Hydropower Sustainability Standard

Add certification label (if the project is certified)

Assessment Report

Project Name: Fljótsdalsstöð

Installed Capacity: 690 MW

Country: Iceland

Landsvirkjun

Project Sponsor: Landsvirkjun

Report Author: Dr Bernt Rydgren, Dr Jörg Hartmann; Mr Pelle Bågesund and Mrs Arjola Tola

Report Date: 08 November 2024

Operation

Fljótsdalsstöð, 690 MW, Iceland

Cover page photo: Spilling just starting for the season at Kárahnjúkar Dam - 19 September 2024

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The findings in this report are based on an independent assessment conducted in compliance with the processes set out in the Hydropower Sustainability Assurance System.

Fljótsdalsstöð, 690 MW, Iceland

Hydropower Sustainability Standard

About the HSS	The Hydropower Sustainability (HS) Standard is the normative document that sets out the performance requirements of the Hydropower Sustainability Certification System, a global labelling and certification scheme outlining the expectations for hydropower projects around the world. The HS Standard recognises hydropower projects for their environmental, social and governance (ESG) performance by setting minimum and advanced performance requirements for the sector and acknowledging projects for meeting these requirements. The HS Standard is aligned with the safeguards of key lenders (e.g. IFC and World Bank) and can be used to attract climate-aligned finance through green bonds certified by the Climate Bonds Initiative and support electricity sales to RE100 companies. The HS Standard is managed by the Hydropower Sustainability Alliance. The HS Alliance was established in October 2023 to act as the independent and multistakeholder standard-setting body that oversees the Hydropower Sustainability Certification System.
Intended users and uses	The HS Standard includes three separate stages: Preparation, Implementation and Operation. These reflect the different stages of hydropower development and have been designed to be used as standalone documents. Each reporting template provides an action plan to help project teams address any gaps against minimum (good practice) and advanced requirements (best practice). Official HS Standard assessments are carried out by Accredited Assessors, who take an evidence-based approach based on data triangulation. All findings are supported by objective evidence, which is factual, reproducible, objective and verifiable. The HS Standard is most effective when operators and developers commit to implement the recommendations provided and resolve identified significant gaps. Hydropower development and operation may involve public entities, private companies or combined partnerships, and responsibilities may change as the project progresses through its life cycle. It is intended that the organisation with the primary responsibility for a project at its particular life-cycle stage will have a central role in any HS Standard assessment.
Structure of the reporting template	The HS Standard comprises 12 sections that cover the environmental, social, governance and climate change impacts, both negative and positive, that arise from hydropower development and operation. Summary sections at the beginning of the report include: (A) Assessment Overview, (B) Project Details, (C) Performance against Minimum Requirements, (D) Performance against Advanced Requirements, (E) Environmental and Social Action Plan and (F) Abbreviations and Acronyms. The summary sections are followed by the 12 ESG sections where requirements for good and best practices are presented and project findings are provided. The report finishes with three appendixes that list the types of evidence used in the assessment.
Supporting resources	Additional guidance on the structure, content and history of the HS Standard can be found online at: www.hs-alliance.org
Version date	October 2023

A. Assessment Overview

Assessor(s)	Dr Bernt Rydgren (Lead Assessor); Dr Jörg Hartmann; Mr Pelle Bågesund and Ms Arjola Tola (Provisional Assessor)
Assessment objective	Certification of the Fljótsdalsstöð hydropower plant
Assessment dates	16 September – 22 September, 2024 (assessors' travel dates included)
Assessment report date	8 November 2024
Summary of key findings	The results of the assessment demonstrate a very high level of sustainability performance. The project was assessed with an earlier iteration of the hydropower sustainability tools – the Hydropower Sustainability Assessment Protocol – in 2017, with similar results and the assessment team can conclude that performance remains high in 2024, and has also continued to improve in some areas. The overall ongoing assessment and management of sustainability issues for the Fljótsdalur/Kárahnjúkar hydropower project and also for Landsvirkjun at corporate level are of very high standard. Extensive monitoring, further extended as a result of the work on WFD and Taxonomy, is in place and management responses to any emerging issues is generally swift and effective. The project complies and conforms to all requirements and commitments and delivers electrical energy with a GHG footprint of a remarkably low 1.2 gCO_2e/kWh. The company's management at corporate level is also of very high standard with sustainability aspects fully integrated into overall business operations and reported publicly as part of the company's Annual Report. This includes extensive data in accordance with the GRI and the CDP. Regular and frequent staff-satisfaction surveys combined with twice annual "staff talks", a special KPI for HR, strong equality/inclusivity focus and comprehensive policies guarantee early identification of any emerging risks or opportunities. Both union representatives and individual employees confirm a very high level of satisfaction with the company's HR efforts. The OHS work is comprehensive with frequent training of own and contractors' staff, including short-term extra staff such as students employed through the summer-works programme. OHS is monitored by the external regional arm of the Administration of Occupational Safety and Health. All policies, plans and processes relating to HR and OHS are fully extended to all contractors, suppliers and business partners as all contracts include a chain-of-responsibility provision. The project has a well-established system of managing and responding to erosion and water-quality issues (such as ecosystem management, restoration activities, proactive participation in the WFD process etc.) and emerging issues are assessed on a continuous basis. There are no gaps against the minimum-level requirements and one gap against the advanced-level requirements – suspended sediments present ongoing problems due to tunnel leakage and the inter-basin transfer. Landsvirkjun practices a "good neighbour" policy to engage with project-affected communities, mitigate and compensate any negative project impacts, and deliver benefits. This includes infrastructure-safety aspects where the project has a very comprehensive infrastructure-safety programme in place with close collaboration with the local emergency-response units (such as fire and police

	departments etc.) that includes regular trainings and emergency drills. There are emergency plans for a broad range of incidents (from minor oil spills to major dam breaks). The project, in combination with the Alcoa Fjardaál smelter, has had a transformative impact on the regional society and economy. East Iceland's population increased from 9 280 in 2003 to 11 085 in 2024, and the region produces almost one quarter of Iceland's exports with 3% of the population. There are no indications that any license conditions or negotiated/voluntary commitments to communities have not been met. The project has improved infrastructure and access, pays a significant amount of taxes (although unequally distributed), and supports multiple groups on a variety of issues, including land management, bank erosion, fishing, tourism, and culture. Livelihoods and living standards have improved in almost all respects, but there is one group of affected people, landowners downstream of the power-station tailrace with fishing right in Lake Lagarfljót, for whom that one aspect of their livelihoods has not yet been restored.The biodiversity risks identified in the EIA led to a number of license conditions and voluntary commitments through the East Iceland Sustainability Initiative which have been implemented without non-compliances or non-conformances. External agencies are used for biodiversity management and monitoring. Several predicted negative impacts have not materialised, and populations of some species have increased. This has generally happened for reasons unrelated to the project, except for the aquatic habitat in Jökulsá à Dal, which has improved as a consequence of the project (reduced flows and glacial-sediment content). Salmon has been stocked to mitigate negative impacts on populations and to accelerate the establishment in new habitats. Management of the reindeer herd is mainly carried out by government agencies, with Landsvirkjun supporting the monitoring efforts. The revegetation efforts are extensive and successful. Ecosystems in the project's area of operation should generally be able to remain healthy, functional and viable. There are unrealised opportunities to manage ecosystems in the region and achieve better conservation outcomes at a broader scale, through improved coordination between government agencies, state-owned companies such as Landsvirkjun, and other stakeholders. Many archaeological and historical sites have been documented in the project area of influence. Several sites affected by the Halslón Reservoir were excavated, and others that could be affected by riverbank erosion and groundwater level changes have been monitored and protected where necessary. Landsvirkjun maintains good relationships with the Cultural Heritage Agency, has indicated its willingness to address any issues that may arise, and has supported a number of cultural heritage initiatives in the area. Iceland is a stable, free and open democracy with generally high to very high rankings for various governance-related independent indexes. The corporate governance in Landsvirkjun is that of a leading company in the Icelandic business environment with strict policies and processes and good internal management tools to implement these. Sustainability is a core issue, fully internalised into the company's governance and reported as an integrated part of the Annual Report. Partly because of excellent market conditions, but also because of good management, the company has recorded two years in a row with record financial results. Procurement is based on chain-of-responsibility with Landsvirkjun's high standards as a benchmark and also relies on external expert input establishing a list of pre-qualified suppliers who live up to Landsvirkjun's required standards. The only relevant issue to note is external to the company, consisting of the unfair distribution of benefits resulting from the nature of the real-estate tax. This issue is

	apparently well under way towards reform, something that would constitute a big step in the direction of a balanced sharing of negative and positive benefits among the host municipalities for Landsvirkjun's many projects. Landsvirkjun's corporate-level communications team and the project team place engage and inform stakeholders through a variety of processes and channels. The East Iceland Sustainability Initiative is an effective process to enable an evidence-based discussion of project impacts. While a majority of local stakeholders and the general public hold favourable opinions of renewable energy in general and the project in particular, and are satisfied with Landsvirkjun's approach to communications and consultation, there are some opportunities for improvement on specific issues. One such issue would be to increase the project's visibility to visitors and communicate more proactively about its history, impacts and benefits. Disclosure about the project's resilience to climate change could also be improved. Landsvirkjun has a comprehensive management and monitoring system in place to assess present and future ongoing and emerging issues related to hydrological variability and the resulting generation capacity. This system is underpinned by a wide range of monitoring equipment (flow gauges, snowpack/glacier monitoring points, weather stations, measurement of reservoir, lake levels and groundwater levels etc.) that is followed-up continuously in cooperation with the Met Office in Iceland to assess impacts on the specific projects (in this case Fljótsdalur/Kárahnjúkar). There are no gaps at the minimum-requirement level and the comprehensive management and monitoring system results in 14 out of the 16 advanced-level requirements being met. The gaps at advanced level are due to the constraints in the transmission network in Iceland which prevents Fljótsdalur/Kárahnjúkar to fully optimise and maximise its operations, this also prevents the project from having the flexibility to fully anticipating and adapting to future changes. Landsvirkjun has a very comprehensive and ambitious programme to deal with climate-change-related issues (as evident by its CDP and GRI commitments and continuous climate-risk assessment, also disclosed to CDP). The company's net emissions are very low, but it is still continuously working on reducing its operational emissions further. There are no gaps against the minimum-level nor against the advanced level requirements.
Limitations of the assessment	The assessors have not identified any serious limitations of the assessment. The schedule was quite hectic (50 interviews in 4 days and 2 more via video after the assessment team had left Iceland), but the planning by the client was well-executed which ascertained that interviews and field inspections ran smoothly and efficiently.

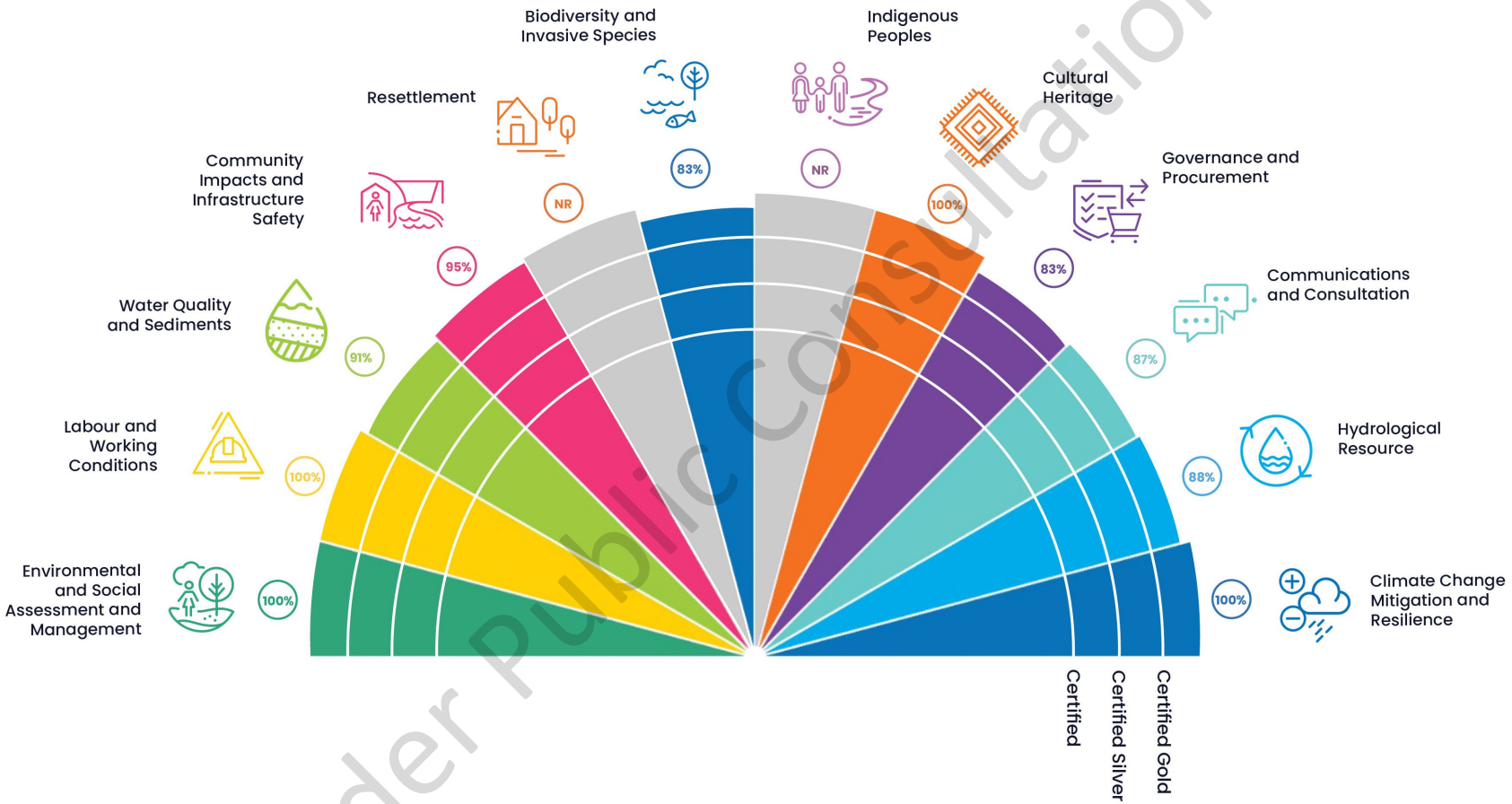

Figure 1 – Hydropower Sustainability Standard (HSS) Results Diagram

B. Project Details

Project name	Fljótsdalsstöð
Country	Iceland
Location	East Iceland, just west of Egilsstaðir, with the power station at app. 65°00' N and 15°01' W
Purpose	Hydropower generation of electricity
Developer / Owner	Landsvirkjun
Financer(s)	Government-owned, investment was financed mainly by Landsvirkjun's bond programme
Installed capacity (MW)	690 MW
Construction start date (planned or actual)	2003
Commercial operations date (planned or actual)	2007
Annual average generation (GWh / year)	4 800 (planned), varies between 4 800 and 5 000
Associated infrastructure: road(s) (length)	104 km
Transmission lines and sub-stations (names, lengths and capacities)	Two 55-km 400-kV lines operated at 220 kV
Total cost (USD m)	Not divulged
Annual operating costs (USD m)	Not divulged
Specific investment cost (USD m / MW)	Not divulged
Levelised energy cost (USD / kWh)	Not divulged
Dam type	CFRD
Dam height (m)	6 dams: 198 m (Kárahnjúkastifla); 69 m (Desjarárstifla); 25 m (Sauðárdalsstifla); 26 m (Kelduárstifla); 37 m (Ufsarstífla); and 15 m (Grjótárstífla)
Dam length at crest (m)	In order as above: 730 m; 1 000 m; 1 100 m; 1 650 m; 620 m; and 150 m
Units (number, type, MW)	6 x 115, Francis
Reservoir area at Full Supply Level (FSL) (km^2)	62
Average net head at FSL (m)	599 metres (gross head)
Average flow (m3/s)	151.7
Design flow (m3/s)	144
Load factor	76% (planned), a factor >80% has been achieved in most years
Number of physically displaced households	0
Power density (W / m^2)	9.7
Emissions intensity (gCO_2e / kWh)	1.2 gCO_2e/kWh (well below average emissions data for other renewable sources)
Contacts / website	https://www.landsvirkjun.com/lvpower/lvpowerprojects/karahnjukar
Project name	

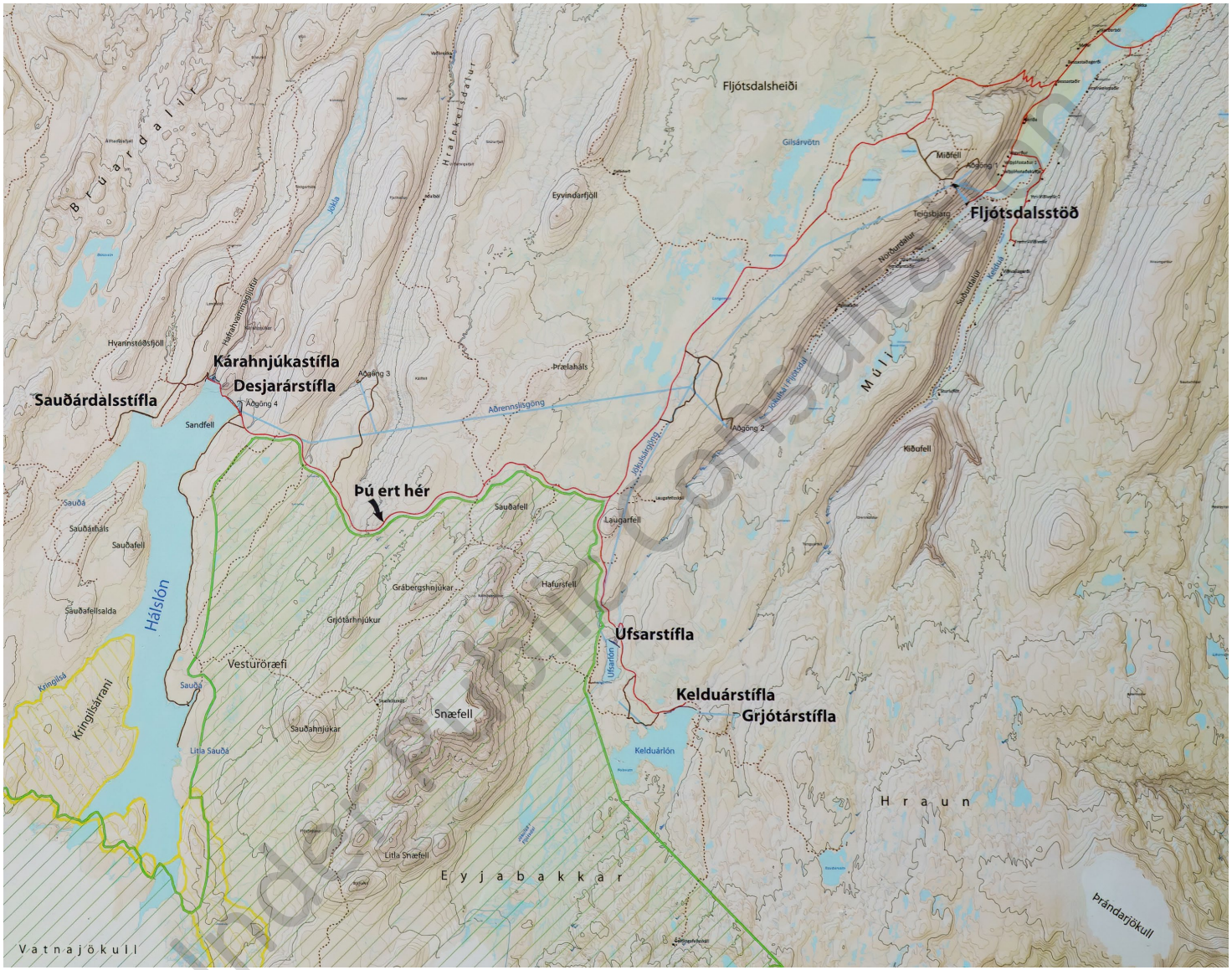

Figure 2 – Project layout

C. Performance against Minimum Requirements

There are no significant gaps against the minimum-level requirements.

D. Performance against Advanced Requirements

	Sections											
	1. Environmental and Social Assessment and Management	2. Labour and Working Conditions	3. Water Quality and Sediments	4. Community Impacts and Infrastructure Safety	5. Resettlement	6. Biodiversity and Invasive Species	7. Indigenous Peoples	8. Cultural Heritage	9. Governance and Procurement	10. Communications and Consultation	11. Hydrological Resource	12. Climate Change Mitigation and Resilience
TOTAL NUMBER OF REQUIREMENTS	6	5	11	21	5	6	8	5	6	15	16	15
NUMBER OF REQUIREMENTS MET	6	5	10	20	NR	5	NR	5	5	13	14	15
PERCENTAGE OF REQUIREMENTS MET	100	100	91	95	NR	83	NR	100	83	87	88	100

Note:

- A project must meet all Minimum Requirements on all relevant sections to achieve HS Certified label.
- To receive the HS Silver label, a project must meet all Minimum Requirements on all relevant sections AND meet at least 30% of the Advanced Requirements on each relevant section.
- To receive the HS Gold label, a project must meet all Minimum Requirements on all relevant sections AND meet at least 60% of the Advanced Requirements on each relevant section.

E. Environmental and Social Action Plan (ESAP)

Minimum Requirements							
Section	Significant gaps	Action(s)	Responsibility	Indicator of achievement	Timeframe		
					<12 months	12-24 months	>24 months
There are no significant gaps against the minimum-level requirements							

Advanced Requirements							
Section	Requirement sought	Action(s)	Responsibility	Indicator of achievement	Timeframe		
					<12 months	12-24 months	>24 months
3	Erosion and sedimentation associated with operating facility do not present ongoing problems for environmental, social and economic objectives of the facility or the project-affected areas	Continue to address the ongoing suspended-sediment issues caused by the inter-basin transfer	Landsvirkjun, in cooperation with external partners and expertise	See section 4 below, the gap is caused by the same issue and the possible solution(s) will be the same			x
4	The measures put in place to improve livelihoods and living standards are on track to become self-sustaining in the long-term	Continue efforts to restore the fishery in Lagarfljót and tributaries for landowners who hold fishing rights downstream of the tailrace	Landsvirkjun, in cooperation with external partners and expertise	Fishery in Lagarfljót restored to pre-project levels, as demonstrated by monitoring reports, or evidence of alternative resolution of impact with landowners			X
6	Processes are in place to anticipate and respond to emerging risks and opportunities	Resolve uncertainties regarding plans for a highlands national park and improve coordination regarding land zoning and management between the national government, protected areas administrations,	National government, protected areas administrations, municipalities, Landsvirkjun and other stakeholders	Zoning of areas north of Vatnajökull to reflect management requirements for target ecosystems and species			X

		municipalities, Landsvirkjun and other stakeholders					
9	There are no unresolved corporate and external governance issues identified	Tax reform	Not with Landsvirkjun but to the extent that consultations with the relevant Government actors can help, this should be carried out	A new law for real-estate tax providing an equitable sharing of the revenue among all project-affected municipalities.		X	
10	Processes are in place to anticipate and respond to emerging risks and opportunities	Improve visibility of the project for visitors to the area	Landsvirkjun, in cooperation with other stakeholders such as museums, cultural centre, Austurbrú and Vatnajökull NP	Updated signage, exhibitions, brochures, and/or social media presence		X	
10	The assessment of project resilience is publicly disclosed	Disclosure of information about climate change impacts on and resilience of the project (covering technical, commercial, environmental and social aspects)	Landsvirkjun	Publicly accessible information through specific reports, Landsvirkjun website or Annual Report	X		
11	Planning of generation operations fully optimises and maximises efficiency of water use and Planning of generation operations has the flexibility to adapt to anticipate and adapt to future changes	Continue cooperating with Landsnet on the removal of the transmission-line bottlenecks.	Landsvirkjun, in cooperation with external partners and expertise	No or little stranded capacity officially reported by Landsnet or Landsvirkjun in public statements.			x

F. Abbreviations and Acronyms

AD	(Anno Domini) - Before Christ
CDP	Carbon Disclosure Project
CPI	Corruption Perception Index (Index annually updated by Transparency International (transparency.org)
e	equivalent – used when denoting emissions intensity for power projects to reduce all emissions to a comparable number according to accepted standards
EEA	European Economic Area
EIA	Environmental Impact Assessment
ESG	Environmental, Social and Governance
ESMP	Environmental and Social Management Plan
EU	European Union
g	gram
GDP	Gross Domestic Product
GHG	Green-House Gas
GRI	Global Reporting Initiative (a sustainability-reporting standard)
GRM	Grievance Redress Mechanism
HPP	HydroPower Project
HQ	Headquarter
ILO	International Labour Organization
IPCC	Inter-governmental Panel on Climate Change
ISK	Icelandic krona (Íslensk króna in Icelandic) - unit of currency used in Iceland (1 € = 150 ISK in October 2024)
ISO	International Organization for Standardization
km	1 000 metres
KPI	Key Performance Index
kWh	kiloWatthours – 1 kWh is the energy generated by e.g. an HPP turbine of 1 kW installed capacity in 1 hour.
m	metre
m.a.s.l.	metres above sea level (altitude)
MW	MegaWatt – 1 million Watts of (in this case) installed power-generating capacity of an HPP
N/A	Not Applicable
NEA	National Energy Authority (Orkustofnun in Icelandic), the energy regulator
OHS (or OH&S)	Occupational Health and Safety
RCP	Representative Concentration Pathway (a kind of model scenario for use in climate-change modelling)
SDG	Sustainable Development Goals (UN initiative)
UN	United Nations

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USD	United States dollar - the official currency of the United States (1 USD = 137 ISK in October 2024)
W	Watt, SI unit for power
WFD	Water Framework Directive (EU Directive)

1 Environmental and Social Assessment and Management

Scope and Principle
This section addresses the plans and processes for environmental and social issues management. The principle is that negative environmental and social impacts associated with the hydropower facility are managed; avoidance, minimisation, mitigation, compensation and enhancement measures are implemented; and environmental and social commitments are fulfilled.

Background	
Identify the main environmental and social issues during operation	The downstream-flow aspects of the two main affected rivers, Jökulsá á Dal and Jökulsá í Fljótsdal (including Lake Lagarfljót); fish in the downstream stretches of the two rivers; bank erosion around the Halslón Reservoir; and a sense of unfairness lingering in some of the project-affected communities which is caused by the real-estate tax being paid to the municipality in which the power plant is located, without reference to where (negative) impacts occur.
Identify the environmental regulator	Umhverfisstofnun (The Environment Agency), part of the Ministry of Environment, Energy and Climate, evaluate environmental impact assessments (EIA) and development plans and monitors and regulates performance vis-à-vis the operating licence. The Regional Environmental and Public Health Office grants operating permits related to food safety, environmental quality and general hygiene issues.
Identify other regulators (e.g. on land, water use, Indigenous Peoples)	Orkustofnun, the National Energy Authority is the energy regulator and, following a merger, now belongs to the same Ministry as the Environment Agency. Heilbrigðiseftirlits Austurlands (the Environmental Quality and Health Authority for Eastern Iceland) issue 12-year licences, the present one runs from 2021 to 2033. Vinnueftirlitid (The Administration of Occupational Safety and Health) regulates safety aspects relating to heavy machinery etc. Allmannavarnir (The Department of Civil Protection and Emergency Management) regulates public-safety-related aspect, see Section 4. The local municipalities (two in the case of Fljótsdalstöð – Fljótsdalhreppur and Mulaþing) issue development and building permits, which have to be consistent with overall municipal plans.
Summarise the ESIA regulatory requirements	Item 3.02 in Annex 1 of Act no. 111/2021 on Environmental Impact Assessment (EIA) of Projects and Plans states: "…other (includes hydropower) with an installed electric power of 10 MW or more" are always subject to an Environmental Impact Assessment according to Article 5 of the law.
Describe the non-physical cultural heritage in the project area	Wilderness is an important life-quality aspect of many Icelanders, going beyond the recreational value into being a part of their cultural identity. In the project area, the annual reindeer hunt is also a very important part of many people's lives.
Other relevant information	N/A

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
ASSESSMENT					
Systematic processes are in place to identify any ongoing or emerging environmental and social issues associated with the operating hydropower facility	✓	Landsvirkjun went through a materiality assessment in 2018-2020, and a new one is now being implemented to align the company with the European Union's (EU) European Sustainability Reporting Standards (ESRS), expected to go into effect at the end of 2024. The 2018-2020 assessment identified 9 sustainability priorities, three of which address environmental management specifically: climate-change action; producing electricity in harmony with nature; and maximising resources and reduce waste. Landsvirkjun's sustainability work is mainly done at the corporate level but at the local level the Fljótsdalur / Kárahnjúkar project monitors the key environmental and social aspects identified, as well as any emerging issues, partly directly, often through expert agencies hired for the work but also notably through the East Iceland Sustainability Initiative, see below.	Processes to identify ongoing and emerging environmental and social issues take into account broad considerations, and both risks and opportunities	✓	Landsvirkjun and the power plant are managed in a proactive manner with a number of best-practice tools and processes as support, among these the Carbon Disclosure Project (CDP) and the Global Reporting Initiative (GRI). Monitoring is in place for a suite of issues e.g. water use, water quality (through the ongoing work on the EU Taxonomy and Water Framework Directive alignments), fish, vegetation, birds, reindeer, erosion and deposition of wind-borne sediments. These monitoring programmes are implemented with the assistance of a number of external expert agencies and institutions such as universities, research institutes, and consultancy firms specialising in these fields. However, there is a clear opportunity to repeat the 2017 internal evaluation of minimisation and mitigation of the original 20 environmental licence conditions, given that another 7 years have passed since the last one. This is considered **a non-significant gap**, but one that would develop into a significant one if not addressed by 2027.
The processes utilise appropriate expertise	✓	At corporate level Landsvirkjun has a number of senior experts in various sustainability-related fields. In cases where there is a need for external expertise this is contracted from outside expert agencies, often Government ones such as Náttúrustofa Austurlands (the East			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		Iceland Nature Research Centre), one of eight such centres of excellence in Iceland. The Hafrannsóknastofnun (Hafro for short, the Marine and Freshwater Research Institute) are assisting with categorisation and monitoring-programme design for the European Unions' (EU) Water Framework Directive (WFD).			
Monitoring programmes are in place for identified issues	✓	The East Iceland Sustainability Initiative, a best-practice joint venture between the Alcoa Fjarðaál aluminium smelter and Landsvirkjun, managed by Austurbrú (a joint organisation of the four municipalities in the Austurland, East Iceland, region), has been reporting on a comprehensive range of indicators for the cumulative impacts of the smelter, Fljótsdalur/Kárahnjúkar and the transmission lines associated with the power project. This was started even before the beginning of the power project's commissioning. The Náttúrustofa Austurlands monitors vegetation in 72 plots, since 2006, studies groundwater-level changes, flooding and vegetation response, winter-grazing by reindeer and five species of birds. The project reports to the Heilbrigðiseftirlits Austurlands on the required monitoring on an annual			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		basis (it is only required every two years) on aspects such as the gas station; workshops; pollution from the plant itself; public health aspects of the(accommodation at the station; food security (canteen); drinking water at the living facilities, at the dam and at Halslón and Ulfsarlón. There are also a number of other specialised monitoring programmes in place, see e.g. Sections 2, 3, 4, 6, and 11.			
MANAGEMENT					
Environmental and social management system is in place to manage measures to address identified environmental and social issues	✓	The Community and Environment Division is responsible for the ongoing management of environmental and social issues, which (as "sustainability" are treated as a core element in Landsvirkjun's business. Landsvirkjun's management approach starts at the level of a Vision - *A sustainable world, powered by renewable energy*. This is broken down into five targets, among these is "*leading the way in climate and environmental affairs*". The company is committed to the UN Sustainability Development Goals and put emphasis on numbers 5, 7 and 13. A new Climate and Environmental Policy was approved by the board earlier in 2024. Sustainability reporting is included in the Annual Report, reflecting the	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	See above under Assessment.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		importance the company puts on sustainability. All management instruments are fully internalised into the overall CCQ system.			
This management system is implemented utilising appropriate expertise (internal and external)	✓	Landsvirkjun has a number of internal experts in various fields of specialisation and also engages external expert agencies and institutions such as universities, research institutes, and consultancy firms.	Plans and processes are embedded within an internationally recognised environmental management system which is third party verified, such as ISO 14001	✓	The company and the power plant are certified against ISO 14001 and recently audited with favourable results.
CONFORMANCE AND COMPLIANCE					
Processes and objectives in environmental and social management plans have been and are on track to be met with:			There are no non-compliances	✓	No current non-compliances have been identified.
• no major non-compliances	✓	No major non-compliances have been identified			
• no major non-conformances	✓	No major non-conformances have been identified			
Environmental and social commitments have been or are on track to be met	✓	The power plant meets all its environmental and social commitments. The project management makes new commitments at times (e.g. around the fish in Lake Lagarfljót), commitments which are met in terms of effort if not completely in terms of desired results. The ongoing work with the stakeholders in order to jointly find acceptable mitigation means this requirement is met.	There are no non-conformances	✓	The commitment to the local community around the Lake Lagarfljót issue (see to the left) is worked on but still without a permanent solution. The fact that there are ongoing studies in place to find such a solution makes this **a non-significant gap** at this time.
Environmental and social funding commitments have	✓	No gaps have been identified, see also above.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
been or are on track to be met					
OUTCOMES					
Negative environmental and social impacts associated with hydropower facility operations are avoided, minimised and mitigated	✓	The negative impacts predicted by the 2001 EIA have not all been realised. Erosion and sand encroachment have not been as significant as expected (vegetation cover in the highlands has actually improved) and the negative impacts on the Pink-footed Geese and Wild Reindeer have not materialised at all. The impacts that did develop have mainly been in line with what was precited by the EIA, and most of those were included as licence conditions. Most of them have been evaluated by Umhverfisstofnun (the Environment Agency) as "fulfilled in full" already in 2010, only three years after commissioning. Landsvirkjun then again evaluated the remaining 6 internally in 2017, and considered an additional two fulfilled in full. The remaining ones can only be evaluated over a considerably longer time horizon than what is yet available – they deal with issues such as long-term monitoring of e.g. benthic communities in the near-shore marine environment of Héraðsflói (the bay into which both the project rivers flow) and the reindeer population's fluctuations.	Negative environmental and social impacts associated with hydropower facility operations are avoided, minimised, mitigated and compensated	✓	The fishing of salmonid species in Lake Lagarfljót is negatively affected as a result of the increased turbidity in the lake, in turn caused by the diversion of Jökulsá à Dal's glacial melt water through the project into the lake. This impact cannot be avoided, nor fully mitigated in regards to the actual disturbance. Work has been going on, since the project was commissioned, in cooperation between the angling club of the river (Veiðifélag Lagarfljóts), Landsvirkjun and now the East Iceland Nature Research Centre (Náttúrustofa Austurlands) whose part was previously managed by a private company named Laxfiskar ehf. The focus of the work has recently changed and now aims at determining whether or not the tributaries of the lake are viable habitats for salmonid fish. The impacts are extra difficult to deal with as they are clearly a combined effect of several different aspects. The power plant located farther downstream and the fish ladder constructed in the Lagarfljót River share responsibility for the impacts, but it is close to impossible to determine to what extent.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		The Fljótsdalsstöð power plant has a verified specific GHG emission of 1.2 gCO_2e/kWh and the company-wide number is 3.3 gCO_2e/kWh, both very low numbers, far below intermittent renewables such as wind and solar PV.			Given that the project is working with the affected stakeholders and are continuously trying to find ways to mitigate the impact with support from reputable expert organisations, this is assessed as **a non-significant gap** against this requirement.
Land disturbance associated with development of the hydropower project is rehabilitated or mitigated	✓	Land disturbances by the project was highly significant, details can be found in specialist sections below (mainly Section 3) but the main ones are: the 40+ km^2 of reservoirs (the by far largest being Halslón, which is also growing with the retreat of the Brúarjökull outlet glacier's front; windblown sand from the exposed areas of the drawn-down reservoirs. These disturbances have all been well-managed throughout the operational period of the plant with an extensive and highly successful erosion-protection and revegetation programme implemented by the conservation arm of the recently established (by merger of the land conservation and forestry authorities) Land og Skógur department under the Ministry of Food, Agriculture and Fisheries.			
The operating hydropower facility or the corporate entity to which it belongs can pay for social and environmental commitments	✓	The power-plant team has sufficient budget allocation to address both ongoing commitments as well as a certain freedom to meet emerging risks and opportunities.			

Fljótsdalsstöð, 690 MW, Iceland

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	6 out of 6 (100%)

Summary of findings and other notable issues
The overall ongoing assessment and management of sustainability issues for the Fljótsdalur/Kárahnjúkar hydropower project and also for Landsvirkjun at corporate level are of very high standard. Extensive monitoring, further extended as a result of the work on WFD and Taxonomy, is in place and management responses to any emerging issues is generally swift and effective. The project complies and conforms to all requirements and commitments and delivers electrical energy with a GHG footprint of a remarkably low 1.2 gCO_2e/kWh. The company's management at corporate level is also of very high standard with sustainability aspects fully integrated into overall business operations and reported publicly as part of the company's Annual Report. This includes extensive data made public in accordance with the GRI and the CDP.

Relevant evidence	
Interview	1 – 3, 11, 14, 15, 17, 20, 21, 23, 27, 34, 37, 41, 43, 47, 49, 50 – 52
Document	38, 42 – 46, 48, 50, 52, 55, 58, 61, 71, 73, 76, 77, 81, 82, 99, 100, 112 – 116, 121, 127, 129, 130, 135, 137 – 141, 151, 153, 156, 160, 162, 164, 169 – 171, 173, 174, 178, 181, 189, 193, 204, 216, 222 – 224, 245, 248
Photo	1 – 8, 10 – 12, 18 – 22, 26, 27, 31 – 34, 36 – 43, 45, 46, 48 – 58, 63 – 65, 68 - 72

2 Labour and Working Conditions

Scope and Principle
This section addresses labour and working conditions, including employee and contractor opportunity, equity, diversity, health and safety. The principle is that workers are treated fairly and protected.

Background	
Labour requirements during operation (full-time equivalent)	359 in total in Landsvirkjun, 2/3 are men. Fljótsdalstöð employs 15 people with housekeeping outsourced.
Applicable key human resources regulations	The Labour Code, The Act on Working Terms and Pension Rights Insurance No. 55/1980
Applicable key occupational health and safety (OH&S) regulations	Act on the Working Environment, Health and Safety in Workplaces No. 46/1980; Regulations No. 785/1999 on work camps & No. 798/1999 on sewers and sewage; Rules on Working Conditions, Health and Safety Measures at Construction Sites and Other Temporary Construction No. 547/1996; Regulation No. 920/2006 on the organisation and implementation of occupational health and safety activities in workplaces; Law No. 7/1998 on hygiene and pollution prevention
Identify the regulator for labour law and OH&S	The Labour Code is under the auspices of the Ministry of Social Affairs. This responsibility is mainly executed by two agencies, Vinnumálastofnun (The Directorate of Labour) whose principal role is to assist persons seeking employment as well as organising positive labour market actions, and Vinnueftirlitid (The Administration of Occupational Safety and Health) which is the primary regulatory agency responsible for enforcing safety and occupational-health laws in Iceland. There are regional offices that handle the local monitoring and inspections to ensure compliance with the regulations.
Other relevant information	Landsvirkjun at central level are actively recruiting women into the workforce (45% of hires over the last 12 months), but turnover is high. Work at Fljótsdalsstöð is organised on a shift schedule with a 9-week rotation. They use 3 different shifts: a shorter dayshift; dayshift and on call at home; and a longer dayshift shift. The 9-week rotation consists of four weeks on; one week off; three weeks on and one week off.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
ASSESSMENT					
A periodically updated assessment has been undertaken of human resource and labour management requirements for the operating facility	✓	The power plant employs only 15 people plus outsourced support services. Assessment of changing human-resources needs are done continuously and whenever a need for recruitment is identified this is reported to the headquarter (HQ) for senior-management approval. Labour diversity is regularly followed up, gender equality in salary (a legislated issue in Iceland) with monthly frequency. The HR management at the level of the power plant mirrors policies and processes at HQ level with the obvious difference that communication lines are much shorter.	Identification of ongoing or emerging labour management issues takes broad considerations into account, and both risks and opportunities	✓	The employee satisfaction surveys and the safety records are supplemented by two employee talks/year, an inclusion index (self-expressed by the employees on how inclusive they feel the company is will commence late 2024. Regular staff interviews on developing risks for safety, communication etc. Issues are followed up in detail on an annual basis with a special Key Performance Index (KPI) index for HR, looking at trends and emerging “red flags”. Aggregated results from all surveys and polls are available on the Intranet and each unit manager is responsible for following up risks and opportunities.
The assessment included project occupational health and safety issues, risks, and management measures	✓	Assessment of Occupational Health and Safety (OHS) is not a one-off at Landsvirkjun but is followed up on a continuous basis both at the corporate level and at the power plant. Employees are insured 24/7, not just during work hours			
Monitoring is being undertaken to assess if management measures are effective	✓	Landsvirkjun implements a company-wide series of internal surveys and statistics. An employee satisfaction survey is distributed every 6 weeks. It contains 9 questions, 8 of which are repeated, plus an open one which varies depending on the present need.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
Ongoing or emerging labour management issues have been identified	✓	See above			
MANAGEMENT					
Human resource and labour management policies, plans and processes are in place to address all labour management planning components	✓	The company is certified against ISO 45001. The company uses the CCQ system for its overall management needs and HR and labour management are fully integrated. Policies related to HR and labour management include: HR and Equal Opportunities Policy; Remuneration Policy; Health and Safety and Occupational Safety Policy; and Employees' Code of Conduct Safety records at the plant are monitored via a dash board on the CCQ system. Incidents, accidents and any lost time due to these are entered there and followed up. The Vinnueftirlitid (The Administration of Occupational Safety and Health) carries out regular inspections at the power plant. They have also introduced digital monitoring, requesting data that companies and institutions are legally required to have, for example, a written plan for safety and health, procedures for the protection of whistleblowers, etc. All worker accidents which account for at least one day of lost time needs to be reported to them.	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	The continuous recording of staff opinions, safety records and safety exercises at the plant, including with the Fire Department; annual training exercises with Alcoa Fjarðaál and Landsnet as well as an operational-failure training supports continuous vigilance in terms of emerging risks. The CCQ contains standard emergency plans for predictable events and training on these are conducted twice annually with two employees selected to lead the exercise based on a "case". This is all recorded in the DMM sub-system of the CCQ Contractors who regularly work at the power plant are brought together (200 people in 2024) for safety training, something also done for students employed through the summer-works programme. From 2025 an online training module will be compulsory for all contractors before they can mobilise. This is followed up with site- or assignment-specific additional training.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Human resource and labour management policies, plans and processes of contractors, subcontractors and intermediaries are in place	✓	There is a special Code of Conduct developed for suppliers, business partners and service providers. They are all required to have equal standards as Landsvirkjun. Chain-of-responsibility provisions are included in all contract, meaning everything outlined in the box above also applies here.			
CONFORMANCE AND COMPLIANCE					
Processes and objectives relating to human resource and labour management have been and are on track to be met with:			There are no non-compliances	✓	No non-compliances have been identified.
• no major non-compliances	✓	No major non-compliances have been identified. The company complies with all identified requirements including that for equal pay.			
• no major non-conformances	✓	No major non-conformances have been identified. The 0-lost-time target has been reached at Fljótsdalsstöð.	There are no non-conformances	✓	No non-conformances have been identified. The extraordinary high employee support for the company's human-resources work is noteworthy.
Any labour related commitments have been or are on track to be met	✓	Both national-level and local-level union representatives express a very high level of satisfaction with their employer and attest to all commitments being met.			
OUTCOMES					
There are no identified inconsistencies of labour management policies, plans and practices with internationally recognised labour rights	✓	Iceland has ratified 10/10 if the International Labour Organization's (ILO) Fundamental Conventions and 4/4 of Governance Conventions. They are all "in force", implemented into Law in Iceland.	Labour management policies, plans and practices are demonstrated to be consistent with internationally recognised labour rights	✓	There is no specific assessment of consistency but this is not significant as the company is certified and audited against ISO 45001 with no non-compliances and has a firm

Fljótsdalsstöð, 690 MW, Iceland

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					commitment to the UN Global Compact principles.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	5 out of 5 (100%)

Summary of findings and other notable issues
Regular and frequent staff-satisfaction surveys combined with twice annual "staff talks", a special KPI for HR, strong equality/inclusivity focus and comprehensive policies guarantee early identification of any emerging risks or opportunities. Both union representatives and individual employees confirm a very high level of satisfaction with the company's HR efforts. The OHS work is comprehensive with frequent training of own and contractors' staff, including short-term extra staff such as students employed through the summer-works programme. OHS is monitored by the external regional arm of the Administration of Occupational Safety and Health. All policies, plans and processes relating to HR and OHS are fully extended to all contractors, suppliers and business partners as all contracts include a chain-of-responsibility provision.

Relevant evidence	
Interview	1, 5, 7, 30, 32, 34, 40
Document	5, 46, 56, 57, 67 – 69, 71, 74, 79, 100, 102, 105, 109 – 111, 115, 116, 118, 122, 124, 126, 128, 131 – 133, 140, 149, 153, 164, 168, 169, 182 – 187, 231, 243, 246, 247
Photo	51, 59-62, 66, 69, 70

3 Water Quality and Sediments

Scope and Principle
This section addresses the management of water quality, erosion and sedimentation issues associated with the operating hydropower facility. The principle is that water quality in the vicinity of the operating hydropower facility is not adversely impacted by activities of the operator, that erosion and sedimentation caused by the project are managed responsibly and do not present problems with respect to other social, environmental and economic objectives, and that commitments to address water quality, erosion and sedimentation issues are fulfilled.

Background	
Water Quality	
Description of water quality	The surface water quality of Iceland's rivers and lakes is generally very good, with the exception of extremely high content of suspended sediments in rivers draining major glaciers. The two project affected rivers are originally both affected by glacial melt (see project impacts under "main influences on water quality" below). It should be noted that surface water is not used as domestic water supply, this is normally supplied from groundwater sources (generally of such high quality that it normally requires little or no treatment).
Key water quality issues	The turbidity and suspended-sediment content of the Lagarfljót Lake, causing reduced primary biological production in the lake, hence affecting the entire food chain.
Main influences on water quality	The main negative impact is described above. The sediment load has increased sevenfold in Jökulsá í Fljótsdal (but the total amount of sediment in both rivers have been reduced by 85% - now captured in the Hálslón reservoir). This results in a positive influence on the water quality in Jökulsá á Dal, where the significantly reduced suspended-sediment load results in clean, clear water for much of the year, contributing to improved conditions for e.g. salmon.
Sedimentology	
Key sediment issues	Landslides and erosion both in the reservoir and in the river downstream of the power plant. There is a neighbouring nature reserve (Kringilsárrani) and there is considerable uncertainty about how far the landslides will cause erosion into the reserve boundary before reaching equilibrium. This process has slowed down in recent years and seems to be reaching an equilibrium (another 10-20 metres is still expected to be eroded in the most affected areas, before equilibrium is reached). Sandification (migrating wind-blown sand) that constitutes a risk to the local vegetation cover, which has very low resilience to sand encroachment. Retreating ocean shoreline due to reduced sediment yield at the mouth on Héraðsflói bay. It was predicted that the shoreline would retreat 200 metres in the first 100 years due to a reduced sediment yield from the two rivers, and that sea-level rise due to climate change would add on another 80 meters of shoreline retreat to this. When the northwards migration of the river mouth at Héradsflói bay became a concern to local stakeholders, Landsvirkjun consulted with all relevant parties and the decision was made in 2014 to break through the outer sand bank.

Sediment load (tonnes/year)	Pre-project it was assessed that the two main rivers utilised (Jökulsá á Dal and Jökulsá í Fljótsdal) carried 8-9 million tonnes/year to their common mouth on Héradsflói bay. The EIA predicted that the bulk of this (an average of 6 million tonnes/year) would settle in the Hálslón reservoir.
Catchment area at the dam	Around 2 200 km^2
Other information	Landgræðslan (Land Reclamation Agency has previously conducted regular monitoring of landslides and bank erosion in Kringilsárrana, this work has been financed by Landsvirkjun. The Agency has, since 1st of January 2024, been merged with the forestry department into Land og Skógur (Land and Forest).

Minimum Requirements			**Advanced Requirements**		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Ongoing or emerging issues have been identified in the following areas:					
• water quality	✓	The EIA predicted the impacts on Lake Lagarfljót's turbidity but did not identify water quality in itself as a general issue. Ongoing monitoring programmes since the commissioning of the project has proven this prediction to be correct. These were continued for 5 years after the commissioning of the dam, but was discontinued in 2013 as no need for further monitoring was identified. Monitoring of oil spills have been ongoing ever since the commissioning of the project as part of the Eastern Iceland Sustainability Initiative, and only one minor spillage associated with the power station has been recorded since then (in 2010).	Identification of ongoing or emerging water quality issues takes into account both risks and opportunities	✓	The WFD went into force in 2022 (Iceland is going through its first cycle, that will end in 2027). The water bodies associated with the project have been classified, resulting in 11 water bodies classified as heavily modified (3 of them are classified as artificial). Hafrannsóknastofnun (commonly abbreviated as Hafró), the Marine and Freshwater Institute, has been assigned by Landsvirkjun to assess the water quality of these water bodies as part of the WFD process.
• erosion and sedimentation	✓	A continuous monitoring programme is in place to assess risks of erosion and sedimentation. For instance, monitoring of the risk of sandification takes place through visual inspection			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		twice annually (in spring and autumn) by Land og Skógur (The Land and Forest Agency). They conduct land restoration in the affected areas to reduce the risk of erosion and the spread of wind-born sediments. A comprehensive baseline was put in place for the shoreline erosion with planned evaluations approximately every 10 years. A possible repeat of the breaching of the sandbank due the northward migration of the river mouth is being assessed presently.			
If management measures are required then monitoring is being undertaken to assess if management measures are effective for:			Identification of ongoing or emerging erosion and sedimentation issues takes into account both risks and opportunities	✓	Evidence shows that Landsvirkjun is doing more than what is formally required of them when it comes to identifying risks and opportunities connected to erosion and sedimentation. For instance, a fund has been established where people living downstream can make requests on bank protections if there is an ongoing erosion issue. Landsvirkjun has an ongoing communication around these issues with the local stakeholders.
• water quality	✓	Regular monitoring has been conducted in a satisfactory way (even though discontinued in 2013). The process around the EU Water Framework Directive (WFD) will show if there will be a need to start monitoring the water quality again due to WFD requirements.			
• erosion and sedimentation	✓	Regular monitoring has been conducted in a satisfactory way. The Land and Forest Agency is regularly assigned by Landsvirkjun to assess erosion along the rivers and the reservoirs. The Conservation Management Plan for Kringilsárrani Nature Reserve and the other soil conservation initiatives have been going according to plan. The shoreline erosion in Kringilsárrani has, for			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		instance, almost reached equilibrium (even though another 10-20 meters is estimated to be eroded in the most affected areas, before equilibrium is fully reached.)			
MANAGEMENT					
Measures are in place to manage the following identified issues:			Processes are in place to anticipate and respond to emerging risks and opportunities relating to:		
• water quality	✓	Water-quality issues have been included in the project's management procedures in the past in a satisfactory way (it was concluded in 2013 that the water quality monitoring could be discontinued as no need for further monitoring was identified). The ongoing assessments as part of the WFD implementation in Iceland might change this in the coming years, based on the final confirmation of the status of the water bodies related to the project (the status has been assessed, but final status needs to be officially designated by the government). Action plans related to these water bodies (there are 11 heavily-modified water bodies, 3 of these are artificial, related to Fljótsdalur/Kárahnjúkar) will most probably be required to be developed before the end of the present WFD cycle that ends in 2027.	• water quality	✓	The water bodies associated with the project have been classified, resulting in 11 water bodies classified as heavily modified (3 of them are classified as artificial). The general WFD process in Iceland is now waiting for the government to formally verify these classifications. This system, once fully formalised, will improve the ability to identify any emerging issues and the findings (see under assessment above) will be integrated into the project's management system.
• erosion and sedimentation	✓	There is a comprehensive management programme (that responds to the issues identified in	• erosion and sedimentation	✓	The project is actively following up on emerging risks and opportunities (see description under assessment above)

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		the ongoing assessments described above) in place to follow up on identified and emerging issues related to erosion and sedimentation.			and has management procedures in place to respond to these issues. The coastal erosion issue at the mouth of the rivers is not continuously monitored (but followed-up through communication with the community members in the area) but the project has plans to conduct a comprehensive reassessment of the situation next year. If not reassessed before the start of 2027 (it is supposed to be assessed every 10 years), this would develop into a significant gap.
CONFORMANCE AND COMPLIANCE					
Processes and objectives in place to manage each of the following have been and are on track to be met:			There are no non-compliances relating to:		
• water quality, with no major non-compliances	✓	The project has satisfactorily fulfilled the licensing conditions. The WFD might add new requirements in the future, but this is not an issue at the time of the assessment.	• water quality	✓	There are no indications of any non-compliances.
• water quality, with no major non-conformances	✓	There are no specific commitments apart from the licensing conditions.			
• erosion and sedimentation, with no major non-compliances	✓	The project has satisfactorily fulfilled the licensing conditions. The WFD might change requirements in the future, but this is not an issue at the time of the assessment.	• erosion and sedimentation	✓	There are no indications of any non-compliances.
• erosion and sedimentation, with no major non-conformances	✓	The project is committed to addressing erosion and sedimentation issues related to the operation of the facility and a specific fund has been			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		established to address these issues with yearly replenishment.			
Commitments related to the following have been or are on track to be met:			There are no non-conformances relating to:		
• water quality	✓	There are no specific commitments apart from the licensing conditions.	• water quality	✓	There are no indications of any non-conformances.
• erosion and sedimentation	✓	The project is committed to addressing erosion and sedimentation issues related to the operation of the facility and a specific fund has been established to address these issues with yearly replenishment.	• erosion and sedimentation	✓	There are no indications of any non-conformances.
OUTCOMES					
Negative water quality impacts arising from activities of the operating hydropower facility are avoided, minimised and mitigated	✓	The project has monitored and assesses potential emerging risks associated with water quality since the commissioning of the project. The implementation of the WFD will possibly result in the need to start monitoring water quality again. At the time of the assessment the water-quality impacts caused by the project are fully minimised and mitigated.	Water quality in the area affected by the operating hydropower facility is of a high quality	✓	The monitoring implemented showed that the impact on water quality due to the project was negligible (and even positive in Jökulsá á Dal). The assessment of water bodies as part of the WFD has confirmed this.
			The facility has contributed or is on track to contribute to addressing water quality issues beyond those impacts caused by the operating hydropower facility	✓	Landsvirkjun shows that they are working proactively to address water-quality issues (by contributing to the WFD process – see assessment above). The positive impacts on Jökulsá á Dal is slowly transforming that river into a prime salmon river.
Erosion and sedimentation issues are avoided, minimised and mitigated	✓	The project is actively responding to issues and tries to minimise and mitigate emerging issues reported to them (there is an active communication between the project's staff and the local municipality downstream and the project).	Erosion and sedimentation associated with operating facility do not present ongoing problems for environmental, social and economic objectives of the	✘	Evidence shows that the project is working proactively to identify and address erosion and sediment-related issues, evidenced by e.g. successful control of tunnel leakages in the upper parts of the catchment. However, there are unresolved

Fljótsdalsstöð, 690 MW, Iceland

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
			facility or the project-affected areas		ongoing issues with increased suspended sediments in Lake Lagarfljót as a result of the diverted glacial melt-water originally from Jökulsá á Dal. This is **a significant gap** against this requirement. It's root cause is the same as the gap assigned under Section 4 below.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	10 out of 11 (91%)

Summary of findings and other notable issues
The project has a well-established system of managing and responding to erosion and water-quality issues (such as ecosystem management, restoration activities, proactive participation in the WFD process etc.) and emerging issues are assessed on a continuous basis. There are no gaps against the minimum-level requirements and one gap against the advanced-level requirements – suspended sediments present ongoing problems in Lake Lagarfljót.

Relevant evidence	
Interview	1 – 3, 8, 13, 20, 24, 26, 29, 33, 35, 38, 39, 42, 46
Document	19, 20, 22 – 25, 27, 28, 30, 38, 48, 53, 54, 56, 62, 77, 82, 100, 122, 130, 138 – 141, 157, 161, 175, 179, 182, 189, 190, 197 – 200, 211, 214, 215, 224, 229
Photo	2, 3, 5, 6, 10 – 12, 19, 21, 22, 34, 37 – 39, 41, 42, 49, 55, 56, 58, 63, 64

4 Community Impacts and Infrastructure Safety

Scope and Principle
This section addresses how impacts of development of the hydropower facility on project-affected communities have been addressed, in cases where these commitments are well-documented against a pre-project baseline. These impacts include economic displacement, impacts on livelihoods and living standards, public health impacts, impacts to rights, risks and opportunities of those affected by the project, infrastructure safety risks and additional benefits that can arise from a hydropower facility. The principle is that livelihoods and living standards impacted by the project have been improved relative to pre-project conditions for project-affected communities, that commitments to project-affected communities have been fulfilled, and that life, property and community assets and resources are protected from the consequences of dam failure and other infrastructure safety risks. This section does not address requirements that relate to physical displacement or to Indigenous Peoples, which are addressed in Section 5 and 7. Other interested parties and groups are addressed in Section 10. In the case of older projects, commitments to project-affected communities and project benefits refer to commitments made at the time of project development (if they were well-documented) as well as to more recent commitments.

Background
In the case of older projects, commitments to project-affected communities and project benefits refer to commitments made at the time of project development (if they were well-documented) as well as to more recent commitments.

Community Impacts and Benefits	
Description of project-affected communities and how they are affected (distinguish between physically displaced (addressed in Section 5), economically displaced and other project-affected communities and include estimated number of people and households)	Communities, associations, owners and users of land and rivers, and businesses in the project affected area, in the Jökulsá á Dal and Jökulsá í Fljótsdal / Lagarfljot catchments, organized in the two municipalities of Múlaþing and Fljótsdalshreppur, and Fjarðabyggð municipality where the Alcoa aluminium smelter is located. The pre-project socio-economic baseline conditions and the impacts on local communities from project construction and operation are well documented, together with the commitments made to address these impacts.
Agencies relevant to land acquisition	N/A
Agencies relevant to livelihood restoration and project benefits	Municipal administrations and Austurbrú, an association of East Iceland municipalities, specialised government agencies for fisheries, land reclamation, cultural heritage, etc.
Infrastructure Safety and Public Health	
Type of dam	The Kárahnjúkar Dam is a concrete-faced earth/rock-fill dam. All other dams are earth-fill dams.
Dam height (m)	Kárahnjúkar – 198 m, Desjará – 68 m, Kelduár – 26 m, Ufsar – 37 m, Saudárdalur – 29 m

Fljótsdalsstöð, 690 MW, Iceland

Probable maximum flood (m3/s)	Hálslón – 2 250 m^3/s (a catastrophic flood due to volcanic eruption estimated to 6 000 m^3/s), Kelduárlón – 550 m^3/s and Ufsarlón – 1 720 m^3/s
Design flood (expressed as estimated flood with return period)	Hálslón – 1 350 m^3/s (1 000-year return period + 25% risk factor) and 6 000 m^3/s (for the catastrophic event of a volcanic eruption under the Vatnajökull glacier – design is by fuse plug), Kelduárlón – 420 m^3/s, Ufsarlón – 620 m^3/s and Grjótárlón – 435 m3/s
Spillway capacity (m3/s)	Hálslón – 1 350 m^3/s (main spillway) & 6 000 m^3/s (including fuse plug), Kelduárlón – 550 m^3/s and Ufsarlón – 1 290 m^3/s (plus 430 m^3/s through the bottom outlet)
Spillway height (m.a.s.l.)	Hálslón – 625 m.a.s.l., Kelduár – 669 m.a.s.l. and Ufsar – 625.2 m.a.s.l.
Headrace length (m)	From Hálslón – 39.7 km, From Ufsarlón 13.3 km
Headrace width (m)	Diameter from Hálslón – 7.2-7.6 m, diameter from Ufsarlón 6.5-7.2 m
Headrace capacity (m3/s)	115 m^3/s (average discharge)
Seismicity	The Kárahnjúkar region has no known active volcanoes and low recent seismic activity.
Geology	Iceland is prone to natural hazards including volcanic eruptions, earthquakes and extreme weather conditions. Large floods can result from eruptions under glaciers. However, the Kárahnjúkar region has no known active volcanos and low recent seismic activity.
Dam safety regulatory authorities	There is no dam-safety regulator in Iceland.
Local presence/capacity of emergency services	The closest health facilities to Fljótsdalur power station are in the town of Egilsstaðir (30 minutes' drive), which has a health clinic. The regional hospital is located in Neskaupstaður (1.5 hours' drive; 23 beds). The health clinic and hospital are further supported by visiting specialists, but patients might need to go to Akureyri or Reykjavik for specific treatments. Police and fire departments are available in the region with a regional cooperation when it comes to emergency preparedness and cooperation. Emergency simulations and trainings are held on an ongoing basis (for instance fire drills at the power station twice a year).
Potential safety risks in this context	During the preparation of the project, there were extensive assessments of dam safety risks including geological, geotechnical, hydrological, and engineering studies. Overtopping of the dams is the most relevant potential failure mode; others are internal erosion, and seismic or volcanic activity. General public risks related to the reservoir area (for instance drowning or similar accidents) is regulated in the nature conservation act where it is stipulated that everyone is responsible for him- or herself in the natural environment, it will only be the project's liability if the accident happens in relation to operations that were not properly informed in advance (such as unnotified spilling or similar).
Degree of risk of dam failure and in what way	Low, overtopping of the dams is the most relevant potential failure mode; others are internal erosion, and seismic or volcanic activity. The Kárahnjúkar region has no known active volcanoes and low recent seismic activity. The spillway capacity has been determined in order to handle a catastrophic flood (due to volcanic eruption) almost three times the size of the probable maximum flood (usually the design flood of high-risk dams).
Population at risk of dam break (locations, numbers)	For the Kárahnjúkar dam the estimated population at risk is 101 people. There are 16 permanent houses, another 54 outhouses, a power station, 18 summer houses and/or deserted farms, as well as the national road and highway 1 that are all below the flood line).

	For the Desjará dam the population at risk at risk is 70 people. There are 25 permanent houses, another 63 outhouses, a power station, 19 summer houses and/or deserted farms, as well as the national road and highway 1 that are all below the flood line). For Sauðárdal dam site the population at risk is estimated to be 27 people (there are 5 permanent houses, another 26 outhouses, a power station, 12 summer houses and/or deserted farms, as well as the national road and ighway 1, which are all below the flood line).
Dam safety standards followed	Norwegian standards for dam design and construction are used in Iceland.
Agencies relevant to dam safety	The Civil Protection Agency, The Public Health Authority Austurland and other associated local departments (fire, police, health care etc.)
Other infrastructure safety issues	There are risks associated to ancillary infrastructure such as transmission lines (however, to a large extent managed by Landsnet) with the major risks being impacts by avalanches or storms.
Description of key public health issues	No public health issues have been linked to the development or operation of the Kárahnjúkar project.
Agencies relevant to public health	East Iceland Office for Public Health and Environment and the Food and Veterinary Authority

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Community Impacts and Benefits					
Monitoring is being undertaken to assess if the following commitments have been delivered and if management measures are effective:			Identification of ongoing or emerging issues for project-affected communities takes into consideration both risks and opportunities, and interrelationships among issues	✓	A broad range of issues related to the cumulative impacts of the hydropower project and the smelter are monitored and discussed through the East Iceland Sustainability Initiative, including 10 social and 12 economic indicators, and including indicators on risks (e.g. traffic accidents, housing prices) as well as opportunities (e.g. age structure of population, local tax income). The project team frequently meets with various local stakeholders and is well aware of ongoing and emerging issues.
• commitments to project-affected communities	✓	There were few license conditions with social/community implications, but a number of additional commitments to communities which are being monitored by Landsvirkjun's staff (in particular, the power station's Community and Nature Manager), the East Iceland Sustainability Initiative, local authorities and communities. In some cases, affected individuals are directly involved in monitoring (e.g. the owner of the Húsey farm monitors groundwater levels).			
• commitments to project benefits	✓	See above.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Ongoing or emerging issues relating to the following have been identified:			Identification of ongoing or emerging issues relating to project benefits takes into account both risks and opportunities	✓	See above.
• issues that affect project-affected communities	✓	Ongoing negative impacts were largely those predicted by the EIA and they have been tracked through monitoring, with no significant emerging issues.			
• delivery of project benefits	✓	See above. Additionally, a few positive impacts have emerged, such as improved conditions for fishing and tourism in the lower Jökulsá á Dal valley.			
Infrastructure Safety and Public Health					
Ongoing or emerging issues relating to the following have been identified:			Identification of ongoing or emerging safety issues takes into account a broad range of scenarios and both risks and opportunities	✓	Landsvirkjun routinely assesses its dam-safety measures internally and externally (such as the dam-safety review in 2024). A panel of independent experts has also reviewed the project previously (last time in 2017).
• dam and other infrastructure safety	✓	Landsvirkjun has a very comprehensive dam-safety programme where assessment of ongoing issues is done both at company and project levels. The dams and nearby areas are equipped with a complex system of instruments which monitor seepage (incl. turbidity levels), face deflection, crest movements, settlement, strain, pore pressure, seismic activity, acceleration (in case of earth-quakes), vertical and horizontal ground movement, and groundwater levels.			
• public health issues associated with the operating hydropower facility	✓	No public-health issues have been linked to the development or operation of the Fljótsdalur / Kárahnjúkar project. Residents in East Iceland report higher than average			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		satisfaction with health-care services, compared to other regions. Windblown dust from Hálslón reservoir has not become a health issue.			
Routine monitoring of dam and infrastructure safety is being undertaken to identify risks and assess the effectiveness of management measures	✓	See above			
If public health issues require management measures then monitoring is being undertaken to assess if management measures are effective	✓	The satisfaction with health-care services is tracked through one of the indicators of the East Iceland Sustainability Initiative. Dust from the Hálslón reservoir's shores is monitored with dust meters and webcams in the highlands and in populated areas.	Identification of ongoing or emerging public health issues takes into account public health system capacities, access to health services, and health needs, risks and opportunities for different community groups	✓	As described, satisfaction with health care has been monitored to ensure that the increased user population does not result in reduced access and quality. Two other community health- and safety-related issues are also monitored (crime and accident rates), and have generally been lower than in other parts of Iceland and/or declining.
MANAGEMENT					
Community Impacts and Benefits					
Measures are in place to deliver commitments:			Processes are in place to anticipate and respond to emerging risks and opportunities relating to project-affected communities and project benefits	✓	Following the 'good neigbour' approach, Landvisrkjun implements systematic, effective and transparent processes to engage stakeholders in East Iceland (see also section 10), understand emerging risks and opportunities, and respond with appropriate measures.
• to project-affected communities	✓	Commitments to communities are part of Landsvirkjun's Strategy, Corporate Social Responsibility Policy, and Community Engagement Policy. Various management plans are in place to assure that formal and informal commitments are delivered. These include the ongoing land			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		reclamation fund, bank erosion control programme, support to fisheries associations, and fencing to maintain boundaries between grazing districts. Progress is reviewed regularly with affected groups and individuals, and publicly reported.			This includes some measures to promote tourism to the area. Since the project was planned, tourism has become an important sector in the regional economy, although still mostly domestic tourism. While the visibility of the project itself could be increased (see section 10), some measures not directly related to the project (such as support for the cultural centre and museum in Egilsstaðir), improved accessibility, as well as changes in the landscape as a result of the project (for example, at the Stuðlagil canyon) have contributed to the attractiveness of East Iceland for visitors. Landsvirkjun has offered to time releases from smaller dams in order to enhance the appeal of waterfalls for visitors.
• to project benefits	✓	Several mechanisms are in place to deliver commitments to benefits, including local taxes, grant programmes, and direct work support. The Landsvirkjun Community Fund supports projects with broad community relevance. The summer-works programme with students supports small projects in the area. There are a number of other research and sponsorship programmes, for example grants to the Fljótsdalshérað travel association for a three-year programme to improve trails, funding for the Cultural Centre in Egilsstaðir (Slaughterhouse), and the Eyglo initiative for energy transition, efficiency and circular economy in East Iceland.			
Measures are in place to manage any identified issues relating to these commitments:					
• to project-affected communities	✓	Landsvirkjun staff are highly-skilled and experienced and are being further trained in community engagement. In a number of cases, issues with mitigation and compensation commitments and their			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		communication were identified, and changes are being made. For example, the unsatisfactory progress with restocking salmonids in Lagarfljót has recently led to a change in approach. The fact that some people remain sceptical and are not taking note of positive developments documented by the East Iceland Sustainability Initiative, is leading to a re-evaluation of the initiative's approach (see section 10).			
• to project benefits	✓	Issues with the delivery of benefits, such as the unequal distribution of property taxes between municipalities, have been followed up at the national level (see Section 9).			
If there are any formal agreements with project-affected communities, these are publicly disclosed	✓	License conditions and reporting on their implementation have been publicly disclosed. Formal agreements with municipalities and local organisations, such as Austurbrú and fishing associations are easily accessible. Individual agreements with landowners and the holders of water rights are confidential, while the compensation principle for water rights was publicly disclosed as part of the relevant court proceedings.			
Commitments to project benefits are publicly disclosed	✓	Information on the various sponsorship programmes and funds, the summer-works programme, taxes and other benefits is easily accessible.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Infrastructure Safety and Public Health					
Dam and other infrastructure safety management plans and processes have been developed in conjunction with relevant regulatory and local authorities	✓	There is no regulatory body in Iceland, Landsvirkjun is thus self-regulating. However, the company is instead assigning independent dam-safety reviews of its operations to ensure that they are aligned with international good practice on dam safety. The Kárahnjúkar Action Plan (LEI-151) contains guidelines, checklists, communication procedures, inundation maps etc. and ongoing assessments (see above) are integrated continuously into the management system.	Processes are in place to anticipate and respond to emerging infrastructure safety risks and opportunities	✓	Landsvirkjun is continuously assessing its infrastructure-safety programme. It was recently reviewed (in March 2024) and there is evidence that the company is responding to the gaps that were identified, which were all at corporate level and not relevant to the project. The project hires students on summer break. They receive significant safety and first-aid training as a part of their employment, contributing to an enhanced awareness and response level in the community.
These plans and processes provide for communication of public safety measures	✓	The project has a well-established cooperation with Almannavarnir (the Department of Civil Protection and Emergency Management) and the local fire and police department and there is continuous communication with these entities.	Public safety measures are widely communicated in a timely and accessible manner	✓	Evidence shows that there is an ongoing communication between the project and the local public-safety entities. There are some indications that a wider dam-safety training with the national and local public-safety entities might be needed (the last one was held in 2007) but the general cooperation when it comes to other major events (such as avalanches or covid) is well-established and brings experience to any other emergency drill.
Emergency response plans and processes include awareness and training programmes and emergency response simulations	✓	Emergency response training are held (related mainly to fire risks at the power station) twice a year. Other trainings and simulations, related to dam failure and other risks are held internally regularly.			
Measures are in place to manage identified public health issues	✓	No particular health issues that require management measures have been identified, beyond the erosion control and revegetation programmes to prevent windblown dust.	Processes are in place to anticipate and respond to emerging public health risks and opportunities	✓	Public health in Iceland is well monitored and managed, with no particular responsibilities for Landsvirkjun.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
CONFORMANCE AND COMPLIANCE					
Community Impacts and Benefits					
Processes and objectives in place to manage the following have been and are on track to be met:			There are no non-compliances relating to:		
• delivery of commitments to project-affected communities, with no major non-compliances	✓	There are no indications of major non-compliances.	• project-affected communities	✓	There are no indications of non-compliances.
• delivery of commitments to project-affected communities, with no major non-conformances	✓	There are no indications of major non-conformances.			
• project benefits, with no major non-compliances	✓	There are no indications of major non-compliances.	• project benefits	✓	There are no indications of non-compliances.
• project benefits, with no major non-conformances	✓	There are no indications of major non-conformances.			
Commitments have been or are on track to be met relating to:			There are no non-conformances relating to:		
• project-affected communities	✓	There are no indications otherwise. Support to the Lake Lagarfljót fishery has been delivered as committed to, although a full recovery of the fishery has not yet been achieved and may not be possible, given the changed habitat conditions.	• project-affected communities	✓	There are no indications of non-conformances.
• project benefits	✓	There are no indications otherwise.	• project benefits	✓	There are no indications of non-conformances.
Infrastructure Safety and Public Health					
Processes and objectives in place to manage the following have been and are on track to be met:			There are no non-compliances relating to:		
• dam and other infrastructure safety, with no major non-compliances	✓	There are no non-compliances	• dam and other infrastructure safety	✓	There are no non-compliances

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• dam and other infrastructure safety, with no major non-conformances	✓	There are no specific commitments related to dam and other infrastructure safety			
• public health issues, with no major non-compliances	✓	There are no indications of major non-compliances.	• public health	✓	There are no indications for non-compliances.
• public health issues, with no major non-conformances	✓	There are no indications of major non-conformances.			
Commitments have been or are on track to be met relating to:			There are no non-conformances relating to:		
• dam and other infrastructure safety	✓	There are no specific commitments related to dam and other infrastructure safety	• dam and other infrastructure safety	✓	There are no non-conformances
• public health	✓	There are no indications otherwise.	• public health	✓	There are no indications of non-conformances.
OUTCOMES					
Community Impacts and Benefits					
Livelihoods and living standards impacted by the project have been or are on track to be improved	✓	Interviews with project-affected communities and data published under the East Iceland Sustainability Initiative, indicate no significant negative impacts on the livelihoods or living standards of the project-affected communities. Pre- and post-project data confirm that many concerns raised in the early stages of the project did not materialise. The compensation and mitigation programmes, improvements in infrastructure services, and general increases in economic activity, property values and other parameters have improved livelihoods. Salaries and total incomes in East Iceland are	The measures put in place to improve livelihoods and living standards are on track to become self-sustaining in the long-term	✘	It is impossible to separate out the impacts on the regional economy of increased employment from the smelter, general economic growth, and the specific contributions of the hydropower project. However, practically all groups affected by the project have experienced improvements in infrastructure, personal incomes, municipal finances and services, cultural offerings etc. There is one group for which measures to mitigate impacts on livelihoods and living standards, are not yet on track to become self-sustaining. These are the landowners

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		similar to the Icelandic average and have grown steadily since the economic crisis which followed shortly after the commissioning of the project. One aspect of the regional growth has been a concern over the real-estate market, but prices are still lower than in other parts of the country, and the Sustainability Initiative has addressed the issue.			downstream of the tailrace of the power plant, who also hold fishing rights and are organised in an angling association. The changed aesthetics of Lagarfljót Lake cannot be mitigated, and initial mitigation approaches for the fishery have met with mixed success, and a new approach is being tested. The fact that no resolution of this issue has been achieved to date is **a significant gap.** It's root cause is the same as the gap assigned under Section 3 above.
Economic displacement has been fairly compensated, preferably through provision of comparable goods, property or services	✓	Loss of grazing land and water rights have been fairly compensated. In the case of water rights, these have also been confirmed by the Supreme Court. Landowners downstream of the tailrace of the power plant, which have been affected by increased flows and increased turbidity, leading to bank erosion and reduced fishing, have not been financially compensated. However, Landsvirkjun has accepted responsibility for impacts and has been implementing physical mitigation measures.			
Communities directly affected by the development of the hydropower facility and any other identified beneficiary of the facility have received or are on track to receive benefits	✓	All interviewed stakeholders indicate that the project has provided a number of benefits to communities by strengthening infrastructure and increasing property and income taxes, direct and indirect employment, community programmes and funds, sponsorships, and studies.	Benefits are significant and sustained for communities affected by the project	✓	Benefits are significant and sustained for the residents of the Fljótsdalshreppur and Múlaþing municipalities, and in a wider sense, the entire East Iceland region. The increase in employment and population is a good indicator for the benefits. There are no indications that the benefits will not be sustained.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					One aspect of benefits remains unequally distributed. The property taxes go to only one municipality (Fljótsdalshreppur), although most of the (negative) project impacts are felt in another municipality (Múlaþing). In 2022, Landsvirkjun paid a total of ISK 231 million (USD 1.7 million) to Fljótsdalshreppur, 65% of the municipal tax revenue. This issue is addressed in section 9, as it is a wider concern that would need to be addressed at the national level. It is not considered a gap here, as Múlaþing receives a range of other benefits.
Infrastructure Safety and Public Health					
Safety risks have been avoided, minimised and mitigated with no significant gaps	✓	The health and safety statistics show that these risks have been avoided, minimised and mitigated without significant gaps.	Safety risks have been avoided, minimised and mitigated with no identified gaps	✓	No gaps have been identified.
			Safety issues have been addressed beyond those risks caused by the operating facility itself	✓	The project's comprehensive dam-safety (and general safety) management programme is continuously addressing emerging and ongoing risks (such as addressing erosion risks that could potentially be due to natural causes). The safety and first-aid training given to the summer employees contributes to an enhanced level of security awareness in the community, resulting in a better overall

Fljótsdalsstöð, 690 MW, Iceland

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					preparedness if incidents were to develop.
Negative public health impacts arising from activities of the operating hydropower facility are avoided, minimised and mitigated	✓	There are no indications otherwise.	Where opportunities have been identified, measures to address public health issues beyond those impacts caused by the operating hydropower facility have been or are on track to be achieved	✓	No needs or opportunities for the project to invest directly in health services were identified. However, road upgrades have contributed to better access to health facilities, and the increase in regional population has made it possible to maintain and expand health services.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	20 out of 21 (95%)

Fljótsdalsstöð, 690 MW, Iceland

Summary of findings and other notable issues
Landsvirkjun practices a “good neighbour” policy to engage with project-affected communities, mitigate and compensate any negative project impacts, and deliver benefits. This includes infrastructure-safety aspects where the project has a very comprehensive infrastructure-safety programme in place with close collaboration with the local emergency-response units (such as fire and police departments etc.) that includes regular trainings and emergency drills. There are emergency plans for a broad range of incidents (from minor oil spills to major dam breaks). The project, in combination with the Alcoa Fjardaál smelter, has had a transformative impact on the regional society and economy. East Iceland’s population increased from 9 280 in 2003 to 11 085 in 2024, and the region produces almost one quarter of Iceland’s exports with 3% of the population. There are no indications that any license conditions or negotiated/voluntary commitments to communities have not been met. The project has improved infrastructure and access, pays a significant amount of taxes (although unequally distributed), and supports multiple groups on a variety of issues, including land management, bank erosion, fishing, tourism, and culture. Livelihoods and living standards have improved in almost all respects, but there is one group of affected people, landowners downstream of the power-station tailrace with fishing right in Lake Lagarfljót, for whom that one aspect of their livelihoods has not yet been restored.

Relevant evidence	
Interview	1, 2, 4, 9, 12, 17 – 19, 22, 24, 26, 28, 29, 32 – 35, 38, 42, 45 – 49, 51
Document	4, 5, 9, 10, 15, 16, 31, 32, 39 – 41, 54, 55, 59 – 67, 70, 71, 77-80, 83 – 100, 102 – 108, 117 – 124, 127, 128, 130 – 132, 135, 136, 141, 142, 145 – 151, 153, 154, 165, 166, 173 – 176, 189 – 192, 200, 201, 207, 208, 215 – 218, 225, 226, 230 – 236, 239, 240
Photo	7, 8, 19, 26 – 30, 32 – 34, 38, 39, 48, 50 – 52, 59, 60 – 62, 64 – 66, 69 – 72

5 Resettlement

Scope and Principle
This section addresses how the physical displacement arising from development of the hydropower facility has been addressed, in cases where resettlement occurred and commitments are well-documented against a pre-project baseline. The principle is that the dignity and human rights of those physically displaced have been respected; that these matters have been dealt with in a fair and equitable manner; that livelihoods and standards of living for resettlees and host communities have been improved; and that commitments made to resettlees and host communities have been fully fulfilled. This section does not address those that are only economically displaced, who are addressed in Section 4.

Background	
Did the project require or result in any physical displacement of people? Please state the evidence on which this determination is made.	
Yes, this section is relevant (for older projects, see note below)	N/A
No, this section is not relevant	No, this section is not relevant. Verbal evidence from both national- and local-level authorities clearly demonstrate that the section is Not Relevant as the low population density in the project's impact area made it possible to completely avoid physical displacement.
In the case of older projects, commitments to resettlees and host communities refer to commitments made at the time of project development (if they were well-documented) as well as to more recent commitments.	

6 Biodiversity and Invasive Species

Scope and Principle
This section addresses ecosystem values, habitat and specific issues such as threatened species and fish passage in the catchment, reservoir and downstream areas, as well as potential impacts arising from pest and invasive species associated with the operating hydropower facility. The principle is that there are healthy, functional and viable aquatic and terrestrial ecosystems in the area that are sustainable over the long-term; that biodiversity impacts arising from the operating hydropower facility are managed responsibly; that ongoing or emerging biodiversity issues are identified and addressed as required; and that commitments to implement biodiversity and invasive species measures are fulfilled.

Background	
Short description of the ecological region in the project area	Iceland's ecosystems are comparatively young, as the country was entirely covered by ice until the end of the last ice age around 10 000 years ago. Flora and fauna in the project area are adapted to a cold and windy climate. The average annual temperature at Egilsstaðir is 3.8°C, and the annual precipitation is 619 mm. The landscape has suffered severe human impacts since the first settlers arrived in Iceland in the 9th century. Sheep grazing and almost complete deforestation reduced large parts of the country's vegetation cover. Before the implementation of the project, the highlands north-east of the Vatnajökull glacier were essentially a wilderness area with large barren tracts interspersed with rivers and wetlands, affected only by sheep grazing and hunting. There is a rich bird population but few mammal and fish species.
Protected areas (national parks and reserves etc) and their distance from the project	The project-affected area is adjacent to several legally protected areas, most of which have been included in the Vatnajökull National Park (now 14 967 km^2, created in 2008 and inscribed in the World Heritage register in 2019), such as the Snaefell-Eyjabakkar area (264 km^2), which is also a Ramsar wetland. The nature reserve Kringilsáranni was reduced in size to accommodate the Hálslón reservoir. Several unprotected areas in the region have high wilderness and conservation values.
Critical habitats in the project area, including important bird areas, hotspots of endemism etc.	Several of the wetlands in the area, including the coastal wetland of Úthérað, are considered important bird areas according to the Icelandic Institute of Natural History.
# threatened species in the directly affected area: terrestrial	The reindeer (*Rangifer tarandus*) was introduced to Iceland from Norway. The species is considered globally vulnerable, and some populations and subspecies have gone extinct. The Icelandic population is currently small but stable, with fluctuations around 6 000 individuals.
# threatened species: aquatic	No threatened species are known.
Any other species of conservation importance	Indicator or target species for the area that were selected for monitoring and management purposes (with their global conservation status) are reindeer (see above), pink-footed goose (*Anser brachyrhynchus*, least concern), several coastal birds, as well as three Salmonidae: Arctic Char (*Salvelinus alpinus*, least concern), Atlantic Salmon (*Salmo salar,* near threatened), and Brown Trout (*Salmo trutta,* least concern).

Migratory pathways	Reindeer herds migrate between the highlands near the Hálslón reservoir in the summer and the lowlands in the winter. Several salmonid species migrate along the rivers and into coastal waters.
Invasive species: terrestrial	Reindeer, mink and lupin have been introduced to Iceland. Nevertheless, the reindeer has become a symbol of the wilderness, and of Eastern Iceland as a whole. Lupin has been used extensively in revegetation programmes but is now a controversial species in Iceland.
Invasive species: aquatic	No invasive aquatic species are known.
Key threats to biodiversity	Climate change may affect habitat conditions for some species. The highlands region around the project is increasingly accessible and visited, and there may be additional developments such as road improvements and wind power developments. On the other hand, Iceland is expanding its protected areas and reducing grazing pressure by sheep.
Agencies involved in biodiversity conservation	Ministry of the Environment, Energy and Climate; Vatnajökull National Park; Institute of Natural History
Other relevant information	Iceland's ecosystems are comparatively young, as the country was entirely covered by ice until the end of the last ice age around 10 000 years ago. Flora and fauna in the project area are adapted to a cold and windy climate. The average annual temperature at Egilsstaðir is 3.8°C, and the annual precipitation is 619 mm. The landscape has suffered severe human impacts since the first settlers arrived in Iceland in the 9th century. Sheep grazing and almost complete deforestation reduced large parts of the country's vegetation cover. Before the implementation of the project, the highlands north-east of the Vatnajökull glacier were essentially a wilderness area with large barren tracts interspersed with rivers and wetlands, affected only by sheep grazing and hunting. There is a rich bird population but few mammal and fish species.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Ongoing or emerging biodiversity issues have been identified	✓	The EIA identified key biodiversity concerns as the loss of wilderness and protected area; impact on the reindeer herd and on several bird species; loss and deterioration of vegetation and grazing land (related to inundation and erosion); and impact on aquatic biodiversity in Lagarfljót lake and river (note that salmonids have been introduced in many rivers and impacts on introduced salmonids are generally considered a community impact and	Identification of ongoing or emerging biodiversity issues takes into account both risks and opportunities	✓.	The monitoring programmes are designed to capture ongoing and emerging risks to biodiversity over the long term, identified in the EIA and during the years since then. Some indicators have been changed to respond to changing concerns or data availability, and additional species and ecosystems have been analysed where this seemed useful, for example on smaller rivers where glacial sediment from tunnel leakage was detected.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		not a biodiversity issue). A small number of additional biodiversity issues were identified after the EIA.			The use of external institutions including public agencies provides independence from the project owner, as well as a source of experts' suggestions for improvements to monitoring and management. For example, the revegetation programmes are reducing the amount of fertilizer used, in favour of more organic material such as hay. The external experts responsible for most of the monitoring are supported by in-house biodiversity experts. Alien species do not constitute a problem in the area, and do not warrant management interventions beyond reindeer hunting. The areas around the project still preserve high-value wilderness and conservation areas, and the national park has been expanded several times in a northerly direction by including some of these areas. A number of ongoing and emerging changes have been identified, including the increased appreciation of wilderness in Iceland, climate change causing vegetation growth and melting of glaciers, reduced sheep grazing, improved road access and increased presence of local recreationists and foreign tourists, changes in population dynamics of flora and fauna species, potential for wind
If management measures are required, then monitoring is being undertaken to assess if management measures are effective	✓	A number of environmental licence conditions and Sustainability Initiative biodiversity-related indicators are being monitored, as well as several additional identified issues. For example, Land and Forests Iceland monitor several revegetation programmes, and the effects of wind-blown sand on vegetation. The Marine and Freshwater Research Institute monitor the salmon-release programme and aquatic fauna. The East Iceland Nature Research Centre monitor bird and reindeer populations and vegetation plots in the highlands. The Icelandic Institute of Natural History monitor the effect of groundwater impacts on vegetation in the lowlands. Monitoring shows increases, decreases and range shifts in affected flora and fauna populations, not all of which can be attributed to the project. No significant declines that threaten local biodiversity have been detected in any species. The greatest concern of the community has been about salmonids in Lagarfljót lake. Arctic char and trout appear to have been native species, while salmon may not have been. At			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		the Lagarfoss rapids, a natural migration barrier below Lagarfljót lake, a fish ladder and later a hydropower station were built. Despite years of monitoring, the fish passage's effectiveness is uncertain, and decisions on potential improvements are pending. The issue is made more complex by the increased turbidity, decreased temperature and the concomitant decreased habitat quality in Lagarfljót lake and river, and the uncertain success of salmon stocking.			power, and other risks and opportunities for biodiversity.
MANAGEMENT					
Measures are in place to manage identified biodiversity issues	✓	The detailed monitoring programmes have been described above, and are frequently connected to management programmes. A stocking programme in Lagarfljót has been in place for several years but is now being modified. Stocking was also undertaken initially in Jökulsá á Dal but is being suspended as stocks began reproducing naturally. Jökulsá á Dal is becoming one of the most valuable salmon rivers in Iceland. The annual reindeer hunting quota is determined with the target of limiting the density at < 1/km^2 in order to protect vegetation from over-grazing. The road to the Hálslón reservoir is closed during the breeding season for	Processes are in place to anticipate and respond to emerging risks and opportunities	×	There are several ongoing monitoring and adaptive management programmes, related to target species and ecosystems. Through the cooperation with public and private organisations, Landsvirkjun is aware of new developments regarding these target species and ecosystems in the project affected areas. However, biodiversity opportunities and risks related to the broader changes in the project region described above are not being actively and consistently managed. There is uncertainty regarding plans for a highlands national park, and insufficient coordination regarding land zoning and management between the national government,

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		the pink-footed goose, in order to minimise disturbances. Shifting channels and increased groundwater levels near the estuary have been successfully managed by opening a new outlet to the sea in 2014, and this may be repeated if necessary. There are three separate revegetation programmes in the area involving different collaborations between farmers, municipalities, central government, Landsvirkjun, and Land and Forests Iceland.			protected areas administrations, municipalities, Landsvirkjun and other stakeholders. This is a **significant gap** because it is becoming increasingly clear that species are mobile, influenced by multiple factors of which the project may only be a minor one, and thus need to be managed at much larger scales.
CONFORMANCE AND COMPLIANCE					
Processes and objectives in place to manage biodiversity issues have been and are on track to be met with:					
• no major non-compliances	✓	There are no indications of any major non-compliances. Government reviews have confirmed that biodiversity-related license conditions have been met or are on track to be met.	There are no non-compliances	✓	There are no indications of any non-compliances.
• no major non-conformances	✓	There are no indications of any major non-conformances. The relevant indicators and targets for the East Iceland Sustainability Initiative are all on track to be met.	There are no non-conformances	✓	There are no indications of any non-conformances.
Biodiversity related commitments have been or are on track to be met	✓	Biodiversity-related commitments have been or are on track to be met.			
OUTCOMES					

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
Negative biodiversity impacts arising from activities of the operating facility are avoided, minimised, mitigated, and compensated	✓	A number of impacts predicted by the EIA were related to biodiversity, and are monitored and, where possible, managed in accordance with plans. Residual impacts on biodiversity are smaller than predicted in most cases. Fauna and flora species have proven resilient, and have been able to adapt to new conditions and use new ecological niches where they became available. For example, because of fertilization and other management efforts, the vegetation near Hálslón has been able to outgrow blowing sand; the amount of sand that can still be mobilised from the reservoir bottom appears to be declining. Reindeer, salmon, pink-footed geese, long-tailed ducks and other species have moved into new areas. The new infrastructure and improved human access to the highland area have altered the physical landscape and contributed to a loss of wilderness conditions, but so far mostly affecting visitor experiences and not biodiversity.	There are healthy, functional and viable aquatic and terrestrial ecosystems in the area affected by the hydropower facility that are sustained over the long-term	✓	Aquatic and terrestrial ecosystems in the project area have been significantly affected by the project; some impacts have been negative and some positive. Habitat conditions in Lagarfljót with its increased levels of turbidity are worse, while those in Jökulsá á Dal with a reduced level of turbidity are improved. Populations of monitored species have been generally stable, experienced increases, or declines that may be attributable to other factors. The ecosystems in the area should remain healthy, functional and viable, particularly if regional land management can be made more consistent and comprehensive, and protected areas continue to be consolidated and expanded.
			The facility has contributed or is on track to contribute to addressing biodiversity issues beyond those impacts caused by the operating hydropower facility	✓	Through its assessment, monitoring and management measures, the project has significantly contributed to increasing ecological knowledge and awareness in the region. Additionally, the revegetation programmes go well beyond compensating the project's own impacts and have contributed to the establishment of a healthy native flora over large previously severely degraded areas (more than 100 km^2). The extreme reduction of suspended sediment content in Jökulsá à Dal has

Fljótsdalsstöð, 690 MW, Iceland

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					led to increasing stocks of salmonids, water birds, and other aquatic species.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	5 out of 6 (83%)

Summary of findings and other notable issues
The biodiversity risks identified in the EIA led to a number of license conditions and voluntary commitments through the East Iceland Sustainability Initiative which have been implemented without non-compliances or non-conformances. External agencies are used for biodiversity management and monitoring. Several predicted negative impacts have not materialised, and populations of some species have increased. This has generally happened for reasons unrelated to the project, except for the aquatic habitat in Jökulsá à Dal, which has improved as a consequence of the project (reduced flows and glacial-sediment content). Salmon has been stocked to mitigate negative impacts on populations and to accelerate the establishment in new habitats. Management of the reindeer herd is mainly carried out by government agencies, with Landsvirkjun supporting the monitoring efforts. The revegetation efforts are extensive and successful. Ecosystems in the project's area of operation should generally be able to remain healthy, functional and viable. There are unrealised opportunities to manage ecosystems in the region and achieve better conservation outcomes at a broader scale, through improved coordination between government agencies, state-owned companies such as Landsvirkjun, and other stakeholders.

Relevant evidence	
Interview	1-3, 9, 20, 24, 29, 33, 37, 41
Document	23-27, 29. 34-37, 41, 51, 55, 61, 79, 81, 121, 129, 137-139, 156, 160, 174, 178, 181, 188, 189, 209, 210, 223, 233-235, 249-254
Photo	3, 5, 10-12, 17, 22, 25, 36, 37, 43, 53-58, 63, 64, 68, 71, 72

7 Indigenous Peoples

Scope and Principle
This section addresses the rights at risk and opportunities of Indigenous Peoples with respect to the hydropower facility, recognising that as social groups with identities distinct from dominant groups in national societies, they are often the most marginalized and vulnerable segments of the population. The principle is that the operating facility respects the dignity, human rights, aspirations, culture, lands, knowledge, practices and natural resource-based livelihoods of Indigenous Peoples in an ongoing manner throughout the project life.

Background	
Are any of the affected people Indigenous Peoples? Please state the evidence on which this determination is made.	
Yes, this section is relevant	N/A
No, this section is not relevant	No, this section is Not Relevant because the native Icelandic population is considered homogenous, with no ethnic minorities.

8 Cultural Heritage

Scope and Principle
This section addresses cultural heritage, with specific reference to physical cultural resources, associated with the hydropower facility. The principle is that physical cultural resources are identified, their importance is understood, and measures are in place to address those identified to be of high importance. This section does not address non-physical cultural resources, which are addressed in Section 1 and/or in Sections 5 and 7 when relevant.

Background	
Does the project affect any physical cultural resources? Please state the evidence on which this determination is made.	
Yes, this section is relevant	Iceland was settled by the Vikings in approximately 870 AD, and there are approximately 200 000 physical-cultural heritage sites associated with early settlement. The Cultural Heritage Act no. 80/2012 stipulates that all cultural objects older than 100 years are automatically protected. More significant objects are given a special status and listed by the Minister. Extensive archaeological surveys undertaken by the Archaeological Institute of Iceland, as part of the EIA for the Kárahnjúkar project identified approximately 4 000 sites, none of which are on the Minister's list.
No, this section is not relevant	N/A

Sites of physical cultural heritage affected by or in proximity to the project-affected areas	Approximately 4 000 sites associated with the project area, including sites located within 100 m of the downstream rivers. Most of the sites identified were rambling huts but also included cairns for marking travel routes, river fords and ferry crossings.
How they are affected	About 300 sites were located within 100 m from construction areas and riverbanks. A total of 25 sites were considered to be at risk from the project, either due to inundation by Hálslón (7 sites) or as a result of groundwater levels and erosion (18 sites). All excavated finds were sent to the national museum, including those from the Pálsrúst site (dating back to at least 1262) which was excavated before inundation of Hálslón Reservoir.

Agencies responsible for cultural heritage	The Cultural Heritage Agency (Minjastofnun Íslands) under the Ministry of Environment, Energy and Climate
Other important local or regional physical cultural heritage values and issues	N/A

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Ongoing or emerging cultural heritage issues with respect to physical cultural resources have been identified	✓	An Archaeological Survey was undertaken in 2000, and a follow-up survey specifically on sites at risk near water in 2001, by the Archaeological Institute of Iceland. The surveys were part of the EIA and included document gathering and field investigations. All items were recorded and 7 sites were excavated and finds handed to the National Museum.	Identification of ongoing or emerging cultural heritage issues takes broad considerations into account, and both risks and opportunities	✓	In addition to the ongoing visual inspections, Landsvirkjun has proactively sought collaboration with the Cultural Heritage Agency for expert monitoring of the archaeological sites. Landsvirkjun's station employees were trained in 2023 by the Agency about cultural heritage objects in the project area, the role of the agency and the developers, and processes in place to record, protect and conserve cultural heritage.
If management measures are required, then monitoring is being undertaken to assess if management measures are effective.	✓	The power development license has no conditions about monitoring or management of archaeological remains during operation. The 2001 survey recommended further monitoring for 18 sites. The Community and Nature Manager undertakes regular visual inspections of sites that might be at risk due to bank erosion, and has been in continuous communication with Cultural Heritage Agency regarding ongoing monitoring.			
MANAGEMENT					
Measures are in place to manage identified cultural heritage issues	✓	Formal management measures are no longer required but Landsvirkjun has approached the Cultural Heritage Agency for expert monitoring of the heritage sites identified at risk during EIA surveys. A partial assessment was undertaken by the Agency in 2023	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	According to the Cultural Heritage Act no. 80/2012, archaeological remains are monitored by Cultural Heritage Agency, including necessary investigations such as emergency investigations and field surveys. Landsvrikjun staff are aware of the

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		and an assessment report is expected to be completed shortly. A bank stabilisation programme is implemented (see sections 3 and 4) to manage bank erosion at sites prioritised in discussion with landowners and Múlaþing municipality, following the ongoing monitoring of water levels and land erosion along Lagarfljót, including the site near Hóll, one of the archaeological sites on risks.			sites around project components and their obligations to not affect them. Regular voluntarily visual inspections are performed, water levels and erosion are monitored, and a bank erosion management programme is in place. Landsvirkjun has expressed its willingness to implement any additional management measures that would be recommended by the Agency, following the ongoing assessment.
CONFORMANCE AND COMPLIANCE					
Processes and objectives in place to manage cultural heritage issues have been and are on track to be met with:			There are no non-compliances	✓	There are no indications of non-compliances.
• no major non-compliances	✓	There was only one consent condition about regular monitoring on archaeological remains at risk during construction. A 2007 letter from the Archaeological Conservation Agency confirms that there is no need for continued monitoring.			
• no major non-conformances	✓	There are no indications major non-conformances.	There are no non-conformances	✓	There are no indications of non-conformances.
Cultural heritage related commitments have been or are on track to be met	✓	Landsvirkjun has made some voluntary commitments to monitoring and support for unrelated cultural heritage initiatives, that are on track.			
OUTCOMES					
Negative cultural heritage impacts arising from activities of the operating hydropower facility are avoided,	✓	Internal visual inspections of sites near riverbanks including the site at Hóll have shown very little change in comparison to previous recorded	Where opportunities have been identified, measures to address cultural heritage issues beyond those impacts	✓	Landsvirkjun maintains good relationships with local organizations managing and promoting cultural and historical heritage. Several

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
minimised, mitigated and compensated		observations, and no negative impacts. While the report from the ongoing site assessment by the Cultural Heritage Agency has not yet been finalized, there are no indications of negative impacts.	caused by the facility have been or are on track to be achieved		opportunities for positive impacts have been identified and supported: • Increased public visibility of historical and cultural sites due to better access and signage installed by the project • Outdoor artworks in the project area • Contributions to mapping of cultural heritage sites • Exhibitions at the Heritage Museum Egilsstaðir • Preservation of the house of a famous poet (Kjarvashamur) • Co-funding the cultural centre in Egilsstaðir ('Slaughterhouse') opened in 2022 • Landscaping at cultural sites via the summer-works programme (Sledbryot church, Geirstaður church, monastery ruins at Skriduklaustur, etc)

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	5 out of 5 (100%)

Summary of findings and other notable issues
Many archaeological and historical sites have been documented in the project area of influence. Several sites affected by the Halslón Reservoir were excavated, and others that could be affected by riverbank erosion and groundwater level changes have been monitored and protected where necessary. Landsvirkjun maintains good relationships with the Cultural Heritage Agency, has indicated its willingness to address any issues that may arise, and has supported a number of cultural heritage initiatives in the area.

Relevant evidence

Fljótsdalsstöð, 690 MW, Iceland

Interview	1, 26, 28, 31, 38, 48, 52
Document	1, 2, 189, 203, 232, 237 – 240
Photo	28 -30, 32, 33, 35, 40, 44, 46, 47, 50, 65, 67

9 Governance and Procurement

Scope and Principle
This section addresses corporate and external governance considerations for the operating hydropower facility. The principle is that the owner/operator has sound corporate business structures, policies and practices; addresses transparency, integrity and accountability issues; can manage external governance issues (e.g. institutional capacity shortfalls, political risks including transboundary issues, public sector corruption risks); and can ensure compliance.

Background	
Key information on political context and public sector risks	The political stability of Iceland is ranked higher than many other EU/EES, including other Nordic countries. The country is a parliamentary democracy with general elections every four years. Freedom House ranks it as totally free with a score of 94 and Transparency International's Corruption Perceptions Index (2023) ranks Iceland at a score of 72 (19th place globally) ahead of countries such as the UK, France and the USA, but well behind all its Nordic neighbours and with a sinking trend over many years. One aspect of this sinking trend is the explosion in bribery cases in the court system. In 2023 alone 20 people were under investigation, a number that should be compared to the single previous case, in the 1990s. The country has a national debt of 65% of GDP (2023), down from the year before and equal to, or lower than most large European nations. The state's rating was upgraded from A2 to A1 by Moodys in late September 2024 after which also Landsvirkjun's rating was upgraded from Baa1 to A3.
Key information on corporate ownership and governance	The company is a public partnership owned by the Icelandic government (99.9%) and the company Eignarhlutir (in turn owned by the State Treasury) with 0.1%, and generally governed by the Act on Landsvirkjun (Act 42 of 1983) and by the Electricity Act no. 65/2003 and EU/EEA Energy Market legislation. Landsvirkjun previously owned 65% of Landsnet, the national grid company, but this ownership was sold to the Icelandic sate in 2022. The company is governed by a Board of Directors which in turn is appointed by the Minister of Finance and consists of three members from the ruling political coalition and two members from the opposition parties. All board members have voting rights. The day-to-day management team is headed by a CEO who has an "Office of the CEO" containing departments for Legal Affairs; Humans Resources; Communication and Public Relations; Policy Development and Sustainability; and Management Systems and Reforms. There is a separate Division for Finance and IT aspects which contains departments for Treasury Management; Procurement and Real Estate Management; Accounting; Operational Development, IT and Digital Development and something called "Core". The operational divisions are four – Hydropower, Wind and Geothermal, Sales and Services and Business Development and Innovation. Separate divisions for Community and Environment as well as Constructions complete the set-up.
Details of the concession, if applicable	Landsvirkjun originally received what is called an authorisation to harness the river, from the Icelandic Parliament, in 2002.

Key licenses or permits	Power Development Licences were formerly granted by the Ministry of Industry (in the case of Fljótsdalur/Kárahnjúkar, in 2002). These are now granted by Orkustofnun (the National Energy Authority), which also administers licenses previously issued by other government bodies. The licence includes conditions on the monitoring of water flows and levels, as well as references to the conditions under the auspices of the Minister with responsibility for the environment. Most power-station licences do not come with such conditions; the fact that Fljótsdalur/Kárahnjúkar's licence does, reflects its special importance, both in terms of its size and its impacts in the country. Development Permits and Building Permits are granted by municipalities and have to be consistent with municipal zoning plans. In the case of power plants, Development Permits may also define environmental conditions, on the basis of recommendations from EIA reviews by the Planning Agency. At the time of the project's permit application, the Planning Agency recommended not granting the Development Permit, but after an appeal by Landsvirkjun, this appeal was overruled by the Minister for the Environment. The Minister then, in 2001, defined a number of environmental conditions. Regional Environmental and Public Health Offices grant operating permits related to food safety, environmental quality and general hygiene issues, under the supervision of the Food and Veterinary Authority and the Environment Agency. The relevant permits for Fljótsdalsstöð were granted by the East Iceland office for 2008-2020. Other operating permits are issued by the Administration for Occupational Health & Safety for work safety related to equipment such as vehicles, heavy machinery and overhead cranes. Fire safety is supervised by the regional Fire Department. There are also regulations regarding the acquisition of and compensation for property and water rights which are required for the project, and may be owned privately, by municipalities or the state.
Other relevant information	Landsvirkjun is a public company originally established with Act no. 59/1965 to produce and transmit high-voltage electricity. The company holds an approximately 75% market share in terms of generation. The power plant is located in the Austurland region (East Iceland, population 11 085) and in the Fljótsdalshreppur Municipality. Fljótsdalshreppur has a population of only 95 people, but the surrounding municipality Mulaþing (which is subjected to most of the negative socio-environmental impacts from the project) has a population of 5 177, including the region's largest town of Egilsstaðir with 2 632 people (all population data from early 2024).

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Ongoing or emerging political and public sector governance issues have been identified	✓	At company level a formal risk-assessment process is in place to deal with any ongoing or emerging issues relating to external governance.	There are no significant opportunities for improvement in the assessment of political and	✓	The major political-, public- and corporate-governance requirements are all well identified and known with

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
Corporate governance requirements and issues have been identified	✓	The risk management process mentioned above is relevant internally as well and the company sets internal policies for 14 different aspects, among these are Risk Management, Procurement, Competition and Information Security.	public sector governance issues and corporate governance requirements and issues		no significant opportunity for improved issues identification. One key issues that has been identified is the worry that the Rammaáætlun – the Master Planning Committee – which for a long time has been a world-class example of national-level multi-criteria prioritisation of power-generation projects, is losing traction, something that would risk politicising the energy sector more and weaken the fact-based decision-making process. A second issue is the long-running problem with the unequitable nature of the real-estate tax (see under Outcomes below).
Monitoring is being undertaken to assess if corporate governance measures are effective	✓	The main risk factors are mapped in a special-purpose information system defining risk factors and suitable remedial actions. Whenever a risk is identified steps are taken to minimise its likelihood of occurrence as well as defining remedial action for any negative impact it might cause.			
MANAGEMENT					
Processes are in place to manage the following:			Processes are in place to anticipate and respond to emerging risks and opportunities	✓	The risk management process together with the extensive community-outreach work done at the project level combine to guarantee a comprehensive approach to anticipating and responding to emerging risks and opportunities. The external expert company VSO is contracted to assist with emerging or changing legislation. One important issue is the relatively high dependence on a few very large contracts for the sale of energy. This is closely monitored and the
• corporate, political and public sector risks	✓	This is part of the overall risk-management process and managed by staff in the Office of the CEO. The company at corporate level maintains communication channels with political decision-makers (e.g. Parliament) which serves to minimise political risk.			
• compliance	✓	KPMG audits compliance against permits and licences. The Legal Unit within Landsvirkjun is responsible and internal and external audits (by the BSI auditing company)			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		are conducted regularly of the ISO systems in place at the company. In addition there are audits (internal and external) of the Electricity Security and equal-pay legislations. The board conducts annual evaluations of its work.			responsibility lies with Treasury Management.
• social and environmental responsibility	✓	The Community and Environmental Division is responsible and the work is governed by the ISO 14001 certification, supported by a number of tools and commitments, e.g. the Global Reporting Initiative (GRI) and Carbon Disclosure Project (CDP).			
• procurement of goods and services	✓	The company's procurement is governed by e.g. EU legislation when the contract amount exceeds a certain level. The company uses the InTend system for procurement management, a system which has separate entry points for the client and the service providers. The Achilles system is used to screen providers for larger contracts, they now have 31 suppliers listed in this system. For smaller contracts there is a simpler system called "Credit-Information" which traditionally has focussed on just that – financial aspects – but which has also started including sustainability information.	Contractors are required to meet or have consistent policies as the developer	✓	Chain-of-responsibility provisions are included in all procurement contracts and all contractors are required to meet Landsvirkjun's standards. It is explicitly emphasised in the "Requirements for Contractors and Service Providers on Environmental Matters" that Landsvirkjun's policies and performance standards will at times exceed legal and regulatory requirements.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
• grievance mechanisms	✓	A special management procedure describes the general grievance mechanism (see Section 10).			
• ethical business practices	✓	Three policies target the ethics aspect: the Code of Ethics, the Supplier Code of Ethics and the Reprehensible Conduct Response Plan. In additional there is a Code of Conduct for employees and a separate Company and Supplier Code of Conduct, which was updated in 2023. The Personal Data Policy ensures confidentiality, security, and reliability of personal information.			
• transparency	✓	The policies described above, together with the Procurement Policy, guarantee transparency in all areas of the business.	Procurement processes include anti-corruption measures as well as sustainability and anti-corruption criteria specified in pre-qualification screening	✓	The environmental aspects of sustainability are exhaustively covered in Landsvirkjun's "Requirements for Contractors and Service Providers on Environmental Matters". Anti-corruption measures and a series of other sustainability issues such as OHS, non-discrimination, several additional HR aspects are outlined in the Supplier Code of Conduct, basing itself on e.g. UN Global Compact. Landsvirkjun generally uses a system of listed prequalified companies which are screened by external expert agencies for all sustainability aspects.
Policies and processes are communicated internally and externally as appropriate	✓	Internal communication on policies and processes are through special-purpose trainings, the intranet and regular manager-employee contacts. External communication is mainly via the web site and the Annual Report. The company has a policy to maintain close ties with the Icelandic language but have to communicate in English as well since a considerable fraction of Iceland's population is not Icelandic-speaking.			
In case of capacity shortfalls, appropriate external	✓	Landsvirkjun have many highly skilled professionals on its permanent staff but whenever necessary also hires			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
expertise is contracted for additional support		external expert organisations, universities and consulting companies in all areas of its operations.			
CONFORMANCE AND COMPLIANCE					
The project has no major non-compliances	✓	No major non-compliances have been identified.	The project has no non-compliances	✓	No non-compliances have been identified and the ISO audits conducted during 2023 (9001, 14001 and 45001) resulted in only 6 remarks (a significantly lower level of concern than a non-compliance) in total.
OUTCOMES					
There are no significant unresolved corporate and external governance issues identified	✓.	There are no significant unresolved corporate issues that affect the project. Landsvirkjun has recently been upgraded from a Baa1 rating to A3 by Moodys. The company is financially strong and generates considerable income for the Icelandic state.	There are no unresolved corporate and external governance issues identified	✕	The Hydropower Sustainability Assessment Protocol assessment of the project in 2017 stated that: "*The regulatory framework was not set up to equitably share the benefits and compensate the impacts of a project of this kind, which has left a lingering sense of unfairness and frustration among some affected communities, and is seen as a significant gap against proven best practice*". This statement is still true in 2024 (even if feelings have been somewhat tempered by time), and there are indications that a political solution will be forthcoming. However, until such a solution – distributing the tax-related benefits to better address the distribution of negative (and positive) impacts between e.g. municipalities and individual stakeholders, this

Fljótsdalsstöð, 690 MW, Iceland

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					remains **a significant gap** against this advanced-level requirement. This issue is extra important in a country such as Iceland where many municipalities have very small populations, making them poorly equipped to deal with large power projects in their areas, if the benefit distribution disfavours them.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	5 out of 6 (83%)

Summary of findings and other notable issues
Iceland is a stable, free and open democracy with generally high to very high rankings for various governance-related independent indexes. The corporate governance in Landsvirkjun is that of a leading company in the Icelandic business environment with strict policies and processes and good internal management tools to implement these. Sustainability is a core issue, fully internalised into the company's governance and reported as an integrated part of the Annual Report. Partly because of excellent market conditions, but also because of good management, the company has recorded two years in a row with record financial results. Procurement is based on chain-of-responsibility with Landsvirkjun's high standards as a benchmark and also relies on external expert input establishing a list of pre-qualified suppliers who live up to Landsvirkjun's required standards. There is only one issues of relevance to note, an issue external to the company and project. It concerns the unfair distribution of benefits resulting from the nature of the real-estate tax. This issue is apparently well under way towards reform, something that would constitute a big step in the direction of a balanced sharing of negative and positive benefits among the host municipalities for Landsvirkjun's many projects.

Relevant evidence	
Interview	1, 14 – 17, 21, 23, 25 – 28, 40, 43, 44, 47, 50, 51
Document	62, 73, 79, 82, 100, 108, 112 – 114, 127, 131, 132, 134, 143, 144, 171, 191, 224, 241, 242, 244, 248
Photo	N/A

10 Communications and Consultation

Scope and Principle
This section addresses ongoing engagement with project stakeholders, both within the company as well as between the company and external stakeholders (e.g. affected communities, governments, key institutions, partners, contractors, catchment residents, etc). The principle is that stakeholders are identified and engaged in the issues of interest to them, and communication and consultation processes maintain good stakeholder relations throughout the project life.

Background	
Directly affected community-level stakeholders	See Section 4. Owners and users of land and rivers in the project affected area, in the Jökulsá á Dal and Jökulsá í Fljótsdal / Lagarfljót catchments, as well as their associations and businesses (related to fishing, farming, tourism etc). In a wider sense, because the project is of national interest, the entire Icelandic population.
Directly affected institutional-level stakeholders	Municipalities of Fljótsdalshreppur and Múlaþing; other local and national governments and government agencies listed in the different sections of this report; businesses directly associated with the project such as Alcoa and Landsnet.
Other relevant information	N/A

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Ongoing or emerging issues relating to hydropower facility communications and consultation have been identified	✓	Landsvirkjun as the national power company is well integrated into national society, and the project team is well integrated into the community in East Iceland. Both levels have been able to identify any ongoing and emerging issues with communications. An underlying, ongoing issue is that some stakeholders are still dissatisfied with the decision for the project and earlier community engagement; overcoming division and rebuilding trust will take time.	The stakeholder mapping takes broad considerations into account	✓	The project's local stakeholder mapping is comprehensive, with more entries than for any other Landsvirkjun operational region, and almost all local stakeholders are personally known to the project team. Additional stakeholders at a broader regional level have been identified through the East Iceland Sustainability Initiative and the various grant programmes. Landsvirkjun also maps stakeholders at the national and international level.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
Requirements and approaches are determined through a periodically updated assessment process involving stakeholder mapping	✓	The project stakeholder list and communications plan are updated annually by the project team, and an interactive software (Stakeholder Relations Management) is used to track ongoing engagement activities. The national stakeholder list is updated as required.			
Effectiveness is monitored	✓	A number of opinion surveys have been used to track national and regional stakeholder perceptions on Landsvirkjun in general and specific projects in particular. Opinions among tourists have also been tracked, both at the national and regional level, to better understand the compatibility between tourism and power projects. Surveys at the Kárahnjúkar dam are planned next. Some survey results are publicly disclosed through Landsvirkjun's, Alcoa's and the East Iceland Sustainability Initiative websites. Majorities of respondents hold favourable opinions of renewable energy, Landsvirkjun and the project.			
MANAGEMENT					
Communications and consultation plans and processes are in place to manage communications and engagement with stakeholders	✓	Community engagement is guided by a Community Engagement Policy (STE-004, updated in 2024), which emphasizes Landsvirkjun's commitment to be a good neighbour. This is complemented by policies and procedures on CSR, grievances, media	Communication and consultation plans and processes show a high level of sensitivity to communication and consultation needs and	✓	Local stakeholders confirm a responsive, transparent, careful, respectful and solution-orientated approach on the part of the project team. There is sufficient staff capacity available to engage with all local stakeholders, including calls and visits

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		relations, and others. Plans and processes are in place, both at the corporate level and at the level of regional operational units. Local communications are led by the station manager and the Nature and Community manager.	approaches for various stakeholder groups and topics		with individual farmers and other neighbours. A diversity of communication channels are used including, periodic meetings with institutions such as municipalities, text messages for operations and safety-related updates (such as road closures and reservoir spilling), inserts into the main East Iceland newspaper for general information, giving explanations for visitors at Kárahnjúkar dam through Vatnajökull National Park rangers, detailed information of sustainability issues through websites and annual reports, and annual public meetings for the Sustainability Initiative, generally with a focus on specific issues of interest to the community (last year, on housing shortages). Landsvirkjun's last annual staff celebration was held in Egilsstaðir, partly to demonstrate a commitment to regional equity.
They include an appropriate grievance mechanism	✓	Procedure VKL-0068 describes the grievance mechanism; there has been only a small number of formal grievances filed through this channel, while other concerns are followed up through ongoing E&S management processes.	Processes are in place to anticipate and respond to emerging risks and opportunities	✕	The stakeholder engagement described above is generally sufficiently proactive and well-resourced to anticipate and respond to emerging risks and opportunities. The Sustainability Initiative was also designed to detect negative and positive trends. While Landsvirkjun has decided to not revive an earlier visitor centre (that saw declining visitor numbers) or
They outline communication and consultation needs and approaches for various	✓	Appropriate and practical approaches for various groups are outlined in the communications plans and in topic-specific agreements with			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
stakeholder groups and topics		stakeholders. Landsvirkjun's general approach to communicating with project sceptics/opponents is to present facts and correct factual mistakes, not to try persuade.			promote project visits (out of security concerns) and to instead invest in other community benefits (see Section 4), there could be other opportunities to communicate more proactively about the project and its history, impacts and benefits, for example through the heritage museum, cultural centre ('Slaughterhouse'), or the National Park visitor centre close to the power station. Signage is partially outdated and fading, although there is now a nation-wide programme to update rest stops and put up signs with QR codes for additional information. There has been no update to the printed project brochure from 2015, and it is not easily available for visitors. The lack of visibility is **a significant gap** because better communication with visitors could enhance the project's contribution to tourism as well as foster knowledge and discussion about this project of national importance, and thus contribute to the closure of old controversies.

STAKEHOLDER ENGAGEMENT					
The project operation stage involves engagement with directly affected stakeholders	✓	As described above, there is active engagement with all interested stakeholders.	Engagement is inclusive and participatory	✓	There are no indications otherwise.
Engagement is:					
• appropriately timed and scoped	✓	There are no indications otherwise.	Negotiations are undertaken in good faith	✓	There are no indications otherwise.
• often two-way	✓	There are no indications otherwise.			
• undertaken in good faith	✓	There are no indications otherwise.			
The business interacts with a range of directly affected stakeholders to understand issues of interest to them	✓	As described above, Landsvirkjun has a good understanding of issues of interest for national and project-level stakeholders.	The assessment and management process for downstream flow regimes has involved appropriately timed and two-way engagement with directly affected stakeholders	✓	Downstream flow regimes have been implemented as originally designed and approved (see section 11). Stakeholders along both affected rivers are well aware of and accustomed to the operating regimes. Landowners, tourism operators and other stakeholders are kept informed in a timely manner of operating conditions (e.g. anticipated reservoir levels and times for spilling) by the project, and the project has signalled openness to consider specific requests (such as releases to increase the attractiveness of waterfalls downstream of Ufsarlón).
Ongoing processes are in place for stakeholders to raise issues and get feedback	✓	As described above, there are multiple channels available for stakeholders and their representatives.	Ongoing processes are in place for stakeholders to raise issues with downstream flow regimes and get feedback	✓	Stakeholders can raise issues through a variety of channels as described above, including regular meetings with the project team and the formal grievance mechanism, and there are multiple examples of issues being resolved (e.g. high groundwater levels near the mouths of the two project-affected rivers' was resolved through

					a new artificial outlet, or riverbank erosion on Jökulsá á Dal being resolved through riverbank strengthening).
Ongoing processes are in place for:			Feedback on how issues raised have been taken into consideration has been thorough and timely	✓	Feedback has been thorough and timely, even with stakeholder groups that may be sceptical, such as the Lagarfljót fishing association.
• environmental and social issues	✓	Stakeholder engagement processes cover all environmental and social issues.			
• project-affected communities	✓	All affected communities are covered, including those indirectly affected such as the area around Alcoa's smelter, which depends on the power generated at the project, and along transmission lines.	Project-affected communities have been involved in decision-making around relevant issues and options	✓	Communities are involved in multiple ways. The Fljótsdalshreppur municipality decides on the use of property tax payments. Collaborating institutions propose priorities for research, monitoring and management programmes. Allocation of funds for various programmes such as for revegetation, riverbank protection, and small community grants are demand-led, and most applications are able to be funded, especially if they are from the vicinity of the project. Several stakeholders reported that Landsvirkjun will defer to their preferences and knowledge of local conditions, when appropriate.
• resettlees and host communities	✓	Not relevant	Resettlees and host communities have been involved in decision-making around relevant issues and options	✓	Not relevant, therefore counted as met.
• Indigenous Peoples	✓	Not relevant			
• employees and contractors on human resources and labour management issues	✓	Trade union representatives, employees and management all attest to the fact that communication channels for HR and labour aspects are in place and well-functioning.			
• management of climate risks	✓	Landsvirkjun's Climate and Environment Policy, Climate Action			

		Plan, and Climate Accounts are well communicated online. There is a significant amount of public discussion and research in Iceland regarding climate mitigation and adaptation, with active involvement of Landsvirkjun, e.g. regarding implications of future hydrology for generation. Landsvirkjun is engaging with the Climate Change Council (set up to keep the government accountable on its climate change strategy and actions) regarding reservoir emissions and nature conservation. Revegetation and related programmes supported by Landsvirkjun increase resilience, and are also well communicated.			
Channels of communication with Indigenous Peoples are maintained	✓	Not relevant.	Directly affected Indigenous Peoples have been involved in decision-making around relevant issues and options	✓	Not relevant, therefore counted as met.
These channels are:					
• appropriately timed	✓	Not relevant.			
• culturally appropriate	✓	Not relevant.			
• two-way	✓	Not relevant.			
A mutually-agreed disputes procedure is in place with Indigenous Peoples	✓	Not relevant.			
Public disclosure:			The business publicly reports on project performance in sustainability areas of high interest to its stakeholders	✓	At the national level, Landsvirkjun's last formal materiality assessment was conducted in 2018-2020 and is in the process of being updated. At the project level, the East Iceland
• the business makes significant project reports publicly available	✓	Landsvirkjun is a highly transparent company. A wide range of project-related reports is publicly available. In addition to annual monitoring and			

		specialist reports, there are also summary reports and websites that are easily accessible and convey information in non-technical formats.			Sustainability Initiative indicators were selected and adapted over time, on the basis of discussions with regional stakeholders. 17 years into operations, E&S conditions in the project-affected region appear to have largely stabilised, and a review of the Sustainability Initiative's approach, lessons learnt, and future monitoring is planned for 2025. There is awareness that the data gathered under the initiative, while very valuable for research, could be made more easily accessible and usable, to support evidence-based discussions and decision-making by stakeholders.
• the business publicly reports on project performance, in some sustainability areas	✓	Landsvirkjun publishes GRI-compliant annual reports, integrated between sustainability, financial and other corporate information, as well as a range of other sustainability-related information such as climate accounts, a green finance framework, E&S policies etc. Most of this information applies to the entire portfolio of Landsvirkjun, and is not specific to the project. The East Iceland Sustainability Initiative, a joint venture of Alcoa Fjardaál and Landsvirkjun managed by Austurbrú (a joint organisation of the East Iceland municipalities) has been reporting on a comprehensive range of indicators for the cumulative impacts of the smelter, power generation project, and transmission lines, since before the beginning of operations.			
• power density calculations, estimated GHG emissions, and / or the results of a site-specific assessment are publicly disclosed	✓	GHG emissions, including from hydropower reservoirs, other emissions, and data for GHG sequestration are disclosed through Sustainability Reports and Climate Accounts (see Section 12).	The assessment of project resilience is publicly disclosed	×	While there are a number of public national-level discussions and reports, they are mostly about increased generation as a result of glacial melt, not about other aspects of resilience and not project-specific. This is a **significant gap**.
CONFORMANCE AND COMPLIANCE					
Processes and objectives relating to communications and consultation have been and are on track to be met with:			There are no non-compliances	✓	There are no indications of non-compliances.

• no major non-compliances	✓	There are no indications of major non-compliances.			
• no major non-conformances	✓	There are no indications of major non-conformances.	There are no non-conformances	✓	There are no indications of non-conformances.
Communications related commitments have been or are on track to be met	✓	There are no indications otherwise.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	13 out of 15 (87%), two advanced-level requirements are Not Relevant, hence excluded from the percentage calculation.

Summary of findings and other notable issues
Landsvirkjun's corporate-level communications team and the project team place engage and inform stakeholders through a variety of processes and channels. The East Iceland Sustainability Initiative is an effective process to enable an evidence-based discussion of project impacts. While a majority of local stakeholders and the general public hold favourable opinions of renewable energy in general and the project in particular, and are satisfied with Landsvirkjun's approach to communications and consultation, there are some opportunities for improvement on specific issues. One such issue would be to increase the project's visibility to visitors and communicate more proactively about its history, impacts and benefits. Disclosure about the project's resilience to climate change could also be improved.

Relevant evidence	
Interview	1, 14-16, 18-20, 22, 24, 26, 28. 29, 31, 33, 36-38, 42, 46, 48, 49, 52
Document	9, 65, 66, 78, 79, 107, 125, 130, 136, 140, 141, 153, 163, 169, 189, 201, 202, 233, 255
Photo	30, 32, 33, 40, 46, 47, 50, 59-61, 65, 67

11 Hydrological Resource

Scope and Principle
This section addresses hydrological resource availability and reliability, reservoir management, and downstream flow regimes in relation to the operating hydropower facility. The principle is that power generation planning and operations take into account hydrological resource availability and reliability in the short- and long-term, that the reservoir is well managed taking into account power generation operations, environmental and social management requirements, and multi-purpose uses where relevant, and that issues with respect to downstream flow regimes are identified and addressed.

Background	
Hydrology and flows	
Average flow at dam (m^3/s)	Hálslón Reservoir: 116 m^3/s, Ufsarlón Pond: 27 m^3/s, Kelduárlón Reservoir: 4 m^3/s, Grjótárlón Pond: 4 m^3/s
Minimum monthly average flow (m^3/s)	Hálslón Reservoir: 4 m^3/s, Ufsarlón Pond: 1m^3/s, Kelduárlón Reservoir: 0.3 m^3/s, Grjótárlón Pond: 0.1 m^3/s
Maximum monthly average flow (m^3/s)	Hálslón Reservoir: 511 m^3/s, Ufsarlón Pond: 98 m^3/s, Kelduárlón Reservoir: 17 m^3/s, Grjótárlón Pond: 28 m^3/s
Lowest observed flow (m^3/s)	Hálslón Reservoir: 3 m^3/s, Ufsarlón Pond: 0.2 m^3/s, Kelduárlón Reservoir: 0.2 m^3/s, Grjótárlón Pond: 0.01 m^3/s
Highest observed flow (m^3/s)	Hálslón Reservoir: 767 m^3/s, Ufsarlón Pond: 400 m^3/s, Kelduárlón Reservoir: 76 m^3/s, Grjótárlón Pond: 41 m^3/s
Design flow (m^3/s)	Hálslón Reservoir: 1350 m^3/s (6000 m^3/s including extreme flows and all spillways), Ufsarlón Pond: 620 m^3/s, Kelduárlón Reservoir: 420 m^3/s, Grjótárlón Pond: 435 m^3/s
Affected river reaches (start/end and how affected)	Hálslón Reservoir: Jökulsá á Dal, Desjará and Sauðá are dammed to form Hálslón Reservoir. The water is diverted into Jökulsá í Fljótsdal., Ufsarlón Pond: Jökulsá í Fljótsdal is diverted into Fljótsdalsstöð power plant. The water is released back into the original river downstream of the power plant., Kelduárlón Reservoir: Kelduá river is diverted into Ufsarlón Pond., Grjótárlón Pond: Grjótá, Innri Sauðá and Ytri Sauðá rivers are diverted into Kelduárlón Reservoir.
Proposed downstream flow regimes for environmental or social objectives	Ufsarlón Pond: Providing spills during the tourist season to maintain flows in the Jökulsá í Fljótsdal and Kelduár in July and August (during good-water years), to ensure tourists to the area can enjoy these water courses and their waterfalls.
Reservoir	
Reservoir length (km)	Hálslón Reservoir: 28 km, Ufsarlón Pond: 2 km, Kelduárlón Reservoir: 5 km, Grjótárlón Pond: 1 km
Minimum operating level MOL (m.a.s.l.)	Hálslón Reservoir: 550 m.a.s.l., Ufsarlón Pond: 622 m.a.s.l., Kelduárlón Reservoir: 654 m.a.s.l., Grjótárlón Pond: 669.5 m.a.s.l.
Normal operating level (m.a.s.l.)	Hálslón Reservoir: The reservoir fills in fall after the glacier melt period and is drawn down in winter. The reservoir has been operated between a level of 568 m.a.s.l. and its FSL since its inundation in 2007 to 2024. Average level in years 2008-2024: 610 m.a.s.l. Ufsarlón Pond: 622-625.2 m.a.s.l., Kelduárlón Reservoir: 654-669 m.a.s.l., Grjótárlón Pond: 669.5-672m.a.s.l.

Full supply level FSL (m.a.s.l.)	Hálslón Reservoir: 625 m.a.s.l., Ufsarlón Pond: 625.5 m.a.s.l., Kelduárlón Reservoir: 669 m.a.s.l., Grjótárlón Pond: 672 m.a.s.l.
Reservoir area at FSL (km^2)	Hálslón Reservoir: 62 km^2, Ufsarlón Pond: 1 km^2, Kelduárlón Reservoir: 7.7 km^2, Grjótárlón Pond: 0.7 km^2
Reservoir area at MOL (km^2)	Hálslón Reservoir: 10 km^2, Ufsarlón Pond: 0.8 km^2, Kelduárlón Reservoir: 1.5 km^2, Grjótárlón Pond: 0.1 km^2
Volume at FSL (million m^3)	Hálslón Reservoir: 2196 m^3, Ufsarlón Pond: 9 m^3, Kelduárlón Reservoir: 65 m^3, Grjótárlón Pond: 0.2 m^3
Volume at MOL (million m^3)	Hálslón Reservoir: 0 m^3, Ufsarlón Pond: 5.9 m^3, Kelduárlón Reservoir: 3 m^3, Grjótárlón Pond: 0 m^3
Average retention time in days	Hálslón Reservoir: 219 days (calculated as reservoir volume at FSL / average flow at dam), Ufsarlón Pond: 4 days, Kelduárlón Reservoir: 188 days, Grjótárlón Pond: 0.6 days
Number of days for filling	Hálslón Reservoir: 103 days (on average in 2023 and 2024), Ufsarlón Pond: N/A, Kelduárlón Reservoir: 122 days (on average in 2022 and 2023), Grjótárlón Pond: N/A
Other relevant information	Note: Reservoir volume numbers above refer to active storage. Hydrological monitoring is also a condition of the power development licence, and monitoring stations and protocols are approved by the National Energy Authority.

Minimum Requirements			**Advanced Requirements**		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Ongoing or emerging issues in the following areas have been identified:			Issues that may impact on water availability or reliability have been comprehensively identified	✓	There is extensive research in Iceland on future water availability and reliability, allowing for comprehensive assessments on impacts on the water resources based on long-term historical flow data as well as climate observations and modelling. There is an ongoing and continuous cooperation (since the start of the 1980's) between Landvirkjun and Vedurstofa Islands (the Met Office) on these issues.
• hydrological resource availability and reliability	✓	The hydrological resource availability and reliability is continuously monitored through a comprehensive monitoring programme – see further description under "inputs to monitoring include" below.			
• reservoir management	✓	The hydrological monitoring system is continuously assessing ongoing and emerging issues for reservoir management to ensure that both operations and commitments to downstream flows are ensured. Ongoing and emerging issues are monitored by about 40 different sensors (reservoir and lake levels, flows, groundwater levels) that are			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		accessible online for operational staff.			
• downstream flow regimes	✓	See above.	Scenarios, uncertainties and risks for water availability and reliability are routinely and extensively evaluated over the short- and long-term	✓	The hydrological model and weather forecasting are continuously improved. The Met Office has, since 2011, used HARMONIE high-resolution numerical weather prediction model which has further increased the performance of existing models. The cooperation with the Met Office also extends to hydro-meteorological network and studies on climate change and long-term implications. Landsvirkjun is presently basing its water availability predictions on the trend that the glaciers are melting (same trend on the project-specific level). However, as indicated in the climate projections from the Met Office (see section 12), the future projections indicates both above and below present values in terms of both temperature and precipitation which might lead to changes to this strategy. Given how closely Landsvirkjun is working with the Met Office to update its projections and inputs for operations, it is clear that the project is assessing these scenarios, uncertainties and risks continuously.
If management measures are required then monitoring is being undertaken to assess if management measures are effective:					
• reservoir management	✓	Monitoring is continuous, for further details see “inputs to this monitoring include” below			
• downstream flow regimes	✓	See above.			
Monitoring is being undertaken of hydrological	✓	See above.	Identification of ongoing or emerging reservoir management	✓	The research into water availability and reliability described above gives

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
resource availability and reliability			issues takes into account both risks and opportunities		a solid foundation for identification of ongoing or emerging reservoir-management issues, both risks and opportunities.
Inputs to this monitoring include:			Issues identification relating to downstream flow regimes takes into account both risks and opportunities	✓	The licencing conditions of the powerplant were based on a comprehensive assessment that included a wide range of objectives (environmental, social and economic). Furthermore, the project is continuously assessing the ongoing and emerging issues through its communication programme in the region.
• field measurements	✓	Landvirkjun and the Icelandic Met Office have, since the 1980's, jointly maintained a system of flow gauges, snowpack/glacier monitoring points, and weather stations across Iceland (currently 17 in the project area)	An assessment has been undertaken that includes identification of the flow ranges and variability to achieve different environmental, social and economic objectives based on field studies as well as relevant scientific and other information	✓	See above.
• appropriate statistical indicators	✓	Observed data (such as reservoir level, outflows, seepage, evaporation etc.) are processed and used to calculate reservoir inflows from glaciers (these cannot be directly measured).			
• issues which may impact on water availability or reliability	✓	The above-described gauging and data-collection system is used to assess the mass balance of glaciers (such as Vatnajökull and its several outlet glaciers), surface-water inflows, reservoir storage as well as reservoir and groundwater levels.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		These assessments include climate-change impacts as well.			
• a hydrological model	✓	The hydrological model for Fljótsdalur/Kárahnjúkar is based on high-quality, long-term (61 years) historical inflow series and has been updated several times to reflect new data and methodological advances.			
MANAGEMENT					
Measures are in place to guide generation operations that are based on:			Planning of generation operations has a long-term perspective	✓	The generation planning department calculates sales forecast for the next three to five years. These forecasts undergo stress tests to test risks for curtailments, various energy forecasts, closures of power plants due to maintenance and additions of new power plants into the system etc.
• analysis of the hydrological resource availability	✓	Landsvirkjun has a comprehensive system in place to assess the hydrological availability which is incorporated into its general management and monitoring system. Input into this system comes from the monitoring described under assessment above.			
• a range of technical considerations	✓	There are a number of technical considerations that needs to be balanced for generation operations such as reservoir levels, minimum-release requirements, generation needs, transmission constraints and curtailment agreements where clients need to be informed as early as possible – for instance, Alcoa needs to be notified at least 45 days prior to curtailment in accordance with the contract.	Planning of generation operations fully optimises and maximises efficiency of water use	✘	Even though there has been some development since the HSAP assessment of Fljótsdalur / Kárahnjúkar in 2017 (the connection between Kárahnjúkar and Akureyri has been strengthened, for example), the constraints posed by transmission capacity are still causing a capacity gap, resulting in 30-50 MW of stranded capacity from Fljótsdalsstöð. This constraint means that the use of the water in the Halslón Reservoir is not fully

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					optimised. This is **a significant gap** against this requirement. The root cause of this gap is the same as the gap assigned against the requirement below.
• an understanding of power system opportunities and constraints	✓	The generation planning department within Landsvirkjun has a clear understanding of the power system and how the project can contribute (opportunities) and assesses these possibilities over both the short and long terms, they are also fully aware of the constraints of the system (bottlenecks, curtailments etc.).	Planning of generation operations has the flexibility to anticipate and adapt to future changes	✘	Not fully, based on the transmission constraint described above. This is **a significant gap** against this requirement. Removal of the transmission bottleneck in north-western Iceland would make the project able to adapt its generation in response to increasing inflows due to glacial melting. The root cause of this gap is the same as the gap assigned against the requirement above.
Measures are in place to manage identified reservoir management issues	✓	There are a number of monitoring programmes to manage identified reservoir issues such as shoreline erosion, wind-driven dust and associated ecosystem restoration, and reservoir sedimentation.	Processes are in place to anticipate and respond to emerging risks and opportunities for reservoir management	✓	Landsvirkjun's processes are well prepared to both anticipate and respond to emerging risks and opportunities. See description of monitoring procedures above.
Measures are in place to address identified downstream flow issues	✓	The project follows the licence conditions that stipulates that when release from the reservoirs is required (mainly due to aesthetic values and attractiveness for the tourism industry) – this follows a three-step guidance based on the reservoir levels at different dates during the summer season.	Processes are in place to anticipate and respond to emerging risks and opportunities for downstream flow regimes	✓	Evidence shows that the project has a comprehensive communication process in place to assess the needs and risks related to downstream-flow regimes (such as issues related to flooding, erosion, fishing and more) and that there is a well-functioning process in place, enabling the project to respond to these risks and opportunities.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Where formal commitments have been made to downstream flow regimes, these are publicly disclosed	✓	There are no formal commitments apart from the licencing conditions. Informal commitments have been made in the past (such as releasing water for a limited time in connection to tourism).	Commitments are made in relation to downstream flow regimes that include the flow objectives; the magnitude, range and variability of the flow regimes; the locations at which flows will be verified; and ongoing monitoring	✓	There are no specific commitments beyond the licensing conditions at the moment, but evidence shows that Landsvirkjun is continuously assessing and responding to these issues when they arise (see description above as well).
CONFORMANCE AND COMPLIANCE					
Processes and objectives in place to manage each of the following have been and are on track to be met:			There are no non-compliances relating to:		
• reservoir management, with no major non-compliances	✓	No major non-compliances have been identified.	• reservoir management	✓	No non-compliances have been identified.
• reservoir management, with no major non-conformances	✓	No major non-conformances have been identified.			
• downstream flow regimes, with no major non-compliances	✓	No major non-compliances have been identified.	• downstream flow regimes	✓	No non-compliances have been identified.
• downstream flow regimes, with no major non-conformances	✓	No major non-conformances have been identified.			
Commitments relating to the following have been or are on track to be met:			There are no non-conformances relating to:		
• reservoir management	✓	There are no specific commitments apart from the licencing conditions.	• reservoir management	✓	No non-conformances have been identified.
• downstream flow regimes	✓	There are no specific commitments apart from the licencing conditions.	• downstream flow regimes	✓	No non-conformances have been identified.
OUTCOMES					
Downstream flow regimes take into account environmental, social and economic objectives	✓	The project has ongoing communications with local stakeholders. Environmental, social and economic objectives (in	Downstream flow regimes and commitments are an optimal fit amongst environmental, social and economic objectives within	✓	The project went through a comprehensive licencing process where specific requirements were considered, and the project even

Fljótsdalsstöð, 690 MW, Iceland

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		addition to the licensing conditions for flow regimes) and specific objectives have been met based on requests (such as increased release for short periods in connection to tourism).	practical constraints of the present circumstances		went through redesign (such as moving the main spillway at the Hálslón reservoir). It can, therefore, be considered that an optimal fit based on the project's circumstances has been achieved.
Where relevant, they also take agreed transboundary objectives into account	✓	Not relevant			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no significant gaps against the minimum-level requirements.	14out of 16 (88 %)

Summary of findings and other notable issues
Landsvirkjun has a comprehensive management and monitoring system in place to assess present and future ongoing and emerging issues related to hydrological variability and the resulting generation capacity. This system is underpinned by a wide range of monitoring equipment (flow gauges, snowpack/glacier monitoring points, weather stations, measurement of reservoir, lake levels and groundwater levels etc.) that is followed-up continuously in cooperation with the Met Office in Iceland to assess impacts on the specific projects (in this case Fljótsdalur/Kárahnjúkar). There are no gaps at the minimum-requirement level and the comprehensive management and monitoring system results in 14 out of the 16 advanced-level requirements being met. The gaps at advanced level are due to the constraints in the transmission network in Iceland which prevents Fljótsdalur/Kárahnjúkar to fully optimise and maximise its operations, this also prevents the project from having the flexibility to fully anticipating and adapting to future changes.

Relevant evidence	
Interview	1, 3, 4, 8, 10, 13, 20, 24, 26, 28, 29, 34, 35
Document	21, 33, 34, 50, 51, 65, 77, 80, 82, 96, 102, 107, 122, 137 – 140, 148, 153, 155, 156, 158 – 160, 162, 167, 168, 173 – 175, 177, 178, 181, 193, 195, 196, 209, 212, 213, 219, 221, 227 – 230
Photo	3, 7, 8, 11, 12, 19 – 29, 34, 41, 52 – 54, 57, 58, 62, 63, 71, 72

12 Climate Change Mitigation and Resilience

Scope and Principle
This section addresses the estimation and management of the project's greenhouse gas (GHG) emissions, analysis and management of the risks of climate change for the project, and the project's role in climate change adaptation. The principle is that the project's GHG emissions are consistent with low carbon power generation, the project is resilient to the effects of climate change, and the project contributes to wider adaptation to climate change.

Background	
Climate Change Mitigation	
Capacity (MW) (or additional capacity in case of expansion/ rehabilitation projects)	690 MW
Average reservoir area (representing area of flooded land, net of pre-impoundment water body) (km^2) (or additional reservoir area if any, for expansion/rehabilitation projects)	Hálslón (62 km^2), Kelduárlón (7.7 km^2), Saudárvatn (2 km^2; 1.9 km^2 before impoundment), Ufsarlón (1 km^2), Grjótárlón (0.7 km^2)
Power density (W / m^2)	9.7 W/m^2
Emissions intensity (gCO_2e / kWh)	Landsvirkjun assesses its GHG emissions as part of commitments to both the Global Reporting Initiative (GRI) and Carbon Disclosure Project (CDP) reporting initiatives. The emissions from the project's reservoirs have been falling from 1 140 tonnes of CO_2-equivalents/year in 2010 to an average of 900 tonnes CO_2e/year during 2015-2016, the levels since then are more or less the same indicating stabilised emission conditions. The total emissions intensity is 1.2 gCO_2e / kWh, this figure is third-party verified.
National and regional policies, plans and commitments relevant to mitigation	A Sustainable Energy Future – an Energy Policy to the Year 2050 (Government of Iceland, Ministry of Industries and Innovation). Iceland's Climate Action Plan 2018-2030 and 2020 update, with specific targets for different sectors and carbon neutrality by 2040. Iceland updated its National Determined Contribution (NDC) in 2021 committing to at least 55 percent net greenhouse emissions reduction by 2030 compared to 1990 (this commitment is part of the climate cooperation with the EU member states and Norway - EEA Joint Committee No 269/2019).

Fljótsdalsstöð, 690 MW, Iceland

Climate Change Resilience	
Hydrological data available for the project site and the basin, and observed climate trends	Landsvirkjun and the Icelandic government agencies (mainly through the Icelandic Met Office) have a good sense of the availability and reliability of resources, based on long-term historical flow data as well as climate observations and modelling (see more detailed description under section 11). A majority of glaciers were advancing between the 1970s and 1990s, but they are now universally in retreat, and expected to largely disappear within ~200 years. Climate change is already affecting reservoir inflows, and will continue to do so for the years to come. However, Iceland shows a slightly different pattern to most other countries in that warming is not predicted to be considerable over the next 50-100 years and precipitation only expected to increase by single-digit percentage points. Three different Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP), 2.6, 4.5 and 8.5, yield results for temperature and precipitation both above and below present levels. One clear trend is, however, recognisable from other parts of the world – an increase in extremes in precipitation. The fact that glacial melting has been ongoing on a broad scale in Iceland for at least the last 30 years is, however, undebatable.
Regional and basin-level climate models relevant to the project location, if any	The 5th iteration of the CMIP5 with RCP2.6, RCP4.5 and RCP8.5 has been coupled with the SNOW-17 model to predict trends in Icelandic snow conditions for the period 1930-2100.
Any climate change predictions for the project location, and degree of consistency	The Icelandic Met Office's modelling work shows results both above and below present values in terms of both temperature and precipitation, depending on which IPCC RCP is used. However, Iceland's glaciers are in an ongoing strong melting phase which has lasted for approximately the last 30 years. The one consistent result from the climate modelling is the trend towards lower inter-seasonal variation in precipitation and increased frequency and magnitude of extreme events with very high short-term precipitation, especially for high-altitude areas such as the existing glaciers.
National policies, plans and commitments relevant to adaptation and resilience	See above under "Mitigation"
Other relevant information	Landsvirkjun has a climate and environmental policy and a climate action plan integrated into their business strategy with efforts to decrease emissions and lower the emissions per unit of generated electricity even further.

Minimum Requirements			**Advanced Requirements**		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Climate Change Mitigation					
If power density is below 5 W/m2, net GHG emissions (gCO2e) of electricity generation are calculated,	✓	The power density of the project is higher than 5 W/m^2	If a site-specific assessment is required, it incorporates a broad range of scenarios, uncertainties and risks	✓	Not relevant, not counted.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
independently verified and periodically updated					
If power density is below 5 W/m2 and estimated emissions are above 100 gCO2e/kWh, a site-specific assessment of GHG emissions is undertaken and periodically updated	✓	See above			
Climate Change Resilience					
An assessment of the project's resilience to climate change is undertaken and periodically updated	✓	The Icelandic Met Office is working continuously to assess how climate change will affect the conditions for operation of hydropower (and other activities), the latest updated summary came out in 2023. Landsvirjkun is working continuously to assess how these findings will affect the project's operations. This is evident by its comprehensive climate-risk assessment as part of its CDP commitment.	Assessment of resilience incorporates sensitivity analysis, project specific hydrological modelling using recognised climate models	✓	Landsvirkjun has a very comprehensive methodology in place to assess how hydrological variability, both on short and long-term, affects the project. Evidence shows that this methodology is put into practices that guides the day-to-day, and in this case, long-term operation of the company (and thus the power plant). For further description of utilised hydrological and climate models, see topic 11 and the background section above.
The assessment:					
• incorporates an assessment of plausible climate change at the project site	✓	See above			
• identifies a range of climatological and hydrological conditions at the project site	✓	See the description of utilised hydrological and climatological models under section 11 and in the background section above.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• applies these conditions in a documented risk assessment or stress test	✓	Landsvirkjun has very comprehensive procedures around assessing how external threats might affect operation and specifically the project (where climate change is one of them)., infrastructural issues and/or environmental and social risks. Climate-change impacts on power generation and the availability of water resources are assessed continuously (see topic 11 for further details).			
The risk assessment or stress test encompasses:			The project's opportunities to provide adaptation services are considered on an ongoing basis	✓	Around 86% of the project's power production is provided to the Alcoa Fjarðaál aluminium smelter. The rest of the production is used in Landsvirkjun's (in cooperation with Landsnet) continuous work on providing timely power to the Icelandic national grid. There are still bottlenecks in the system (see topic 9 and 11), but the project is still able to provide balancing power and thus adaptation services.
• dam safety	✓	Climate change risks related to dam safety is a secondary risk in this case, the biggest threat would be the impact of a volcanic eruption under the Vatnajökull glacier that would by far exceed any impacts that climate change would have on the project (estimated to be three times larger than the probable maximum flood).			
• other infrastructural resilience	✓	Landsvirkjun has comprehensive procedures around assessing risks to project-related infrastructure (such as avalanche threats to transmission lines etc.) as it is today, the changed impact on these risks due to climate change are not assessed specifically (and would probably be hard to quantify) but			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		the robust processes and procedures indicate means of adapting these changes in the future.			
• environmental and social risks	✓	The land reclamation and management programme that is in place as well as the continuous assessment of erosion and sedimentation risks shows that Landsvirkjun is continuously working to address these issues (even in the long-term perspective since these programmes continue even this many years after commissioning). They also use the best available expertise that will be able to assess the ongoing changes and impacts (climate change being one of them) - Land og Skogur for land reclamation and Hafro for water quality and sedimentation issues. This shows that the project has a adaptive management system in place to respond to emerging risks (including climate change issues).			
• power generation availability	✓	Landsvirkjun is presently basing its water availability predictions (and consequently the power generation availability) on the trend that the glaciers are melting (same trend on the project-specific level). However, as indicated in the climate projection section in the			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		background above, the future projections from the Icelandic Met Office indicates both above and below present values in terms of both temperature and precipitation which might lead to changes to this strategy. Given how closely Landsvirkjun is working with the Met Office to update its projections and inputs for operations, it is clear that the project will adapt to a more clearly changed projection for the future of the glaciers (or other climate-related impacts).			
MANAGEMENT					
Climate Change Mitigation					
If GHG emissions estimates assume design and management measures, these measures are in place	✓	No design and management measures required.	Management measures are in place to respond to risks and opportunities including offsetting emissions	✓	The project does not require offsetting based on the requirements that the Standard is based on, yet it is still providing offsets through its revegetation programme and other measures such as electric vehicles.
			Plans are in place to monitor parameters used in GHG emissions estimates or to monitor GHG stocks	✓	Landsvirkjun estimates carbon emissions from the Kárahnjúkar reservoirs as part of commitments to both the GRI and the CDP, the estimates are based on measurements of the carbon content in the ground conducted before the filling

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					of the dam then continuously assessed by a verified methodology that has been continuously updated and improved.
Climate Change Resilience					
Measures are in place to avoid or reduce identified climate risks	✓	Evidence shows that Landsvirkjun has a comprehensive system in place to manage the risks that might emerge from the assessments described above.	Measures take account of a broad range of risks and interrelationships	✓	Landsvirkjun has shown that continuous assessments to address emerging and ongoing risks are ongoing, and that these are assigned to the most qualified expertise in Iceland (internally and externally, with academia, national institutions and consultants involved). This guarantees that a broad range of risks and interrelationships are being considered.
			Processes are in place to respond to unanticipated climate change	✓	The company and project have adopted a comprehensive approach to assessing climate risks and associated impacts, including some extremely unlikely but high-risk aspects such as a volcanic eruption under the Vatnajökull Glacier. There is no detailed general-purpose climate-stress tests, or similar, but given the considerable attention to

Fljótsdalsstöð, 690 MW, Iceland

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					even highly unlikely events, this is considered **a non-significant gap** against this requirement.
			Plans are in place to provide adaptation services if necessary	✓	Even though the relative adaptation potential of the project (85% is dedicated to the Alcoa smelter) is limited, the project is still Iceland's biggest hydropower plant and it would be able to provide adaptation services (in terms of balancing power) if issues due to climate impacts on hydrological resources would occur elsewhere in the country and aspects of these issues are included in the above-described assessments.

CONFORMANCE AND COMPLIANCE					
Climate Change Mitigation					
Processes and objectives relating to mitigation have been and are on track to be met with:			There are no non-compliances	✓	There are no non-compliances
• no major non-compliances	✓	There are no specific regulatory requirements when it comes to climate change in Iceland,			
• no major non-conformances	✓	Landsvirkjun is a leading enterprise when it comes to assessing its climate-change impacts and reporting on them (such as the commitments both to GRI and CDP). At the company level the stated targets for mitigation are under review at the time of the assessment. No major non-conformances have been identified.	There are no non-conformances	✓	None have been identified.
Mitigation-related commitments have been or are on track to be met	✓	The project has committed to monitoring GHG emissions from its reservoirs and other parts of the business. It demonstrates very low emissions and ongoing studies of reservoir emissions indicate that even these low numbers may be over-estimations.			

Climate Change Resilience					
Processes and objectives relating to resilience have been and are on track to be met with:			There are no non-compliances	✓	There are no non-compliances.
• no major non-compliances	✓	There are no specific requirements in the Icelandic legislation related to climate change.			
• no major non-conformances	✓	There are no specific resilience-related commitments.	There are no non-conformances	✓	There are no non-conformances.
Resilience-related commitments have been or are on track to be met	✓	See above			
OUTCOMES					
Climate Change Mitigation					
The project's GHG emissions are demonstrated to be consistent with low carbon power generation	✓	The project's emissions are very low (and third-party verified).	Project net emissions are minimised or project operations facilitate system emissions reductions	✓	Even though Landsvirkjun has extremely low net emissions, the company is still working on minimising these further.
Climate Change Resilience					
Findings of the climate change assessment indicate that the project is resilient to climate change	✓	Evidence is showing that Landsvirkjun in cooperation with the Met Office and several other government institutions and private companies are at the forefront in assessing how climate change (and other related issues) affects the infrastructure and operations of the project.	The project is resilient under a broad range of scenarios	✓	A number of different scenarios of impacts are continuously assessed based on IPCC's climate scenarios and findings are integrated into the operations of Landsvirkjun's assets.
			The project will contribute to climate change adaptation at a local, regional or national levels	✓	As Iceland's biggest reservoir and power plant (even though around 85% of the production is dedicated to the Alcoa smelter) it has an important role in adaptation services at local, regional and national levels.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
There are no gaps against the minimum requirements	15 out of 15 (100%), one advanced-level requirement is Not Relevant, hence excluded from total.

Summary of findings and other notable issues
Landsvirkjun has a very comprehensive and ambitious programme to deal with climate-change-related issues (as evident by its CDP and GRI commitments). The company's net emissions are very low, but Landsvirkjun is still continuously working on reducing its operational emissions further from all its projects and activities. There are no gaps against the minimum-level requirements nor against the advanced level requirements.

Relevant evidence	
Interview	1, 6, 10, 11, 13, 35, 39
Document	4, 9, 11, 12, 14, 29, 31, 34, 39, 50, 51, 56, 73, 77, 80 – 83, 101, 122, 130, 138 – 140, 143, 161, 175, 180, 182, 195, 206, 207, 212, 213, 219 – 222, 234, 256
Photo	3, 20, 34

Appendix 1 – Interviews

No	Interviewee/s	Organisation / Community	Date	Section									
				1	2	3	4	6	8	9	10	11	12
1	Gunnhildur I. Georgsóttir María Kjartansdóttir Þórólfur Nielsen Kristján Halldórsson Sindri Óskarsson Árni Óðinsson	Landsvirkjun	17-09-2024	X	X	X	X	X	X	X	X	X	X
2	Helga P. Finnsdóttir Árni Óðinsson	Landsvirkjun	17-09-2024	X		X	X	X					
3	Ásrún Elmarsdóttir Sigurður Guðjónsson	Landsvirkjun	17-09-2024	X		X		X				X	
4	Dóra Hjálmsdóttir Matthías Haraldsson	Verkís Consulting Engineers Landsvirkjun	17-09-2024				X					X	
5	Guðmundur Helgi Þórarinsson Halldór Arnar Guðmundsson	VM Union	17-09-2024		X								
6	Halldór Þorgeirsson	Climate Council	17-09-2024										X
7	Harpa Víðisdóttir Þóra María Guðjónsdóttir	Landsvirkjun	17-09-2024		X								
8	Helgi Jóhannesson Sigurjón Einarsson	Landsvirkjun Land and forest Iceland	17-09-2024			X						X	
9	Ingi Rúnar Jónsson	Marine and freshwater research institute	17-09-2024				X	X					
10	Ívar Baldursson	Landsvirkjun	17-09-2024									X	X
11	Jóhanna Hlín Auðunsdóttir Ívar Kristinn Jasonarson	Landsvirkjun	17-09-2024	X									X
12	Ólafur Arnar Jónsson	Landsvirkjun	17-09-2024				X						
13	Óli Grétar Blöndal Sveinsson Hörður Bragi Helgason	Landsvirkjun	17-09-2024			X						X	X
14	Rán Jónsdóttir	Energy agency	17-09-2024	X						X	X		
15	Steinar Örn Jónsson	Ministry of the Environment, Energy and Climate	17-09-2024	X						X	X		
16	Atli Thor Fanndal	Transperency Iceland (appointed representative)	18-09-2024							X	X		

Fljótsdalsstöð, 690 MW, Iceland

No	Interviewee/s	Organisation / Community	Date	Section									
				1	2	3	4	6	8	9	10	11	12
17	Ármann Jónsson	Landsvirkjun	18-09-2024	X			X			X			
18	Dagmar Ýr Stefánsdóttir Arnar Úlfarsson	Austurbrú and East Iceland Sustainability Initiative	18-09-2024				X				X		
19	Ella Sauren	Wilderness Center	18-09-2024				X				X		
20	Guðmundur á Vaði	East Iceland Nature Conservation Association	18-09-2024	X		X		X			X	X	
21	Helga Elísa Þorkelsdóttir Bylgja Björk Haralsdóttir	Landsvirkjun	18-09-2024	X						X			
22	Ingvar Birkir Einarsson	Fire department Múlaþing	18-09-2024				X				X		
23	Ingvar Christiansen	Landsvirkjun	18-09-2024	X						X			
24	Jósef Valgarð Þorvaldsson Fjölnir Hlynsson	Lagarfljót Angling Club	18-09-2024			X	X	X			X	X	
25	Kristín Linda Árnadóttir Þórólfur Nielsen	Landsvirkjun	18-09-2024							X			
26	Lárus Heiðarson	Fljótsdalshreppur municipality	18-09-2024			X	X		X	X	X	X	
27	Lejla Cardaklija María Kjartansdóttir	Landsvirkjun	18-09-2024	X						X			
28	Óðinn Gunnar Óðinsson	Múlaþing municipality	18-09-2024				X		X	X	X	X	
29	Þorvaldur P. Hjarðar	Jökla Angling Club/Land Improvement Fund	18-09-2024			X	X	X			X	X	
30	Dagbjartur Jónsson	Landsvirkjun	19-09-2024		X								
31	Elsa Guðný Björgvinsdóttir	Minjasafn Austurlands	19-09-2024						X		X		
32	Matthías Haraldsson Sverrir H Sveinbjörnsson Páll J. Kristinsson	Landsvirkjun	19-09-2024		X		X						
33	Sigríður Þorvaldsdóttir	Land and Forest Iceland (the former Soil conservation service of Iceland)	19-09-2024			X	X	X					
34	Sindri Óskarsson Kristján Halldórsson	Landsvirkjun	19-09-2024	X	X		X					X	
35	Sindri Óskarsson Sigurbjörn Nökkvi Björnsson Paul Slangen (teams)	Landsvirkjun	19-09-2024			X	X					X	X
36	Þóra Arnórsdóttir	Landsvirkjun	19-09-2024								X		
37	Agnes Brá Birgisdóttir	Vatnajökull National Park	20-09-2024	X				X			X		

Fljótsdalsstöð, 690 MW, Iceland

No	Interviewee/s	Organisation / Community	Date	Section									
				1	2	3	4	6	8	9	10	11	12
38	Árni Óðinsson Sindri Óskarsson Ólafur Arnar Jónsson	Landsvirkjun	20-09-2024			X	X		X		X		
39	Eydís Salome Eiríksdóttir	Marine and freshwater research institute	20-09-2024			X							X
40	Guðbjörg Oddfríður Friðjónsdóttir Gunnhildur Björk Jóhannsdóttir	GG þrif, contractor	20-09-2024		X					X			
41	Guðrún Óskarsdóttir	East Iceland Nature Research Centre	20-09-2024	X				X					
42	Gunnar Valgeirsson	Skeggjastaðir	20-09-2024			X	X				X		
43	Ísleifur Guðmundsson	Administration of Occupational Safety and Health	20-09-2024	X						X			
44	Jón Björn Hákonarson	Landsvirkjun	20-09-2024							X			
45	Kristján Ólafur Guðnason	East Iceland Police	20-09-2024				X						X
46	Laufey Ólafsdóttir	Húseyfarm	20-09-2024			X	X				X		
47	Lára Guðmundsdóttir	East Iceland Public Health Authoroty	20-09-2024	X			X			X			
48	Skúli Björn Gunnarsson	Gunnarsstofnun/Skriðuklaustur	20-09-2024				X		X		X		
49	Smári Kristinsson	Alcoa	20-09-2024	X			X				X		
50	Örn Alexandersson	BSI Iceland	23-09-2024	X						X			
51	Jóna Björt Friðriksdóttir	Administration of Occupational Safety and Health	30-09-2024	X			X			X			
52	Þuríður Elísa Harðardóttir	Cultural Heritage Agency of Iceland	30-09-2024	X					X		X		

Appendix 2 – Documents

No	Author / Organisation	Year	Title	Language	Web links etc., most evidence is internal documents available only to the assessors	Section									
						1	2	3	4	6	8	9	10	11	12
1	Adolf Friðriksson and Ragnar Edvardsson/Fornleifastofnun Íslands (The Institute of Archaeology, Iceland)	2001	Kárahnjúkavirkjun - fornleifar og vatnafar	Icelandic							X				
2	Adolf Friðriksson/Fornleifastofnun Íslands (The Institute of Archaeology, Iceland)	2001	Fornleifakönnun vegna fyrirhugaðarar virkjunar við Kárahnjúka	Icelandic							X				
3	Alexandra Kjeld and Helga J. Bjarnadóttir/Efla Consulting Engineers	2021	Losun frá lónum - Samantekt á niðurstöðum rannsókna og stöðu þekkingar	Icelandic											X
4	Almannavarnir/Civil protection	2009	Viðbragðsáætlun Almannavarna - stíflurof við Hálslón	Icelandic	https://www.almannavarnir.is/utgefid-efni/vidbragdsaaetlun-vegna-stiflurofs-vid-halslon/				X						
5	Alþýðusamband Íslands/Icelandic Federation of Labor	2024	Icelandic Labour Law website	English	https://asi.is/vinnurettarvefur/vinnurettur/icelandic-labour-law/		X								
6	Andri Gunnarsson, Sigurdur M. Gardarsson, Finnur Pálsson, Tómas Jóhannesson and Óli G. B. Sveinsson	2021	Annual and inter-annual variability and trends of albedo of Icelandic glaciers	English	The Cryosphere, 15, 547–570, 2021									X	
7	Andri Gunnarsson, Sigurður M. Garðarsson and Óli G. B. Sveinsson	2019	Icelandic snow cover characteristics derived from a gap-filled MODIS daily snow cover product	English	Hydrol. Earth Syst. Sci., 23, 3021–3036, 2019									X	
8	Ágúst Guðmundsson and Hjalti Sigurjónsson/Vatnaskil Consulting Engineers	2022	Rennslisraðir fyrir rekstrarsvæði Landsvirkjunar, viðmiðunarár 2020, 2035 og 2050.	Icelandic											X

Fljótsdalsstöð, 690 MW, Iceland

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						1	2	3	4	6	8	9	10	11	12
9	Árni Óðinsson/Landsvirkjun	2024	Community and communication Fljótsdalsstöð - presentation for HSS 2024	English	Presentation for the interview with assessors				**X**				**X**		
10	Carbon Disclosure Project	2024	CDP website	English	https://www.cdp.net/en/responses/58641/Landsvirkjun?back_to=https%3A%2F%2Fwww.cdp.net%2Fen%2Fresponses%3Fqueries%255Bname%255D%3Dlandsvirkjun&queries%5Bname%5D=landsvirkjun										**X**
11	Carbon Disclosure Project/Landsvirkjun	2024	CDP response Landsvirkjun 2023	English											**X**
12	Darri Eythorsson, Sigurdur M. Gardarsson, Andri Gunnarsson and Birgir Hrafnkelsson	2018	Statistical summer mass-balance forecast model with application to Brúarjökull glacier, South East Iceland	English	Journal of Glaciology (2018), 64(244) 311–320									**X**	
13	Darri Eythorsson, Sigurdur M. Gardarsson, Andri Gunnarsson and Oli Gretar Blondal Sveinsson	2023	Observed and predicted trends in Icelandic snow conditions for the period 1930–2100	English	The Cryosphere, 17, 51–62, 2023									**X**	**X**
14	Dóra Hjálmarsdóttir /Verkís	2024	Neyðarstjórn Landsvirkjunar Starfsemin 2023	Icelandic	Yearly report from LV Emergency commitee				**X**						
15	Dóra Hjálmarsdóttir/Verkís	2024	LV-2024-050 Neyðarstjórn Landsvirkjunar - Æfing 2024 - Stíflurof	Icelandic					**X**						
16	Egill Axelsson and Jónas Guðnason/Landsvirkjun	2022	Vatnamælingar Landsvirkjunar Vatnsárið 2020/2021	Icelandic										**X**	
17	Egill Axelsson and Jónas Guðnason/Landsvirkjun	2024	Vatnamælingar Landsvirkjunar Vatnsárið 2022/2023	Icelandic										**X**	
18	Egill Axelsson/Landsvirkjun	2013	Áhrif Kárahnjúkavirkjunar á grunnvatnsstöðu við Hálslón og Fljótsdalsheiði	Icelandic				**X**							

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						1	2	3	4	6	8	9	10	11	12
19	Egill Axelsson/Landsvirkjun	2020	Groundwater measurements in Húsey	Icelandic	https://www.sjalfbaerni.is/static/research/files/minnisblad_husey_2020_sjalfbaerni vefur.pdf			**X**							
20	Egill Axelsson/Landsvirkjun	2020	Grunnvatnsmælingar í Húsey árin 2013-2019. Minnisblað.	Icelandic	Memo									**X**	
21	Elín Fjóla Þórarinsdóttir and Ágústa Helgadóttir/Landgræðslan (Soil conservation service of Iceland)	2023	Vöktun á áfoki og viðhald fokgirðinga við strönd Hálslóns 2023	Icelandic				**X**							
22	Elín Fjóla Þórarinsdóttir and Sigurjón Einarsson/Landgræðslan (Soil conservation service of Iceland)	2012	Skráning á landbroti á bökkum Lagarfljóts og Jökulsár í Fljótsdal	Icelandic				**X**							
23	Elín Fjóla Þórarinsdóttir, Guðný H. Indriðadóttir, Sigríður Þorvaldsdóttir and Hrafnkatla Eiríksdóttir/Landgræðslan (Soil conservation service of Iceland)	2022	Uppgræðslusvæði við Hálslón og í Húsey Úttekt á gróðurfari og jarðvegsrofi	Icelandic				**X**		**X**					
24	Elín Fjóla Þórarinsdóttir, Guðný H. Indriðadóttir, Sigríður Þorvaldsdóttir, Hrafnkatla Eiríksdóttir and Ásdís Hrönn Jónsdóttir/Landgræðslan (Soil conservation service of Iceland)	2023	Landbótasjóður Norður Héraðs Úttekt á gróðurfari og jarðvegsrofi	Icelandic				**X**		**X**					
25	Embætti Landlæknis (The Directorate of Health)	2024	Statistics, health registers and research	English	https://island.is/en/o/directorate-of-health/statistics-health-registers-research					**X**					
26	Erlín Emma Jóhannsdóttir, Elísabet Ragna Hannesdóttir /	2019	Áhrif yfirfallsvatns úr Hálslóni á botnlæga þörunga og hryggleysingja í Jökulsá á Dal	Icelandic				**X**		**X**					

Fljótsdalsstöð, 690 MW, Iceland

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	Náttúrustofa Austurlands (East Iceland Nature Research Cetre) and Eydís Salome Eiríksdóttir, Iris Hansen, Jón S. Ólafsson, Sigurður Óskar Helgason / Hafrannsóknastofnun (Marine Research Institute)														
27	Erlín Emma Jóhannsdóttir/Náttúrustofa Austurlands (East Iceland Nature Research Centre)	2024	Vistfræðilegt ástand Glúmsstaðadalsár og Hrafnkelsár á áhrifasvæði Kárahnjúkavirkjunar	Icelandic				X		X					
28	European Union Climate ADAPT	2018	Hydropower expansion and improved management in response to increased glacier melt in Iceland. Case Study.	English	https://climate-adapt.eea.europa.eu/en/metadata/case-studies/hydropower-expansion-and-improved-management-in-response-to-increased-glacier-melt-in-iceland										X
29	Eydís Salome Eiríksdóttir and Fjóla Rut Svavarsdóttir / Hafrannsóknastofnun (Marine Research Institute)	2024	Mótvægisaðgerðir sem milda áhrif vatnsaflsvirkjana á ferksvatnsvistkerfi	Icelandic				X		X					
30	Élyse Fournier/Ouranos	2016	Fine-Tuning Observations to Better Manage and Design Hydroelectricity Assets. Case Study.	English	https://www.ouranos.ca/sites/default/files/2022-07/proj-201419-energie-braun-casestudy02.pdf										X
31	Ferðamálastofa/Icelandic Tourist Board	2024	Icelandic Tourist Board - Research and Statistics	English	https://www.ferdamalastofa.is/en				X						

Fljótsdalsstöð, 690 MW, Iceland

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32	Finnur Pálsson, Andri Gunnarsson, Eyjólfur Magnússon, Sveinbjörn Steinþórsson, Hlynur Skagfjörð Pálsson, Andri Björnsson and Steinunn Helgadóttir	2024	Vatnajökull: Mass balance, meltwater drainage and surface velocity of the glacial year 2022-23	English										**X**	
33	Guðfinna Aðalgeirsdóttir, Eyjólfur Magnússon, Finnur Pálsson, Thorsteinn Thorsteinsson, Joaquín M. C. Belart, Tómas Jóhannesson, Hrafnhildur Hannesdóttir, Oddur Sigurðsson, Andri Gunnarsson, Bergur Einarsson, Etienne Berthier, Louise Steffensen Schmidt Hannes H. Haraldsson and Helgi Björnsson	2020	Glacier Changes in Iceland From 1890 to 2019	English	Frontiers in Earth Science, 8, 1-15, 2020									**X**	
34	Guðrún Óskarsdóttir / Náttúrustofa Austurlands and Sigurður H. Magnússon / Náttúrufræðistofnun Íslands	2018	Gróðurbreytingar 2006-2017 við Lagarfljót og Jökulsá á Dal á Úthéraði, áhrif Kárahnjúkavirkjunar	Icelandic						**X**					
35	Guðrún Óskarsdóttir, Elín Guðmundsdóttir, Kristín Ágústsdóttir and Hans Tømmervik	2019	Reindeer winter forage Long-term monitoring research	English						**X**					
36	Guðrún Óskarsdóttir, Kristín Ágústsdóttir, Skarphéðinn G. Thórisson, Gerður Guðmundsdóttir and Guðrún Áslaug Jónsdóttir	2024	Decadal vegetation changes in suparctic alpine ecosystem	English	Applied Vegetation Science Research article https://onlinelibrary.wiley.com/doi/full/10.1111/avsc.12772					**X**					

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37	Gústav M. Ásbjörnsson, Elín Fjóla Þórarinsdóttir and Jóhann Thorarensen/Landgræðslan (Soil conservation service of Iceland)	2023	Gróðurstyrking við Hálslón Framkvæmdir 2023	Icelandic				X		X					
38	Gyða M. Ingólfsdóttir and Helga J. Bjarnadóttir/ Efla Consulting Engineers	2018	Vistferilsgreining raforkuvinnslu með vatnsafli - Fljótsdalsstöð	Icelandic	Fljótsdalsstöð LCA	X									X
39	Hafdís Guðlaugsdóttir and Silja H Sverrisdóttir /Landsvirkjun	2024	Skýrsla sumarvinnu 2024	Icelandic					X						
40	Hagstofa Íslands/Statistics Iceland	2024	Statistics website	English	https://www.statice.is/				X						
41	Halldór W Stefánsson, Skarphéðinn G. Þórisson and Kristín Ágústsdóttir/Náttúrustofa Austurlands (East Iceland Nature Research Centre)	2022	Fuglarannsóknir á áhrifasvæði Kárahnjúkavirkjunar 2004-2020	Icelandic						X					
42	Hákon Aðalsteinsson/Landsvirkjun	2017	Kárahnjúkavirkjun Framkvæmd skilkyrða fyrir virkjunarleyfi	Icelandic		X									
43	Heilbrigðiseftirlit Austurlands (East Iceland Health Authority)	2023	Skoðunarskýrsla-34502A Fljótsdalsstöð mötuneyti 2023	Icelandic		X									
44	Heilbrigðiseftirlit Austurlands (East Iceland Health Authority)	2023	Skoðunarskýrsla-34661A Hreinlætisaðstaða við Kárahnjúka 2023	Icelandic		X									
45	Heilbrigðiseftirlit Austurlands (East Iceland Health Authority)	2023	Skoðunarskýrsla-34664A Virkjun 2023	Icelandic		X									
46	Heilbrigðiseftirlit Austurlands (East Iceland Health Authority)	2021	Work Permit	Icelandic	https://www.haust.is/images/Utgefin_starfsleyfi/210420_Starfsleyfi_Landsvirkjun-Flj%C3%B3tsdalsst%C3%B6%C3%B0.pdf	X	X								

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47	Helgi Jóhannesson/Landsvirkjun	2024	2024-09-17 HSAP - Bank protection	English	Presentation for the interview with assessors			**X**							
48	Hæstiréttur (Supreme Court)	2012	Supreme Court ruling on compensation due to water Rights of Kárahnjúkar Power plant	Icelandic	https://www.haestirettur.is/default.aspx?pageid=0f2f6428-7b6a-11eb-947c-005056bc0bdb&id=9aefbd2c-96a8-4f17-8109-9c706a78a13c	**X**									
49	Hörður Bragi Helgason/Landsvirkjun	2024	Hydrological resource - Summary slides	English	Presentation in interview with assessors									**X**	**X**
50	Implement Consulting Group	2023	No Wasted Energy - Uncovering the electricity efficiency potential in Iceland	English	https://www.landsvirkjun.is/api/get-pdf?id=83adc772-b54b-4863-9a28-763ba9071be4_2023+No+wasted+energy.pdf&name=2023%20No%20wasted%20energy.pdf	**X**								**X**	**X**
51	Ingi Rúnar Jónsson, Ragnhildur Þ. Magnúsdóttir, Haraldur R. Ingvason and Eydís Salome Eiríksdóttir. Hafrannsóknastofnun (Marine Research Institute).	2024	Vatnalífsrannsóknir í Hálslóni, Kelduárlóni og Sauðárvatni, auk hliðaráa	Icelandic						**X**					
52	Jón Haukur Steingrímsson/Efla Consulting Engineers	2017	Jarðfræðirannsóknir og mælingar á Kringilsárrana 2017 Minnisblað Efla	Icelandic		**X**		**X**							
53	Kolbeinn Árnason	2014	Breytingar á grunnvatns- og jarðvatnsborði á áhrifasvæði Kárahnjúkavirkjunar	Icelandic				**X**							
54	KPMG for Landsvirkjun	2024	Greidslur LV Múla og Fljótsdals-Gogn sent til LV	Icelandic	KPMG Analysis				**X**						

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55	Landsvirkjun	2023	Aðgerðaáætlun loftslags- og umhverfismála	Icelandic		X		X		X					X
56	Landsvirkjun	2023	Aðgerðaáætlun ÖH 2023	Icelandic			X								
57	Landsvirkjun	2024	Aðgerðaáætlun ÖH 2024-2025	Icelandic			X								
58	Landsvirkjun	2024	Áhættustefna	Icelandic		X									
59	Landsvirkjun	2023	Notification to the emergency line for the flushing of Hálslón	Icelandic	Email from power station manager				X						
60	Landsvirkjun	2022	EYD-0262 Skoðun á stíflum eftir jarðskjálfta og óvænt atvik	Icelandic					X						
61	Landsvirkjun	2022	EYD-0294 Endurheimt gróðurs og skógrækt	Icelandic		X		X		X					
62	Landsvirkjun	2023	Financial statements LV 2023 and Statement of Corporate Governance	English	https://www.landsvirkjun.com/api/get-pdf?id=74fd15b8-3ad6-46fb-a5b3-3d28f35d989c_Financial+statements+LV+2023.pdf&name=Financial%20statements%20LV%202023.pdf				X			X			
63	Landsvirkjun	2023	Fljótsdalsstöð Hydroelectric Facility Technical Handbook - Dam Safety	English					X						
64	Landsvirkjun	2024	Fljótsdalur inflow view	Icelandic	Screenshots from system									X	
65	Landsvirkjun	2023	Fundargerð frá fundi Landsvirkjunar með Veiðifélagi Lagarfljóts og Náttúrustofa Austurlands	Icelandic	Meeting minutes				X				X		

Fljótsdalsstöð, 690 MW, Iceland

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66	Landsvirkjun	2024	Fundargerð frá fundi Landsvirkjunar með Veiðifélagi Lagarfljóts og Náttúrustofa Austurlands	Icelandic	Meeting minutes				X				X		
67	Landsvirkjun	2021	GAT-0054 ÖHU-skoðanir - Útisvæði Landsvirkjunar	Icelandic			X								
68	Landsvirkjun	2021	GAT-0058 ÖHU-skoðanir - Aflstöðvar, veitumannvirki og þjónustubyggingar	Icelandic			X								
69	Landsvirkjun	2021	GAT-0060 ÖHU-skoðanir - Skrifstofurými, mötuneyti og starfsmannabústaðir	Icelandic			X								
70	Landsvirkjun	2022	GAT-0243 Hlutverk viðbragðsaðila Neyðarstjórnar	Icelandic					X						
71	Landsvirkjun	2024	Health and Safety incident management dashboard	Icelandic	Screenshot	X	X								
72	Landsvirkjun	2009	Hnattræn hlýnun og orkugeta Landsvirkjunar til ársins 2050	Icelandic											X
73	Landsvirkjun	2017	Implementatin of conditions for the power development license 2017	English		X						X			
74	Landsvirkjun	2024	Jafnréttisáætlun LV maí 2021-maí 2024	Icelandic			X								
75	Landsvirkjun	2015	Kárahnjúkar - Hydroelectric Project	English	Brochure										
76	Landsvirkjun	2001	Kárahnjúkar Hydroelectric Project up to 750 MW - Environmental Impact Assessment	English		X									
77	Landsvirkjun	2001	Kárahnjúkavirkjun allt að 750 MW - mat á umhverfisáhrifum	Icelandic	EIA	X									
78	Landsvirkjun	2024	Kynning fyrir Veiðifélag Lagarfljóts - Lagarfljótsmótvægi	Icelandic	PP Presentation				X				X		
79	Landsvirkjun	2023	Landsvirkjun Annual Report 2023	English	https://www.landsvirkjun.com/api/get-pdf?id=ZfRe-		X		X	X		X	X	X	X

Fljótsdalsstöð, 690 MW, Iceland

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						1	2	3	4	6	8	9	10	11	12
					3YkiKrtlJl9_LV_AnnualReport_2023.pdf&name=LV_AnnualReport_2023.pdf										
80	Landsvirkjun	2024	Landsvirkjun Climate Accounts 2023	English	https://www.landsvirkjun.com/api/get-pdf?id=ZhP3YxrFxhpPBX2H_LV_Climate_Accounts_2023.pdf&name=LV_Climate_Accounts_2023.pdf										**X**
81	Landsvirkjun	2024	Landsvirkjun Map Viewer (Kortasjá)	Icelandic	https://www.map.is/lv/	**X**		**X**		**X**				**X**	**X**
82	Landsvirkjun	2024	Landsvirkjun website	Icelandic/English	https://www.landsvirkjun.is/	**X**						**X**			
83	Landsvirkjun	2022	LEI-0006 Viðbragðsáætlun vegna ofanflóða og hruns	Icelandic					**X**						
84	Landsvirkjun	2022	LEI-0009 Viðbragðsáætlun vegna eldgosa	Icelandic					**X**						
85	Landsvirkjun	2023	LEI-0010 Viðbragðsáætlun vegna bilunar í búnaði sem veldur minna rekstraröryggi	Icelandic					**X**						
86	Landsvirkjun	2022	LEI-0011 Viðbragðsáætlun vegna óveðurs	Icelandic					**X**						
87	Landsvirkjun	2022	LEI-0133 Viðbragðsáætlun vegna jarðskjálfta	Icelandic					**X**						
88	Landsvirkjun	2021	LEI-0141 Váverk - Viðbragsáætlun á vettvangi. Ásamt fylgiskjölum (Váverk fskj)	Icelandic					**X**						
89	Landsvirkjun	2021	LEI-0146 Boðun aðila Neyðarstjórnar	Icelandic					**X**						

Fljótsdalsstöð, 690 MW, Iceland

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90	Landsvirkjun	2021	LEI-0151 Viðbragðsáætlun vegna stíflurofs á Fljótsdalssvæði. Ásamt fylgiskjölum A, B1-B2, C, D1-D4	Icelandic					X						
91	Landsvirkjun	2021	LEI-0215 Viðbragðsáætlun vegna bruna í Fljótsdalsstöð	Icelandic					X						
92	Landsvirkjun	2021	LEI-0216 Viðbragðsáætlun vegna hruns og eða jarðskjálfta í Fljótsdalsstöð	Icelandic					X						
93	Landsvirkjun	2021	LEI-0217 Viðbragðsáætlun Fljótsdalsstöðvar - Vegna vatnsflóðs í stöðvarhúsi	Icelandic					X						
94	Landsvirkjun	2021	LEI-0218 Viðbragðsáætlun Fljótsdalsstöðvar - Flóttaleiðir	Icelandic					X						
95	Landsvirkjun	2024	LEI-0220 Fastbundnar takmarkanir fyrir Fljótsdalsstöð	Icelandic					X					X	
96	Landsvirkjun	2021	LEI-0225 Viðbragðsáætlun neyðarstjórnar ásamt fylgiskjölum (Samskiptarit og Flæðirit aðgerða)	Icelandic					X						
97	Landsvirkjun	2021	LEI-0234 Viðbragðsáætlun Fljótsdalsstöðvar - Vegna válynds veðurfars	Icelandic					X						
98	Landsvirkjun	2021	LEI-0235 Viðbragsáætlun Fljótsdalsstöðvar - Framkvæmd staðstýringar	Icelandic					X						
99	Landsvirkjun	2024	LEI-0236 Viðbragsáætlun Fljótsdalsstöðvar - Hálslón uppfok og áfok	Icelandic		X		X							
100	Landsvirkjun	2023	LEI-0237 Requirements for Contractors and Service Providers	English		X	X					X			X
101	Landsvirkjun	2021	LEI-0247 Skerðingaráætlun orkuvinnslu vegna óvæntra atburða	Icelandic										X	

Fljótsdalsstöð, 690 MW, Iceland

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102	Landsvirkjun	2021	LEI-0293 Skipulag ÖHU skoðana á starfssvæðum aflstöðva	Icelandic			X								
103	Landsvirkjun	2021	LEI-0294 Viðbragðsáætlun vegna netöryggisógna gagnvart stjórnkerfum aflstöðva	Icelandic					X						
104	Landsvirkjun	2021	LEI-0304 Viðbragðsáætlun Fljótsdalsstöðvar vegna Argon slökkvikerfa	Icelandic					X						
105	Landsvirkjun	2022	LEI-0305 Viðbragðáætlun vegna farsótta	Icelandic			X		X						
106	Landsvirkjun	2023	MEF-0002 Raforkuvinnsla	Icelandic										X	
107	Landsvirkjun	2024	Presentation from Communications department - surveys	Icelandic/English					X				X		
108	Landsvirkjun	2024	REG-0001 Innkaupareglur Landsvirkjunar	Icelandic								X			
109	Landsvirkjun	2024	REG-0023 Endurmenntun starfsfólks Landsvirkjunar	Icelandic			X								
110	Landsvirkjun	2023	REG-0106 Öryggishandbók Landsvirkjunar	Icelandic			X								
111	Landsvirkjun	2023	Rýni stjórnenda á ÖHV 2023	Icelandic			X								
112	Landsvirkjun	2021	Samantekt er varðar eftirlitsatriði vegna virkjunarleyfis Kárahnjúkavirkjunar fyrir árið 2021	Icelandic	Annual report to Orkustofnun (National Energy Authority)	X						X			
113	Landsvirkjun	2022	Samantekt er varðar eftirlitsatriði vegna virkjunarleyfis Kárahnjúkavirkjunar fyrir árið 2022	Icelandic	Annual report to Orkustofnun (National Energy Authority)	X						X			

Fljótsdalsstöð, 690 MW, Iceland

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						1	2	3	4	6	8	9	10	11	12
114	Landsvirkjun	2023	Samantekt er varðar eftirlitsatriði vegna virkjunarleyfis Kárahnjúkavirkjunar fyrir árið 2023	Icelandic	Annual report to Orkustofnun (National Energy Authority)	X						X			
115	Landsvirkjun	2023	Samantekt LV Rýnifundur. Laga og reglugerðagrunnur - apríl 23	Icelandic		X	X								
116	Landsvirkjun	2023	Samantekt LV Rýnifundur. Laga og reglugerðagrunnur - okt 23	Icelandic		X	X								
117	Landsvirkjun	2023	Sauðárdalur Dam Fljótsdalsstöð Hydroelectric Facility Technical Handbook - Dam Safety	English					X						
118	Landsvirkjun	2024	Screenshot from Health and Safety incident management dashboard	Icelandic			X								
119	Landsvirkjun	2021	SKI-0058 Hugtök neyðarstjórnunar	Icelandic					X						
120	Landsvirkjun	2021	SKI-0096 Válisti atburða	Icelandic					X						
121	Landsvirkjun	2022	SKI-0114 Áhrifaþættir á umhverfið í starfsemi Landsvirkjunar	Icelandic		X		X		X				X	X
122	Landsvirkjun	2023	SKI-0125 Rafmagnsöryggisstjórnkerfi Landsvirkjunar (RÖSK) 20.12.23	Icelandic			X								
123	Landsvirkjun	2023	SKI-0125 Skipulag og ábyrgð rafmagnsöryggiskerfis	Icelandic					X						
124	Landsvirkjun	2023	SKI-0127 Jafnlaunakerfi	Icelandic			X								
125	Landsvirkjun	2024	SKI-0143 Hagaðilar Landsvirkjunar	Icelandic									X		
126	Landsvirkjun	2024	Staff list Fljótsdalsstöð	Icelandic			X								
127	Landsvirkjun	2022	STE-0001-Stefna Landsvirkjunar enska	English		X			X			X			

Fljótsdalsstöð, 690 MW, Iceland

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128	Landsvirkjun	2024	STE-0002 Öryggis- og heilsustefna	Icelandic			X								
129	Landsvirkjun	2024	STE-0003 Climate and environmental policy - English	English		X		X		X					X
130	Landsvirkjun	2024	STE-0004 Community Engagement Policy	English		X			X				X		
131	Landsvirkjun	2023	STE-0007 Code of Conduct (translation)	English			X		X			X			
132	Landsvirkjun	2023	STE-0008 Supplier Code of Conduct (translation)	English			X					X			
133	Landsvirkjun	2024	STE-0024 Mannauðs- og jafnréttisstefna	Icelandic			X								
134	Landsvirkjun	2021	STE-0028 Innkaupastefna Landsvirkjunar	Icelandic								X			
135	Landsvirkjun	2020	STE-0075 Stefna um samfélagsábyrgð	Icelandic		X			X						
136	Landsvirkjun	2024	Vatnsbúskapur Landsvirkjunar á Fljótsdalssvæði; Rekstrarnefndarfundur Alcoa Fjarðaáls, Landsvirkjunar og Landsnets	Icelandic	PP Presentation								X	X	
137	Landsvirkjun	2024	VIN-0004 Umhverfisstjórnun aflsstöðva	Icelandic		X		X		X				X	X
138	Landsvirkjun	2023	VIN-0005 Umhverfisstjórnun stærri verkefna	Icelandic		X		X		X					X
139	Landsvirkjun	2023	VIN-0006 Umhverfisstjórnun minni verkefna	Icelandic		X		X		X					X
140	Landsvirkjun	2022	VIN-0008 Viðbragðsáætlun vegna olíu- eða efnaleka	Icelandic		X	X	X					X		
141	Landsvirkjun	2024	VIN-0011 Viðbrögð við kvörtunum er varðar viðskiptavini Landsvirkjunar	Icelandic		X			X				X		

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142	Landsvirkjun	2024	VIN-0023 Sértækt innra kolefnisverð: Ákvarðanir og endurskoðun	Icelandic											X
143	Landsvirkjun	2023	VIN-0080 Ferill útboðsgagna	Icelandic								X			
144	Landsvirkjun	2024	VIN-0087 Kröfur til birgja og birgjamat	Icelandic								X			
145	Landsvirkjun	2021	VIN-0132 Viðbragðsáætlun Fljótsdalsstöðvar - Mælingar á veitusvæði	Icelandic					X						
146	Landsvirkjun	2021	VIN-0133 Viðbragðsáætlun Fljótsdalsstöðvar - Bilun í búnaði sem veldur minna rekstraröryggi	Icelandic					X						
147	Landsvirkjun	2021	VIN-0135 Viðbragðsáætlun Fljótsdalsstöðvar - Skerðing orkuvinnslu	Icelandic										X	
148	Landsvirkjun	2021	VIN-0136 Viðragðsáætlun Fljótsdalsstöðvar - Vatnavextir Flóð	Icelandic					X						
149	Landsvirkjun	2024	VIN-0154 Jafnréttisnefnd	Icelandic			X								
150	Landsvirkjun	2022	VIN-0172 Eftirlit með stíflum og vatnsvegum á vatnasviði Fljótsdalsstöðvar	Icelandic					X						
151	Landsvirkjun	2021	VIN-0190 Áfangar og áfangahlið við þróun og byggingu virkjana	Icelandic		X									
152	Landsvirkjun	2022	VIN-0203 Langtímarekstur vinnslukerfisins	Icelandic										X	
153	Landsvirkjun	2022	VIN-0210 Viðbrögð við vinnuslysum, umhverfisatvikum og hættutilvikum	Icelandic		X	X		X				X		
154	Landsvirkjun	2021	VIN-0211 Áhættustig í vatnsbúskap	Icelandic										X	
155	Landsvirkjun	2020	VIN-0216 Samningsgeta orkuvinnslukerfis	Icelandic										X	

Fljótsdalsstöð, 690 MW, Iceland

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156	Landsvirkjun	2022	VIN-0218 Endurheimt gróðurs og skógrækt	Icelandic		X		X		X					
157	Landsvirkjun	2021	VIN-0226 Gerð vinnsluáætlana	Icelandic										X	
158	Landsvirkjun	2021	VIN-0229 Horfur	Icelandic										X	
159	Landsvirkjun	2021	VIN-0230 Langtímahorfur	Icelandic										X	
160	Landsvirkjun	2024	VIN-0234 Umhverfisgögn og gagnaferlar	Icelandic		X		X		X					X
161	Landsvirkjun	2024	VKL-0001 Rof og vinna við rekstrareiningar	Icelandic										X	
162	Landsvirkjun	2022	VKL-0003 Verkefnastjórnun	Icelandic		X									
163	Landsvirkjun	2024	VKL-0012 Samskipti við fjölmiðla	Icelandic									X		
164	Landsvirkjun	2022	VKL-0018 ÖHU skoðanir	Icelandic		X	X								
165	Landsvirkjun	2021	VKL-0026 Neyðarstjórnun Landsvirkjunar	Icelandic					X						
166	Landsvirkjun	2023	VKL-0054 Staðstýring í aflstöðvum	Icelandic										X	
167	Landsvirkjun	2023	VKL-0065 Orkuuppgjör og rafmagnsreikningar	Icelandic										X	
168	Landsvirkjun	2023	VKL-0066 Þjálfun og starfsþróun	Icelandic			X								
169	Landsvirkjun	2024	VKL-0068 Ábendingar, atvik, kvartanir eða hrós	Icelandic		X	X						X		

Fljótsdalsstöð, 690 MW, Iceland

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170	Landsvirkjun	2024	VKL-0070 Ferli áhættustýringar og áhættumata ásamt fylgiskjölum (áhættumat og áhættuskrá)	Icelandic		X									
171	Landsvirkjun	2024	VKL-0075 Vöktun og hlítning á ytri kröfum	Icelandic		X						X			
172	Landsvirkjun	2021	VKL-0085 Skerðingar á afhendingu raforku	Icelandic										X	
173	Landsvirkjun	2023	VKL-0098 Rekstur aflstöðva	Icelandic		X			X					X	
174	Landsvirkjun	2024	VKL-0161 Umhverfisstjórnun	Icelandic		X		X		X				X	X
175	Landsvirkjun	2023	VKL-0194 Eftirlit með stíflum og vatnsvegum	Icelandic					X						
176	Landsvirkjun	2023	VKL-0210 Fyrirkomulag skammtímaorkuviðskipta	Icelandic										X	
177	Landsvirkjun	2022	VKL-0211 Dagleg vinnslustýring	Icelandic										X	
178	Landsvirkjun	2022	VKL-0213 Efnastjórnun	Icelandic		X		X		X					
179	Landsvirkjun	2022	VKL-0214 Innra kolefnisverð	Icelandic											X
180	Landsvirkjun	2024	VKL-0215 Kerfisrannsóknir vinnsluáætlana	Icelandic										X	
181	Landsvirkjun	2023	VKL-0218 Umhverfisgögn og loftslagsbókhald	Icelandic		X		X		X					X
182	Landsvirkjun	2024	Öryggis- og heilsustefna Landsvirkjunar fyrir kynningar	Icelandic			X								
183	Landsvirkjun	2024	Öryggis- og heilsuyfirlit apríl 2024	Icelandic			X								

Fljótsdalsstöð, 690 MW, Iceland

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184	Landsvirkjun	2024	Öryggis og heilsuyfirlit Júní og Júlí 2024	Icelandic			X								
185	Landsvirkjun	2024	Öryggis- og Heilsuyfirlit maí 2024	Icelandic			X								
186	Landsvirkjun	2024	Öryggis- og heilsuyfirlit mars 2024	Icelandic			X								
187	Landsvirkjun	2024	Öryggisnámskeið Sumarvinna LV 2024	Icelandic	PP Presentation		X								
188	Landsvirkjun and Hafrannsóknastofnun (Marine Research Institute)	2023	3939-01 - viðauki við samning-220523-150404 við Hafrannsóknastofnun	Icelandic				X		X					
189	Landsvirkjun/Alcoa/Austurbrú	2024	Sustainability initiative	Icelandic/English	https://www.sjalfbaerni.is/	X		X	X	X	X		X		
190	Landsvirkjun/Landsnet	2007	Landsvirkjun - Leiga á búnaði vegna raforkuafhendingar draugatenginga	Icelandic					X						
191	Landsvirkjun/Landsnet	2019	Landsvirkjun - Viðauki 1 dags. 18.12.2019 við leigusamning vegna búnaðar dags. 20.12.2007	Icelandic					X			X			
192	Louise Steffensen Schmidt, Peter L. Langen, Guðfinna Aðalgeirsdóttir, Finnur Pálsson, Sverrir Guðmundsson and Andri Gunnarsson	2018	Sensitivity of Glacier Runoff to Winter Snow Thickness Investigated for Vatnajökull Ice Cap, Iceland, Using Numerical Models and Observations	English	Atmosphere 2018, 9, 450									X	
193	Lovísa Ásbjörnsdóttir and Atli Sigurðsson/Náttúrufræðistofnun Íslands	2024	Áhugaverðar jarðminjar á áhrifasvæði Kárahnjúkavirkjunar	Icelandic		X									
194	Magnús Sigurðsson and Úlfar Linnet/Landsvirkjun	2010	Aukning orkuvinnslu virkjana Landsvirkjunar	Icelandic										X	X

Fljótsdalsstöð, 690 MW, Iceland

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195	Magnús Sigurðsson, Ívar Baldvinsson and Árni Benediktsson/Landsvirkjun	2023	Vatnsárið 2022-2023	Icelandic										X	
196	Matís (Food Research and Biology)	2024	Drinking water Result 1 2024	Icelandic				X							
197	Matís (Food Research and Biology)	2025	Drinking water Result 2 2024	Icelandic				X							
198	Matís (Food Research and Biology)	2026	Drinking water Result 3 2024	Icelandic				X							
199	Matís (Food Research and Biology)	2027	Drinking water Result 4 2024	Icelandic				X							
200	Matthías Haraldsson/Landsvirkjun and Dóra Hjálmarsdóttir/Verkís consultant	2024	NLV - kynning fyrir stíflueftirlit (ID 390345)	English	PP Presentation				X						
201	Matthías Þorvaldsson and Arna Frímannsdóttir/Gallup	2023	Ímynd Landsvirkjunar á Austurlandi Nóvember desember 2023	Icelandic									X		
202	Matthías Þorvaldsson and Sarah Knappe/Gallup	2022	Reneweable energy sources - survey amongst foreign tourists in Iceland December 2022	English									X		
203	Minjastofnun Íslands (Cultural Heritage Agency of Iceland)	2024	Minjastofnun Íslands (Cultural Heritage Agency of Iceland) website	Icelandic	https://www.minjastofnun.is/						X				
204	Orkustofnun (National Energy Authority)	2002	Virkjunarleyfi fyrir allt að 750 MW Kárahnjúkavirkjun	Icelandic		X									
205	Ouranos (Marco Braun)	2014-2019	Scientific program: Adaptation Case Studies in the Energy Sector	English	https://www.ouranos.ca/en/projects-publications/adaptation-case-studies-energy-sector-overcoming-barriers-adaptation										X

Fljótsdalsstöð, 690 MW, Iceland

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						1	2	3	4	6	8	9	10	11	12
206	Óli Grétar Blöndal Sveinsson (United Nations Policy Brief)	2016	Energy in Iceland: Adaptation to Climate Change	English	https://collections.unu.edu/eserv/UNU:5756/DNC2015_PolicyBrief_No4.pdf										X
207	Paul Slangen/Landsvirkjun	2024	Landsvirkjun Dam Safety report 2023	English					X						
208	Philippe Crochet	2021	Quality Analysis of new flow scenarios	English	PP Presentation and Report									X	
209	Rán Þórarinsdóttir, Kristín Ágústsdóttir and Hálfdán Helgi Helgason/Náttúrustofa Austurlands (East Iceland Nature Research Centre)	2022	Burðarsvæði Snæfellshjarðar	Icelandic						X					
210	Sigurður H. Magnússon/Náttúrfræðistofnun Íslands (The Icelandic Institute of Natural History)	2016	Áhrif Lagarfossvirkjunar og Kárahnjúkavirkjunar á gróður og landbrot við Lagarfljót 1976–2014	Icelandic				X		X					
211	Sigurður M. Garðarsson, Birgir Jónsson and Jónas Elíasson	2005	Kárahnjúkavirkjun - Langtímaþróun rennslis og miðlunar	Icelandic	https://skemman.is/handle/1946/15667									X	X
212	Sigurður Magnús Garðarsson and Jónas Elíasson	2006	Influence of climate warming on Hálslón Reservoir sediment filling	English										X	X
213	Sigurjón Einarsson and Elín Fjóla Þórarinsdóttir/Landgræðslan (Soil conservation service of Iceland)	2022	Landbrot á bökkum Hálslóns í Kringilsárrana Úttekt 2022	Icelandic				X							
214	Sigurjón Einarsson and Elín Fjóla Þórarinsdóttir/Landgræðslan (Soil conservation service of Iceland)	2023	Landbrot á bökkum Hálslóns í Kringilsárrana Úttekt 2023	Icelandic				X							
215	Sigurlaug Hjaltadóttir, Gunnar B. Guðmundsson and Bergur H.	2024	Jarðskjálftavirkni á virkjanasvæðum Veðurstofa Íslands	Icelandic					X						

Fljótsdalsstöð, 690 MW, Iceland

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						1	2	3	4	6	8	9	10	11	12
	Bergsson/Veðurstofa Íslands (Icelandic Met Office)														
216	Skipulagsstofnun (The National Planning Agency)	2001	Kárahnjúkavirkjun allt að 750 MW, Úrskurður Skipulagsstofnunar um mat á umhverfisáhrifum	Icelandic	https://www.skipulag.is/media/attachments/Umhverfismat/671/2000110003.PDF	X									
217	Stephen Rigbey P. Eng./SJR Consulting Inc.	2024	Independent Review of LV Dam Safety Program 2024	English					X						
218	Thorbjörg Sigurbjörnsdottir	2021	Suspended Sediment Transport and Accumulation in Hálslón Reservoir, Iceland, from 2007 to 2060 using Topkapi-ETH	English										X	X
219	Tobias Linke	2024	Effect of basaltic particles and iron-containing minerals in wetland soils and reservoirs on CO2 drawdown	English	https://opinvisindi.is/handle/20.500.11815/5000										X
220	Tómas Jóhannesson, Guðfinna Aðalgeirsdóttir, Helgi Björnsson, Philippe Crochet, Elías B. Elíasson,Sverrir Guðmundsson, Jóna Finndís Jónsdóttir,Haraldur Ólafsson, Finnur Pálsson, Ólafur Rögnvaldsson,Oddur Sigurðsson, Árni Snorrason, Óli Grétar Blöndal Sveinsson, Thorsteinn Thorsteinsson	2007	Effect of climate change on hydrology and hydro-resources in Iceland	English	Orkustofnun									X	X
221	Umhverfis-, orku- og loftlagsráðuneytið (Minnistry of the Environment, Engergy and Climate)	2024	Samráðsgátt: Ný og uppfærð aðgerðaáætlun í loftslagsmálum	Icelandic	https://island.is/samradsgatt/mal/3758										X
222	Umhverfisráðuneytið (The Ministry for the Environment)	2001	Ruling for Kárahnjúkar Power Plant/Ministry for the Environment	Icelandic	https://www.stjornarradid.is/media/umhverfisraduneyt	X									

Fljótsdalsstöð, 690 MW, Iceland

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						1	2	3	4	6	8	9	10	11	12
					i-media/media/pdf_skrar/urskurdurkarahnjukar2001.pdf										
223	Umhverfisstofnun (Environmental Agency of Iceland)	2017	Kringilsárrani - Stjórnunar- og verndaráætlun 2017 - 2026 - undirrituð og staðfest af ráðherra	Icelandic		X		X		X					
224	UN Global Compact	2023	UN Global Compact participation	English	https://unglobalcompact.org/what-is-gc/participants/27541-Landsvirkjun	X									
225	Vatnajökulsþjóðgarður (Vatnajökull National Park)	2023	Kárahnjúkar - skýrsla vegna viðveru landvarða Vatnajökulsþjóðgarðs við Hálslón	Icelandic					X						
226	Vatnaskil Consulting Engeneers	2013	Hydrological runoff model for glacial watersheds	English										X	
227	Vatnaskil Consulting Engeneers	2013	Kárahnjúkavirkjun Endurskoðun rennslislíkans fyrir Jökulsá á Brú, Jökulsá í Fljótsdal og Kelduá	Icelandic										X	
228	Veðurstofa Íslands (Icelandic Met Office)	2024	Icelandic Met Office - Gauging stations - monitoring	English	https://en.vedur.is/hydrology/stations/			X						X	
229	Veðurstofa Íslands (Icelandic Met Office)	2024	Icelandic Met Office website - Hydrology	English	https://en.vedur.is/hydrology/									X	
230	Veiðifélag Jöklu (Jökla Angling Club)	2024	Fréttabréf Veiðifélags Jöklu	Icelandic					X						
231	Velferðarráðuneytið (Ministry of Welfare)	2018	Act No 46 1980 as amended 2018on Working Enviroment, Health and Safety in Workplaces	English			X								
232	Þuríður Elísa Harðardóttir/Minjastofnun	2023	Presentation for employees - Minjastofnun Íslands ÞEH	Icelandic	PP Presentation for Fljótsdalur employees						X				

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	Íslands (Cultural Heritage Agency of Iceland)														
233	Michaël Virgil Bishop, Rannveig Ólafsdóttir and Þorvarður Árnason	2022	Tourism, Recreation and Wilderness: Public Perceptions of Conservation and Access in the Central Highland of Iceland	English	Land 11(2), 242				X	X			X		
234	Wildland Research Institute	2022	Mapping Wilderness Quality in the Central Highlands of Iceland	English					X	X					
235	Sigurður H. Magnússon	2016	Áhrif Lagarfossvirkjunar og Kárahnjúkavirkjunar á gróður og landbrot við Lagarfljót 1976–2014	Icelandic					X	X					
236	LANDSNET	2022	Infrastructure Development	English	https://www.landsnet.is/framkvaemdir/yfirlit-framkvaemda/framkvaemd/krafla-fljotsdalur				X						
237	Minjastoftun Islands - Culturral Heritage	2024	GIS portal _Cultural Heritage Agency	Icelandic	https://minjastofnun.gis.is/mapview/?application=minjastofnun						X				
238	Email Communications with Cultural Heritage Manager for Eastern Iceland	2022-2023	Inspection of monuments	Icelandic							X				
239	Fljótsdalshreppur Muncipality website	2024	Fljótsdalshreppur Muncipality website	Icelandic	https://www.fljotsdalur.is/				X		X				
240	Múlaþing Municipality Website	2024	Múlaþing Municipality Website	Icelandic/English	https://www.mulathing.is/				X		X				
241	The Global Economy	2024	Organisation's web site	English	https://theglobaleconomy.com							X			
242	Freedom House (ranking of the level of freedom enjoyed country by country	2024	Organisation's web site	English	https://freedomhouse.org/countries/freedom-world/scores							X			

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243	International Labour Organization (The international organisation for Labour Rights	2024	Organisation's web site	English	https://normlex.ilo.org/		X								
244	Transparency International's Corruption Perception Index, 2023	2024	Organisation's web site	English	https://www.transparency.org/en/cpi/2023							X			
245	Environment Agency of Iceland	2024	Official web site	English	https://ust.is/english/	X									
246	The Administration of Occupational Safety and Health (Vinnueftirlitið)	2024	Official web site	English	https://island.is/en/o/aosh		X								
247	The Directorate of Labour (Vinnumálastofnun)	2024	Official web site	English	https://www.vinnumalastofnun.is/en		X								
248	The National Energy Regulatory Authority (Orkustofnun)	2024	Official web site	English	https://orkustofnun.is/en	X						X			
249	Landsvirkjun and Veiðimálastofnun	2015	Útbreiðsla og ástand seiða í Jökulsá á Dal og hliðarám hennar 2014	Icelandic	http://gogn.lv.is/files/2016/2016-056.pdf					X					
250	Landsvirkjun	2021	Seiðarannsóknir og veiði í Jökulsá á Dal, hliðarám hennar og Fögruhlíðará 2019	Icelandic	https://www.hafogvatn.is/is/midlun/utgafa/haf-og-vatnarannsoknir/seidarannsoknir-og-veidi-i-jokulsa-a-dal-hlidaram-hennar-og-fogruhlidara-2019-hv-2020-34					X					
251	Sveinn Kári Valdimarsson, Landsvirkjun and Ingi Rúnar Jónsson and Gudni Gudbergson, Institute of Freshwater Fisheries	2016	TALE OF TWO RIVERS: THE LARGEST HYDRO PROJECT IN ICELAND AND ITS INFLUENCE ON TWO RIVERS	English	https://asnevents.s3.amazonaws.com/Abstrakt-FullPaper/26592/Valdimarsson-2659+revisited.pdf			X		X				X	

Fljótsdalsstöð, 690 MW, Iceland

No	Author / Organisation	Year	Title	Language	Web links etc., most evidence is internal documents available only to the assessors	Section									
						1	2	3	4	6	8	9	10	11	12
252	BirdLife International, Icelandic Nature Conservation Association(INCA), Wildfowl & Wetlands Trust (WWT), World Wide Fund For Nature (WWF)	2003	Hydropower Development in Iceland: Damage to habitats and species of European importance	English	https://rm.coe.int/1680746 90f					X					
253	Vatnajökulsþjóðgarur	2022	Stjórnunar- og verndaráætlun Vatnajökulsþjóðgarðs. 3. útgáfa	Icelandic	https://prismic-io.s3.amazonaws.com/vatnajokulsthjodgardur/2c39eb78-dd8b-4122-ad29-300826409421_3.-utgafa-sogv-med-samth.-vidaukum-og-breytingum-juli-2022-hreint-skjal.pdf					X					
254	Baldursson, S, J Guðnason, H Hannesdóttir & T Thórðarson	2018	Nomination of Vatnajökull National Park for inclusion in the World Heritage List	English	https://www.stjornarradid.is/library/01--Frettatengt---myndir-og-skrar/UAR/unesco-nomination-of-vatnajokull-national-park-dynamic-nature-of-fire-and-ice.pdf					X					
255	Landsvirkjun	2015	Brochure Kárahnjúkar Hydroelectric Project	English									X		
256	Landsvirkjun -	2024	EGU24-9926 - climate change, water resources and the hydropower system in Iceland: Presentation on innovation in Hydropower Operations and Planning (EGU, Vienna, Austria)	English											X

Appendix 3 - Photographs

Photography by Bernt Rydgren (1-17, 19-34, 66, 68-72); Jörg Hartmann (35-51; Pelle Bågesund (52-62); and Arjola Tola (18, 63-65, 67).

Photo 1: Alcoa aluminium smelter in Reyðarfjörður

Photo 2: Drainage from headrace-tunnel leakage

Photo 3: Eyjabakka Jökull outlet glacier

Photo 4: Farmer driving sheep in for the winter - Fljótsdalsheiði in Vatnajökull national park

Photo 5: Fertilization with hay for vegetation recovery - Fljótsdalsheiði in Vatnajökull national park

Photo 6: Fljótsdalsheiði with Snæfell in the background 1

Photo 7: Fljótsdalsstöð power station

Photo 8: Fljótsdalur with transmission line running on the mountain

Photo 9: Hengifoss waterfall, near Fljótsdalsstöð power station 1

Photo 10: Tributary to Jökulsa a Dal, affected by sediments from tunnel leakage

Photo 11: Lake Lagarfljót north-east from Egilsstaðir

Photo 12: Lake Lagarfljót south-west from Egilsstaðir

Photo 13: Hengifoss waterfall, near Fljótsdalsstöð power station 2

Photo 14: Rjúkandi waterfall in the Jökulsa á Dal valley

Photo 15: Litlanesfoss, near Fljótsdalsstöð power station

Photo 16: Natural birch forest

Photo 17: Natural birch forest

Photo 18: Sheep grazing on Fljótsdalsheiði in Vatnajökull national park

Photo 19: The Halslón Reservoir towards the Kárahnjúkar and Desjarár dams

Photo 20: The Eyjabakkajökull outlet glacier with the Geldigafell mountain

Photo 21: The Jökulsá í Fljótsdal delta in upper Lagarfljót

Photo 22: The Jökulsá í Fljótsdal delta in upper Lagarfljót 1

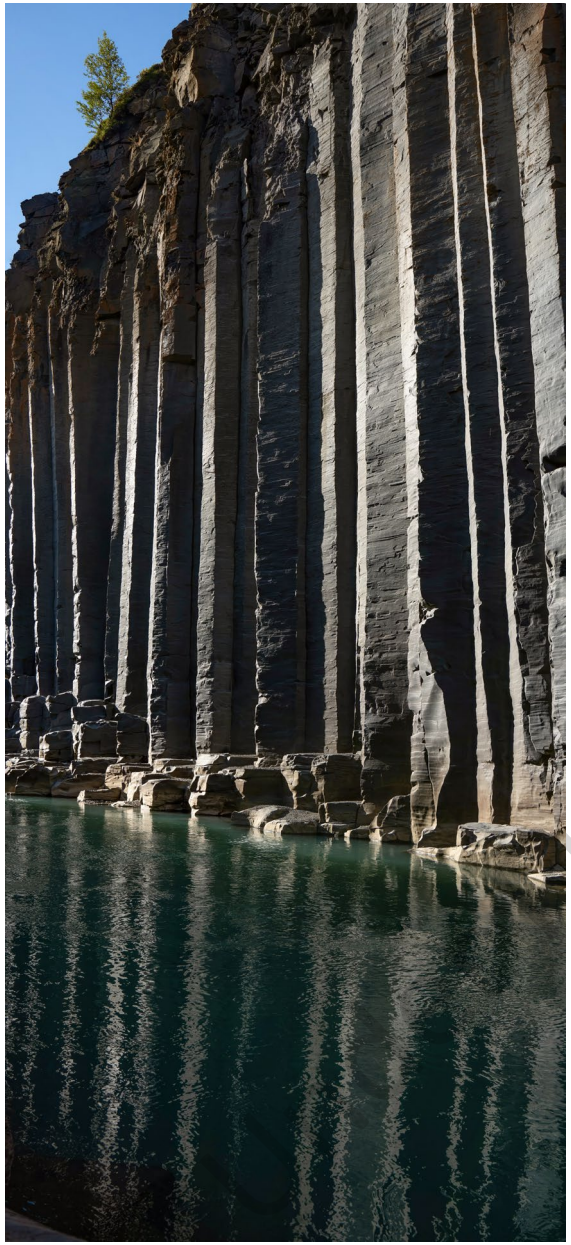

Photo 23: Stuðlagil Canyon on Jökulsá á Dal, tourist attraction realised by the changed flow conditions caused by the project.

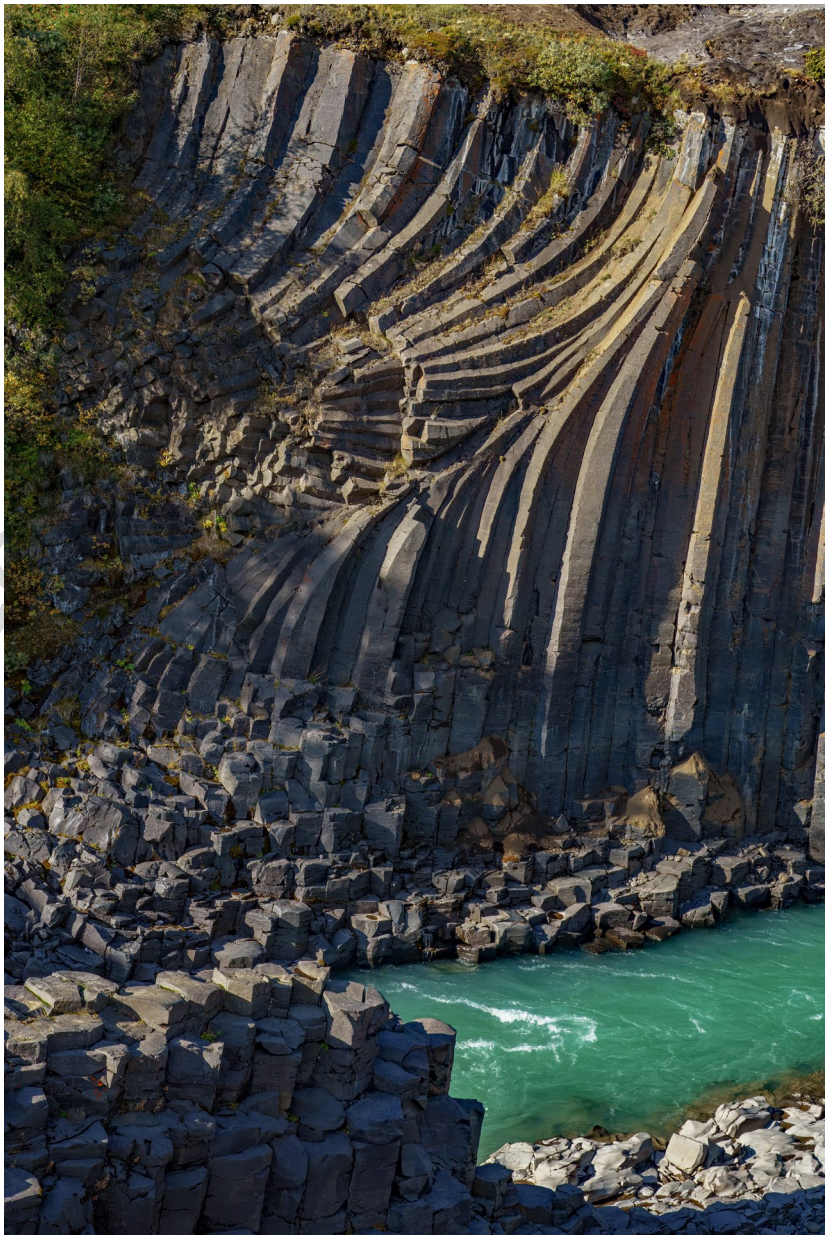

Photo 24: Stuðlagil Canyon

Photo 25: Stuðlagil Canyon

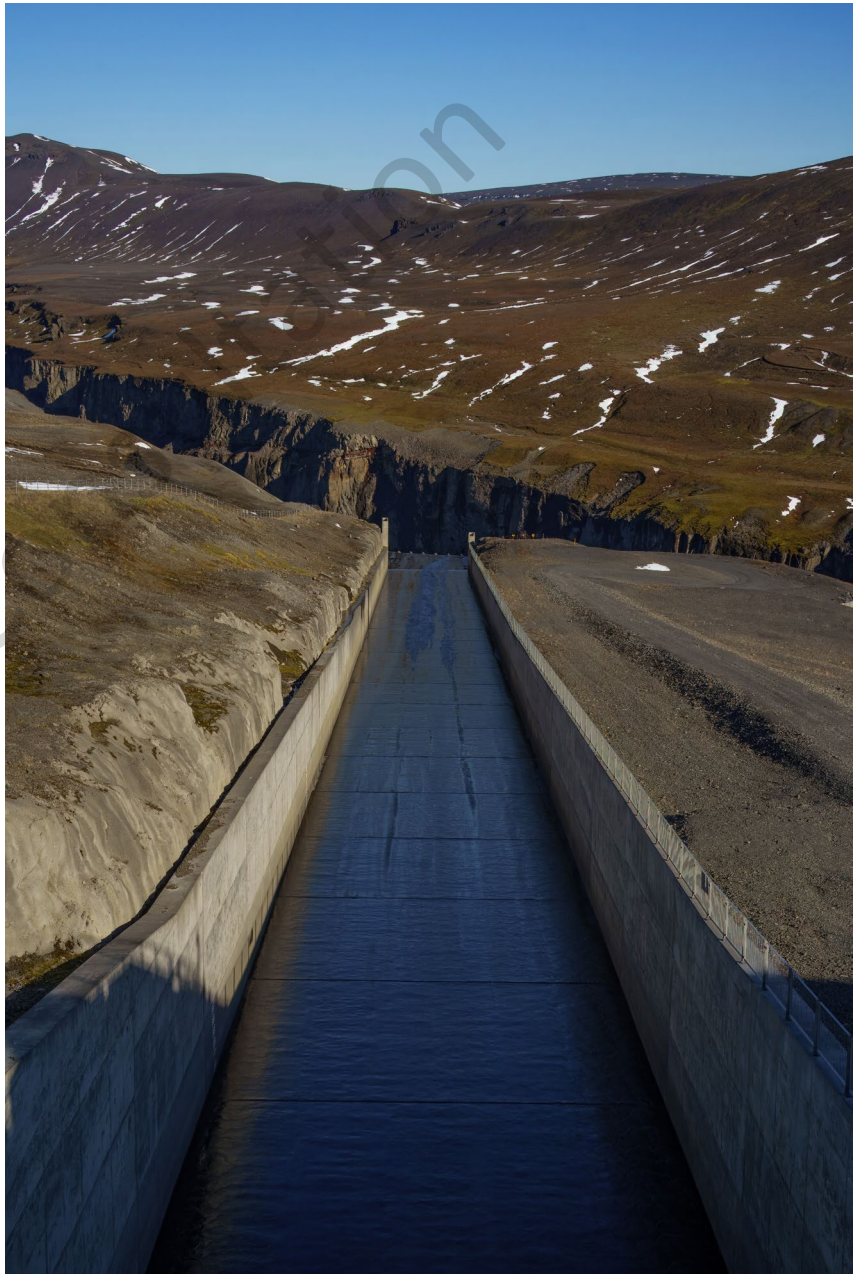

Photo 26: The spillway at the Kárahnjúkar Dam

Photo 27: The Kárahnjúkar spillway and the Hafrahvammagljúfur Canyon

Photo 28: The tailrace canal below Fljótsdalsstöð power station with boat art work in the canal

Photo 29: The Vortex art work, Kárahnjúkar Dam and members of the Assessment Team and Local Support Team

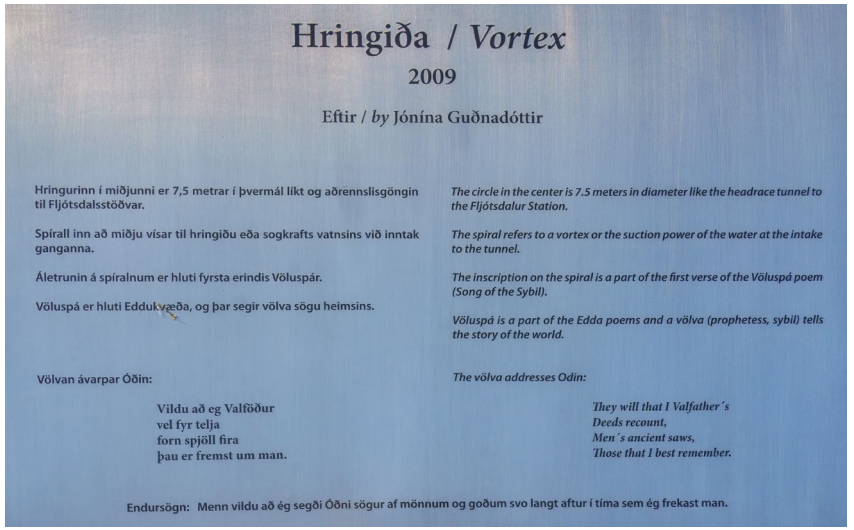

Photo 30: Signage explaining the Vortex art work

Photo 31: Wind measurements on Fljótsdalsheiði

Photo 32: Tourist signage

Photo 33: Tourist signage

Photo 34: View across the Halslón Reservoir towards the Brúarjökull outlet glacier

Photo 35: Artwork – the Wind Reindeer – on ventilation shaft

Photo 36: Site for release of salmon smolt into Lagarfljót Lake

Photo 37: Drainage water from tunnel mixing with clear stream flows

Photo 38: Entrance to Húsey farm in lowlands between Jökulsá á Dal and Lagarfljót

Photo 39: Fencing to prevent sheep from crossing Jökulsá á Dal River

Photo 40: Fljótsdalshreppur municipality building near power station (housed original visitor centre)

Photo 41: Gravel extraction by landowners on banks of Jökulsá á Dal, near fish-spawning areas, a river which has considerably better water quality post-project.

Photo 42: Groundwater-level measurement on Húsey farm

Photo 43: Group of harbor seals (Phoca vitulina) in distance on gravel banks in Jökulsá á Dal estuary (difficult to make out)

Photo 44: Historic church in the lowlands between Jökulsá á Dal and Lagarfljót, which has benefitted from Landsvirkjun's summer work programme

Photo 45: Lagarfoss power station downstream of Lagarfljót Lake

Photo 46: Vatnajökull NP visitor centre near power station

Photo 47: Main building at Skriðuklaustur cultural-heritage site near the power station

Photo 48: Planned building site for expansion of Fljótsdalshreppur community

Photo 49: Spoil deposit with good revegetation results

Photo 50: Community cultural centre Sláturhúsið ('Slaughterhouse') in Egilsstaðir

Photo 51: Landsvirkjun staff of field visit to Húsey farm

Photo 52: Saudárdalur Dam

Photo 53: Fish ladder at Lagarfoss

Photo 54: Fish ladder at Lagarfoss

Photo 55: Sand traps along Kárahnjúkar Reservoir

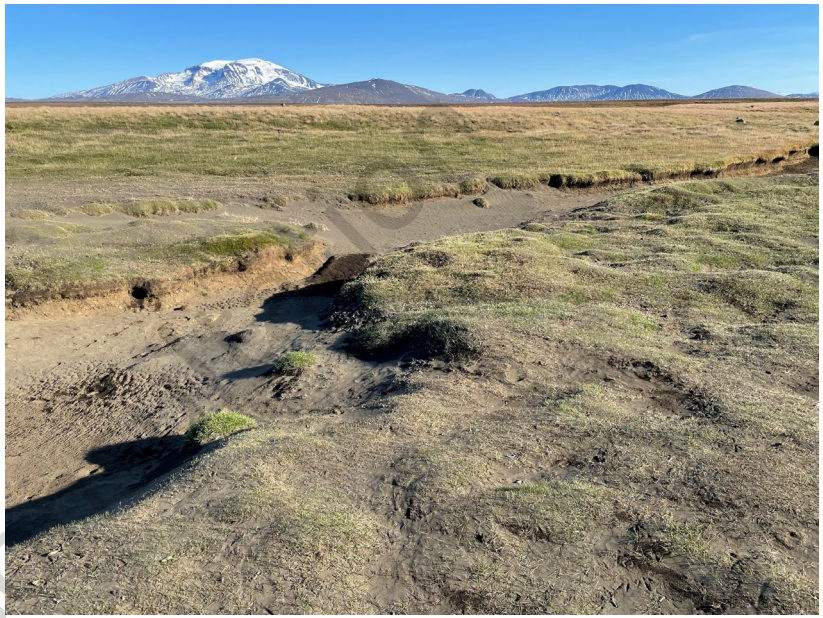

Photo 56: “Sandification” (sand encroachment) along the Halslón Reservoir

Photo 57: Lagarfoss Hydropower plant

Photo 58: The estaury for both Jökulsá í Fljótsdal and Jökulsá á Dal

Photo 59: Safety signage at Kárahnjúkar Dam

Photo 60: Safety signage at Kárahnjúkar dam

Photo 61: Safety signage at Kárahnjúkar dam

Photo 62: Bottom outlet gate at Kárahnjúkar Dam

Photo 63: Lake Lagarfljót

Photo 64: Land Rehabilitation by Land of Skógur

Photo 65: Kárahnjúkar/Fljótsdalur project Information board

Photo 66: Fire-fighting equipment in the Fljotsdalur power station

Photo 67: Signage about the reindeer aspects of the art work – the Wind Reindeer - in the background (photo 35).

Photo 68: Difference between glacial and non-glacial runoff, Kelduarlón reservoir

Photo 69: Fljotsdalur power station, cable tunnel

Photo 70: Inside Fljotsdalur power station, machine hall in the background

Photo 71: Kelduarlón spillway with dam-leakage monitoring in foreground

Photo 72: Ufsarlón reservoir

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