Hydropower Sustainability Standard

Add certification label (if the project is certified)

Assessment Report

Project Name: Bakun HEP

Installed Capacity: 2520 MW

Country: Malaysia

sarawak energy

Project Sponsor: Sarawak Energy

Report Authors: Doug Smith, Helen Locher, Tashi Pem

Report Date: 28 February 2025

Cover page photo: Overview of Bakun HEP, photo taken in 2014. Source: Bakun

Operation

Bakun HEP, 2,520 MW, Malaysia

Published by:

Hydropower Sustainability Alliance
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1350-352 Lisboa, Portugal
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Reporting template first published in September 2021.
This edition published October 2023.

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.

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: https://www.hs-alliance.org/
Version date	October 2023

A. Assessment Overview

Assessor(s)	Doug Smith (Accredited Lead Assessor), Helen Locher (Accredited Assessor), Tashi Pem (Provisionally-accredited Assessor). The report was updated in February 2025 by the Accredited Lead Assessor only, following gap resolution.
Assessment objective	1. To identify and address risks and opportunities for improvement in the social, environment and governance management during operation stage of the project; 2. To benchmark against international best practices; and 3. To demonstrate transparency and credibility in project development and management.
Assessment dates	On-site assessment 2-9 July 2024
Assessment report date	Initial version: 2nd August 2024; Following gap resolution: 28th February 2025
Summary of key findings	Bakun Hydroelectric Project (Bakun HEP) was constructed in the 2000's, with the first units commissioned in 2011, and it was fully operational in 2014. Sarawak Energy (SEB) acquired Bakun HEP in August 2017 from Sarawak Hidro Sdn Bhd (owned by the Federal Ministry of Finance, Malaysia). Environmental and social studies were conducted, and resettlement implemented in the 1990's. Since acquisition, SEB has extended its corporate-level systems for sustainability to Bakun HEP, while also developing the breadth and depth of these systems. These include systems for procurement, ethical business practices, internal and external audits, legal compliance, and HSE management, for example. Bakun HEP is certified against a wide range of ISO standards. Bakun HEP has been able to draw on SEB corporate divisions such as Sustainability, and Research and Development, for example in greenhouse gas (GHG) monitoring. As a result of internal application of the Hydropower Sustainability Standard (HSS), Bakun HEP was able to identify further steps to take to address sustainability, and so has recently put in place a range of additional plans. These address social and wider (beyond the plant level) environmental issues, and include an Environmental Management Plan, Community Management Plan, Stakeholder Management Plan, Biodiversity Management Plan, and Reservoir Management Plan. Bakun HEP has recently established quarterly Bakun ESG reporting and meetings, and formed a new, more inclusive community-level stakeholder steering committee. In addition, SEB has extended its range of Policy, Procedures and Guidelines (PPG) to encompass social and wider environmental issues. The initial version of this official HSS assessment, dated 2nd August 2024, identified 19 significant gaps against the Minimum Requirements of HSS. These fell into three categories: implementation capacity; social issues and the legacy of development; and a number of specific issues, concerning low dissolved oxygen in releases from Bakun Dam, the Dam Safety and Emergency Plan (DSEP), and floating logs in the reservoir. In the six-month period allowed for gaps to be addressed, SEB has addressed all gaps and has removed or is on track to remove all gaps.

	Implementation capacity. Bakun HEP has recently increased social and biodiversity staffing including at the plant level, established quarterly ESG meetings, extended SEB's environmental and social management system to the transmission lines, made significant progress in biodiversity studies and plans, and a downstream flows and water quality study, incorporated management review processes in its various environmental and social plans, and publicly disclosed some of these plans. **Social issues and the legacy of development.** Although it remains that livelihoods and living standards have not been restored or improved among some affected households, and some impacts on Indigenous Peoples' rights are not mitigated or compensated, Bakun HEP and Sarawak Energy have taken significant steps towards addressing these issues. Grave sites affected at the reservoir shoreline have been surveyed and funds released for their protection or relocation. Engagement with communities in all areas is more frequent, and a new grievance mechanism has been fully established. SEB has begun a study on Indigenous Peoples' rights for all its hydropower facilities, which will begin with Bakun HEP and deliver a Bakun Indigenous Peoples' Plan. A committee representing all affected communities is currently reviewing a Memorandum of Understanding to be agreed with SEB. Monitoring of commitments and the effectiveness of measures taken is being strengthened. **Specific issues.** Bakun HEP has recently addressed these, including repairs to the training log crane at the intake, construction of a device to aerate outflows, strengthening of the Dam Safety and Emergency Plan (DSEP) to include the agencies with responsibilities for emergency response and its distribution to these agencies, and additional inspections for floating logs and the planned extension of the log removal activities further upstream.
Limitations of the assessment	The assessment was planned and managed ably by the 'single point of contact', Darylynn Chung of SEB, and her local support team, all of whom have considerable experience in internal and official assessments using the Hydropower Sustainability Standard. They assembled a highly comprehensive array of documentary evidence, and arranged wide-ranging interviews with internal and external stakeholders, in the Bakun HEP area, Belaga, Bintulu, and Kuching. The majority of interviews were conducted in-person. There were few limitations. Time constraints prevented the assessor team visiting communities residing far upstream on the reservoir.

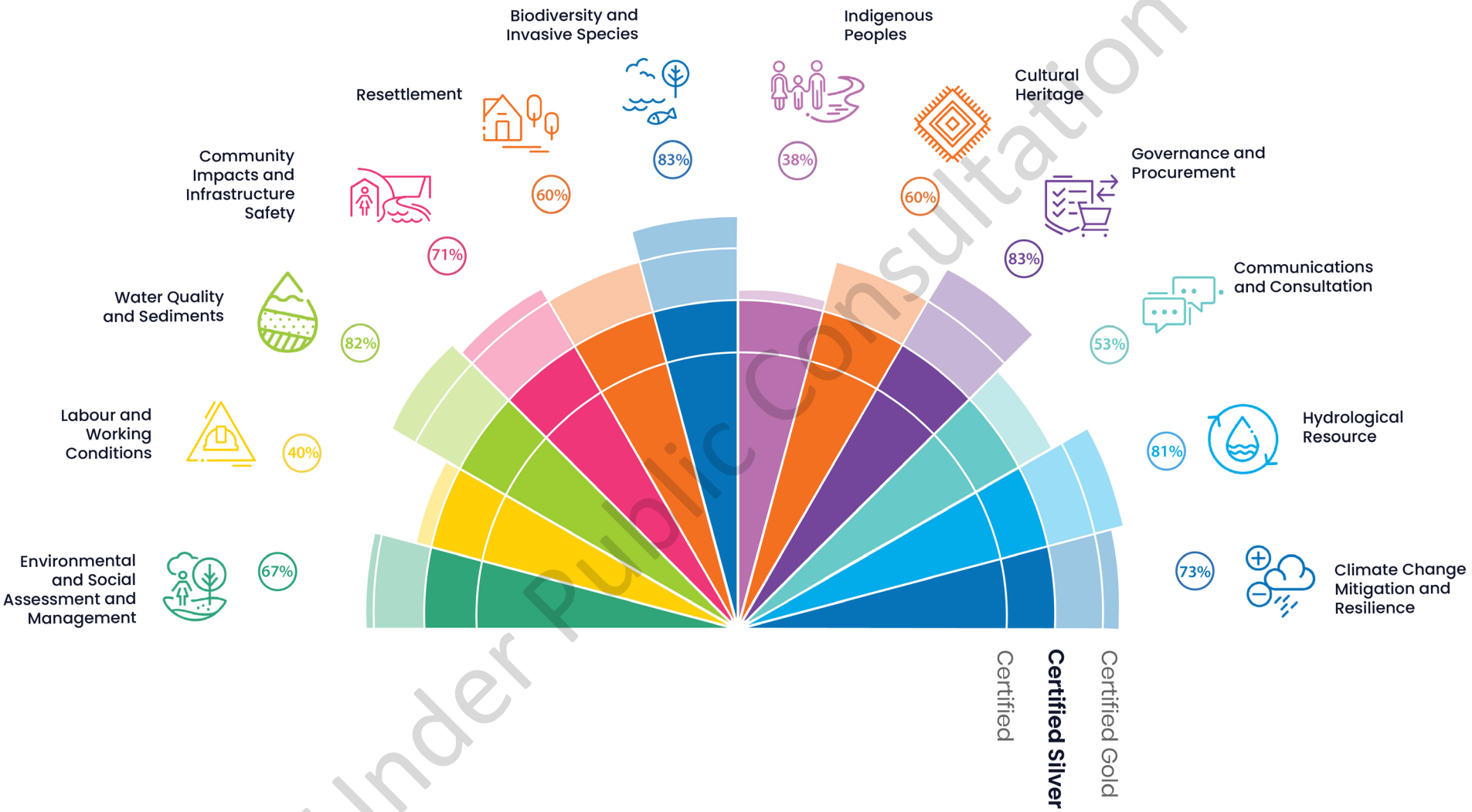


Figure 1 – Hydropower Sustainability Standard (HSS) Results Diagram

B. Project Details

Project name	Bakun Hydroelectric Project (HEP)
Country	Malaysia
Location	Belaga District, Kapit Division, State of Sarawak
Purpose	Power generation
Developer / Owner	Sarawak Energy (formally Bakun Hydro Power Generation Sdn Bhd, a subsidiary of Sarawak Energy Berhad, since August 2017)
Financer(s)	At the time of the project's development, Ministry of Finance (Government of Malaysia)
Installed capacity (MW)	2520 MW
Construction start date (planned or actual)	Construction began in 1996, but was halted in 1997 in the face of the Asian financial crisis, subsequently continuing in the early 2000's. NREB's approval of Bakun was issued in 2002. The first social study for Bakun was conducted in 1994, followed by the EIA study 1995, additional socio-economic studies in 1996, and implementation of resettlement in 1998.
Commercial operations date (planned or actual)	First units commissioned in 2011, and fully operated by 12 July 2014
Annual average generation (GWh / year)	15,514 GWh (Firm Annual Energy Generation)
Associated infrastructure: road(s) (length)	125 km from Bintulu-Tubau-Bakun
Transmission lines and sub-stations (names, lengths and capacities)	281.5 km, 275 kV (Bakun to Similajau)
Total cost (USD m)	Not available
Annual operating costs (USD m)	Not available
Specific investment cost (USD m / MW)	Not available
Levelised energy cost (USD / kWh)	Not available
Dam type	Concrete-Faced Rockfill Dam (CFRD)
Dam height (m)	205 m
Dam length at crest (m)	750 m
Units (number, type, MW)	4 X 300 MW and 4 X 330 MW Francis turbines
Reservoir area at Full Supply Level (FSL) (km^2)	695 km^2
Average net head at FSL (m)	168 m
Average flow (m^3 / s)	1,450 m^3/s
Design flow (m^3 / s)	1,664 m^3/s (8 X 208 m^3/s per unit)
Load factor	0.85
Number of physically displaced households	15 longhouses consisting of 1,640 households with a total population of 9,428, resettled in 1998. Numbers displaced for the transmission line and road are not known.

Power density (W / m^2)	3.6 W/m^2
Emissions intensity (gCO_2e / kWh)	39.9 gCO_2e/kWh
Contacts / website	https://www.sarawakenergy.com/bakun-hydroelectric-plant

Figure 2 – Map of dam site

C. Performance against Minimum Requirements

List of significant gaps against Minimum 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
	There are no significant gaps against Minimum Requirements.												
NUMBER OF SIGNIFICANT GAPS BY SECTION:		0	0	0	0	0	0	0	0	0	0	0	0
TOTAL NUMBER OF SIGNIFICANT GAPS:		0											

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	4	2	9	15	3	5	3	3	5	8	13	11
PERCENTAGE OF REQUIREMENTS MET	67%	40%	82%	71%	60%	83%	38%	60%	83%	53%	81%	73%

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)

(Note to user: filling in the Minimum Requirements ESAP is only required if there are gaps against the Minimum Requirements)

Minimum Requirements							
Section	Significant gaps	Action(s)	Responsibility	Indicator of achievement	Timeframe		
					<12 months	12-24 months	>24 months

(Note to user: filling in the Advanced Requirements ESAP is optional if there are gaps against the Minimum Requirements)

Advanced Requirements							
Section	Requirement sought	Action(s)	Responsibility	Indicator of achievement	Timeframe		
					<12 months	12-24 months	>24 months

F. Abbreviations and Acronyms

AADK	Agensi Anti-Dadah Kebangsaan
ANCOLD	Australian National Committee on Large Dams
ARC	Audit Risk and Compliance
BAC	Bakun Action Committee
BARC	Board Audit and Risk Committee
BCMSC	Bakun Community Management Steering Committee
BINP	Bakun Islands National Park
BioMoT	Biodiversity Monitoring Tool
BLNA	Balui Lake Native Association
BMEP	Biodiversity Monitoring and Evaluation Plan
BMP	Biodiversity Management Plan
BRS	Bakun Resettlement Committee
CCAR	Climate Change Assessment Report
CEO	Chief Executive Officer
CEOM	Corporate Environment Operations Meeting
CEOSH	Corporate Environment, Occupational Safety and Health
CFRD	Concrete Faced Rock Filled Dam
CHA	Critical Habitat Assessment
CHMP	Cultural Heritage Management Plan
CIDB	Construction Industry Development Board
CMIP	Climate Model Intercomparison Project
CMP	Community Management Plan
CMS	Continuous Monitoring Stations
COP	Conference of Parties
CR	Controlled Release
CSR	Corporate Social Responsibility
CSRSM	Corporate Social Responsibility and Social Management
DEIA	Detailed Environmental Impact Assessment
DID	Department of Irrigation and Drainage
DO	Dissolved Oxygen
DO	District Office
DoA	Department of Agriculture
DOE	Malaysian Department of Environment
DOSH	Department of Occupational Health and Safety
DSEP	Dam Safety and Emergency Plan
DSRR	Dam Safety Review Report
DSU	Dam Safety Unit
DWDM	Dynamic Water Dispatch Management
E&S	Environmental and Social
EASI	Environmental Aspects and Significant Impact
EIU	Electricity Inspectorate Unit
EMP	Environmental Management Plan
EOSH	Environment, Occupational Safety and Health
EPU	Economic Planning Unit
ERM	Enterprise Risk Management
ESG	Environmental, Social, and Governance
FDS	Forest Department Sarawak
FSL	Full Supply Level
GCEO	Group Chief Executive Officer
GCM	Global Circulation Model
GEC	Group Executive Committee
GHG	Greenhouse Gases
GM	Grievance Mechanism
GRI	Global Reporting Initiative
H_2S	Hydrogen Sulphide
HEP	Hydroelectric Project
HIRADC	Hazard Identification, Risk Assessment and Determining Controls
HR	Human Resources
HSE	Health, Safety, and Environment
HSSE	Health, Safety, Security, and Environment
IBA	Important Bird Area
ICE	Institution of Civil Engineers ICE
IMSA	Integrated Management System and Assurance
IQMS	Integrated Quality Management System
ISO	International Organization for Standardization
IWP	Integrated Workforce Planning
JKKK	Jawatan Kuasa Kemajuan dan Keselamatan Kampung (Village Committees)

KBA	Key Biodiversity Area
KFA	Key Focus Area
KKM	Kementerian Kesihatan Malaysia
LSD	Land and Survey Department
MEESty	Ministry of Energy and Environmental Sustainability
MUDeNR	Ministry of Urban Development and Natural Resources
MUT	Ministry of Utility and Telecommunication Sarawak
MyDAMS	Malaysia Dam Safety Management Guidelines
NCR	Native Customary Rights
NREB	Natural Resources and Environment Board
NTU	Nephelometric Turbidity Unit
NWQSM	National Water Quality Standard Malaysia
OR2	Operator's Residence 2
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Act
PLAAB	Peng Lepo' Asen Alo Belaga (Belaga River Original Residents Association)
PMF	Probable Maximum Flood
PMMU	Peng Maren-Maren Uma (Sungai Asap headmens' committee)
PPE	Personal Protective Equipment
PPG	Policies, Procedures, and Guidelines
PPP	Procurement Policies and Procedures
R&D	Research and Development
RAP	Resettlement Action Plan
RCP	Representative Concentration Pathways
RM	Malaysian Ringgit
RMP	Reservoir Management Plan
RO	Resident's Office
SBC	Sarawak Biodiversity Centre (SBC)
SDSM	Statistical Downscaling Model
SEACE	Sarawak Energy – Assess, Comply, Empower
SEEMROV	Sarawak Energy Environmental Monitoring Remotely Operated Vehicle
SEES	Sarawak Energy Employee Survey
SFC	Sarawak Forestry Corporation
Sg.	Sungai (meaning River)
SMArT	Self-sustaining Modular Aeration Technology
SMP	Stakeholder Management Plan
SOCG	Statement of Corporate Governance
SOP	Standard Operating Procedures
SORMIC	Statement on Risk Management and Internal Control
SRB	Sarawak Rivers Board
STP	Sewage Treatment Plant
TACOS	Terms and Conditions of Service
TSS	Total Suspended Solids
UAUC	Unsafe Acts / Unsafe Conditions
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNIMAS	University of Malaysia, Sarawak
WiMoR	Wildlife Monitoring and Rescue Plan
WQ	Water Quality

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	Environmental issues include: plant environmental management including emissions to air (Hydrogen Sulphide H_2S, Sulphur hexafluoride SF6), the management of wastes and hazardous wastes; environmental management on specific projects (e.g. current construction of Operator's Residence 2); reservoir rim landslips; debris and solid wastes disposal in the reservoir; low dissolved oxygen (DO) in downstream releases; sedimentation at the reservoir tail; ongoing biodiversity impacts in the catchment, reservoir, and downstream; and GHG emissions. Social issues include: legacy impacts of project development on resettled as well as upstream and downstream communities, and impacts on their rights as Indigenous Peoples; downstream dam safety; safety risks, downstream damage and erosion from spilling releases; reduced fish catches downstream; and impacts of log debris on navigation on the reservoir.
Identify the environmental regulator	Natural Resources and Environment Board (NREB) Sarawak, and the federal Malaysian Department of Environment (DOE). NREB is responsible for the Sarawak Natural Resources and Environment Ordinance 1993, which provides a regulatory mechanism for the sustainable management of natural resources and the protection of environmental quality. NREB can also issue Directives, and it has done so for Bakun HEP water quality monitoring. DOE is responsible for enforcement of environmental quality regulations such as the Malaysia Environmental Quality Act 1974, Environmental Quality (Scheduled Wastes) Regulations 2005, and Environmental Quality (Sewage) Regulations, 2009.
Identify other regulators (e.g. on land, water use, Indigenous Peoples)	Sarawak Rivers Board (SRB), Land and Survey Department, Forest Department Sarawak (FDS).

Summarise the ESIA regulatory requirements	Natural Resources and Environment (Prescribed Activities) Order 1994 (NREO) requires EIA reports on prescribed activities having impacts on the environment to be submitted to the NREB for approval prior to project implementation. NREB has published a Handbook of Policy and Basic Procedure of Environmental Impact Assessment in Sarawak, and NREB is responsible for post-EIA monitoring of its Conditions of Approval. NREB requires that smaller facilities that are not prescribed activities submit an Environmental Management Plan for approval.
Describe the non-physical cultural heritage in the project area	This includes folklore, ceremonies, song, chant, music, traditional dance, festivals, and traditional crafts and costumery. Observations on Bakun HEP's activities related to intangible heritage are provided in Section 8.
Other relevant information	A Detailed Environmental Impact Assessment (DEIA) for Bakun dam and ancillary facilities was delivered in March 1995, ultimately obtaining NREB approval, with terms and conditions of approval, in February 2002. A separate DEIA for reservoir preparation was delivered in February 1995, attaining NREB approval, with terms and conditions of approval, in February 2008. These are two out of four DEIAs that were prepared, the other two being for the power transmission system (in three parts, for the Sarawak on-land sector, sub-marine sector, and on-land peninsular sector) and the Bintulu-Tubau-Bakun access road, both of which were not available at the time of this assessment.

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	✓	SEB's HSE Management System is applied on Bakun HEP, which includes several processes to identify environmental issues: an Environmental Aspects and Significant Impact (EASI) assessment; procedures on identification and evaluation of environmental aspects and OSH hazards and on identification and maintenance of compliance obligations; weekly inspections of powerhouse, warehouse, and	Processes to identify ongoing and emerging environmental and social issues take into account broad considerations, and both risks and opportunities	✓	HSE Management System processes are thorough across plant-level issues, e.g. SEACE (Sarawak Energy – Assess, Comply, Empower) inspections are conducted via a software application (allowing corrective action tracking), EASI assessments are comprehensive across all plant-level aspects, and there are HSE Management System procedures for internal audit, and for monitoring and measurement.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		switchyard; monthly sewage treatment plant inspections; inspections on specific items such as spill kits and scheduled wastes storage; annual legal compliance inspections; ISO 14001:2015 certification audits; and quarterly EOSH reports and meetings. Bakun HEP also participates in SEB-wide quarterly corporate environment – operations meetings (CEOM), and annual CEOSH meetings. These meetings are meticulously minuted. The above are focused on environmental issues at Bakun HEP facilities. In addition, the following provide processes to identify issues on the wider environment and social issues: the preparation of various plans – principally the Environmental Management Plan (EMP), Stakeholder Management Plan (SMP), Community Management Plan (CMP), Biodiversity Management Plan (BMP); recently introduced quarterly ESG committee meetings; and regular stakeholder engagement (see Section 10).			In addition, for a range of wider environmental and social issues, SEB's divisions that support Bakun HEP – HSSE, Water Management, CSRSM, Sustainability, R&D etc – provide support that enables the identification of emerging issues. Examples of these are provided for the corresponding criterion in other Sections. The Bakun HEP ESG committee held its first meeting in May 2024, chaired by a member of the Bakun HEP Management Team. The committee is additional and complementary to the Bakun EOSH committee, and will address wider environmental and social issues, including conformance with SEB PPG. The EOSH committee is operationally focussed and must follow regulatory requirements (e.g. to include management, employees, and contractors).
The processes utilise appropriate expertise	✓	A good range of internal and external expertise is drawn on: Bakun HEP HSSE staffing; support from HSSE, CSRSM (CSR and Social Management), Sustainability, R&D (Research and			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		Development), and other functions; and external expertise for detailed assessments, e.g. on dam safety, downstream flows, biodiversity, and climate change risk.			
Monitoring programmes are in place for identified issues	✓	Bakun HEP conducts a range of monitoring for environmental issues, and summarises these (in a recently updated format) in a Quarterly Environmental Performance Report, which also include objectives, and some corrective actions. Monitoring programmes in place include: water quality (reservoir and downstream); biodiversity; noise; air quality; H_2S; scheduled wastes; and recycled and composted wastes. Separate reports for various reporting periods are available presenting water quality (continuous monitoring stations), downstream water quality, H_2S, air quality, scheduled wastes, reservoir rim inspections, and noise. For social issues, the Community Management Plan (and corresponding Community Monitoring Book) identifies monitoring parameters. No monitoring programmes are in place for some issues (reservoir debris, sedimentation at the reservoir tail) but these are addressed in other sections.			
MANAGEMENT					

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
Environmental and social management system is in place to manage measures to address identified environmental and social issues	✓	SEB's HSE Management System, including Environmental Policy and EOSH Management Manual, is applied to Bakun HEP for the management of plant-level environmental issues, but not all wider environmental or social issues. Examples of procedures concerning environmental management are: operational control, chemical control, waste management, and corrective action. There is also a Bakun HEP legal register and evaluation of compliance. Numerous examples of environmental measures are observable at the HEP site. Bakun HEP plans environmental activities using an excel-based planning sheet, updated twice in 2024 so far, including corresponding objectives and targets. The Bakun HEP EMP, CMP, SMP, and a range of other plans such as a reservoir management plan (see other Sections) set out the measures to be implemented to address wider environmental and social issues. These are supported by SEB's Policy, Procedure and Guidelines (PPG) on a range of issues, e.g. CSR, biodiversity, and cultural heritage.	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	There are some processes that are used to anticipate and respond to emerging risks at a plant level: the range of monitoring as described above, the EASI assessment, chemical spill response procedures Including training and drills), and Management Review of the SEB HSE Management System, for example. In response to this assessment, Bakun HEP has strengthened its implementation capacity and management review processes, especially the ESG Committee. The ESG Committee TOR, quarterly meetings minutes, and dashboard show detail for environment, HSE, CSR, grievances etc, with further detail for social aspects. Sections on management review have been strengthened in the EMP andCMP.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		In addition, there are SEB EIA Guidelines, which would be applied to larger projects, such as the potential (now deferred) Bakun capacity expansion, and SEB Environmental Management Guidelines for Construction Sites applicable to all scales of works. These guidelines were not applied to the current contract for the construction of Operator's Residence 2 (OR2) but, as standard, contract conditions include environmental requirements. Environmental management is also applied to the Bakun HEP transmission line: a recently-prepared (February 2025) EMP for Transmission Line Operation; HSSE risk assessment prepared in December 2024; the establishment of an EOSH Committee for the transmission network; work instructions for line and slope inspections that refer to safety requirements; and documentation on environmental requirements and monitoring reports. In addition, the Bakun HEP EMP, SMP and CMP were recently (February 2025) revised to refer to the transmission line.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
This management system is implemented utilising appropriate expertise (internal and external)	✓	As described above, a good range of internal and external expertise is used across environmental and social issues. Bakun HEP maintains a register of staff competencies and training, provides training on environmental management to staff (for example training on scheduled waste management, and chemical safety, waste and spillage management is planned in 2024), and keeps records of attendance and training events. In general, SEB is making significant efforts to embed an HSE 'generative' culture, and instils this with its HSE portal, posters etc. In response to this assessment, Bakun HEP has recently (February 2025) improved its capacity, with additional permanent social staff (Senior Executive and Executive) and social and biodiversity consultants on 24-month fixed contracts at Bakun HEP. Implementation of some studies remains slow (e.g. 6 months to reach the inception stage for the indigenous people's study, see Section 7; and the downstream flows study) indicating institutional constraints on approval and mobilisation, but that is not a significant gap against this requirement.	Plans and processes are embedded within an internationally recognised environmental management system which is third party verified, such as ISO 14001	✓	Bakun HEP is certified to ISO 14001: 2015, having obtained certification in December 2019, with validity until December 2026.

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					
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 legal non-compliances are apparent.
• no major non-compliances	✓	This HSS is reliant on secondary reports and testimony to judge whether there are legal non-compliances. The Bakun HEP legal register and evaluation of compliance (last updated 2022), Q1 2024 quarterly environmental report, SEACE full inspection in July 2023, and interviews with the regulator indicate full compliance; no legal non-compliances are apparent.			
• no major non-conformances	✓	Bakun HEP has defined 12 environmental objectives with corresponding programmes: avoid detrimental impact on the water quality of reservoir and downstream of Bakun HEP not exceeding the National Water Quality Standard Malaysia (NWQSM) Class IIB; minimize operational noise impact on nearby sensitive receptors; avoid degradation of water quality due to sewage discharge; compliance to Scheduled Waste Regulation; proper management of domestic waste generated; reduce domestic waste disposed to landfill; proper management of biodiversity; early detection of erosion and sedimentation upstream; early			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		detection of landslides; zero penalties from authorities; minimise dark smoke emission impact of fuel burning equipment on nearby sensitive receptors. It is in conformance with most of these. Social objectives set out in the CMP can be summarised as: identify and evaluate social impacts; engagement of stakeholders; implement mitigation measures; benefit optimisation; and conformance. Bakun HEP has recently made significant strides to meet these objectives, as reported in Sections 4, 5, 7 and 10.			
Environmental and social commitments have been or are on track to be met	✓	Commitments are on track to be met, but implementation has been slow.	There are no non-conformances	✘	There remain some non-conformances, some linked to slow implementation, as reported in other Sections, on water quality (prolonged low DO downstream), indigenous peoples (conformance with SEB's Social Policy), and consultation (conformance with the Stakeholder Management Policy).
Environmental and social funding commitments have been or are on track to be met	✓	SEB and Bakun HEP funding commitments are on track.			
OUTCOMES					
Negative environmental and social impacts associated with hydropower facility operations are avoided, minimised and mitigated	✓	No negative environmental impacts on the HEP site are apparent. A range of negative social impacts and impacts on the wider environment are yet to be resolved: prolonged low Dissolved Oxygen (DO) downstream; reduced access to public services among	Negative environmental and social impacts associated with hydropower facility operations are avoided, minimised, mitigated and compensated	✘	A range of negative social impacts and impacts on the wider environment are ongoing. Some resettlement impacts from the time of Bakun HEP's development were not compensated, and remain as legacy impacts (see Section 5).

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		upstream communities; legacy impacts of resettlement; possible biodiversity impacts, especially due to downstream DO; impacts on Indigenous Peoples' rights; disturbance to relocated graves; and navigation and safety hazards of floating logs. However, SEB has made great strides in response to this assessment, with action imminent in each of these areas, so this is not considered a significant gap against Minimum Requirements.			
Land disturbance associated with development of the hydropower project is rehabilitated or mitigated	✓	No land disturbance associated with the development of Bakun HEP remains on site. Exposed areas appear to have naturally revegetated. Bakun HEP has an ongoing tree planting programme, with 400 trees planted at site in 2023, and 255 elsewhere.			
The operating hydropower facility or the corporate entity to which it belongs can pay for social and environmental commitments	✓	SEB and Bakun HEP can pay for all environmental and social commitments. Environmental and social activities and CSR activities have a specific cost centre in operating expenditure budgets, and if exceeded, the wider SEB Power budget can be used.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● There are no significant gaps against Minimum Requirements.	4 out of 6

Summary of findings and other notable issues
SEB's HSE Management System and a range of Bakun HEP processes and plans, including an Environmental Management Plan (EMP) and Community Management Plan (CMP), are used to identify and manage environmental and social issues, and Bakun HEP is certified to ISO-14001: 2015. Bakun HEP conducts a range of monitoring for environmental issues, and reports these on a quarterly basis. Quarterly EOSH reports and meetings, newly-instigated quarterly ESG meetings and support from a range of SEB divisions enables Bakun HEP to identify emerging issues. Bakun HEP has recently increased implementation capacity for the management of social and wider environmental issues, though implementation is slow. A range of negative social impacts and impacts on the wider environment are ongoing, but this is not considered against the Minimum Requirements as all are being addressed by action or studies to better understand the issues in the coming months.

Relevant evidence	
Interview	3, 6, 10, 21-24, 39, 43, 45, 48, 50, 57, 58
Document	2, 18, 20, 23, 24, 25, 26, 27, 28, 29, 91, 92, 93, 94, 95, 96, 110, 111, 449, 112, 113, 114, 115, 116, 117, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 207, 210, 269, 299, 300, 301, 302, 303, 304, 305, 306, 323, 336, 340, 341, 357, 359, 360, 413, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 580, 581, 582, 583
Photo	5-25, 120, 121

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)	165 staff, 60 short-term contractors, and 493 total workers.
Applicable key human resources regulations	Employment Act 1955; Work Permit Requirement (Department of Immigration); Construction Industry Development Board Act 1994; Employees Social Security Act 1969.
Applicable key occupational health and safety (OH&S) regulations	Occupational Safety and Health Act (OSHA) 1994; Workers Minimum Standard of Housing & Amenities Act 1990; Factory and Machinery Act 1967.
Identify the regulator for labour law and OH&S	Department of Occupational Health and Safety (DOSH); Construction Industry Development Board (CIDB); Labour Department; Department of Immigration.
Other relevant information	Of the 165 staff: 27 are female and 138 are male; 71 are local (just over 40%), from the Belaga District; of these local staff, 34 are from Sungai Asap, 32 are from Belaga township, 2 are from upstream villages, and 3 are from other villages. Construction of a second Operators Residence (OR2), involving a major contractor, sub-contractors and foreign workers (215 workers in total), was in progress during the assessment, along with a number of infrastructure improvement initiatives.

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	✓	Bakun HEP assesses recruitment and manpower needs for the facility each year, and these are incorporated into SEB's annual Integrated Workforce Planning (IWP).	Identification of ongoing or emerging labour management	✕	In addition to labour management and OSH risk assessment approaches summarised under Minimum Requirements, some broad approaches at Bakun HEP include regular employee Fit-to-Work health assessments, and regular employee hearing checks.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
and labour management requirements for the operating facility		The Bakun Risk Register is regularly updated, and identifies labour-related requirements and risk categories, including: Shortage of Skilled Staff; Succession Planning; Staff Strike (Staff Reluctancy to work); and Competency Gaps.	issues takes broad considerations into account, and both risks and opportunities		The UAUC initiative at Bakun reflects identification and incorporation of an opportunity, in this case to inculcate a culture of safety reporting. Similarly, a number of inclusions on the employee website, health-related initiatives, and the use of employee apps respond to identified opportunities. SEB aims to become a digital utility, and as part of this a number of labour and working condition components have been digitised. A Sarawak Energy Hall of Fame has been set up to recognise staff who have come up with good ideas. However, no evidence was available to show a periodic update of Bakun HEP OHS issues and risks under the HSSE management system, nor to incorporate OHS risks that may arise from the broader scope and geographic range for environmental and social programs (e.g. biodiversity monitoring). There is an absence of tracking and reporting on several aspects of labour management at Bakun, notably: • Bakun HEP diversity, equality and inclusivity (including against targets, as this is a main focus for SEB); and • Bakun HEP local content for both staff and contractors, broken down to show Sungai Asap and upstream and downstream longhouses. There is an absence of credible tracking and reporting on broader considerations for OSH management at Bakun, such as: medical treatment injuries; non-work-related injuries; first aid injuries; restricted work injuries (alternate duties); soft tissue injuries (e.g. strains and
The assessment included project occupational health and safety issues, risks, and management measures	✓	The Bakun Risk Register includes one 'Safety, Health and Environmental Risk', with a description and a list of root causes and existing key controls. Bakun Occupational Safety and Health (OSH) risk assessments are also informed by: • A DOSH unscheduled audit of Bakun HEP every year regarding the OSHA Act 1994; • DOSH inspections every 15 months of all certifiable machinery on the Bakun HEP site (e.g. hoisting machines), giving tickets that machinery will be safe to operate; and • External audits against SEB's certification to ISO 45001:2018 Occupational Health and Safety management systems.			
Monitoring is being undertaken to assess if management measures are effective	✓	The Bakun Environment and Occupational Safety and Health (EOSH) Committee meets quarterly, and provides a forum for regular sharing of initiatives and progress. The Bakun HSSE team compiles Performance Statistics monthly. These inform the Bakun HSSE Committee reports as well as SEB Health, Safety, Security and Environment (HSSE) statistics. Additionally, Bakun HEP-specific monitoring that helps the Bakun HSSE team assess if management measures are effective includes:			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		• Periodic / ad hoc Hazard Identification, Risk Assessment and Determining Controls (HIRADC) reviews; • Tracking the number of Unsafe Acts / Unsafe Conditions (UAUCs) reported, as well as those that are open and closed; • Receipt of data from the on-site Bakun Health Clinic; • Checks of Hydrogen Sulphide (H_2S) emission levels against employee exposure limits; • Maintaining and confirming training lists for requirements such as First Aid, and Safety Passports; and • Periodic sub-contractor site inspections, for example for the OR2 site in Nov. 2023. SEB conducts the Sarawak Energy Employee Survey (SEES) annually, and Bakun HEP management evaluates results for Bakun and puts in place a Bakun HEP SEES improvement plan with actions and time targets.			sprains; slips, trips and falls); non-physical medical conditions (e.g. mental health related); and percent closure of UAUCs (ideally within time limits). Some spreadsheets shown for this assessment had added several of these such as non-work related injuries, but reported zero every month since the start of 2023. In the absence of these kinds of indicators, there is no ability to analyse the data and understand where further attention should be focussed.
Ongoing or emerging labour management issues have been identified	✓	The Bakun Risk Register, Bakun EOSH meetings, UAUC monitoring, Hazard Risk assessments, and the SEES provide avenues to identify ongoing or emerging labour management issues. For example, the 2023 SEES, whilst showing overall high results for Bakun, identified opportunities for improvement in: communication; diversity, equity and inclusiveness; senior leadership; compensation and benefits; and flexible work arrangements.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
MANAGEMENT					
Human resource and labour management policies, plans and processes are in place to address all labour management planning components	✓	SEB has a comprehensive approach to all aspects of human resources (HR) and labour management, which is applied by Bakun HEP. At the highest level, SEB's Strategic Roadmap for Sarawak Energy Excellence 2025 has six Key Focus Areas (KFAs), of which 3 relate to HR and labour management: HSSE Excellence; Talent Management Excellence; and High Performance Culture. SEB has 20 human resource and labour management-related Policy, Procedures and Guidelines (PPG) including: Workforce Planning; Succession Planning; Recruitment; Performance Management; Flexible Work Arrangements; Overtime Claims; Medical Benefits; Progression; the Employee Assistance Programme; Learning and Development; and Drugs and Alcohol. SEB has: an Occupational Safety and Health (OSH) Policy; a Health, Safety and Environment (HSE) Management System Manual; a Life-Saving Rules Procedure; Emergency Response and Preparedness Guidelines; and a comprehensive suite of Standard Operating Procedures (SOPs) for a wide range of matters with OSH risks. Some specific OSH management measures at Bakun include: (1) steps to limit hydrogen sulphide (H_2S) emissions to avoid workers' exposure to them; and (2) an ongoing 5S initiative, which is a method of	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	The Bakun EOSH Committee provides a regular process to consider both risks and opportunities. It is chaired by the Station Manager, and includes representatives from all Bakun HEP organisational areas, corporate HSSE, contractors and employees. Two staff at Bakun are specifically focussed on HSSE, supported by the corporate HSSE division. The annual SEES also helps to identify emerging risks.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✓) or no (✗)		**Findings and Observations**	**Requirement is met: yes (✓) or no (✗)**		**Findings and Observations**
		forming teams to organise the workplace. 5S stands for 'sort', 'set in order', 'shine', 'standardize', and 'sustain'.			
Human resource and labour management policies, plans and processes of contractors, subcontractors and intermediaries are in place	✓	SEB's standard Conditions of Contract include a significant section on staff and labour, and a clause on health and safety. Contract Appendix D (Employer's Administration Requirements) includes sections on HSSE, discrimination, and working hours, and detailed annexes with requirements. Further annexes provide a code of conduct for the contractor's personnel, and committed minimum levels of participation of local content. Major contractors (such as Ibraco for OR2) are required to submit plans for Construction HSE, and Security and Manpower Management. Contractors must engage a full-time safety officer and a site safety officer. Safety Passport requirements include contractors.			
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	✓	There are no non-compliances.
• no major non-compliances	✓	DOSH has advised that Bakun has no non-compliances. Previous non-compliances with worker amenities and also worker behaviours were previously identified for the OR2 contractor, but these were rectified or being addressed at the time of this assessment.			
• no major non-conformances	✓	No major non-conformances were identified in this assessment.	There are no non-conformances	✗	A minor non-conformance is the absence of any committed minimum levels of participation of local content in the Ibraco contract, which is a requirement of SEB's standard Conditions of Contract.
Any labour related commitments have	✓	SEB makes many commitments to its staff through its Terms and Conditions of Service (TACOS) and its			

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		20 HR and labour management-related PPGs. There was no indication that Bakun HEP is not meeting any of these commitments. Although not formally expressed as a commitment, Bakun HEP has ensured that H_2S concentrations are at mild levels or zero, to avoid the risks of staff exposure.			Targets have been set for: fatalities (zero); LTIs (zero); EOSH committee meetings (quarterly); UAUCs reported (12 per staff person per year, a total of 2,088); HSSE audits, inspections, inductions, toolbox talks, safety briefings; fumigation activities; and DOSH visits. Of these, one indicator is not met, regarding UAUCs. An annual target has been set for 12 UAUC per year per staff member, which would total 2,088 submissions. UAUC reporting for Bakun in 2023 totalled 1,283, which is below the target. All of these were Unsafe Conditions (UCs), with zero Unsafe Acts (UAs). The total for Bakun at the end of June 2024 is 326 UAUC reports, again all UCs and no UAs, which is not on track to achieve the annual objective. During this assessment, it was evident that a culture of reporting of UAs and UCs could be better established at Bakun.
OUTCOMES					
There are no identified inconsistencies of labour management policies, plans and practices with internationally recognised labour rights	✓	No inconsistencies were identified in this assessment with respect to alignment with internationally-recognised labour rights, taking into consideration: labour-related laws of Malaysia and Sarawak; SEB employees working conditions; and contractors' Conditions of Contract. Bakun HEP provides high standard facilities for staff, i.e. accommodation, recreation, canteens and a bakery, a creche and an early learning school. All staff interviewed, including women and those from project-affected communities, spoke very positively about the workplace, working and living conditions, culture and development opportunities.	Labour management policies, plans and practices are demonstrated to be consistent with internationally recognised labour rights	✘	There is no analysis or benchmarking against internationally recognised labour rights to demonstrate consistency.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● No gaps against Minimum Requirements	2 out of 5

Summary of findings and other notable issues
SEB has established thorough policies, plans and processes for all aspects of human resources (HR) and occupational safety and health (OSH), relevant to Bakun HEP staff and contractors. Corporate HR and OSH commitments, Key Focus Areas (KFAs), Policies, Procedures and Guidelines (PPGs) and Standard Operating Procedures (SOPs) all ensure strong foundations for labour and working conditions. Employees have internal web access to all employment-related policies and procedures, and a range of apps that enable them to easily report incidents and to raise concerns. Three of SEB's KFAs relate to labour and working conditions, resulting in a high degree of attention at all levels of the business: Health, Safety, Security and Environment (HSSE) Excellence; Talent Management Excellence; and a High-Performance Culture. Bakun fully meets minimum requirements, but does not meet three of the advanced requirements: (1) limitations in the assessment and reporting of HR and OSH matters; (2) several non-conformances (contractors and local content commitments; meeting Unsafe Acts / Unsafe Conditions (UAUC) targets; and (3) a lack of demonstration of alignment of labour management policies, plans and practices with internationally-recognised labour rights.

Relevant evidence	
Interview	6, 12, 13, 15, 18, 19, 30
Document	5, 6, 24, 30, 31, 61, 62, 86, 87, 101, 310, 311, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 394
Photo	7, 18, 21-23, 25-33

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	River water quality has improved compared to the pre-dam situation, and presently aligns with Malaysia's National Water Quality Class IIB Standards, which class it as 'slightly polluted'. The Detailed Environment Impact Assessment (DEIA) for development of the Bakun HEP showed that prior to impoundment the river water was broadly categorised under Class III (suitable for livestock needs and irrigation). It was generally highly turbid with Total Suspended Solids (TSS) values well above 350 NTU (nephelometric turbidity unit) during high flows, in response to timber harvest activity and natural erosion processes. Water quality in smaller tributaries was generally better. The DEIA predicted that TSS levels downstream of the dam would reduce post-dam, and turbidity would improve with normal operation of the dam.
Key water quality issues	Monitoring has shown the key ongoing water quality issue to be ongoing elevated levels of dissolved oxygen (DO) in the river downstream of the dam. Release of low DO water can kill fish and other biota in the downstream reach. Other water quality issues that appear to be managed or no longer issues include: water quality management from the construction site for the second Operator Residence (OR2); discharges from Bakun power station site buildings, and workshop, storage and re-fuelling areas; and odorous water and iron-manganese precipitates downstream associated with hydrogen sulphide (H_2S). Possible or localised water quality issues include: sanitary wastes in the reservoir from floating houses and unregulated developments; and drinking water quality for Sungai Asap and for downstream and reservoir longhouses.
Main influences on water quality	The main influences on water quality are reservoir biomass decay, eutrophication and stratification. Stratification (i.e. layering) has created anoxic (i.e. lacking in oxygen) conditions in the deeper Bakun reservoir water layers, which leads to low DO levels downstream when passed through the power station. Other influences on local water quality issues would include: the absence of waste treatment facilities in floating houses or other reservoir developments; insufficient attention to water treatment and water quality management requirements at specific power station and construction sites; and possible water treatment needs at specific longhouses. Anoxic reservoir conditions have also led to historical release of H_2S and toxic metals, which have resulted in atmospheric H_2S emissions (a serious safety issue in high concentrations, source of odour, and corrosive of project components through formation of sulfuric acid, H_2SO_4).

Sedimentology	
Key sediment issues	Possible erosion/sediment issues include: • Downstream riverbank erosion, particularly during Controlled Releases (CRs) from the dam or during floods; whilst noting that this is likely to have decreased compared to pre-project (as predicted in the DEIA) because of the decrease in flood flows and in large variations in water levels; • Reservoir rim instability and landslips; and • Increased sediment build-up in specific reservoir locations, e.g. at tributary confluences, and behind the dam.
Sediment load (tonnes/year)	There are no current measurements of sediment load, and the only estimates of riverine sediment loads are from the DEIA: • Prior to 1983 under the situation of minimal land use disturbance, 13.5 million tonnes/year was estimated; • Under increasing disturbance associated with forest harvest and road construction and use, 29 million tonnes/year was estimated; and • With biomass removal, an increase to between 35-50 million tonnes/year was estimated. Given the very large size of Bakun reservoir, shortening of reservoir life was not considered an issue.
Catchment area at the dam	14,750 km^2
Other information	Relevant SEB policies, procedures and guidance include: the Sarawak Energy Environmental Policy; the SEB Environmental Management System and ISO-14001 certification (see Section 1); and the SEB Corporate Work Instruction on Reservoir Water Quality Monitoring. The Bakun HEP has several environmental management objectives relating to water quality and to erosion and sedimentation: (1) To avoid detrimental impact on water quality of the reservoir and downstream of Bakun HEP by not exceeding the National Water Quality Standard Malaysia (NWQSM) Class IIB; (2) To avoid detrimental impact on water quality of the reservoir and downstream of Bakun HEP; (4) To avoid degradation of water quality due to sewage discharge from the Sewage Treatment Plant (STP); (9) Early detection of erosion and sedimentation upstream; and (10) Early detection of landslides.

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:			Identification of ongoing or emerging water quality issues takes into account	✓	The Continuous Monitoring Stations (CMS) are best practice for monitoring water quality. The CMS water quality data is Quality Assured / Quality Controlled (QA/QC'd) to avoid the risk of monitoring findings creating misleading results.
• water quality	✓	Water quality monitoring has been conducted for at least ten years in the reservoir and downstream, by both the NREB and (at different locations) by Bakun HEP. WQ parameters required by NREB encompass:			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		• Physical: Temperature, Total Suspended Solids, Turbidity; • Microbiological: Chlorophyll-a (at one location); and • Chemical: Ammoniacal Nitrogen (NH3-N), Total Organic Carbon (TOC), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Dissolved Oxygen (DO), DO percentage saturation, pH, Conductivity, and Salinity. NREB also requires Bakun to maintain four Continuous Monitoring Stations (CMSs) for water quality, one near the Bakun HEP intake, and three located progressive distances downstream of the dam. NREB conducts water quality monitoring twice per year, and been doing this for 10 years, alongside SEB's monitoring. NREB has 3 reservoir sampling points and 2 downstream sampling points. Additional water quality monitoring at the Bakun HEP includes: daily monitoring of the wastewater flow condition of oil interceptors by visual inspection; daily checking the condition and oil scum level in the oil interceptors; weekly checks of the STP condition, and visual inspection of STP sewage flow condition; and weekly checks of sludge levels in the septic tanks, and periodic desludging. Additionally, SEB is commissioning a "Downstream Flow and Water Quality Study".	both risks and opportunities		The Downstream Flow and Water Quality Study includes monitoring and analyses of water quality alongside flows, sediment transport, aquatic ecology/biodiversity, and social and economic aspects. Bakun HEP has taken the opportunity to support a number of strategic research projects into various aspects of water quality for the reservoir and downstream. A number of these have resulted in publications. Whilst these publications greatly contribute to scientific knowledge of water quality transformations from a large tropical hydroelectric dam, they do not raise any further management issues than have been highlighted under the minimum requirement findings. SEB has approved development of a floating lab for the Bakun Reservoir. This is an opportunity that will greatly enhance the ability to gather data from the upper three arms of the Bakun reservoir to assist in fully understanding the reservoir and to support refinements to the reservoir management plan. The floating lab will also facilitate implementation of university-conducted research into various aspects of reservoir dynamics. Sarawak Energy presently has a research agreement with Curtin University entitled "Research Collaboration on Bioremediation for Mitigation of Hydrogen Sulphide (H_2S) and Greenhouse Gases (GHGs) in Hydropower Reservoirs". This ultimately seeks to mitigate reservoir hazardous gas production from biomass composition. The two research objectives are: (1) to identify the microbial communities in the reservoir that contribute to the GHGs (CO_2 and CH_4) and H_2S production; and (2) to convert H_2S
• erosion and sedimentation	✓	Two approaches to monitoring for reservoir rim instability and landslips are implemented. Regular monthly inspections of the reservoir rim are conducted by the Bakun Dam Safety Unit (DSU). Additionally, joint inspections are carried out bi-annually by the DSUs from different regions (e.g. Batang Ai, Murum and HQ).			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		Typically, the reservoir rim inspections cover a radius up to 15 km from the dam, encompassing the Belepeh River, Murum River, Balui River, and Bulo River. No monitoring has been conducted regarding increased sediment build up in specific reservoir locations, such as at tributary confluences, and behind the dam. Bathymetric surveys are planned to be conducted behind the dam, if needed. There has been no inspection of the upstream arms of the reservoir specifically for sediment deposition. The major flooding that was experienced at the upstream longhouse Long Busang does not appear to be exacerbated by sediment deposition, as the longhouse elevation is well above reservoir water levels at 263 masl, 20 km upstream of the reservoir tail). A hydraulic modelling – backwater effect assessment was conducted for Long Busang, confirming the absence of backwater effects in Long Busang. For downstream riverbank erosion or sedimentation, particularly during Controlled Releases (CRs) from the dam or during floods, no concerns regarding downstream riverbank erosion or sedimentation have ever been raised. The Downstream Flow and Water Quality Study includes monitoring and analyses of sediment transport.			and methane (CH_4) in the reservoir to elemental sulphur and nontoxic CO_2. This study should achieve an overall picture of microbial communities in reservoir; and a biofilter system for conversion of CH_4 and H_2S into CO_2 and elemental sulphur.
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	✓	Regular monthly inspections of the reservoir rim conducted by the Bakun DSU aim to identify any new erosion and to monitor existing erosion. These inspections also highlight activities around the reservoir rim (e.g. logging, fish cage farming, biomass removal) which have the potential to contribute to sedimentation.
• water quality	✓	Low DO in discharges is managed by the deployment of "training logs" at the dam (see Management below). Operational monitoring is in place regarding proper functioning of the training logs, and downstream water			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		quality monitoring provides an indication of their effectiveness.	into account both risks and opportunities		High-resolution drone aerial inspections are also utilised for these inspections to enhance efficiencies. The Downstream Flow and Water Quality Study includes monitoring and analyses of sediment transport, alongside flows, water quality, aquatic ecology/biodiversity, and social and economic aspects. In March 2024, a Request for Proposal was issued by Sarawak Energy for services to support Catchment Management Planning for the Bakun-Murum catchment. A catchment study will support long-term planning and management of the catchment, with the scope including: hydrology and hydraulic modelling; river water quality modelling; erosion and sedimentation assessment; reservoir rim stability assessment; and remote sensing for land use, land cover, watershed management analysis and settlements mapping. The floating lab mentioned above can also contribute to improved assessment of erosion and sedimentation focal points, influences and trends in the reservoir.
• erosion and sedimentation	✓	Minor landslides are noted and monitored, but the regular visual monitoring has shown that no treatment has been required to date. A major landslip on the left abutment of the dam occurred in 2022, and has been treated (see Section 4). Slope treatments such as shotcreting, contouring, and drainage management, are evident in the area of the dam, and inspections are included in the reservoir rim monitoring. Regular monthly (reservoir rim / landslides) and biannual (dam safety) inspections have confirmed the effectiveness of these landslip treatments.			
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	✓	The EMP has a number of water quality control measures for Bakun HEP that are in place, including: • Locating fuel and chemical storage away from waterways; • Storage tanks shall be leak-proof and provide 110% capacity for spill containment; • Emergency Response Planning includes chemical or oil spillage;	• water quality	✓	Training logs alone will not raise DO in discharges as monitoring shows reservoir low DO levels can be 6 or 7 m, and even as high as 3m, below the reservoir surface. The role of the Research and Development (R&D) department in SEB helps to identify emerging risks and opportunities relating to water quality. The floating lab mentioned above, and the SMArT project are initiatives of the R&D department.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		• Spill kits are available; • Heavy machinery and vehicles are maintained regularly and checked for leaks; • Machinery and vehicle inspections and maintenance is undertaken in a workshop fitted with oil and grease traps; • Office domestic wastewater is treated; • Toilet and septic tanks are maintained regularly; • Water quality monitoring of the reservoir and downstream is carried out periodically; and • All laboratory analyses will be performed by laboratories accredited under 'Malaysia Laboratory Accreditation Scheme'. "Training logs" are deployed at the dam to manage low DO in releases. These are panels stacked on top of each other in front of the gates, to ensure water drawn into the power station is from nearer the surface, i.e. from the top 10m. At the time of the assessment in July 2024, the gantry and crane used to move the logs had not been working since August 2023. Repairs were made, and the system has been functional since November 2024. R&D has made significant progress with a project, 'SMArT' (Self-sustaining Modular Aeration Technology) that responds to the ongoing risk of low DO in Bakun HEP discharges. SMArT uses floating Hydrokinetic Turbines (HKT) to harness energy from fast flowing water at turbines outflow/tail race to power air pumps. The first unit is currently (February 2025) being manufactured, and it will be installed for pilot testing in Q3 2025.			The objective of the SMArT project is to raise DO levels to between 5 – 7 mg/L, consistent with the requirements for Class IIA and IIB. Theoretically a total of 40 units will be required to pump the volume of air required to achieve this. It is expected that only 2 units will be in place by Q4 2026. If there turns out to be insufficient aeration, and the desired level of DO is not met, SEB will aim to improve SMArT performance or increase the number of SMArT units, or consider further options such as an aeration weir.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• erosion and sedimentation	✓	Slope stabilisation measures are applied as needed for reservoir rim erosion prone areas. No further sediment management measures have been identified as needed.	• erosion and sedimentation	✓	The SEB Sustainability Division is motivating and helping to advance several measures which can ultimately anticipate and respond to emerging risks and opportunities relating to erosion and sedimentation. These include: meetings with NREB about gazetting the Bakun catchment as a Water Catchment Area, which would mean there would be no upstream developments; and instigating a catchment management study for the Murum-Bakun catchment. Measures are in place towards creation of a Sarawak Lakes Authority (see HSS9), which would have the authority to manage reservoir activities that could cause erosion and sedimentation issues.
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	✓	Bakun HEP is fully compliant with NREB requirements regarding water quality. The main legislative requirements relate to monitoring and reporting, which Bakun HEP complies with. The NREB Bakun EIA Approval, dated 20 February 2002, requires for the Operation Stage that Bakun HEP: maximizes discharge of aerated waters to the downstream river; maintains regulated flows throughout its life service (recommended to avoid silt build up and changes in river course); and ensures that "Best management practices, as described in the Bakun HEP-EIA-Appendix 6: EMP during operation phase shall be implemented". Other NREB requirements are for sampling locations upstream and downstream of the dam, stated in a 2007 approval document for Reservoir Preparation. The	• water quality	✓	NREB confirmed that there are no non-compliances with regards to water quality with the Bakun HEP.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		latest NREB Directive, issued on 19.08.2019, required Bakun to put in CMSs. NREB confirmed that there are no non-compliances with regards to water quality with the Bakun HEP.			
• water quality, with no major non-conformances	✓	The permissible standard for DO for NWQSM Class IIB is 5 – 7 mg/L. NWQSM is not a regulatory instrument, but a guideline. Sarawak Energy's ambition to be consistent with Class II is not a directive from NREB, and so it has no legal formality as a compliance requirement. TSS and H_2S have been in line with the NWQSM since 2020-21. Iron and manganese concentrations in water quality samples taken have been occasionally elevated, but are not a great source of concern. The OR2 construction site discharged water with a high TSS reading during October-December 2023, but there were no water quality concerns at the time of this assessment. Five of Bakun's seven monitored sampling points, from the reservoir, are within the permissible standard of NWQSM Class IIB for all parameters. Two downstream sampling points (BK6 and BK7) have consistently recorded water quality below the NWQSM Class IIB standard since 2018-19, to as low as 1 mg/L. The prolonged low DO levels in discharges downstream of the Bakun dam are a non-conformance against objectives of SEB, and the Bakun EMP. However, this is not a significant gap as SEB is taking action, including the repair of the training logs crane and the SMArT project, to raise DO.			
• erosion and sedimentation, with no major	✓	The NREB confirmed that there are no non-compliances with regards to erosion or sedimentation with the Bakun HEP.	• erosion and sedimentation	✓	NREB confirmed that there are no non-compliances with regards to erosion or sedimentation with the Bakun HEP.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
non-compliances					
• erosion and sedimentation, with no major non-conformances	✓	A previous internal HSS assessment of Bakun HEP noted that a requirement to monitor the bed erosion/stability of the riverbanks annually during operation is stipulated in Appendix 6 of the 2002 Bakun HEP EMP, and is not being conducted. However, this was not included in the Conditions of Approval for the Bakun Dam, it is not in the current Bakun EMP, and there has been no indication in the past 10 years that such monitoring is required. Downstream erosion and sedimentation issues will be considered as part of the "Downstream Flow and Water Quality Study" that is soon to commence. Consequently, this requirement is not considered as a non-conformance.			
Commitments related to the following have been or are on track to be met:			There are no non-conformances relating to:		
• water quality	✓	No additional commitments regarding water quality have been identified, other than the compliance requirements of NREB and the EMP objectives cited above.	• water quality	✕	The prolonged low DO levels in discharges downstream of the Bakun dam are a non-conformance.
• erosion and sedimentation	✓	No additional commitments regarding erosion and sedimentation have been identified.	• erosion and sedimentation	✓	There are no non-conformances regarding erosion and sedimentation for Bakun.
OUTCOMES					
Negative water quality impacts arising from activities of the operating hydropower facility are	✓	The longhouses that were interviewed for this assessment, located downstream between the dam and Belaga, advised that discharges from the dam in its early years were smelly and made things rust. This is consistent with H_2S releases. However they stated these	Water quality in the area affected by the operating hydropower facility is of a high quality	✕	Low DO levels downstream of the dam means that water quality affected by the operating hydropower facility is of low quality.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
avoided, minimised and mitigated		are no longer issues, except that they can still smell H_2S near the dam. Low DO in the downstream river is an ongoing negative water quality impact. Downstream longhouses have consistently raised concerns about declining fish populations, which they believe is caused by poor water quality, and it is possibly linked to low DO. However, this is not a significant gap as SEB is taking action to raise DO, including the repair of the training logs crane and the SMArT project, and the Downstream Flows and Water Quality study will investigate if it has resulted in declining fish populations.	The facility has contributed or is on track to contribute to addressing water quality issues beyond those impacts caused by the operating hydropower facility	✓	SEB has supported improved drinking water supplies for a number of longhouses. SEB has contributed to building research capacity in water quality studies, such as through the Bakun-related publications mentioned above. SEB is contributing to advancing research and innovative solutions for dealing with Bakun reservoir CH_4 and H_2S through the collaboration with Curtin University. Through the floating lab on the Bakun reservoir, the project will be able to increase its level of support for research into reservoir water quality dynamics. SEB's proposals for a gazetted Bakun Water Catchment Area and for a Sarawak Lakes Authority will help address other reservoir activities that could potentially affect water quality (e.g. shoreline developments, floating longhouses).
Erosion and sedimentation issues are avoided, minimised and mitigated	✓	The longhouses that were interviewed downstream between the dam and Belaga advised that they have not noticed any issues regarding erosion or sedimentation, other than that the previously shallow-sloped riverbanks are now more steeply-sloped, and some minor erosion at a jetty. The left bank landslide at the dam has been treated and the issue appears to have been mitigated. At the time of this assessment, some minor erosion issues were observable around the reservoir rim and downstream. Also, occasional and minor local erosional issues were noted around some longhouse infrastructure. However, water levels were high in both the reservoir and downstream, so visible evidence was limited.	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	✓	The only erosion and sedimentation issue known to be associated with Bakun HEP is the deposition of sediments where the incoming rivers/streams meet the reservoir. There are no known ongoing problems.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● There are no significant gaps against Minimum Requirements.	9 out of 11

Summary of findings and other notable issues
Water quality downstream of Bakun HEP is adversely impacted by Bakun HEP releases. This is in relation to dissolved oxygen (DO) levels downstream of the dam, which have been consistently below guidelines set out in the Malaysian national standard that SEB is committed to. All other aspects of reservoir and downstream water quality are in alignment with the national standard. Where landslips have periodically occurred on the reservoir rim, including on the dam's left abutment, these have been treated, and are the focus of regular monitoring. Erosion and sedimentation caused by the project do not present any major problems with respect to social, environmental and economic objectives.

Relevant evidence	
Interview	7, 10, 31-35, 37, 38, 43, 61
Document	120, 121, 122, 123, 124, 125, 177, 195, 201, 202, 203, 208, 209, 210, 252, 253, 261, 268, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 307, 308, 403, 480, 481, 482, 483, 484, 485, 486, 487, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520
Photo	7, 10-13, 16, 34-40, 131, 133, 135, 136

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.
Commitments made at the time of project development were not well-documented (see Section 5 for details) so this section focuses on 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)	The communities affected by the project can be considered in groups: the Sungai Asap resettled communities and host communities (addressed under Section 5); communities downstream of Bakun HEP (through Belaga town, to Punan Bah - 10,454 people / 1,605 households; and the population downstream which are likely to be affected by dam safety issue are Kapit district – 37,222 people, Kanowit district – 25,181 people, Sibu district – 283,296 people, Sarikei district – 28,000 people); and those living within and upstream of the reservoir (1,436 people / 172 households) including Long Jawe and Long Busang. Downstream communities to Punan Bah are affected by water quality, a perceived or real decline in fisheries, increased water levels in low-lying areas (at Punan Bah), damage to boats, jetties, and other properties during controlled

	releases from the dam, increased crocodile numbers, and (for left bank longhouses) increased theft and vandalism risks for parked cars. Additionally, there are concerns about dam safety to and beyond Punan Bah. The communities upstream of Bakun HEP face issues such as stranded boats and flooding due to changing water levels, limited access to healthcare and education, and high transportation costs. Disruption of river navigation due to log debris and jams is also a major concern. It is not known whether any households are affected by the Bakun HEP transmission line. Under the Electricity Ordinance, SEB does not acquire land for transmission way leaves, but the construction of structures and tall trees are not permitted for safety reasons.
Agencies relevant to land acquisition	The Land and Survey Department of the Government of Sarawak is the main agency responsible for the administration of land acquisition. SEB's Land and Wayleave Unit (in the Legal and Compliance Department) is responsible for SEB's land acquisition.
Agencies relevant to livelihood restoration and project benefits	Belaga District Office (DO) and Economic Planning Unit (EPU).
Infrastructure Safety and Public Health	
Type of dam	Concrete Faced Rock Filled Dam (CFRD)
Dam height (m)	205 m
Probable maximum flood (m^3 / s)	51,900 m^3/s (PMF)
Design flood (expressed as estimated flood with return period)	Same as PMF
Spillway capacity (m^3 / s)	15,000 m^3/s (with peak inflow of 50,000 m^3/s)
Spillway height (masl)	209.4 masl
Headrace length (m)	Length 171 m and height 56 m
Headrace width (m)	58 m
Headrace capacity (m^3 / s)	208 m^3/s
Seismicity	Sarawak is situated on the Sunda Shield, a seismically-stable block where almost no recent volcanic activity or active tectonics have been recorded. For design parameters, extreme risk class was considered in the Detailed Environmental Impact Assessment (DEIA) for Bakun Dam.
Geology	The dam site is located in a prominent mountain range, which the Balui River intersects nearly at right angles. The bedrock consists of strong, massive greywacke strata, interspersed with mudstone/shale layers.

Dam safety regulatory authorities	There are no regulatory authorities for dam safety, however, the Malaysia Dam Safety Management Guidelines (MyDAMS) 2017 are being followed.
Local presence/capacity of emergency services	The State Disaster Management Committee and District Disaster Management Committee are the officially established committees, headed by the Head of State and District Officer respectively, and responsible for management and coordination for emergency response.
Potential safety risks in this context	In the event of dam failure, the downstream communities along Rajang River up to the estuary are at risk. Downstream infrastructure, including roads and jetties, is also at risk.
Degree of risk of dam failure and in what way	The results of the dam break study show substantial areas downstream would be severely affected by a breach of Bakun Dam. Under the MyDAMS classification for dams in Malaysia, as well as the Australian National Committee on Large Dams Inc., 'ANCOLD Guidelines on Dam Safety Management', August 2003. [ANCOLD (2003)] and the Institution of Civil Engineers, 'Floods and Reservoir Safety - Fourth Edition', 2015. [ICE (2015)], the Bakun Dam is assigned the most severe rating – i.e. the 'Very High' dam hazard category under the MyDAMS classification.
Population at risk of dam break (locations, numbers)	As per the dam break study, the population at risk downstream are the longhouses and townships of Belaga, Punan Bah, Kapit, Song, Kanowit and Sibu. The total population at risk is estimated to be around 394,758.
Dam safety standards followed	MyDAMS guidelines of Malaysia.
Agencies relevant to dam safety	The Ministry of Utility and Telecommunication (MUT), State Disaster Management Committee, and District Disaster Management Committee.
Other infrastructure safety issues	Hydrogen sulphide (H_2S) emissions causing corrosion and rust of electro-mechanical equipment and metal works around the power plant; road safety; fire safety; and public safety on the reservoir as well as downstream during control releases from the dam.
Description of key public health issues	The most common diseases are dengue, malaria, tuberculosis, Hand Foot and Mouth Disease (HFMD) and leptospirosis. A few cases of melioidosis have also been reported. Drug abuse is widespread in rural communities including Sungai Asap, and is attributed by local health professionals to the influx of logging employees. Non-communicable lifestyle-related diseases such as diabetes and hypertension are prevalent in rural communities in the area, especially Sungai Asap. None of these issues are easily attributable to Bakun HEP.

Agencies relevant to public health	Ministry of Health is the overall agency responsible for public health. Responsibilities are delegated to district-level hospitals and clinics. There are 6 medical clinics (KK Belaga, KK Sg. Asap, KK Sg. Koyan, KK Sambop, KK Bakun and KK Long Busang) in the project-affected area and 1 fire station in Belaga District. Bakun clinic caters to plant operators, contractors and local communities living in the area. Access to health care for communities living upstream and in far-flung areas is supplemented by a monthly flying doctor programme.

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	✘	There is no indication that the scope of monitoring as set out in the CMP and CMP Monitoring Book includes risks or inter-relationships. They identify basic ongoing and emerging issues for downstream and upstream communities, without considering risks, opportunities, and their interrelationships. For example, communities in Long Busang (upstream of Bakun HEP) have experienced repeated flooding over the years which have not been identified in the CMP. Additionally, emerging issues faced by communities affected by transmission lines have not been assessed.
• commitments to project-affected communities	✓	The Community Management Plan (CMP) has a list of issues, corresponding mitigation measures and commitments for upstream and downstream communities, and a 'CMP Monitoring Book' is used to track the implementation status of these commitments that are approved by SEB for implementation as part of their CSR programme.			
• commitments to project benefits	✓	The monitoring of the delivery of all requests received from the communities are tracked through the CMP Monitoring Book. Regular meetings are held with community organisations (Belaga Action Committee - BAC, Balui Lake Native Association - BLNA, etc), and will be continued with a new Bakun Community			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		Management Steering Committee (BCMSC) to discuss the status of past and new on CSR projects. SEB also has convened the Group Sustainability Committee to oversee and guide the implementation of CSR commitments.			
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	✓	SEB's annual CSR programme identifies and prioritises community projects, facilitates stakeholder participation, manages programme planning and implementation, and monitors project progress, under the programme headings listed under Management below: education and Young People; environmental management and conservation; culture and heritage; community development and entrepreneurship; other contributions/relief assistance. Stakeholder engagement is planned and held regularly to identify and provide updates on issues and project benefits. Additionally, emerging issues are identified through the Bakun Grievance Mechanism. For example, communities have raised the need for skills training in bakery and sewing for women, as well as employment opportunities for local people, through the grievance mechanism.
• issues that affect project-affected communities	✓	The CMP has a list of issues identified. Issues are also identified through the Grievance Mechanism. Bakun HEP also identifies issues and concerns through their regular community engagements. SEB conducted its own study and commissioned another through UNIMAS to assess pre- and post-Bakun impacts, identifying ongoing and emerging issues for downstream and upstream communities.			
• delivery of project benefits	✓	SEB delivers project benefits through its CSR initiatives. SEB's CSR and Social Impact Management (CSRSM) team engages regularly with community organisations such as BAC, BLNA and PMMU for identification of issues and delivery of benefits. At the plant level, the ESG Committee can track CSR commitments (formed in 2024, meeting on a quarterly basis, and chaired by the Bakun HEP Station Manager). The Bakun Community Management Steering Committee (BCMSC), established in June 2024, will serve as the main mechanism			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		for identifying, delivering and monitoring of benefits to project-affected communities.			
Infrastructure Safety and Public Health					
Ongoing or emerging issues relating to the following have been identified:					
• dam and other infrastructure safety	✓	The Bakun Dam Safety Review Report (DSRR) 2023 provides a comprehensive assessment of the dam's condition and performance. Some of the key dam safety issue identified were: improvement in surveillance through satellite images and inspection using drone footage; removal of undesirable fauna from adits; all instruments to be read at the frequency established in Dam Safety Emergency Plan (DSEP); the H_2S issue; and revision of DSEP. Bakun HEP tracks implementation of the recommendations of the DSSR through their action logs. Reservoir rim stability is identified based on the occurrence of landslides. Dam safety surveillance and reservoir rim monitoring are conducted regularly as per the required frequency. The DSSR identified the cascade failure of Murum and Bakun dams as the worst-case scenario, and mapped inundation areas down to the coast.	Identification of ongoing or emerging safety issues takes into account a broad range of scenarios and both risks and opportunities	✓	Dam break analysis has been conducted, considering various scenarios, with the cascade failure of Murum and Bakun identified as the most catastrophic scenario. Flood inundation maps have also been generated for the downstream area under different scenarios. Dam safety has been identified as a key risk in Bakun's risk register, and a range of control measures have been identified, which are tracked and updated quarterly. Long-term management of H_2S corrosion risks is being studied through research collaboration, with plans to develop a corrosion management strategy.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• public health issues associated with the operating hydropower facility	✓	There are no ongoing significant public health issues that are directly associated with Bakun HEP.			
Routine monitoring of dam and infrastructure safety is being undertaken to identify risks and assess the effectiveness of management measures	✓	Daily, weekly, monthly and yearly surveillance, visual inspections and instrumentation monitoring are carried out by the Dam Safety Team at Bakun HEP. The frequency of this monitoring is in keeping with the requirements of MyDAMS. Independent dam safety review is also carried out, the last one being in 2022.			
If public health issues require management measures then monitoring is being undertaken to assess if management measures are effective	✓	No management measures have been taken to address public health issues, as they are not attributable to the project. SEB monitors cases reported at the Bakun clinic, analysing trends, with no discernible cases directly linked to operations reported so far.	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	✘	SEB and Bakun HEP have taken into account risks and opportunities, for example: the Standard Operating Procedure (SOP) for the COVID-19 pandemic and enforced strict measures to safeguard both staff and communities; the CMP outlines the need to ensure sustainable healthcare services for communities; a research paper assesses heavy metal contamination in fish (concluding they are within permissible guidelines); and monitoring of H_2S levels is conducted weekly across a large number of sites (showing a declining trend) with trend analysis conducted regularly.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					Access to health facilities for upstream communities is hindered by limited access (see Outcomes / Minimum Requirements). Existing plans do not adequately consider risk assessment, the capacities of health infrastructure in case of emergencies, or opportunities to enhance access health services for some communities. Further examples are: inadequacy of water supplies at Sungai Asap (due to expanding populations, especially when all return during festivities); infrequent emptying of septic tanks, also at Sungai Asap; and downstream communities fearful of bathing in the river due to crocodiles and poor water quality.
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	✘	The delivery of project benefits through CSR is generally reactive, addressing current needs and issues at hand rather than focusing on long-term livelihood enhancement. Additionally, there are no processes in place to ensure an equitable distribution of these benefits. For example, communities affected by the transmission line are not
• to project-affected communities	✓	Bakun HEP's CMP outlines strategies and measures for project-affected communities. The CMP categorises communities into upstream, downstream, and resettled groups, identifies ongoing and emerging issues, and proposes management measures. These measures include programmes/actions with timelines, budget allocation, targets,			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		beneficiaries, and collaborators. The CMP Monitoring Book tracks the implementation of these programmes/actions.			included in any of CSR programmes, and upstream and host communities have received minimal benefits (based on SEB's CSR spending from 2021 – 2023) compared to Sungai Asap communities. Furthermore, there is no evaluation or impact assessment of the current CSR programs to evaluate their effectiveness in delivering the intended outcome. Some projects may be at risk of becoming white elephants if not fully executed, which was observed during this assessment. It lacks consideration of risks, opportunities, and their inter-relations among community issues, as well as a long-term strategy for sustainable livelihood development.
• to project benefits	✓	SEB's CSR programme is in place to manage commitments to project benefits. The programme is managed under the following pillars and SEB in the last six years (2018 – 2023) has spent over RM 21 million in Bakun communities: 1. Education funds (scholarships, skills training and academic/co-curriculum/infrastructure initiatives) - RM 2.6 million; 2. Environmental Management and Conservation – RM 71,447; 3. Cultural Heritage – RM 2 million; 4. Community Development and Entrepreneurship – RM 16 million; 5. Other contribution and Relief Assistance – RM 592,870.			
Measures are in place to manage any identified issues relating to these commitments:					
• to project-affected communities	✓	Bakun HEP's CMP identifies issues relating to commitments. The CMP Monitoring Book tracks and monitors actions to address these issues. The newly-formed Bakun ESG Committee, chaired by a Management Team member, should ensure effective implementation of ESG targets and key performance indicators, meeting quarterly or as needed. Monthly,			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		CSR initiative updates and budget spending are logged and discussed at SEB's Power Department Head's meeting, covering budget utilisation, programme updates, issues, mitigation, and approvals. These updates are also provided to the Group Sustainability Committee quarterly. In addition, engagement with community organisations such as BAC, BLNA and PMMU, and now the BCMSC are planned and organised on a regular basis to update and discuss issues.			
• to project benefits	✓	As above.			
If there are any formal agreements with project-affected communities, these are publicly disclosed	✓	There are no formal agreements. Formal agreements on ongoing activities carried out through CSR are limited to Minutes of Meetings, which are circulated to the participants. Information on completed projects/activities are available on the Bakun HEP website. SEB is also planning to agree a Memorandum of Understanding with the newly formed BCMSC, which will be disclosed.			
Commitments to project benefits are publicly disclosed	✓	SEB's Annual Report and Sustainability Report provide details on the ongoing programs and support given to communities. Information about scholarships and an educational trust fund are available on SEB's website.			

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	✓	Bakun HEP has a Controlled Release Procedure in place for spilling excess water during the wet season. Bakun HEP coordinates closely with the Sarawak River Board and downstream communities and other local authorities such as District Officers, Police, Department of Irrigation and Drainage (DID), etc. while undertaking any controlled releases from the dam. SEB initially prepared a Dam Safety Emergency Plan (DSEP) in 2022, and this was updated through 2024 in response to this assessment. The DSEP was presented to Disaster Management Committees (DMCs) through workshops in January 2024 (Kapit, Sibu and Sarikei Divisional DMC), May 2024 (Belaga District DMC), and August 2024 (Kapit Divisional DMC), as well as the National Disaster Management Agency (NADMA) in January 2025. .	Processes are in place to anticipate and respond to emerging infrastructure safety risks and opportunities	✓	Bakun HEP's Risk Register identifies all emerging risks relating to infrastructure safety, and the Risk Action Plan is updated quarterly. The dam safety surveillance and monitoring programme follows MyDAMS guidelines. The H_2S equipment safety issue was mitigated by isolating critical equipment and the control room, installation of air filtration system, and applying protective coatings. H_2S monitoring is conducted weekly. Three flood warning stations have been set up downstream along with warning sirens. Communities are trained to recognise different sounds for controlled releases versus emergencies. Safety measures include debris booms to protect the intake structure, beacon lights (three upstream and two downstream), and public safety signage to mitigate navigation hazards.
These plans and processes provide for communication of public safety measures	✓	Coordination and information-sharing with all stakeholders during controlled release from Bakun Dam is done through various means such as print media, social media and WhatsApp group messaging. Dam safety awareness programs are held	Public safety measures are widely communicated in a timely and accessible manner	✓	Controlled releases from Bakun dam are widely communicated across all stakeholders in a timely and accessible manner.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		regularly among all key stakeholders. Contact details of external agencies are included in the updated (January 2025) DSEP.			The public safety measures set out in the Bakun DSEP have been communicated toKapit RO and Belaga DO (distribution of DSEP in January 2025, and further engagement on the updated DSEP with Belaga DO in February 2025), and engagement with a range of external agencies is planned in 2025 (Kapit RO, Betong, Kanowit and Song DOs, and safety awareness with communities, as set out in an Emergency Preparedness Schedule). .
Emergency response plans and processes include awareness and training programmes and emergency response simulations	✓	Bakun HEP carries out emergency response simulation drills internally and the recommendations from the drills are recorded for corrective action. Regular engagement with all communities downstream and local authorities are also planned and carried out on dam safety awareness.			
Measures are in place to manage identified public health issues	✓	No measures are necessary to meet Minimum Requirements, as there are no significant public health impacts.	Processes are in place to anticipate and respond to emerging public health risks and opportunities	✓	In addition to monitoring of health reports from the clinics, the CMP and Reservoir Management Plan outline engagement with Agensi Anti-Dadah Kebangsaan (AADK) on school talks to raise awareness against drug use; and engagement with Kementerian Kesihatan Malaysia (KKM) to carry out health checks and talks regarding public health and CSR donations for health clinic improvements. During the pandemic, SEB supported the clinics by supplying Personal Protective Equipment (PPE) when there was an acute shortage, preventing health officials from having to reuse their PPE. SEB

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					implemented strict COVID-19 protocols to minimise the spread of the virus and has a pandemic emergency preparedness plan in place. SEB's CSR supports health clinics, and SEB employs two nurses at Bakun Health Clinic. An MoU for the construction of a new Murum-Bakun Health Clinic is also under finalisation with the Ministry of Health.
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	✓	No non-compliances have been identified. Regarding commitments, see below.	• project-affected communities	✓	There are no non-compliances.
• delivery of commitments to project-affected communities, with no major non-conformances	✓	Regarding commitments, see below. As a result of recent (February 2025) strengthening of its plans, improved engagement, and various actions, Bakun HEP is on track to be in conformance with SEB's social Policies, Procedures and Guidelines (PPG).			
• project benefits, with no major non-compliances	✓	No non-compliances have been identified.	• project benefits	✓	There are no non-compliances.
• project benefits, with no major non-conformances	✓	No major non-conformances have been identified.			
Commitments have been or are on track to be met relating to:			There are no non-conformances relating to:		

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• project-affected communities	✓	Ongoing CMP and CSR commitments to the project-affected communities have been met or are on track to be met.	• project-affected communities	✓	As a result of recent (February 2025) strengthening of its plans, improved engagement, and various actions, Bakun HEP is on track to be in conformance with SEB's social PPG. .
• project benefits	✓	Commitments to project benefits through the CSR programmes have been met or are on track to be met.	• project benefits	✘	The CSR PPG clearly requires evaluation of programmes. No impact evaluation has been carried out to assess the effectiveness of the CSR activities. This is the same gap as described under Management.
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 compliance requirements with respect to dam and other infrastructure safety.	• dam and other infrastructure safety	✓	There are no compliance requirements.
• dam and other infrastructure safety, with no major non-conformances	✓	MyDAMS requires an Emergency Response Plan (ERP) to be signed off by all involved agencies, with controlled copies distributed, and the ERP also needs regular updates to ensure its effectiveness. SEB distributed the DSEP to Kapit Resident (as chairman of the Kapit Division Disaster Management Committee) and Belaga District Officer (chairperson of Belaga District DMC) in January 2025, requesting that they			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		conduct controlled distribution of the DSEP to the other agencies in their DMCs. Controlled copies will be distributed to the remaining Residents and District Officers in the Sibu and Sarikei divisions by March 2025, and engagement with the Divisions DMC will follow in Q2 2025. Further engagement on the updated DSEP with Belaga DO took place in February 2025, and engagement with a range of external agencies is planned in 2025 (set out in an Emergency Preparedness Schedule). SEB has also involved external agencies in desktop walkthrough exercises including drills, and NADMA is visiting Bakun HEP in April 2025 to prepare for a physical drill in August 2025.			
• public health issues, with no major non-compliances	✓	No non-compliances with respect to public health issues has been identified.	• public health	✓	No non-compliances with respect to public health issues have been identified.
• public health issues, with no major non-conformances	✓	No non-conformances with respect to public health issues have been identified.			
Commitments have been or are on track to be met relating to:			There are no non-conformances relating to:		
• dam and other infrastructure safety	✓	The commitments relating to dam and other infrastructure safety have been or on track to be met.	• dam and other infrastructure safety	✓	No non-conformances are apparent.
• public health	✓	There is no indication of any commitment that has not been met with respect to public health safety.	• public health	✓	No non-conformances with respect to public health have been identified.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
OUTCOMES					
Community Impacts and Benefits					
Livelihoods and living standards impacted by the project have been or are on track to be improved	✓	The development of Bakun HEP has connected Belaga District with a good road to Bintulu. Communities enjoy better amenities than pre-project, such as telecommunications, local schools, clinics, recreational facilities, shops, markets, and electricity. Treated water is also available in affected communities, which was previously unavailable. According to the Department of Statistics of Malaysia, the monthly median household income for Belaga District in 2022 is RM 3,587, compared to RM 1,066 in the 1996 ESIA. Two groups of communities bear continuing impacts on their livelihoods or living standards: • Upstream communities face longer commutes for health and education services compared to pre-project. While the DO flying doctor service provides much-needed primary care, it is intermittent; the schools, even at primary level, are much further away compared to pre-project, requiring children as young as 7 years old to be sent away for schooling; • Downstream communities report declining fish stocks and the difficulty	The measures put in place to improve livelihoods and living standards are on track to become self-sustaining in the long-term	✘	A significant number of affected households do not have livelihoods and living standards that are on track to become self-sustaining in the long-term. Many households in the communities downstream of Bakun Dam have self-sustaining living standards and livelihoods due to improved access to services and other economic opportunities. However, they still rely heavily on public services support from the District Office (DO) and assistance from SEB in longhouse and infrastructure maintenance, such as jetty upkeep and educational scholarships. The livelihoods of some downstream households dependent on fishing, or with inaccessible paddy land, have not improved. Also, as described under Minimum Requirements, upstream communities have more limited access to health and education services than pre-project. SEB has funded numerous CSR projects in these communities, but it has not evaluated them for their success in

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		of adjusting to a cash economy (some with paddy lands that are currently too inaccessible for oil palm); this may affect only a minority of 'left behind' households, but it is a significant minority; a UNIMAS study indicates that 26% of the downstream population rely on fishing as their primary occupation. However, this is not indicated as significant against Minimum Requirements, as Bakun HEP is now (February 2025) undertaking numerous activities, including the Indigenous Peoples' Plan (IPP) to address these issues.			terms of outcomes for livelihoods and living standards.
Economic displacement has been fairly compensated, preferably through provision of comparable goods, property or services	✓	This criterion relates specifically to compensation for economic displacement at the time of the project's development. There is a legacy from Bakun HEP's development resulting from inadequate compensation, as discussed fully in Section 7. Economic displacement that has never been fairly compensated includes: loss of land used for hunting and gathering in the infrastructure area of Bakun HEP and possibly upstream; loss of crop land upstream; ongoing lower fisheries production downstream and possibly upstream (although stabilised ecologically, some households complain			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		that fishing in a large reservoir is more difficult than in rivers). However, as described in Section 7, Bakun HEP is now taking action to address these issues, including through the development and implementation of the IPP.			
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	✓	Directly-affected communities have received benefits. SEB's education scholarships benefited 746 students from 2019 to 2024. SEB also provided financial assistance to 80 students at SMK Belega and SMK Bakun from 2019 to 2023. Under its Longhouse Adoption programme, SEB repaired and refurbished 15 longhouses from 2019 to 2023, benefiting around 15,600 residents. SEB also provided immediate relief to fire victims in longhouse fire accidents and offered fire safety training, awareness programs, and fire extinguishers.	Benefits are significant and sustained for communities affected by the project	✘	Although SEB is strongly committed to providing benefits through its CSR programme, they cannot be said to be significant and sustained. In some groups of affected communities, they are piecemeal (upstream, host communities, for example) and CSR activities are reactive, without the guidance of a strategy to meet identified objectives in each community as stated above.
Infrastructure Safety and Public Health					
Safety risks have been avoided, minimised and mitigated with no significant gaps	✓	As a result of the above measures, safety risks have been avoided, minimised and mitigated with no significant gaps.	Safety risks have been avoided, minimised and mitigated with no identified gaps	✓	Other critical safety risk including explosions, fire, fuel leakage and critical equipment failure are identified in Bakun's risk register and control measures are in place. These measures are tracked quarterly through their risk action plan.
			Safety issues have been addressed beyond those	✓	An example of safety issues addressed beyond the risks of the operating facility is fire hazard

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
			risks caused by the operating facility itself		mitigation in longhouses. SEB has contributed 1 mini fire station, 1 fire engine, 50 sets of fire hoses, and over 600 fire extinguishers and refills to communities. Additionally, SEB has organised annual fire safety programs and basic firefighting training for communities since 2018. SEB contributed an ambulance to Sg. Asap Health Clinic and distributed relief assistance to Uma Long Busang during the 2023 flooding.
Negative public health impacts arising from activities of the operating hydropower facility are avoided, minimised and mitigated	✓	There are no public health impacts that are attributable to the operating facility.	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	✓	As discussed above, opportunities have been identified and measures were put in place to respond to emerging health issues beyond those impacts caused by operating hydropower facility. These measures have been or are on track. In addition to the above-mentioned ambulance, SEB has also finances additional (out-of-budget) items for Sungai Asap clinic, such as an ultra-sound machine.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● There are no significant gaps against Minimum Requirements.	15 out of 21

Summary of findings and other notable issues
SEB has undertaken numerous CSR projects and programs to address issues faced by project-affected communities. The project has enabled developmental benefits such as improved roads, better health care and education, markets for produce, and services like electricity and telecommunications. Statistics show

increased average income levels in the communities. There are ongoing impacts on some households within some affected communities that remain unresolved, specifically upstream and downstream communities, but Bakun HEP is taking action across a range of studies, plans, and measures to address this, and it is strengthening its CMP and CSR programmes.

SEB has a robust dam safety monitoring and surveillance programme with routine monitoring and inspections which are in keeping with MyDAMS guidelines. Other infrastructure risks are identified in Bakun HEP's Risk Register and mitigation measures are monitored through Risk Action Plans, which are updated quarterly. The Dam Safety Emergency Plan (DSEP) has been updated (February 2025) and controlled copies are being shared with the agencies that would be involved in any emergency response on the ground.

Relevant evidence	
Interview	5, 9, 11, 12, 14, 16, 19, 20, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 42, 48, 49, 50, 56, 57, 58, 63, 64, 72, 73
Document	17, 22, 23, 24, 25, 26, 27, 30, 31, 35, 36, 37, 38, 39, 40, 41, 75, 76, 77, 78, 79, 80, 97, 222, 291, 312, 313, 314, 325, 326, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 448, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 489, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 546, 548, 549
Photo	41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 67, 71, 132

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)	Yes, this section is relevant, based on documentary and verbal evidence.
No, this section is not relevant	This section is relevant.
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.	

Description of physically displaced communities and how they are displaced (distinguish between permanently vs temporarily and include number of people and households)	The Government of Sarawak relocated 15 longhouses in 1998 from the area that would become the Bakun Reservoir to a resettlement area, Sungai Asap or the 'Bakun Resettlement Scheme' (BRS), over 65 km by road from the Bakun dam site. Prior to resettlement, 12 of these longhouses were located along the main stem and 3 on tributaries. At the time of resettlement, based on a census conducted in 1994/5 including a number who refused to resettle, they consisted of 1,640 households with a total population of 9428, from 5 ethnic groups (Kayan, Kenyah, Kajang/Lahanan, Buket/Ukit, and Penan). More than 90% of the resettled population were of Kayan or Kenyah ethnicity. The population at Sungai Asap is now over 14,000. A significant number of households (over 100 but numbers are not known) from at least 3 longhouses refused to participate in the resettlement scheme, and relocated independently to the shoreline of the reservoir or to upstream longhouses. Some of these communities have since relocated independently to Sungai Asap.

	No information is available on the longhouses or households affected by the development of the transmission line. It is not likely that the transmission line required the physical displacement of any households. Under the Electricity Ordinance, SEB does not acquire land for transmission way leaves, but the construction of structures and tall trees are not permitted for safety reasons.
Name and number of settlements	15 longhouses relocated to Sungai Asap: Uma Badeng, Uma Bakah Uma Balui Liko, Uma Balui Ukap, Uma Bawang, Uma Belor, Uma Daro, Uma Juman, Uma Kelap, Uma Lahanan, Uma Kulit, Uma Lesong, Uma Nyaving, Uma Penan Talun, Uma Ukit. Households that refused resettlement now reside at Long Kebuho, Long Lebuie, Long Lawen and possibly other longhouses.
Agencies relevant to land acquisition	Lands and Survey Department of the Government of Sarawak. Sarawak Energy's Land and Wayleave Unit (in the Legal and Compliance Department).
Agencies relevant to livelihood restoration	Belaga District Office (DO), Economic Planning Unit (EPU).
Other relevant information	SEB believes that commitments to resettled communities were documented at the time of the project's development. However, according to SEB's enquiries with State and Federal government departments, no such documents can now be found. For this reason, in keeping with the condition "in the case of older projects" above, reference to "commitments" in the criteria below is interpreted as commitments arising since resettlement only. Verbal testimony gathered by an EPU Master Plan 2050 study indicates that entitlements for affected households were: replacement housing in longhouses (while having to pay the difference between USD $12,400 and the value of their former house, and with only a 60-year occupational license for their replacement house); compensation per fruit tree, from USD $1.20 to $7.00 depending on the species; 3 acres of land; compensation from logging and oil palm companies for the use of the land previously used by villagers and not inundated by Bakun dam, USD $120 per head; compensation per individual born before 1998; and compensation for graves. A number of longhouses residing in the vicinity of Sungai Asap can be considered host communities. They claim they used the area of Sungai Asap for

	hunting and other natural resource use in the long term (over a century). These consist of 11 longhouses with a total population of over 2,400 persons, majority Kenyah (65%) and also Penan (21%) and Seping (8%). In the time since resettlement in 1998, Sarawak has experienced significant economic growth (for example, 40% GDP growth 2010 to 2016) and it is now one of Malaysia's high income states. In all longhouses affected by Bakun, a high proportion of the younger population live and work in Sarawak's urban areas, but maintain their residence and family and cultural ties, returning to their longhouses for festivals.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Monitoring is being undertaken to assess if commitments made to resettlees and host communities have been delivered and if management measures are effective	✓	SEB tracks its commitments to Sungai Asap longhouses, upstream longhouses, and host communitiesunder its CSR programme, using an excel sheet of commitments and requests. In the same excel file (the Community Management Plan 'Monitoring Book') it identifies indicators against its CSR programmes, and records data on their delivery in previous years. An EPU Master Plan 2050 study for all resettlement areas associated with Sarawak's hydropower provides an assessment of commitments made to Sungai Asap longhouses.	Identification of ongoing or emerging resettlement issues takes into account both risks and opportunities	✘	SEB's identification of issues includes risks, for example longhouse fire risk, and its CSR programmes in Sungai Asap address opportunities, for example educational scholarships. The development plan proposed by the EPU Master Plan 2050 study could also be said to encompass opportunities (e.g. higher value agriculture such as pineapples and durian, and livestock rearing). However, no evidence has been made available regarding monitoring of the commitments made by other agencies such as the DO. For example, no data on the number of households with unresolved legal cases is available. There is no systematic monitoring to assess if commitments made by other agencies, to resettlees and host communities, have been delivered. In
Ongoing or emerging issues relating to resettlement have been identified	✓	Ongoing and emerging issues raised over the years by Sungai Asap communities, for example concerning			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		the 60-year tenure limit and poor quality and workmanship of the longhouses, have been identified by the DO and recently by SEB. SEB's CMP Monitoring Book lists a range of ongoing and emerging issues for Sungai Asap as a whole, as follows: insufficient land for farming and accommodation due to population expansion; limited vehicle access to farmland; insufficient treated water during [festivities]; drug use; condition of longhouses (wiring, prone to fire hazards); absence of telecommunication towers/ connectivity; health issues such as melioidosis; undelivered commitments; and lack of skilled manpower. The CMP's list of issues for upstream communities is limited and the issues do not relate to resettlement, e.g. inconveniences such as stranded boats due to reservoir level fluctuation. For both Sungai Asap and other households affected by resettlement, there is no assessment of ongoing legacy of resettlement. However, this issue is addressed in relation to Indigenous Peoples' rights in Section 7.			addition, there is no identification of risks or opportunities for displaced upstream communities.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
MANAGEMENT					
Measures to address resettlement are documented in a Resettlement Action Plan	✓	This is not applicable. No RAP from the time of the project's development is available.	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	SEB's CMP includes targets and methods of tracking the actions planned in response to the issues identified, as well as reporting monthly (SEB Power departmental heads, CMP Monitoring Book log), quarterly (ESG meetings), and half yearly (Group Sustainability Meetings). As described in Section 1, in response to this assessment, Bakun HEP has strengthened its implementation capacity and management review processes, especially the ESG Committee.
Measures are in place to deliver commitments to resettlees and host communities	✓	In recent years, the DO has made and delivered upon commitments to Sungai Asap communities through considerable investment in public services: paving of roads; health services including a large clinic providing primary and some secondary services (and due for further expansion); and primary and secondary schools, for example. Commitments by the government to lift the 60-year tenure restriction, and repay the amounts households had to pay for their replacement housing, have been kept. In addition, SEB's Community Management Plan, including further commitments to Sungai Asap, is in place.			
Measures are in place to manage any issues relating to resettlement, including provision of grievance mechanisms	✓	The Sarawak Government appears to be committed to providing further support, including by commissioning the preparation of a Master Plan 2050, which has a range of proposals, for Sungai Asap communities. Some measures have been and are being taken to address issues for displaced upstream households: specifically, the provision of government housing at Long Kebuho; and construction of a			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		new longhouse at Long Lebuie. Measures are not in place to address all legacy issues of resettlement, but this is addressed in Section 7. SEB has established a Bakun HEP Grievance Mechanism Procedure, including response/resolution times, effective February 2024. The Grievance Register Log includes a column indicating whether the grievance relates to the legacy of resettlement.			
Formal agreements with resettlees and host communities are publicly disclosed	✓	To-date there are no formal agreements with any resettled communities. However, SEB will publicly disclose a Memorandum of Understanding with communities represented on a Bakun Community Management Steering Committee.			
CONFORMANCE AND COMPLIANCE					
Processes and objectives in the Resettlement Action Plan have been and are on track to be met with:			There are no non-compliances	✓	No legal non-compliances are apparent.
• no major non-compliances	✓	There are a number of unresolved court cases raised by resettled households concerning insufficient compensation from the time of resettlement. As these are not resolved, they cannot be said to be non-compliances. No other possible non-compliances are evident.			
• no major non-conformances	✓	As a result of recent (February 2025) strengthening of its plans, improved	There are no non-conformances	✓	Bakun HEP is on track to be in conformance with SEB's social

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		engagement, and various actions, Bakun HEP is on track to be in conformance with SEB's social Policies, Procedures and Guidelines (PPG)..			Policies, Procedures and Guidelines (PPG).
Any resettlement related commitments have been or are on track to be met	✓	See above (Management).			
OUTCOMES					
Resettlement has been and is being treated in a fair and equitable manner	✓	Resettlement was not treated in a fair manner at the time of the project's development, with communities offered replacement longhouses a considerable distance from their traditional lands, and without sufficient land or a river with which re-establish their land- and fisheries-based livelihoods. In recent years, Sungai Asap communities have been treated fairly and equitably, but longstanding demands for sufficient farmland have not been addressed. Upstream households that refused to move there are not treated fairly as their concerns have not been identified or addressed, or in some cases addressed only recently. However, as described in Section 7, Bakun HEP is now taking action to address these issues, including through the	The measures put in place to improve livelihoods and living standards are on track to become self-sustaining in the long-term	✘	Some Sungai Asap households do not have self-sustaining livelihoods, with a high degree of dependency on government benefits. The EPU Master Plan and IPP will identify development plans that aim to ensure that Sungai Asap households have self-sustaining livelihoods. Living standards in Sungai Asap can be said to be self-sustaining. While the DO provides considerable support for public services, and SEB occasionally provides support to living standards, for example for longhouse maintenance, this support is sustainable. The provision of improved public services will be necessary for living standards to become self-sustaining in upstream communities.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		development and implementation of the IPP.			
Resettlees and host communities have experienced or are on track to experience a timely improvement in livelihoods and living standards relative to the pre-project baseline	✓	There is no pre-project baseline. Living standards among Sungai Asap and host communities are considerably improved compared to pre-project, i.e. they have access to vastly improved public health, education and other services, as well as running water and electricity. This is evidenced by the communities' own testimony and that of all interviewed stakeholders. In addition, many individuals have been able to share in Sarawak's wider economic growth, due to participation in the palm oil, timber, and oil and gas industries, and to education and participation in the wider economy. There is evidence (EPU Master Plan) that a high proportion, around 20%, of Sungai Asap households have incomes below the poverty line. Their incomes are higher than pre-project, but lower in real terms and relative to other social groups in Sarawak. Many return seasonally or more frequently to their traditional lands and the reservoir for their livelihoods, as they do not have access to sufficient farmland or fisheries in Sungai Asap. Some households do not have access			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		to transport, so are not able to supplement their livelihoods in this way. In addition, interviews with displaced upstream households indicate that they have restored their livelihoods, but their living standards, with more limited access to services than pre-project, have declined. However, as described in Section 7, Bakun HEP is now taking action to address these issues, including through the development and implementation of the IPP.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
• There are no significant gaps against Minimum Requirements.	3 out of 5

Summary of findings and other notable issues
The Government of Sarawak relocated 15 longhouses in the 1990's, prior to Bakun HEP's development, from the area that would become the Bakun Reservoir to a resettlement area, Sungai Asap. Resettlement was not treated in a fair manner, with very limited rates of compensation, limited replacement farmland, and affected households required to pay for improved housing. A significant number of households refused to participate, and remain where they self-relocated to, on the reservoir shoreline. Some longhouses in the vicinity of Sungai Asap lost their traditional lands and can be considered host communities. Some aspects of the legacy of unfair resettlement in the 1990s have been resolved in recent years, for example payments for improved housing were waived or repaid, a 60-year tenure limit on housing removed, and poor quality of the longhouses rectified. The Belaga District Office (DO) also has invested considerably in public services in Sungai Asap, so it is now the second economic hub of the district. SEB tracks its CSR commitments to Sungai Asap longhouses and upstream longhouses, but there is no evidence regarding monitoring of the commitments made by other agencies such as the DO. Many Sungai Asap residents have benefitted from education and have been able to share in Sarawak's wider economic growth. However, not all legacy issues have been addressed, and around 20%, of Sungai Asap households are below the poverty line. Households that refused to move remain with more limited access to public services. Host communities have benefitted from wider economic growth, but were never compensated for their traditional lands. Bakun HEP has recently taken action and initiated studies to address these issues.

Relevant evidence	
Interview	3, 8, 20, 21-24, 28, 29, 30, 42, 45, 48, 50, 57, 58, 63
Document	17, 23, 24, 25, 26, 27, 35, 36, 37, 38, 39, 40, 41, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 431, 433, 434, 442
Photo	49-52, 74-79

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	Bakun is part of the Borneo lowland rainforest ecoregion within the tropical and subtropical moist broadleaf forest biome. The Detailed Environment Impact Assessment (DEIA) for Bakun HEP described terrestrial and aquatic biodiversity as diverse and abundant, and said Sarawak has exceptional levels of endemism due to Borneo's isolation. It noted that the pre-project reservoir and catchment area supported biodiversity characteristic of inland low- to mid-elevations of Borneo, and that biodiversity remained significant and abundant despite large-scale land conversion from primary forest in the reservoir area. The DEIA provided the best inventory available: it documented more than 800 species of plants and a myriad of tropical communities, ecotypes and ecosystems; 187 species of birds (159 within the reservoir); 42 species of mammals; and 104 species of fish, caught from the main rivers of the upper Rajang river basin and its tributaries.
Protected areas (national parks and reserves etc) and their distance from the project	Bakun Islands National Park (c.20 km from the Bakun Dam); Batu Laga National Park (c.37 km); Hose Mountain National Park (c.78 km); Sungai Jelangai Wildlife Sanctuary (c.85 km)
Critical habitats in the project area, including important bird areas, hotspots of endemism etc.	No Important Bird Areas (IBAs) or other Key Biodiversity Areas (KBAs) have been identified in the Bakun area. A Critical Habitat Assessment (CHA) is yet to be undertaken, but several species of high conservation value have been recorded in the Bakun HEP reservoir area, including threatened, endemic and restricted range species.
# threatened species in the directly affected area: terrestrial	From the DEIA: Flora: Totally Protected – 2 species; Protected - 67 species; Birds: Totally Protected – 9 species; Protected– 28 species; IUCN vulnerable – 1 species (Large Green Pigeon); Mammals: Totally Protected – 4 species; Protected – 7 species; IUCN vulnerable - 1 species (Malayan Sun Bear).
# threatened species: aquatic	None identified.
Other species of conservation importance	None identified.
Migratory pathways	Migratory fish - *Pangasius niewenhuisii* (Labang); *Lobocheilos falcifer* (Kulung) are two important commercial species; exact movements are not known, but it is likely they are localised to their spawning grounds.

	Migratory birds - *Bubulcus ibis* (Cattle Egret) – long-distance dispersive movements related to food resources in connection with seasonal rainfall; *Egretta garzetta* (Little Egret) - extensive and non-directional post-breeding dispersal, consisting mostly of juveniles; *Ixobrychus sinensis* (Yellow Bittern) – long-distance seasonal inter-continental migration.
Invasive species: terrestrial	None identified.
Invasive species: aquatic	*Oreochromis niloticus* (Nile tilapia) – used for aquaculture in Bakun reservoir.
Key threats to biodiversity	Habitat conversion due land clearing, new roads and timber harvesting; poaching; hunting; collecting; invasive fish species (specifically tilapia, which is farmed in fish cages in Bakun reservoir); impacts to reservoir and downstream aquatic species through changes to local species breeding and spawning grounds; possible water quality effects (low dissolved oxygen, DO) on downstream species.
Agencies involved in biodiversity conservation	Natural Resources and Environment Board (NREB), regarding responsible environmental management; Forest Department Sarawak (FDS), regarding forestry practices; Sarawak Forestry Corporation (SFC), regarding wildlife protection and nature conservation; Department of Agriculture (DoA), involved in fisheries; Sarawak Biodiversity Centre (SBC), regulating access to and collection of biological resources for research or commercial purposes; the Ministry of Urban Development and Natural Resources (MUDeNR) Sarawak, regarding the Sarawak Land Use Policy, and the Sarawak Biodiversity Master Plan; and the Economic Planning Unit (EPU), regarding medium- and long-term socio-economic development plans for Sarawak.
Other relevant information	Bakun HEP undertook a major multi-year Wildlife Monitoring and Rescue Plan (WiMoR), initiated in 2009, conducted collaboratively by Sarawak Hidro with SFC. Over a period of two and a half years, the WiMoR operation rescued over 1,500 individual animals, comprising 47 mammal species, 15 avifauna species and 22 reptile species. In addition, over 30,000 seeds were successfully germinated. The DEIA recommended that the regional impact of removing wildlife populations and habitat from the reservoir area be addressed by three initiatives: 1. National Parks: establish the Batu Laga Wildlife Sanctuary and the Hose Mountain National Park to offset the impact of the reservoir on wildlife, and to serve as refuges for escaping wildlife in the short and long term; 2. Catchment protection: include protective status for Batu Laga and Hose Mountain within a larger initiative of catchment land use management around the reservoir; and 3. Sub-catchment protection: secure the sub-catchments of Sg. Jelangai, Sg. Beeng in the Balui, Sg. Bahau, Sg. Bereen and Sg. Danum for the conservation of genetic diversity, to be used in the re-introduction of natural and cultured fish to the reservoir.

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	✓	Ongoing and issues have been identified through an initial reconnaissance trip conducted in July 2023, followed by a rapid assessment in December 2023. These helped inform the Bakun Biodiversity Monitoring and Evaluation Plan (BMEP) to guide assessment and monitoring of terrestrial and aquatic fauna at Bakun HEP, which will be further developed and refined over time. A total of 5 sectors are outlined for BMEP monitoring, based on WiMoR sites, into which monitoring will progressively expand. The BMEP aims to rebuild a new biodiversity baseline. Specialist techniques for various types of species will be used, such as: camera traps, bioacoustics surveys, and environmental DNA (e-DNA) analyses. The first quarterly Biodiversity Monitoring and Evaluation Plan (BMEP) Report for Q1 2024 was dated 2nd May 2024. Sarawak Energy continued to deliver quarterly BMEP reports through 2024, and an annual report on 2024. These reported on all data collected regarding fish, mammals, avifauna, herpetofauna, and the citizen science approach. Of the potential threats identified in the Background, only continued habitat loss at small-scale and invasive tilapia are confirmed, and low DO impacts on downstream fish populations and impacts on breeding and spawning areas are considered possible.	Identification of ongoing or emerging biodiversity issues takes into account both risks and opportunities	✓	A number of initiatives by SEB's R&D team are able to identify risks and opportunities: a proposed Centre of Excellence for Biodiversity and Environmental Research; an approved floating lab for extension of reservoir monitoring; detailed review of the WiMoR programme, helped by employing the individual who managed the WiMoR programme; and 'BioMoT', the Biodiversity Monitoring Tool, which is a citizen-science approach enabling observers to record, report, and monitor biodiversity sightings on their smartphones. SEB's R&D Department is actively adding to its biodiversity monitoring expertise, so it will comprise specialists in: flora, avifauna, mammals, herpetofauna, aquatic fauna, molecular science, and citizen science. In addition, Bakun's monthly reservoir rim monitoring can identify riparian vegetation impacts, and the Downstream Flows and Water Quality study (currently under procurement) includes monitoring and analyses of aquatic ecology/biodiversity, alongside flows, water quality, sediment transport, and social and economic aspects. Plans to eventually "operationalise" management of the Bakun Islands National Park with rangers should help monitor hunting and poaching pressures on the islands.
If management measures are required, then monitoring is	✓	At the time of the assessment in July 2024, there was little visible evidence of management of biodiversity on the ground, other than placement of signage. Visual inspections both by the biomonitoring team and			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
being undertaken to assess if management measures are effective		by the dam safety team are mechanisms by which issues requiring attention could be highlighted.			
MANAGEMENT					
Measures are in place to manage identified biodiversity issues	✓	Measures taken to manage biodiversity by the time of the assessment in July 2024 were: • The WiMoR programme from 2009; • Protection of the Bakun Islands NP, gazetted in 2015; and • Awareness-raising with SFC, including signage and posters at the reservoir public jetty and at the Bakun main guard post. BINP consists of 18 islands in the Bakun reservoir, ranging in size from 21 to 1,201 ha. There is no management plan for BINP, nor established management objectives. SEB is in collaboration with SFC, who want to see an inventory of wildlife and values to inform a management plan. SEB and Bakun HEP biodiversity-related policy and planning documents, in order of management hierarchy, are: the Sarawak Energy Biodiversity Policy, Procedure and Guideline (PPG) 2022; the Bakun Biodiversity Management Plan (BMP) 2024; and the Bakun Biodiversity Monitoring and Evaluation Plan (BMEP) 2024. The BMP also allows for Bakun Biodiversity Action Plans (BAPs) for threatened species and habitats, of which none are as yet developed. The Bakun Biodiversity Management Plan (BMP) 2024 has a Table 5 Biodiversity Risk and Mitigation	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	The Bakun BMP shows the Bakun Station Manager as responsible for implementation and to ensure sufficient resources are provided, with guidance and support provided by: SEB Biodiversity Conservation Committee; Sustainability and ESG division of SEB Power; Bakun Environment Team; SEB R&D team; SEB HSSE Environment Team; and SEB HSSE Biodiversity Conservation unit of the EIA Team. The BMP has been recently (October 2024) amended to strengthen responsibilities, and these, with detailed monitoring through the BMEP, will enable emerging risks and opportunities to be addressed. SEB is discussing a proposal to establish a Bakun Centre of Excellence for Biodiversity and Environmental Research – a field research centre modelled similar centres in other parts of Malaysia, such as the Danau Girang Field Centre (Sabah). The proposal now SEB internal approvals (Group Chief Operating Officer, Research and innovation Management Team, and Biodiversity Conservation Committee) and will proceed to the Group Executive Committee technical committee in 2025. .

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		Measures. These include: tree planting; invasive species management; and awareness-raising; BINP governance and management (in collaboration with SFC, and including identification of critical habitat/high conservation values and a species inventory for development of the BINP Management Plan); methods to increase DO concentrations in downstream releases (to reduce pressures on riverine biodiversity); and re-population of indigenous fish species through releases in the downstream tributaries. Since the assessment, significant progress has been made with establishing a floating laboratory and hatchery/nursery (both at the tender stage), prevention of illegal wildlife trade and community awareness, and plans to implement rehabilitation of the reservoir shoreline with riparian vegetation and action plans for endemics. Three additional biodiversity experts are in position at Bakun HEP, with a fourth to be appointed in the near future.			
CONFORMANCE AND COMPLIANCE					
Processes and objectives in place to manage biodiversity issues have been and are on track to be met with:			There are no non-compliances	✓	There are no identified non-compliances relating to biodiversity.
• no major non-compliances	✓	There are no identified non-compliances relating to biodiversity.			
• no major non-conformances	✓	The Bakun Environmental Management Plan (EMP) has an objective relating to biodiversity, "*to ensure proper management of biodiversity*". With recent improvements and progress in implementation of the BMP, Bakun is now in conformance with this objective.	There are no non-conformances	✓	There are no identified non-conformances relating to biodiversity.
Biodiversity related commitments	✓	In the Biodiversity PPG, Sarawak Energy is committed to upholding and leading towards: • Maximizing positive impacts and minimizing negative impacts of projects and business on			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
have been or are on track to be met		biodiversity through impact management and conservation measures; • Building internal capability and capacity and exploring new and relevant biodiversity research areas as a foundation of biodiversity conservation measures; • Advocating, developing, implementing, and monitoring biodiversity conservation measures according to regulatory requirements and international best practices; and • Streamlining biodiversity conservation efforts across the organization towards environmental excellence. Further, Sarawak Energy's Biodiversity PPG commits the business to: knowledge creation; planning, executing, monitoring and measuring strategic biodiversity protection and conservation; good stewardship; partnership; and continuous improvement. Bakun HEP has made significant progress in these recently (by February 2025) through increased Bakun-level capacity with the recruitment of 4 field staff, improvements to the BMP, continuing monitoring and quarterly and annual reporting under the BMEP, and progress in putting the floating laboratory, fish hatchery and plant nursery in place.			
OUTCOMES					
Negative biodiversity impacts arising from activities of	✓	The Q1 BMEP Report showed, for each type of fauna, very positive results with respect to the number of species recorded and the further recommendations for monitoring approaches and data management.	There are healthy, functional and viable aquatic and terrestrial	✕	Based on BMEP monitoring and on the visual evidence of dense jungle around the reservoir, it would appear that there are healthy, functional and

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
the operating facility are avoided, minimised, mitigated, and compensated		Whilst downstream longhouses reported ongoing concerns with fish populations that may have something to do with low DO, this will be investigated in the Downstream Flows and Water Quality Study (see Section 3). There are no concerns relating to species of conservation significance, such as declines that may result in a species becoming threatened, or increasingly threatened.	ecosystems in the area affected by the hydropower facility that are sustained over the long-term		viable aquatic and terrestrial ecosystems in the reservoir area. The same cannot be said for downstream of the power station, where concerns have been expressed about fish abundance, size and condition, and the absence of other aquatic biota such as small prawns.
			The facility has contributed or is on track to contribute to addressing biodiversity issues beyond those impacts caused by the operating hydropower facility	✓	SEB has supported a tree planting initiative (e.g. at Rh Aging, Belaga on 8 October 2022) via a collaboration with SFC and DOE. Whilst this raises awareness and supports the government's pledge for tree-planting, it is not clearly addressing a biodiversity issue beyond Bakun HEP's impacts. SEB's biodiversity activities additionally address: actions to counter illegal wildlife trade, including monitoring and community awareness; mitigation of the spread of invasive alien fish species, in collaboration with the Ministry of Agriculture through the fish hatchery, which is an increasing concern as the government has designated Bakun reservoir as an 'Aquaculture Industrial Zone'.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● There are no significant gaps against Minimum Requirements.	5 out of 6

Summary of findings and other notable issues
Bakun HEP is located in a region of the island of Borneo that is globally noteworthy for its biodiversity. The Detailed Environment Impact Assessment (DEIA) for development of Bakun HEP described terrestrial and aquatic biodiversity in this location as diverse and abundant, and provided inventories for mammals, plants, fish, avifauna, herpetofauna and other taxa. Considerable effort was made over more than two years to rescue wildlife whilst water levels were rising due to dam closure. No biodiversity monitoring was conducted since the DEIA, until the recent development and implementation of the Bakun Biodiversity Monitoring and

Evaluation Plan (BMEP), a long-term comprehensive monitoring programme that will update biodiversity inventories. This is all part of a much greater vision to establish a Bakun Centre of Excellence for Biodiversity and Environmental Research, which will encompass a floating lab, fish hatchery, plant nursery, aviary and research facilities. Whilst monitoring indicates that there are healthy, functional and viable aquatic and terrestrial ecosystems in the reservoir area, the health and influences on the downstream aquatic biodiversity are not well understood. Bakun HEP has recently taken steps to fully resource and implement the Biodiversity Management Plan (BMP).

Relevant evidence	
Interview	25, 26, 31-35, 37, 38, 46, 57, 59
Document	19, 118, 119, 120, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 446, 447, 450, 451, 454, 455, 456, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565
Photo	80-87, 113-114, 124, 133

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	Yes, this section is relevant, based on the Federal Constitution of Malaysia.
No, this section is not relevant	This section is relevant.

	Add columns for each Indigenous People
Brief description of the peoples and their culture, lands, and representation	The people affected by Bakun's development and operation are Indigenous Peoples by both international definitions and the Federal Constitution of Malaysia. They are of the following ethnicities: Kayan (the largest by population affected, with communities residing at the Bakun Resettlement Scheme, BRS, as well as upstream and downstream); Kenyah (next largest by population affected, also in all three affected areas); Punan (residing downstream only); Kajang/Lahanan, Buket (Ukit), and Penan (residing at BRS); and Kejaman, Sekapan, and Tanjung (downstream). These and a range of other ethnic groups are collectively known as *Orang Ulu* (meaning hill peoples), forming about 6% of Sarawak's population. The proportion of Orang Ulu affected by Bakun is significant: over 20% of Sarawak's Orang Ulu population. Indigenous Peoples in Sarawak are collectively known as natives or Dayak. Sarawak's larger indigenous groups – Iban, Bidayuh and Melanau – are not affected by Bakun. Including these groups, Indigenous Peoples make up slightly more than 50% of Sarawak's population. The term *Bumiptera* (meaning heirs to the soil) is a collective term for Indigenous Peoples and Malays, together more than 70% of Sarawak's population.

	Orang Ulu live in generally ethnically homogenous longhouses. They traditionally grow rice and crops for food or sale, with shifting cultivation relatively close to rivers, hunt and gather non-timber forest products across large expanses of forest, and fish and gather other aquatic species. Men often take paid employment in timber and oil palm plantations, and women and men migrate for other employment elsewhere in Sarawak. *Adat* refers to the common body of rules i.e. customary laws applied by each ethnicity. Most adat remain unwritten and are orally passed down, but some are written (e.g. the Adat Kayan-Kenyah 1994). Longhouse headmen (or in some cases head-women) have authority in enforcing adat, and are government-appointed. In addition, *Penghulu* and *Pemanca* represent groups of longhouses of the same ethnicity at a District-level, and a *Temengong* represents all indigenous peoples at a Division-level. These positions are established in formal law, and are state-salaried government appointees.
Directly affected communities and how they are affected	15 longhouses were resettled to the BRS in the 1990s in advance of Bakun's development: 8 Kayan, 4 Kenyah, 1 Lahanan/Kajang, 1 Buket, 1 Penan; a population around 9000 at the time, now 14,700 including out-migrants. They have been affected by physical and economic displacement, limited land availability, loss of traditional lands, and loss of access to remaining traditional lands. 18 longhouses reside on the downstream river, down to Punan Ba: 7 Kayan; 4 Punan, 2 Kenyah, 2 Kejaman, 1 Lahanan/Kajang, 1 Sekapan, 1 Tanjung. They are affected by the influence of operations on river flows and riverine ecology. Two of these longhouses may have been affected by loss of traditional lands for the project infrastructure. A number of longhouses reside on the reservoir shoreline and upstream, largely of Kayan and Kenyah ethnicity. Some refused to relocate to BRS. They are affected by loss of traditional lands, reduced access to public services, impacts of the fluctuating reservoir level, and biomass debris affecting navigation.
Other affected indigenous communities	According to the EPU Masterplan 2025 Study, 11 longhouses with a current population over 2,400 persons lost their traditional lands in the area that was

	developed into BRS (i.e. the 'host communities'). They are majority Kenyah, and also Penan and Seping. Some longhouses may be affected by restrictions on use of the transmission line way-leave. The numbers affected are not clear.
# households physically displaced	1,640 households displaced in 1998.
# households economically displaced	The above households were also economically displaced. In addition: the longhouses immediately downstream of the dam, Uma Apan and Uma Nyaving, were economically displaced by loss of land at the time of the project's development; these and other downstream longhouses and upstream longhouses may have been economically displaced by impacts on fisheries.

Agencies relevant to Indigenous Peoples	The Economic Planning Unit of Sarawak, responsible for economic development of all communities, and the Land and Survey Department, responsible for administering land titles. BRS communities have formed the Balui Lake Native Association (BLNA) and downstream communities have formed the Belaga Action Community (BAC). All longhouses have a longhouse committee (*Jawatan Kuasa Kemajuan dan Keselamatan Kampung*, JKKK). There are some federal-level agencies (Human Rights Commission of Malaysia – Suruhanjaya Hak Asasi Manusia Malaysia) and civil society organisations (Jaringan Orang Asal SeMalaysia, JOAS), but these seem to have no involvement in Bakun.
Other relevant information	Malaysia's definition of ethnicities as indigenous is set out in Clause (7), Article 161A, Federal Constitution of Malaysia; Schedule under Section 3, Interpretation Ordinance. Malaysia has adopted the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and endorsed the Outcome Document of the World Conference on Indigenous Peoples but has not ratified International Labour Organization (ILO) Convention 169. Only lands cultivated in 1958, i.e. at the time Native Customary Rights (NCR) were recognised in law, are eligible for legal title, so NCR does not include wider areas used for shifting cultivation or the forest used for hunting and gathering. However there have been some recent developments in the legal context: Land

	Code Amendment Bill (2022); Interpretation (Amendment) Ordinance 2022. Land titles may be issued for community land, as "S.6 Native Communal Reserve".

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 the operating hydropower facility that may affect Indigenous Peoples' rights have been identified	✓	SEB's Corporate Paper (April 2023) on Indigenous Peoples' Rights at Risks and Recommendations for Sarawak Energy presents analysis of rights at the wider level of Sarawak, and includes a joint analysis of rights affected by three HEPs including Bakun. SEB is on track to assess ongoing and emerging issues for IP rights by July 2025. In response to this HSS assessment conducted in July 2024, SEB has contracted a consulting firm to prepare an Indigenous Peoples' Plan (IPP) which will include analysis of IP rights, relating to Bakun-affected communities and how those rights have been and are affected by Bakun. The firm was awarded the contract in December 2024, delivered an Inception Report in January 2025, will deliver Interim Reports for upstream, downstream, and Sungai Asap and host communities by June 2025. The consultant's scope also includes similar analysis and IPP preparation for Murum and Batang Ai HEPs, following Bakun.	Identification of issues that may affect Indigenous Peoples' rights is undertaken with the free, prior and informed participation of Indigenous Peoples	✓	SEB is on track on meet this requirement, as it has required the firm that is preparing the IPP to do so with the free, prior, and informed participation of all communities. In addition, the EPU Master Plan Study (see below) involved BRS communities through village profiles, household surveys and focus group discussions.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
If management measures are required, then monitoring is being undertaken to assess if management measures are effective	✓	SEB's CMP identifies targets and tracking measures for each management measure addressing social issues. In response to this HSS assessment conducted in July 2024, SEB has strengthened its CMP Monitoring Book to include indicators, target dates and outcomes, and tracking of closure of community requests .	Identification of issues that may affect Indigenous Peoples' rights takes into account both risks and opportunities	✕	There is no analysis that identifies risks (e.g. risk of conflict due to unmanaged return to traditional lands in the reservoir catchment) or opportunities (e.g. economic opportunities for Indigenous People in reservoir management). No Indigenous Peoples-related or social risks are included in Bakun's Risk Register or Risk Action Plans.
MANAGEMENT					
Measures are in place to address the Indigenous Peoples' rights at risk	✓	Many of the measures implemented by SEB under its CMP, as well as by the DO in Sungai Asap and arising from the EPU Master Plan Study for Sungai Asap longhouses address Indigenous Peoples' rights. For example: health and education services at Sungai Asap; longhouse improvements; and support to cultural heritage (see Section 8). Further measures are in process, such as: steps to be taken to provide additional farming land areas and improved access to them; a fish breeding programme to improve downstream fisheries; and the relocation of affected grave sites upstream. SEB is on track to put in place an Indigenous Peoples Plan, including	Measures to address ongoing or emerging issues that may affect Indigenous Peoples' rights at risk have been developed with the free, prior and informed participation of Indigenous Peoples	✓	Some measures, for example for Sungai Asap communities arising from the Master Plan study, have been developed with participation, but there is no indication it is free, prior and informed. However, SEB is on track on meet this requirement, as it has required the firm that is preparing the IPP to do so with the free, prior, and informed participation of all communities.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		actions for SEB and government agencies. In response to the HSS assessment conducted in July 2024, SEB has contracted a consulting firm to prepare an Indigenous Peoples' Plan (IPP) by July 2025. This will identify rights that are not addressed or not sufficiently addressed. For example, there may be a need for measures addressing: managed access and rights to traditional lands, along the reservoir shoreline and in the catchment; recognition of each longhouse's traditional lands in the reservoir and catchment areas; the legacy of a lack of compensation for the lands at the time of the project's development; rights to representation; their spiritual relationship with land and water resources; or conservation of their environment.			
Formal agreements are publicly disclosed	✓	SEB intends to develop a Memorandum of Understanding with the newly formed Bakun Community Management Steering Committee (BCMSC, see Section 10). This MoU will be agreed with BCMSC and disclosed on the Bakun HEP webpage.	Processes are in place to anticipate and respond to emerging risks and opportunities	✕	SEB's Social Management Framework and its CMP, combined with the management processes described in Section 1 at the plant level, provide a means of anticipating and responding to emerging risks and opportunities. However, it is not clear that government agencies will respond to emerging risks and opportunities in relation to IP rights.

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					
Processes and objectives relating to Indigenous Peoples' rights at risk have been and are on track to be met with:					
• no major non-compliances	✓	There is no evidence of non-compliance of Bakun with legally-enforceable rights. Note that, as stated in SEB's Social Management Framework, full compliance and adherence to either State or Federal Laws and Regulations is deemed inadequate to meet international best practices.	There are no non-compliances	✓	There is no evidence of non-compliance with legally-enforceable rights.
• no major non-conformances	✓	Prompted by SEB's comprehensive Social Management Framework (December 2022), policy objectives related to Indigenous Peoples are set out in the SEB Social Policy and related PPG on CSR, cultural heritage, and land acquisition and resettlement. These and the Bakun CMP aim that the dignity, human rights, aspirations, culture, lands, knowledge, practices, and natural resource-based livelihoods of Indigenous Peoples are respected, in addition to some specific requirements such as FPIC when physical displacement is unavoidable, FPIC if there are significant impacts on critical cultural heritage or commercial use of heritage; and that engagement recognises inherent differences in indigenous culture,	There are no non-conformances	✘	With the IP analysis and IPP delivered by July 2025, SEB is on track to conform with SEB PPG on IP rights , but it is too early to conclude there are no non-conformances.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		language, etc. In addition, the Corporate Paper recommends management plans to address all identified impacts that infringe the rights of the Indigenous Peoples, and a review mechanism. The firm preparing the IP analysis and IPP is required to identify the SEB corporate objectives that are related to Indigenous Peoples' rights that Bakun HEP must conform to.			
Commitments made to Indigenous Peoples have been or are on track to be met	✓	A range of specific commitments have been met, for example the paving of roads to improve access to replacement farmland at BRS. SEB tracks a wide range of commitments to each longhouse in its CMP Monitoring Book (with over 70 completed or ongoing commitments listed). Some have not been met on a timely basis, but this is addressed in other Sections.			
OUTCOMES					
Processes provide for negative impacts of the project to Indigenous Peoples' rights to be avoided, minimised, mitigated or compensated	✓	A range of impacts to Indigenous Peoples' rights from the time of Bakun HEP's development and from ongoing operations have not been mitigated or compensated. For example, some BRS households return seasonally or more regularly to their traditional lands to make a living, households that refused to relocate remain on the reservoir shoreline or in floating	Opportunities for positive impacts have been identified and maximised as far as practicable	×	Opportunities have been taken, especially for BRS communities (see Section 4, regarding project benefits). Implementation of the Master Plan 2050 recommendations may go some way towards maximising opportunities for BRS, but this study is still in process. Opportunities cannot be said to be maximised as far as practicable. Opportunities for positive

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		communities with limited access to services, and compensation was never provided for the loss or impacts to traditional forest lands and rivers used for hunting, gathering, and fishing. However, SEB and its government partners are on track to address these impacts through implementation of the IPP that will be delivered in July 2025. Many households affected at the time of Bakun HEP's development and by its operations are better off than prior to its development, owing to wider economic growth (see Sections 4 and 5).			impacts among downstream and upstream communities are as yet piecemeal.
Processes provide some practicable opportunities for positive impacts to be achieved	✓	Positive impacts, especially in Sungai Asap, are significant: it is broadly agreed that communities have benefitted significantly from improved health, education and other public services although some households have precarious livelihoods; SEB's CSR activities have further improved living standards (e.g. longhouse improvements) and positively uplifted communities' heritage.	Opportunities for positive impacts have been or are on track to be achieved	✕	As above.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● There are no significant gaps against Minimum Requirements.	3 out of 8

Summary of findings and other notable issues
Many of the measures implemented by SEB under its Community Management Plan (CMP), as well as by the Belaga District Office address Indigenous Peoples' rights. SEB has recently, in response to the first draft of this assessment, commissioned a detailed analysis of the impacts of Bakun's development and operations on Indigenous Peoples' rights and the preparation of an Indigenous Peoples Plan for Bakun HEP. SEB's Corporate Paper on Indigenous Peoples' Rights at Risks and Recommendations for Sarawak Energy presents analysis of rights at the wider level of Sarawak, and includes a joint analysis of rights affected by three HEPs including Bakun, but a full analysis of the rights affected by Bakun HEP is necessary, including the legacy of resettlement and undelivered commitments. This IPP, once implemented by SEB in partnership with government agencies, can be expected to mitigate and compensate for impacts on Indigenous Peoples' rights. A number of Minimum Requirements are met because SEB and its government partners have made significant steps towards recognising IP rights and addressing them in recent years and months, for example with the EPU Master Plan study and SEB's commissioning of IPP preparation, and so can be said to be 'on track' to meeting the requirements. However, this assumes implementation of the EPU Master Plan and IPP measures, by SEB and by government, and any future HSS assessment of Bakun and other HEPs in Sarawak will require evidence of implementation and positive outcomes.

Relevant evidence	
Interview	3, 8, 21-24, 29, 30, 31-35, 37-39, 42, 45, 48, 49, 50, 56, 62, 63, 68, 69, 70, 73
Document	17, 23, 24, 26, 29, 359, 360, 361, 362, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 377, 378, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 430, 431, 433, 434, 441, 539, 540, 541, 542, 543, 544, 545, 548, 549
Photo	-

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	Yes, this section is relevant.
No, this section is not relevant	This section is relevant.

Sites of physical cultural heritage affected by or in proximity to the project-affected areas	How they are affected
Sites of physical cultural heritage identified in social assessments as early as 1994, during early Bakun HEP planning, were churches and grave sites. A range of movable physical artefacts may have been lost during project development: for example carved wooden adornments on longhouses; Tiang Belawing (tall carved structures / poles); musical instruments; hunting equipment and trophies; shields; weaved basketry and mats; and traditional clothing. Prior to project development, an archaeological survey was conducted in 1997, a cultural heritage management plan was prepared around 2008, and over 500 graves were exhumed and relocated to higher land. A range of artefacts collected during the archaeological survey are currently stored by Sarawak Museum. These include stone artefacts, glass fragments, and European and Chinese porcelain fragments, indicating Orang Ulu occupation of the area as early as the 17th century.	No physical cultural heritage sites are affected by ongoing project operations, except for relocated graves. Graves relocated in the 2000's were unexpectedly inundated by the reservoir, and have become exposed at the reservoir shoreline, on at least 2 occasions. In addition, SEB supports CSR heritage activities and projects, including physical heritage and the preservation of intangible culture.

Agencies responsible for cultural heritage	Sarawak Museum
Other important local or regional physical cultural heritage values and issues	Intangible cultural heritage of local communities varies according to ethnic group, and includes folklore, ceremonies, song, chant, music (with unique

	musical instruments, e.g. sapé), traditional dance, festivals, and traditional crafts and costumery. While the scope of this section is intended to be limited to physical cultural heritage, observations on the project's activities related to intangible heritage are provided in this section. However intangible heritage is not considered when indicating whether the requirements are met or are not met.

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	✓	SEB's Community Management Plan identifies the issue of graves at Long Kebuho becoming exposed at the reservoir shoreline, and proposes collaboration with Sarawak Museum and *Pemali* (compensation for rituals) for reburial. In addition, it identifies a request and commitment to a museum for Sungai Asap (Apau Koyan Museum). Further issues on physical cultural heritage would be identified through the CSRSM planning and management cycle.	Identification of ongoing or emerging cultural heritage issues takes broad considerations into account, and both risks and opportunities	✓	SEB's ongoing and strengthened community engagement (see Section 10) provides a mechanism for identifying emerging issues with the cultural activities supported by SEB.
If management measures are required, then monitoring is being undertaken to assess if management measures are effective.	✓	The CMP Monitoring Book is used for tracking for commitments and requests, and also identifies a target ('no grievances') for the exposed grave site issue.			
MANAGEMENT					
Measures are in place to manage identified cultural heritage issues	✓	There is no Bakun Cultural Heritage Management Plan. However, Culture and Heritage is one of three	Processes are in place to anticipate and respond to	✘	SEB's CSRSM processes enable opportunities to be responded to.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		'community investment focus areas' in SEB's Community Management Plan. This provides the mechanism to identify measures for physical cultural heritage. The concept of a Bakun Museum was raised as long ago as 1996, in the socio-economic study, and was initially requested by communities in 2016. Recently (Q4 2024), the proposal has been developed further into a cultural and commercial centre in Sungai Asap, with conceptual architect's drawings, and RM 3 million of the RM 10.4 million budget approved by SEB and the remainder sought from State and Federal Government. SEB has made significant recent progress (February 2025) in addressing the issue of disturbed grave sites, supporting a Sarawak Museum survey of all reservoir-affected grave sites, whether previously relocated or not. SEB has releases funds to Belaga District Office (DO) to address all issues, including improvements in cemeteries, burial of remains etc, the works will be implemented by the DO, and a legal agreement has been drafted.	emerging risks and opportunities		These include in the past 3 years, for physical heritage: • Pesta Apau Koyan (Traditional Hut Competition) in consecutive years; • The longest decorated rattan verandah wall ever built using local rattan species (620 feet, at Uma Ukit); • The tallest Tiang Belawing, and supporting the entry of this and the rattan mat into the Malaysia Book of Records; • Support to handicrafts and the participation of artisans from Bakun at in international events; and • Manufacture of Uma Penan Talun cultural clothes. Support to intangible heritage includes: cultural dance and music competitions; a range of annual cultural festivals; and traditional sapé music training. There are no processes in place to no mechanisms for responding to emerging risks, or for monitoring and evaluation of the effectiveness of support to cultural heritage, and lesson learning. The specific risk of commercial use of intellectual

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		SEB has also supported clearing for the expansion of cemeteries at Sungai Asap, and has financed furniture for a church in Sungai Asap. Most longhouses in Sungai Asap have their own church.			property that may be considered to be owned by ethnic groups communally is included in the SEB Cultural Heritage PPG. Bakun HEP has not assessed this risk. This is the same gap as identified under Conformance below.
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 is no evidence of non-compliances.
• no major non-compliances	✓	There is no evidence of non-compliances.			
• no major non-conformances	✓	The SEB cultural heritage Policy, Procedures and Guidelines (PPG) include a requirement for a chance find procedure and for a Cultural Heritage Management Plan (CHMP; at all stages of project design and implementation, continuing to operations). There is no evidence that this PPG has been applied to Bakun: there is no Bakun CHMP and no chance find procedure in the HSSE procedures or contractor's (e.g. the OR2 contractor's) specifications. However these are not major non-conformances, as the risk of uncovering physical cultural heritage is minimal, and the CMP addresses CSR projects for heritage.	There are no non-conformances	✘	There are minor non-conformances with the PPG: no Bakun CHMP (that would, as indicated above, identify a means of identifying emerging risks and lessons) or chance finds procedure.
Cultural heritage related commitments have been or are on track to be met	✓	SEB has met some commitments regularly, for example support to festivals through consecutive years. At			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		the time of the on-site assessment in July 2024, measures to address the grave issue and the museum opportunity had not been taken on a timely basis. However recent progress (February 2025) has been considerable, with site surveys, conceptual drawings, budgetary allocations etc, as described above.			
OUTCOMES					
Negative cultural heritage impacts arising from activities of the operating hydropower facility are avoided, minimised, mitigated and compensated	✓	There is an ongoing impact, of significance to the affected communities and families, of the exposure of grave sites at the reservoir shoreline. However, this is being addressed following the Sarawak Museum survey, and SEB's approval of the budget. Communities expect works to begin in March 2025. No other significant heritage impacts of the operating facility are apparent.	Where opportunities have been identified, measures to address cultural heritage issues beyond those impacts caused by the facility have been or are on track to be achieved	✓	The above activities supporting physical cultural heritage activities go beyond the impacts caused by the facility. The updated cultural centre / museum in Sungai Asap will also support culture beyond the impacts caused by the facility. Traditional heritage was in decline in the Bakun area prior to the project, and likely would have declined further without the project. Wider economic growth has provided people with the means to invest in and maintain their culture and heritage.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● There are no significant gaps against Minimum Requirements.	3 out of 5

Summary of findings and other notable issues

Bakun HEP has identified ongoing or emerging physical heritage issues – the emergence of graves at the reservoir shoreline, and an opportunity to develop a cultural centre at Sungai Asap – and is taking steps to address these. Culture and Heritage is one of three 'community investment focus areas' in SEB's Community Management Plan, and SEB provides a range of support to the renewal of physical cultural heritage and to intangible heritage. SEB's CSRSM processes enable heritage opportunities to be identified and responded to. Traditional heritage that was in decline in the Bakun area prior to the project is being maintained and widely celebrated. However, there are minor non-conformances with SEB's PPG on cultural heritage, as Bakun HEP has no Cultural Heritage Management Plan or chance finds procedure.

Relevant evidence	
Interview	21-24, 31-35, 37, 38, 55, 65, 66, 67, 68, 69, 70, 71
Document	23, 24, 27, 28, 29, 359, 360, 377, 378, 404, 405, 406, 413, 416, 418, 419, 420, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579
Photo	88-108

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	Sarawak is one of 13 states of federal Malaysia; it is subject to federal law and elects representatives to the federal level, and it also has its own state government, laws and politics. Changes in leadership, policy shifts, integrity issues or government instability can pose risks to the public sector and its initiatives.
Key information on corporate ownership and governance	Sarawak Energy is fully owned by the Government of Sarawak, and is headquartered in Kuching, the State capital. The Sarawak Energy group structure consists of four wholly owned entities, of which SEB Power Sdn. Bhd. is responsible for ownership and operation of hydropower generation assets including Bakun HEP. Sarawak Energy Group is governed by a Board of Directors, to whom the Group Chief Executive Officer (GCEO) and Company Secretary report.
Details of the concession, if applicable	Not applicable.
Key licenses or permits	The primary licence for the operation of Bakun HEP is the Generating License. In Sarawak this is issued by the Electrical Inspectorate Unit (EIU), under the purview of Ministry of Utilities and Telecommunication (Sarawak). Permits are required for specific Occupational Safety and Health approvals from the Sarawak Department of Occupational Safety and Health (DOSH). New developments at Bakun HEP must be approved by the Sarawak Natural Resources and Environment Board (NREB), who may put conditions on the approval.
Other relevant information	SEB is in the process of improving its sustainability governance processes. The SEB Sustainability Roadmap 2023-2025 has been approved and is being operationalised. The SEB Sustainability Roadmap has 5 key themes: sustainability leadership, sustainable growth, business resilience, climate action, and workforce and supply chain. Some notable actions include: a Group Sustainability Committee is now in place for the CEO and group executives; a Board Sustainability Committee will be functioning by early 2025; and SEB Power has a new Sustainability and ESG unit. SEB and Bakun HEP are certified against International Organization for Standardization (ISO) standards ISO-9001 (quality), ISO-45001 (health and safety), ISO-14001 (environmental management), ISO-27001 (information security), and ISO-55001 (asset management).

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	✓	Ongoing or emerging political and public sector governance issues are identified through a range of measures, including through: • The SEB Board members, who are predominantly from the government, and so have good insights into present and emerging political and public sector risks; • Regular checks from SEB risk owners, including: Corporate Services Department; Business Development Department (with respect to international development risks); Strategy and Corporate Development Department; and Legal and Compliance Department. • Meetings of the Chief Risk Officers' risk forum; • Quarterly meetings of the SEB Board Audit Risk Committee (BARC), Business Units (SEBP, SESCO, SER) and Corporate Support Functions and Audit Risk and Compliance (ARC) function; • Global and local news scanning; • Attendance of the Government Relations Unit of the Corporate Services Department at Sarawak General Assembly gatherings; • At the Bakun level, routine meetings with state-appointed native leaders including headmen, and Resident and District Offices; and • Regular state-wide and local liaison with key authorities including government ministries and regulators. An identified political risk for SEB is the proposed establishment of a Sarawak Lakes Authority. Risks include that SEB is excluded from decision-making, and that	There are no significant opportunities for improvement in the assessment of political and public sector governance issues and corporate governance requirements and issues	✓	Assessment processes such as internal audit have proven to be effective in identifying issues and requirements. For example, a significant opportunity for improvement was identified in the area of compliance and conformance. Following concerns with many non-compliances with regulations and internal policies and procedures, an internal audit was conducted that found, for 2023 across SEB, 730 cases of non-compliance with internal Policies, Procedures and Guidelines (PPGs) and 13 instances of non-compliance with regulations. Most non-compliances with regulations were with the Department of Environment (Malaysia), and with the Department of Safety and Health (DOSH). PPG non-compliances were often with retail and revenue management, a number regarding procurement, and with Terms and Conditions of Service (TACOS). A compliance policy is now in place and a compliance framework is under development. An opportunity for improvement has also been identified regarding risk. Whilst SEB's corporate risk policies and frameworks are in place, the focus of attention is now on embedding them at the grassroots. Whilst recognising the presence of a corporate commitment to continuous improvement, this assessment has not identified further significant opportunities for improvement in assessment of political, public sector, or corporate requirements and issues.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		decision-making is slow. It is possible that this change in public sector governance could help address a range of other reservoir-related risks faced by Bakun HEP, as highlighted under the Advanced Requirements in Sections 3, 6 and 11, relating to unconstrained shoreline development and other commercial activities. Other than this, no other political or public sector risks have been identified.			
Corporate governance requirements and issues have been identified	✓	Methods of identifying corporate governance requirements and issues include: • SEB's voluntary provision of a Statement on Risk Management and Internal Control (SORMIC) and a Statement of Corporate Governance (SOCG) in its Annual Sustainability Report each year. SORMIC is compared against other leading companies' best practices and with requirements of the Malaysia Code of Corporate Governance, and is reviewed annually by an external auditor. • SEB's Control Framework, which captures and documents overall controls in place. It outlines the foundational elements of SEB's internal controls and defines roles and responsibilities of parties responsible for assurance for respective risk areas. • Internal audits, including an SEB compliance and conformance audit, and a Bakun HEP Internal Audit in July 2023. The scope of the Bakun HEP internal audit was on operations and maintenance and HSSE, and key audit findings included contract management and contractor HSSE; and • External audits, which include Integrated Management System (IMS) Audit Reports conducted in 2023 by the national certification body NIOSH.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		The increased corporate focus on sustainability described in the Background is partly in response to increased expectations from SEB's investors, and new requirements for performance disclosures on ESG matters in international accounting standards, including climate change.			
Monitoring is being undertaken to assess if corporate governance measures are effective	✓	A number of the monitoring methods listed above (e.g. SOCG, SORMIC, and audits) help indicate if corporate governance measures are effective. SEB annually updates its corporate Key Performance Indicators (KPIs) to measure the implementation of its strategic framework. Corporate KPIs undergo regular monitoring and are reported to the Group CEO and executives every quarter, while annual reports are presented to the Board. The organisation also discusses action plans to achieve KPIs across all its levels. The company's annual reporting is in line with both local and international best practices. This includes compliance with the listing requirements of Bursa Malaysia Securities Berhad, the Malaysian Code on Corporate Governance, and the Sustainability Reporting Standards of the Global Reporting Initiative (GRI). These procedures are instrumental in identifying issues related to corporate governance and tracking the effectiveness of governance measures.			
MANAGEMENT					
Processes are in place to manage the following:			Processes are in place to anticipate and respond to	✓	SEB has numerous processes in place at all levels of the business that are responding to emerging risks and opportunities, and will ultimately help them to better anticipate these.
• corporate, political and	✓	The Group Executive Committee (GEC), serving as the Executive Risk Committee, reviews risks at the highest level of management. Enterprise Risk Management (ERM)			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
public sector risks		manages enterprise-wide risk and submits quarterly reports to the GEC, BARC, and Board of Directors. Responsibility for fraud risk management rests with the Internal Audit department, where project delivery and procurement are key audit areas. Risk assessments generated by Bakun HEP feed into high-level risk registers and action plans. FTRD reviews these risks, potentially flagging any for further escalation. The Bakun HEP Risk Register and Risk Action Plan include some risks related to governance, i.e. fraud, information security, and non-compliance with regulations. In addition to technical risks, there are a number of staff-related risks, including: shortage of skilled staff; succession planning; staff strike; safety, health and environment risk; and competency gap. These staff-related risks are strongly influenced by the corporate governance frameworks. No political or public sector risks are included in the Bakun Risk Register. Business continuity is a major corporate risk, and Bakun HEP is noted as a nationally significant generation asset. There are active processes in place for business continuity, including: SEB Group Crisis Management Plan; Business Continuity Plan for Bakun HEP; and crisis simulation exercises and emergency response drills for Bakun HEP.	emerging risks and opportunities		Governance risks and opportunities are foreseen and managed through departmental action plans, aimed at achieving current KPIs and addressing those unfulfilled. Several meetings play a part in this process, including Board and GEC meetings, and those of the BARC. Opportunities for further improvement are identified in the IMS audits for all levels of the business, including the Bakun HEP. The development of a Sarawak Energy Compliance Framework is a process in place that will enable the business to better track and respond to emerging compliance risks. SEB is lifting its capacities with regards to international standard certifications. The previous Integrated Quality Management System (IQMS) division is now an Integrated Management System and Assurance (IMSA) division. It will address the present five ISO certifications in a consolidated manner, and has plans to add further ISO certifications in the next and coming years. Additional processes specific to Bakun HEP which will help to anticipate and respond to emerging risks and opportunities, and at various stages of development, include the Bakun ESG committee and the Bakun Community Management Steering Committee (BCMSC). A government Sarawak Lakes Authority, if and when established, could provide a process that would respond to emerging risks and opportunities regarding
• compliance	✓	SEB has a Compliance and Conformance Assessment Procedure, and nine compliance action plans were endorsed by the SEB Board in September 2023. An engagement letter with PwC was signed on 29.02.2024 to establish a compliance management framework for SEB. The Bakun HEP risk register lists ”Non-compliance with			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		Regulations" as a risk, with the associated action plan focussed on competency training.			management of development in and around Bakun reservoir.
• social and environmental responsibility	✓	Bakun maintains international certifications for safety (ISO-45001:2018) and environmental (ISO-14001:2015) standards, a process supervised by the corporate Integrated Management System and Assurance (IMSA) division. SEB has an overarching corporate Environmental Policy and a Social Policy. The corporate Environmental Policy (2020) falls under the purview of the corporate Health, Safety, Security, and Environment (HSSE) department. There is a range of Policies, Procedures and Guidelines (PPGs) and Standard Operating Procedures (SOPs) for various environmental and social aspects. The CSR PPG is administered by the Social Investment and Planning Division of the Sustainability Department. Bakun HEP has management plans for particular focal areas, covered under other Sections of this report. SEB and Bakun have appropriate policy and planning frameworks for social and environmental responsibility. Bakun HEP has recently (February 2025) increased its local environmental and social staff capacity, and can draw on support from corporate HSSE, CSRSM, Sustainability and R&D divisions.			
• procurement of goods and services	✓	The SEB Contracts and Procurement Division is responsible for all procurement aspects. The division follows the corporate Procurement Policies and Procedures (PPP), which aligns with international and industry best practices. The PPP guide uniformity, transparency, and efficient management of procurement actions.	Contractors are required to meet or have consistent policies as the developer	✓	Appendix D of the Contract Conditions outlines the Employer's Administrative Requirements. It provides guidance on areas for each contractor to maintain corporate policy alignment. Areas covered include project management, document handling, design processes, and quality control. The document also covers security measures, health and safety protocols,

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		Bakun HEP procurement follows an annual cycle. Major procurement acquisitions for Bakun are goods and services relating to maintenance works. Small purchases can be authorised by the Bakun Station Manager in line with the Limits of Authority. There are fast-track procurement methods that can be used if needed for Emergency Purchases. Supply chain risks are included in the Bakun HEP risk register. Corruption-related risks are managed by mechanisms such as: the integrity pledge; whistle-blower policy; Manual of Authority; Code of Conduct; and internal audits. Ongoing monitoring methods for procurement effectiveness include evaluations by the corporate Contracts and Procurement division against SEB's PPP, and internal and external audits.			environmental stewardship, and Corporate Social Responsibility (CSR) management.
• grievance mechanisms	✓	The need for Grievance Mechanisms (GMs) are cited in SEB's Social Management Framework, in relation to the Land Acquisition and Livelihood Restoration PPGs. The need for GMs is also in the Stakeholder Management Toolkit. Bakun HEP has a Grievance Mechanism Procedure dated February 2024, which is a comprehensive document accompanied by grievance forms and a grievance log. This requirement is further considered in Section 10.			
• ethical business practices	✓	Sarawak Energy maintains a public and internal commitment to zero tolerance towards fraud, bribery, and corruption. The business has a Code of Ethics, an Anti-bribery and Corruption Policy, a Conflict of Interest PPG, and a Fraud, Bribery and Corruption Risk Management Framework. Employees must sign an			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		integrity pledge against corrupt practices on an annual basis. There are several support mechanisms in place including the Integrity Management Unit, Whistleblower Policy, Manual of Authority, Disciplinary Procedures, and internal and external audits. Sarawak Energy organises training for employees on ethical business, integrity, and zero fraud tolerance.			
• transparency	✓	SEB provides the SORMIC and SOCG statements in its Annual Sustainability Report each year. The Corporate Stakeholder Management Policy also refers to transparency, accountability, informed participation and inclusiveness. Transparency is a core principle steering the company's procurement procedures. The Bakun webpage (https://www.sarawakenergy.com/bakun-hydroelectric-plant) was recently launched.	Procurement processes include anti-corruption measures as well as sustainability and anti-corruption criteria specified in pre-qualification screening	✓	Procurement processes incorporate several anti-corruption measures, such as background checks of tenderers and third-parties due diligence reviews. Contractors must declare anti-corruption commitments and disclose any potential conflicts of interest. Conditions of Contract Clause 1.10 addresses corruption and other prohibited practices. Pre-qualification screening criteria in the PPP include sustainability and anti-corruption requirements. Procurement processes for major packages also include anti-corruption and sustainability measures, e.g. tenderers must adhere to high ethical standards, with Sarawak Energy having the right to rescind a tender in cases of corrupt practices. Tenderers must detail compliance plans for environment, health and safety, local content, economic opportunities for Sarawakians, transparency, and community engagement.
Policies and processes are communicated internally and externally as appropriate	✓	External dissemination of corporate governance policies and processes is done via the Sarawak Energy website, the Sarawak Energy Annual Report, and through contract and procurement procedures. SEB conveys its corporate governance policies and processes internally through its intranet site. SEB's "My Human Resources" (My HR) Portal provides a comprehensive avenue for staff to access a wide range of HR products and services. These include all relevant PPGs, TACOS, and information on systems and tools.			
In case of capacity shortfalls, appropriate external	✓	SEB and Bakun regularly use appropriate external expertise for additional support. Examples include: Dam Safety Review Report; corrosion study; proposals for bioremediation for mitigation of Hydrogen Sulphide (H_2S) and GHGs (Curtin University); validation of GHG			

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		emissions; and the Study on Impacts of Pre- and Post-Bakun Hydropower Plant Construction on Rejang River Basin and its Communities (UNIMAS). Upcoming use of external expertise includes the catchment management and downstream flows studies.			
CONFORMANCE AND COMPLIANCE					
The project has no major non-compliances	✓	Bakun HEP has no major non-compliances.	The project has no non-compliances	✓	Bakun HEP has no non-compliances.
OUTCOMES					
There are no significant unresolved corporate and external governance issues identified	✓.	There are a number of unresolved court cases regarding compensation for displacement at the time of Bakun HEP's development, as raised in Section 5. These are an unresolved governance issue, but not considered significant against the Minimum Requirements because their resolution through legal processes would not present a major risk for the project. In addition, the Sarawak Government's EPU Master Plan study will seek resolution of resettlement-related claims at Sungai Asap.	There are no unresolved corporate and external governance issues identified	✕	The court cases regarding compensation for displacement are an unresolved governance issue.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
• There are no significant gaps against Minimum Requirements.	5 out of 6

Summary of findings and other notable issues
SEB and Bakun HEP assess ongoing or emerging political, public sector, and corporate governance requirements and issues through a range of diverse corporate and project-level processes. Monitoring is in place to measure the effectiveness of corporate governance and procurement processes. Internal and external audits, including against a wide range of ISO certifications and the Malaysian Code of Corporate Governance, help ensure identification and follow-up on opportunities for improvement. Policies and processes are in place for all aspects of corporate governance, including compliance, risk, social and environmental responsibility, and

procurement. The project has no major non-compliances relating to governance or procurement, nor any unresolved governance issues identified in this assessment. This section has no significant gaps against Minimum Requirements, and one against Advanced Requirements regarding the unresolved court cases.

Relevant evidence	
Interview	5, 18, 29, 36, 39, 40, 41, 43, 45, 47, 48, 51
Document	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 21, 11, 12, 13, 14, 15, 16, 17, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 443
Photo	21, 25, 28, 109-112

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	Directly-affected community-level stakeholders consist of: communities residing on the reservoir shoreline and in the catchment, some of whom were physically displaced at the time of the project's development; communities residing along the river downstream of Bakun HEP, including Belaga town; 15 longhouse communities residing in Sungai Asap, who were resettled from the reservoir area in the 1990s; communities around Sungai Asap that gave up traditional lands for its development; and communities residing along the transmission line. Within these communities, there are differently-affected groups such as leaders, women, fishers, the elderly, and youth.
Directly affected institutional-level stakeholders	Community organisations (Balui Lake Native Association BLNA, and Belaga Action Committee BAC), traditional leaders (Penghulu, Pemanca, and Temengong – see section 7), Sarawak State and Federal Assemblymen, employees, actual and potential contractors and service providers, Belaga District Office (DO), Kapit Residence Office (RO), Natural Resources and Environment Board, (NREB), Department of Environment (DOE), Ministry of Utility and Telecommunication (MUT) Sarawak, Ministry of Energy and Environmental Sustainability (MEESty), a range of government partners (e.g. Sarawak Rivers Board (SRB), Department of irrigation and Drainage, Economic Planning Unit, Land and Survey), NGOs (WWF, Save Rivers).
Other relevant information	Other affected communities, though not directly-affected, include: communities residing along the road to Bakun HEP; and outmigrants and diaspora of the above communities that now reside in other areas of Sarawak.

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	✓	Ongoing and emerging issues for Bakun HEP communications and consultation are met through the stakeholder engagement planning described below. Examples include the need to extend engagement to upstream and downstream communities, the need for a Bakun HEP Grievance Mechanism, and insufficient information disclosure.	The stakeholder mapping takes broad considerations into account	×	The stakeholder analysis set out in the SMP is broad in its inclusion of most directly-affected community groups and institutional stakeholders. However, the analysis could be improved in a number of respects: issues of concern are not separately identified for each community (the same list of issues is given for all downstream, and the same list for all upstream communities); issues are not distinguished between groups within communities (elders, women, youth etc); out-migrants and diaspora are not identified; there is no analysis of interactions between stakeholders (e.g. between traditional leaders and their communities).
Requirements and approaches are determined through a periodically updated assessment process involving stakeholder mapping	✓	Requirements and approaches based on detailed stakeholder mapping and analysis are set out in Bakun HEP's Stakeholder Management Plan (SMP). The initial version dated February 2024 was updated in June and September 2024, and includes mapping of over 30 stakeholders or stakeholder groups based on levels of interest and influence, separately for different issues (e.g. dam safety, environment). It also identifies issues of concern for almost 50 stakeholders or stakeholder groups, and determines methods of engagement for the stakeholder groups. The Group Stakeholder Map and Engagement Plan 2024 also includes mapping of SEB-level stakeholders by interest and influence.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
Effectiveness is monitored	✓	SEB Corporate Communications' Perception Survey (last conducted in 2019, including a survey of 76 stakeholders) and media monitoring provide some monitoring of the reputation of SEB as a whole. Bakun HEP's ESG Committee monitors effectiveness: the ESG Dashboard Q4 2024 shows total grievances raised, numbers open/closed, and categorization by type, as well as data on community engagement categorized by upstream/downstream etc, and minutes of ESG quarterly meetings (Q3, Q4 2024) show discussion of grievances, and CSRSM activities, including engagement and community requests. An excel planner is used to record the completion of planned community engagement visits.			
MANAGEMENT					
Communications and consultation plans and processes are in place to manage communications and engagement with stakeholders	✓	The SMP (June 2024) is in place, including objectives, roles and responsibilities and a stakeholder engagement strategy. CSRSM's meetings with BLNA (representing Sungai Asap resettled communities) and BAC (representing up- and downstream communities), and the newly formed Bakun Community Management Steering Committee	Communication and consultation plans and processes show a high level of sensitivity to communication and consultation needs and approaches for various stakeholder groups and topics	✕	The SMP identifies the elderly, women, and people with disabilities as Vulnerable / Disadvantaged Groups. However, it lists very similar methods of engagement for them (meetings, dialogues, CSR activities) as for communities as a whole. It lists the same methods for entire groups of communities (e.g. all communities in Sungai Asap), and very similar

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		(three times per year; see below) are also processes to manage engagement with stakeholders. The Bakun HEP Information Disclosure Plan specifically addresses the requirements for disclosure, to be implemented through a revised Bakun website. The website is now active and provides an overview of information about Bakun HEP, including environmental and social matters of stakeholder interest. In addition, SEB's Corporate Communications Team has put in place: a Group Stakeholder Map and Engagement Plan 2024 that identifies legacy issues from Bakun as an issue, and includes an Integrated Stakeholder Management Team with representation from 7 SEB business units; the Corporate Message House, which is a document providing consistent, standardised text and narrative across a range of issues; and issues briefs for the SEB Group Executive Committee on issues reaching the media and civil society.			methods of engagement for most stakeholders, the most common method being 'meetings'. There is no sensitivity to needs and approaches for various stakeholder groups and topics.
They include an appropriate grievance mechanism	✓	A Bakun HEP Grievance Mechanism (GM) Procedure is in place, including grievance reporting channel (with QR code link to an MS Forms-based	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	SEB CSRSM involvement, and Bakun HEP ESG quarterly meetings should provide mechanisms to respond to emerging risks and opportunities. For

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		form), roles and responsibilities, process flow, target intervals for acknowledgement, investigation, action, and close-out, reporting, and monitoring and evaluation. The GM also includes a Grievance Log, and guidelines for stakeholders, and MS Word grievance forms. Notices of the GM and its QR link were observed at locations in several communities during this assessment. The GM has been strengthened recently, with weather-proof notices of the QR code and steps in the grievance process, and suggested areas of interest, and an improved Grievance Log that clearly distinguishes between requests and grievances and include dates of receipt and resolution.			example, CSRSM staff have determined that the target intervals in the GM are too stringent and will need adjusting. Since the assessment in July 2024, quarterly ESG meetings are being used to discuss community engagement, grievances, and requests..
They outline communication and consultation needs and approaches for various stakeholder groups and topics	✓	The SMP identifies issues of concern, relationship owner, level of engagement, and methods of engagement for almost 50 stakeholders or stakeholder groups. In addition, the Group Stakeholder Map and Engagement Plan sets out planned engagement activities for 14 stakeholder groups.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
STAKEHOLDER ENGAGEMENT					
The project operation stage involves engagement with directly affected stakeholders	✓	Bakun HEP has regular engagement with community-level stakeholders, especially BLNA, BAC, and longhouse committees, often focused around CSR initiatives, and will meet the newly formed BCMSC three times per year. It is intended that the head of the Belaga DO co-chairs the BCMSC (with Bakun HEP station manager), and SEB and Bakun HEP engage with other institutional stakeholders whenever necessary.	Engagement is inclusive and participatory	✓	Community dialogues tend to be dominated by the village headman. However, community-level interviewees did not respond with concerns when asked about levels of participation and inclusivity during this assessment (for example when women were asked if women had sufficient opportunity to participate). To enhance inclusivity, Bakun HEP has included representatives of women's associations and youth clubs in the BCMSC.
Engagement is:					
• appropriately timed and scoped	✓	Communities and institutions interviewed for this assessment raised no concerns with the timing and scope of engagement when asked. Coverage of upstream and downstream communities has been very limited previously, but Bakun HEP has brought them into the BCMSC to ensure regular, formal engagement.	Negotiations are undertaken in good faith	✓	Negotiations are in good faith, but can be delayed considerably due to SEB's internal processes (see below).
• often two-way	✓	In addition they were content that engagement is two-way.			
• undertaken in good faith	✓	Interviews indicate a high level of trust and good faith in SEB and Bakun HEP's engagement with its stakeholders.			
The business interacts with a range of directly affected	✓	SEB's Corporate Communications team manages engagement with	The assessment and management process for	✓	Engagement with BAC and on the Controlled Release Procedure (see

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
stakeholders to understand issues of interest to them		business-level stakeholders, for example courtesy meetings with Ministries and government departments, engagement with elected representatives, and update sessions for civil society. Directly-affected institutional stakeholder interviewed for this assessment were satisfied with the level and scope of Bakun HEP engagement with them.	downstream flow regimes has involved appropriately timed and two-way engagement with directly affected stakeholders		Section 4) allows for appropriately-timed and two-way engagement on downstream flows. Engagement with downstream stakeholders is expected to be part of the process for the Downstream Flows Study. Bakun has shown responsiveness to downstream flow issues, for example flooding at Punan Ba and water shortages in Kapit.
Ongoing processes are in place for stakeholders to raise issues and get feedback	✓	As detailed below.	Ongoing processes are in place for stakeholders to raise issues with downstream flow regimes and get feedback	✓	Engagement with BAC, the BCMSC, and engagement for the Controlled Release Procedure provide ongoing processes.
Ongoing processes are in place for:					
• environmental and social issues	✓	There is ongoing engagement with NREB and DOE on water quality monitoring, and with community representatives on other environmental and social issues.	Feedback on how issues raised have been taken into consideration has been thorough and timely	✘	During this assessment, interviewees in a range of affected communities expressed frustration with the timeliness of Bakun HEP's responses to their grievances and requests, including not receiving any response to indicate that the resolution of the issue would be delayed. An example is a response to damage of the jetty in a community downstream of Bakun Dam.
• project-affected communities	✓	There are ongoing, regular meetings with BLNA, BAC, and now BCMSC, and with headmen's committees (Peng Maren-Maren Uma, PMMU, and Jawatankuasa Ketua Masyarakat dan Ketua Kaum Belaga, JKMKKB) and village committees, often around CSR initiatives. Since the assessment in	Project-affected communities have been involved in decision-making around relevant issues and options	✘	There is no evidence that upstream and downstream communities have been involved in decision-making. More can be done to ensure that upstream communities are aware of and involved in BCMSC.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		July 2024, engagement has continued, with meetings in 11 downstream and upstream communities, and the Community Engagement workplan for 2025 shows planned engagement meetings each month, at least in one upstream, two downstream, two BRS, and one host community each month.			
• resettlees and host communities	✓	There are meetings with BLNA, which represents resettled communities. Engagement with host communities, has occurred to a limited extent, with some recent support to some longhouses and now Peng Lepo' Asen Alo Belaga (PLAAB; Belaga River Original Residents Association) is represented on the newly formed BCMSC. Engagement meetings have been held with two host communities since the assessment in July 2024, and the Community Engagement workplan for 2025 shows planned engagement meetings, at least two BRS, and one host community each month.	Resettlees and host communities have been involved in decision-making around relevant issues and options	✓	Interviewees at Sungai Asap during this assessment were satisfied in their involvement in decision-making, which is managed through their village committees. Examples of SEB CSR activities that they cited in this regard were support for the construction of a parking area, and Tiang Belawing (carved pole, similar to a totem pole).
• Indigenous Peoples	✓	Members of BLNA, BAC and other community associations are indigenous, and representatives are engaged, for example the Temenggong is chair of BAC, and now a signing member of BCMSC.			
• employees and contractors on human resources and labour management issues	✓	Employees and contractors interviewed felt that there were adequate processes in place to raise			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		issues. Primarily employees would raise issues with their supervisors, or contractors with the SEB contact person. Staff or supervisors can come directly to SEB Power Human Resources (HR). Staff grievances can be raised under Sarawak Energy Industrial Relations, or they can write directly to the SEB Chief Integrity Officer, or the GCEO, or to HR. The Sarawak Energy Employee Survey provides an annual process of engagement with employees. Staff also have access to a confidential Employee Assistance Programme. The internal website provides guidance on communication channels available for staff.			
• management of climate risks	✓	Currently the primary climate risk that Bakun HEP is managing is increased precipitation leading to controlled releases of reservoir water to the downstream river. The communication protocols are well-developed for these releases (see Section 11).			
Channels of communication with Indigenous Peoples are maintained	✓	As above, with BLNA, BAC, BCMSC, and with formal representatives such as the Temenggong.	Directly affected Indigenous Peoples have been involved in decision-making around relevant issues and options	✘	At the time of the assessment in July 2024, some parts of the affected indigenous Peoples communities have been involved in decision-making, but
These channels are:					

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• appropriately timed	✓	No concerns on the timing of engagement have been raised by indigenous representatives.			there was no evidence that was the case for upstream and downstream communities. Bakun HEP has improved its engagement with upstream and downstream communities since that time, and could involve them in decision-making in future, for example through the BCMSC. More can be done to ensure that upstream communities are aware of and involved in BCMSC.
• culturally appropriate	✓	Engagement is culturally-appropriate.			
• two-way	✓	Engagement is two-way.			
A mutually-agreed disputes procedure is in place with Indigenous Peoples	✓	The formal system of indigenous representation (Penghulu, Pemanca, and Temenggong), Adat, and native courts, as described in Section 7, provide established and widely accepted means to resolve disputes. In addition, SEB is in the process of formally recognising these in a Conflict Resolution Procedure that is currently in draft.			
Public disclosure:					
• the business makes significant project reports publicly available	✓	Key project information is now disclosed on a Bakun HEP page within SEB's website. With further improvements made since the assessment in July 2024, the Bakun HEP page now reports on performance (OHS, environmental, grievances, community engagement, employment), includes additional details on a range of issues from water management to integrated management, and includes links to executive summaries of the EMP and the CMP, and the Inception Report of the IPP.	The business publicly reports on project performance in sustainability areas of high interest to its stakeholders	✓	SEB has taken steps towards improving transparency. The updated Bakun HEP website (accessed February 2025) reports on a range of areas of high interest to stakeholders: generation performance, environmental and social performance including numbers of engagement events and grievances (October 2024 data is the latest in February 2025), environmental measures to be taken, controlled releases, water quality, CSR initiatives, H2S research, GHG emissions

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• the business publicly reports on project performance, in some sustainability areas	✓	The Bakun HEP website presents data on safety performance, water management, water quality management, debris control, CSR activities, controlled release plan, Hydrogen Sulphide, and GHG research programmes, and Bakun's Integrated Management System.			research, and the biodiversity monitoring programme. .
• power density calculations, estimated GHG emissions, and / or the results of a site-specific assessment are publicly disclosed	✓	Power density and GHG Emissions Intensity are disclosed in the Annual Sustainability report and on the Bakun HEP website.	The assessment of project resilience is publicly disclosed	✕	The CCAR has not been publicly disclosed.
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	✓	No legal non-compliances are apparent.
• no major non-compliances	✓	No legal non-compliances are apparent.			
• no major non-conformances	✓	There are no major non-conformances with the Corporate Disclosure Policy and Stakeholder Management Policy (both adopted May 2023) or CMP (for example, Bakun HEP conforms with the CMP principle that stakeholders are identified and engaged in the issues of interest to them, and communication and consultation processes maintain good stakeholder relations).	There are no non-conformances	✕	Bakun HEP conforms with the Disclosure Policy (disclosure of ESG performance at the project level). However it does not conform with an objective of the Stakeholder Management Policy (to uphold the principles of transparency): further steps can be taken to ensure that a range of reports (not only executive summaries) are easily accessible, and updates are disclosed regularly.
Communications related commitments have been or are on track to be met	✓	There is no indication that commitments are not on track, but the SMP and CMP are relatively recently prepared, e.g. CMP			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		commitments are mainly for later in 2024 and 2025.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● There are no significant gaps against Minimum Requirements.	8 out of 15

Summary of findings and other notable issues
Bakun HEP has regular engagement with community-level stakeholders, and SEB and Bakun HEP engage with other institutional stakeholders whenever necessary. Bakun HEP's Stakeholder Management Plan (SMP) sets out consultation and communications approaches based on detailed stakeholder mapping, as does the SEB Group Stakeholder Map and Engagement Plan 2024 for corporate-level stakeholders. The SMP has identified emerging issues for Bakun HEP communications and consultation. Ongoing processes of engagement are in place for almost all stakeholder groups and issues, but communication and consultation planning does not show a high level of sensitivity to needs and approaches for various stakeholder groups and issues. A number of improvements were made in response to initial findings of this HSS assessment in July 2024: quarterly ESG meetings were improved to respond to risks and opportunities; the CMP Monitoring Book includes strengthened indicators and targets; the Bakun HEP Grievance Mechanism (GM) Procedure has been strengthened, to ensure all communities are aware of it, and it does not conflate requests and grievances; and significant project reports are being disclosed on the Bakun HEP webpage.

Relevant evidence	
Interview	3, 4, 10, 21-24, 29, 31-35, 37, 38, 42, 43, 48, 50, 56, 57, 63, 64, 70, 71, 73
Document	15, 16, 17, 18, 23, 24, 35, 36, 37, 38, 39, 40, 41, 42, 53, 54, 55, 56, 91, 92, 309, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 383, 413, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 499, 547, 548, 549, 584
Photo	109-114

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)	1,450 m^3/s
Minimum monthly average flow (m^3 / s)	1,264 m^3/s
Maximum monthly average flow (m^3 / s)	1,603 m^3/s
Lowest observed flow (m^3 / s)	34 m^3/s
Highest observed flow (m^3 / s)	6,526 m^3/s
Design flow (m^3 / s)	1,664 m^3/s
Affected river reaches (start/end and how affected)	Bakun dam is situated downstream of the confluence of three rivers, Balui, Murum and Belepeh Rivers. In the downstream, the affected reaches include: from the dam to the confluence with the Belaga River at Belaga town; Belaga to Punan Bah; and downstream of Punan Bah towards Kapit, Kanowit and Sibu. The affected upstream reaches are around 140 km along the Balui River, around 30 km along the Murum River and around 20 km along the Belepeh River.
Proposed downstream flow regimes for environmental or social objectives	Specific downstream flow requirements were in the Conditions of Approval by the Natural Resources and Environment Board Sarawak (NREB), and for the operation stage included: maintenance of regulated flows above a minimum of 300 m^3/s, and occasional release of a flushing flow above 1,300 m^3/s.
Reservoir	
Reservoir length (km)	c.140 km from Bakun to upper Balui river c.30 km from Balui confluence to upper Linau River c.30 km from Bakun to upper Murum river c.20 km from Bakun to upper Belepeh river
Minimum operating level MOL (masl)	195 masl
Normal operating level (masl)	221 – 227.5 masl

Full supply level FSL (masl)	234 m
Reservoir area at FSL (km^2)	695 km^2
Reservoir area at MOL (km^2)	475 km^2
Volume at FSL (million m^3)	43,800 million m^3
Volume at MOL (million m^3)	24,600 million m^3
Average retention time in days	305 days
Number of days for filling	524 days (impoundment period from 13 October 2010 until 9 March 2012)
Other relevant information	Bakun HEP generation is constant, ranging from 1,700 MW to 2,400 MW depending on grid demand, with downstream outflows between 1,300 m^3/s and 1,500 m^3/s. The constant outflow results in constant water levels downstream, where the level is between 53 m to 55 m during normal operations. For optimum operation, the reservoir is maintained below the Full Supply Level (FSL) within the range of 225.0 masl to 227.5 masl. Operating below the FSL allows for larger flood storage and minimises flood discharges and downstream flow fluctuations. Controlled releases through the spillway are made when the reservoir water level reaches 228 masl.

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 no abstraction in the catchment that could affect water availability. The impact of climate change on the long-term water availability for Bakun and Murum dams has been assessed, showing increased precipitation and higher hydropower production under various scenarios (see Section 12). Another study examined the impact of El Niño and La Niña events on reservoir levels using remote sensing, revealing significant rainfall
• hydrological resource availability and reliability	✓	The streamflow available for Bakun HEP was derived from the 1949-1993 discharge series in addition to available rainfall records. Bakun HEP has established 17 hydro-meteorological ("hydromet") stations for continuous monitoring of inflows and weather data. Its Dynamic Water Dispatch Management (DWDM) system has been in use since 2019 to forecast inflows using real-time data as well			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		as weather forecasting models to generate short-term and long-term inflow forecasts.			reductions and lower reservoir levels during severe El Niño episodes.
• reservoir management	✓	The Reservoir Management Plan (RMP) 2024 identifies the following issues for Bakun reservoir: - River flow fluctuations - Floating debris in the reservoir - Water quality - Public health and safety - Biodiversity and declining fish stocks - Erosion and sedimentation - Dam and infrastructure safety - Greenhouse gas emissions			
• downstream flow regimes	✓	SEB's internal report on downstream flow assessment identified various risks and opportunities. A highly detailed Downstream Flow and Water Quality Study is being conducted to assess ongoing ecological, social, and economic issues, with contract award expected in March 2025.	Scenarios, uncertainties and risks for water availability and reliability are routinely and extensively evaluated over the short- and long-term	✓	Water availability and reliability are routinely evaluated over the short- and long-term using the DWDM system using real-time data. The available historical (40 years) inflow data are also evaluated to assess water availability. The climate studies summarised in Section 12 consider multiple scenarios and include projections to the end of this century.
If management measures are required then monitoring is being undertaken to assess if management measures are effective:					
• reservoir management	✓	The DWDM system provides daily and weekly projected reservoir water levels, thus managing potential floods better while reducing impacts to upstream and downstream communities. Reservoir rim monitoring is			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		conducted monthly. The Bakun Dam Safety team conducts surveillance and visual inspections, along with assessing various instrumentation readings, including seismic monitoring. One continuous water quality monitoring station has been established in the reservoir, and H_2S monitoring is undertaken. Nothing is said in the Reservoir Management Plan (RMP, see Management) on monitoring of the effectiveness of the proposed measures.			
• downstream flow regimes	✓	SEB's hydromet stations provide continuous monitoring of water levels downstream, which are used to ascertain compliance with downstream flow commitments and controlled releases. In addition to SEB's hydromet stations, 16 downstream water level stations are continuously monitored by the Department of Irrigation and Drainage (DID) and used for flood control downstream.			
Monitoring is being undertaken of hydrological resource availability and reliability	✓	Monitoring is being done through a network of hydrometric stations throughout the Bakun catchment. See below for details.	Identification of ongoing or emerging reservoir management issues takes into account both risks and opportunities	✓	Some studies and plans will extend monitoring to take account of risks and opportunities: the floating lab will enhance data collection from its upper three arms, helping to finetune RMP measures; the Catchment Management Study for the Bakun-Murum catchment will

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					include hydrology and hydraulic modelling, river water quality modelling, erosion and sedimentation assessment, reservoir rim stability assessment, and remote sensing for land use, land cover, watershed management analysis, and settlements mapping, all aimed at effective reservoir management; the identification of H_2S and GHG issues has led to the research collaboration with Curtin University titled "Research Collaboration on Bioremediation for Mitigation of Hydrogen Sulphide (H_2S) and Greenhouse Gases (GHGs) in Hydropower Reservoirs".
Inputs to this monitoring include:			Issues identification relating to downstream flow regimes takes into account both risks and opportunities	✓	The planned Downstream Flow and Water Quality Study responds to both risks and opportunities. It aims to assess current gaps in knowledge and information on downstream flow and water quality, collect extended baseline data, identify and update social and environmental issues, risks, and impacts, and recommend measures, action plans, and alternatives that will benefit financial, environmental, and social aspects.
• field measurements	✓	Data from 17 hydrometric, weather and gauging stations in the Bakun and Murum catchment are	An assessment has been undertaken that includes identification of the flow ranges	✓	The planned Downstream Flow and Water Quality Study is expected to develop a downstream hydrological

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		collected every 15 minutes, and this real-time data is transmitted using global system for mobile (GSM) and satellite to a central database. Data validation is also carried out by the water resources team at Bakun HEP. In addition, weather forecast data from service provider is also used.	and variability to achieve different environmental, social and economic objectives based on field studies as well as relevant scientific and other information		model to reflect various flow conditions and releases from Bakun HEP, and to carry out bathymetric surveys at downstream reaches to develop a hydraulic model to assess impacts of downstream flow regimes under various conditions. This assessment has not yet been undertaken, but contract award is scheduled for March 2025..
• appropriate statistical indicators	✓	Data are processed, and trends and forecasts are determined using appropriate statistical indicators.			
• issues which may impact on water availability or reliability	✓	Issues which may impact on water availability or reliability largely relate to rainfall and inflows. Monitoring of weather and flows variability is carried out, and short-term (3-day and 7-day) and long-term (up to 7-month) forecasts are generated.			
• a hydrological model	✓	Bakun HEP uses the DWDM system for reservoir management and generation optimisation. The hydrological model within DWDM generates short- and long-term simulations and optimisations based on the following input data: - Hourly rainfall from 19 stations - Hourly water level data - Daily rainfall forecasts data - Hydroelectric plant operational inputs such as daily load commitments, spillway readiness, grid limitations,			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		outage scheduling, plant discharge, etc.			
MANAGEMENT					
Measures are in place to guide generation operations that are based on:			Planning of generation operations has a long-term perspective	✓	Both short-term (3-day and 7-day) and long-term (up to 7-month) forecasting is used to plan generation operations, and a number of climate change studies have provided a perspective for generation operations to the end of the century (see Section 12).
• analysis of the hydrological resource availability	✓	Generation planning and operations are based on real time hydromet data. The DWDM system uses predictive models to forecast future (short-term and long-term) water availability, reservoir inflows, and power generation needs.			
• a range of technical considerations	✓	Generation planning is based on a range of technical considerations factored into the DWDM system, such as hydromet data, weather forecasting, hydrological modelling, water balance analysis, energy demand forecasting, etc. The system incorporates operation of the upstream Murum HEP in order to optimise Bakun HEP generation and enhance flood management.	Planning of generation operations fully optimises and maximises efficiency of water use	✓	The DWDM system ensures optimal use of water by integrating real-time data and grid demand, and the controlled release procedure is used to balance generation with downstream social constraints. The Downstream Flow and Water Quality Study will further study the optimisation of downstream flows.
• an understanding of power system opportunities and constraints	✓	Generation planning is based on grid demand as well as projected reservoir water levels provided weekly from the DWDM system. Based on the updated water availability studies, SEB implemented the re-rating of 4 of the 8 Bakun generating units in 2022.	Planning of generation operations has the flexibility to adapt to anticipate and adapt to future changes	✓	The real-time management system has capability for quick adjustments to generation output and controlled water releases from Bakun HEP allowing for mitigation of flood risks during extreme weather events.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Measures are in place to manage identified reservoir management issues	✓	Regular measures for Bakun reservoir management include: navigation safety for reservoir users; debris management within a 15 km radius of the dam; safety signages along the reservoir including at the jetty used by upstream communities. Since the assessment in July 2024, SEB has strengthened debris management actions, including: strengthened RMP measures on debris management and biomass removal include detailed tasks, categories of severity, methods, zonation, reporting etc; extension of debris removal and disposal to beyond the 15 km radius with the revised debris removal contract to be awarded in June 2025; inspections to identify areas of greatest concern, and continuing monthly inspections, with varying geographical focus; community engagement in the affected longhouses and the establishment of a whatsapp group for headmen to report debris-related issues; and community action (*gotong-royong*) to remove log debris.	Processes are in place to anticipate and respond to emerging risks and opportunities for reservoir management	×	There is no process in place to anticipate and respond to risks and opportunities for reservoir management, such as flood management, public access, shoreline development, fish cages, timber logging, commercial and recreational uses, and coordination of the return of the resettled communities (see Section 7), for example. Formation of the Sarawak Lakes Authority is under discussion to oversee reservoir management in Sarawak, but its establishment timeline and mandate remain unclear. It remains to be seen if it would provide the means to manage these risks and opportunities and clarify SEB's and other partners' roles and responsibilities for reservoir management. The government's recent (February 2025) designation of the reservoir as an 'Aquaculture Industrial Zone' may present risks or opportunities.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
Measures are in place to address identified downstream flow issues	✓	The controlled release procedure is in place for the spilling of high flows, and it takes into account safety of the dam, and the safety of other river users and downstream communities. Currently, there are no measures in place to mitigate impacts on downstream aquatic biota, but it is unclear what these impacts are and how they relate to downstream flows or low Dissolved Oxygen. SEB's commitment to a Downstream Flows and Water Quality Study, with contract award expected in March 2025, is expected to propose measures to mitigate impacts on downstream aquatic biodiversity.	Processes are in place to anticipate and respond to emerging risks and opportunities for downstream flow regimes	✓	Emerging risks and opportunities for downstream flow regimes are identified through stakeholder engagement. An example is from May 2022, when the downstream water level at the Kapit water treatment plant fell below the minimum level. Bakun HEP responded to a request for a controlled release, raising the water level to ensure adequate intake for the treatment plant. Further processes are discussions around the controlled release procedure, and the Bakun Community Management Steering Committee (BCMSC), as discussed in Section 4. Additional risks are: the loss of riverbank crops due to high flows in downstream communities; and flooding in the Sibu area when high flows coincide with high tides. The Downstream Flow and Water Quality Study is a response to risks related to downstream flow regimes.
Where formal commitments have been made to downstream flow regimes, these are publicly disclosed	✓	NREB's Conditions of Approval include downstream flow requirements. These are formal commitments, and they were publicly disclosed.	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	✘	The NREB Conditions of Approval do not clearly specify all of the flow objectives, the magnitude, range and variability of flow regimes, or locations of flows verification and monitoring. The Downstream Flow and Water Quality Study is expected

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
			flows will be verified; and ongoing monitoring		to recommend such requirements, but it has not yet begun and its duration will be at least 1 year.
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	✓	There are no major non-compliances with regards to reservoir management.	• reservoir management	✓	There are no indications of non-compliances with regards to reservoir management.
• reservoir management, with no major non-conformances	✓	There are no major non-conformances with regards to reservoir management.			
• downstream flow regimes, with no major non-compliances	✓	There are no indications of major non-compliances with regards to downstream flow regimes, including with the NREB Conditions of Approval which require: • Real time simulation of the downstream river flow • Occasional flushing flows (about 1,300 m^3/s) in order to provide the sediment flushing capacity in the river downstream of the dam • Maintenance of regulated flows throughout the project life, to increase the average flow during the normal low-flow period of the year • Initial releases of no less than 150 m^3/s with monitoring of water and salinity levels downstream, and immediate	• downstream flow regimes	✓	There are no indications of any non-compliances with regards to downstream flow regimes.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		increases to 300 m^3/s or more when there is an indication of adverse impacts on downstream aquatic environment, navigation and other potentially irreversible changes in the estuarine environment. Regulated flow discharges are fairly continuous from the Bakun HEP, and as a consequence the downstream flows always exceed 300 m^3/s. The periodic controlled releases can be considered flushing flows.			
• downstream flow regimes, with no major non-conformances	✓	There are no indications of any major non-conformance with regards to downstream flow regimes.			
Commitments relating to the following have been or are on track to be met:			There are no non-conformances relating to:		
• reservoir management	✓	Commitments in the RMP have been or are on track to be met.	• reservoir management	✓	There are no indications of non-conformances with regards to reservoir management.
• downstream flow regimes	✓	No other commitments have made in relation to downstream flow regimes except for NREB Conditions of Approval, and communications with downstream communities ahead of a controlled release. These have been delivered.	• downstream flow regimes	✓	There are no indications of non-conformances with regards to downstream flow regimes.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
OUTCOMES					
Downstream flow regimes take into account environmental, social and economic objectives	✓	The current downstream flow regime is primarily governed by Bakun HEP's generation needs. However, regulated flows are maintained throughout its service life, significantly reducing downstream flooding in both frequency and magnitude. Controlled releases from the dam are monitored to prevent loss of life and property downstream. Additionally, social requirements such as extra releases for drinking water at the Kapit water treatment plant are considered as needed.	Downstream flow regimes and commitments are an optimal fit amongst environmental, social and economic objectives within practical constraints of the present circumstances	×	Currently there is no established downstream flow that is regarded as an optimal fit among environmental, social and economic objectives. The Downstream Flow and Water Quality Study is intended to identify key knowledge gaps, collect comprehensive baseline data, and update social and environmental risks. Based on these findings, it is expected that measures and action plans will be put in place to ensure that downstream flow regimes and commitments effectively address these objectives.
Where relevant, they also take agreed transboundary objectives into account	✓	Not applicable.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
• There are no significant gaps against Minimum Requirements.	13 out of 16

Summary of findings and other notable issues
Hydrological resources are managed efficiently for generation planning and operations using real-time data through the DWDM system, allowing for short-term and long-term forecasts. This capability enables the timely release of water through the spillway, effectively managing the impacts of downstream flooding. The downstream flow regime takes social, environmental and economic aspects into account, but cannot be said to be an optimal fit until the Downstream Flow and Water Quality study has been delivered. Reservoir management, including debris control within 15 km of the dam, safety measures, shoreline erosion, and water quality monitoring, is conducted diligently through routine processes. SEB has strengthened debris management, with community engagement on the issue, monthly inspections, and extension to beyond

the 15 km radius when a new contract for debris removal is awarded in 2025. However, there is a lack of clarity on emerging risks and opportunities, including multi-purpose considerations such as leveraging the reservoir for industries like tourism and the risks of the government's designation of the reservoir as an 'Aquaculture Industrial Zone'. The Sarawak Lakes Authority is a proposed agency to manage all reservoirs and lakes in Sarawak, but its mandates and responsibilities remain to be clarified and declared by the Sarawak government, leaving SEB's role in reservoir management uncertain.

Relevant evidence	
Interview	7, 10, 14, 19, 27, 32, 33, 35, 37, 38, 44, 48, 49, 53, 54, 60, 62, 71
Document	114, 195, 201, 211, 212, 213, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 265, 266, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 403, 585, 586, 587, 588, 589, 590, 591, 592, 593
Photo	64, 65, 66, 68, 69, 70, 72, 73, 115, 117, 112, 125, 127, 128, 129, 130

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)	2,400 MW at commissioning; re-rated in 2021 to 2,520 MW
Average reservoir area (representing area of flooded land, net of pre-impoundment water body) (km^2)	695 km^2
Power density (W / m^2)	3.6 W/m^2 (after re-rating)
Emissions intensity (gCO_2e / kWh)	39.9 gCO_2e/kWh
National and regional policies, plans and commitments relevant to mitigation	In its national statement to the latest Conference of Parties (COP28) in December 2023, Malaysia pledged to reduce its GHG emissions intensity by 45% in 2030 compared to 2005 levels, and to aspire to achieve net-zero GHG emissions. Malaysia is passing the Energy Efficiency and Conservation Act, formulating a Climate Change Bill, and has launched a voluntary carbon market. Aligning with Malaysia's commitments, the Sarawak government is establishing carbon pricing mechanisms, energy transition strategies, digital carbon management platform, carbon levy, hydrogen economy, biofuels, offshore wind, and energy efficiency technologies. The Sarawak Legislative Assembly passed the Environment (Reduction of Greenhouse Gases Emission) Bill in November 2023 to regulate GHG emissions, promote carbon capture and storage, and mitigate climate change effects to achieve net zero carbon emissions by 2050. Sarawak Government is investing in nature-based solutions like reforestation, and has established Forest (Forest Carbon Activity) Rules 2022, and the Land Code (Carbon Storage) Rules 2022.
Climate Change Resilience	
Hydrological data available for the project site and the basin, and observed climate trends	Section 11 provides an overview of hydrological data availability for Bakun. Between 1970–2013, Sarawak experienced a surface mean temperature increase of 0.14°C–0.25°C per decade. The surface mean temperature for Sarawak from 1951 to 2013 showed a very slight increasing trend (increase of 0.14°C–0.25°C per decade) The long-term average annual rainfall remains at 3,500 mm. The frequency of extreme flood events in Malaysia has increased in recent decades.

Regional and basin-level climate models relevant to the project location, if any	Climate-related studies and the regional and basin-level climate models that they use, relevant to Bakun's location, are listed below.
Any climate change predictions for the project location, and degree of consistency	Studies with climate change predictions for Malaysia, Sarawak and Bakun all consistently show increased rainfall under a range of scenarios. The main studies are: • ADB (2021), *Climate risk country profile: Malaysia.* Asian Development Bank. This predicted increased temperatures and frequency and intensity of flood events under all Representative Concentration Pathways (RCPs, i.e. scenarios). The highest emissions pathway, RCP8.5, had average temperatures increasing by 3.11°C by the 2090s, compared to 0.8°C for the lowest emissions pathway, RCP2.6. • Hussain *et al* (2017), *Projected changes in temperature and precipitation in Sarawak State of Malaysia for Selected CMIP5 Climate Scenarios*. This assessed RCPs using the CanESM2 Global Circulation Model (GCM), using the Statistical Downscaling Model (SDSM), and presented climate change projections for 3 Sarawak coastal cities including Bintulu, for which annual rainfall increased by 1.4% between 2071 and 2100. High seasonal variability was shown, varying between -18.7% and +15.9%, with relatively less precipitation during December-February and more during June-August. • Wan Yusof *et al*. (2017), *Assessing Hydropower Resilience under changing climate: Murum-Bakun cascade in East Malaysia*. This analysed climate change impacts on precipitation for the Rajang river basin using models from the Coupled Model Intercomparison Project Phase 2 (CMIP5). The mean inflow at Bakun Dam under RCP4.5 and RCP8.5 respectively would remain the same and increase by 4% during the 2020's, and increase up to 4% and 11% during the 2080's. • Sa'adi *et al* (2017), *Projection of spatial and temporal changes of rainfall in Sarawak of Borneo Island using statistical downscaling of CMIP5 models*. This study downscaled 20 GCMs of CMIP5, with all GCMs under various scenarios showing increased precipitation in almost all parts of Sarawak. • Hussain *et al* (2018), *Evaluation of CMIP5 models for projection of future precipitation change in Bornean tropical rainforests*. This assessed climate change impacts of the Rajang river basin using models from CMIP5, and selecting three GCMs. It showed an increase in annual precipitation of 7% and 10% under RCP4.5 and RCP8.5 by the end of the twenty-first century. • Chin *et al* (2022), *Assessing Downstream Flood Risk under Changing Climate for Bakun Dam in Sarawak*. This developed flood modelling for Bakun Dam down to Belaga. The results show projected peak rainfall and peak discharge increasing between 6-27% and 7-30% respectively. Corresponding floodplain maps were generated for pre-and post-Bakun Dam using GeoHECRAS software, showing floodplain impacts for downstream structures and communities.
National policies, plans and commitments relevant to adaptation and resilience	In its national statement to COP28, Malaysia pledged to maintain at least 50% of the country's land area under forests and tree cover as an adaptation measure. Malaysia is formulating a National Adaptation Plan. Sarawak, being the state of Malaysia with the largest extent of forest cover, aims to protect and enhance its natural capital for adaptation, as well as to become a net carbon sink for mitigation.

Other relevant information	The SEB Sustainability Roadmap 2023-2025 includes Climate Action as one of its five themes. Relevant strategies include climate mitigation and adaptation, and reporting standards (i.e. climate disclosures in annual reports). SEB publicly reports on its Scope 1, 2 and 3 emissions in its Annual Report, including for Bakun HEP, and publicly discloses its GHG emissions estimates and intensity on the Bakun website. SEB has made commitments in line with the Science-Based Targets initiative (SBTi) to reduce scope 1, 2 and 3 GHG emissions.

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/m^2, net GHG emissions (gCO_2e) of electricity generation are calculated, independently verified and periodically updated	✓	Power density is below 5 W/m^2, at 3.6 W/m^2. SEB applied the G-res tool to Bakun HEP in 2021, and the application and results were independently verified in November 2021. The G-res analysis reported for Bakun GHG emissions: reservoir-wide emissions 618,437 tCO_2e/yr; Allocated Emissions Intensity 39.9 gCO_2e/kWh; and net GHG footprint integrated over 100 years of 885 gCO_2e/m^2/yr.	If a site-specific assessment is required, it incorporates a broad range of scenarios, uncertainties and risks	✓	A site-specific assessment is not required. However, SEB's Research and Development (R&D) division, Limnology and Gases Unit, conducted in-situ GHG measurement for all SEB's hydropower reservoirs, starting with Batang Ai HEP in 2010. The first measurement for Bakun HEP was in 2012 and the collection continues to the present day. Several innovative assessment approaches are being progressed by SEB R&D. The R&D team is considering using remote sensing/ autonomous methods for more accurate measurements of emissions. A prototype of the Sarawak Energy Environmental Monitoring Remotely Operated Vehicle (SEEMROV) is currently under development. SEB's R&D division recently commenced a "Research Collaboration on Bioremediation for Mitigation of H_2S and GHGs in HPP Reservoirs" (described under Section 3). If successful, this collaboration would deliver a biofilter system for conversion of reservoir methane (CH_4) and hydrogen
If power density is below 5 W/m^2 and estimated emissions are above 100 gCO_2e/kWh, a site-specific assessment of GHG emissions is	✓	Emissions intensity based on the G-res results is 39.9 gCO_2e/KWh, and therefore a site-specific assessment is not required.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
undertaken and periodically updated					sulphide (H_2S), both GHGs, into CO_2, a less potent GHG, and elemental sulphur.
Climate Change Resilience					
An assessment of the project's resilience to climate change is undertaken and periodically updated	✓	The Bakun Climate Change Assessment Report (CCAR), dated May 2024, includes a risk and opportunity matrix based mainly on the International Hydropower Association (IHA) Hydropower Sector Climate Resilience Guide, Annex B Risk and Opportunity Register. A series of workshops were conducted to identify climate change risks and opportunities for the Bakun CCAR, involving relevant departments within SEB (R&D team, Mentarang Induk HEP, Baleh HEP and Bakun HEP) as well as Owner's Engineers (Entura, SMEC, NorConsult). Plans for periodically updating this assessment have not been specified; given its recent development, this is not considered a significant gap.	Assessment of resilience incorporates sensitivity analysis, project specific hydrological modelling using recognised climate models	✓	At the moment, the assessment of resilience has been conducted in a workshop for Bakun HEP, based on published research (see Background), with the results summarised in the CCAR. The research incorporates recognised climate models (e.g. GCMs, CMIP5). The CCAR incorporated sensitivity analyses by drawing on this published research, which forecasted climate change for different Representative Concentration Pathways (RCPs). RCPs are prescribed pathways for GHG and aerosol concentrations, together with land use change, that are consistent with a set of broad climate outcomes used by the global climate modelling community. The CCAR incorporated the results of project-specific hydrological models that were applied, with recognised climate models, in some of the studies (e.g. see Wan Yusof *et al* 2017 in the Background).
The assessment:					
• incorporates an assessment of plausible climate change at the project site	✓	The CCAR incorporates plausible climate change at Bakun, based on several published research papers that have investigated potential changes in rainfall patterns in rural			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		areas of Sarawak (see Background section).			
• identifies a range of climatological and hydrological conditions at the project site	✓	Climate change analyses summarised in the Bakun CCAR identify a range of potential future climatological and hydrological conditions at the Bakun HEP site, notably relating to rainfall, temperature and extreme weather events.			
• applies these conditions in a documented risk assessment or stress test	✓	The CCAR reports on the documented risk assessment for Bakun HEP that applies the forecast climate change conditions.			
The risk assessment or stress test encompasses:			The project's opportunities to provide adaptation services are considered on an ongoing basis	×	The Bakun CCAR identifies two possible areas for which adaptation services could be further considered – project-affected community livelihood impacts related to climate-dependent agricultural practices, and biodiversity-related objectives. So far, these opportunities have not been the focus of any analysis. As the CCAR has been a one-off exercise, no follow-up regarding Bakun HEP adaptation services has been identified and planned. Examples that could be assessed further are set out under 'environmental and social risks' under Minimum Requirements.
• dam safety	✓	The Bakun CCAR encompasses dam safety. Dam safety risks identified include: the spillway is of insufficient size to pass floods; erosion at the dam toe tailrace occurs due to increased spillway discharges; increased windspeed reduces the dam freeboard; and reservoir slope instability causes landslides at the reservoir rim.			
• other infrastructural resilience	✓	The climate change risk assessment for Bakun encompasses other infrastructure resilience in quite some detail. Infrastructure resilience risks identified include, for example: equipment failures due to heat, mould, condensation; increased bush			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		fires damaging transmission lines and sub-stations; flooding of infrastructure shortening material life, damaging panels; and trips/ shutdowns.			
• environmental and social risks	✓	The Bakun CCAR included a natural hazard assessment drawing on the World Bank's ThinkHazard! Initiative, and identified a number of risks, including for example: urban flood risks for Belaga; increased reservoir backwater effects from precipitation increases, notably for Long Busang in the upper reservoir; increased deadly heat waves and/or droughts causing human health impacts; increased landslides; and compounded biodiversity losses. The study of downstream flood risk (see Background) showed that projected peak rainfall and peak discharge under future changing climate increase between 6 – 27% and 7 - 30% respectively, and generated maps to show flood impacts on downstream structures and communities.			
• power generation availability	✓	Forecasts for increased precipitation, and consistency across various studies give confidence for future power generation availability. Published research (see Background) shows that			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		the average annual energy is forecast to increase under all RCPs by the 2080s. The CCAR risk assessment included the risk of increased evaporation losses (drier air), leading to reduced water for generation. Threats were listed as increased reservoir losses, and reduced energy output. The assessment concluded that, as the reservoir is quite large, the impact is not significant.			
MANAGEMENT					
Climate Change Mitigation					
If GHG emissions estimates assume design and management measures, these measures are in place	✓	No assumptions are made regarding Bakun design and management measures.	Management measures are in place to respond to risks and opportunities including offsetting emissions	✓	Management measures are in place to respond to some climate change opportunities. An example is the re-rating of machines to be able to generate more power from the Bakun HEP: this has been completed for 4 machines, and it could be extended to the remaining 4 machines. Initial ideas on emissions offsetting have been considered, but not clearly developed or proposed. Floating solar is being considered for all of SEB's hydro reservoirs, starting with Batang Ai HEP.
			Plans are in place to monitor parameters used in GHG emissions estimates or to monitor GHG stocks	✓	Parameters used in GHG emissions estimates from the reservoir have been monitored, as described under Assessment.
Climate Change Resilience					

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Measures are in place to avoid or reduce identified climate risks	✓	Bakun Dam's Controlled Release (CR) is a measure in place that will reduce the identified climate risk of more precipitation. Procedures for the CR ensure advance notification of downstream communities to get ready for discharge of water through Bakun Dam's spillway (see Section 11).	Measures take account of a broad range of risks and inter-relationships	✓	A Sustainability Finance and Climate Change team has been created under the corporate Sustainability Division; once fully established, SEB will be well set up to respond to climate change risks and opportunities. Climate Change Action Plans, including for Bakun HEP, will be developed and presented to the SEB Group Sustainability Committee for endorsement. The CCAR shows it has taken account of a broad range of risks and inter-relationships. For example, extreme storm events can lead to increased landslips which can lead to increased sediments which can lead to infrastructure issues; or increased precipitation leads to higher reservoir levels which can lead to increased backwater effects for the Long Busang longhouse. Another inter-relationship identified is that the projected increase in ambient temperature may increase electricity demand due to increased demand for cooling and air conditioning. Measures include consideration of potential Bakun HEP upgrades to utilise the forecasted increased precipitation, which would effectively mean fewer Controlled Releases (CRs), reducing their risks for downstream residents.
			Processes are in place to respond to unanticipated climate change	✓	The SEB Power Hydro Team and the Bakun HEP Dam Safety team are in place and able to respond to some unanticipated climate change scenarios. SEB Power Hydro brought a Drought Dam Safety Emergency Management Plan to the SEB Executive for endorsement in July 2023. With the El Niño phenomenon expected to last till the end of 2023, establishing a Drought DSEP was considered necessary. It includes trigger values and mitigation measures for SEB's HEPs, and even includes mitigation measures to facilitate the scenario of Sarawak's reduced potential power

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					generation and grid stability. The proposal also sought endorsement for development of a cloud seeding process and procedures, and to run a trial exercise.
			Plans are in place to provide adaptation services if necessary	✘	At this time, there are no specific plans in place for identified adaptation areas (e.g. regarding agricultural livelihoods, or biodiversity).
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	✓	Bakun HEP has no non-compliances.
• no major non-compliances	✓	Bakun HEP has no major non-compliances.			
• no major non-conformances	✓	Bakun HEP has no major non-conformances.	There are no non-conformances	✓	Bakun HEP has no non-conformances.
Mitigation-related commitments have been or are on track to be met	✓	SEB is setting itself up to ensure that its commitments to SBTis (see Background) can be met.			
Climate Change Resilience					
Processes and objectives relating to resilience have been and are on track to be met with:			There are no non-compliances	✓	Bakun HEP has no non-compliances.
• no major non-compliances	✓	Bakun HEP has no major non-compliances.			
• no major non-conformances	✓	Bakun HEP has no major non-conformances.	There are no non-conformances	✓	Bakun HEP has no non-conformances, as the CCAR has not yet been developed into an Action Plan.
Resilience-related commitments have been or are on track to be met	✓	Bakun HEP has no resilience-related commitments.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
OUTCOMES					
Climate Change Mitigation					
The project's GHG emissions are demonstrated to be consistent with low carbon power generation	✓	The G-Res tool for reservoir emissions verified that Bakun's GHG emissions are consistent with low carbon power generation, with emissions intensity well below 100 gCO_2e/kWh.	Project net emissions are minimised or project operations facilitate system emissions reductions	✘	So far Bakun HEP has focussed on showing that reservoir GHG emissions are consistent with low carbon power generation. Small-scale initiatives that can reduce GHG emissions have been identified and promoted, e.g. car-pooling, vehicle emissions testing, LED lighting, tree planting, paper usage reduction, domestic waste reduction, and better maintenance and replacements for old vehicles. Whilst these are all positive initiatives, it cannot yet be said, in the absence of a quantified Bakun GHG emissions reduction strategy, that Bakun HEP net emissions are minimised. SEB's Annual Sustainability Report 2022 shows that Sarawak's grid emission intensity was greatly reduced with the introduction of Bakun HEP into the system (2011-2014), but it remains to be demonstrated how project operations facilitate further system emissions reductions. The Dynamic Water Dispatch Management (DWDM) system may help limit spills and thus reduce the need to meet Sarawak electricity demand with thermal generation, but this is simply efficient water management. The feasibility of a floating solar scheme at Bakun HEP is yet to be determined.
Climate Change Resilience					
Findings of the climate change assessment indicate that the project is resilient to climate change	✓	All indications from the assessments conducted to date are that the Bakun HEP is resilient to climate change. With regards to dam safety risks, it was concluded that the Bakun Dam spillway is designed to cater for Probable Maximum Flood (PMF) even	The project is resilient under a broad range of scenarios	✓	Multiple published research papers show that Bakun is resilient to a broad range of climate change scenarios, expressed as RCPs (see Background).
			The project will contribute to climate change adaptation at	✘	The Bakun HEP may be able to contribute to climate change adaptation, but work focussed on this has not begun.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		with climate change-induced increased flows (see Section 4).	a local, regional or national levels		

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
● No significant gaps against minimum requirements.	11 out of 15

Summary of findings and other notable issues
SEB has been monitoring GHG emissions from Bakun reservoir for ten years, and has independently verified that Bakun reservoir's GHG emissions are consistent with low carbon power generation. SEB has set Science-Based Targets for corporate GHG reductions in line with targets set at the State and National levels, and is setting up its governance and organisational structures and strategies to ensure that it will be able to achieve these. A number of published climate change studies consistently forecast increased precipitation for the Bakun HEP under a range of globally-standardised scenarios known as Representative Concentration Pathways (RCPs). All indications are that Bakun HEP is resilient to the effects of climate change under low emission and high emission RCPs to the end of this century. At this point in time, Bakun HEP fully meets Minimum Requirements for Climate Change Mitigation and Resilience, and most of the Advanced Requirements, but will need to further establish the proposed organisational capacity to meet more Advanced Requirements. As of yet, Bakun HEP needs to show quantitative progress in minimising its GHG emissions, and to show action to identify and contribute to wider adaptation to climate change.

Relevant evidence	
Interview	2, 51
Document	43, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 262, 263, 264, 266, 267, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 452, 453
Photo	13, 24, 33

Appendix 1 – Interviews

Ref	Interviewee/s, Position	Organisation	Date	Location
1	1. Susie Nadya Anak David Asen (LST) 2. Curazon Landon Anak Munan (LST) 3. Wilfred Wong Kam Veng (SEB HSS Internal Assessor)	Sarawak Energy	11-Jun-24	Online (MS Teams)
2	1. Susie Nadya Anak David Asen (LST) 2. Mohd. Firdaus Bin Ibrahim (LST)	Sarawak Energy	14-Jun-24	Online (MS Teams)
3	1. Jiwari Bin Abdullah @ Jong Jan Jung, (General Manager, CSR & Social Impact Management) 2. Encharang Anak Ngtingih (Station Manager, Bakun HEP) 3. Mahmood Bin Long (Senior Manager, Community Relations & Consultation, CSR & Social Impact Management) 4. Irwan Bin Borhan (Senior Executive, CSR & Social Impact Management) 5. Bit Surang (Senior Executive, CSR & Social Impact Management) 6. Nur Khairin Binti Bujang (Senior Executive, Sustainability)	Sarawak Energy	26-Jun-24	Online (MS Teams)
4	1. Peing Tajang (Vice President, Corporate Shared Services) 2. Mahmood Bin Long (Senior Manager, Community Relations & Consultation, CSR & Social Impact Management) 3. Bit Surang (Senior Executive, CSR & Social Impact Management)	Sarawak Energy	28-Jun-24	Online (MS Teams)
5	1. Ir. Bunyak Lunyong (Chief Executive Officer, SEB Power) 2. Hajah Siti Aisah Bt. Adenan (Senior Vice President, Corporate Services) 3. Jonny Wong Kwei Ji (Vice President, Hydro) 4. Mohamad Irwan Bin Aman (General Manager, Sustainability)	Sarawak Energy	02-Jul-24	CEO SEB Power Office, Level 7, Menara SEB
6	1. Marconi Madai (Senior Vice President, HSSE) 2. Robin Tigai (General Manager, Health, Safety & Environment) 3. Encharang Anak Ngtingih (Station Manager, Bakun HEP) 4. Zarifina Binti Sarbini (Senior Manager, HSSE) 5. Julaidi Bin Rasidi (Senior Manager, HSSE) 6. Patrick Anak Sibat (Senior Manager, HSSE) 7. Dr. Bong Yii Change (Occupational Health Doctor, HSSE) 8. Watiqah Binti Chali (Senior Engineer, HSSE) 8. Nur Ainiza Binti Zakaria (Senior Executive, HSSE)	Sarawak Energy	02-Jul-24	(Hybrid) S2, Level 7, Menara SEB & Online (MS Teams)
7	1. Dr. Ng Sing Muk (General Manager, Research & Development) 2. Zarifina Binti Sarbini (Senior Manager, HSSE)	Sarawak Energy	02-Jul-24	S2, Level 7, Menara SEB

	3. Dr. Martin Anyi (Senior Manager, Distributed Energy Resources) 4. Karen Lee Suan Ping (Manager, Environmental Sciences) 5. Edwin Sia Sien Aun (Senior Biologist, Research & Development) 6. Nur Ainiza Binti Zakaria (Senior Executive, HSSE)			
8	1. Rita William Toyad (Head of Department, Urban and Rural Development Division, EPU Sarawak) 2. Benard Anak Upieh (Assistant Director, EPU Sarawak) 3. Ikmal Hisham Maharon (Assistant Director, EPU Sarawak) 4. Ir. Ts. Dr. Angelia Liew San Chuin (Special Administrative Officer and Advisor (Climate Change and Sustainable Development, Department of the Premier of Sarawak)	Economic Planning Unit	02-Jul-24	Level 6, EPU Office, Wisma Bapa
9	1. Simon Loh Cheng Kui (Assistant General Manager, Business Continuity Management) 2. Jerry Betie Chin Timothy Asson (Senior Manager, Dam Safety) 3. Mervin Kuek Teck Chia (Manager, Business Continuity Management, GCOO Office) 4. Irwan Bin Borhan (Senior Executive, CSR & Social Impact Management) 5. Jonathan Tiong Kung Yew (Engineer, Hydro) 6. Stephanie Alex (Engineer, Hydro) 7. Sandiarri Bin Sutimin (Senior Technician, Hydro)	Sarawak Energy	02-Jul-24	(Hybrid) S2, Level 7, Menara SEB & Online (MS Teams)
10	1. Sinanawati Marto (Head of Bintulu Division, NREB) 2. Siti Hajar Beinti Wahab (Assistant Environmental Control Officer, NREB Bintulu Branch)	Natural Resources and Environment Board (NREB), Bintulu	03-Jul-24	NREB Bintulu
11	1. Dr Melvin Chung Hsien Liang (Divisional Health Officer, Bintulu)	Bintulu Divisional Health Office, Ministry of Health Malaysia	03-Jul-24	Media Room, Bakun HEP
12	1. Ervin Kana (Medical Assistant, Ministry of Health)	Ministry of Health Malaysia	04-Jul-24	Bakun Clinic , Bakun HEP
13	1. Patrick Anak Sibat (Senior Manager, Occupational Safety, HSSE) 2. Dr. Bong Yii Change (Occupational Health Doctor, HSSE) 3. Marcus Ngau Laeng (Senior Executive, HSSE)	Sarawak Energy	04-Jul-24	(Hybrid) Media Room, Bakun HEP & Online (MS Teams)
14	1. Jonathan Tiong Kung Yew (Engineer, Hydro) 2. Raphael Ruezo bin Thomas (Engineering Assistant, Hydro)	Sarawak Energy	04-Jul-24	Bakun HEP
15	1. Mohd. Azam (Head of DOSH Bintulu) 2. Fadhli Azhar (Plant & Machinery Assistant Inspector, DOSH)	Department of Occupational Safety and Health (DOSH)	04-Jul-24	Online (MS Teams)

16	1. Carl Jensen (Consultant, SMEC) 2. Robert Polzinger (Consultant, SMEC)	SMEC	04-Jul-24	Online (MS Teams)
17	1. Tay Guan Heng (SME 1, Building & Infrastructure, Hydro) 2. Goh Chee Hui (Manager (Mechanical & Civil), Hydro) 3. Melvin Aedy Anak Anyoi (Senior Engineer, Hydro)	Sarawak Energy	04-Jul-24	SEB Hydro Owners Project Management (HOPM) Office, Bakun HEP
18	1. Lewis Ayan (Project Manager, Ibraco) 2. Wesley Tang Tiong Huo (Deputy Project Manager, Ibraco) 3. Abdul Aziz Nawabdeen (Safety Health Officer, Ibraco) 4. Jelim Edward Martin (Site Safety Supervisor, Ibraco)	Ibraco Construction Sdn Bhd	04-Jul-24	SEB Hydro Owners Project Management (HOPM) Office, Bakun HEP
19	1. Andrian Kalang Anak Fedrick (Maintenance Technical Executive, Hydro) 2. Donnie Anyang (Maintenance Technician, Hydro) 3. Kevin Umpang Anak Sauh (Plant Performance Technician, H2S Monitoring, Hydro) 4. Diana Kulleh (Contractor - Abadi Trading, Housekeeper at Clubhouse)	Sarawak Energy	04-Jul-24	Media Room, Bakun HEP
20	1. Dr. Allen Chai Shiun Chat (Medical Officer, Sg. Asap Health Clinic) 2. Dr. Abdul Muqsit bin Mohd Jamil (Medical Officer, Sg. Asap Health Clinic)	Ministry of Health Malaysia	04-Jul-24	Health Clinic, Sg. Asap
21	1. Upo Apui (Representative of Maren Uma/ Village Head) 2. Communities of Uma Nyaving		04-Jul-24	Uma Nyaving, Sg. Asap
22	1. Paren Lepo Padan Bisau (Village Head) 2. Communities of Uma Baha (Bakah)		04-Jul-24	Uma Baha (Bakah), Sg. Asap
23	1. Penghulu Dominic Minggu Magui 2. Communities of Uma Penan Talun		04-Jul-24	Uma Penan Talun, Sg. Asap
24	1. Paren Lepo Matu Lian (Village Head) 2. Communities Uma Sambop		04-Jul-24	Uma Sambop, Sg. Asap
25	1. Louis Velda (Regional Manager, Sarawak Forestry Corporation)	Sarawak Forestry Corporation	05-Jul-24	Media Room, Bakun HEP
26	1. Karen Lee Suan Ping (Manager, Environmental Sciences, Research & Development) 2. Keswarran Kalimuthu (Senior Executive, Environmental Impact Assessment (EIA)) 3. Tonny Anak Ganyai (Senior Aquatic Ecologist, Research & Development) 4. Toloy Keripin Munsang (Aquatic Ecologist, Research & Development)	Sarawak Energy	05-Jul-24	(Hybrid) Media Room, Bakun HEP & Online (MS Teams)

27	1. Chia Fuk Jing (Manager, Hydro) 2. Susie Nadya Anak David Asen (Manager, Water Management, Hydro) 3. Admund Gabriel Anak Andrew (Operation Manager, Bakun HEP) 4. Jerry Betie Chin Timothy Asson (Senior Manager, Dam Safety) 5. Jonathan Tiong Kung Yew (Engineer, Hydro) 6. Tonny Anak Ganyai (Senior Aquatic Ecologist, Research & Development) 7. Toloy Keripin Munsang (Aquatic Ecologist, Research & Development)	Sarawak Energy	05-Jul-24	(Hybrid) Media Room, Bakun HEP & Online (MS Teams)
28	1. Dr. Wilson Ling (Medical Officer, Belaga Health Clinic) 2. Daryll Pandong Anak Kunang (Medical Assistant, Belaga Health Clinic)	Ministry of Health Malaysia	05-Jul-24	Belaga Health Clinic
29	1. Puan Bidah Lujah (District Officer Belaga)	Belaga District Office	05-Jul-24	District Officer Belaga/ District Disaster Management Committee (DDMC)
30	1. Local communities among SEB staff in Bakun HEP		05-Jul-24	Media Room, Bakun HEP
31	1. Maren Uma Lejau Sirek (Village Head) 2. Communities of Uma Sekapan Piet		05-Jul-24	Uma Sekapan Piet (Downstream of Bakun HEP)
32	1. Maren Uma Lato Juman (Village Head) 2. Communities of Uma Long Amo		05-Jul-24	Uma Long Amo (Downstream of Bakun HEP)
33	1. Maren Uma Lukut Kesing (Village Head) 2. Communities of Uma Apan, Long Mejawah, Belaga		05-Jul-24	Uma Apan, Long Mejawah, Belaga (Downstream of Bakun HEP)
34	1. Laja Leveuk Sylvia Senah Lasah (Village Head) 2. Communitiies of Uma Kejaman Lasah, Long Segaham		05-Jul-24	Uma Kejaman Lasah, Long Segaham (Downstream of Bakun HEP)
35	1. Communities of Rumah Punan Bah		06-Jul-24	Rumah Punan Bah
36	1. Penghulu Katan Lawai (Sg. Asap resettlee originated from Long Lawen)		06-Jul-24	Media Room, Bakun HEP
37	1. Maren Uma Aging Bato (Village Head) 2. Communities of Uma Long Kebuho		07-Jul-24	Uma Long Kebuho
38	1. Maren Uma Abeng Awing (Village Head) 2. Communities of Long Lebuie		07-Jul-24	Long Lebuie
39	1. Encharang Anak Ngtingih (Station Manager, Bakun HEP) 2. Admund Gabriel Anak Andrew (Operation Manager, Bakun HEP) 3. Mohd Hafizul Bin Masdar (Maintenance Manager, Bakun HEP) 4. Susie Nadya Anak David Asen (Manager, Water Management, Hydro)	Sarawak Energy	07-Jul-24	Media Room, Bakun HEP
40	1. Shahrizal Bin Mustapha (Integrated Management System Specialist, Integrated Management System & Assurance (IMSA), Corporate Shared Services)	Sarawak Energy	09-Jul-24	Car ride enroute to SEB

41	1. Maria Lee Siao Ling (Chief Integrity & Compliance Officer) 2. Loretta Kerawang Anak Bangkam (Manager, Compliance) 3. Olivia Marie Wong Wei Yin (General Manager, Group Risk & Insurance) 4. Dennis Bong Yee Long (Manager, SEB Power & SER Group & Corp. Support Functions) 5. Jessica Empang Lian (Senior Executive, Finance) 6. Aminudin Bin Abdul Kadir (Senior Engineer, Hydro) 7. Jasmine Minotty Anak Akaw (Senior Manager, Finance)	Sarawak Energy	09-Jul-24	(Hybrid) S2, Level 7, Menara SEB & Online (MS Teams)
42	1. Eivind Kofod (Study Manager/ Environmental Consultant, Chemsain Konsultant Sdn Bhd) 2. Tay Siok Ying (Study Coordinator/ Senior Environmental Executive, Chemsain Konsultant Sdn Bhd)	Chemsain Konsultant Sdn Bhd	09-Jul-24	Chemsain Office, Kuching
43	1. Jefrin Johnny Gutuk @ Mohd. Jefrin Azlan Abdullah (Head of NREB Betong Division) 2. Agnes Remina Anak Seliman (Head of Compliance Section, NREB) 3. Valecca Sibuar (Head of Water Quality Section, NREB)	Natural Resources and Environment Board, Bintulu	09-Jul-24	NREB Office, Kuching
44	1. Fiona Anak Vivian Raya (Manager, Sarawak Energy Resources) 2. Bantin Anak Tommy (Senior Engineer, Sarawak Energy Resources)	Sarawak Energy Resources	09-Jul-24	Online (MS Teams)
45	1. Mohamad Irwan Bin Aman (General Manager, Sustainability) 2. Darylynn Chung Yiu Li (Manager, Sustainability/ESG - SEB Power)	Sarawak Energy	09-Jul-24	S2, Level 7, Menara SEB
46	1. Oswald Braken Tisen (Environmental Impact Assessment (EIA))	Sarawak Energy	09-Jul-24	S1, Level 7, Menara SEB
47	1. Kong Pik Hung (Senior Manager, HR - SEB Power) 2. Aida Widya Binti Jemat (Senior Executive, HRiB SEB Power) 3. Danielle Bridget Clarke (Executive, HRiB Hydro)	Sarawak Energy	09-Jul-24	S1, Level 7, Menara SEB
48	1. Yang Berhormat Datuk Liwan Lagang (Member of Sarawak State Legislative Assembly N65 Belaga & a Sg. Asap resettlee from Uma Balui Liko)	Sarawak State Legislative Assembly	09-Jul-24	LCDA Tower, Kuching
49	1. Dr. Rosmina Binti Ahmad Bustami (Team Lead for the Study, UNIMAS) 2. Dr. Haslina Hashim (Team Member- Socioeconomic & Social Impact Study, UNIMAS) 3. Marjorie Maria Lympa (Research Assistant for the Study, UNIMAS)	University of Malaysia Sarawak (UNIMAS)	10-Jul-24	Online (MS Teams)
50	1. Irwan Bin Borhan (Senior Executive, CSR & Social Impact Management 2. Bit Surang (Senior Executive, CSR & Social Impact Management) 3. Nur Khairin Binti Bujang (Senior Executive, Sustainability)	Sarawak Energy	10-Jul-24	(Hybrid) S2, Level 3, Menara SEB & Online (MS Teams)

51	1. Mohd. Firdaus Bin Ibrahim (Senior Executive, Sustainability) 2. Susie Nadya Anak David Asen (Manager, Water Management, Hydro)	Sarawak Energy	10-Jul-24	S1, Level 3, Menara SEB
52	1. Mohamad Hafiz Bin Kadir (Senior Executive, Generation Central Services) 2. Yusermarina Binti Sapiee (Senior Clerk, Hydro)	Sarawak Energy	10-Jul-24	S2, Level 3, Menara SEB
53	1. Jerry Lenggir (Assistant Enforcement Officer, Sarawak River Board)	Sarawak River Board	10-Jul-24	Online (MS Teams)
54	1. Ir Rudi Bin Abg Zamhari (Divisional Engineer, DID Sibu Division)	Department of Irrigation and Drainage	24-Jul-24	Online (MS Teams)
55	1. Nicholas Daby Anak Henry Atie (Head of Conservation Section, Sarawak Museum Department)	Sarawak Museum Department	24-Jul-24	Online (MS Teams)
56	Temenggong Ajang Sirek and Pemanca Unak Akah		5-Jul-24	Belaga lunch meeting
57	1. Irwan Bin Borhan (Senior Executive, CSR & Social Impact Management) 2. Diana Mail (Clerk, Corporate Shared Services) 3. Jane Ering (Clerk, CSR & Social Impact Management) 4. Larry Ngang Luhat (Consultant, CSR & Social Impact Management)	Sarawak Energy	5-Feb-25	Online (MS Teams)
58	1. Jonny Wong Kwei Ji (Vice President, Hydro) 2. Jiwari Bin Abdullah @ Jong Jan Jung (General Manager, CSR & Social Impact Management) 3. Encharang Anak Ngtingih (Station Manager, Bakun HEP) 4. Irwan Bin Borhan (Senior Executive, CSR & Social Impact Management) 5. Bit Surang (Senior Executive, CSR & Social Impact Management)	Sarawak Energy	5-Feb-25	Online (MS Teams)
59	1. Tonny Anak Ganyai (Senior Aquatic Ecologist, Research & Development) 2. Jackshaman Anak Ahed (Botanist, Hydro) 3. Calvin Belulok Ngang (Wildlife Ecologist, Hydro)	Sarawak Energy	6-Feb-25	Online (MS Teams)
60	1. Susie Nadya Anak David Asen (Manager, Water Management, Hydro) 2. Jonathan Tiong Kung Yew (Engineer, Hydro)	Sarawak Energy	6-Feb-25	Online (MS Teams)
61	1. Dr Ng Sing Muk (General Manager, Research & Development) 2. Dr Martin Anyi (Senior Manager, Research & Development) 3. Karl Diffenny Anak Robert Achang (Engineer, Research & Development)	Sarawak Energy	7-Feb-25	Online (MS Teams)
62	1. Brian Chong (Director, Chemsain Konsultant Sdn. Bhd.) 2. Tan Shwu Mei (Project Manager, Chemsain Konsultant Sdn. Bhd.)	Chemsain Konsultant Sdn. Bhd.	7-Feb-25	Online (MS Teams)
63	1. Darylynn Chung Yiu Li (Manager, Sustainability/ESG – SEB Power) 2. Nur Khairin Binti Bujang (Senior Executive, Sustainability)	Sarawak Energy	7-Feb-25	Online (MS Teams)

	3. Irwan Bin Borhan (Senior Executive, CSR & Social Impact Management)			
64	Teacher Angeline Edward Lingok (Community Member of Uma Nyaving, Long Menjawah)		10-Feb-25	Online (MS Teams)
65	Maren Uma Donny (Headman for Uma Juman, Bakun Resettlement Scheme)		10-Feb-25	Online (MS Teams)
66	Nicholas Daby Anak Henry Atie (Head of Conservation, Sarawak Museum)	Sarawak Museum Department	10-Feb-25	Online (MS Teams)
67	Dr Ipoi Datan (Officer, Majlis Adat Istiadat Sarawak)	Majlis Adat Istiadat Sarawak (MAIS)	10-Feb-25	Online (MS Teams)
68	Pemanca Tony Kulleh (Chairman, Balui Lake Native Association)		10-Feb-25	Online (MS Teams)
69	Amit Ului (Secretary, Balui Lake Native Association)		10-Feb-25	Online (MS Teams)
70	Yang Berhormat Tuan Kennedy Chukpai Ugon (Member of Sarawak State Legislative Assembly N66 Murum)	Sarawak State Legislative Assembly	13-Feb-25	Online (MS Teams)
71	Maren Uma Aging Bato (Headman, Long Kebuho)		13-Feb-25	Online (MS Teams)
72	1. Jerry Betie Chin Timothy Asson (Senior Manager, Dam Safety) 2. Then Woei Yaw (Assistant General Manager, Hydropower Development & Dam Management) 3. Stephanie Alex (Engineer, Dam Safety)	Sarawak Energy	14-Feb-25	Online (MS Teams)
73	Bilong Akah (Secretary, Belaga Action Committee (BAC) – Downstream)		18-Feb-25	Online (MS Teams)

Appendix 2 – Documents

Ref	Author	Year	Title	Notes / links / language
1	SEB	2024	Quality & HSE Objectives for Bakun Hydro Power Generation	
2	SEB	2023	IMS Compliance and Conformity Assessment	
3	SEB	2023	Sarawak Energy Berhad Group Manual of Authority	
4	SEB	2023	Risk Management Policies and Procedures	
5	SEB	2020	Policy, Procedures & Guidelines for Sarawak Energy Code of Ethics (COE)	
6	SEB	2018	Policy, Procedures & Guidelines for Drugs and Alcohol	
7	SEB	2020	Anti Bribery & Corruption Policy	
8	SEB	2021	Anti Bribery & Corruption Policy Statement	
9	SEB	2021	Conflict of Interest Policy, Procedure and Guideline	
10	SEB	2023	Fraud, Bribery & Corruption Risk Management Framework	
11	SEB	2018	Memorandum: Whistleblower Policy 2018 - Interim Practice Note No.1/2022	
12	SEB	2022	Consequence Management Procedures for Non-compliance with Procurement Policies & Procedures (PPP)	
13	SEB	2023	Procurement Policies	
14	SEB	2023	Procurement Procedures	
15	SEB	2023	Corporate Disclosure Policy	
16	SEB	2023	Stakeholder Management Policy 2023	
17	SEB	2024	Bakun HEP Grievance Mechanism Procedure	
18	SEB	2023	Environmental Policy	
19	SEB	2022	Corporate Biodiversity Policy, Procedure, and Guidelines	
20	SEB	2023	Environmental and Social Impact Assessment (ESIA) Guideline	
21	SEB	2023	Sarawak Energy Control Framework	
22	SEB	2023	Corporate Emergency Response and Preparedness	
23	SEB	2023	Sarawak Energy Social Policy	
24	SEB	2022	Sarawak Energy Social Management Framework	
25	SEB	2023	Land Acquisition and Resettlement PPG	
26	SEB	2023	Livelihood Restoration & Community Development	
27	SEB	2022	CSR Policy, Procedures & Guidelines	
28	SEB	2023	Cultural Heritage PPG	

29	SEB	2023	A Corporate Paper - Indigenous Peoples' Rights at Risks and Recommendations for Sarawak Energy	
30	SEB	NA	Emergency Response Plan for COVID-19 Outbreak and Other Pendemics	
31	SEB	NA	Standard Operating Procedure for COVID-19	
32	SEB	2022	Statement of Risk Management and Internal Control & Statement of Corporate Governance 2022	
33	SEB	2023	Statement of Risk Management and Internal Control & Statement of Corporate Governance 2023	
34	SEB	NA	SORMIC benchmark from Malaysia Code of Corporate Governance and Other companies	
35	SEB	2023	Bakun HEP Garis Panduan Aduan untuk Pihak yang Berkepentingan (Stakeholders)	
36	SEB	NA	Bakun HEP Grievance Mechanism Guidelines for Stakeholders	
37	SEB	2024	Bakun HEP Grievance Register Log	
38	SEB	NA	External GM Process Flow	
39	SEB	NA	Grievance Form	
40	SEB	NA	Borang Aduan Bakun HEP	
41	SEB	NA	Bakun HEP Grievance Form	
42	SEB	2020 - 2022	Annual & Sustainability Reports	
43	SEB	2024	Sustainability Report 2023 Concept	
44	SEB	2024	Strategic Risk Profile Annual Risk Review and Emerging Risk Update	
45	SEB	2024	Bakun Tier 3 Risk Profile	
46	SEB	2024	SEBP - Hydro Department Tier 2 Risk Profile	
47	SEB	2024	SEB Power - Tier 1 Risk Profile	
48	SEB	2024	Social Impact Management & CSR Risk Profile	
49	SEB	2024	Sustainability Risk Profile	
50	SEB	2024	Board Level Risk Appetite Statement	
51	SEB	2023	Bakun HPG Risk Action Plan Q2 2023	
52	SEB	2023	Bakun HPG Risk Register Q2 2023	
53	SEB	2024	Approval for Bakun HEP Information Disclosure via Webpage	
54	SEB	2024	Group Operation Management Committee Minutes of Meeting - Approval for Bakun HEP Information Disclosure via Webpage	
55	SEB	2024	Bakun Webpage Content & Concept	
56	SEB	2024	Bakun Webpage	
57	NIOSH Certification	2023	Asset Management- Management Systems Stage 1 Audit Report	
58	NIOSH Certification	2023	Asset Management- Management Systems Stage 2 Audit Report	
59	NIOSH Certification	2023	Information Security Management Systems Stage 1 Aufit Report	
60	NIOSH Certification	2023	Information Security Management Systems Stage 2 Aufit Report	
61	NIOSH Certification	2023	GEOSH Management System Recertification Audit Report	

62	SEB	2023	IMS CCA Corrective Action Request (CAR) Form	
63	SEB	2023	Opportunity For Improvement for IMS CCA Bakun HPG	
64	SEB	2024	Refurbishment of Seismic Monitoring System for Bakun Station	
65	SEB	2023	Service (Tender)	
66	SEB	2022	Supply (Tender)	
67	SEB	2022	Work (Direct Negotiation)	
68	SEB	2021	Work (Tender)	
69	SEB	2022	Hydro Centralized Procurement Standard Operating Procedures (Flowchart)	
70	SEB	NA	Minor Works Tender Procedure	
71	SEB	2024	2024 SEPRO List	
72	SEB	2024	Generation Operation Excellence - Key Focus Area Gear 9 Contract & Procurement	
73	SEB	2024	Procurement Status Tracking for GPI (Works & Services) for Hydro Stations	
74	SEB	2024	SEB Power Procurement Status	
75	SEB	2022	GROUP CRISIS MANAGEMENT PLAN	
76	SEB	2021	BAKUN HYDROELECTRIC PLANT BUSINESS CONTINUITY PLAN	
77	SEB	2021	CRISIS SIMULATION EXERCISE BAKUN HYDROELECTRIC PLANT POST MORTEM REPORT	
78	SEB	2022	BUSINESS RECOVERY EXERCISE BAKUN HEP POST MORTEM REPORT	
79	SEB	2024	Planning of Bakun Community Evacuation Exercise	
80	SEB	2023	DESKTOP WALKTHROUGH EXERCISE BAKUN & MURUM HEP POSTMORTEM REPORT	
81	SEB	2023	Board Sustainability Committee TOR	
82	SEB	2023	Group Sustainability Committee TOR	
83	SEB	2023	Sustainability Governance & Performance Structure	
84	SEB	2023	CEO's Report - Q2 2023 Social Performance Reporting	
85	SEB	2024	CEO's Report - Sustainability Feb 2024	
86	SEB	2023	Key Focus Areas (High Performacnce Culture) - Q4 2023	
87	SEB	2024	Key Focus Areas (High Performacnce Culture) - Q1 2024	
88	SEB	2023 - 2024	Generation Operation Excellence - Key Focus Area Quarterly Updates	
89	SEB	2023	GOE GENX KFA 3.0 Terms of Reference	
90	SEB	2023	Generation Excellence Key Focus Area Introduction	
91	SEB	2024	Bakun ESG Committee 2024	
92	SEB	2024	Bakun HEP- ESG MoM 2024	
93	SEB	2024	Bakun HEP Organogram	
94	SEB	2024	Sustainability Department Organisation Chart	
95	SEB	2024	SEB Power Sustainability & ESG Organogram	

96	SEB	2024	CSR & Social Impact Management Organogram	
97	SMEC	2023	Bakum Dam Safety Review Report - Final (June 2023)	
98	SEB	2024	Plant Performance- Bakun Hydro Power Generation	
99	SEB	2024	SEB Compliance Management Framework - Consultant Scope of Works	
100	SEB	2024	Assurance, Risk & Compliance Forum - Integrity & Compliance	
101	SEB	2024	Quality HSE Objective 2024 v2.0	
102	Ministry of Utilities & Telecommunication Sarawak	2012	Bakun HEP Generating License	
103	SEB	2024	Bakun HSS Preparation Activities 2020 - 2024	
104	SEB	2024	Sustainability KPI for each Division & Unit for 2024	
105	SEB	2024	Proposed Integrated Workforce Planning 2025_Corporate Services (Sustainability)	
106	SEB	2024	Sustainability Strategy & Roadmap + SBTi	
107	Securities Commission Malaysia	2021	Malaysia Code of Corporate Governance 2021	
108	SEB	2024	Bakun HEP Plant Management Meeting	
109	RAM	2023	[ESG Extract] Bakun Hydro Power Generation Sdn Bhd RAM Rationale 2023	
110	Ekran Berhad	1995	Bakun HEP EIA	
111	NREB	2002	EIA Report/EIS/EMP Approval by NREB	
112	Ekran Berhad	1995	DEIA for Reservoir Preparation	
113	Ekran Berhad	1995	DEIA for Dam and Ancillary Facilities	
114	Ekran Berhad	1995	DEIA for Downstream Hydrology	
115	Envisar	2019	EIA for Bakun Expansion	
116	Natural Resources and Environment Board (NREB)	2020	Bakun HEP Expansion EIA Final Report	
117	Natural Resources and Environment Board (NREB)	2021	EIA Approval for Bakun Expansion	
118	SEB	2024	Bakun HEP Biodiversity Monitoring and Evaluation Plan (BMEP)	
119	SEB	2024	Bakun HEP Biodiversity Management Plan	
120	Hindawi Publishing Corporation	2016	Assessment of Heavy Metals in Water, Sediment, and Fishes of Large Tropical Hydroelectric Dam in Sarawak, Malaysia	
121	Hindawi	2019	Effects of Opened and Closed Spillway Operations of a Large Tropical Hydroelectrical Dam on the Water Quality of the Downstream River	

122	Borneo Journal of Resource Science and Technology	2018	Nutrient Level of a Young Tropical Hydroelectric Dam Reservoir in Sarawak, Malaysia	
123	Sains Malaysiana	2016	Physicochemical Parameters of Bakun Reservoir in Belaga, Sarawak, Malaysia, 13 Months after Reaching Full Supply Level	
124	Hindawi Publishing Corporation	2016	Physicochemical Characteristics of River Water Downstream of a Large Tropical Hydroelectric Dam	
125	Hindawi	2017	Seasonal Changes and Spatial Variation in Water Quality of a Large Young Tropical Reservoir and Its Downstream River	
126	SEB	2020	Historical Data Analysis on Bakun Fish Diversity	
127	SEB	2020	Historical Data Analysis on the Efficiency Flow and Fish Diversity of Murum HEP	
128	SEB	2022	Case Study of Fish in Cascade Hydropower (Murum-Bakun HEP)	
129	SEB	2023	Biodiversity Assessment & Monitoring Workshop for Bakun HEP	
130	SEB	2024	Biodiversity Monitoring Tool (BioMot) Competition	
131	SEB	2023	Biodiversity and Assessment Workshop Report for Bakun HEP	
132	SEB	2023	Biodiversity and Assessment Workshop Report for Bakun HEP	
133	SEB	2023	BIODIVERSITY RAPID ASSESSMENT OF BAKUN HEP	
134	SEB	2024	BAKUN HEP BIODIVERSITY MONITORING & EVALUATION PLAN Dec 2023 & Q1 Mar 2024 Update	
135	SEB	2024	Biodiversity Monitoring & Evaluation Report Bakun HEP (BKQ1)	
136	Sarawak Hidro Sdn Bhd	2008	Wildlife Monitoring and Rescue (WiMoR) Plan	
137	Sarawak Hidro Sdn Bhd	2012	Wildlife Monitoring and Rescue Operation at Bakun Hydro Electric Project Flooded Zone	
138	SEB	2020	Wildlife Monitoring and Rescue (WiMoR) Programme Presentation	
139	SEB	2023	Proposal of Bakun HEP Research Floating Laboratory	
140	SEB	2023	Biodiversity Rapid Assessment of Bakun HEP	
141	SEB	2024	Proposal of Bakun Centre of Excellence for Biodiversity and Environmental Research	
142	SEB	2024	Proposal of Bakun Centre of Excellence for Biodiversity and Environmental Research (RIMT Approval)	
143	SEB	2023	Engagement with Sarawak Forestry Corporation Bintulu Regional Office	
144	SEB	2022	Memorandum of Understanding between SEB and Sarawak Forestry Corporation	
145	SFC	NA	Public Awareness Signboard on Protected Animal	
146	SEB	2024	Appointment Letter for BMEP Committee dd 25.3.2024 S	
147	SEB	2024	Map of Monitoring Sites in Bakun	
148	SEB	2024	Bakun BMEP Committee	
149	SEB	2024	HSS6 List of any Migratory Species	
150	SEB	2024	HSS6 List of Biodiversity-related Commitments	
151	SEB	2024	HSS6 List of Invasive Species	

152	SEB	2024	HSS6 List of Most Important Flora	
153	SEB	2024	HSS6 List of the nearby Protected Areas	
154	SEB	2024	HSS6 List of Universities	
155	SEB	2024	HSS6 List of valued Fish	
156	SEB	2024	HSS6 Short Description of the Ecological Region of Bakun	
157	SEB	2024	Bakun HEP Environment Management Plan (Operation Stage) V1	
158	SEB	2023	Air Quality Performance – Fleet Management Smoke Test Record 2023	
159	SEB	2024	Air Quality Performance – Dark Smoke Monitoring Report 2024	
160	SEB	2024	H2S Reading (Supply and Demand Meeting)	
161	SEB	2015-2023	BAKUN H2S Monitoring Summary	
162	SEB	2020-2023	Bakun H2S Monitoring Y2020 to Y2023	
163	SEB	NA	H2S Mitigation	
164	SEB	2018	Hydrogen Sulfide H2S Impact to Electrical & Electronic Equipment	
165	The International Society for Automation (ISA)	1986	ISA-71.04-1985 Environmental Conditions for Process Measurement and Control System Airborne Contaminants	
166	SEB	2022-2024	Bakun Water Quality Continuous Monitoring System (CMS) – Monthly Report	
167	SEB	2022-2023	Bakun Water Quality Continuous Monitoring System (CMS) - Yearly Report	
168	SEB	2024	Bakun HEP Quarterly Environment Performance Report	
169	SEB	2024	Boundary Noise Monitoring Report	
170	SEB	2022-2023	SEACE Environmental Assessment	
171	SEB	2024	SEACE Portable Spill Kit Inspection 2024	
172	SEB	2024	SEACE STP Visual Inspection 2024	
173	SEB	2024	SEACE Temporary SW Storage Inspection 2024	
174	SEB	2024	SEACE Weekly Site Inspection Powerhouse	
175	SEB	2024	SEACE Weekly Site Inspection Warehouse & Switchyard	
176	SEB	2024	Waste Management Performance	
177	SEB	2024	Water Quality Performance Reports	
178	SEB	2024	Action Plan Mini Workshop 020524	
179	SEB	2023	Bakun HEP EASI & SIR	
180	SEB	2023	Bakun HEP EASI & SIR	

181	SEB	2022	Bakun HPG Environmental Legal Register List and Evaluation of Compliance	
182	SEB	2023	Attendance Chemical Spillage and Drill Training 2023	
183	SEB	2023	Chemical Spill Control, Procedure & Drill Training Notes	
184	SEB	2023	2023 Training Attendance_Certificate record	
185	SEB	2023	Chemical Spillage Training Slide	
186	SEB	2019-2023	Training Plan & Summary	
187	SEB	2024	Corporate Environment Objective Target and Plan 2024 and Bakun HEP OTP	
188	SEB	2024	Environment Planner (BHPG) May 2024	
189	SEB	2024	(Draft) RES. ESIA Guideline Rev01. 06.02.24. v06	
190	SEB	2021	Corporate HSE MS Manual_Rev 0. 01.03.21	
191	SEB	2019	RES-SOP-RO-EOSH-02-01-Identification And Evaluation of Environmental Aspects and OSH Hazards	
192	SEB	2019	RES-WI-HQ-ESH-05-04-Identification And Evaluation of Environmental Aspects Methodology	
193	SEB	2019	RES-SOP-RO-EOSH-03-01-Identification and Maintenance of Compliance Obligation	
194	SEB	2020	Scheduled Wastes Management SOP_v00	
195	SEB	2021	WI-Reservoir Water Quality Monitoring_21.4.2021_GS	
196	SEB	2019	Document Control Masterlist (Power Station)	
197	SEB	2023	Bakun HEP EOSH MOM (Q1-Q4, 2023)	
198	SEB	2023	Centralised Environment - Operation Meeting No. 1-4, 2023	
199	SEB	2024	Centralised Environment - Operation Meeting No. 1, 2024	
200	SEB	2023	MoM EOSH Documents Update	
201	Natural Resources and Environment Board (NREB)	2022	Minute Of Meeting with NREB HQ	
202	Natural Resources and Environment Board (NREB)	2023	Reply Letter from NREB on Bakun WQM Report	
203	Natural Resources and Environment Board (NREB)	2019	NREB Directive dated 19.08.2019 for Bakun to install CMS	
204	SEB	NA	Ear Protection Signage Photo	
205	SEB	NA	Garbage Bin Photo	
206	SEB	NA	SW Building Photo	
207	SEB	2024	Bakun HSS Certification Interview Slide_Topic 1_E&S_020724	
208	SEB	2024	Bakun HSS Certification Interview Slide_Topic 3_Water Quality & Sediments_020724	

209	SEB	2024	Bakun Training Log Crane Rectification Work	
210	Natural Resources and Environment Board (NREB)	1995	A Handbook of the Policy and Basic Procedure of EIA in SarawakNREB	
211	SEB	NA	Assesssing Downstream Flood Risk Under Changing Climate for Bakun Dam in Sarawak	
212	SEB	2017	Evaluation of CMIP5 models for projection of future precipitation change in Bornean tropical rainforests	
213	SEB	2017	Assesssing Hydropower Resilience under Changing Climate: Murum-Bakun Cascade in East Malaysia	
214	SEB	2024	Bakun HEP Climate Change Assessment Report	
215	SEB	2021	Bakun GCB Unit 7- Generator Circuit Breaker System — Field Service Report	
216	SEB	2008	275KV CB Manual	
217	SEB	2020-2023	Sarawak Energy SF6 Data 2020 - 2023 (Bakun)	
218	SEB	2024	Bakun HEP - Climate Change Presentation	
219	SEB	2023	Sarawak Energy Berhad Near-Term Approval Letter	
220	SEB	2023	Sarawak Energy's SBTi and 1.5C Business Ambition Journey	
221	SEB	2023	Sarawak Energy Berhad Near-Term Target Validation Report	
222	Sarawak River Boad	2022	Controlled Release Correspondence & Notices: May, Sept, Dec 2022	
223	Hatch	2021	Sarawak Energy Berhad Dynamic Dispatch and Water Management System - Inflow Vista Training Manual	
224	SEB	2024	Weekly Indicative Running Notification (Jan - April 2024)	
225	SEB	2024	Weekly Dispatch (Jan - April 2024)	
226	SEB	2022 - 2024	Yearly Generation Plan by GSO	
227	SEB	2022 - 2024	Long Term and Short Term Weekly Inflow Projection Reports	
228	SEB	2024	Long Term Water Balance Reports (Jan - June 2024)	
229	SEB	2023	Hydro River Water Level Weekly Projection 2023	
230	SEB	2024	Hydro River Water Level Weekly Projection 2024	
231	SEB	2023	Summary Of Bakun HEP Daily Generation And Water Level Status (Jan 2023)	
232	SEB	2023	Summary Of Bakun HEP Daily Generation And Water Level Status (Dec 2023)	
233	SEB	2024	Summary Of Bakun HEP Daily Generation And Water Level Status (Jan 2024)	
234	SEB	2023	Updates on Drought DSEP; Trigger Values & Mitigation Measures	
235	SEB	2024	Bakun Inflow Forecast Report (Jan 2024)	
236	SEB	2023	Bakun Inflow Forecast Report (July-Aug 2023)	
237	SEB	2023	Bakun Inflow Forecast Report (Long Term 2023)	

238	SEB	2023	Bakun Inflow Forecast Report (Short Term for June 2023)	
239	SEB	2023	Bakun Inflow Forecast Report (Short Term for Nov 2023)	
240	SEB	2023	Bakun Water balance Forecast Report (7 Jan- 30 June 2024)	
241	SEB	2023	Bakun Water balance Forecast Report (31 Dec 2023-30 June 2024)	
242	SEB	2023	Bakun Water balance Forecast Report (18 June - 31 Dec 2024)	
243	SEB	2024	Bakun Water balance Forecast Report (11 Feb- 31 June 2024)	
244	SEB	2023	Bakun Water balance Forecast Report (9 Jan-J4 Aug 2023)	
245	SEB	NA	Dam Level Analysis (2019 - 2023)	
246	SEB	2023	Hydro Reservoirs Water Level Projection: Week 50 (10 - 17 Dec 2023)	
247	SEB	NA	Hydrometric Station in Murum-Bakun Catchment	
248	SEB	2023	Establishment of a new rainfall station at Long Kebuho (Bakun Reservoir)	
249	SEB	2023	Hydrometric Station Register: Hydrometric Network System in Murum-Bakun Catchment	
250	SEB	2024	Bakun Hydrology Info	
251	SEB	2022	Controlled Release Reporting (May, Sept, Dec 2022)	
252	SEB	2024	Contract Strategy for Consultancy Services for Downstream Flow and Water Quality Study for Bakun HEP	
253	SEB	2024	Request for RFP for the Consultancy Services for Downstream Flow and Water Quality Study for Bakun HEP	
254	SEB	2024	BHEP SUMMARY DAILY GENERATING-05 JULY 2024	
255	SEB	2024	Monthly Logsheet Power Generation 2024 (with Guidevane)	
256	SEB	2024	Control Operator (CO) Daily Logsheet 30.06.2024	
257	SEB	2024	Control Operator (CO) Daily Logsheet 01.07.2024	
258	SEB	2024	Control Operator (CO) Daily Logsheet 02.07.2024	
259	SEB	2021	GOMC - Rerating Exercise Up to Date	
260	SEB	2022	GEC Paper Updates on Bakun Re-rating Exercise	
261	SEB	2024	Request for proposal - Murum-Bakun Catchment Management Plan	
262	SEB	2024	Bakun HEP Controlled Release Procedure	
263	g-res tool	2021	Bakun HEP GHG Emissions Assessment using g-res tool	
264	g-res tool	2021	g-res Tool Validation Report #3.02158	
265	SEB	2024	Bakun HEP Downstream Flow Assessment Report	
266	SEB	2024	Sarawak Energy NBS Carbon Sequestration Project Presentation to FDS	
267	SEB	2022	Data Template for Assurance SR22 (Main Grid CO2 Emission Intensity)_for NREB	
268	SEB	2002	Bakun Concept Design Brief Vol.1 of 2_Dec 2002_Sedimentation rate_Section1.6.4	
269	SEB	2024	Bakun HEP Reservoir Management Plan	
270	SEB	2022	Reservoir Management Review for Baleh Hydroelectric Project	
271	SEB	2024	Bakun HEP Reservoir Management Plan	

272	SEB	2021	Sarawak Hydrolake Management & Development Plan 2030 – Executive Summary	
273	SEB	2021	Sarawak Hydrolake Management & Development Plan 2030 – Vol I Main Report	
274	SEB	2021	Sarawak Hydrolake Management & Development Plan 2030 – Vol II Technical Appendices	
275	SEB	2024	R&D Progress Update with GCOO June 2024 (Meeting 2024/5)	
276	SEB	2020	Bakun GHG Research - Appendices for PM Award 2020	
277	SEB	2021	Bakun GHG Research - Appendices for PM Award 2021	
278	SEB	2022	Bakun GHG research updates Dec 2022	
279	SEB	2023	Compiled Bakun Intake Outlet and Downstream GHG concentrations	
280	SEB	2022	GHG Research Programme Lead Updates 2022	
281	SEB	2021	GHG Research Programme Lead Updates 2021 Report	
282	SEB	2020	GHG writeup PM award Bakun R&D 2020	
283	SEB	2021	GHG writeup PM award Bakun R&D 2021	
284	SEB	2020	Programme Lead Updates GHG Research Programme 2020	
285	SEB	NA	Data Request No.4 (SEB)	
286	SEB	NA	EV 2030 Timeline	
287	SEB	NA	Data Request No.4 Green Mobility (SEB)	
288	SEB	NA	GHG emissions Reduction Programs in Bakun	
289	SEB	2021	Research Agreement - Corrosion Study at Bakun Hydroelectric Plant, Sarawak	
290	SEB	2023	Research Agreement - Research Collaboration on Bioremediation for Mitigation of Hydrogen Sulphide (H2S) and Greenhouse Gases (GHG) in Hydropower Reservoirs	
291	SEB	2018 - 2024	H2S Compilation 2018-2024	
292	SEB	NA	Hydropgen Sulphide (H2S) Trend - Selected Data from Bakun HEP	
293	SEB	2022	Hydropgen Sulphide (H2S) Research Programme - Programme Leads Updates (2022)	
294	SEB	NA	Corrosion Study in Bakun Hydropower Plant, Sarawak - Summary Report	
295	Curtin University	2023	Research Collaboration on Bioremediation for Mitigation of H2S and GHG in Hydropower Reservoirs – Progress Report 1	
296	Curtin University	2024	Bioremediation for Mitigation of H2S and GHG in Hydropower Reservoirs – Industrial Grants Progress Report 1	
297	Curtin University	2024	Bioremediation for Mitigation of H2S and GHG in Hydropower Reservoirs – Industrial Grants Progress Report 2	
298	Curtin University	2024	Bioremediation for Mitigation of H2S and GHG in Hydropower Reservoirs – Industrial Grants Progress Report 3	
299	SEB	2024	Environmental and Social Impact Assessment (ESIA) Guideline	
300	SEB	2024	GEC Paper - Environmental and Social Impact Assessment (ESIA) Guideline	

301	SEB	2024	Briefing on ESIA Guideline - Attendance report	
302	SEB	2024	Picture - Briefing session	
303	SEB	2020	EC 18-2020 Transmission Line Maintenance Strategy	
304	SEB	2024	Environmental Management Guidelines: Slope Protection Works at Similaju-Bakun SB287	
305	SEB	2024	Environmental Monitoring Report_2Q24_SB287_090724	
306	SEB	2024	Site Mapping With Proforma Checklist_Murum Junction Bakun MJB22	
307	SEB	2024	Development and Application of a Self-Sustaining Modular Aeration Technology (SMArT) System for Bakun HEP	
308	SEB	2024	Bakun Training Log Crane Rectification Work	
309	SEB	2024	Community Engagement (Association, Political Party and NGOs) 23 & 24 May 2024	
310	SEB	2024	Bakun 5S Committee Meeting dd 19.01.2024	
311	SEB	2024	Bakun Staff Locality	
312	Land and Survey	2024	Sarawak Maps Scale 1:750,000	
313	Land and Survey	2024	Sarawak Maps Scale 1:500,000	
314	Land and Survey	2024	Sarawak Maps Scale 1:2,000,000	
315	Malaysian Gov	2021	SLIDES - Employees Minimum Standards of Housing, Accomodations and emenities Act 1990 [Act 446]	
316	Malaysian Gov	2021	Employees Minimum Standards of Housing, Accomodations and emenities Act 1990 [Act 446]	
317	Malaysian Gov	2021	Housing-amenities-Act	
318	SEB	2015-2024	BAKUN H2S Monitoring Summary	
319	SEB	2020-2023	Bakun H2S Monitoring Y2020 to Y2023	
320	SEB	NA	H2S Mitigation	
321	SEB	2018	Hydrogen Sulfide H2S Impact to Electrical & Electronic Equipment	
322	SEB	2024	H2S Bakun Improvement Works for HSS	
323	SEB	2022 - 2024	Bakun Environment, Occupational, Safety and Health (EOSH) Quarterly Meeting	
324	SEB	2024	HSSE Contractors' Meeting No.1_2024.v1 signed	
325	SEB	NA	COVID-19 Outbreak Emergency Response Plan_Rev 1.0	
326	SEB	2021	Post MCO COVID-19_GROUP_SOP	
327	SEB	2024	Bakun HPG HSSE Performance Statistic	
328	SEB	2019 & 2023	Annual report Bakun Clinic	

329	SEB	2021-2023	Fitness To Work – Health Assessment and Surveillance	
330	SEB	2024	Health monitoring for Bakun staff	
331	SEB	2024	Occupational Health Site Inspection Report	
332	SEB	2023	Bakun HEP_Employee Health and Wellbeing 2023	
333	SEB	2024	BAKUN HPG HSSE Performance Statistic MARCH 2024.v1	
334	SEB	NA	SEB Health Assessment Form	
335	SEB	2023 - 2024	Bakun HEP Safety Indicators 2023 & 2024	
336	SEB	2023	OR2 Contract Agreement	
337	Ibraco	2024	Ibraco Construction Health, Safety & Environment Plan OR2 2024	
338	Ibraco	2024	Ibraco Construction- OR2 Security and Management Plan	
339	SEB	2024	OR2 Site Inspection Report_V2	
340	Envisar	2021	OR2 Environmental Management Plan (EMP)	
341	Natural Resources and Environment Board (NREB)	2022	OR2 Environmental Management Plan (EMP) - NREB Approval	
342	Ibraco	NA	Sarawak Energy Safety Pasport (SESP) Training List	
343	Ibraco	NA	Sarawak Energy Safety Passport (SESP) CARD	
344	SEB	NA	Screenshots of SEB Employee Portal	
345	SEB	2024	Pre-read HSS Assessment - Section 2 Labour and Working Conditions	
346	SEB	2024	Bakun Accommodation for Bakun Staffs - 2024	
347	SEB	2024	Locality of Bakun HEP Staff- 2024	
348	SEB	2024	Internal Application for Staff	
349	SEB	2024	HSSE Communication Channels	
350	SEB	2023	New Position Demand (IWP2023) Sustainability Section	
351	SEB	2018	Recruitment Policy, Procedure & Guidelines	
352	SEB	2024	Sarawak Energy Hall of Fame (SEHOF)]	
353	SEB	2023	Sarawak Energy Employee Survey (SEES)	
354	SEB	2023	Sarawak Energy Employee Survey (SEES)	
355	SEB	2023	Bakun HEP Sarawak Energy Employee Survey Report 2023	
356	SEB	2023	Diversity, Equity and Inclusiveness	
357	SEB	2024	HSE Observation (UAUC) Monitoring for Bakun	
358	SEB	2024	UAUC Life jacket 7 July 2024	
359	SEB	2024	Bakun HEP Community Management Plan	

360	SEB	2024	CMP Monitoring Book	
361	SEB	2024	Bakun Social Impact Summary	
362	SEB	NA	Extract of Bakun HEP CSR Activities	
363	SEB	2021 - 2024	CSR Contributions (2021 - 2024)	
364	SEB	2024	Attendance 2023 - BLNA	
365	SEB	2024	Attendance BAC 2024	
366	SEB	2023	Attendance BLNA 2024	
367	SEB	2024	Briefing Slides for Meeting with Bakun Consultative Committees (8 April 2024)	
368	SEB	2023	CSR Communication Pack_BLNA & PMMU 2023	
369	SEB	2022	Slide Presentation for Bintulu 22 Dec 2022 - BAC	
370	SEB	2022	Slide Presentation for Bintulu 25 Nov 2022 - BLNA & PMMU	
371	SEB	2023	MINIT MESYUARAT SARAWAK ENERGY BERSAMA BELAGA ACTION COMMUNITY BIL.1_2023	
372	SEB	2024	MINIT MESYUARAT SARAWAK ENERGY BERSAMA BELAGA ACTION COMMUNITY BIL.1_2024	
373	SEB	2023	MINIT MESYUARAT SARAWAK ENERGY BERSAMA BALUI LAKE NATIVE ASSOCIATION DAN PENG MAREN MAREN UMA BIL.1_2023	
374	SEB	2024	MINIT MESYUARAT SARAWAK ENERGY BERSAMA BALUI LAKE NATIVE ASSOCIATION DAN PENG MAREN MAREN UMA BIL.1_2023	
375	Department of Statistics	2022	My Local Stats Belaga, Sarawak 2022	
376	Department of Agriculture	NA	Information from Department of Agriculture	
377	Jawatankuasa Pesta Daerah Belaga	2023	MoM Belaga Regatta Rev 1	
378	SEB	2023	Progress Assessment Report on Uma Ukit on MBOR -	
379	Sinaran Bakun	2018	Sinaran Bakun - Submission of memorandum to SEB	
380	SEB	2022	Dam Safety Emergency Planning Bakun 2022	
381	SEB	2024 - 2026	Emergency Preparedness Plan 2024 - 2026	
382	SEB	30-Jan-24	MURUM-BAKUN HYDRO CASCADE ERP WORKSHOP WITH EXTERNAL STAKEHOLDERS	
383	SEB	2023-2024	Dam Safety Engagement Records	
384	SEB	2022	2022 Dam Safety Checklist	
385	SEB	2023	2023 Dam Safety Checklist	
386	SEB	2024	2024 Dam Safety Checklist	

387	SEB	2018-2023	Bakun Annual Inspection Report	
388	SEB	2023-2024	Bakun Dam Instrumentation Monitoring	
389	SEB	2017-2024	Bakun Dam Safety - Weekly Report	
390	SEB	2020-2024	Bakun Outage (Tunnel Inspection)	
391	SEB	2021-2024	Bakun Quarterly Instrumentation Report	
392	SEB	2019-2024	Seismic Monitoring - Incident Report	
393	SEB	2023	Bakun Dam Safety Emergency Plan Report 2023	
394	SEB	2024	Bakun Clinic Health Monitoring	
395	SEB	2023	SMEC Findings - Action Log Status 1	
396	SEB	2024	Action Log - 1st AI Findings in March 2024	
397	SEB	NA	Murum-Bakun Hydro Cascade Map	
398	SEB	NA	Population At Risk for Bakun Downstream v2	
399	SEB	2024-2026	Emergency Preparedness Schedule 2024-2026	
400	SEB	2024	RFQ Remedial Work of Drainage Drop Shaft at LHS Abutment for Bakun HEP, Year 2024	
401	Ministry of Health	2024	Common Diseases Data from Belaga District 2019 TO 2024	
402	SEB	2024	2024 Mid-Year Performance Review for Sandiarri Sutimin	
403	UNIMAS	2024	Study on the Impacts of Pre- and Post- Bakun Hydropower Plant on Rejang River Basin and its Communities	
404	PE Research Sdn Bhd	1996	Socio-Economic Impact Study of the Catchment, Reservoir and Downriver Communities June 1996	
405	PE Research Sdn Bhd	1996	Socio-Economic Study of the Human Population in the Catchment and Downriver Area of the Proposed HEP	
406	Tan Chee Beng	1994	Review of Socio Economic Studies for Bakun HEP with Preliminary Recommendations for Resettlement - A Report submitted to the State Planning Unit, Jabatan Ketua Menteri, Sarawak	
407	Economic Planning Unit	2019	Terms of Reference: Master Plan for Community Development in the Resettlement Areas 2050: Batang Ai, Bakun, Murum and Bengoh	
408	Chemsain Konsultant	2022	Master Plan for Community Development in the Resettlement Areas 2050: Batang Ai, Bakun, Murum and Bengoh Inception Report	

409	Chemsain Konsultant	2023	The Masterplan for Community Development in the Resettlement Areas 2050. Component I: Resettlement Areas Studies Interim 1 Report	
410	Chemsain Konsultant	2023	The Masterplan for Community Development in the Resettlement Areas 2050. Component I: Resettlement Areas Studies Interim 2 Report	
411	Chemsain Konsultant	2023	**EXTRACT OF (BAKUN ONLY)** The Masterplan for Community Development in the Resettlement Areas 2050. Component I: Resettlement Areas Studies Interim 2 Report	
412	SEB	2024	Bakun Community Development Pre and Post Project Comparisons	
413	SEB	2024	CSRSM Bakun HSS Official Assessment	
414	Department of Statistics Malaysia	2022	MY LOCAL STATS BELAGA SARAWAK 2022	
415	Department of Agriculture	2024	List of Entreprenuers and assistance received	
416	SEB	2023	Progress Assessment Report on Uma Ukit on Malaysian Book of Records	
417	Sinaran Bakun	2018	Submission of Memorandum to Sarawak Energy Berhad through our Right Honorbale Chief Minister of Sarawak	
418	SEB	2019	MEMO – Final Budget Release for Tallest Belawing Tower Ceremony	
419		2019	Backdrop Design - Tallest Belawing Tower Malaysia Book of Records	
420		2019	MEMO – Budget Release for Tallest Belawing Tower Ceremony	
421	SEB	2024	Bakun HEP Stakeholder Management Plan	
422	SEB	2024	Corporate Level Stakeholder Map & Engagement June 2024	
423	SEB	NA	Stakeholder Management - SE02 V5	
424	SEB	2023	STAKEHOLDER MANAGEMENT TOOLKIT	
425	SEB	2024	RIMBAWATCH REC Issues Brief Report 1	
426	SEB	2024	RES_Corporate Message House 2024	
427	SEB	2024	Sebuyau and Simunjan issues brief 1	
428	SEB	2020	Perception Survey Report_20.01.2020 1	
429	Meltwater	2024	Sarawak Energy Tonality Report APRIL 2024 1	
430	SEB	2024	[Draft] Conflict Resolution Procedure	
431	SEB	2024	MINIT MESYUARAT JAWATANKUASA PEMANDU PENGURUSAN KOMUNITI BAKUN	
432	SEB	2024	Report Write Up for Community Engagement	
433	Sarawak Government	2022	Laws of Sarawak LAND CODE 2022	
434	Malaysia Government	2020	Laws of Malaysia - National Land Code Act 828	
435	SEB	2015	MoU - Bakun Charitable Trust (Belaga Penan)	
436	SEB	2015	EMC Approval for Collaborative Partnership with Bakun Charitable Trust on Education Fund for Penan Communities in Belaga and Murum	

437	SEB	2022	SFMC Approval for Continuation of Collaborative Partnership on BRS Education Fund 2022	
438	SEB	2024	Memo for Bakun Education Fund 2024	
439	SEB	2020	Sarawak Energy CSR Educational Initiative - Belaga Penan Based Education Fund	
440	SEB	2016-2023	Belaga Penan Education Fund Reports (Year 2016 - 2023)	
441	SEB	2024	[DRAFT] Indigenous People Rights at Risk Assessment Questionnaire	
442	SEB	2024	[WIP] Social Performance Indicators	
443	SEB	2023	Board Audit and Risk Committee Meeting - SORMIC & SOGC	
444	SEB	2024	Bakun HEP Introduction	
445	SEB	2024	Bakun HEP Maps	
446	SEB	2024	Bakun National Park Islands Maps	
447	SFC	2024	Gazetted Totally Protected Area of Sarawak	
448	SEB	2024	SEB Scholarship Recipient Statistics 2024	
449	NREB	2008	EIA - Terms and Conditions Reservoir Preparation (21 February 2008)	
450	-	-	www.keybiodiversityareas.org	
451	-	-	https://chinese.sarawaktourism.com/attraction/birding-sarawak-malaysia/	
452	Hussain et al	2017	Projected changes in temperature and precipitation in Sarawak State of Malaysia for Selected CMIP5 Climate Scenarios	
453	Sa'adi et al	2017	Projection of spatial and temporal changes of rainfall in Sarawak of Borneo Island using statistical downscaling of CMIP5 models	
454	SEB	2024	Contract For Service Engagement for Wizilla Janti Anak Joshua, Aquatic Ecologist at Bakun and Murum HEP	
455	SEB	2024	Contract For Service Engagement for Calvin, Wildlife Ecologist at Bakun and Murum HEP	
456	SEB	2024	Contract For Service Engagement for Jackshaman, Botanist at Bakun HEP	
457	SEB	2024	Job Description for Senior Executive position, Community Relations & Consultations at Bakun HEP (New Position)	
458	SEB	2024	Job Description for Executive position, Community Relations & Consultations at Bakun HEP (New Position)	
459	SEB	2024	Contract For Service Engagement for Larry Ngang Luhat, Consultant, Community Relations & Consultation,	
460	SEB	2024	Job Description for Consultant, Community Relations & Consultation, CSRSIM.	
461	SEB	2024	Enhanced Job Description for Senior Executive position, Community Relations & Consultations at Bakun HEP (Irwan bin Borhan)	
462	SEB	2024	Job Description for Executive position, Community Relations & Consultations at Batang Ai HEP	

463	SEB	2024	Job Description for Senior Executive position, Community Relations & Consultations at Menara SEB (Jovita Elderson ak Ripen)	
464	SEB	2024	Job Description for Senior Executive position, Corporate Social Responsibility at Menara SEB (Bit Surang)	
465	SEB	2024	Job Description for Executive position, Corporate Social Responsibility at Menara SEB (Anjellyn anak William)	
466	SEB	2024	Job Description for Executive position, Centre of Excellence: New Projects at Menara SEB (Nur Irmanina Hamka)	
467	SEB	2024	Job Description for Executive position, New Project – Liaison Executive for Belaga/Gaat/Etc.	
468	SEB	2024	Job Description for Executive position, SIM - Social Investment / Community Development & Entrepreneurship	
469	SEB	2024	Job Description for Executive position, Centre of Excellence – New Projects – Community Relations & Consultation (Team 2 ; Trusan, Tutoh, etc..)	
470	SEB	2024	Enhanced Job Description for Senior Executive position, Community Relations & Consultations at Murum HEP (Alis Ekan)	
471	SEB	2024	Picture – Job advertisement for New Positions (CSRSM) at Sarawak Energy's Webpage.	
472	SEB	2024	Job Advertisement for Executive position, Community Relations & Consultations (Bakun)	
473	SEB	2024	Job Advertisement for Senior Executive position, Community Relations & Consultations (Bakun)	
474	SEB	2024	Social Training Record for Sustainability/ESG-SEB Power year 2024	
475	SEB	2024	Social Training Record for CSRSM year 2024-2025	
476	SEB	2024	Bakun HEP, ESG Committee – Term of Reference	
477	SEB	2024	Bakun EHP, ESG Committee Dashboard Q4 2024	
478	SEB	2024	Bakun HEP, ESG Committee MoM for Q3 2024	
479	SEB	2024	Bakun HEP, ESG Committee MoM Q4 2024	
480	SEB	2024	Scope of Project for Downstream Flow and Water Quality Study for Bakun HEP	
481	SEB	2024	GOMTC MoM on Permission to Direct Nego for Consultancy Services for Downstream Flow and Water Quality (DWFQ) Study for Bakun HEP	
482	SEB	2024	Briefing slide for DFWQ Study	
483	SEB	2024	Pricing and Payment term for Downstream Flow and Water Quality Study for Bakun HEP	
484	SEB	2024	GOMTC paper on Permission to Direct Nego for Consultancy Services for Downstream Flow and Water Quality (DWFQ) Study for Bakun HEP	
485	SEB	2024	GOMTC MoM on RFP Cancellation Consultancy Services for Downstream Flow and Water Quality (DWFQ) Study for Bakun HEP	
486	SEB	2024	GOMTC paper on RFP Cancellation for Consultancy Services for Downstream Flow and Water Quality (DWFQ) Study for Bakun HEP	
487	SEB	2024	DFWQ Study new timeline due to changes of procurement mode (RFP to Direct Nego)	

488	SEB	2025	Bakun HEP Environmental Management Plan for Operation Stage revision 2	
489	SEB	2024	Bakun HEP Community Management Plan revision 1	
490	SEB	2024	Inspection Checklist EMS_EPTW Tower Inspection	
491	SEB	2024	Inspection Checklist EMS for Tower 1 (MA Tower)	
492	SEB	2024	Inspection Checklist EMS for Tower 2 (TA Tower)	
493	SEB	2024	Briefing slides on Safety and Health Committee to Transmission Department dated 06112024	
494	SEB	2024	Proposed Transmission Department EOSH Committee Members	
495	SEB	2024	Working Instruction (WI) for Transmission Line Inspection and Maintenance for EMS, Bakun	
496	SEB	2024	WI for Transmission Line Slope Inspection and Maintenance for CMS, Bakun	
497	SEB	2024	EAIA – Environment Aspect and Impact Assessment for Transmission Line Operation (TLO)	
498	SEB	2024	Environment Management Plan for Transmission Line Operation (TLO) for Operation Stage	
499	SEB	2024	Bakun HEP Stakeholder Management Plan revision 2	
500	SEB	2024	Picture - Daily updated of Plant Status showing training log gate status dated 12.2.2025	
501	SEB	2024	Power Intake Crane Operation Log Sheet dated 11 November 2024	
502	SEB	2024	Power Intake Crane Operation Log Sheet dated 13 November 2024	
503	SEB	2024	Power Intake Crane Operation Log Sheet dated 6 November 2024	
504	SEB	2024	Power Intake Crane Operation Log Sheet dated 7 November 2024	
505	SEB	2024	Power Intake Crane Operation Log Sheet dated 8 November 2024	
506	SEB	2024	Slides – Training Logs Completion	
507	SEB	2024	Video – Training logs lift work in progress	
508	SEB	2024	Video – View Training Logs Installation Completed	
509	SEB	2024	Slides – SMArT progress update	
510	SEB	2024	GOMC MoM – Project Scheme Approval and Release of Budget for development of SMArT Aeration system for Bakun HEP	
511	SEB	2024	Request for Opening of Quotation with less than 3 Offers (SMArT Aeration system)	
512	SEB	2024	RFQ Award Paper for supply, fabrication, delivery, installation, testing and commissioning of SMArT Aeration system at Bakun HEP	
513	SEB	2024	Notification of Award for supply, fabrication, delivery, installation, testing and commissioning of SMArT Aeration system at Bakun HEP (Audit trail)	
514	SEB	2024	Notification of Award for supply, fabrication, delivery, installation, testing and commissioning of SMArT Aeration system at Bakun HEP	
515	SEB	2024	GCOO approval paper to proceed with the development and application of SMArT Aeration system for Bakun HEP	
516	SEB	2024	RIMT approval paper to proceed with the development and application of SMArT Aeration system for Bakun HEP	

517	SEB	2024	Bakun SMArT Site Assessment Report	
518	SEB	2024	Schedule for SMArT system 2024 – 2025	
519	SEB	2024	Video - SMArT system progress	
520	SEB	2024	Video - SMArT system progress	
521	SEB	2024	Desktop Walkthrough Exercise for Bakun & Murum HEP – Post Mortem Report	
522	SEB	2024	Murum-Bakun BCP Testing Report	
523	SEB	2024	GOMC MoM on Approval for DSEP document distribution to Disaster Management Committee (DMC)	
524	SEB	2024	Distribution of revised Bakun DSEP and Inundation Map for use of DMC planning Letter to Belaga District Office	
525	SEB	2024	Acknowledgement of Receipt by Belaga DO and Kapit RO	
526	SEB	2024	Distribution of revised Bakun DSEP and Inundation Map for use of DMC planning Letter to Kapit Resident Office	
527	SEB	2024	List of Agencies under DMC	
528	SEB	2024	Invitation letter to Kapit DDMC, ERP	
529	SEB	2024	Invitation letter to Belaga DDMC, ERP	
530	SEB	2024	Bridging the Gap - MBHC Workshop with External Stakeholders_Attendance List Day 1	
531	SEB	2024	Bridging the Gap - MBHC Workshop with External Stakeholders_Attendance List Day 2	
532	SEB	2024	Slide briefing on MBHC ERP Workshop	
533	SEB	2024	Revised DSEP for Bakun HEP Version 2	
534	SEB	2024	Arahan NADMA No 1	
535	SEB	2024	Emergency Preparedness Yearly Plan (2024-2026)	
536	SEB	2024	Information and Communication Distribution Chart of Disaster Management and Assistance	
537	SEB	2024	Invitation letter to NADMA to Visit Bakun HEP on 28-Apr-2025	
538	SEB	2024	District Action Committee (DAC) Belaga No.1_2023	
539	SEB	2024	GOMTC Paper No. 001/2025 – FLYING PAPER FOR NOTIFICATION – Outcome of Direct Negotiation with Chemsain Konsultant Sdn Bhd (Chemsain) for the provision of Consultancy Service to develop Indigenous People's Plan for Hydroelectric Powerplants (HEP) Project Affected Communities (Ref No. GPI/SUST/MY/2024-1236)	
540	SEB	2024	Award For Provision of Consultancy Service To Develop Indigenous People's Plan For Hydroelectric Powerplants (HEP) Project Affected Communities	
541	SEB	2024	Indigenous Peoples' Plan (IPP) Bakun HEP Inception Report 6 January 2025	
542	SEB	2024	Indigenous Peoples' Plan (IPP) Bakun HEP Inception Report (R1) 17 January 2025	
543	SEB	2024	Indigenous Peoples' Plan (IPP) Bakun HEP Inception Report (R2) 14 February 2025	
544	SEB	2024	Indigenous Peoples' Plan (IPP) Bakun HEP Preliminary Interim Report for Phase 1: Upstream Community 17 January 2025	

545	SEB	2024	Direct Negotiation Meeting for Provision of Consultancy Service to Develop Indigenous Peoples' Plan for Hydroelectric Powerplants (HEP) Project Affected Communities	
546	SEB	2024	Community Management Plan Monitoring Book Revised January 2025	
547	SEB	2024	Bakun HEP Grievance Register Log DD 10 December 2024	
548	SEB	2024	Email Screenshot on Follow Up: Memorandum of Understanding for BCMSC	
549	SEB	2024	Draft Memorandum Of Understanding In Relation To The Establishment Of The Bakun Community Management Steering Committee (BCMSC), For Comments	
550	SEB	2024	Biodiversity Management Plan (BMP) For Bakun Hydroelectric Plant (HEP)	
551	SEB	2024	Project Scheme Approval and Budget Release for the Construction of Fish Hatchery and Plant Nursery at Bakun HEP	
552	SEB	2024	Slides – GOMC Paper No: GOMC (9)/2025 Project Scheme Approval and Release for the Construction of Fish Hatchery and Plant Nursery at Bakun HEP	
553	SEB	2024	Proposal of Fish Hatchery & Plant Nursery at Bakun HEP	
554	SEB	2024	Progress Report Biodiversity (Bakun HEP) – Construction of Fish Hatchery and Plant Nursery at Bakun HEP	
555	SEB	2024	Invitation to Tender for performance of Engineering, Procurement, Construction and Commissioning (EPCC) of Bakun HEP Floating Research Laboratory Sarawak Energy Ref. No.: GPI/BAK/AF/2024-642a	
556	SEB	2024	Tender for the Engineering, Procurement, Construction and Commissioning (EPCC) of Floating Research Laboratory at Bakun HEP; Tender Documents Structure – SARAWAK ENERGY REF. NO. GPI/BAK/AF/2024-642A	
557	SEB	2024	Tender for the Engineering, Procurement, Construction and Commissioning (EPCC) of Floating Research Laboratory at Bakun HEP; Tender Documents Part I: SARAWAK ENERGY REF. NO. GPI/BAK/AF/2024-642A	
558	SEB	2024	Appendix D – Health, Safety, Security and Environment Requirements	
559	SEB	2024	Tender for the Engineering, Procurement, Construction and Commissioning (EPCC) of Floating Research Laboratory at Bakun HEP; Tender Documents Part II: SARAWAK ENERGY REF. NO. GPI/BAK/AF/2024-642A	
560	SEB	2024	Checklist Requirements: Tender for the Engineering, Procurement, Construction and Commissioning (EPCC) of Floating Research Laboratory at Bakun HEP	
561	SEB	2024	Contract Strategy for the Engineering, Procurement, Construction and Commissioning (EPCC) of Bakun HEP Floating Research Laboratory	
562	SEB	2024	Request for Extension of Closing Date for Tender for the Engineering, Procurement, Construction and Commissioning (EPCC) of Floating Research Laboratory at Bakun HEP	
563	SEB	2024	SEPRO Tender Notice for Engineering, Procurement, Construction and Commissioning (EPCC) of Bakun HEP Floating Research Laboratory	

564	SEB	2024	Slides – Tender Briefing for Engineering, Procurement, Construction and Commissioning (EPCC) of Bakun HEP Floating Research Laboratory	
565	SEB	2024	Progress Report Biodiversity (Bakun HEP) – Floating Research Laboratory at Bakun HEP	
566	SEB	2024	Slides – Graveyard Site Inspection at Upstream Bakun HEP	
567	Jabatan Muzium Sarawak	2024	Laporan: Isu Perkubuaran Di Banjiri Air Selepas Proses Penakungan Air Di Empangan Hidro Elektrik Bakun, Belaga	
568	SEB	2024	Fund Release to Belaga District Office to Pay for Penti Pemali and Associated Works for the Affected Graves Upstream of Bakun HEP	
569	SEB	2024	Minit Mesyuarat Berkenaan Kadar Penti Pemali Bagi Isu Perkuburan di Empangan Hidro Elektrik Bakun, Belaga	
570	SEB	2024	Settlement Agreement in Relation to the Bakun Hydroelectric Power Plant's Upstream Affected Graves Compensation for "penti pemali" Between Sarawak Energy Berhad and The State Government of Sarawak	
571	SEB	2024	Evidence of Fund Disbursement for Affected Graves	
572	SEB	2024	Site Assessment Report for Apau Koyan Museum	
573	Persatuan Penduduk Asal Tasik Balui Belaga, Sarawak	2024	Pemohonan Dana Bagi Projek Membina Baru Muzium Apau Koyan Di Atas Lot 1116 Block 26, Punan Land District, Penempatan Semula Bakun, Sungai Asap, Belaga, Sarawak – Lukisan Konsep Projek and Anggaran Kos Awal oleh DUAL ARCHITECTS PRACTICE SDN BHD	
574	SEB	2024	GEC Paper: Contribution To BLNA For the Construction of Lamin Paren Apau Koyan and The Supplementary Budget Approval	
575	Dual Architects Practice Sdn Bhd	2024	Projek Membina Baru Lamin Paren Apau Koyan Di Atas Lot 1116, Block 26, Punan Land District, Penempatan Semula Bakun, Sungai Asap, Belaga, Sarawak	
576	Pusat Khidmat Masyarakat DUN Murum	2024	Surat Pemohonan YB ADUN Murum Kepada YAB Timbalan Perdana Menteri: Projek Membina Baru Lamin Paren Apau Koyan Di Atas Lot 1116, Block 26, Punan Land District, Penempatan Semula Bakun, Sungai Asap, Belaga, Sarawak	
577	Persatuan Penduduk Asal Tasik Balui Belaga, Sarawak	2024	Minit Mesyuarat Exco BLNA dd 11 January 2025	
578	SEB	2024	Minit Mesyuarat Lamin Paren Apau Koyan	
579	SEB	2024	Fund Disbursement for Shop and Lamin Paren	
580	SEB	2024	Bakun ESG Committee Terms of Reference (TOR) 2024	
581	SEB	2024	Bakun ESG Dashboard Q4 2024	
582	SEB	2025	Bakun HEP ESG Minutes of Meeting for Q3, 2024	
583	SEB	2025	Bakun HEP ESG Minutes of Meeting for Q4, 2024	
584	SEB	2024	Grievance Mechanism Display for Bakun Communities	

585	SEB	2024	Bakun Reservoir Floating Debris Monitoring and Reservoir Rim Inspection – 12 September 2024	
586	SEB	2024	Bakun Reservoir Floating Debris & Standing Trees Inspection (Beyond 15km radius from Bakun Dam): Identification of Areas of Concern – 29 September 2024	
587	SEB	2024	Slides – Bakun Reservoir Floating Debris Monitoring and Reservoir Rim Inspection (Within 15km radius from Bakun Dam) – 27 October 2024	
588	SEB	2024	Bakun Reservoir Floating Debris Inspection Report (Beyond 15km radius from Bakun Dam) – 8 – 9 November 2024	
589	SEB	2024	Bakun Reservoir Floating Debris Inspection Report (Beyond 15km radius from Bakun Dam) – 8 January 2025	
590	SEB	2024	Bakun HEP Reservoir Management Plan (November 2024)	
591	SEB	2024	Contract Strategy for Annual Contract for Reservoir Biomass Removal Works at Bakun Hydroelectric Plant (HEP) (Ref. No.: GPI/HDDM-DS/MY/2025-005)	
592	SEB	2024	SEPRO Tender Publication for Floating Debris	
593	SEB	2024	Slides – Timeline for Floating Debris Procurement Process	

Appendix 3 - Photographs

		
Photo 1: Downstream face of the dam and spillway, viewed from the operator's residence	Photo 2: View of the reservoir from the crest of the dam	Photo 3: The powerhouse and immediate downstream reiver, viewed from the crest of the dam
		
Photo 4: Powerhouse tailrace	Photo 5: Fuel storage on site	Photo 6: Warehouse storage

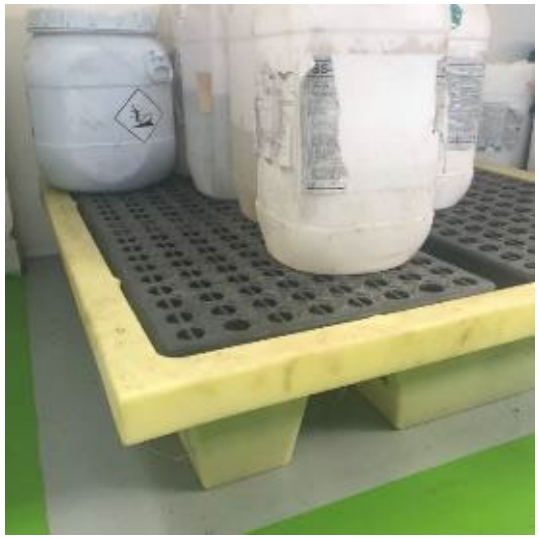
		
Photo 7: Signage at the chemical storage warehouse	Photo 8: Compressed gas canisters stored safely at the warehouse	Photo 9: Materials stored on pallets to prevent ground contamination at the warehouse
		
Photo 10: Waste oils stored on pallets to prevent ground contamination at the chemical storage warehouse	Photo 11: Spill response kit at the chemical storage warehouse	Photo 12: Chemicals stored on trays to avoid spillage

Photo 13: Drainage around buildings at the Bakun HEP

Photo 14: Centre for the collection of recyclable wastes

Photo 15: Machine for composting of organic wastes

Photo 16: Fuel storage with bunding at Bakun HEP

Photo 17: Signage indicating category of hazardous wastes at warehouse

Photo 18: HSSE culture signage at Bakun HEP

Photo 19: View of turbine hall within the powerhouse

Photo 20: Tidy storage of equipment and materials during works, turbine hall

Photo 21: Occupational Safety and Health Policy and Environmental Policy on display at the powerhouse

Photo 22: Sign at the powerhouse promoting safety and HSSE excellence

Photo 23: 5S corner at Bakun HEP - 'sort', 'set in order', 'shine', 'standardize', 'sustain'

Photo 24: Covered areas for major equipment at Bakun HEP

Photo 25: Health, Safety and Environment (HSE) corner at the powerhouse

Photo 26: Safety signage on SEB boat

Photo 27: Sarawak Energy life-saving rules displayed at Bakun HEP entrance

Photo 28: SEB policy statements and certificates on display at Bakun HEP

Photo 29: Worker, PPE, safety signage, safety shower at Bakun HEP warehouse

Photo 30: Signage about the Bakun HEP crisis management team

Photo 31: Signage for Bakun HEP staff for an emergency assembly point

Photo 32: Staff continuous feedback signage with method at Bakun HEP

Photo 33: Temperature-controlled storage areas at Bakun HEP

Photo 34: Some of the ”training logs” for water quality management at Bakun Dam

Photo 35: Gantry for positioning of the ”training logs“ at Bakun Dam

Photo 36: Transmission towers near Bakun Dam showing gold-colouration from hydrogen sulphide coatings

Photo 37: Small-scale reservoir shoreline erosion

Photo 38: Logging camp reservoir shoreline access

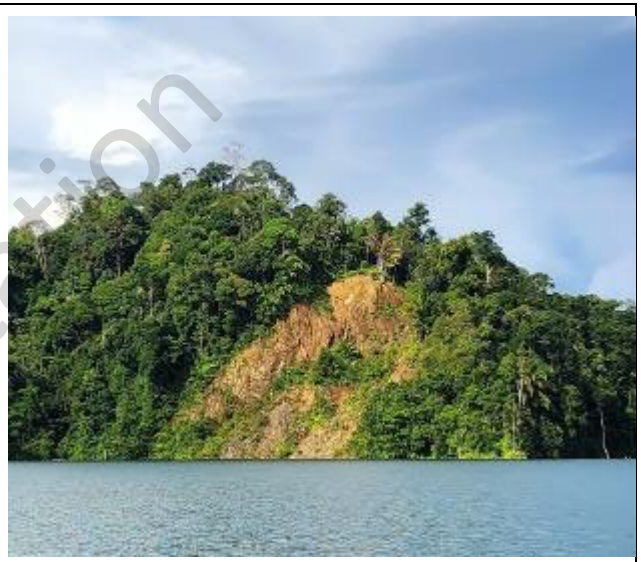


Photo 39: Localised Bakun Reservoir shoreline erosion

Photo 40: Example of infrequent and very small-scale downstream riverbank erosion

Photo 41: Longhouse at Long Amo, downstream of Bakun

Photo 42: Flood damage at the base of the Longhouse at Long Amo, downstream of Bakun

		
Photo 43: Damage at Long Amo longhouse downstream of Bakun	Photo 44: Settlement downstream of Bakun dam	Photo 45: Bridge at Punan Bah, also used as the flood alert level during controlled releases
		
Photo 46: A barn for rearing swiflets (for harvesting nests for bird's nest soup), a widespread economic activity downstream of Bakun	Photo 47: Jetty at Punan Bah	Photo 48: Public jetty at Bakun reservoir, used by communities to sell their catch and local produce on Saturdays

		
Photo 49: Pathway at Long Kabuho, on reservoir shoreline, and Community Center on right	Photo 50: Example of a house at Long Kabuho built by the government	Photo 51: Floating village at Naha Jaley Balui Labuei
		
Photo 52: Naha Jaley Balui Labuei	Photo 53: Privately-owned floating hotel	Photo 54: Privately owned floating hotel

Photo 55: Bakun Clinic

Photo 56: OPD, Bakun Clinic

Photo 57: Interior of Sungai Asap clinic

Photo 58: Posters on Rabies outbreak at Bakun HEP

Photo 59: Awareness poster for COIVD-19 prevention at Bakun HEP entrance

Photo 60: Health Alert at Bakun HEP entrance

Photo 61: Health awareness posters at Bakun HEP

Photo 62: Water filtration system at Punan Bah

Photo 63: Poster announcing health campaign day at Uma Sambop

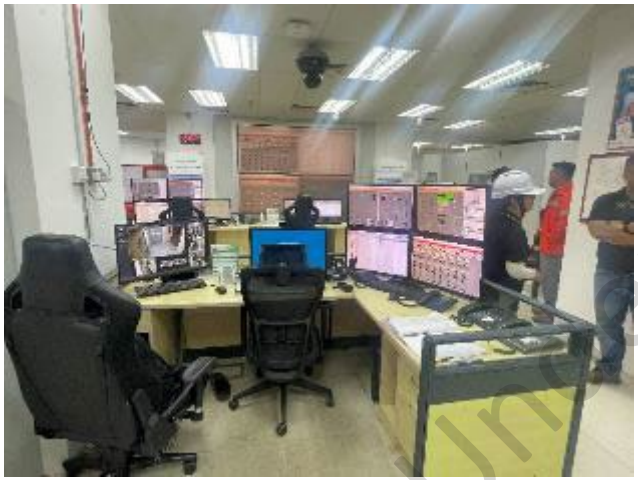


Photo 64: Bakun HEP Control room

Photo 65: Spillway

Photo 66: Spillway radial gate

Photo 67: Air filtration equipment at Bakun powerhouse

Photo 68: Corrosion on the streetlamp pole due to H_2S

Photo 69: Protective coating of electronic equipments

Photo 70: Seclusion of important equipment at Bakun powerhouse

Photo 71: Bakun left abutment

Photo 72: Upstream emergency siren

Photo 73: Switchyard

Photo 74: Uma Nyaving longhouse, Sungai Asap

Photo 75: Sungai Asap secondary school

Photo 76: Sungai Asap secondary school

Photo 77: Uma Baha church, Sungai Asap

Photo 78: Uma Baha longhouse, Sungai Asap

Photo 79: Uma Sambop longhouse (host community), Sungai Asap

Photo 80: Bakun Islands National Park at public jetty

Photo 81: Island as part of the Bakun Islands National Park, with Hose Mountain National Park in the background

Photo 82: Bakun Reservoir birdlife, on standing trees

Photo 83: Evidence of wildlife hunting and sale at Bakun reservoir public jetty weekly market

Photo 84: Typical example of uniformly dense vegetation growth on reservoir shoreline

Photo 85: Fish for sale at weekly market at Bakun reservoir public jetty

Photo 86: Signage on wildlife protection at Bakun reservoir public jetty

Photo 87: SEB R&D team members with camera trap for biodiversity monitoring around the Bakun reservoir

Photo 88: Traditional costumery, Uma Nyaving, Sungai Asap

Photo 89: Traditional musical instrument (sapé) on display at Uma Nyaving longhouse, Sungai Asap

Photo 90: Carved entrance and Tiang Belawing (on right), Uma Baha, Sungai Asap

		
Photo 91: Traditional costumery, Penan Talun longhouse, Sungai Asap	Photo 92: Interior verandah, PenanTalun longhouse, Sungai Asap	Photo 93: Church, Penan Talun, Sungai Asap
		
Photo 94: Traditional arch at entrance to Penan Talun, Sungai Asap	Photo 95: Wildlife trophies on display at Sekapan Piet, downstream of Bakun	Photo 96: Weaving underway, at Sekapan Piet, downstream of Bakun

Photo 97: Trophies for boating regattas, displayed at Sekapan Piet, downstream of Bakun

Photo 98: Traditional costumery, displayed at Long Amo, downstream of Bakun

Photo 99: Tiang Belawing at Punan Bah, downstream of Belaga

Photo 100: Tiang Belawing at Punan Bah, downstream of Belaga

Photo 101: Traditional basketry, Punan Bah, downstream of Belaga

Photo 102: Mat woven from plastic at Punan Bah, downstream of Belaga

Photo 103: Fish net weaving, on show at a Do Ledoh (harvest festival) near Belaga

Photo 104: Traditional hats, on show at a Do Ledoh (harvest festival) near Belaga

Photo 105: Traditional costumery, on show at a Do Ledoh (harvest festival) near Belaga

Photo 106: Traditional musical group, performing at Do Ledoh (harvest festival) held at Bakun HEP during this assessment

Photo 107: Traditional dancers, performing at Do Ledoh (harvest festival) held at Bakun HEP during this assessment

Photo 108: Hunting trophy, Long Kabuho, on the reservoir shoreline

Photo 109: Grievance mechanism on display at Bakun HEP entrance

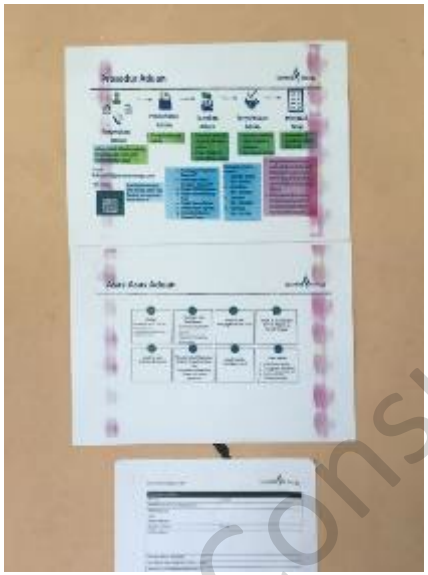


Photo 110: Grievance mechanism on display at Uma Nyaving longhouse, Sungai Asap

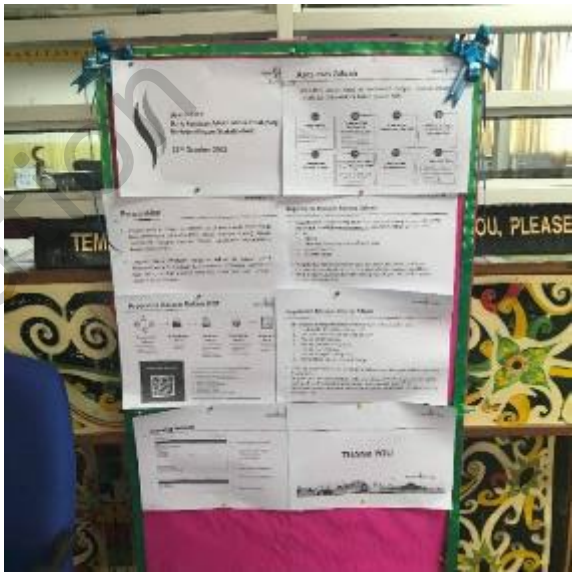


Photo 111: Grievance mechanism on display at Belaga District Office

Photo 112: Grievance mechanism on display at Bakun reservoir jetty

Photo 113: Signage for Bakun HEP staff about protected species

Photo 114: Bakun Islands National Park signage – fully protected areas

Photo 115: Bakun reservoir upstream longhouse jetty and boats

Photo 116: SRB patrol boat

Photo 117: Examples of Bakun Reservoir shoreline development

Photo 118: Bakun reservoir shoreline development

Photo 119: Collapsed shoreline development, visible from Bakun reservoir jetty

Photo 120: Signage at Bakun reservoir public jetty against littering

Photo 121: Littering at Bakun reservoir public jetty

Photo 122: Bakun reservoir floating logs

Photo 123: Bakun Reservoir public jetty

Photo 124: Bakun reservoir dense shoreline vegetation

Photo 125: Bakun reservoir signage for boaters

Photo 126: Bakun reservoir shoreline development

Photo 127: Weather station at Punan Bah

Photo 128: Weather station at Bakun

Photo 129: Weather station at Bakun

Photo 130: DID weather station at Bakun

Photo 131: Occasional sighting of localised erosion on the Bakun Reservoir shoreline

Photo 132: Notice warning of melioidosis and leptospirosis

		
Photo 133: Downstream of Bakun Dam showing densely vegetated riparian zone	Photo 134: Temporary makeshift jetty at Kejaman Lasah	Photo 135: Turbid river water in downstream river
		
Photo 136: Downstream of Bakun Dam showing turbid water quality		