CAUCASUS CLEAN ENERGY FUND – ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM (ESMS) AUDIT

December 2022

NRM Services AS

Natural Resource Management

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Submitted to:

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0 EXECUTIVE SUMMARY

This report summarises the main findings of the audit of the Environmental and Social Management System (ESMS) for the Caucasus Clean Energy Fund (CCEF, or "the Fund") including a review of the environmental and social management at five small hydropower projects in the Fund's portfolio in Georgia. The report also provides recommendations for further work to optimise management of environmental, social, health and safety (ESHS) risks and opportunities. The Audit mainly covers the period since the ESMS was introduced in 2017 after which it was revised in 2019.

0.1 THE FUND

The Caucasus Clean Energy Fund invests in small hydropower projects in Georgia. Projects typically have an installed capacity less than 20 MW. Private equity capital is invested mainly in greenfield but also operational run-of-river small hydropower projects. Funds are managed on behalf of multiple development finance institutions, prominent family offices and institutional investors.

An important part of the Fund's engagement is to provide expertise not only to deliver robust financial results but also sound non-financial results including undertake environmentally and socially responsible projects. A key element of this commitment has been the development and implementation of an Environmental and Social Management System (ESMS) for the CCEF to guide and ensure compliance with environmental, social, health and safety standards and also to add value to the Fund's operations.

0.2 AUDIT OBJECTIVES

The main purpose of the Audit was to evaluate the ESMS implementation and the environmental and social performance at the Fund and its portfolio companies as represented by five selected portfolio projects. The Audit included three interrelated objectives:

- Independent ESMS review: Undertake an independent review of the ESMS implementation and the Fund's environmental and social performance including review of the interrelated elements of the ESMS, potential gaps in environmental and social performance and identify appropriate corrective measures.
- Learning for improvements: Identify lessons learned and good environmental and social management practices for sharing and improved operations at the Fund.
- Propose updates: Propose updates to the ESMS to ensure relevance and added value to the Fund's operation.

The Audit's scope included reviewing performance in relation to international ESHS standards such as those of the International Finance Corporation (IFC) and the European Investment Bank (EIB).

The Audit was based on document review, discussions with persons involved with the projects, and brief site visits to five portfolio projects in Georgia either in operation (Lakhami 1 and 2, and Bakhvi 3) or in final stages of construction (Akhalkalaki 1 and 2). Discussions were also held on three projects under development (Bakhvi 1, Bakhvi 2a, and Bakhvi 2b).

0.3 MAIN FINDINGS

0.3.1 Environmental and Social Management System

The ESMS is overall sound, comprehensive and to a substantial extent developed with hydropower in mind rather than being generic. The ESMS includes policies, identifies most main ESHS risks, outlines a number of management plans and procedures, outlines organisational responsibilities, and emphasises stakeholder engagement as well as grievance management. Key issues expected in an ESMS are therefore in place and in a manner relevant to the Fund's projects.

All ESHS procedures cannot and should not be placed in an ESMS. Parts are better placed in more specific plans or procedures as part of implementing the ESMS at project-specific level. No major gaps in the ESMS were found, the balance between coverage of issues in the Fund's ESMS versus project-specific procedures is generally sound, but some aspects either require or would benefit greatly from further detailing in specific plans or procedures. In particular, some hydropower-specific risks should be further elaborated in checklists or guidance for Terms of References for studies (e.g., fish migration issues, environmental flows, interface with hydrology studies), guidance for monitoring (e.g., of aquatic ecology and fish, water quality), and clearer analytical frameworks for learning (e.g., learning on environmental flow releases, fish migration). Developing a set of ESHS key performance indicators could assist in both prioritising resources during project operations and documenting important performance areas.

The ESMS would also benefit from further visualisations of the main issues, processes and workflows to be readily understandable by non-expert audiences, in particular how ESHS risk management is efficiently integrated into interdisciplinary project planning, contractor tendering, construction, commissioning and operations.

It is important to note that the above-mentioned ESMS modifications are mostly about optimising and refining an already well-functioning environmental and social risk management and increase value-for-money rather than correcting non-compliances or gaps, of which there are very few.

0.3.2 ESHS Risk and Impacts

In terms of risks and impacts, the likely single most important audit finding is that through sound site identification and selection the Fund has been able to avoid and minimise many environmental, social, health and safety risks in the first place. The importance of this approach by the Fund should not be underestimated. Even with a wise site selection, the Fund and its projects continue to invest substantial resources to integrate ESHS risk management measures after site selection, that is, during further project planning, construction as well as in operations and maintenance. Overall, the Fund's small hydropower projects therefore have a low risk profile and impacts experienced are likely small overall and also small measured per unit of energy produced (e.g., in GWh) when compared with other small hydropower projects. The ESMS likely played an important role in lowering the risk profile substantially, which also underscores the relevance of the ESMS for the Fund, its operations, and the projects' attractiveness at a future exit by the Fund.

Of particular importance is that the five projects reviewed (Akhalkalaki 1 and 2, Lakhami 1 and 2, and Bakhvi 3) have all avoided physical displacement. Three additional projects under development (Bakhvi 1, 2a and 2b) also appear to avoid physical displacement. The importance of such avoidance for economic, timeline, social and reputational risks should not be underestimated. A precise value of such avoidance is difficult to estimate as the potential costs of these risks only reveal themselves fully after problems arise. It is also worth noting that despite the low level of social risks and impacts, the projects have invested well beyond social compliance requirements and continue to support surrounding communities and consolidating the social license to operate.

An impressive 70 environmental, social and governance (ESG) indicators were monitored regularly for the projects. Easy-to-digest presentations of this large volume of information were not seen despite the important results achieved and shown through these indicators. The ESG indicators largely related to the United Nations (UN) Sustainable Development Goals (SDGs) rather than key hydropower-specific impacts (or the avoidance of such impacts). No indications of substantial adverse impacts were observed during the Audit, beyond the obvious impacts of land take and substantially reduced river flow along the diverted river sections for much of the year. More robust monitoring, analysis and communication of a limited number of key indicators for hydropower projects during construction and operations may consolidate the impression of, and better document, the low risk profile of the project portfolio (e.g., physical and economic displacement, water quality, fish and or other important indicators of biodiversity impacts, health and safety indicators, socio-economic benefits at local level). Depending on the ESHS criteria and requirements of future potential buyers of the portfolio projects as well as their exposure to hydropower projects, a more systematic monitoring of key ESHS issues related to hydropower projects may add value to the Fund's past and future investments. For some of the indicators it may be worth benchmarking against other hydropower projects or other renewable energy projects.

0.3.3 Performance Gaps

Quite unusually in the small hydropower world, there were no major ESHS performance gaps identified that had a clear risk potential or caused materially adverse ESHS impacts. It should be noted that the level of site verification and stakeholder engagement were limited during the Audit, but the consistency in audit findings indicated that substantially greater efforts in audit data collection and analysis might not have changed the conclusions significantly.

Possibly the most significant ESHS weakness observed in an overall impressive performance, was the generic rather than site-specific approach to environmental flows and fish migration and the ESIAs' seemingly limited understanding of aquatic ecosystems in a hydropower context. In the specific projects reviewed, this may not materially have affected the environmental and social compliance in a narrow sense. But there may be portfolio projects where ecologically ineffective or unjustified measures come at a cost and reduce power output, and where resources could have supported also aquatic ecosystem in better ways. This unfortunate situation appears to be caused by generic rather than site-specific national requirements, which do not reflect a wealth of experiences from other countries on what are ecologically meaningful mitigation measures under various conditions, as well as stakeholder perceptions and expectations of undertaking certain measures. Unfortunately, the generic and at times ecologically ineffective measures are supported by at times weak or incorrect aquatic ecology analysis in ESIAs as opposed to illustrating the variation in site-specific aquatic ecosystem conditions and how this may affect the appropriateness of mitigation measures.

While regulatory requirements are beyond the control of the Fund and portfolio projects, the aquatic ecology analysis in ESIAs and monitoring documentation can be managed better by the Fund. For instance, the Fund could contribute to ESIAs and monitoring documentation better reflecting internationally documented experiences with functional and non-functional aquatic ecology and fish mitigation measures. This is an opportunity more than a compliance gap. It is recommended that aquatic ecology, and fish migration and passage in particular, receives more attention by the Fund in terms of future monitoring, interpretation of monitoring data while using peer-reviewed, published literature on mitigation measures for aquatic ecosystems in a hydropower context, particularly systems with brown trout. This may be the area with the potential greatest further added value to the Fund from the ESMS and the more specific procedures supporting ESMS implementation. Recommendations in this respect are included below (see Section 3.4).

0.3.4 Good Practices and Lessons

Good practices identified, which have been facilitated by a well-developed ESMS, include:

- Good site identification and selection.
- Early investment in ESHS risk management.
- Early stakeholder engagement to secure a social license to operate.
- On-site ESHS staff presence to deliver good implementation and performance.
- ESHS requirements placed on, and support to contractors, to deliver results.

Some of the main lessons that can be extracted include:

- Low risk hydropower portfolio is possible.
- Trust and confidence can be established in hydropower-sceptical communities.
- ESHS-Engineering interface provides solutions.
- Aquatic ecology issues require different approaches to better reflect site-specific conditions.

0.3.5 Corrective Actions and Optimisations

The well-developed ESMS and generally sound implementation of the ESMS mean there are few corrective actions and no substantial non-compliances identified in this Audit. Potential modifications are more about optimising and finetuning the ESMS and its implementation.

Moving towards the Fund's exit and sale of the project portfolio, it is important that the overall very positive ESMS audit results herein do not allow for complacency in terms of ESHS risk management. With a portfolio mainly in, or entering, the operations phase, there are fewer actionable changes to site identification, early project planning, and construction practices. Nevertheless, potential actions and optimisation both during project development as well as operations and maintenance are outlined below within three prioritised areas.

<u>Environmental and Social Management System</u>

The overall sound ESMS has contributed to added values for the Fund and no substantial revision of the ESMS is proposed following this Audit. Section 3.4.1 of the main text lists several smaller ESMS-related recommendations that the Fund should review. The capable staff at the Fund and portfolio projects are best placed to consider how the issues should be taken forward, whether to modify the ESMS, whether to develop project-specific procedures to address the issues, or a combination of these two. The ESMS audit consultant considers the development of more specific procedures in certain areas to be of clearly higher priority than a significant revision of the ESMS.

The modifications to the ESMS or development of procedures can be undertaken in the first half of 2023. Most if not all of this work can be undertaken internally, possibly reviewed and supported by external expertise as in previous years. Depending on the priorities of the Fund, more specialised expertise may be required in certain areas such as for aquatic ecology and related measures.

<u>Aquatic Ecology</u>

The area of aquatic ecology, and in particular fish migration and passage as well as linkages to environmental flow, is where modifications or optimisations appear most required to follow international good practice and will have the largest potential for added value to the Fund. Aquatic

ecology mitigation measures should be better analysed and justified ecologically. Certain measures in some projects would likely be better to remove or revise (e.g., fish stocking, upstream and downstream fish passage, riverbed management), if possible given regulatory requirements and other limitations. Potentially, this may result in increased power production, increase revenue in some portfolio projects, and channel more resources towards useful measures and monitoring in the area of aquatic ecology. This Audit has placed extra emphasis on the aquatic considerations as other issues were generally well-addressed and these aquatic issues are among the relatively few ESHS issues that may materially affect hydropower project design, construction, and operations. Whether regulatory agencies and stakeholders are willing to open up the discussions based on data and research and gradually abandon one-size-fits-all type of mitigation measures remain to be seen, if the Fund believes this important area is worth exploring further. Further recommendations are made in Section 3.4.2.

Development of requirements and guidance concerning ESIA consultants and monitoring consultants can be undertaken in the first half of 2023. Protocols for internal collection and analysis of aquatic ecology monitoring data can be prepared and initiated during the first half of 2023 but implementation may not start in earnest until the second half of the year. Thereafter, the monitoring should be an adaptive process where modifications are made in light of practical experiences and findings, whether internally or externally generated. If the monitoring appears to add value, it should likely continue until the exit and at a level the Fund and projects find appropriate in light of the initial experiences. External support is likely required in defining monitoring protocols and analytical frameworks but most of the actual field work can be undertaken by project staff, ideally supported by in-country researchers on an intermittent basis. It is likely beneficial with some external support after initial testing and experiences with the monitoring to review protocols, interpret results in an aquatic ecology-hydropower context, incorporate the wealth of international experiences from similar aquatic ecology systems, and possibly to adapt the monitoring protocols and analytical frameworks as the work progresses.

ESHS Key Performance Indicators

There appears to be potential for improvements in monitoring and reporting by developing a set of key performance indicators more targeted at hydropower-related ESHS issues that can also provide important documentation on low risks and good performance towards the exit, which may also be of particular interest for potential buyers. The proposed indicators (see Section 3.4.3 in the main text) are therefore focussed more on hydropower than the current, large ESG impact metric database. The former is not proposed to replace the latter but rather supplement the more generic ESG indicators. The more hydropower-oriented indicators are described in Section 3.4.3 and cover aspects like water quality/pollution, health and safety, grievances, environmental flow compliance, fish migration, and displacement. If of interest to the Fund, these may also be used for benchmarking.

The indicators can be refined in the first half of 2023 with baseline conditions established for the most part in this period. Monitoring and reporting can thereafter be implemented until the exit. Most of this work can be undertaken internally.

0.3.6 Towards the Exit

The Fund plans to exit from the projects by selling the portfolio approximately in 2025. The main audit recommendation is to continue the sound implementation of ESHS measures until the Fund's exit, document the sound ESHS measures well, ensure institutional memory and hand-over where transition from construction to operation results in staff changes, as well as critically consider what should be prioritised and can realistically be undertaken prior to the Fund's exit based on the recommendations made in this Audit (see Sections 3.4 and 3.5).

0.4 CONCLUSIONS AND RECOMMENDATIONS

The existing Environmental and Social Management System is overall sound and includes the main required elements. The ESMS has been competently implemented and adds value to the Fund's operations. The Fund's site identification and selection have been particularly important in reducing the risk profile of portfolio projects both in absolute terms and compared with similar size hydropower projects.

No substantial performance gaps or non-compliances that represent a clear ESHS risk or resulting in adverse ESHS impacts were identified. Substantial changes to the ESMS are not recommended. Any modifications are more about finetuning and optimising than changing.

Three main areas should be considered for modifications and optimisation:

- ESMS: Minor modifications to the ESMS or development of separate procedures to fill small gaps or optimise the ESMS, mainly concerning project operations and maintenance (see Table 3.3 and Section 3.4.1).
- Aquatic ecology: Aquatic ecology related measures, mostly on fish migration and partly on environmental flow, with potential further added value by the ESMS to the Fund (see Section 3.4.2).
- Monitoring: Revised ESHS indicators focussed toward the exit to provide potential buyers and stakeholders with better documentation of low risks and good performance (see Section 3.4.3).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXES

ACRONYMS AND ABBREVIATIONS

CCEF	Caucasus Clean Energy Fund
EHS	Environment, Health and Safety
EIB	European Investment Bank
ESAP	Environmental and Social Action Plan
ESG	Environmental, Social and Governance
ESHS	Environment, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESS	Environmental and Social Standards
GEEREF	Global Energy Efficiency and Renewable Energy Fund
GWh	Gigawatt hours
IFC	International Finance Corporation
KBA	Key Biodiversity Area
OeEB	Development Bank of Austria
PS	Performance Standard
RAP	Resettlement Action Plan
SDGs	Sustainable Development Goals
ToR	Terms of Reference
UN	United Nations

1 INTRODUCTION

This report summarises the main findings of the Environmental and Social Management System (ESMS) audit for the Caucasus Clean Energy Fund (CCEF, or "the Fund"). The Audit also included review of environmental and social management issues at five small hydropower projects in the Fund's portfolio in Georgia: Bakhvi 3 (operational), Lakhami 1 (operational), Lakhami 2 (operational), Akhalkalaki 1 (near commissioning at the time of the visit), and Akhalkalaki 2 (near commissioning at the time of the visit). In order to contextualise this report, the introductory section below provides a brief background to the Audit, outlines the purpose and scope of the Audit, and summarises materials and methods applied.

1.1 BACKGROUND

The Caucasus Clean Energy Fund is a private equity fund, managed by Cerberus Frontier, focused on providing equity capital to small hydropower projects (less than 20 MW installed capacity each) in Georgia since 2015. CCEF is anchored by Global Energy Efficiency and Renewable Energy Fund (GEEREF), a well-known clean energy investor in emerging markets advised by the European Investment Bank (EIB) and by the Development Bank of Austria (OeEB).

The Fund seeks to implement environmental, social, health and safety (ESHS) standards in line with Georgian and international requirements. The Fund's ESMS outlines how CCEF will deliver ESHS compliance at the Fund and project levels.

1.2 PURPOSE AND SCOPE OF THE AUDIT

The main purpose of the Audit was to evaluate the ESMS implementation and the environmental and social performance at the Fund and its portfolio companies that develop and operate small hydropower projects in Georgia.

The Consultant has understood the Audit as covering three interrelated objectives:

- **Independent ESMS review:** Undertake an independent review of the ESMS implementation and the Fund's environmental and social performance including review of the interrelated elements of the ESMS, potential gaps in environmental and social performance and identify appropriate corrective measures.
- **Learning for improvements:** Identify lessons learned and good environmental and social management practices for sharing and improved operations at the Fund.
- **Propose updates:** Propose updates to the ESMS to ensure relevance and added value to the Fund's operations.

The Audit also documents to investors and stakeholders the quality of the current ESMS and the effectiveness of ESMS implementation including contributions to the environmental and social performance of the CCEF at different stages of the project life cycle. Learning from the Audit can improve effectiveness and cost-efficiency of ESHS activities across the portfolio, improve overall project performance as well as provide useful learning for investors and stakeholders in other contexts.

The scope of the Audit is described in the Terms of Reference (Annex 1) and can be summarised as follows:

- Review and summarise the environmental, social, health and safety risks, impacts and opportunities related to the Fund's operations.
- Assess the relevance of the ESMS and the performance of its implementation including performance gaps and corresponding corrective actions.
- Identify good practices as well as lessons to improve effectiveness and cost-efficiency of ESHS risk management.
- Propose updates to the ESMS where needed to improve relevance, fill gaps, and add value to the Fund's operations including prioritise updates and recommend implementation timelines.

As an integral part of the Audit, the ToR requested that at least three (3) portfolio projects were to be evaluated as basis for understanding the implementation context, provide specific examples and illustrations, and to identify opportunities of inter-project learning.

1.3 MATERIALS AND METHODS

1.3.1 Overall Approach and Methodology

The Audit is based on document review, discussions with persons involved with the Fund and the portfolio projects, and brief visits to project sites in September 2022.

Document review covered documents provided by the Client as well as documentation collected by the Consultant including from other hydropower projects (see Annex 2 for list of documents). Regular discussions were held with the Client on the scope, methodology, assessments, analysis, recommendations and progress of the Audit. Discussions were partly online and partly in-country at the main office in Tbilisi and partly at project sites with portfolio project staff (see Annex 3 for listed of persons). Meetings in Tbilisi were held on the 26th and 30th of September while site visits were undertaken on the 27th–29th September (see Annex 4 for itinerary). The site visits covered projects in operation, projects under construction, and discussions were also held with staff involved in the development of further projects where studies and designs were ongoing. Discussions were also held with an independent external advisor on environmental and social issues who has been working with the Fund in recent years. A draft version of the report was presented to the Client and representatives of FMO on the 31st October.

Reference documents and context for the Audit, which CCEF operates in line with, included:

- Georgian regulations and frameworks and the practical working conditions in Georgia including stakeholder expectations.
- IFC Environmental and Social Performance Standards (IFC, 2012).
- EIB Environmental and Social Standards (EIB, 2022).
- International conventions and agreements including the Sustainable Development Goals (SDGs).
- CCEF frameworks and procedures for decision-making and project implementation including in deal preparation, approval and monitoring as well as the ESMS itself.

As an initial step in the Audit, a review was undertaken of ESHS risks, impacts and opportunities associated with development of hydropower projects in the small hydropower range (less than 20 MW installed capacity) in the Caucasus and Georgian contexts. This was to contextualise the ESMS Audit.

Based on document review and site visits, the ESMS and environmental and social performance were assessed, gap analysis was undertaken, and practical improvements or corrective actions and measures were considered. From the review of performance and practices, a number of good practices and lessons were identified at the Fund and project levels. These cut across issues and stages of the project life cycle. This provided a basis for recommending measures to improve the effectiveness and cost-efficiency in ESHS risks management.

Finally, recommendations for updates to the ESMS and associated procedures were considered. These focussed on adding value to the operations of the Fund from project identification to completion and eventual exit.

1.3.2 Limitations

The Client was very responsive in terms of availing documentation and relevant staff for the purpose of the Audit. An efficient schedule with useful meetings and informative site visits in-country was organised. Most of the documentation was available in English. The main limitation of the Audit was therefore the available time (21 days in total) including the available time for site-based inspections and stakeholder discussions. There are, however, no specific indications that additional time would likely change the main conclusions and recommendations substantially but the empirical basis for the analysis, conclusions and recommendations would have been wider and deeper.

As the overall sound implementation of the ESMS quickly became evident during the Audit, the priorities of the Audit were partly shifted towards some of the aquatic ecology and monitoring issues. Rather than spreading limited resources evenly across an all-encompassing compliance audit as per detailed IFC Performance Standards and EIB Environmental and Social Standards, more emphasis was placed on aquatic ecology and fish migration in particular as this was considered the area with the greatest potential for improvements and where most added value for the Fund and some of the portfolio projects could be realised.

2 THE FUND AND REVIEWED PROJECTS

2.1 CERBERUS FRONTIER AND THE CAUCASUS CLEAN ENERGY FUND

The private equity firm Cerberus Frontier invests in several sectors in growing Asian and African economies. In Georgia, Cerberus Frontier pioneered the Caucasus Clean Energy Fund I with a focus to provide equity capital to small hydropower plants (less than 20 MW) in a mountainous country well suited for hydropower development. The Fund's investments are bundled through a holding company, Caucasus Clean Energy Holding. The ESG Policy has capped project size to 30 MW installed capacity (ref. ESMS Appendix XIII), but none of the five main reviewed and visited projects were above 10 MW. The largest projects considered are three projects on the Bakhvistskali river with proposed installed capacities between 10 and 24 MW.

Funds are managed on behalf of multiple development finance institutions, prominent family offices and institutional investors that also subscribe to multiple ESHS standards. Cerberus Frontier is committed to ensure investments have positive impacts beyond achieving successful financial results including community development and environmental protection. The CCEF commits to operate in line with Georgian regulations and leading international standards such as the IFC Environmental and Social Performance Standards (IFC 2012) and the EIB Environmental and Social Standards (EIB 2018, 2022). An important part of this commitment has been the development and implementation of an Environmental and Social Management System (ESMS) for the CCEF to guide and ensure compliance with environmental, social, health and safety standards and add value to the Fund's operations. CCEF also decided to recruit a short-term consultant to undertake an audit of the Fund's ESMS, which is presented in this report.

2.2 PROJECTS

The Fund has developed a project portfolio consisting of both earlier commissioned projects and greenfield projects. The small hydropower projects are in different parts of Georgia and represent different implementing conditions from engineering, environmental and social perspectives. Currently, the Fund's portfolio includes five operational projects (Achi, Intsoba, Bakhvi 3, Lakhami 1, and Lakhami 2)[1] and two projects nearing commissioning at the time of the site visits in September 2022 (Akhalkalaki 1, and Akhalkalaki 2).[2] The Fund is currently planning three further small hydropower projects upstream of the Bakhvi 3 project, that is, Bakhvi 1 and Bakhvi 2 where the latter has more recently been split into two projects (Bakhvi 2a, and Bakhvi 2b). Additional hydropower development opportunities have been and continue to be explored by the Fund.

Table 2.1 below summarises key project information including selected engineering data and Table 2.2 summarises selected environmental and social data. Some typical project data have been omitted because they are not relevant for the projects in question. For instance, none of the projects have a reservoir (storage) or practice hydro-peaking and related data are therefore not included.

[1] The Achi Hydropower Project (1 MW, operational since 1958) is located on the Achistskali river, Adjara region. The Intsoba Hydropower Project (1.8 MW, rehabilitated in 2015) is on the Intsoba river, Kakheti region. These two projects were not reviewed during this ESMS Audit.

[2] The Akhalkalaki 1 and 2 Hydropower Projects have commissioned since the site visits, in October 2022.

Table 2.1: Key project information including engineering data for the Fund's portfolio as reviewed in the ESMS Audit (text in italics refers to planned projects).

	Bakhvi 3	***Bakhvi 1***	***Bakhvi 2a***	***Bakhvi 2b***	**Lakhami 1**	**Lakhami 2**	**Akhalkalaki 1**	**Akhalkalaki 2**
Location	Near Ukanava village (Bakhvi 3) or near Bakhmaro resort (Bakhvi 1), Ozurgeti Municipality, Guria Region (Bakhvi 1 partly also in Chokhatauri Municipality, Guria Region).				Near Lakhami village, Mestia Municipality, Samegrelo-Zemo Svaneti Region		Near Diliska and Korkhi villages, Samtskhe-Javakheti Region	
River	Bakhvistskali	*Bakhvistskali*	*Bakhvistskali*	*Bakhvistskali*	Lakhami	Lakhami	Paravani	Korkhi (tributary of Paravani river)
Cascade	Potentially Bakhvi 1-5	*Potentially Bakhvi 1-5*	*Potentially Bakhvi 1-5*	*Potentially Bakhvi 1-5*	Lakhami 1-2	Lakhami 1-2	Small hydros-Akhalkalaki 1 - Paravani HPP	Not applicable
Construction start	December 2011	*Not started*	*Not started*	*Not started*	September 2018	September 2018	2020	2020
Commissioning	July 2015	*Not applicable*	*Not applicable*	*Not applicable*	August 2020	October 2020	October 2022	October 2022
Installed capacity (MW)	9.8	*10.9*	*11.6*	*23.8*	7	10.5	7.5	1.6
Estimated annual generation (GWh)	38	*43.1*	*45.5*	*92.8*	28.3	42.5	42.5	10.3
Plant factor	44%	*45%*	*45%*	*45%*	46%	46%	65%	74%
Units (MW)	2 x 4.0MW (Francis), 1 x 1.8MW (Pelton)	*2 x 5.45 MW (Pelton)*	*2 x 5.8 MW (Pelton)*	*2 x 11.9 MW (Pelton)*	2 x 3.5 MW (Pelton)	3 x 3.5 MW (Pelton)	3 x 2.5 MW (Francis)	1 x 1.6 MW (Francis)
Turbine capacity (m^3/s)	6.0	*4.0*	*4.6*	*5.3*	2.5	3.75	15.0	2.8
Gross / net head (m)	200 / 195	*342 / 320*	*312 / 297*	*551 / 530*	337 /325.9	337 /325.9	61 / 56	72 / 65
Dam / powerhouse elevations (m asl)	500 / 300	*1,731 / 1,389*	*1,378 / 1,066*	*1,057 / 506*	1400/1047	1070/708	1,616 / 1,555	1,627 / 1,555
Weir height (m)	5.5 (from ground)	*4.4 (from ground)*	*4.6 (from ground)*	*4.4 (from ground)*	3.5 (from ground)	2.9 (from ground)	4.0	2.5
Intake	Side intake (left bank)	*Side intake (left bank)*	*Side intake (right bank)*	*Side intake (left bank)*	Tyrolean	Tyrolean (and water directly from Lakhami 1)	Side intake (left bank)	Tyrolean (possibility of side intake if Tyrolean freezes)

Table 2.2: Key data related to environmental and social issue for the Fund's portfolio as reviewed in the ESMS Audit (text in italics refers to planned projects).

	Bakhvi 3	***Bakhvi 1***	***Bakhvi 2a***	***Bakhvi 2b***	**Lakhami 1**	**Lakhami 2**	**Akhalkalaki 1**	**Akhalkalaki 2**
Mean annual flow (MAF)	3.4	*2.9*	*3.4*	*3.9*	1.86	2.76	13.4	3.0
Environmental flow	0.34	*0.29*	*0.34*	*0.39*	0.18	0.27	1.3	0.3
E-flow (as % of MAF)	10%	*10%*	*10%*	*10%*	9.7%	9.8%	9.7%	10%
Seasonal eflow variation?	No	*No*	*No*	*No*	No	No	No	No
Key water interests	Mainly ecosystem	*Mainly ecosystem*	*Mainly ecosystem*	*Mainly ecosystem*	Mainly ecosystem	Mainly ecosystem	Ecosystem and irrigation scheme	Mainly ecosystem
Diverted section (km)	3.7	*3.95*	*3.2*	*3.75*	3.7	4.4	3.6	1.9
E-flow release	Via fish passage	*Via fish passage*	*Via fish passage*	*Via fish passage*	Via fish passage	Via fish passage	Via fish passage	Via fish passage
E-flow backup release	Via Flushing Gate	*Via Flushing Gate*	*Via Flushing Gate*	*Via Flushing Gate*	Via Gravel Trap Flushing Gate	Via Gravel Trap Flushing Gate	Via Flushing Gate	Via Flushing Gate
E-flow monitoring (water level converted to flow via calculations)	Automated intake water level	*Automated intake water level*	*Automated intake water level*	*Automated intake water level*	Staff gauge in upstream fish passage	Staff gauge in upstream fish passage	Automated level sensor in fish passage	Automated water level downstream the fish passage
Fish passage moving upstream	Formal, vertical slot passage	*Formal, vertical slot passage*	*Formal, vertical slot passage*	*Formal, vertical slot passage*	Formal, vertical slot passage	Formal, vertical slot passage	Semi-natural passage	Semi-natural passage
Fish passage moving downstream	No specific fish passage downstream				No specific fish passage downstream	No specific fish passage downstream	Fish diverter in sedimentation basin.	No specific fish passage downstream
Sediment flushing	From intake pond, sedimentation basin and forebay	*From intake pond and sediment-ation basin*	*From intake pond and sedimentation basin*	*From intake pond and sediment-ation basin*	From Tyrolean weir and sedimentation basin	From Tyrolean weir and sedimentation basin	From small reservoir and sedimentation basin	From small reservoir and sedimentation basin
Physical displacement?	No	*No*	*No*	*No*	No	No	No	No

Figure 2.1 shows the project locations within Georgia while Figures 2.2, 2.3 and 2.4 show the Bakhvi project locations on Bakhvitskali river, the Lakhami 1 and 2 projects on Lakhami river, and the Akhalkalaki 1 and 2 projects on the Paravani and Korkhi rivers, respectively.

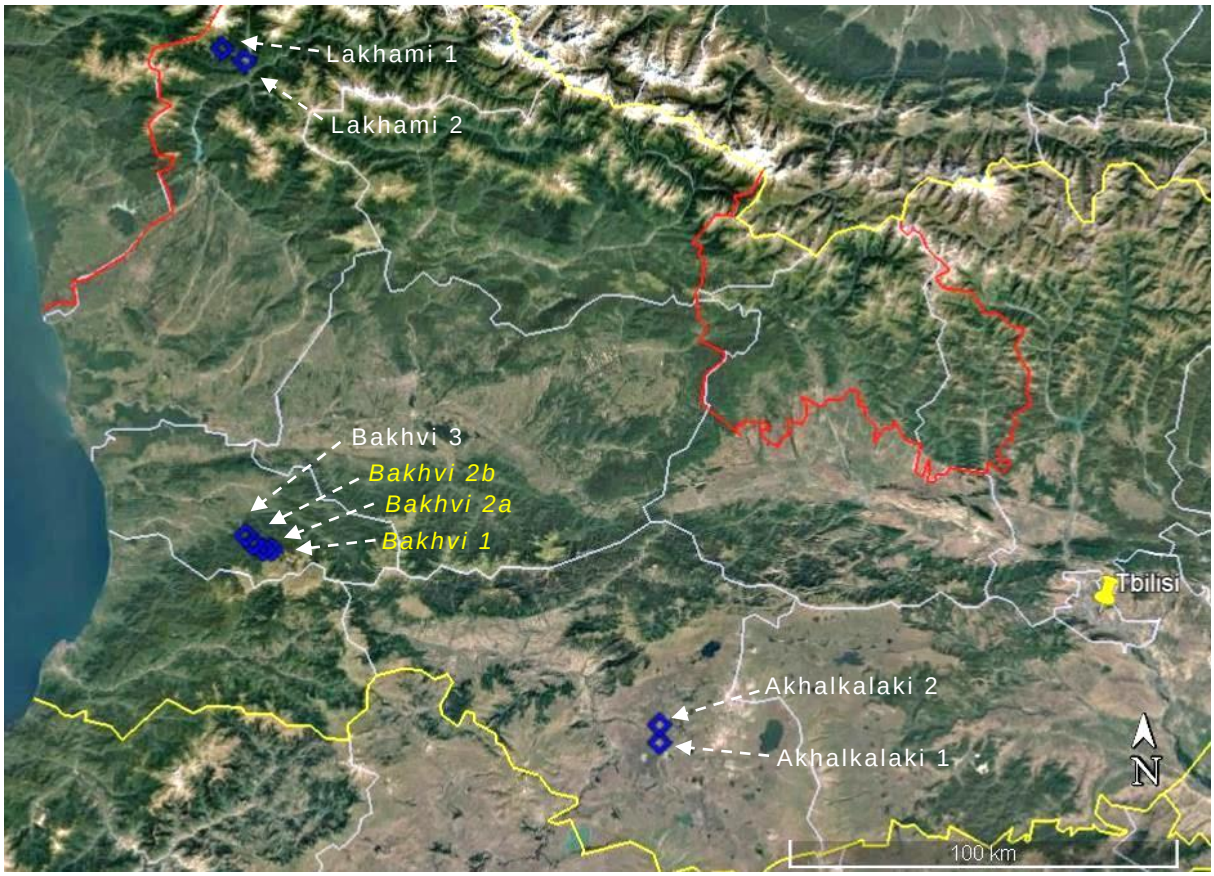


Figure 2.1: CCEF project locations considered in the ESMS Audit including five projects in operation or final stages of construction (white text) and three projects at planning stage (yellow text).

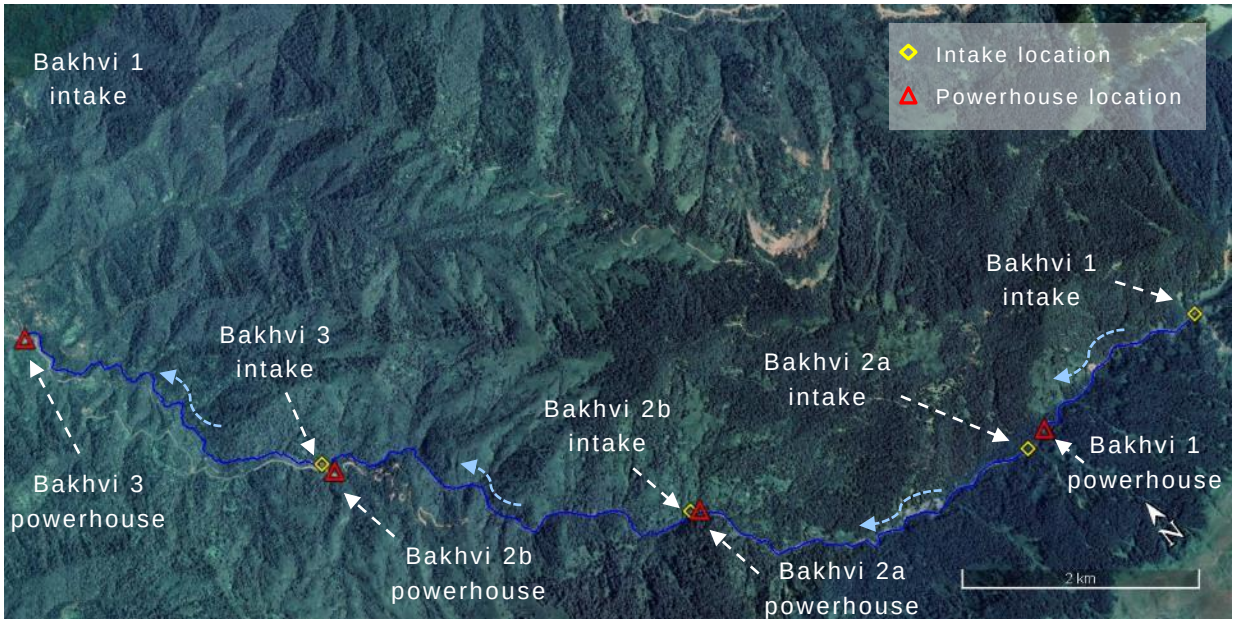


Figure 2.2: Bakhvi project locations on the Bakhvitskali river, with Bakhvi 3 operational and Bakhvi 1, 2a and 2b planned for construction.

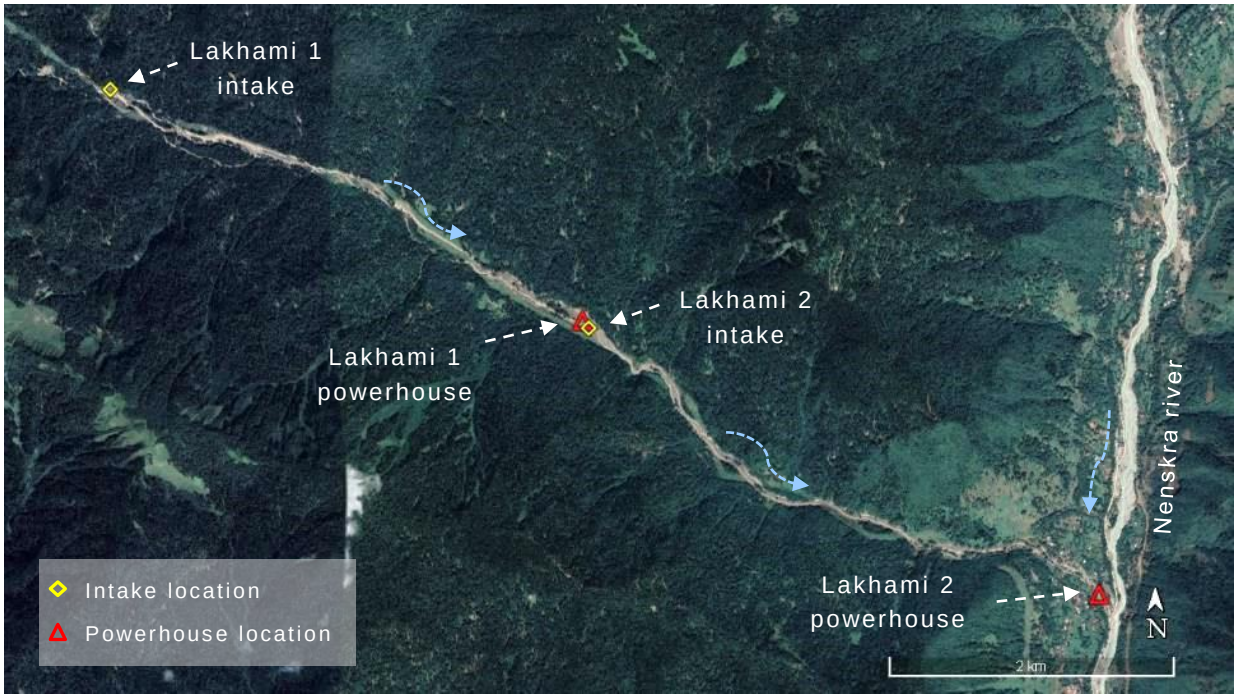


Figure 2.3: Lakhami 1 and 2 project locations (operational) on Lakhami river shortly upstream of the confluence with the Nenskra river.

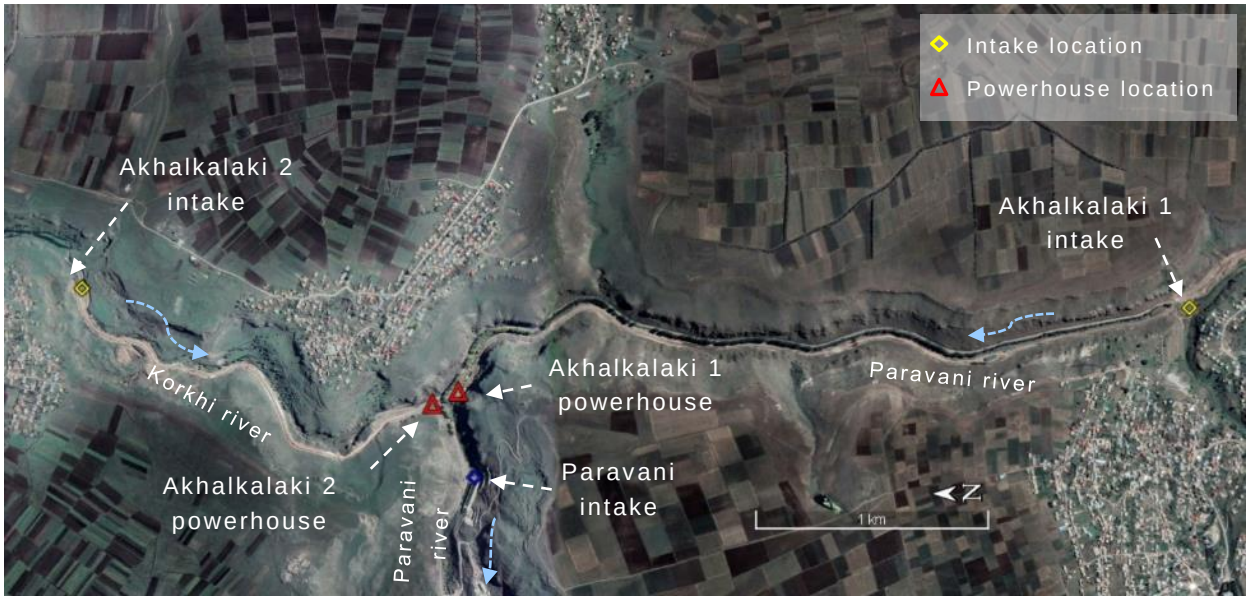


Figure 2.4: Akhalkalaki 1 and 2 projects locations (operational) on the Paravani and Korkhi rivers with the Paravani hydropower project intake shortly downstream.

3 ESMS RELEVANCE AND PERFORMANCE

Section 3.1 below summarises a review of the ESMS structure and contents while Section 3.2 considers the practical implementation and performance with reference to portfolio projects. The review of performance has been structured according to the IFC Performance Standards. Based on this review, a selection of good practices and lessons have been identified and described briefly in Section 3.3, while Section 3.4 discusses recommended corrective actions and optimisations for ESHS risk management and documentation. Suggestions for how to approach ESHS risk management as part of the exit strategy are included in Section 3.5.

At the time of developing the ToR for the ESMS and at the time of the site visits in September 2022, the Fund was still considering investment in additional projects, that is, beyond those mentioned in this report. During the finalisation of this report, the Fund informed that investments in further projects would not be undertaken. Some of the recommendations developed in this report concerning early-stage project development may therefore be of lower priority for the Fund.

3.1 ESMS STRUCTURE AND CONTENTS

The Environmental and Social Management System (ESMS) includes four main parts:

- A brief Environmental and Social Policy.
- Multiple Investment Appraisal and Supervision Procedures across seven (7) main stages of the Fund's project life cycle from deal vetting to non-compliance management.
- A brief description of Organisation and Responsibilities.
- Comprehensive descriptions of Internal and External Reporting including checklists and templates.

3.1.1 Environmental and Social Policy

The Environmental and Social Policy is short (1 page) but reflect key issues by specifically referring to investing in hydropower "with minimal environmental and social impact" and "introduce international best practice" in Georgia across the project life cycle (design–construction–operation). Specific reference is also made to EIB and IFC standards. This provides a high-level ambitious and relevant context, while specifics are left for the procedures that are included in the ESMS.

3.1.2 Investment Appraisal and Supervision Procedures

The Fund has developed a comprehensive set of Investment Appraisal and Supervision Procedures that cover seven stages in the project life cycle from deal vetting to non-compliance management. These steps are illustrated in Figure 3.1. Undoubtedly, the Fund places substantial emphasis on integrating ESHS risk management in the operations and decision-making.

Hydropower projects are characterised by a large variation in project design, construction approaches and operational conditions. While projects certainly have many similarities, each project is generally tailored to the site-specific conditions. Hydropower projects may have highly variable levels of environmental and social risks. Rightly, the Fund's ESMS places substantial emphasis on identifying risks early, communicating the high ESHS requirements to partners early, and categorising projects according to their risk profile in order to avoid and minimise investment in projects that are associated with significant time, resource or reputation risks due to their ESHS

risk profile. The large variation in potential ESHS risks for hydropower projects, means that the ESMS' emphasis on ESHS-related activities being commensurate with project risks and impacts is very important and a sound approach.

Most ESHS issues are covered by the ESMS. The ESMS appears largely to be framed around the IFC Performance Standards (PS), which were launched in 2012. International financiers' thinking and procedures concerning some thematic areas have evolved since 2012, and the ESMS is less explicit or detailed on some of those issues. For instance, recent years have seen a substantially increased attention to gender-based violence and sexual harassment, which is covered in the IFC PS but not as prominently as in international standards and guidance updated since the IFC standards in 2012.[3] This Audit has not found indications that gender-based violence or sexual harassment are issues not managed by the portfolio projects, and in some respects the site selection and limited displacement and community interface mean that the portfolio projects are likely less exposed to such risks. Nevertheless, the Fund may want to consider supplementing the ESMS with guidance specifically on such issues that receive substantial attention from financiers at present. Towards the Fund's exit, there may be further developments in financiers' priority issues that will be beneficial to reflect in the ESMS or in procedures closer to the exit. Such developments should be monitored.

Figure 3.1: Main stages of the investment appraisal and supervision procedures outlined in the ESMS.

The risk considerations covered in the ESMS place particular emphasis on biodiversity (natural habitats, protected or internationally recognised areas), physical displacement as well as major

[3] There are numerous guidance documents published by reputable financing institutions in recent years on the issue including from the World Bank, for instance "Good Practice Note – Addressing Gender Based Violence in Investment Project Financing involving Major Civil Works" (28 Sep. 2018) and "Good Practice Note – Gender" (October 2019). EIB's latest Environmental and Social Standards (February 2022) also elaborates on this issue in Standard 7 "Vulnerable Groups, Indigenous Peoples and Gender".

cultural heritage or touristic sites. Step 1 (deal vetting) and step 2 (due diligence and summary of key terms) in the ESMS procedures are specifically geared towards avoidance and minimisation of such risks, which is important and highly appropriate. This in-principle approach by the Fund appeared to be confirmed by observations during this Audit's review of specific portfolio projects. The review indicated that the early and critically important elements of the ESMS were translated into real action and undertaken competently and successfully.

A minor comment on the ESMS is that Step 2 (due diligence and key terms) would benefit from clarifying and illustrating the scope of the ESMP compared with the ESAP as well as clarifying the scope of these plans compared with other plans listed under Step 2 that are overlapping in coverage, for instance Stakeholder Engagement Plan, Environmental and Social Impact Assessment, Land Acquisition and Livelihood Restoration Plan, Resettlement Action Plan, Retrenchment Plan, Social Content Management Plan, Biodiversity Action Plan, and Visual Impacts Assessment. The lack of such clarify may contribute to confusion for new staff joining the Fund or portfolio projects and can contribute to unnecessary overlap, increased risk of inconsistencies and sub-optimal resource use.

The translation of an ESMS into operational measures is not only dependent on internal factors such as ESMS clarify, staffing, and other resources. This appears evident for some of the aquatic ecology issues where external factors such as regulatory requirements and stakeholder perceptions and expectations appear to have contributed to mitigation measures that are either not backed by sound ecological data or reasoning. The regulatory requirements and perceptions underpinning the social license to operate have pulled fish passage requirements and partly environmental flows requirements away from what is ecologically and scientifically based. Instead of assessing the need for and design of mitigation measures based on site-specific analysis of conditions, there appears to be generic requirements that are not well justified from ecological, engineering or economic perspectives. This appears to be the main reason for some of the mitigation measures described in the ESMS not being implemented in an effective manner, for instance fish passage requirements that appear poorly justified from an ecological perspective while at the same time introducing operational challenges and reducing income if fish passage was to be ensured upstream and downstream. For more information, see descriptions under IFC PS 6 in Table 3.3 below.

The Fund's ESMS has also been translated into an ESMS at portfolio project level. The project-specific ESMS are more operationally oriented documents that consider project-specific conditions to a greater extent and effectively is a steppingstone between the Fund's ESMS and practical procedures. This steppingstone may in some ways be unnecessary if ESHS management plans at project level are developed appropriately by translating the Fund's ESMS into operationally relevant procedures. Nevertheless, going through the ESMS process at project level can build capacity and ownership of project staff ultimately responsible for translating the Fund's ESMS into practical tools and actions at project level.

This Audit has not prioritised a detailed review of the project-level ESMS'. Focus was on the Fund's ESMS and the project performance as indications of how the ESMS is implemented.

3.1.3 Organisation and Responsibilities

The brief (1 page) section on organisation and responsibilities refers to the appointment of an ESG Manager at the Fund level who will report directly to the Managing Director. The description is appropriate but very brief with minimal information about how roles and responsibilities are divided between the Fund level and portfolio project level, and how different disciplines interact.

The substantial ESHS capacity at the Fund and project levels as well as the engineering-ESHS interface and cooperation that are taking place, and is contributing to the overall good ESHS performance, are not clearly reflected in the ESMS' section on organisation and responsibilities. However, updating of this section is not considered of high priority as the results on the ground speak for themselves and the organisation and responsibilities are documented elsewhere. Should the ESMS be updated due to other reasons, it is recommended to use the opportunity to add some further information in this section to better reflect the organisation, capacity, roles and responsibilities that in reality are more elaborate than signalled in this ESMS section. At the current stage of project portfolio development, the focus of such potential update should focus on the operations and maintenance phase leading towards the exit.

3.1.4 Internal and External Reporting

The higher-level objectives have been translated into comprehensive Internal and External Reporting requirements and guidance including checklists and templates. These are generally practical procedures, they reflect a number of hydropower-specific issues, and they can result in relevant measures being implemented on the ground. This has contributed to the good ESHS performance and low risks observed.

A multitude of internal and external presentations, updates and reports have been developed at project and Fund levels to describe progress and status either specifically for environmental and social issues, or across the project portfolio and covering multiple aspects. Reports include weekly, monthly, quarterly and annual reports as well as thematic monitoring reports. The substantial internal reporting means that the head office in Tbilisi is well-informed of progress and status at the site levels. Regular site visits to the projects further strengthen this oversight and contribute to guidance and improved compliance with ESHS requirements.

3.2 IMPLEMENTING INTERNATIONAL STANDARDS

The main part of the ESMS Audit is presented in this section. The assessment is organised as per the eight IFC Performance Standards (2012). While these are organised slightly differently than the EIB environmental and social standards (2013, 2018, 2022), the main aspects covered are largely the same and the main requirements are similar. Table 3.1 provides a simple overview and comparison of the IFC and EIB standards for easy reference.

Table 3.1: An overview of the IFC Performance Standards (2012) compared with the EIB Environmental and Social Standards (2013, 2018, 2022).

IFC Performance Standards (2012)	EIB ESS 2013, 2018	EIB ESS 2022
1. Assessment and Management of Environmental and Social Risks and Impacts	1. Assessment and Management of Environmental and Social Impacts and Risks	1. Environmental and Social Impacts and Risks
2. Labour and Working Conditions	8. Labour Standards	8. Labour Rights
3. Resource Efficiency and Pollution Prevention	2. Pollution Prevention and Abatement	3. Resource Efficiency and Pollution Prevention
4. Community Health, Safety and Security	9. Occupational and Public Health, Safety and Security	9. Health, Safety and Security
5. Land Acquisition and Involuntary Resettlement	6. Involuntary Resettlement	6. Involuntary Resettlement

IFC Performance Standards (2012)	EIB ESS 2013, 2018	EIB ESS 2022
6. Biodiversity Conservation and Sustainable Management of Living Natural Resources	3. Biodiversity and Ecosystems	4. Biodiversity and Ecosystems
7. Indigenous Peoples	7. Rights and Interests of Vulnerable Groups	7. Vulnerable Groups, Indigenous Peoples and Gender
8. Cultural Heritage	5. Cultural Heritage	10. Cultural Heritage
	4. Climate-related Standards	5. Climate Change
	10. Stakeholder Engagement	2. Stakeholder Engagement
		11. Intermediated Finance

Table 3.3 below summarises the main findings from the ESMS Audit. For each of the eight IFC Performance Standards, performance criteria have been defined and the audit observations are summarised per criteria alongside an assessment of the level of risk observed for each of the criteria and recommended actions, if applicable. Risks assessed can categorised as “low”, “medium”, “high” or “critical” as described in Table 3.2.

Table 3.2: Risk categories and colour coding applied in the ESMS audit findings summary (Table 3.3).

LEVEL	DESCRIPTION
Low risk	No or only small ESHS risks, gaps, or non-compliances. The risks can be easily addressed, e.g., through limited adjustments or minor efforts. There is generally a good understanding of the risks. The risks are not expected to affect investors, financiers, or potential buyers.
Medium risk	A medium risk, gap or non-compliance that could represent a challenge to a project’s operations and where modifications in the plans or approaches supplemented by monitoring may be required. A medium risk, gap or non-compliance may be inadequately understood, and additional efforts may be required to appropriately manage the risk. Such extra work is expected to be achievable within a reasonable timeframe and budget. Once the risk is addressed or appropriately managed, it will no longer be expected to affect investors, financiers, or potential buyers.
High risk	A substantial risk, gap or non-compliance is where a project does not meet the requirements of the applicable regulation or standard. Additional studies or substantial work are required to address the gap or risk. High risks, gaps or non-compliance are generally those where there is a significant gap in the documentation or practices and risks that a project would find very difficult / challenging to address in order to comply with regulations or standards. Dedicated action points with accompanying resources are required with clear timelines, yet these action points need to be technically and economically feasible. Addressing the high risk, gap or non-compliance may require engagement with regulatory agencies and/or the investors, financiers, or potential buyers to ensure their expectations and requirements are understood and met.
Critical risk	A critical risk, gap or non-compliance is a potential fatal flaw item for which it is anticipated that a project cannot, or will be extremely challenging to, align to applicable regulations or standards based on the existing project design, operations and maintenance status or plans. Addressing a critical risk, gap or non-compliance typically requires significant changes in project designs, plans, operations or assumptions. Management of such risks must be discussed and agreed with investors, financiers or potential buyers as well as relevant regulatory agencies.

It should be noted that due to the overall very good performance in terms of ESHS risk management, there are only issues of “low” and “medium” risk identified (see column on “Risk” in Table 3.3). Therefore, there are relatively few recommended corrective actions. The continued implementation of the many existing ESHS risk management measures is generally not reflected in the “Recommended action” column of Table 3.3 except where these are considered particularly important. In such cases, “ongoing” is included before the recommendation. Where important opportunities were identified, the recommendation is indicated as “opportunity” to differentiate from corrective measures. Recommendations concerning “ongoing” actions and “opportunities” are reflected in italics in Table 3.3 to differentiate from corrective measures.

Table 3.3: Summary of ESMS Audit findings for the Caucasus Clean Energy Fund, Georgia, organised as per IFC Performance Standards.

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
	Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts			
ES1	Environmental and Social Management System (ESMS).	The Fund has a comprehensive ESMS. The Fund's ESMS includes procedures across the project life cycle and policies. Specifics on emergencies are not included in the ESMS but the projects have Emergency Preparedness and Response Plans. The useful information in the ESMS may be more easily understood by non-expert audiences with more illustrations in the ESMS, including visualisations such as flow charts illustrating the project life cycle, deal stages, interlinkages and relationships between workstream and plans, etc. The project companies for the Bakhvi 3 as well as the Akhalkalaki 1 and 2 projects have ESMS at project level developed in 2019 and 2020, respectively. The project level ESMS is substantially shorter than the Fund's ESMS and focuses more on which types of environmental and social management plans should be developed at project level to address risks and impacts.	Low	Review the full width of Audit recommendations to consider which ones are best incorporated into an updated ESMS, which ones are better incorporated into updated project-level procedures, and which Audit recommendations should be reflected in both the Fund's ESMS and in project-level procedures. The focus of the recommendations is more geared towards key operations and maintenance issues.
ES2	Environmental and social capacity.	There are dedicated environmental, social, health and safety personnel at the Fund level (based in Tbilisi) and dedicated on-site staff for projects during planning/prior to construction (Bakhvi 1, 2a and 2b), during construction (Akhalkalaki 1 and 2), and during operations (Lakhami 1 and 2, and Bakhvi 3). Personnel have relevant backgrounds and appear to have a sound understanding of issues, risks, impacts and management measures enabling adaptive management of ESHS issues. External support has also been provided by an international consultant since 2018. Staff changes typically occur when projects commission and move into the operations and maintenance phase. Important insights and experience may be lost or diluted in such transition unless there is hand-over and preferably overlap between ESHS staff involved during construction and staff with ESHS responsibilities during operations.	Low	Ensure institutional memory through sufficient overlap between ESHS staff during construction and staff responsible for ESHS issues during operations and maintenance.
ES3	Stakeholder engagement.	The ESMS includes a template for a Stakeholder Engagement Plan (Appendix XV). Individual portfolio projects have plans for stakeholder engagement and site-based persons responsible for engaging with stakeholders. All of the Akhalkalaki, Lakhami and Bakhvi projects have limited direct interface with	Low /	Stakeholder engagement and community perceptions of the project is not covered explicitly in Step 1 (deal vetting). The community

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		communities due to the location outside significantly populated areas. The limited verification undertaken during the Audit indicated that the nearest communities generally appeared to have been engaged from early project development and that engagement continued into the operations and maintenance phase even if at lower intensity during operations. Some projects also had established Environmental and Social Advisory Boards or ESG Committees to engage various government and non-government stakeholders. Stakeholders at the proposed Bakhvi 1, 2a and 2b projects had also been taken to Akhalkalaki projects to facilitate a better understanding of what hydropower development could entail. A number of social programmes benefitting stakeholders, most of whom are not directly affected by the projects, are also implemented and assist in engagement. These programmes effectively represent sharing of project benefits with the wider community. Stakeholder acceptance and support should never be taken for granted despite amicable relations. The projects therefore need to continue to invest in stakeholder engagement during operations even if at a lower level and balancing levels to avoid engagement fatigue. The indication of low to medium risk level (see column on the right side) reflects that stakeholder support for a project can never be taken for granted and project staff need to continue to engage at appropriate levels. Bakhvi 1, 2a and 2b projects currently being planned are located downstream of the Bakhmaro resort where stakeholders have voiced potential concerns over hydropower development in the vicinity. The Fund's substantial engagement with stakeholders in the project area at an early stage illustrates the level of proactive engagement and investment of high-risk capital prior to project approvals and potential construction start. For information on grievance management, see Performance Standard 4 below.	medium	(mis)perceptions of the project can substantially affect timeline, cost and reputational risks. Therefore, a screening question on stakeholder engagement to identify potential related risks should be included in Step 1 outlined in the ESMS.
ES4	Georgian laws and regulations and relevant international instruments.	Environmental permits are covered in the ESMS procedures in Step 1 (deal vetting checklist, items 1-3), which is important, but this early stage may be premature for a greenfield project and the check may be better at a later stage. Key permits and licences for the construction and operations phases were reportedly available and valid for the portfolio projects. Registers for environmental legislation and project compliance were available (in Georgian) with the registers for Akhalkalaki and Bakhvi 3 were shared during the Audit.	Low	*Ongoing: Key permit and licence conditions should continue to be incorporated in environmental and social management plans and associated procedures including in cases where renewal of permits introduce new or modified conditions.*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		The ESMS (Appendix III) briefly refers to transboundary impacts and these may be regulated in international agreements or instruments. None of the reviewed projects were considered to have any significant transboundary impacts.		
ES5	Monitoring and measuring compliance with environmental and social requirements and provisions.	A large number of indicators is monitored regularly and updated for each project in the portfolio and summarised in a comprehensive ESG impact metrics database. The database has an impressive 70 indicators that are largely related to the UN Sustainable Development Goals (SDGs) rather than key hydropower-specific risks and impacts (or the avoidance of typical hydropower risks). This database can provide a basis for reports and communication with stakeholders, authorities, investors and others but in itself the database not an easy-to-digest source of information. A more robust hydropower-specific monitoring and communication of a limited number of key risks during project operations may consolidate the impression of, and better document, the low risk profile of the project portfolio. This may be important towards the exit, particularly if potential buyers have insights to the hydropower industry. Key indicators could include for instance selected water quality parameters, grievances and their management, local content, presence and trends in fish populations or fish migration, environmental flow compliance, health and safety indicators, socio-economic benefits at local level, as well as clearly flagging the avoidance of physical displacement and the small number of households economically displaced. Importantly, while monitoring indicators would benefit from modifications, there were no indications of substantial adverse impacts observed during the Audit beyond the obvious impacts of land take and substantially reduced river flow along some kilometres of the diverted river sections for much of the year. If the ESMS is updated, the E&S assessment checklist (step 2 – due diligence) would benefit from explicitly reflecting a requirement to document how the mitigation hierarchy has been applied in project identification and layout optioneering including consideration of project alternatives. In practice, the Fund is already doing this well.	Low	*Opportunity: Consider revision of the indicators used for monitoring across the portfolio to better cover typical hydropower-related risks and issues with an emphasis on indicators reflecting the good site selections and operations phase indicators that are most relevant towards the exit.* *See also Section 3.5 on Exit Strategy, specifically indicators.*
	Performance Standard 2: Labour and Working Conditions			
ES6	Human resources policy and procedures.	The Fund has 18 staff members (13 male, 5 female), Lakhami projects 22 staff (19 male, 3 female), and the Bakhvi 3 project (25 male, 2 female). Bakhvi 1, 2a and 2b being planned have 32 staff (25 male, 7 female).	Low	None. *Opportunity: See ES5 on indicators, including potential indicator on local*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		A human resource manual/policy has been developed at the Fund and portfolio projects. To increase local development benefits, the projects develop local recruitment plans to prioritise local workforce in recruitment. The ESMS includes a template for a retrenchment plan (Appendix XVI) typically applicable when projects transition from the construction phase into operations.		*content.*
ES7	Terms and conditions of employment.	Staff and workers are issued with contracts specifying terms and conditions. External labour audits have not been undertaken, but the ESG Manager at project level regularly review working conditions.	Low	*Ongoing: Checks of contracting practices among contractors and sub-contractors should be undertaken regularly and documented.*
ES8	Grievance mechanism.	A workers' grievance mechanism is required as per the ESMS (see e.g., ESMS Appendices II and III). Grievance mechanisms are in operation for the individual projects. The mechanism means workers can approach the ESG Manager with any issues. A separate grievance management committee with worker representative(s) is not in place at the projects, reportedly as offers to workers to establish such committee have not been of interest to the workers. Grievance registers for Lakhami and Akhalkalaki projects were provided for review and included 21 and 8 recorded grievances, respectively, covering both workers and communities. Most of the records were requests (e.g., for employment with the project or for increased salary) rather than complaints as such. Many of the recorded grievances were not concerned with workers but community member concerns. This was particularly the case at Lakhami where the nature of the recorded grievances indicated high expectations of community benefits rather than dissatisfaction with the Lakhami projects as such.	Low	*Ongoing: A workers' grievance register should be maintained and enable tracking of individual grievance handling step-by-step from registration to implementation of any agreed resolution.*
ES9	Occupational health and safety.	The ESMS includes health and safety requirements including health and safety items in checklists at different stages of the project life cycle, procedures for categorisation and management of health and safety non-compliances of different risk levels. Occupational health and safety requirements cover own workers and non-employee workers and are expected to ensure safe and healthy working conditions also of contractors and sub-contractors. During the brief site visits (Akhalkalaki 1 and 2 in final stages of construction, Lakhami 1 and 2 as well as Bakhvi 3 in operation) the health and safety procedures and practices were generally observed to be implemented. This included safety inductions, use of personal protective equipment (PPE), signage, guard rails in high-risk areas such as facilities at height, etc.	Low	Hydropower specific risks should be considered and more explicitly reflected in checklists both for construction and operations, for instance risks during river diversion for weir/dam construction, during work in or near the river, inside the waterway such as monitoring/ inspection of pipelines or manual cleaning of sedimentation basins (if needed), monitoring (regular checks)

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		Discussions with staff at the Fund and project levels indicated that in-country contractors were often not conversant with international standards on labour and working conditions including health and safety. Therefore, the projects had to spend extra time and resources to work with contractors to improve their systems, procedures and practices, which was facilitated by the portfolio company having an ESG Manager on site and contractors being requested to recruit and place ESHS personnel on site. These efforts represent ESHS capacity building of contractors, which were also important to increase contractors' compliance with ESG requirements in the contracts between the portfolio companies and contractors.		of workers' hearing abilities at operational power plants, fish passage or aquatic ecology monitoring, etc. *Ongoing: Risk assessments and inspections should be regularly performed and documented.*
ES10	Workers' accommodation.	The ESMS makes reference to international standards in terms of workers' accommodation (e.g., Appendix II re. due diligence checklist, and Appendix XVIII re. standard E&S clauses in contractor contracts). The project company provides accommodation for its own staff while construction workers are typically housed in a workers' camp that is established as part of the contractor's contract to ensure this is in place. Fund or portfolio company ESG staff monitor the quality and maintenance of the workers' accommodation.	Low	None.
	Performance Standard 3: Resource Efficiency and Pollution Prevention			
ES11	Environmental policy.	The ESMS includes an Environmental and Social Policy as well as an ESG Policy (Appendix XIII). The policy is overall sound and covers the different stages of the project life cycle. Each project is also expected to have an Environmental, Social, Health and Safety Policy.	Low	None.
ES12	National regulations and international standards.	Applicable Georgian legislation and regulations on waste and pollution were typically reviewed in the project ESIAs. Key permits and licences as per national regulations have been obtained by the projects, and these have been renewed as and when they expire in the instances where permit validity is time limited. Key requirements in international standards (e.g., World Bank Group EHS Guidelines, IFC PS, EIB ESS) regarding pollution and waste management are generally reflected in the ESMS.	Low	None.
ES13	Prevention and management of pollution.	As per the ESMS (Appendix III), waste management is based on the waste hierarchy (prevent – minimise – reuse – recycle – dispose). The ESMS also commits projects to avoid using hazardous materials in line with international requirements, for instance ozone depleting substances. The ESMS checklists do not specifically mention old/legacy pollution (e.g., old	Low	ESMS checklists should include checks for old/legacy pollution in at key facilities of brownfield projects. The soon-to-commission projects (Akhalkalaki) should have dedicated

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		switchyards with oil spills in case of brownfield projects) and sediment flushing, which may represent risks of pollution. During site visits, the hazardous materials and hazardous waste appeared well managed including storage, collection, and disposal by certified waste handlers (see Figure 3.2). No signs of substantial oil spills were observed during the site visits (e.g., at switchyards, power stations, oil storage facilities, or construction sites). Water released from oil/water separators or pumped from powerhouse sumps to the tailrace did not appear to be regularly monitored through water quality testing to document that oil content in water released to the environment was below the applicable limit.		storage space for hazardous waste / materials in a safe area on an impermeable surface that is bunded to contain at least 110% of the potential stored volume. Regular water quality monitoring should be undertaken/documented for water released from oil/water separators or pumped from sumps in a powerhouse to the tailrace or river. *Opportunity: See ES5 on indicators, including potential water quality indicator.*
ES14	Greenhouse gases (GHG).	There is no reservoir, substantial inundation or land conversion for any of the hydropower projects and therefore no reservoir GHG emissions or substantial land use changes. There are no other significant GHG emissions from the projects, only small emissions during construction related machinery and during production and transportation of project construction materials and equipment. The projects have undertaken climate change risk assessments including for Bakhvi 1, 2a and 2b that are currently being planned. For small hydropower projects it is generally challenging to practically act on findings from such assessments including incorporate potentially costly measures to deal with (often uncertain) climate risks. Climate change modelling can be particularly challenging in small catchments, even more so in mountainous areas where local topography and climatic conditions vary, where there may be limited hydro-meteorological data, and climate change modelling and predictions may not capture local conditions well. The value of spending resources on climate change assessments can be questioned, particularly after investment decisions have been made, designs have been concluded and projects may even have been constructed. Instead, spending these resources on improved data collection in the catchment and river concerned may be a better use of limited resources as these data can be used by different teams in the project and in a more directly applicable manner. If the ESMS is updated, the E&S assessment checklist (step 2), PS3, item 53, would benefit from specifically referring to reservoir projects in the context of greenhouse	Low	*Opportunity: Consider whether resources for climate change assessments can be more usefully spent to improve collection and analysis of hydrological and meteorological data of more direct applicability in a project.*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		gas assessments.		
	Performance Standard 4: Community Health, Safety, and Security			
ES15	Risks and impacts to health, safety, resources and security.	Households typically do not live immediately adjacent to project infrastructure and there are few economic or other activities near the affected river sections or project infrastructure. The selection of sites for project development have reduced the potential risks to community health, safety and security. None of the projects have open headrace canals with associated spillways, which are typical high-risk facilities in a number of small hydropower projects (e.g., drowning risk at open canal, rapidly increasing flows at spillways during power station trips). Bakhvi 3 has a headrace canal, but this is covered by a concrete slab and the spillway from the forebay is located in a virtually inaccessible area, which reduce risks associated with spilling at the spillway (see Figure 3.3). Rapid water-level changes can take place at the weir and the tailrace locations during power station trips. The locations require monitoring to observe any risks due to people or livestock in these areas and potential measures to manage any such risks. Due to the occasional use of the river downstream of Bakhvi 3 (e.g., fishing), there was an alarm system recently installed that can be used to warn people of sudden increases in the river flow. Reportedly, there has not been a need to use the system until now. Generally, there grid appeared relatively stable and therefore not triggering frequent, unexpected trips at the power station, which would cause rapid water level fluctuations at the tailrace and weir of projects. Other typical risks associated with hydropower that may be worth reflecting more explicitly in checklists if the ESMS is updated include slope (in)stability issues in steep areas, flood risks in rivers with heavy material transport and project-induced modifications to the river system, hydro-peaking risks and risks associated with unlikely penstock bursts particularly if a penstock isolation valve is not installed. Some of these risks should be covered in emergency preparedness and response plans.	Low	Monitoring should be undertaken and documented of the frequency of power station trips and any risks associated with rapid water level fluctuations downstream of weirs and power stations. Mitigation measures to safeguard local people should be implemented as and when required. These hydropower-specific risks should also be reflected in ESMS checklists. *Opportunity: See ES5 on indicators, including potential health and safety indicator.*
ES16	Grievance mechanism.	The ESMS requires the establishment and operation of a grievance management mechanism (see e.g., Appendix II on due diligence checklist, Appendix III on safeguard requirements, Appendix IV on resettlement, Appendix V on E&S impact assessment). The grievance mechanism is expected to the scaled to the risks and impacts of the project in question, and the mechanism should address concerns and complaints promptly and transparently in a culturally appropriate yet gender	Low	*Ongoing: A community grievance register should be maintained and enable tracking of individual grievance handling step-by-step from registration to implementation of any agreed resolution.*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		responsive manner. Grievance mechanisms are in operation at the individual projects. The existence of grievance mechanisms combined with site selections that inherently reduce the community-project interaction and consequently reduce risks of grievances mean that these risks are considered low. Community members can approach the ESG Manager with any issues. A separate grievance management committee with community representative(s) is not in place at the projects, and communities have not indicated interest in such arrangement. The few affected people also enable individual or household level engagement by project staff rather than engagement of large groups where individuals may not feel comfortable expressing their views. The number of reported grievances is low with the grievance registers for Lakhami and Akhalkalaki projects reporting 21 and 8 grievances, respectively, covering both workers and communities. Most of the records were requests (e.g., for employment with the project or for increased salary) rather than complaints as such (see Item ES8 above in this table). Generally, grievances are raised by individuals rather than groups.		*Opportunity: See ES5 on indicators, including potential grievances-related indicator.*
	Performance Standard 5: Land Acquisition and Involuntary Resettlement			
ES17	Land take and displacement.	The ESMS includes multiple requirements concerning physical and economic resettlement including a comprehensive and sound list of specific safeguard requirements concerning involuntary resettlement (Appendix IV) and an outline of a resettlement plan (Appendix VI). At the due diligence stage, the risk of physical displacement is a key element in the project risk categorisation. In case the ESMS is updated, it would be beneficial to ensure the E&S assessment checklist (step 2) under PS 5 specifically request information on how displacement has been avoided or minimised (which is clearly a highlighted priority in the ESMS Appendix IV). The checklist would also benefit from requesting clarification of whether a cut-off data has been defined, disclosed and documents. For completeness, a checklist item should also refer to host communities in case of physical displacement including risks to such communities and their engagement. The project portfolio has been successful in avoiding physical displacement. No physical displacement was triggered by any of the projects. This commendable achievement is an important contributor to the unusually low risk profile of the Fund's portfolio in terms of social impacts in general and resettlement impacts in particular	Low	None. *Opportunity: See ES5 on indicators, including potential indicators on physical and economic displacement and land take.*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		(see Figure 3.4 illustrates displacement and land take per GWh compared with a number of comparable size hydropower projects in a different context). Economic displacement generally cannot be avoided entirely. However, the projects have generally been successful in avoiding areas with substantial cultivation and most areas taken for the projects have been less intensively used, for instance for grazing of livestock, or were not actively used at all. Provided information indicated that economic displacement affected less than households per project.		
ES18	Additional land take.	Following the initial land take by projects, there have generally been no increases necessitated. Increases in land take during construction is often a sign of inadequate early-stage planning. A main reason for not requiring additional land in the portfolio projects is likely the inclusion of additional space to minimise risks of subsequent delays triggered by expanded land requirements, which may result in time-consuming processes with the authorities and or protracted negotiations with right holders to the land. The width of the corridor acquired by projects for infrastructure varies with the infrastructure component in question and the local terrain.	Low	None.
ES19	Compensation, livelihood restoration and benefits for affected persons.	Without physical displacement being triggered, none of the projects have developed a Resettlement Action Plan. A cut-off date with subsequent census and valuation have not been undertaken for any of the projects, the reason again being the successful avoidance of physical displacement and ability to negotiate reasonable agreements with right holders. Land has never been expropriated. Resolution have always been found through negotiation, even if at times lengthy. Compensation payments have been negotiated rather than based on specific standards or formula for calculating compensation amounts. The compensation has been monetary (transfer to bank account, not cash in hand) rather than in-kind (e.g., land-for-land). However, additional support has been provided, for instance in the form of fodder for animals (e.g., hay). The formal owner of land is typically a man, and he has to sign for compensation agreements. To reduce the risk of misuse of funds, or the risk that other parts of the household is not having information or is becoming more vulnerable, the projects typically engage in discussions and negotiations prior to arriving at compensation agreements and issuing compensation payments. This engagement has been a main strategy to reduce risks associated with economic displacement. Specific monitoring of livelihoods has not been considered necessary due to the	Low	None. *Opportunity: More systematically monitor the livelihood status of economically displaced households to more credibly document the avoidance of adverse impacts (e.g., indications of project-related impacts to livelihood security or status for those households that would be most likely subject to such impacts).*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		limited extent of risks and impacts. Vulnerable people in nearby communities have been identified and supported, not as part of land acquisition and compensation, but rather as part of community support and CSR reaching other people than those economically displaced.		
ES20	Employment and economic opportunities.	Employment opportunities and project-related economic opportunities were mainly related to the construction phase. A limited number of workers and a small volume of good and services are required during the operations and maintenance phase, which may not be significant at community level but certainly for those few individuals and households benefitting. Local recruitment plans were reportedly developed for projects and contributed to increased levels of local benefits during construction. Local people have not only provided their workforce but in instances also machinery (e.g., trucks used during construction and effectively rented by the project).	Low (positive)	*Ongoing: Workers, goods and services should be hired or procured locally as much as possible.*
ES21	Community and stakeholder engagement.	See “Stakeholder Engagement” under item ES3 (PS 1) above.		
ES22	Monitoring.	Specific monitoring of compensation and livelihood restoration was not undertaken (see items ES5 and ES19 above).		
ES23	Grievance mechanism.	Grievance registers for Lakhami and Akhalkalaki projects were provided for review and included 21 and 8 recorded grievances, respectively. Most of the records were requests (e.g., for employment on the project or for increased salary) rather than complaints as such. This was particularly the case at Lakhami where the nature of the recorded grievances indicated high expectations of community benefits rather than dissatisfaction with the Lakhami projects. Except one grievance recorded in August 2022 at Akhalkalaki, which was related to compensation for an affected household, all grievances were closed.	Low	*Ongoing: A community grievance register should be maintained and enable tracking of individual grievance handling step-by-step from registration to implementation of any agreed resolution.* *Opportunity: See ES5 on indicators, including potential grievances-related indicator.*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
	Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources			
ES24	Risks and impacts to biodiversity and habitats.	The ESMS includes a number of references to requirements concerning natural habitats including checks at different stages of the project life cycle (see e.g., Appendix I checklist on deal vetting, Appendix II checklist on due diligence, and Appendix XIII on ESG Policy). At the due diligence stage, the risk of the project footprint covering natural habitats is a key element in the project risk categorisation. The E&S assessment checklist (step 1) would benefit from referring to the informative Integrated Biodiversity Assessment Tool (https://www.ibat-alliance.org/) that generally contains the information referred to in footnote 1 of the list plus additional information. The E&S assessment checklist (step 2), item 81, would benefit from referring specifically to spray zones at waterfalls, which often harbour threatened species. There are important differences between the portfolio projects in terms of the extent to which the project areas have been converted from natural forests and natural habitats to modified habitats due to human activities such as agriculture, livestock grazing, logging, or road construction. While Akhalkalaki areas have been substantially converted to modified habitats with reduced biodiversity values, the Lakhami and particularly Bakhvi projects are located in more natural habitats with greater terrestrial biodiversity values. The Bakhvi project areas have documented or indicated high likelihood of threatened species that have been specifically considered in project studies and in a more appropriate manner than for aquatic ecology. While the risks to terrestrial biodiversity are considered moderate, the presence of threatened species indicates that the Bakhvi 1, 2a and 2b projects require dedicated monitoring efforts to credible document that adverse biodiversity impacts are small. This results in the “medium” risk level allocation for this item. For aquatic biodiversity, the Akhalkalaki project areas and the Paravani river system are likely richer in species despite being more affected by human activities. The Lakhami and Bakhvi river systems are species poor including with only 1 fish species, Brown Trout. Generally, the ESIA documentation on aquatic studies and associated analysis are of lower quality than the terrestrial studies and other parts of the ESIA documentation, at	Medium[4]	*Ongoing: Continue terrestrial biodiversity studies.* More specific requirements should be included for aquatic ecology and hydropower qualifications when tendering for environmental and social consultants. More prescriptive and detailed Terms of Reference for baseline studies, ESIAs, and management plans should be developed to ensure that key aquatic ecology, environmental flows and fish migration issues are appropriately covered. Environmental and social consultants contracted should be provided with key hydrological data and analysis as well as engineering information at an early stage of project studies and in an easy-to-understand manner. Dialogue between internal and external experts should be facilitated to ensure that studies, analysis and recommendations are based on both sound ecological understanding and good understanding of hydropower technology opportunities and limitations reflecting site-specific

[4] Note: “Medium” in the risk column reflects the weak aquatic ecology analysis in relation to good practice internationally and the material impacts on some of the projects where design, construction and operations have likely been affected. If the criterion is changed to the degree to which the national requirements are met, the column would state “low” as the projects are generally following national requirements. The national requirements do not always follow good practice.

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		times substantially lower quality, despite the often more direct link between aquatic ecosystems and hydropower designs, operations and project viability. Mapping of existing natural and man-made barriers to upstream fish migration both upstream and downstream of the project weir is poor undertaken if at all. Sound analysis of whether there is any likely fish migration necessary to maintain viable fish populations, or whether the fish populations are local/river resident fish without such migratory needs, is another essential issue that should have been covered in studies and analysis. These weaknesses have also affected the relevance and value of some of the aquatic mitigation measures that are ecologically poorly justified or even without meaningful effect (e.g., fish passage requirements where there is no sound data analysis to document the likely need for or benefit of upstream and downstream fish passage measures, the same level of environmental flow required across projects as proportion of mean annual flow). If possible, it would likely be better to remove or revise some of the measures to ensure better use of limited resources to generate more positive results on fish (see ES28 and ES29 below). Some of the other requirements from the Government (e.g., stocking of fish eggs in rivers, or fingerlings if applicable) are also poorly justified in most hydropower projects as recruitment tend not to be the limiting factor for fish populations and stocking can be associated with multiple problems (e.g., very low survival rate and no measurable contribution to the fish population) and even have detrimental effects in certain situations (e.g., introducing genetic material that does not originate from the river, disease risks). Most likely, the resources used to meet such requirements could have been spent on monitoring and measures of greater value for aquatic ecology in some of the project, particularly Bakhvi and Lakhami projects. The regulatory requirements place the Fund and portfolio companies in a difficult situation. In some projects, the ecologically sound approaches differ from what is required for project approval and operational compliance. The ESMS audit consultant believes there is substantial potential, while building on a wealth of international experiences and peer-reviewed literature on brown trout and other species, to start collecting more targeted and purposeful monitoring data and analyse these data to facilitate discussions on how best to support fish and other aquatic biodiversity. More detailed requirements in relation to aquatic ecology studies should be developed. Most of these may be too detailed for an ESMS, alternatively can be annexed to an ESMS, or be stand-alone procedures at the Fund level, depending on what the Fund and portfolio projects find most appropriate. In terms of the ESMS		conditions to a greater extent. *Opportunity: Develop and implement revised protocols for aquatic biodiversity monitoring during project operations to understand the need for and effectiveness of mitigation measures and whether modifications to such measures are recommended as well as to provide credible documentation on the level of project impacts and potentially unexpected trends (see also item ES29 below).* See Annex 5 for more information.

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		itself, if this is updated, the E&S assessment checklist (step 2), item 83, should explicitly request mapping of natural barriers to upstream fish migration and a review of whether fish species are likely migratory or river resident. These are essential elements of an aquatic ecology study for a hydropower project. Should the ESMS be updated, potential impacts on aquatic ecosystems from sediment flushing and mitigation measures as well as invasive alien species, particularly in the context of river basin transfers, should be reflected in checklists.		
ES25	Protected areas or internationally recognised areas.	In parallel with the biodiversity and habitats described under the item above (ES24), the ESMS includes requirements concerning protected areas or areas internationally recognised. The site selection has meant that portfolio projects in operation or under construction are located outside protected areas and outside internationally recognised areas such as Key Biodiversity Areas (KBAs). There is a KBA some kilometres upstream and downstream of the Lakhami projects (Svaneti KBA) and the same for the Akhalkalaki projects (Saghamo, Paravani and Meskheti ridge KBAs). The Bakhvi projects are located within the Adjara-Imereti Ridge Key Biodiversity Area (KBA), which is not legally protected area but an area with multiple threatened or endangered species and having been proposed as part of a potential future Guria National Park. The ESIAs' coverage of protected areas and associated issues is substantially better than for aquatic ecology. The E&S checklist (step 1) flow chart concerning "legally protected, planned protected or internationally recognized areas" reflect important aspects of timing for the area designation compared with the project development as well as management responsibilities. This overall sound process would be strengthened by focussing more clearly on the core conservation values and objectives that underpin the designation, proposed designation or recognition of the area. It is important from the outset to focus on these values and objectives as the project risks to those values and objectives are the most critical and decisive in terms of project acceptability. Further, it would be wise to explicitly state that UNESCO World Heritage Sites (natural heritage), which is the most exclusive international designation, are "no-go" areas in the event of significant risks to such a site and its "outstanding universal values" as defined for the heritage site.	Low	See recommended action on monitoring above (ES24).
ES26	Ecosystem services.	The ESMS refers briefly to ecosystem services in the due diligence checklist (Appendix II) and in the template for a stakeholder engagement plan (Appendix XV). Limited ecosystem services were recorded in the project documentation and no	Low	

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		substantial impacts are expected in this area from the portfolio projects.		
ES27	Stakeholder engagement.	Project impacts on ecosystem services are small and the importance of stakeholder engagement in this respect is limited. For other comments on stakeholder engagement, see ES3 (PS1) above.	Low	See “Stakeholder Engagement” under ES3 (PS1) above.
ES28	Mitigation – environmental flow.	The most important mitigation measure for biodiversity during operations is the provision of a continuous environmental flow from the weirs. The ESMS refers to environmental flow and the adequacy to maintain viable populations of native species and ensure no net loss of biodiversity (Appendix II on due diligence checklist, PS 6, item 84). Maintaining viable populations of native species is important. Ensuring no net loss of biodiversity is unrealistic if this refers to biodiversity in general and will in practice mean abandoning the hydropower project as the environmental flow required for no net loss will in all likelihood make a project economically unviable. Therefore, it would be wise to reconsider the formulation as it stands and focus on particularly important biodiversity, where “no net loss” can be a more realistic objective. The environmental flow requirements will have material impacts on project design, construction costs and more importantly impacts on the project revenue during operations due to the foregone power production associated with water allocated as environmental flow. The Georgian authorities’ approach to environmental flows appears generic and not sufficiently considering site-specific conditions. The projects appear generally to have applied a statistical approach to estimating the environmental flow (e.g., 10% of mean annual flow) with ESIAs showing limited site-specific consideration for the ecological needs along the river section in question. Neither the aquatic ecology aspects nor the terrestrial ecology aspects (e.g., riverbank vegetation) appear considered in specific terms in the context of environmental flows. Seasonal variation in environmental flow release also do not appear to be considered in earnest. Such considerations should support decision-making by authorities on environmental flow requirements placed on projects. For the Fund’s projects, the environmental flow release is generally through upstream fish passage structures, which tend to be an inherently less controllable and less precise way of releasing an environmental flow. Under certain conditions such release arrangement is also more prone to blocking by debris in the river. In the event that the primary e-flow release is not ensuring the required minimum flow, the projects	Medium[5]	The reference to environmental flow ensuring “no net loss” of biodiversity as a generic requirement should be removed or revised. Any reference to “no net loss” of biodiversity should be aligned with IFC PS 6, which refers to certain types of particularly important biodiversity. While an environmental flow generally reduces biodiversity losses, there are typically other measures required to ensure no net loss. The environmental flow monitoring arrangements should be improved to consist of automated monitoring (e.g., water level loggers, or flow meter on pipe if environmental flow release arrangements are changed) with higher resolution data capture (e.g., every 15-30 min). The performance of the e-flow release arrangements should be reviewed based on improved monitoring data and necessary modifications to the release arrangements, if any, planned and implemented. In the event the e-flow requirement is not met, the water release should be

[5] See footnote 4, page 25, above.

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		in-principle can release additional water through a sediment or debris flushing gate at the weir, gravel trap or sedimentation basin. Monitoring of the environmental flow is typically by water level measurements in the fish passage, which can be converted to a flow volume by calculations that are based on a number of assumptions. The current monitoring has relatively low resolution and precision, which is a reason for the "medium" risk allocation for this item (ES28), except for Akhalkalaki 1 where a different system will be commissioned in late 2022 based on an automated level sensor.		topped up by releasing from an alternative outlet to ensure the e-flow is released consistently with a safety margin on top (e.g., 20%) until the primary arrangement works reliably. A procedure for the back-up release should be developed including supporting calculations (e.g., for minimum gate opening) and clear markings or instructions (e.g., for how the minimum opening should be ensured). *Opportunity: Development of simple guidance for environmental flow assessments, which should reflect both how baseline studies are used and how the guidance relates to national authorities' typical approach.*
ES29	Mitigation – fish passage.	The ESMS (Appendix II on due diligence checklist) refers to potential migratory fish species and to fish passage upstream and downstream. A substantial weakness of the project studies reviewed, and the conditions defined by authorities approving the projects, is that there is insufficient analysis of the presence of migratory versus river resident fish populations subsequently the need for fish passage, which should always be the starting point for an informed discussion on the need for fish passage as a mitigation measure. While a detailed review aquatic ecology or field investigations beyond brief site visits have not been undertaken as part of this Audit, the audit consultant considers that the Lakhami river and particularly the Bakhvi river appear questionable in terms of whether fish migration between different habitats is required for the survival of fish populations in the river and thereby justify project investments in upstream and downstream fish migration. Further, there appears to be natural barriers to upstream fish migration in Bakhvi river and the upstream habitats appear marginal and potentially high risk as spawning areas (low flow during winter,	Medium[6]	A critical review of the need for fish passage both upstream and downstream should be undertaken for the projects including consideration of natural and artificial barriers to fish migration upstream and downstream of the project infrastructure. While the regulatory requirements may not correspond well to the ecological conditions in all of the rivers (and effectively place project developers in a difficult position of implementing measures that do not add significant ecological

[6] See footnote 4, page 25, above.

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		high risk of drying out or frost for eggs in the gravel). The single species systems of these rivers also reduce the benefits of predator avoidance of young fish that can be a reason for fish migration. Possibly, resources for design, construction and operation of the fish passage as well as environmental flow release through a fish passage represent a poor use of resources for the Georgian society, the project companies, and the river ecosystem. Resources could likely have been spent in ways benefitting all parties more than the current situation. All the portfolio projects have upstream fish passage facilities, which are a combination of semi-natural passages (e.g., Akhalkalaki 1 and 2) and heavily engineered (formal) vertical slot fish passages (Lakhami 1 and 2, Bakhvi 3). In principle, these are sound and tested upstream fish passage solutions as long as the passages have been designed, constructed and operated appropriately as well as being ecologically justified. The downstream fish migration facilities were generally not clearly elaborated in the projects. Safe downstream fish migration is critical for fish passage to make ecological sense and to maintain a viable population of any migratory fish. For the Fund's projects, the cost of functional downstream fish passage can easily be greater than for the upstream fish passage. The cost is likely to be in the form of foregone power production (revenue loss). This will likely take place to ensure safe downstream fish passage, particularly for juvenile fish. Safe downstream fish passage will typically require temporarily stop or reduced power production such that fish can be spilled over the weir or through gates at the weir as opposed to enter the intake during peak downstream migration periods, after which fish likely move through the waterway and turbines that will result in high mortality rates and undermine fish migration. Fish exclusion devices (as installed in for instance Akhalkalaki) will often not work well for juvenile fish. It should be noted that the upstream fish passage generally tends to function poorly as a means of downstream fish passage due to the relatively small volume of water released through the upstream fish passage. Regular monitoring surveys are undertaken and the last few years' monitoring reports for Bakhvi 3 were shared for the audit. The survey reports include information on water quality parameters, macro-invertebrates and fish (brown trout). The apparent conclusion in the reports that fish caught inside the fish passage mean that fish are migrating is questionable in the sense of migration between different habitats necessary to maintain a viable fish population. Fish caught in a fish passage only confirms that fish can enter the fish passage without supplementary data to indicate		value), such a review can outline methodologies and measures of substantial value to more informed hydropower-related studies and decision-making. Plans for safe downstream fish migration, if considered important maintain viable populations, should be developed and implemented in the likely limited time windows when fish migrate downstream. *Opportunity: Develop and implement revised protocols for aquatic ecology monitoring, initially in the form of low-cost monitoring by in-house staff, for instance monitoring of fish by regularly isolating the upstream fish passage and documenting fish presence upstream and downstream of the fish passage as well as fish capture in the intake or sediment basin part of the waterway to better understand the timing of fish migration (see Annex 5).* *Opportunity: Explore the feasibility of cooperation in aquatic monitoring with academic or research institutions as well as with other interested hydropower developers on the same river systems.* *Opportunity: Develop clearer analytical frameworks for aquatic ecology monitoring data to ensure data collection and analysis can inform project operations as well as*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
		that fish is moving between habitats important for population maintenance (e.g., data on seasonal variation in fish catches and their length distribution, sexual maturity stage, tagging of fish to show movement patters, or other relevant data). The audit consultant has not seen documentation for the Bakhvi projects that indicates there is fish migration that require fish passage to maintain viable populations. The riverbed management in the form of manually removing perceived barriers to upstream fish migration likely has no meaningful ecological function as high flow periods (during spilling over the weir) likely allows for any local fish movement. Systematic monitoring targeted at understanding if there is upstream and downstream fish migration of importance to maintaining viable populations should be considered undertaken. Aquatic ecology related actions in this item should be coordinated with the actions recommended under item ES24 above.		*inform regulatory agencies and stakeholders on the performance of mitigation measures and meaningful future measures (see Annex 5).*
ES30	Water quality monitoring.	Water quality monitoring has been undertaken during the operations phase. There appears to be limited data on potential oil pollution from powerhouse and switchyard areas as well as risks caused by sediment flushing. The credibility of water quality monitoring will be strengthened by also covering oil pollution and sediment flushing events.	Low	Regular water quality monitoring should be undertaken and documented including for oil in water from the powerhouse, switchyard and release water from oil/water separators as well as turbidity during sediment flushing events.
	Performance Standard 7: Indigenous Peoples			
ES31	Indigenous Peoples categorisation.	While the ESMS mentions Indigenous Peoples briefly in Appendices III and IV, the project documentation does not refer to Indigenous Peoples. National and international categorisation of Indigenous Peoples often vary, and the issue can be sensitive. Georgia has not ratified ILO Convention 169 on Indigenous and Tribal Peoples. The project areas are generally inhabited by Georgians except Akhalkalaki project areas where there is a substantial Armenian presence. This audit assumes that none of these groups are considered Indigenous Peoples in the context of IFC Performance Standard 7, but project documentation reviewed does not appear to analyse this issue.	Low	*Opportunity: Ensure that at least internal project documentation clarifies whether any internationally recognised Indigenous Peoples inhabit the project areas or not.*
	Performance Standard 8: Cultural Heritage			
ES32	Tangible and intangible	The ESMS makes reference to major cultural heritage or touristic sites as a potential key risk factor and also requires a Visual Impact Assessment in case of visual	Low	*Ongoing: The "fertility pool" at Akhalkalaki 1 should be secured and*

REF.	CRITERIA	OBSERVATIONS, RISKS, OPPORTUNITIES AND POTENTIAL IMPLICATIONS	RISK	RECOMMENDED ACTION
	heritage.	impacts on such sites. Such impacts include changes to the river flow (see e.g., checklists in ESMS Appendices I, II and III). No sites with tangible or intangible cultural heritage of national or international importance have been found at any of the project sites. However, at Akhalkalaki 1 powerhouse there is a “fertility pool” (a natural spring) of local importance. The project has therefore agreed with the local community to adjust project plans such that the pool remains between the powerhouse and the river. Safe access to the pool for local people will be installed once project construction is complete (likely before the end of 2022).		*maintained as per agreement with local communities.*
ES33	Management plan or procedure.	While the ESMS does not make specific reference to cultural heritage management plan, this is implicit in the management of such risks as outlined in the ESMS. The standard ESG clauses for construction contractors include a requirement for the contractor to develop a detailed Chance Finds Procedures as part of the contractor’s Environmental and Social Management Plan to manage any unexpected finds of physical cultural heritage. No chance finds were reported but human remains were uncovered during excavations for the Akhalkalaki 1 penstock. In this case, relevant authorities were notified such that appropriate investigations could be undertaken. No subsequent risks to the project were noted.	Low	None.

Figure 3.2: Waste segregation and hazardous materials and waste store with secondary containment at the Bakhvi 3 project during the site visit.

Figure 3.3: Headrace canal covered by concrete slab and forebay (right photo) with forebay spillway located in virtually inaccessible area (left photo), both which reduces health and safety risks.

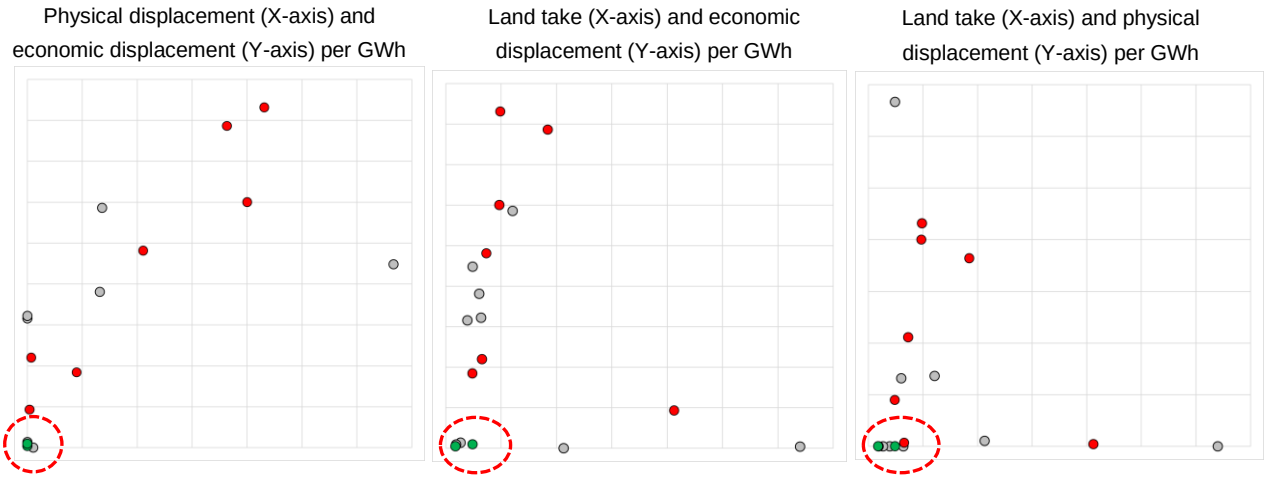


Figure 3.4: Illustration of avoidance and minimisation of displacement (no. of households) and land take (hectares) per GWh of estimated annual production for 4 CCEF projects (Akhalkalaki 1 and 2, Lakhami 1 and 2, green circles, all in red ellipses) compared with a portfolio of 14 small hydropower projects in Uganda (red circles indicate projects with FMO involvement). Bottom left corner of chart represents zero and values increase towards the right on the X-axis and upwards along the Y-axis.

3.3 GOOD PRACTICES AND LESSONS

The overall good performance and absence of gaps that represent clear ESHS risks or non-compliances with material, adverse ESHS impacts on the Fund, portfolio projects, stakeholders or ecosystems indicate that a number of good practices have been implemented. The practices listed below, and the important benefits ensured at Fund and project levels, have been facilitated by a well-developed ESMS. This means there are important linkages between the system level (ESMS) and the practical or operation level (practices).

3.3.1 Selected Good Practices

Site Identification and Selection

The likely single most important reason for the low ESHS risk profile of the Fund's project portfolio is the robust site identification and selection. Critical, early review of risks by the Fund and avoiding selection of sites with substantial risks have resulted in a portfolio of projects with unusually low environmental and social risks. This practice has been supported by competent ESHS staff as well as interdisciplinary engagements between engineering and ESHS teams. The willingness of the Fund to prioritise resources for such work at an early-stage, and prior to having any certainty of being able or willing to develop a site, is commendable.

Early Investment in ESHS Risk Management

Once a site has been considered of interest for development (ref. previous paragraph), the Fund has continued invest early and substantially not only in engineering studies but also in actively further explore ESHS risks and apparently allocating significant in-house capacity as opposed to relying excessively on external service providers, the latter which typically results in less consistency in ESHS efforts and less integration with the in-house engineering teams that progress with project planning. This early and consistent investment has further de-risked projects by investing in the establishment of the basic project characteristics after site selection.

Early Stakeholder Engagement and Social License to Operate

Not only has the Fund invested in understanding ESHS risks early in-house, but external stakeholders have been engaged partly to obtain information to better understand project issues and partly to inform important stakeholders of the project and to some extent involve them in the project development process. The use of in-house staff contributes to trust and institutionalising important information in the portfolio project and the Fund. Such engagement with stakeholders often does not take place in projects without resettlement and in projects with such limited direct project-community interface. This illustrates the importance accorded by the Fund to securing a social license to operate.

On-site ESHS Staff Presence for Good Performance

The good ESHS practices include having on-site ESHS staff to ensure systems and measures are implemented from an early stage as well as to monitor and adaptively manage risks and inevitable changes during the project development process. The on-site presence likely results in greater ESHS responsiveness both to stakeholder concerns and to needs for ESHS input by the engineering team or the contractors. Stakeholder engagement in general appear to have benefitted from this practice.

ESHS Requirements on Contractors and Results

The Fund has developed a set of ESHS requirements to be followed by contractors that are included in contractual terms. The practical results of ESHS contract clauses on paper have likely been substantially improved due to the on-site ESHS staff presence, the capacity building provided by the project to contractors, and the monitoring, corrections and supported provided.

3.3.2 Selected Lessons

Low Risk Hydropower Portfolio

Hydropower projects are in certain contexts perceived as problematic and controversial due to both environmental and social impacts. This situation is not unknown in the Georgian context. The Fund has shown to a range of stakeholders that it is possible to develop a portfolio of low risk projects with limited adverse impacts when there is commitment, investment, and the right steps are taken from the outset, starting with sound site selection and continuing with close follow-up by in-house expertise to manage risks.

Trust and Confidence

In Georgia as is the case in several other countries, there is local scepticism to hydropower development. Through persistent engagement at local level, the Fund has shown that it is possible to overcome such scepticism and to develop trust and confidence based on early, substantial and competent engagement of stakeholders. The apparent trust and confidence is an asset that should be managed wisely moving forward.

ESHS-Engineering Interface

Having in-house expertise both in engineering and ESHS has likely contributed to a better interface where the respective teams better understand each other’s considerations and one can find practical solutions more easily. The Fund’s willingness to allocate resources to both ESHS and engineering workstreams early and concurrently, as opposed to first to engineering and then ESHS when most of the engineering is locked-in, has likely been important to develop a more effective interface producing a low risk portfolio from and ESHS perspective.

Aquatic Ecology Issues and Site-specific Conditions

In an overall very positive audit, there are issues related to aquatic ecology that stand out as in need of critical further review and likely revision to ensure more meaningful use of resources in the best interest of society, the Fund and the environment at some of the projects. In particular, fish migration and passage appear inappropriately analysed in some projects and this also has linkages to environmental flows. Documentation reviewed and site visits during the audit indicate the ecological rationale behind fish migration mitigation is poorly justified in some projects. Aquatic ecology is one of the relatively few ESHS areas that can result in material and substantial impacts on design, operations, costs and revenue of hydropower projects. This lesson has been learned in many projects elsewhere. Often there are two main reasons causing this unfortunate situation. Firstly, there is often poor understanding of aquatic issues in a hydropower context among ESIA consultants, which regularly result in poor analysis and recommendations. Secondly, regulatory authorities often do not have broad exposure to the variation of hydropower contexts, and they do not adequately adapt their requirements to the project and site-specific characteristics. Neither of these two reasons are fully controlled by a project developer, though more influence can be exercised over the former. Combined with stakeholder expectations and perceptions, this means that changing flawed analysis, recommendations and unwise regulatory requirements is challenging and the strategies selected to approach these issues require careful consideration.

3.4 CORRECTIVE ACTIONS AND OPTIMISATIONS

Three main areas have been identified for further consideration by the Fund as follow-up to the ESMS Audit. Firstly, a number of relatively small issues are highlighted concerning the ESMS and mainly coverage in checklists. Secondly, some key aquatic ecology issues are described and flagged as the most important in terms of potential added value to the Fund. Thirdly, a number of ESHS issues for potential future monitoring and reporting are listed.

3.4.1 Environmental and Social Management System

As discussed above, the ESMS is overall sound, has added value to the Fund through de-risking of projects, and no substantial revision of the ESMS is proposed following this Audit. Table 3.3 above lists items that the Fund is recommended to review and consider whether those items are worthwhile incorporating into a revised ESMS, whether the items may be better dealt with in updated project-level procedures, or whether a combination of these two approaches is preferable (e.g., adding a section in the ESMS focussed more on operations and maintenance that refers to more specific and detailed procedures and monitoring protocols recommended).

The Fund and portfolio projects have proven ESHS capacity and performance combined with insights to the ESMS history and past implementation arrangements as well as insights in how existing personnel prefer to work in the operations and maintenance phase moving forward. Therefore, the audit consultant believes that the Fund is best placed to judge which of the three options mentioned in the previous paragraph is the most feasible way to address the ESMS-related recommendations in Table 3.3. The audit consultant believes all of the three mentioned approaches can work well.

As a simple recap, the ESMS-related issues raised in Table 3.3 above include among others:

- Ensuring institutional memory and overlap between ESHS staff when projects transition from construction to operations and maintenance, or during other organisational transitions.
- More clearly reflect stakeholder engagement and community perceptions in Step 1 (deal vetting).

- Develop a set of typical hydropower-related ESHS performance indicators to monitor and document the low-risk profile portfolio.
- More explicitly reflect hydropower-specific occupational as well as community health and safety risks in checklists for construction and operations.
- Undertaking regular water quality monitoring to check for oil in water released from oil/water separators or directly from power stations as well as checking for adverse water quality impacts during sediment flushing.
- Reflect more specific requirements in terms of aquatic ecology experience for ESIA and monitoring consultants and more specific requirements in ToRs for aquatic studies as well as ensure more engagement between aquatic study teams and hydrology/engineering teams.
- Improve (retrofit) monitoring arrangements for environmental flow to provide more reliable and higher resolution data on environmental flow releases.
- Develop explicit back-up procedures for releasing the required environmental flow in case the primary release arrangement fails to release the requirements.
- Undertake a critical review of likely fish migration in the rivers and associated requirements and measures as well as provide plans for safe downstream fish migration, if the latter appears important to maintain viable fish populations.

For further details, see Table 3.3 above as well as Sections 3.4.2 and 3.4.3 below that provide further information in terms of aquatic ecology issues and ESHS key performance indicators, the two issues that likely has the largest potential added value to the Fund and its portfolio companies.

If the recommendations in this Audit are implemented, there will likely be new insights and potentially adjustments made to the ESHS management during operations and maintenance. This may inform adjustments to the Fund's ESMS and project-specific procedures closer towards the exit.

3.4.2 Aquatic Ecology

This section has been expanded due to the potential material impact on the projects from the aquatic ecology issues, the potential alternative and better use of resources in the interest of aquatic ecology, and that these issues likely represent the most substantial additional added value to the Fund beyond what the overall good ESHS work has delivered in recent years.

Fish Migration

The Audit has shown that the Fund and the portfolio companies are committed to undertaking measures that are typically required to maintain fish migration when developing hydropower projects. Maintenance of fish migration is important when fish populations migrate between different habitats that provide qualitatively different characteristics and where these are important for the completion of the fish species' life cycle and therefore the maintenance of a viable population of the fish population in question. In other instances, fish populations find the required habitats to complete their life cycle within a confined or local river section and the fish is resident in this river section and may not be substantially affected by the construction of a barrier (e.g., a dam or weir) on the river. From the information available during this audit, the Bakhvistskali river appear to be such a river due to the natural fragmentation of river sections, the limited variation in available habitat types, and the system being a single species system without predation pressure from other fish species on the young fish.

For a species like Brown Trout (*Salmo trutta* and its various sub-species or sub-populations), migration is typically undertaken by adult sea trout moving from the ocean to rivers to spawn, after which young fish move to the ocean where they grow to sexual maturity and thereafter return to the river for spawning. In other instances, Brown Trout lives in freshwater all its life but make similar migrations from a larger river or a lake in the lowland to smaller rivers at higher elevation where spawning conditions are better (e.g., due to the quality of the substrate/river bed material, fewer predators that feed on the fish eggs and young fish, higher oxygen levels). Where a lake has poor spawning ground in inflowing rivers, the trout may also move downstream into the larger outflowing river to spawn. Importantly, the adult fish migration to a different habitat provides the species with better opportunities for successful reproduction, whether due to reduced predation and or better spawning or nursery grounds. The migration itself comes at a cost for the fish, in terms of energy expenditure, risks of predation, and potentially other hazards, which means fish migrates only when it helps maintaining a viable population.

The maintenance of functional fish migration upstream and downstream typically has material impacts on the design, construction, operations and profitability of hydropower projects. The extent of impacts on the hydropower project can vary substantially from river system to river system and may under certain conditions make a project economically unviable, for instance due to reduced power output during downstream fish migration to minimise turbine mortality of fish, particularly young fish. Therefore, a sound analysis of fish migration and the need for fish passage is critical. In terms of resource use, it is better to spend limited resources on other measures that support aquatic ecosystems than fish passage in cases where fish passage is not well justified ecologically.

Assessing Presence of Fish Migration and the Need for Fish Passage

For none of the reviewed projects is there an adequate assessment of the potential presence of regular upstream and downstream fish migration that is required to maintain viable populations and therefore clearly justify measures to maintain such migration. This is likely the single largest weakness identified in the audit.

The environmental studies including analysis and recommendations do not critically analyse the aquatic ecosystem and the likely presence of fish migration between different habitats important for maintaining viable populations. The studies appear to take for granted that fish migrate and that fish passage is therefore required. As is well documented in many countries, Brown Trout is one of the best examples of wide variation in life history strategies including populations that migrate and others that do not. No sound site-specific ecological justification or reasoning has been provided to support the apparent assumptions of fish migration. Particularly for the single fish species systems at Bakhvistkali and Lakhami, where parts of the project areas are higher altitude, marginal habitats, do the apparent assumptions seem doubtful and potentially incorrect. For the Paravani river (Akhalkalaki 1 and indirectly Akhalkalaki 2), more fish species have been recorded and the river is less steep which may result in a higher likelihood of fish migration.

Further, no sound analysis has been seen in terms of the presence and potential implications of other barriers or hydropower projects on the river, which may substantially affect the justification for fish passage. For the Bakhvistkali river, an ESIA study concludes there are likely natural barriers yet there are plans to modify the riverbed manually to remove such, the latter which appears to lack a sound ecological justification. For the Bakhvistkali river, there are plans for at least four projects in a cascade. For Lakhami river, there are two projects on Lakhami river and additional projects constructed (Enguri) or proposed (Neskra) on the main river that Lakhami empties into shortly downstream of Lakhami 2 powerhouse. For the Akhalkalaki projects, there are small hydropower projects upstream and weirs on the Paravani river. Downstream of the Akhalkalaki river, there is the existing, operational Paravani Hydropower Project and further downstream there is a large hydropower project under construction. The cumulative impacts and necessary measures to ensure upstream and downstream fish migration, if such likely exist and should be maintained

to ensure viable populations, should have been analysed for all three river systems to inform any recommendations of fish passage. Regulatory agencies may define requirements contrary to ecological assessments, but not providing sound analysis of the ecological justifications and implications of fish passage are unfortunate.

As reflected in Table 3.3 above, the monitoring results showing fish inside a fish passage do not show that fish migration is taking place and necessary for maintaining viable populations.

Fish Passage Measures

All five projects reviewed have an upstream fish passage installed and release an environmental flow of approximately 10 percent of the mean annual flow through this passage. Akhalkalaki 1 has a fish diversion structure for downstream migration (Figure 3.9). Plans have been made for an “air bubbles curtain” at the intake for the Lakhami projects (not yet installed at the time of the visit).

Leaving aside the issue of whether fish passage is ecologically justified in some of the projects, the upstream fish passages generally apparent well designed and constructed (see Figures 3.8 and 3.10) and have good chances of working if operated and maintained well including removal of debris during high flow periods in the autumn when upstream fish migration is likely to take place. The observed flow speeds, the gradient and height of steps in the passages were such that adult Brown Trout would easily move upstream. The only challenge observed was the exit step at the upstream end of the fish passage. It was not clear that the fish moving upstream would be able to exit the fish passage and this require further assessment and likely adaptations to the passages. If modifications to the projects or fish passages are required to provide hydraulic conditions that make it possible for upstream migration to take place during the flow conditions at the time of upstream migration, this could be seen as a further reason to critically review whether fish migration is likely taking place in some of the projects.

As an example, the Lakhami 2 fish passage was probably not functioning at the time of the visit due to material build up at the grid installed to reduce material inflow to fish passage. The combination of the grid and the material accumulation on the upstream side probably meant that fish could not exit the passage (see Figure 3.5). The on-site team had been and continued to consider modifications (e.g., concrete slab in front of exit to facilitate easier flow of material past the exit rather than accumulation in front of the exit). A small concrete or steel plate wall to change the opening from facing the flow and material transport to the opening being more sheltered from material transport (see Figure 3.6) may be another solution, alternatively a combination of the two measures.

Another example observed was at Akhalkalaki 2, where the thickness of the weir structure with the opening (exit for upstream fish passage) combined with the pressurised flow from the upstream water level and the “pool” configuration in the fish passage immediately downstream of the opening, were such that the water speed may be too high for fish to successfully move through the opening. Higher intake pond water levels are likely to be experienced during high flow periods when upstream fish migration likely takes place. This may increase the challenge of moving through the opening. At the time of the visit, the on-site team was planning to measure flow speed and were considering modifications to the rock configuration immediately downstream of the opening to facilitate upstream migration (see Figure 3.7).

For the Bakhvistkali river, the current upstream fish passage at Bakhvi 3 appeared passable for fish. However, a potential future cascade of four or more projects across an altitude difference of more than 1,400 m where most of the river has water diverted for hydropower generation and facing at least four intakes and waterways with Pelton turbines (high mortality) during downstream migration appear in practice to be impassable, let alone the highly questionable ecological justification for fish passage in this cascade in the first place (due to natural barriers and marginal

habitat upstream unlikely to be attractive for fish downstream). For the project owners, there will likely substantial operational complications and lost revenue (foregone power production during downstream migration to reduce fish mortality) resulting from cascade operations that adapts to the (hypothetical) fish migration (see Figure 3.12 for illustration). A substantially improved fish migration analysis should have been undertaken, which could have resulted in substantially better solutions for power generation, for the project companies, and, importantly, the aquatic ecosystem if better informed measures to monitor and support biodiversity are put in place. As long as regulatory agencies continue with generic, rather than site-specific, requirements including fish passage, this place project developers in a difficult position where measures have to be implemented even if not serving the intended purpose. Project developers cannot change requirements but should contribute to more informed discussions taking important site-specific considerations into account in terms of which measures benefit aquatic ecosystems, which will be in the longer-term interest of all parties.

In the operational projects, the monitoring and documentation of fish presence in and migration through the fish passages were limited. The on-site teams can likely undertake simple yet potentially valuable monitoring (see Annex 5).

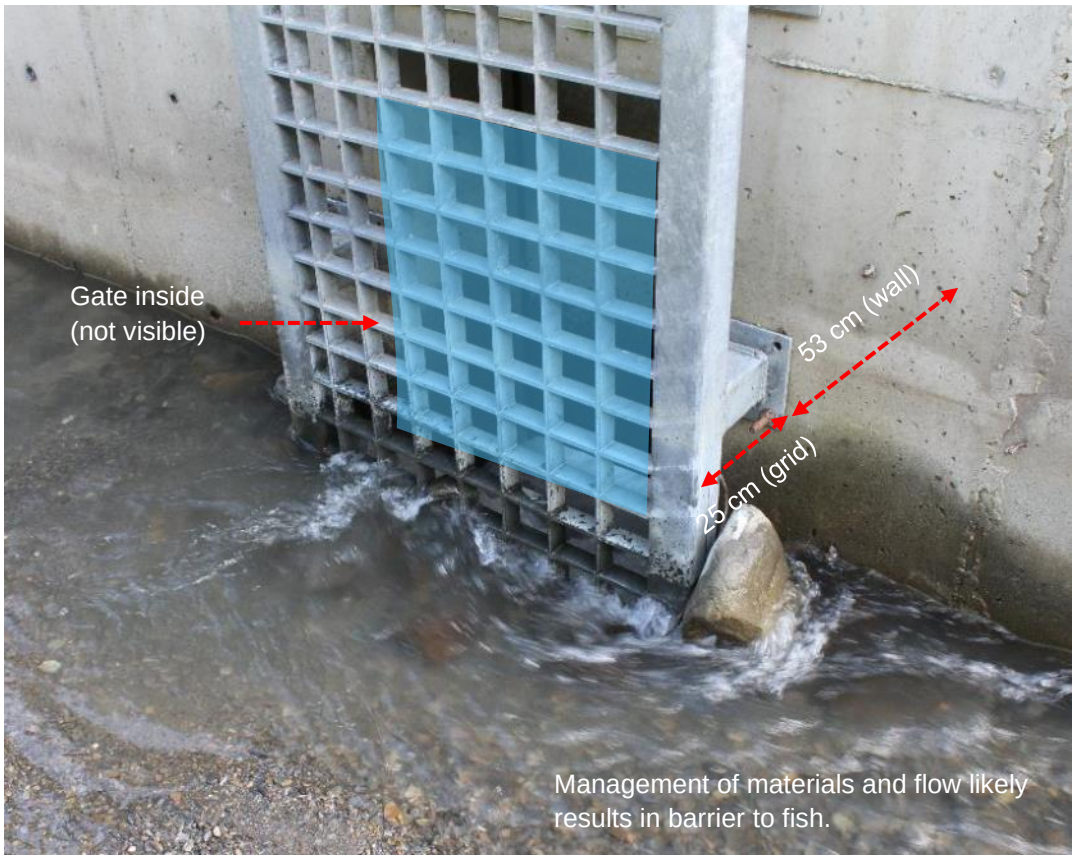


Figure 3.5: Exit of the upstream fish passage at Lakhami 2. Looking downstream at the exit from the fish passage that was likely not passable at the time of the visit due to the combination of the position of the gate, the thickness of the concrete wall, the grid to reduce material entering the fish passage, and the material build-up in front of the grid. Modifications likely required for the upstream fish passage to function as intended.

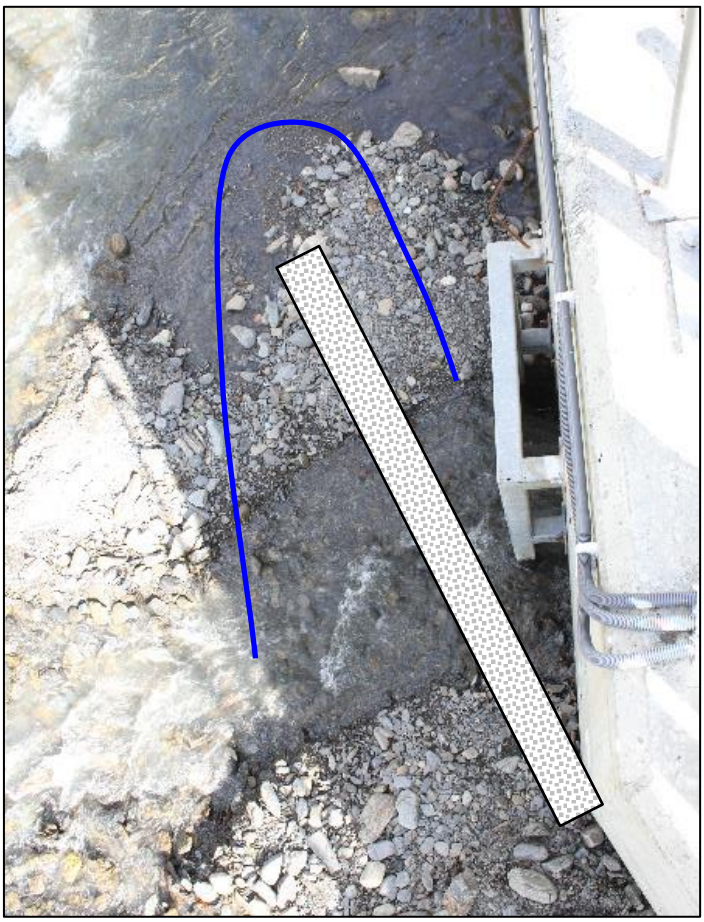


Figure 3.6: Potential modification of the exit area for the upstream fish passages at Lakhami 1 (photo) and Lakhami 2. Constructing a small concrete wall or installing a steel plate to change the fish passage opening from facing the river flow and material transport to being more sheltered behind a retrofitted structure. Fish then would need to move as indicated with the blue line and that area kept largely free from accumulating material to ensure continuous water flow and passage for fish.

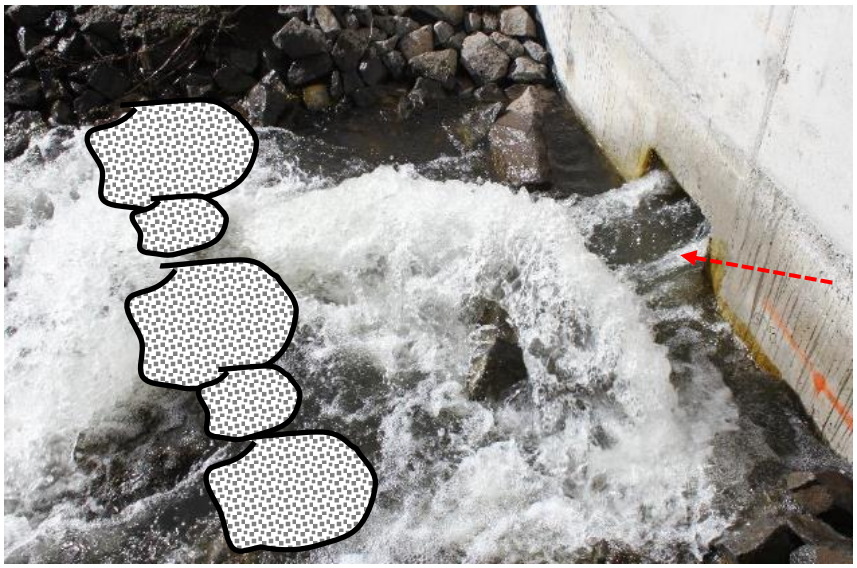


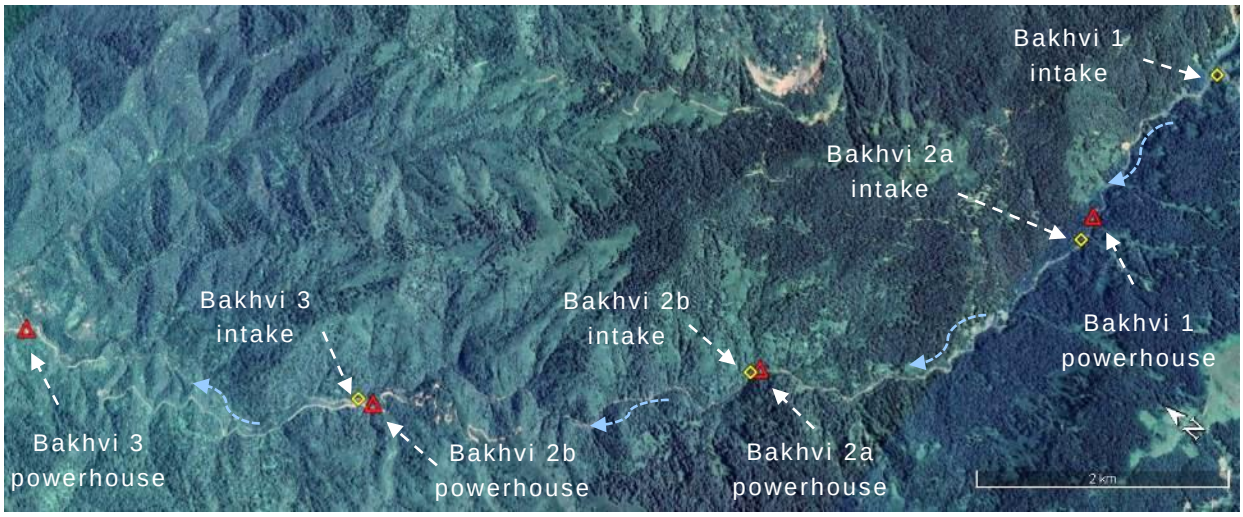
Figure 3.7: Upstream fish passage exit at Akhalkalaki 2 where flow speed (pressurised flow) combined with the thickness of the wall / opening may represent a barrier to upstream fish migration. Checks of passability should be undertaken and corrective measures implemented if needed, for instance placement of rocks to raise the water level immediately downstream of the opening.

Figure 3.8: Section of the upstream fish passage at Akhalkalaki 2 that will be easily passable by fish.

Figure 3.9: Entrance of the fish diverter (red ellipse) next to the trash rack at the sedimentation basin at Akhalkalaki 1 intended to safeguard downstream fish migration by minimising fish entering the waterway.

Figure 3.10: Construction of the upstream fish passage at Akhalkalaki 1 ongoing at the time of the visit.

Figure 3.11: The exit at the upstream fish passage at Akhalkalaki 1, which require checks to ensure this is passable by fish due to pressurised flow (ref. also Figure 3.7 above).



Fish migration past the likely future Bakhvi cascade will have to rely on upstream migration across an elevation difference of more than 1,400 m and a river distance of more than 13-14 km, most of which will have reduced river flow and therefore more barriers than normal. Downstream fish migration will need to avoid four intakes and waterways with associated turbine mortality. The ecological rationale is highly questionable, the likelihood of success very small, and the potential costs to the developers are disproportionate.

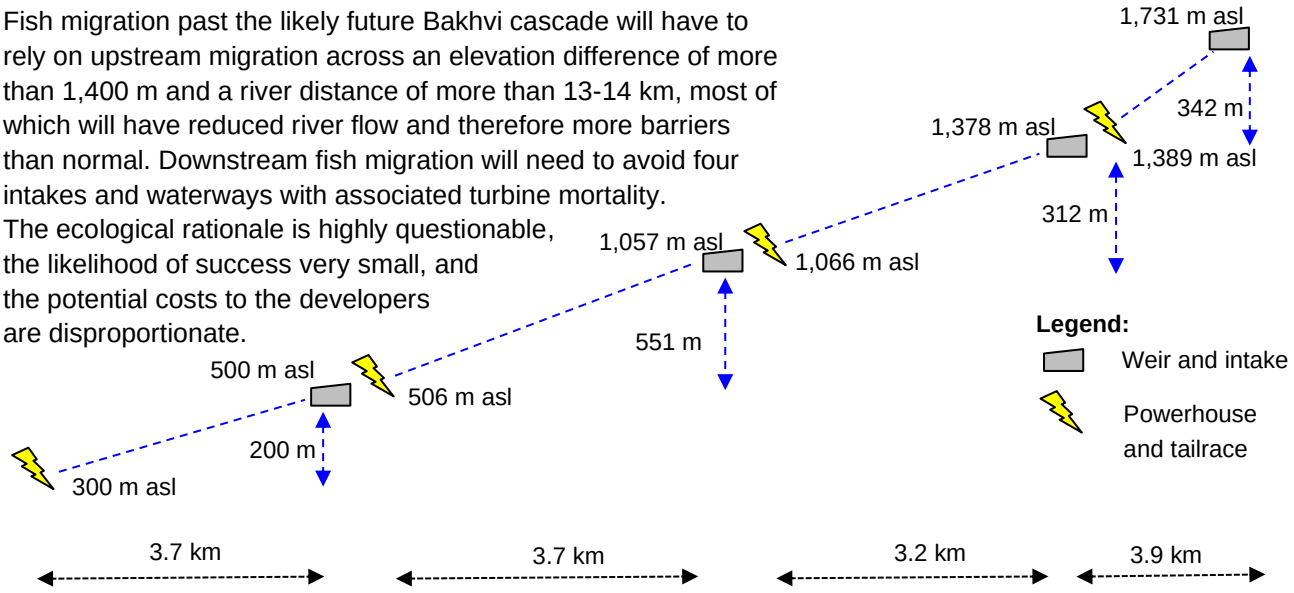


Figure 3.12: Illustration of the Bakhvi cascade that will be very challenging to migrate past (upstream and downstream) in the unlikely event that such fish passage is ecologically well justified.

Environmental Flow

The projects' environmental studies have opted for a simple hydrological (statistical) approach to recommending environmental flow levels, typically approximately 10 percent of the mean annual flow. This is a relatively common approach internationally. This approach requires limited studies compared to more refined approaches such as hydraulic rating, habitat-based, or holistic methods. It also appears that Georgian authorities typically define this level of environmental flow (10% of MAF) as a requirement during the permitting process even if there does not seem to be a regulation or guidance prescribing this approach or level to determine environmental flow levels or regime.

The 10 percent of mean annual flow, also referred to as the Tennant or Montana method, is administratively simple and predictable. But every river system is unique and should have a river-specific environmental flow regime for the best result and balancing of environmental flow versus power generation objectives. Even if applying a statistical approach like 10 percent of mean annual flow as a first step, it is unfortunate that the environmental studies have not considered the site-

specific conditions to discuss the potential need for a higher flow or the possibility of a lower flow without compromising environmental and social concerns beyond critical thresholds.

This Audit recommends that for any future projects the Fund develops a simple approach that is requested to be used during future ESIAs. This can for instance use the 10% percent of the mean annual flow as the first step but then proceed to review specific criteria (e.g., water user interests, length of diverted river section, presence of unique habitats along the diverted river section, the need for fish migration) and thereafter consider options of a higher or lower environmental flow as well as seasonality in the environmental flow regime, the latter which can be well justified where for instance winter conditions greatly affect the runoff patters and the activity levels of fish and other species during low temperature periods.

Recommendations

From an ecological perspective there are mitigation measures and practices that appear poorly justified and likely not serving a meaningful ecological purpose. Resources could likely be spent with much better result for aquatic ecosystems and other stakeholders. The mitigation measures may still be required due to regulatory agency requirements, stakeholders' expectations, current investor expectations, or expectations among the potential buyers of the project portfolio in the future. But a sound ecological analysis will at least raise important questions and avoid explicitly justifying, or continuing providing arguments for, measures that potentially do not make sense.

Ultimately, some of the considerations are made in a more complex societal context rather than only based on ecological considerations, and they are a societal choice informed by other issues than only ecology and maintenance of viable populations. The recommendations below are nevertheless made as suggestions for a longer-term process of gaining further ecological insights to some of these important aspects. Some of the recommended work will most credibly be facilitated by independent analysis of empirical data to document more firmly key aquatic ecology elements and their implications for the projects, for power generation and other societal concerns. The Fund and the portfolio projects are well placed to support such processes and can do so without incurring excessive costs.

Potential actions during the early project development stage that are directly within the scope of the Fund and the projects include:

- Incorporate more specific aquatic ecology and hydropower qualification requirements when tendering for environmental and social consultants.
- Develop more prescriptive and detailed Terms of Reference for baseline studies, ESIAs, management plans and monitoring studies to specifically ensure key aquatic ecology, environmental flows and fish migration issues are appropriately covered.
- Ensure early provision of key topographical and hydrological data and analysis as well as engineering information to environmental and social consultants including presenting this information in an easy-to-understand manner for non-engineering persons.
- Facilitate dialogue between internal and external experts to ensure that studies, analysis and recommendations are based on both sound ecological understanding, other water users interests and a good understanding of hydropower technology opportunities and limitations in light of site-specific conditions.

Potential actions during the project operations and maintenance stage that are directly within the scope of the Fund and the projects include:

- Revise aquatic ecology monitoring data collection protocols that can be undertaken at low cost by in-house staff, for instance monitoring of fish by regularly isolating the upstream fish passage and documenting fish presence upstream and downstream of the fish passage as well as inside the intake or sediment basin part of the waterway.
- Explore cooperation opportunities with academic or research institutions in the aquatic monitoring as well as with other interested hydropower developers on the same river system.
- Develop clearer analytical frameworks for aquatic ecology baseline and monitoring data to ensure data collection and analysis can inform understanding of whether there is fish migration or not, inform definition of mitigation measures, inform project operations as well as inform regulatory agencies on the performance of mitigation measures and eventually what represent meaningful future measures.
- Install automated environmental flow monitoring devices where such are missing to document the environmental flow releases more reliably and with higher frequency of data capture (e.g., automatic level sensor inside fish passage).

3.4.3 ESHS Key Performance Indicators

There is a comprehensive monitoring and reporting system in place that covers many ESG indicators as part of the large ESG impact metric database. These are to a large extent aligned with the UN SDGs, which make them applicable in a number of contexts. Considering that the Fund has focussed on hydropower and has been able to identify and develop low risk projects within the hydropower sector, there is a potential to supplement existing indicators by more hydropower-specific performance indicators that provide for more sector-specific comparison and highlighting the favourable ESHS risk profile and performance of the portfolio prior to exit. This may be of considerable interest to potential buyers, particular buyers with exposure to renewable energy and hydropower projects in particular and may also be interested in benchmarking.

This audit recommends that monitoring and reporting is enhanced by developing a set of key performance indicators more targeted at hydropower-related ESHS issues. The Fund should consider its interest and capacity to track additional indicators. A range of ESHS indicators are listed below in Table 3.4. These are generally affordable track, and they cover a multitude of issues. The Fund may want to select a subset of indicators that are considered useful and that supplement existing monitoring, or the proposed indicators below can be used for developing modified versions of indicators after initial checking of available information and testing of the easy with which the indicators can be monitored reliably.

Some of the listed indicators do not require further monitoring as they have been closed (e.g., extent of displacement). These may still be very interesting for the purpose of highlighting important achievements and potentially for benchmarking.

The indicators can generally be tracked and documented by ESG Managers (or the equivalent position) at project level and then collated to Fund level by the Fund's ESG Manager.

Table 3.4: Examples of ESHS performance indicators targeting hydropower-related risks and impacts that can be considered by the Fund as basis for selecting supplementary indicators to enhance monitoring and reporting.

PERFORMANCE AREA	INDICATOR	BASELINE	METHOD OF MONITORING	RESPONSIBLE	COST	COMMENTS
Workers' health and safety	Lost-time injuries (LTI)	0	Health and safety registers and records	ESG Managers	Incorporated into staff costs.	Can be separated into construction phase and operations phase.
Community health and safety	Health and safety incidents	0	Incident registers	ESG Managers, possibly supported by local clinics or leaders	Incorporated into staff costs.	Can be separated into construction phase and operations phase. Can be reported per GWh or similar.
Water pollution (construction)	Turbidity during construction works	Turbidity in river upstream (unaffected location)	Water quality testing upstream and downstream of construction location.	ESG Managers, possibly supported by external service provider.	Water quality analysis.	Option to choose between external service provider or procuring in-house equipment. Critical for credibility that water samples are collected during activities (when pollution may occur).
Water pollution (operations)	Turbidity during sediment flushing	Turbidity in river upstream (unaffected location)	Water quality testing upstream and downstream of sediment flushing location.	ESG Managers, possibly supported by external service provider.	Water quality analysis.	
Water pollution (operations)	Oil content	Oil content in river upstream of release point	Water quality testing upstream and at release point	ESG Managers supported by external service provider.	Water quality analysis.	Release points likely to be at oil/water separator and the location water is pumped from powerhouse sump (if pumped directly to river or tailrace).
Workers' grievances	No. of grievances per 1,000 hrs worked	0	Grievance register	ESG Managers	Incorporated into staff costs.	"Grievance" needs to be defined as registers also tend to capture non-grievances. Can be separated into construction and operation phases.

PERFORMANCE AREA	INDICATOR	BASELINE	METHOD OF MONITORING	RESPONSIBLE	COST	COMMENTS
Community grievances	No. of grievances per GWh	0	Grievance register	ESG Managers	Incorporated into staff costs.	"Grievance" needs to be defined as registers also tend to capture non-grievances (e.g., other requests). Can be separated into construction and operation phases.
Grievance handling	Average time to resolve grievances	Use a target time, or average time in past periods	Grievance register	ESG Managers	Incorporated into staff costs.	"Time" can refer to time from grievance recorded to agreed solution or to implementation of agreed solution completed.
Displacement	Physical displacement per GWh/yr	0	No. of households physically displaced per GWh (estimated annual prod.)	ESG Managers	Incorporated into staff costs.	Be clear whether this relates to permanent displacement only or also temporary.
Displacement	Economic displacement per GWh/yr	0	No. of households economically displaced per GWh (estimated annual prod.)	ESG Managers	Incorporated into staff costs.	Be clear whether this relates to permanent displacement only or also temporary.
Displacement	Land take (ha) per GWh/yr	0	Hectares of permanent land take per GWh (estimated annual production)	ESG Managers	Incorporated into staff costs.	Land take refers to rented and procured land for the project. Can be separated into productive and non-productive land.
Environmental flow	Proportion of time with compliant releases	Use target proportion or average time in past periods	Proportion of flow readings at or above the minimum requirement	ESG Managers or Plant Manager	Incorporated into staff costs.	Automated readings with relatively high resolution (e.g., every 15-30 min) should be used for credibility.
Aquatic ecology	Successful migration	Use target value or value in past periods	Monitoring of fish migration	ESG Managers, possibly supported by external service provider	Can vary substantially depending on support	Can separate into up- and downstream migration. Can be difficult to separate migratory from non-migratory fish.

3.5 TOWARDS THE EXIT

The Fund is planning to exit from the projects by selling the portfolio by approximately 2025. The main audit recommendation towards the exit is to continue the sound implementation of ESHS measures until the Fund's exit including to document continued compliance levels in a credible, well recorded and verifiable manner. In terms of the ESMS, the Fund's focus should be on finetuning rather than changing substantially.

With a portfolio increasingly moving into operations and maintenance, most risks associated with construction will become less relevant. The exception will be for the Bakhvi 1, 2a and 2b projects that are planned for construction in the coming years, and these projects emphasise the importance of not altering the ESMS substantially as the current version has served the Fund and its portfolio companies well. For operational projects, the ESMS, among other things, stipulates an ESG officer at SPV level and quarterly reporting by this officer, which appear appropriate while building on the existing structures, systems and procedures put in place including making sure the documentation of ESHS aspects are available for later review and analysis if needed. As discussed in Section 3.4.1 above, adding a section in the ESMS focussed more on operations and maintenance may be relevant while referring to more specific and detailed procedures and monitoring protocols that this audit has recommended being refined or developed.

It is important to ensure maintenance of institutional memory of ESHS issues including stakeholder engagement and appropriate hand-over from, and ideally overlap between, outgoing and incoming staff where transition from construction to operation results in staff changes, or where there are other ESHS staff changes. There is currently a lot of capacity and institutional memory that can credibly tell and illustrate the story of how the good ESHS risk management was developed and implemented across the Fund's portfolio. This institutional memory should not be lost prior to the exit.

The portfolio reviewed during this audit appears to be a low risk portfolio with overall good ESHS performance. Recommendations for improvements are mainly concerned with smaller issues except for the aquatic ecology issues, and there were no major ESHS performance gaps identified that had a clear risk potential or caused materially adverse ESHS impacts. There may be potential upsides for the portfolio projects if aquatic ecology issues raised in this report can be reviewed, documented and appropriate measures developed and accepted by regulatory authorities and key stakeholders. This makes it important for the Fund to critically consider what should be prioritised in the coming years in terms of ESHS risk management and what can realistically be undertaken prior to the Fund's exit.

More targeted aquatic ecology monitoring can be undertaken to understand the aquatic ecosystems and their site-specific characteristics better. This includes understanding fish migration dynamics better as well as the effectiveness of current aquatic ecology mitigation measures. Sound monitoring and analysis of monitoring data can better inform future project operations including any modifications to the measures or project operational regimes. Importantly, the monitoring will contribute to learning and hopefully more meaningful requirements for hydropower projects in Georgia in the future.

ANNEXES