Project area, (especially those upstream of the proposed impoundment area) provided more natural, less disturbed areas, with sufficient food availability for these species.

D. Predicted impacts on terrestrial biodiversity

Habitat loss. As a result of the Project there will be impacts regarding habitat loss. The total area of habitats potentially to be effected will be 861 ha. During the construction phase, approximately 314 ha of permanent forestry and scrub loss will occur. To compensate for this loss, the implementation of a Nenskra/Nakra watershed based Reforestation Management Plan is planned. The plan aims to restore and manage a greater area of forest, than that which will be lost. For temporarily lost habitats a Revegetation and Management Plan will be implemented to enable targeted planting and management to restore areas, to similar habitats to those pre-construction.

Mammal and birds. For mammal and bird species no significant impacts were predicted into account the identified mitigation. Only two red list/Annex 1 species of bird were recorded within the Project Area and which may also breed there: woodlark and red-backed shrike. Both species are regarded as being common and widespread in the region. The construction phase will displace the breeding birds where habitat removal occurs. Vegetation clearance works will therefore be timed to occur outside of the nesting season. Nest boxes suitable for Boreal owl (presence not confirmed through survey) and for bat species will also be erected on trees adjacent to the Project area. Monitoring for brown bear will also be undertaken; population estimates will be based on DNA analysis of brown bear dung. Monitoring for otter presence will also be undertaken at the same time as the fish/invertebrate surveys.

Induced access. As part of the Project an access track will be created from the dam area to the upstream end of the reservoir impoundment area. This would replace a track which already exists, but would be flooded by the reservoir. The new track would facilitate access to the upper Nenskra valley therefore mitigation would be implemented to control the access along the reservoir by-pass cattle track, to prevent use by vehicles. In the Nakra valley, the track which currently leads up to the weir location will be improved. This improved track is not anticipated to have any significant effect on the current rate of logging in the valley. However, as the weir and track will be located closed from the boundary of the proposed Svaneti Protected Area, the Project will continue to consult with MoENRP to identify defined conservation project(s) to (part) fund, to aid in the creation of the proposed Svaneti Protected Area.

E. Predicted impacts on river fish

Downstream of Nenskra dam. The Nenskra dam will prevent downstream migration of fish from the upper part of the valley to the lower Nenskra River, as no fish pass is proposed for the Nenskra dam. This is because the available technical solutions are considered to be

inefficient for a 130 m high structure, with fluctuating reservoir levels. Since no suitable spawning areas were identified downstream of the dam on the Nenskra river itself, the altered migration pattern could reduce the brown trout population over time, post construction, in the Nenskra River downstream of the dam, as the only available spawning areas would be within the tributaries flowing in to this stretch of the Nenskra. However, the fish impact assessment found that the change in river levels and flow velocity which will occur as a result of the dam could be of benefit to fish populations in some sections of the river.

River Habitat Enhancement. Downstream of the dam, close to the Tita bridge, a 2.2 kilometre long reach of the river could become a suitable area for nursery and spawning grounds. The expected increased sediment deposition downstream of the dam (due to a decrease in average flow rates) would likely contribute to the emergence of new spawning areas for the fish. However, it is anticipated that sediment deposition would take time, in the order of about 10 years. As a mitigation measure, a River Channel Maintenance/Habitat Enhancement Management Plan will be prepared and implemented. The plan will be informed by the results of ongoing fish monitoring and a year one post dam construction repeat River Habitat Survey. The River Channel Maintenance/Habitat Enhancement Management Plan will deal with the management of a 2.2 km section of river close to the Tita Footbridge area. This section of river will be managed as a spawning/nursery ground for trout; management is likely to include engineering of the river bed to achieve enhancement. On the Nakra River, a natural/slot pass hybrid fish pass will be constructed for the weir and ongoing monitoring to assess its efficacy will be undertaken.

Fish and invertebrate monitoring. Ongoing monitoring to assess the population levels of brown trout and invertebrate populations, in both the Nakra and Nenskra rivers will be undertaken. This monitoring will be ongoing through the construction and operational phase of the Project. The results will be used to inform the need for remedial action (e.g. re-stocking or catch and release of brown trout) if population levels are found to have significantly reduced over a given period of time.

3.7 Cumulative impacts

The information presented in this Section is described in detail in "Volume 10 - Cumulative Impact Assessment" of the 2017 Supplementary E&S Studies.

Objectives. The cumulative impact assessment has identified E&S impacts and risks associated with the Nenskra Hydropower Project that, in the context of existing, planned, and reasonable predictable developments, may generate cumulative impacts that could jeopardize the overall long-term environmental, social and economic sustainability of the Project and the Enguri watershed.

Other Projects. The predictable developments (see Map 5-8) that could generate cumulative impacts with the Nenskra HPP comprise: (i) the proposed Khudoni HPP, which is situated on the Enguri River downstream of the confluence with the Nenskra River; (ii) the existing Enguri reservoir and (iii) the potential small run-of-river hydropower sites that could be developed in the Enguri watershed, especially those on the tributaries of the Nenskra River (Darchi HPP, Lakhami HPP, Okrili HPP, Tskhvandiri HPP) or on the Nakra River (Nakra HPP). Also taken into consideration are the external activities – forestry, mining and tourism, and environmental stressors.

Terrestrial ecosystems and biodiversity. No significant cumulative impacts are predicted on terrestrial ecosystems and biodiversity because there is no spatial overlap of the affected areas of the different projects. On a watershed scale, the overall loss of resources is not significant.

River fish. The migration pattern altered by the construction of the Nenskra dam could reduce the brown trout population over time, post construction, in the Nenskra River downstream of the dam. The Khudoni project will also have significant impacts on fish resources by the creation of an artificial reservoir downstream of the Nenskra powerhouse. However, the two projects affect different reaches of the Nenskra and Enguri rivers and there is no spatial overlap of impacts. Consequently, it is expected that there will be no discernible cumulative impact on fish and fish habitat from the Khudoni and Nenskra projects. Nevertheless, the reduced flow in certain reaches of the Nenskra River's tributaries caused by small run-of-river schemes may represent a loss of fish habitat. However, it can be expected that the environmental authorities will require maintaining of ecological flows and construction of fish passes at the run-of-river weirs thus minimising the impact. Consequently, the residual impact is expected to be low and not significant. A population of brown trout could develop in the Khudoni reservoir, and which may at certain times of year move upstream and partially balance reduced fish numbers in the Nenskra River caused by the Nenskra Project. However, this positive impact will probably be marginal.

Social aspects. At the time of writing, the Nenskra Project's early works are ongoing, as are the discussions with affected people regarding resettlement and compensation. Concerns about the Nenskra HPP have been raised by stakeholders and some of the people from the Nenskra and Nakra valleys were not favourable towards the Project in the early stages. This was partly a result of a perceived lack of social license to operate on the part of the Project and hydropower developments in general. However, the Project has engaged with local communities and revised the design of certain facilities in order to avoid the need for physical displacement and minimise economic displacement. The Nenskra Project is now seen in a more favourable light, and some members of the community have expressed that they see the employment opportunities brought by the Project as positive. The Nenskra Project has the objective to set a standard with respect to the Good International Practice in terms of minimising social impacts, stakeholder engagement and public disclosure.

Most of the land needs for the Khudoni HPP, Nenskra HPP and the small run-of-river projects do not overlap spatially. However, the footprint of the Khudoni HPP labour camp may overlap with the Nenskra powerhouse work areas near Lakhami. This will depend on the final location of the Khudoni labour camp, which is still to be defined. There could be some similar cumulative land acquisition issues related to overlapping land requirements for the Nenskra Transmission Line in the area of the Nenskra powerhouse and the Khudoni substation. However, at the time of writing the location of these components are not available and in addition the Nenskra 220 kV Transmission Line will be designed, constructed and operated by GSE, who will also manage the land acquisition for the Transmission Line. GSE will consult JSCNH to harmonise approaches to environment and social risk management and mitigation.

Construction periods. There is uncertainty with regard to the start date of the Khudoni project construction works. In the event that the construction works for the Nenskra and Khudoni projects are concurrent, it can be expected to result in higher levels of traffic along the Jvari – Khaishi road and along the Khaishi – Chuberi road, compared to the case when the projects are constructed at different times. This has implications on the size of the road needed, upgrading requirements and road maintenance. There are also issues around noise and dust in terms of public health and safety. The high level of traffic may cause traffic delays or give the road a bad safety reputation affecting tourist development around Mestia. The physical presence of the proposed Khudoni reservoir would require that a new section of the Jvari – Mestia road to be constructed to replace the section flooded by the Khudoni reservoir. However, the route taken by the new section of the road has not yet been publically disclosed. In the case that the Khudoni project construction starts before the Nenskra Project construction, the distance covered by Nenskra Project traffic may be slightly longer.

Exposure to technological risk. The physical presence of the Nenskra dam and the Transmission Line will contribute to the general industrialisation of the valley and which translates as an increased exposure to technological risks. However, if exposure to risks is in alignment with European standards, although there may be an increase, the overall cumulative exposure shall be within acceptable and tolerable limits. The presence of the Nenskra dam could be perceived as an additional threat to the safety of the Khudoni dam and consequently downstream communities. However, the likelihood of failure of the Nenskra dam can expected to be in the same order of magnitude at that of the Khudoni dam – very remote likelihood - and the overall risk of the Khudoni dam failure with or without the presence of the Nenskra dam shall be within tolerable limits as defined by good international industry practice.

Microclimate. Discernible impacts on microclimate from the Nenskra reservoir could occur in the immediate area of the reservoir during the summer. Because of the small size of the reservoir these changes are not expected to be detectable beyond Tita, which is 4 km downstream of the dam. The microclimate changes around the Khudoni and Enguri reservoirs are not expected to rise up the valley to Chuberi – because the colder more humid air around the reservoir is denser than the ambient air and thus is not expected to move up a valley gaining 400 m in altitude. Consequently, there is no spatial overlap of areas affected by change in microclimate from the Nenskra and Khudoni projects and therefore no cumulative impact.

Reservoir triggered seismicity. It is considered that the combined physical presence of the Nenskra, Khudoni and Enguri reservoirs will probably not cause a Reservoir Triggered Seismicity event of greater magnitude than that of any one of the three reservoirs considered individually or the case without any of the dams. However, the additional stress that is put on the faults by the combination of the three reservoirs could increase the likelihood or frequency of Reservoir Triggered Seismicity. There are a number of faults situated between the Nenskra and Khudoni reservoirs. The faults are at similar distances from both the Nenskra and Khudoni reservoirs, and could be influenced by both the reservoirs, and the possibility of occurrence of Reservoir triggered seismicity cannot be excluded. As for the Nenskra Project reservoir alone, there are at present no feasible way to assess the maximum magnitude of Reservoir triggered seismicity earthquakes, but events with a magnitude of 4.5 on the Richter Scale and possibly slightly more must be regarded as possible, which although they can be felt are not expected to cause damage to buildings.

The cumulative impact mitigation strategy relies on all parties coordinating their plans and encouraging information sharing on each project. This would help ensure consistency between mitigation strategies, and more effective management of social and environmental aspects. The Georgia State can, and should, play a key role in coordinating the development plans for the various projects.

4 Environmental & social management

4.1 Responsibilities

JSC Nenskra Hydro. As the Project Company, JSCNH will take the full responsibility of the E&S management of the construction, operation and decommissioning of the Nenskra Hydropower Project (Nenskra Dam and Reservoir, Headrace Tunnel and Powerhouse, Nakra Water Intake and Transfer Tunnel).

GSE. The 220 kV Transmission Line to be developed from the Nenskra switchyard to the Khudoni substation will be designed, constructed and operated by a third party company, namely Georgian State Electrosystem (GSE). GSE will take the full responsibility of the E&S management of the construction, operation and decommissioning of the 220 kV Transmission Line that evacuates the power produced by the Nenskra Hydropower Project.

EPC Contractor. Although JSCNH takes the overall responsibility for the implementation of E&S mitigation and compensation measures of the Project, JSCNH delegates to the EPC Contractor (Salini Impregilo SA) the implementation of the E&S measures relating to the construction methods. This delegation is ruled by the E&S specifications that form part of the EPC Contract and that establish the objectives in terms of E&S performance for the construction methods. Some E&S actions that do not relate to the construction methods will be initiated during the construction period. These actions result from the mitigation strategy of the long term effects identified by the 2015 ESIA process and the 2017 Supplementary E&S Studies. Their implementation will be under the responsibility of JSCNH.

GoG. The Government of Georgia and JSCNH have shared responsibility for preparation and implementation of the land acquisition process for the implementation of the Project in compliance with the Georgian legislation and the Lenders policies. JSCNH will define and justify the land required for the Project construction and operation. GoG will review, approve or amend these land requirements. GoG will acquire the approved required lands and transfer to JSCNH the land title that is valid and free of encumbrances. JSCNH will pay costs and expenses incurred by the GoG and needed for acquiring all legal rights in accordance with the applicable laws and in compliance with the Lenders E&S policies.

4.2 Environmental & social management plan

The information presented in this Section is described in detail in “Volume 8 - Environmental & Social Management Plan” of the 2017 Supplementary E&S Studies.

Commitments. The 2017 supplementary E&S Studies complete the work conducted during the 2015 ESIA study. Through these studies, a number of mitigation and compensation measures have been identified to reduce or compensate the predicted adverse E&S effects resulting from the Nenskra HPP construction and operation. They are based on embedded mitigation involving site and technology choice, application of good international industry practice and enhancement measures that distribute benefits more equitably. These measures constitute the Project’s E&S commitments. They are approved by JSCNH and will be implemented during the lifetime of the Project. Through its E&S Management Plan (see Volume 8 - ESMP), JSCNH describes the management actions necessary to implement these commitments and

mitigation strategy, including the manner in which they will be executed, the timetable, the resources and the performance indicators. Management actions include the following:

- **A Land Acquisition and Livelihood Restoration Plan** has been prepared to guide the land take process and to ensure that all individuals affected by land acquisition for the Project are compensated for their land and assets, which will enable them to attain a standard of living similar to and, if possible, better than the existing one.
- **Management of access to pasture** potentially impaired by temporary works will be implemented through layout adaptation of camps and site installations before construction, and through conversion into pasture of temporary facilities (e.g. disposal area, laydown areas), post construction.
- **A Community Investment Program** sourced by the JSCNH during the construction period and the operation phase will be managed to financially support local initiatives which sustainably address educational, economic and social needs of communities in the Nenskra and Nakra valleys.
- **A Downstream Flood Protection Plan** will be prepared and implemented to design and execute (i) the most effective methods for controlling accumulated sediment by re-establishing periodically the natural flow of the Nakra River, sediment accumulation monitoring and possible river maintenance works, and (ii) the structural and non-structural measures to address potential flood flows downstream of the Nenskra dam that are higher than for the natural situation due to reservoir operation.
- **Emergency Planning** will be prepared, tested and resourced to respond to rapid variations of downstream river water level in the Nenskra valley including interface with local authorities and emergency services, in case of dam failure hazard, downstream release hazard or circumstances that potentially indicates an increase in the likelihood of a dam failure hazard or downstream release hazard happening.
- **Replanting of vegetation** will be planned and implemented in order to (i) eco-compensate the loss of forested area due to reservoir impoundment and construction of project's infrastructure, (ii) ensure the long-term reinstatement of areas disturbed during the construction period and prone to erosion, and (iii) conserve possible rare plant species existing on the construction areas.
- **Wildlife conservation measures** will be undertaken through (i) river fish habitat management in the Nenskra valley and construction of a fish pass on the Nakra weir, (ii) monitoring of brown bear and (iii) contribution to biodiversity conservation initiatives in the Enguri watershed in collaboration with NGOs and the Agency for Protected Areas.
- **River water quality** will be protected from project operations through (i) erosion control and effluent/drainage treatment during construction, (ii) vegetation clearing of the Nenskra reservoir and management of associated green waste, (iii) management of tunnelling spoil that represents an environmental risk as per good industry practice.
- **A Stakeholder Engagement Plan** has been prepared to summarize the public consultation process carried so far and the future engagement initiatives planned during the construction and the operation periods. See Section 4.3 below.
- **Detailed E&S obligations** have been included into the EPC Contract to ensure that construction methods do not incur adverse or non-compensated effects on communities, vegetation, soils, groundwater, biodiversity, natural drainage and water quality in areas adjacent to Worksites for the entire duration of the works. It includes the performance standards of the Lenders' E&S policies.
- **E&S Surveillance of Construction works** has been organized to supervise the good execution of the aforementioned E&S construction obligations as well as managing the changes of design required by the 2015 ESIA and 2017 Supplementary E&S Studies.

Natural hazard risks to workers are being addressed through development of a construction Emergency Preparedness Plan that will be informed by detailed studies of a number of potential risks.

- **E&S Monitoring** activities will be implemented to detect unpredicted adverse changes in communities and receiving environment, verify the effectiveness of the ESMP measures and plan corrective actions when and where required. The following indicators will be monitored during construction and the first years of operation: (i) downstream hydrology and environmental flow, (ii) river and drinking water quality, (iii) river fish habitats and fish pass efficiency, (iv) land use, erosion and revegetation progress, (v) livelihood restoration and socio-economic indicators.

4.3 Stakeholder engagement plan

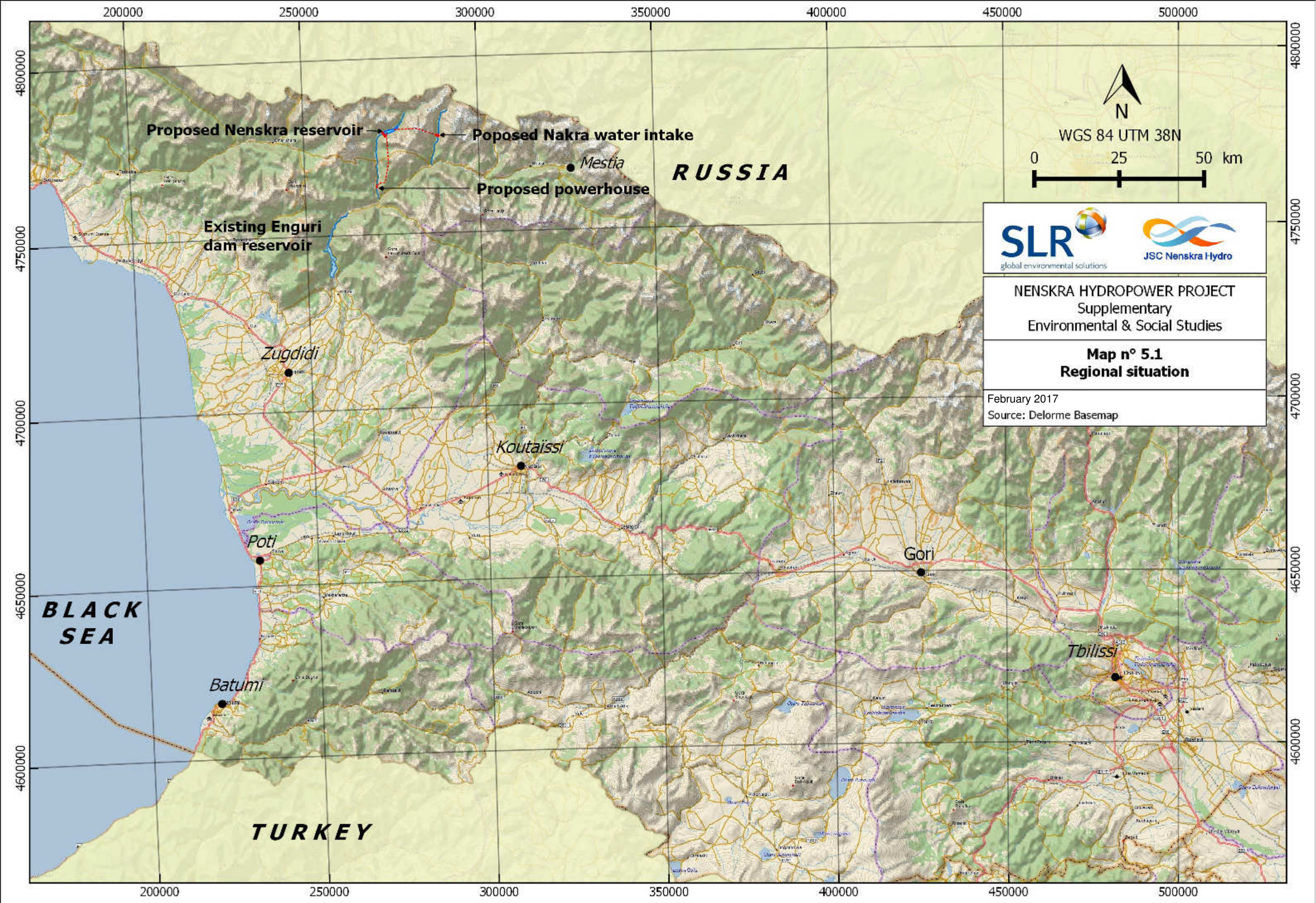
The information presented in this Section is described in detail in "Volume 7 - Stakeholder Engagement Plan" of the 2017 Supplementary E&S Studies.

Previous stakeholder engagement. The Nenskra HPP has conducted a number of stakeholder engagement activities in 2015-2016: (i) Public hearings in the valleys and in Mestia Municipality as part of the 2015 ESIA disclosure process, (ii) Focus groups, key informant interviews and households interviews as part of the socioeconomic surveys for the Supplementary E&S Studies from September to November 2015, (iii) Public information meetings in Chuberi and Naki in December 2015 to discuss the preliminary findings of the Supplementary E&S Studies and the proposed mitigation measures, (iv) Meetings with farmers affected by loss of pasture areas at the Nenskra dam site and at the Nakra water intake site in February, April and October 2016, (v) several meetings with the general population in 2016. These activities have been done prior to the disclosure of the Supplementary E&S Studies, including this report.

Comments from communities. Through these various meetings, the villagers in the Nenskra valley expressed their concerns about dam safety, employment opportunities, micro-climate change, and impaired access to the upper part of the Nenskra valley. The villagers in the Nakra valley expressed their concerns about the accumulation of sediments in the river downstream of the water intake, and the project-induced increased risk of floods if natural dams were created in the riverbed. Both communities highlighted the lack of local benefits in regards to the predicted adverse effects in their respective valley. In 2016, there have been demonstrations in the Nenskra valley from villagers who stressed the lack of communication and information about the project activities, as well as the absence of alternatives analysis to generate power without flooding the Nenskra valley.

Future activities. The future stakeholder engagement activities have been planned in accordance with the identified community's concerns. From 2017, a series of specific information meetings are scheduled with both the local communities and non-governmental organizations after the release the 2017 Supplementary E&S Studies. The EPC Contractor will also conduct dedicated meetings to further explain local recruitment procedures, traffic management, and important construction activities such as the use of TBM machine or explosives. Throughout the Project's lifecycle, JSCNH will ensure that stakeholders are well informed about the construction and then, the operation activities. Stakeholders will have the opportunity to express their opinion about the project and about JSCNH, including complaints. The delivery of information will meet all applicable legal requirements and will comply with the Lenders policies in terms of transparency, disclosure and grievance mechanisms. To facilitate this, the Project will implement a Grievance Mechanism that will allow affected people and other stakeholders to express their grievances or comments to the Project, with the aim of finding an amicable solution to resolve the grievances.

5 Maps



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4780000 4775000 4770000 4765000 4760000

Nenskra Dam and Reservoir

Nakra Intake

Transfer Tunnel

Headrace Tunnel

Powerhouse and Switchyard

Memuli

Nenskra

Okrili

Tita

Tita

Sgurishi

Kari

Zeda Marghi

Devra

Devra

Letsperi

Kvemo Marghi

Lekalmakhi

Kedani

Lakhami

Lakhani

Nenskra

Darchi-Ormeleti

Lukhi

Tobari

Laknashura

Lekverari

Lenkvashi

Anili

Kvitsani

Nakra

Latsomba

Nakra

Nodashi

Shtikhiri

Dizi

Khumpreri

Enguri

Kveda Ipari

Jorkvali

Khaira

Ipari

Lalia

N

WGS 84 UTM 38 N

0 0.5 1 2 3 Km

SLR

JSC Nenskra Hydro

NENSKRA HYDROPOWER PROJECT
Supplementary
Environmental & Social Studies
Volume 1 - Non-Technical Summary

Map n° 5.2
Project Location

Scale	Date
1:80,000 @ A3	February 2017

File n°901.6.2_ES Nenskra_Project location_V03Feb2017
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DAM AREA

500 m

Temporary facility

Permanent facility

Quarry areas

Reservoir

Technical installations

Disposal area

Construction camp

Dam

Nenskra

Map 5-3 - Permanent and temporary infrastructure

Serpentine road

Technical installations

Penstock

Headrace tunnel

Powerhouse

100 m

POWERHOUSE AREA

Nakra

Channel inlet

Transfer Tunnel

Head pond

weir

Fish pass

Technical installations

Construction camp

Disposal area

100 m

NAKRA INTAKE AREA

265000 270000 275000 280000 285000 290000 295000

4780000 4775000 4770000 4765000 4760000

N

WGS 84 UTM 38 N

0 0.5 1 2 3 Km

Nenskra Dam and Reservoir

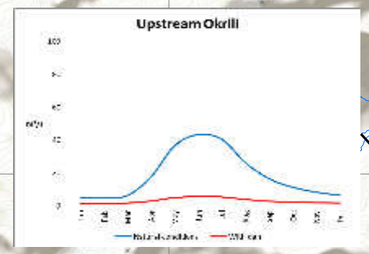
Nakra Intake

Transfer Tunnel

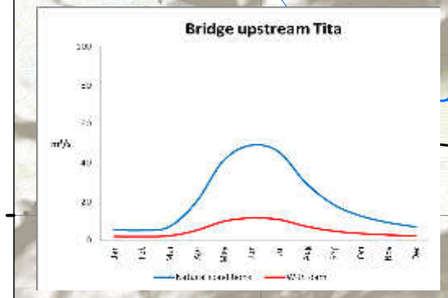
Headrace Tunnel

Powerhouse and Switchyard

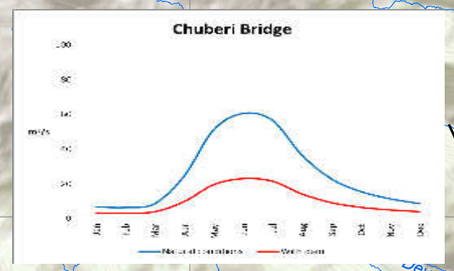
Upstream Okrili



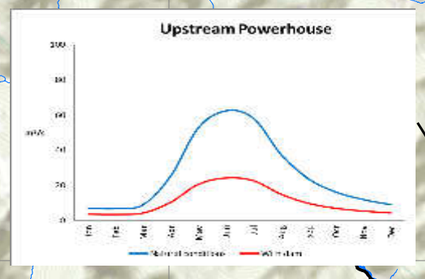
Bridge upstream Tita



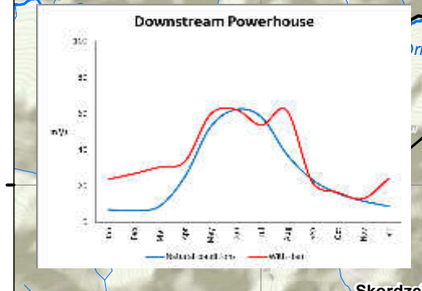
Chuberi Bridge



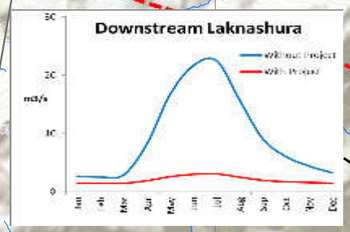
Upstream Powerhouse



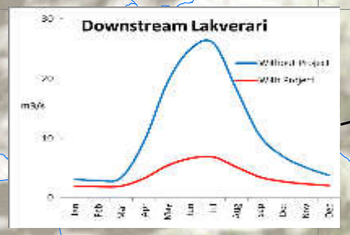
Downstream Powerhouse



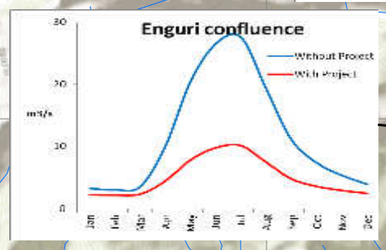
Downstream Laknashura



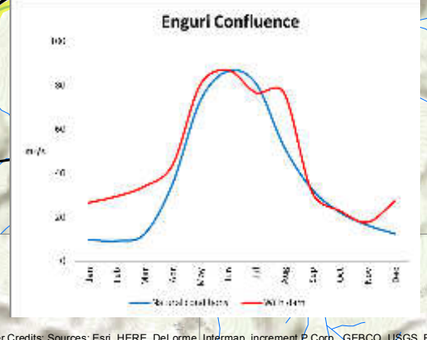
Downstream Lakverari



Enguri confluence



Enguri Confluence



Nenskra Dam

Russia

Black Sea

Turkey

Armenia

Azerbaijan

Tbilisi

Nenskra Dam

Mestia

Enguri Reservoir

Zugdidi

Okrili

Nenskra

Tita

Sgurishi

Kari

Zeda Marghi

Devra

Letsperi

Kvemo Marghi

Lekalmakhi

Kedani

Lakhani

Lukhi

Tobari

Khaishi

Skordzeti

Lenkvashi

Anili

Kvitsani

Nakra

Latsomba

Nodashi

Shtikhiri

Dizi

Khumpreri

Enguri

Kveda Ipari

Jorkvali

Laila

Legend

- Mean annual flow <5% of baseline flow
- Mean annual flow 5 - 15% of baseline flow
- Mean annual flow 15 - 40% of baseline flow
- Mean annual flow 90 -100% of baseline flow
- Mean annual flow >100% of baseline flow
- No change to mean annual flow slightly higher flow in winter - slightly lower flow in summer

SLR

JSC Nenskra Hydro

NENSKRA HYDROPOWER PROJECT

Supplementary Environmental & Social Studies

Volume 1 - Non Technical Summary

Map 5.4

Hydrological Impacts

Scale 1:90,000 @ A3

Date February 2017

File n°
901.6.2_ES Project_Location_Main_Compartments_V06Feb2017

Source:
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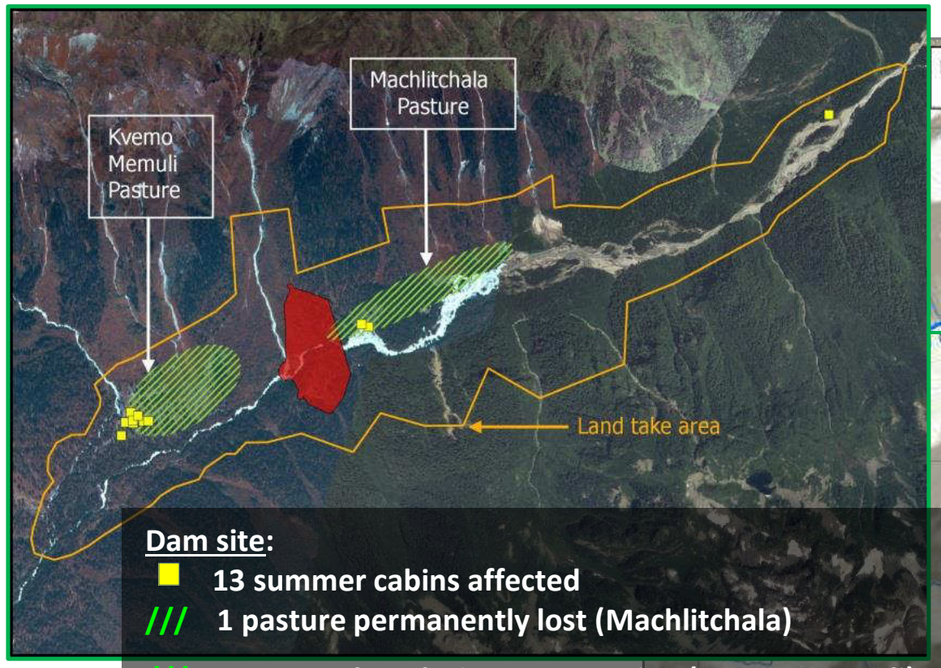


Dam site:

- 13 summer cabins affected
- /// 1 pasture permanently lost (Machlitchala)
- /// 1 pasture lost during construction (Kvemo Memuli)

Total: 20 affected households

Nenskra Dam and Reservoir

Nakra Intake

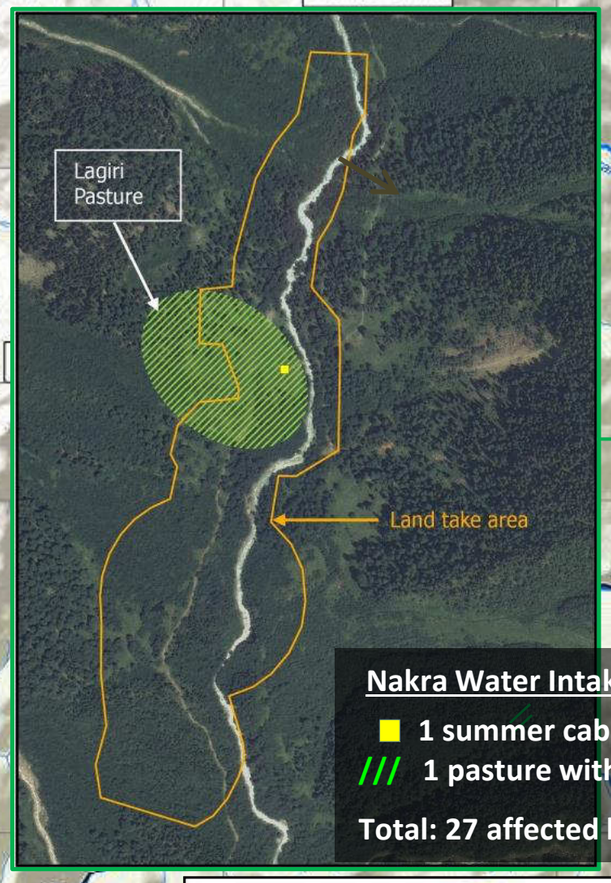
Transfer Tunnel

Operators village:

1 household affected by loss of land

Road widening:

32 households affected by loss of land, trees, fences or ancillary structures



Tita
Sgurishi
Kari
Zeda Marghi
Devra
Letsperi
Kvemo Marghi
Lekalmakhi
Kedani
Lakhar
Jorkvali
Lukhi
Tobari
Powerhouse and Switchyard
Nenskra
Darchi-Ormeleti
Lenkvashi
Anili
Kvitsani
Nakra
Latsomba
Nodashi
Shtikhiri

Powerhouse area:

- 2 occupied houses
- 1 house not occupied
- 1 household affected by loss of land

Total: 4 affected households

Nakra Water Intake area:

- 1 summer cabin affected
- /// 1 pasture with partial permanent loss

Total: 27 affected households

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Map 5.5 - Land requirements
February 2017

260000 265000 270000 275000 280000 285000 290000 295000 300000 305000

4790000 4785000 4780000 4775000 4770000 4765000 4760000

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
- Residentail Areas including House and Gardens

N

WGS 84 UTM 38 N

0 1 2 4 6 Km

Nenskra Dam and Reservoir

Transfer Tunnel

Nakra Intake

Headrace Tunnel

Powerhouse and Switchyard

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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Map n° 5.6
Broad Scale Habitats

Scale	Date
1:125,000 @ A3	February 2017

File n°901.6.2_Critical_Habitat_Assessment_Fauna_V03Feb2017
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
L_6768-B-UW-TT-GE-DW-001_001

260000 265000 270000 275000 280000 285000 290000 295000 300000 305000

4790000 4785000 4780000 4775000 4770000 4765000 4760000

Legend

- Emerald Candidate Site Svaneti – Year 2016
- Planned Svaneti Protected Area

N

WGS 84 UTM 38 N

0 0.5 1 2 3 4 Km

Nenskra Dam and Reservoir

Transfer Tunnel

Nakra Intake

Headrace Tunnel

Powerhouse and Switchyard

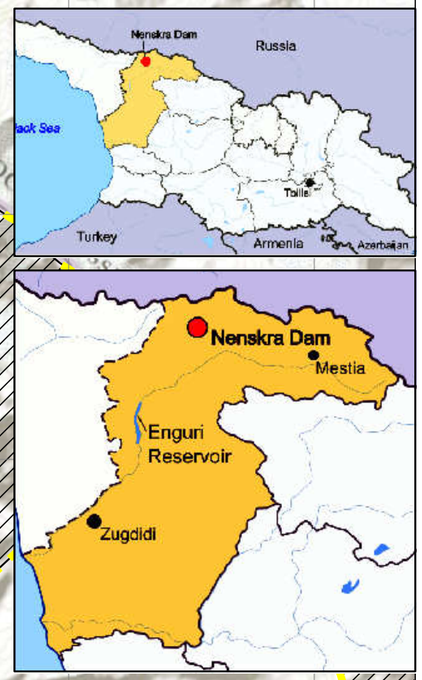
Nenskra

Nakra

РОССИЯ RUSSIA

OCHAMCHIRE

3794 m 3953 m 3806 m 3968 m 3447 m 2927 m



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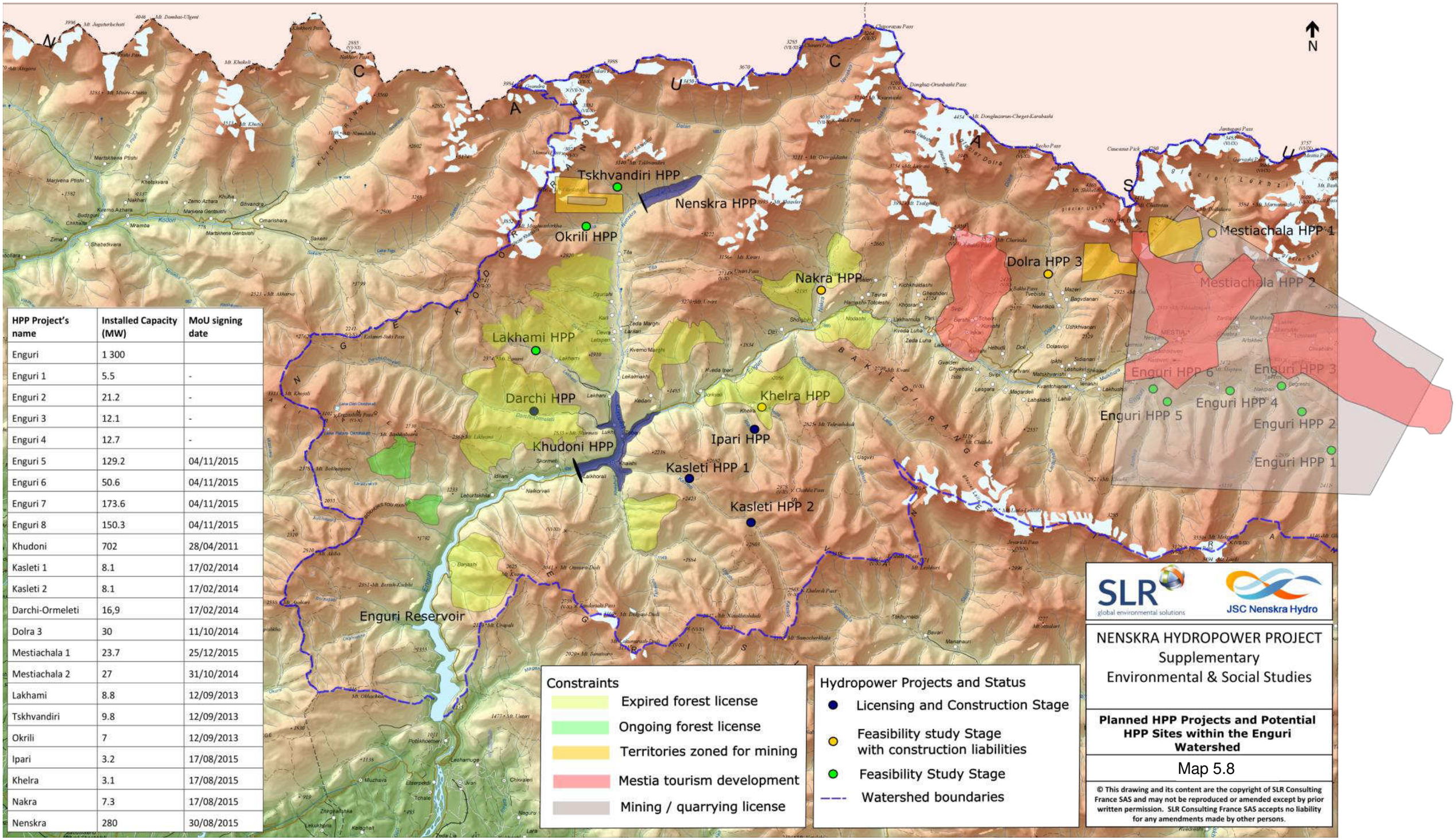
Map n° 5.7
Boundaries of Proposed Svaneti Protected Area and Candidate Svaneti Emerald Site

Scale	Date
1:125,000 @ A3	February 2017

File n°901.6.2_Proposed_Svaneti_Emerald_Boundaries_V20Feb2017
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
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

HPP Project's name	Installed Capacity (MW)	MoU signing date
Enguri	1 300	
Enguri 1	5.5	-
Enguri 2	21.2	-
Enguri 3	12.1	-
Enguri 4	12.7	-
Enguri 5	129.2	04/11/2015
Enguri 6	50.6	04/11/2015
Enguri 7	173.6	04/11/2015
Enguri 8	150.3	04/11/2015
Khudoni	702	28/04/2011
Kasleti 1	8.1	17/02/2014
Kasleti 2	8.1	17/02/2014
Darchi-Ormeleti	16,9	17/02/2014
Dolra 3	30	11/10/2014
Mestiachala 1	23.7	25/12/2015
Mestiachala 2	27	31/10/2014
Lakhami	8.8	12/09/2013
Tskhvandiri	9.8	12/09/2013
Okrili	7	12/09/2013
Ipari	3.2	17/08/2015
Khelra	3.1	17/08/2015
Nakra	7.3	17/08/2015
Nenskra	280	30/08/2015



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Planned HPP Projects and Potential HPP Sites within the Enguri Watershed

Map 5.8

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Industry


Infrastructure


Mining & Minerals


Oil & Gas


Planning & Development


Renewable & Low Carbon


Waste Management